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1987年7月のアリューシャン列島南側水域における  
ベニザケ未成熟魚の豊度及び生物学的情報

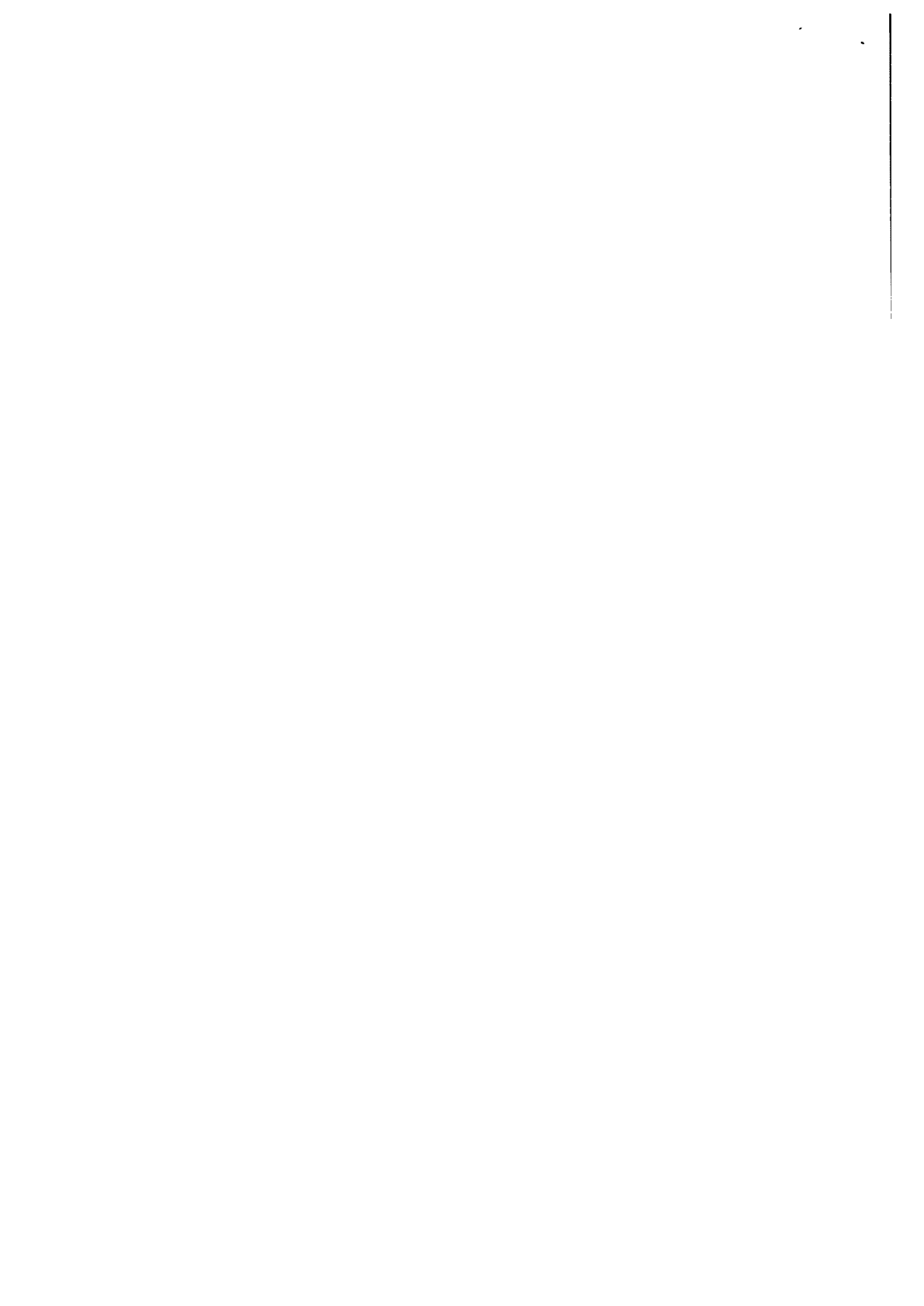
**Abundance and biological information of  
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# 1987年7月のアリューシャン列島南側水域における ベニザケ未成熟魚の豊度及び生物学的情報

## Abundance and biological information of immature sockeye salmon in waters south of Aleutian Islands in July, 1987

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筆者等は、1972～86年(6月28日～8月10日)の期間、経度175°E～175°W及び緯度50°Nによって囲まれた水域(またはその隣接水域を含む)において、日本のさけ・ます調査船が10種目合構成調査用流網によって採集したベニザケ未成熟魚に関する情報を提供してきた(高木・伊藤1980, 1981, 1982, 1983, 1984, 1985, 1986, )。本報告は、これまでの報告に引続いて1987年に得られた新しい情報の提供を目的とする。

図1は、1987年7月のアリューシャン列島南側水域における調査操業位置を示す。従来は、一般的な分布及び豊度を調べるためのグリッド定点調査の中から上記の水域、時期に該当する部分を抜き出して扱ってきた。しかし1987年には、1隻の調査船北辰丸が調査水域を7月7日から7月12日にかけて東から西へ移動しながら1定点1回ずつ、また他の1隻の調査船新りあす丸が同一調査水域を7月13日から7月23日にかけて東から西へ移動しながら、それぞれ一定点2回ずつの流網調査操業を実施した。

表1は、1987年に得られたこれらの調査操業点ごとの揚網月日、投網位置、使用反数、サケ科魚種別漁獲尾数及び表面水温を示す。研究水域における合計16回の調査操業による漁獲物の魚種組成をみると、第1位は昨年に引続きシロザケ(44.4%)であり第2位はカラフトマス(29.8%)であった。1972～1985年まで魚種組成の上で毎年第1位を占めてきたベニザケは今年は第3位(20.7%)であった。他の魚種(合計5.1%)は極めて少なかった。16回の調査操業時における平均表面水温は7.8°Cであった。

調査用流網による漁獲物は、原則として全数の個体が測定され、魚種、尾叉長、体重、性別、生殖腺重量が記録され、鱗が採集された。ベニザケの未成熟魚・成熟魚の判別は、高木(1961)の方法に準じて生殖腺重量に基づいた。年令表示法はKOO(1962)に従い、また年令査定が不能の場合はXを付して表わした。例えば、X.2は淡水年令不明、海洋満年令2年であることを示す。調査点ごとのベニザケ未成熟魚割合(%)を求める際、年令X、Xの個体を含めて、測定されたすべての生殖腺重量を用いた。年令が既知で生殖腺重量が不明な魚は、それらを該当する各年令内の未成熟

魚割合に応じて比例配分した。

調査点ごとのベニザケ未成熟魚の年令別CPUEは、ベニザケ全体のCPUEを成熟度別、年令別、海洋年令グループ別の尾数に応じて比例配分して求めた(表2)。このため年令別の値と合計値が一致しない場合がある。時期・水域内全体CPUEは、調査点ごとの値に基づきそれらを算術平均して求めた。1987年にこの時期・水域内において漁獲されたベニザケの未成熟魚割合は、平均92.0%であった。

図2に1987年に得られた海洋年令別ベニザケ未成熟魚のCPUEを、 $1^{\circ} \times 1^{\circ}$ 区画の地理的位置関係に従って調査点ごとに図示した。図中の数値は、各調査点の揚網月日を示す。過去の調査結果によれば、研究水域内の調査点間において海洋年令組成の差がみられる年があった。例えば1980年及び1981年の調査結果は、研究水域南西部において海洋1年未成魚が卓越するという顕著な特徴を示した。1987年の海洋年令組成にはそのような水域間における顕著な差はみられなかった。1987年調査にみられた顕著な特徴は、同じ水域において行われた北辰丸(7月7~12日)と新りあす丸(7月13~23日)調査結果の差異である。すなわち早い時期に行われた北辰丸調査航海においては海洋2年魚が殆ど出現せず海洋1年魚の出現が認められた(8050, E7950及びE7750)のと同様に、それより1週間前後遅く行われた新りあす丸調査航海においては、同じ水域( $50^{\circ} \sim 51^{\circ} \text{N}$ ,  $175^{\circ} \text{E} \sim 175^{\circ} \text{W}$ )でありながらも海洋1年魚が殆んど認められず海洋2年魚の出現が明瞭に認められ、対象魚群が入れ替ったことを示した。調査期間中の前半に比べて後半の方が海洋2年魚が卓越した傾向はE7751においても同様に認められた。

1987年の研究水域調査によって得られたベニザケ未成熟魚の海洋年令組成は、1年魚20.9%及び2年魚73.1%であった。1サイクル前の1982年未成熟魚調査の場合は1年魚48.7%及び2年魚46.4%であった。

図3に、この調査において漁獲したベニザケ未成熟魚の尾又長頻度分布を全域及び時期別・ $1^{\circ} \times 1^{\circ}$ 区画別にまとめて図示した。調査時期の早いものから遅いものへ $1^{\circ} \times 1^{\circ}$ 区画別に上から下へ配列した。全域合計の海洋年令別尾又長組成によると、1987年の海洋1年魚の体長範囲は27~38cmであり組成のモードは34cmであった。また1987年の海洋2年魚の体長範囲は41~58cmであり組成のモードは48cmであった。表5は、この研究水域における1972~1987年の各年の平均尾又長を示す。1987年における海洋1年魚の平均尾又長33.96は1980~1987年8年間の平均(33.82)に近い値であった。同様に海洋2年魚についても1987年の平均値47.98は、この8年間の平均(48.10)に近似していた。

1987年7月7~23日の期間に、 $50^{\circ} \sim 52^{\circ} \text{N}$ ,  $175^{\circ} \text{E} \sim 175^{\circ} \text{W}$ の水域内において調査用流網によって漁獲された魚の資料に基づいて、前報までと同じく、ベニザケ未成熟魚の海洋年令別CPUEを求めた。1987年に得られた算術平均CPUEは、海洋1年魚0.14及び海洋2年魚0.49であった。

現在利用し得る資料の範囲内で、未成熟魚CPUEとブリストル湾沿岸来遊量との間の直線回帰式を求めると、海洋1年未成熟魚( $X_1$ )と翌年の海洋2年沿岸来遊量( $Y_1$ )の場合は、 $Y_1 = 3.98 +$

15.54  $X_1$ , 相関係数 0.66 であり, 海洋 2 年未成熟魚 ( $X_2$ ) と翌年の海洋 3 年沿岸来遊量 ( $Y_2$ ) の場合は,  $Y_2 = 5.39 + 3.11 X_2$ , 相関係数 0.63 であった。

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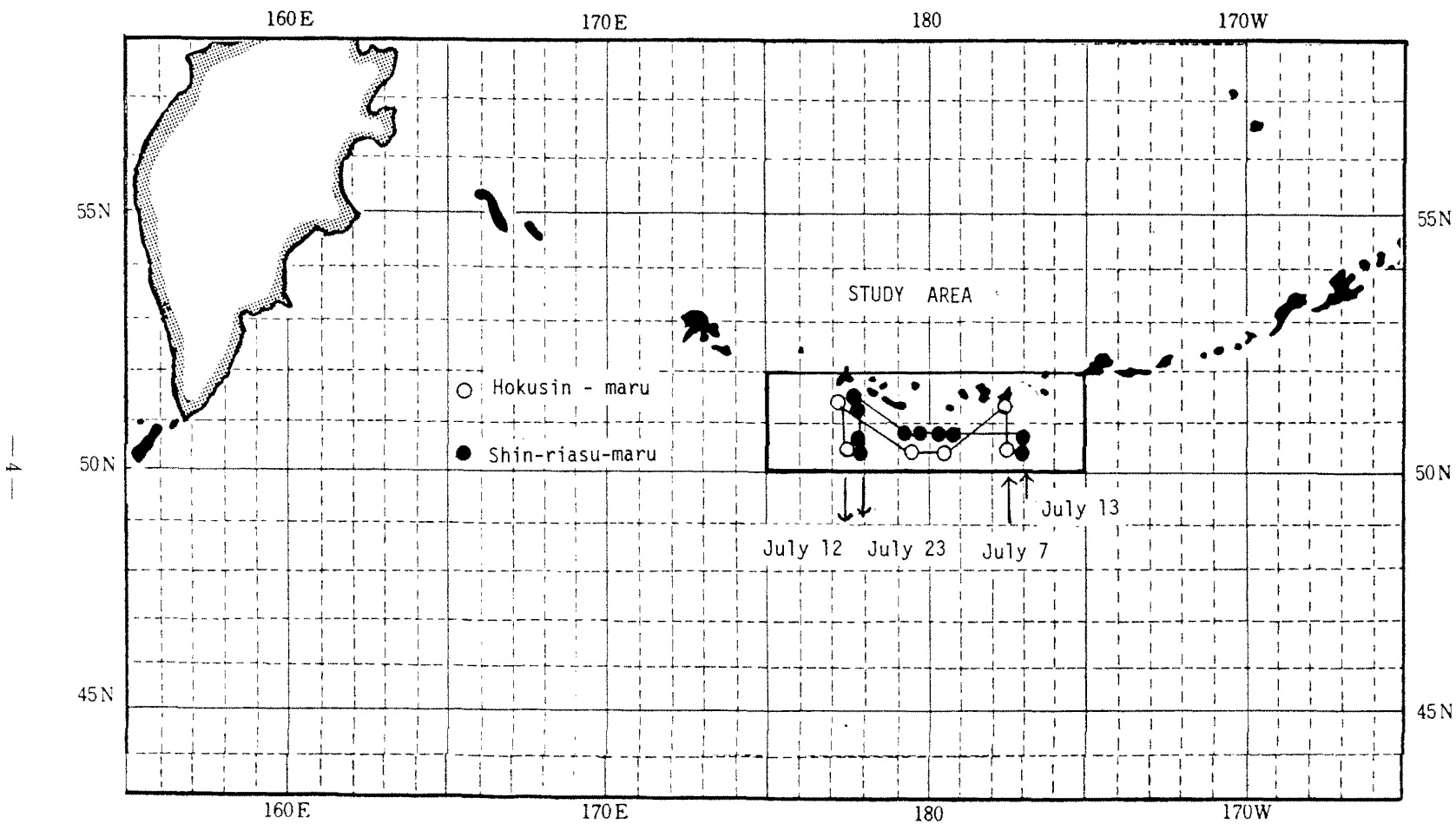


Figure 1. 1987 summer sampling stations of Japanese salmon research vessels in Aleutian waters.

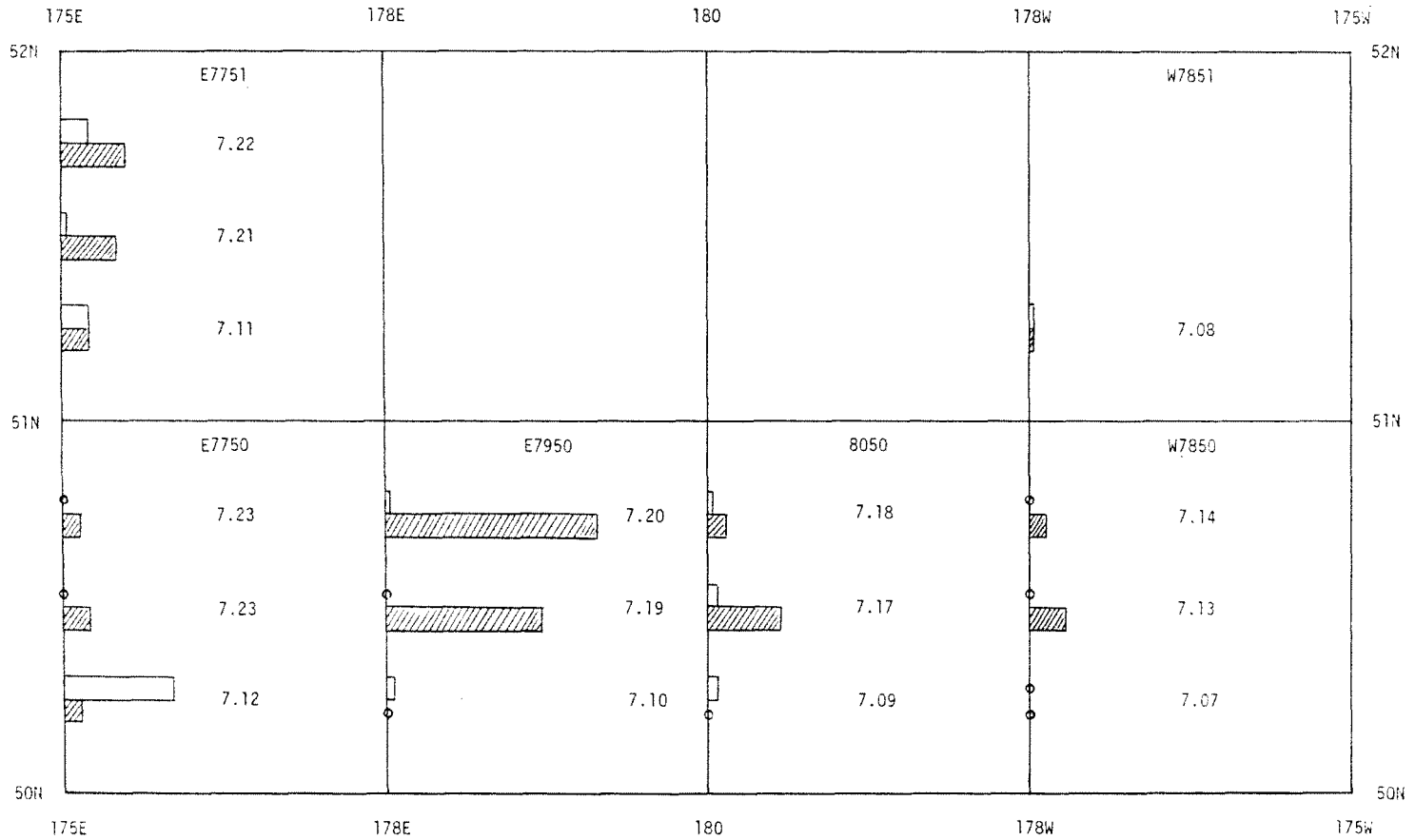
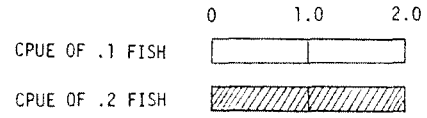


Figure 2. CPUE distribution of immature sockeye salmon by ocean-age, by set and by 1° x 1° area, 1987.

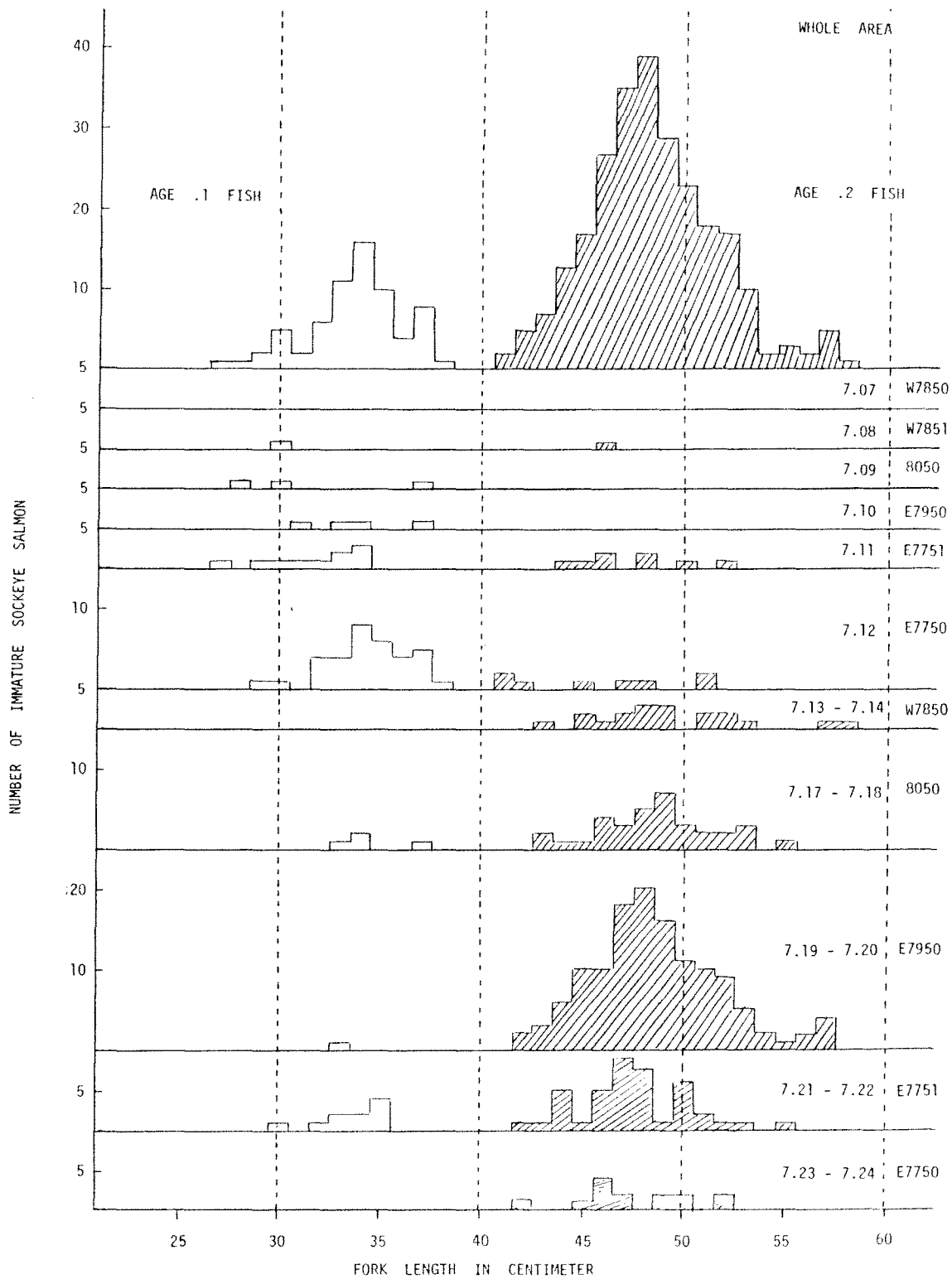


Figure 3. Frequency distribution of fork length of .1 and .2 immature sockeye salmon caught by Japanese research gillnets in each 1°x 1° area and whole area during July 7 - 23, 1987.



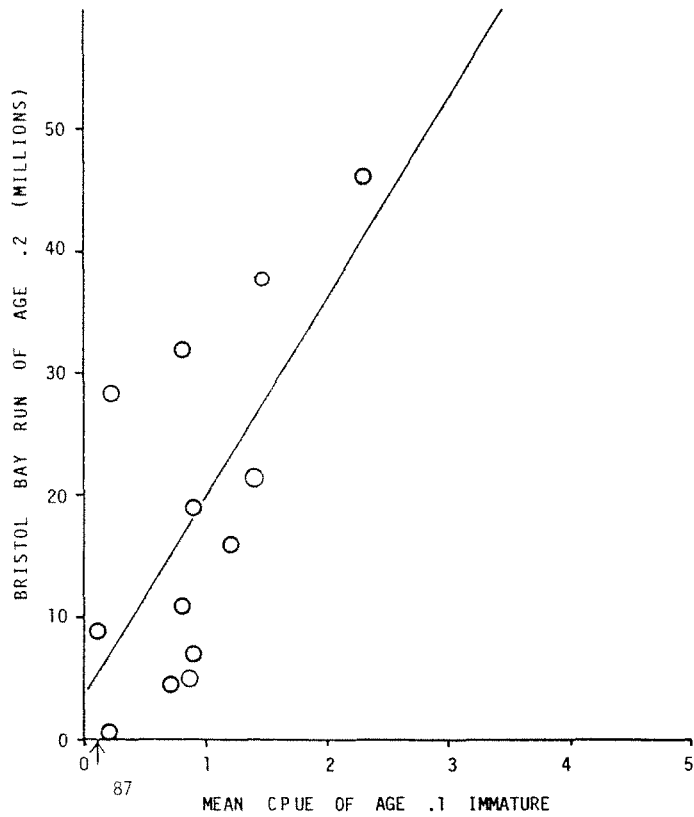


Fig. 4 Relationship between mean CPUE of age .1 immature sockeye salmon in Aleutian waters and number (millions) of age .2 fish of Bristol Bay inshore run in the next year.

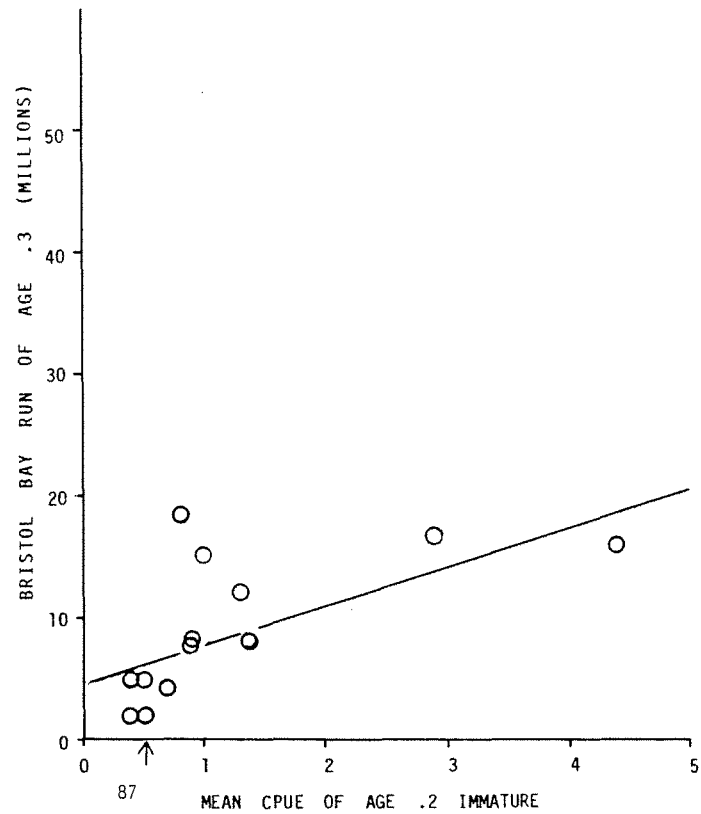


Fig. 5 Relationship between mean CPUE of age .2 immature sockeye salmon in Aleutian waters and number (millions) of age .3 fish of Bristol Bay inshore run in the next year.

TABLE 1. Fishing stations and number of salmonid caught by Japanese research gillnets in Aleutian waters (175°E - 175°W) during July 7 and July 23, 1987.

Year	Series No.	Operation No.	Date	Fishing station		Tan	Number of salmonid caught					Total	Surface temperature	
				Latitude	Longitude		Sockeye	Chum	Pink	Coho	Chinook			Steelhead
1987	1	0036	7. 7	50-47N	177-36W	30	0	33	43	0	0	0	76	6.9 °C
	2	0037	7. 8	51-13N	177-41W	30	2	56	62	0	0	0	120	7.0
	3	0038	7. 9	50-46N	179-37W	30	3	79	31	1	1	0	115	7.3
	4	0039	7.10	50-48N	179-15E	30	4	103	82	3	1	0	193	7.7
	5	0040	7.11	51-16N	177-21E	30	19	55	92	3	0	0	169	8.1
	6	0041	7.12	50-48N	177-29E	30	43	30	65	8	0	0	146	8.0
	7	0447	7.13	50-32N	177-30W	30	12	98	18	3	0	0	131	8.9
	8	0448	7.14	50-32N	177-30W	30	7	67	7	2	0	0	83	8.3
	9	0449	7.17	50-30N	179-30W	30	29	52	9	3	0	1	94	7.6
	10	0450	7.18	50-30N	179-30W	30	9	38	4	4	0	0	55	8.2
	11	0451	7.19	50-28N	179-23E	30	56	10	6	3	0	0	75	7.2
	12	0452	7.20	50-28N	179-23E	30	74	5	7	7	1	0	94	8.0
	13	0453	7.21	51-31N	177-24E	30	23	37	23	6	0	0	89	7.9
	14	0454	7.22	51-31N	177-24E	30	32	18	20	3	0	0	73	7.7
	15	0455	7.23	50-30N	177-30E	30	10	17	3	23	0	0	53	7.8
	16	0456	7.23	50-30N	177-30E	30	5	6	1	6	1	1	20	8.0
Total						480	328	704	473	75	4	2	1,586	7.8

TABLE 2. CPUE of immature sockeye salmon by age class, 1987.

Year	Operation No.	Percentage of immature	CPUE of immature	.1 immature fish					.2 immature fish					.3 immature fish				
				0.1	1.1	2.1	X.1	Subtotal	1.2	2.2	3.2	X.2	Subtotal	1.3	2.3	X.3	Subtotal	
1987	0036		0					0										0
	0037	100.0	0.07		0.03			0.03		0.03								0
	0038	100.0	0.10		0.10			0.10										0
	0039	100.0	0.13		0.10	0.03		0.13										0
	0040	94.7	0.60	0.03	0.20	0.03	0.07	0.33	0.17	0.10								0
	0041	97.7	1.40		0.57	0.57	0.03	1.17	0.07	0.07		0.10						0
	0447	100.0	0.40					0	0.32	0.04						0.36	0.04	0.04
	0448	100.0	0.23					0	0.08	0.15								0
	0449	100.0	0.97		0.04	0.04		0.07	0.54	0.22		0.04			0.79	0.11		0.11
	0450	100.0	0.30			0.04		0.04	0.19	0.04					0.23	0.04		0.04
	0451	100.0	1.87					0	0.99	0.53	0.07	0.07			1.66	0.14	0.07	0.21
	0452	100.0	2.47		0.04			0.04	1.83	0.39	0.04				2.26	0.14	0.04	0.18
	0453	91.3	0.70		0.04			0.04	0.37	0.18		0.07			0.63	0.04		0.04
	0454	96.9	1.03		0.18	0.11	0.04	0.32	0.60	0.11					0.71			0
	0455	90.9	0.30					0	0.27		0.03				0.30			0
	0456	100.0	0.17					0	0.10	0.03	0.03				0.17			0
Arithmetic mean		92.0	0.67	+	0.08	0.05	0.01	0.14	0.35	0.12	0.01	0.02		0.49	0.03	+	+	0.04

TABLE 3. Relationship between mean CPUE of immature sockeye salmon in central Aleutian waters and inshore run size of Bristol Bay sockeye salmon in the next year

Year	Area	No. of set	CPUE ( fish per tan ) and number ( thousands ) of fish of inshore run																						
			1.0 1.1	2.0 2.1	3.0 3.1	Subtot Subtot	0.1 0.2	1.1 1.2	2.1 2.2	3.1 3.2	X.1 X.2	Subtotal	0.2 0.3	1.2 1.3	2.2 2.3	3.2 3.3	X.2 X.3	Subtotal	0.3 0.4	1.3 1.4	2.3 2.4	3.3 3.4	X.3 X.4	Subtotal	Total
1972	Aleutian	10	-	-	-	-	-	0.08	0.11	+ 0.01	0.21	0.01	0.12	0.25	0.02	0.06	0.46	+ 0.01	0.01	-	-	0.02	0.69		
1973	Bristol	4	12	-	16	1	218	214	1	-	433	86	1,010	859	8	-	1,963	6	6	2	-	-	14	2,425	
1973	Aleutian	6	-	-	-	-	0.01	0.03	0.06	0.01	0.02	0.12	0.01	0.19	0.16	0.01	0.01	0.36	-	-	0.01	-	0.01	0.50	
1974	Bristol	3	60	-	63	4	2,014	6,805	5	-	8,828	10	1,392	621	2	-	2,025	5	19	2	-	-	26	10,940	
1974	Aleutian	12	-	-	-	-	0.01	0.22	0.55	0.01	0.09	0.87	0.01	0.14	0.18	0.01	0.03	0.36	-	+	+	-	-	0.01	1.24
1975	Bristol	5	44	6	55	3	1,552	17,223	294	-	19,072	39	2,259	2,749	10	-	5,057	-	18	4	-	-	22	24,204	
1975	Aleutian	10	-	-	-	-	+	0.11	0.55	0.03	0.16	0.86	0.01	0.22	0.30	+ 0.11	0.66	-	+	-	-	-	+	1.52	
1976	Bristol	1	6	-	6	2	1,554	5,256	477	-	7,288	52	2,550	1,468	113	-	4,102	-	4	2	-	-	6	11,403	
1976	Aleutian	6	-	-	-	-	-	0.15	0.50	0.02	0.05	0.72	0.01	0.14	0.37	-	0.54	-	-	0.01	-	-	0.01	1.27	
1977	Bristol	17	5	-	22	2	1,587	2,009	67	-	4,465	62	1,756	3,130	29	-	4,977	6	3	1	-	-	10	9,474	
1977	Aleutian	11	-	-	-	-	0.01	0.49	0.25	0.01	0.08	0.84	0.01	0.61	0.24	-	0.92	+ 0.01	0.01	-	-	+	0.03	1.79	
1978	Bristol	51	330	-	381	19	9,892	1,354	45	-	11,310	25	5,478	2,236	55	-	7,794	4	153	9	1	-	167	19,653	
1978	Aleutian	11	-	-	-	-	0.01	0.21	0.52	0.02	0.05	0.82	0.04	0.44	0.38	0.01	0.08	0.94	-	+	0.01	-	-	0.01	1.76
1979	Bristol	40	320	-	360	7	11,176	21,227	73	-	32,483	37	5,303	2,261	28	-	7,629	-	15	-	-	-	15	40,487	
1979	Aleutian	12	-	-	-	-	0.02	0.93	1.19	0.04	0.16	2.34	0.04	3.35	0.75	0.01	0.23	4.38	0.01	0.02	0.02	-	0.02	0.06	6.78
1980	Bristol	71	170	2	243	8	12,021	34,129	80	-	46,238	48	13,525	2,199	4	-	15,777	-	19	-	-	-	19	62,276	
1980	Aleutian	11	-	-	-	-	-	0.45	0.64	0.03	0.05	1.18	+	0.32	0.38	0.04	0.03	0.77	-	0.03	0.01	-	0.01	0.04	2.00
1981	Bristol	2	4	-	5	-	5,674	10,242	20	-	15,935	50	13,871	4,542	12	-	18,475	+	10	1	-	-	11	34,426	
1981	Aleutian	16	-	-	-	-	0.01	0.37	0.38	0.01	0.09	0.86	+	1.90	0.86	0.01	0.16	2.93	-	0.04	-	-	0.01	0.05	3.84
1982	Bristol	80	28	-	108	2	3,959	1,139	-	-	5,101	17	13,267	3,551	-	-	16,836	1	159	17	-	-	177	22,222	
1982	Aleutian	16	-	-	-	-	-	0.72	0.67	0.02	0.07	1.48	0.01	1.01	0.26	+ 0.12	1.41	-	0.12	0.02	-	0.01	0.15	3.04	
1983	Bristol	8	93	-	101	2	27,430	9,397	57	-	36,886	11	6,041	1,253	4	-	8,109	+	295	25	-	-	320	45,416	
1983	Aleutian	12	-	-	-	-	-	0.05	0.14	0.02	0.02	0.23	-	0.77	0.42	0.01	0.09	1.30	-	0.02	0.01	-	+	0.03	1.56
1984	Bristol	6	92	-	98	+	6,154	22,232	26	-	28,412	31	7,930	4,198	22	-	12,180	3	25	1	-	-	29	40,719	
1984	Aleutian	12	-	-	-	-	-	0.42	0.92	-	0.08	1.44	-	0.61	0.34	0.01	0.05	1.02	-	0.02	0.01	-	0.01	0.04	2.50
1985	Bristol	11	73	-	84	26	4,657	16,690	3	-	21,376	24	9,185	5,763	8	-	14,980	-	28	4	-	-	32	36,576	
1985	Aleutian	12	-	-	-	-	-	0.45	0.34	0.01	0.02	0.82	-	0.29	0.08	-	0.39	-	0.01	0.02	-	-	0.03	1.24	
1986	Bristol	6	14	-	20	-	2,959	7,022	10	-	9,991	23	10,275	3,108	2	-	13,408	-	45	6	-	-	51	23,653	
1986	Aleutian	18	-	-	-	-	-	0.19	0.12	+ 0.02	0.33	+	0.53	0.22	-	0.03	0.78	-	0.01	0.01	-	-	0.01	1.12	
1987	Bristol																								
1987	Aleutian	16	-	-	-	-	+	0.08	0.05	-	0.01	0.14	-	0.35	0.12	0.01	0.02	0.49	-	0.03	+	-	+	0.04	0.76
1988	Bristol																								

TABLE 4. 1987 length statistics of .1 and .2 immature sockeye salmon in Aleutian waters.

Operation Date	1.1 fish			2.1 fish			.1 subtotal			1.2 fish			2.2 fish			.2 subtotal			
	No.	Mean	S.E.	No.	Mean	S.E.	No.	Mean	S.E.	No.	Mean	S.E.	No.	Mean	S.E.	No.	Mean	S.E.	
0036	7.07																		
0037	7.08	1	303.0	-	0	-	-	1	303.0	-	0	-	-	1	462.0	-	1	462.0	-
0038	7.09																		
0039	7.10	6	320.7	31.3	1	371.0	-	7	333.3	35.2	0	-	-	0	-	-	0	-	-
0040	7.11																		
0041	7.12	23	333.7	16.6	18	352.7	25.1	41	342.3	22.6	6	462.4	30.7	5	498.0	31.5	11	480.2	35.2
0447	7.13																		
0448	7.14	0	-	-	0	-	-	0	-	-	10	486.7	29.2	5	481.2	32.7	15	484.9	29.3
0449	7.17																		
0450	7.18	1	341.0	-	2	352.0	31.1	3	346.5	19.1	20	474.5	25.2	7	492.3	25.7	27	479.1	26.1
0451	7.19																		
0452	7.20	1	329.0	-	0	-	-	1	329.0	-	80	477.2	30.5	26	494.9	27.9	106	481.6	30.7
0453	7.21																		
0454	7.22	6	333.2	21.0	3	339.7	8.5	9	335.3	17.4	27	468.5	25.1	8	489.9	25.2	35	473.4	26.4
0455	7.23																		
0456	7.23	0	-	-	0	-	-	0	-	-	11	476.8	21.1	1	485.0	-	12	478.1	19.5
Total		38	330.8	20.9	24	351.8	24.4	62	339.6	24.0	154	475.3	28.7	53	491.7	28.2	207	479.8	29.2



APPENDIX TABLE

1986 Table 55 - 3 Length statistics of immature sockeye salmon by age and by sex, 1986

1986 Table 55 - 4 Weight statistics of immature sockeye salmon by age and by sex, 1986





YEAR	O P N O	SEX	ITEM	CAUGHT IN JAPANESE C NET				III ALUTIAN WATER DURING LATE JUNE AND EARLY AUGUST							
				OCEAN 1.1	AGE 2.1	X.1	SUB TOTAL	OCEAN 1.2	AGE 2.2	X.2	SUB TOTAL	OCEAN 1.3	AGE 2.3	X.3	SUB TOTAL
1986	0118	MALE	AV FL	285.9	314.1	281.6	294.2	478.1	477.6	503.0	479.5	620.0	566.0	-	612.6
			SE FL	18.2	13.9	12.2	21.1	55.7	60.7	7.0	56.4	37.4	-	-	36.7
			NO FL	26	14	5	45	18	11	2	31	6	1	-	7
		FEMALE	AV FL	286.4	305.7	304.4	293.7	445.3	491.3	477.0	465.3	532.7	576.0	-	543.5
			SE FL	15.7	11.1	25.2	20.1	44.6	50.3	45.0	51.1	44.4	-	-	43.1
			NO FL	17	6	5	28	9	6	2	17	3	1	-	4
		COMB- INED	AV FL	286.1	311.6	293.0	294.0	467.2	482.5	490.0	474.5	590.9	572.0	-	567.5
			SE FL	17.2	13.2	22.8	20.8	54.2	57.1	34.7	54.8	57.3	4.0	-	52.6
			NO FL	43	20	10	73	27	17	4	48	9	2	-	11
1986	0119	MALE	AV FL	283.7	313.7	283.7	289.9	478.3	516.9	-	468.3	-	647.0	-	647.0
			SE FL	10.7	23.9	19.3	19.7	42.3	21.7	-	41.7	-	25.0	-	25.0
			NO FL	21	7	6	34	20	7	-	27	-	2	-	2
		FEMALE	AV FL	276.9	312.7	279.0	283.6	456.3	511.3	460.0	470.3	577.5	-	520.0	568.0
			SE FL	10.6	27.0	9.8	19.0	30.4	41.5	-	40.7	26.6	-	-	32.4
			NO FL	9	3	6	18	8	3	1	12	5	-	1	6
		COMB- INED	AV FL	281.7	313.4	281.3	287.7	472.0	515.2	460.0	482.8	577.5	647.0	520.0	567.6
			SE FL	10.1	24.9	16.4	20.0	40.6	29.5	-	41.6	26.5	25.0	-	46.3
			NO FL	30	10	12	52	28	10	1	39	5	2	1	6
1986	0120	MALE	AV FL	276.4	310.7	296.2	290.1	490.5	548.0	-	522.4	-	-	-	-
			SE FL	11.3	26.3	24.6	24.6	33.2	55.8	-	55.5	-	-	-	-
			NO FL	13	6	9	28	4	5	-	9	-	-	-	-
		FEMALE	AV FL	283.3	326.0	286.3	292.5	461.5	470.0	525.0	470.9	563.0	602.0	-	576.0
			SE FL	13.1	15.7	25.0	22.9	35.5	58.3	15.0	46.0	29.0	-	-	30.0
			NO FL	18	6	6	30	11	4	2	17	2	1	-	3
		COMB- INED	AV FL	280.4	318.3	292.3	291.3	469.2	513.3	525.0	486.5	563.0	602.0	-	576.0
			SE FL	12.9	23.7	24.6	24.3	37.6	69.1	15.0	54.6	29.0	-	-	30.0
			NO FL	31	12	15	58	15	9	2	26	0	1	-	3

TABLE 55 - 3

## LENGTH STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

PAGE 2

YEAR	O P N D	SEX	ITEM	CAUGHT IN JAPANESE C HET TO				ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST							
				OCEAN 1.1	AGE 2.1	.1 X.1	SUB TOTAL	OCEAN 1.2	AGE 2.2	.2 X.2	SUB TOTAL	OCEAN 1.3	AGE 2.3	.3 X.3	SUB TOTAL
1986	0121	MALE	AV FL	-	-	-	-	493.3	564.5	518.0	521.2	604.0	-	-	604.0
			SE FL	-	-	-	-	39.1	42.5	36.0	50.5	-	-	-	
			NO FL	-	-	-	-	6	4	2	12	1	-	1	
		FEMALE	AV FL	295.0	-	-	295.0	437.3	424.0	460.0	436.2	531.3	586.0	-	545.6
			SE FL	45.0	-	-	45.0	67.3	-	-	53.3	39.3	-	-	41.6
			NO FL	2	-	-	2	3	1	1	5	3	1	-	4
		COMB-	AV FL	295.0	-	-	295.0	474.7	536.4	498.7	497.1	549.5	586.0	-	557.2
			INED SE FL	45.0	-	-	45.0	56.2	67.9	39.7	63.3	46.0	-	-	44.0
			NO FL	2	-	-	2	9	5	3	17	4	1	-	5
1986	0174	MALE	AV FL	-	-	-	-	478.0	498.0	-	488.0	-	630.0	-	630.0
			SE FL	-	-	-	-	-	-	-	10.0	-	-	-	
			NO FL	-	-	-	-	1	1	-	2	-	1	1	
		FEMALE	AV FL	-	-	410.0	410.0	450.0	478.0	442.0	453.3	580.0	626.0	-	603.0
			SE FL	-	-	-	-	21.1	-	-	21.4	-	-	-	23.0
			NO FL	-	-	1	1	4	1	1	6	1	1	-	2
		COMB-	AV FL	-	-	410.0	410.0	455.6	488.0	442.0	462.0	580.0	626.0	-	612.0
			INED SE FL	-	-	-	-	22.0	10.0	-	23.9	-	2.0	-	22.7
			NO FL	-	-	1	1	5	2	1	8	1	2	-	3
1986	0175	MALE	AV FL	-	-	-	-	478.3	505.0	-	487.2	-	-	-	
			SE FL	-	-	-	-	30.9	30.7	-	33.3	-	-	-	
			NO FL	-	-	-	-	6	4	-	12	-	-	-	
		FEMALE	AV FL	-	-	-	-	469.3	456.8	-	462.8	-	514.0	-	514.0
			SE FL	-	-	-	-	50.2	30.6	-	36.7	-	-	-	
			NO FL	-	-	-	-	3	5	-	8	-	1	1	
		COMB-	AV FL	-	-	-	-	475.8	479.3	-	477.4	-	514.0	-	514.0
			INED SE FL	-	-	-	-	38.0	38.7	-	31.0	-	-	-	
			NO FL	-	-	-	-	11	9	-	20	-	1	1	

YEAR	O P N O	SEX	ITEM	STATISTICS OF IMMATURE SOCKEYE SALMON				BY AGE AND SEX							
				LENGTH CAUGHT IN JAPANESE OCEAN		C NET IN ALUTIAN WATER		DURING LATE JUNE AND EARLY AUGUST		OCEAN		SUB TOTAL			
				1.1	2.1	X.1	SUB TOTAL	1.2	2.2	X.2	SUB TOTAL	1.3	2.3	X.3	SUB TOTAL
1986	0176	MALE	AV FL	312.9	331.6	299.0	318.1	463.7	497.6	464.0	469.0	-	-	-	-
			SE FL	20.9	21.2	9.0	22.8	27.2	23.7	28.1	30.0	-	-	-	-
			NO FL	16	9	2	27	23	5	4	32	-	-	-	-
		FEMALE	AV FL	308.1	330.9	-	317.4	447.5	443.3	477.0	446.1	-	-	-	-
			SE FL	18.0	11.9	-	19.8	25.4	17.3	25.0	25.3	-	-	-	-
			NO FL	13	9	-	22	31	8	2	41	-	-	-	-
		COMB-	AV FL	310.8	331.2	299.0	317.8	454.4	464.2	468.3	457.3	-	-	-	-
		INED	SE FL	19.0	18.1	9.0	21.3	27.4	32.9	28.4	26.8	-	-	-	-
			NO FL	29	18	2	49	54	13	6	73	-	-	-	-
1986	0177	MALE	AV FL	310.8	339.5	308.0	318.3	454.7	474.4	444.0	460.5	-	-	-	-
			SE FL	19.5	21.0	-	22.6	8.4	26.0	-	20.5	-	-	-	-
			NO FL	10	4	1	15	9	5	1	15	-	-	-	-
		FEMALE	AV FL	305.7	336.0	337.0	315.0	453.1	463.7	462.0	457.9	-	-	-	-
			SE FL	12.7	-	21.0	19.9	29.8	16.6	2.0	24.1	-	-	-	-
			NO FL	7	1	2	10	9	6	2	17	-	-	-	-
		COMB-	AV FL	308.7	338.8	327.3	317.0	453.9	468.5	456.0	459.1	-	-	-	-
		INED	SE FL	17.2	18.8	22.4	21.3	21.9	23.4	8.6	22.9	-	-	-	-
			NO FL	17	5	3	25	16	11	3	32	-	-	-	-
1986	0178	MALE	AV FL	-	352.0	-	352.0	464.6	476.0	500.0	469.4	-	-	-	-
			SE FL	-	-	-	-	25.9	6.0	-	25.7	-	-	-	-
			NO FL	-	1	-	1	9	2	1	12	-	-	-	-
		FEMALE	AV FL	-	330.0	-	330.0	464.7	487.0	-	473.6	-	-	-	-
			SE FL	-	-	-	-	2.9	9.0	-	12.9	-	-	-	-
			NO FL	-	1	-	1	3	2	-	5	-	-	-	-
		COMB-	AV FL	-	341.0	-	341.0	464.6	481.5	500.0	470.6	-	-	-	-
		INED	SE FL	-	11.0	-	11.0	22.0	9.4	-	23.5	-	-	-	-
			NO FL	-	2	-	2	12	4	1	17	-	-	-	-

YEAR	O P N O	SEX	ITEM	LENGTH STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX				CAUGHT IN JAPANESE C NET IN ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST							
				OCEAN 1.1	AGE 2.1	.1 X.1	SUB TOTAL	OCEAN 1.2	AGE 2.2	.2 X.2	SUB TOTAL	OCEAN 1.3	AGE 2.3	.3 X.3	SUB TOTAL
1986	0179	MALE	AV FL	324.0	-	-	324.0	432.0	420.0	-	426.0	-	-	-	-
			SE FL	-	-	-	-	-	-	-	6.0	-	-	-	
			NO FL	1	-	-	1	1	1	-	2	-	-	-	
		FEMALE	AV FL	-	362.0	-	362.0	447.0	-	-	447.0	-	-	-	
			SE FL	-	-	-	-	9.8	-	-	9.8	-	-	-	
			NO FL	-	1	-	1	4	-	-	4	-	-	-	
		COMB-	AV FL	324.0	362.0	-	343.0	444.0	420.0	-	440.0	-	-	-	
		INED	SE FL	-	-	-	19.0	10.7	-	-	13.2	-	-	-	
			NO FL	1	1	-	2	5	1	-	6	-	-	-	
1986	0180	MALE	AV FL	-	328.0	-	328.0	494.0	-	-	494.0	-	-	-	
			SE FL	-	-	-	-	-	-	-	-	-	-	-	
			NO FL	-	1	-	1	1	-	-	1	-	-	-	
		FEMALE	AV FL	-	-	-	-	-	428.0	-	428.0	-	-	-	
			SE FL	-	-	-	-	-	-	-	-	-	-	-	
			NO FL	-	-	-	-	-	1	-	1	-	-	-	
		COMB-	AV FL	-	328.0	-	328.0	494.0	428.0	-	461.0	-	-	-	
		INED	SE FL	-	-	-	-	-	-	-	33.0	-	-	-	
			NO FL	-	1	-	1	1	1	-	2	-	-	-	
1986	0181	MALE	AV FL	327.0	-	-	327.0	464.7	-	-	464.7	-	-	-	
			SE FL	10.7	-	-	10.7	12.0	-	-	12.0	-	-	-	
			NO FL	3	-	-	3	3	-	-	3	-	-	-	
		FEMALE	AV FL	314.5	336.0	-	321.7	439.3	454.0	-	443.0	-	-	-	
			SE FL	14.9	2.0	-	15.2	9.7	-	-	9.4	-	-	-	
			NO FL	4	2	-	6	3	1	-	4	-	-	-	
		COMB-	AV FL	319.9	336.0	-	323.4	452.0	454.0	-	452.3	-	-	-	
		INED	SE FL	13.7	2.0	-	15.6	16.7	-	-	15.1	-	-	-	
			NO FL	7	2	-	9	6	1	-	7	-	-	-	

TABLE 55 - 3

LENGTH STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

PAGE 5

YEAR	O P N O	SEX	ITEM	CAUGHT IN JAPANESE OCEAN				NET IN ALUETIAN WATER				DURING LATE JUNE AND EARLY AUGUST			
				1.1	2.1	X.1	SUB TOTAL	1.2	2.2	X.2	SUB TOTAL	1.3	2.3	X.3	SUB TOTAL
				OCEAN	AGE	.		OCEAN	AGE	.		OCEAN	AGE	.	
1986	0346	MALE	AV FL	-	-	-	-	474.5	506.5	-	495.8	584.5	642.0	-	603.7
			SE FL	-	-	-	-	21.5	51.7	-	46.8	47.5	-	46.9	
			NO FL	-	-	-	-	4	8	-	12	2	1	3	
		FEMALE	AV FL	-	350.0	-	350.0	474.4	479.1	500.0	478.3	-	622.0	-	622.0
			SE FL	-	-	-	-	30.2	35.7	-	32.5	-	-	-	
			NO FL	-	1	-	1	7	7	1	15	-	1	1	
		COMB-	AV FL	-	350.0	-	350.0	474.5	493.7	500.0	486.1	584.5	632.0	-	606.3
		INED	SE FL	-	-	-	-	26.1	47.1	-	40.2	47.5	10.0	-	41.0
			NO FL	-	1	-	1	11	15	1	27	2	2	4	
1986	MEAN	MALE	AV FL	293.4	321.0	290.5	300.4	472.5	503.2	484.2	482.7	610.3	626.8	-	616.2
			SE FL	21.9	22.0	21.2	25.8	37.3	52.6	35.1	45.5	41.1	34.0	-	36.4
			NO FL	90	42	23	155	107	53	10	170	9	5	-	14
		FEMALE	AV FL	292.2	325.2	299.9	301.7	452.9	468.8	478.7	459.7	556.1	586.0	520.0	563.5
			SE FL	20.4	19.4	36.7	27.6	33.3	39.8	32.6	35.7	40.4	37.5	-	42.2
			NO FL	70	30	20	120	95	45	12	152	14	6	1	21
		COMB-	AV FL	292.9	322.7	294.9	301.0	463.3	467.4	481.2	471.8	577.3	605.6	520.0	584.6
		INED	SE FL	20.9	21.8	29.6	26.3	36.6	50.2	33.9	43.2	48.6	41.3	-	48.3
			NO FL	160	72	43	275	202	96	22	322	23	11	1	35

TABLE 55 - 4 WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX PAGE 1

YEAR	O P N O	SEX	ITEM	JAPANESE C NET IN				ALUTTIAN WATER DURING				LATE JUNE AND EARLY AUGUST			
				OCEAN		AGE	.1	OCEAN		AGE	.2	OCEAN		AGE	.3
				1.1	2.1	X.1	SUB TOTAL	1.2	2.2	X.2	SUB TOTAL	1.3	2.3	X.3	SUB TOTAL
1986	0118	MALE	AV BW	225.4	284.3	208.0	241.8	1261.7	1290.9	1470.0	1285.5	3445.0	2480.0	-	3307.1
			SE BW	32.5	52.4	16.0	48.3	460.0	546.7	50.0	401.3	895.1	-	-	895.0
			NO BW	26	14	5	45	18	11	2	31	6	1	-	7
		FEMALE	AV BW	221.8	256.7	260.0	236.1	1040.0	1446.7	1380.0	1223.5	1840.0	2740.0	-	2065.0
			SE BW	33.4	38.8	53.7	42.8	311.8	542.2	480.0	469.8	683.7	-	-	708.0
			NO BW	17	6	5	28	9	6	2	17	3	1	-	4
		COMB-	AV BW	224.0	276.0	234.0	239.6	1187.8	1345.9	1425.0	1263.5	2910.0	2610.0	-	2855.5
		INED	SE BW	32.8	50.4	47.4	46.4	429.4	550.2	344.2	476.3	1123.6	130.0	-	1024.3
			NO BW	43	20	10	73	27	17	4	48	9	2	-	11
1986	0119	MALE	AV BW	214.3	297.1	216.7	231.8	1295.0	1642.9	-	1385.2	-	3875.0	-	3875.0
			SE BW	19.5	79.0	26.6	52.3	418.3	332.8	-	426.1	-	575.0	-	575.0
			NO BW	21	7	6	34	20	7	-	27	-	2	-	2
		FEMALE	AV BW	202.8	266.7	213.3	220.3	1042.5	1580.0	1140.0	1185.0	2706.0	-	1840.0	2561.7
			SE BW	23.3	61.7	15.4	43.4	276.5	537.6	-	419.5	469.2	-	-	536.1
			NO BW	9	3	6	18	8	3	1	12	5	-	1	6
		COMB-	AV BW	210.8	294.0	215.0	227.6	1222.9	1624.0	1140.0	1323.6	2706.0	3875.0	1840.0	2890.0
		INED	SE BW	21.9	74.3	21.8	49.8	399.6	406.4	-	434.0	469.2	575.0	-	766.5
			NO BW	30	10	12	52	28	10	1	39	5	2	1	8
1986	0120	MALE	AV BW	206.9	276.7	253.3	236.8	1380.0	2246.0	-	1862.2	-	-	-	-
			SE BW	26.0	75.1	68.1	62.0	317.2	795.0	-	762.9	-	-	-	-
			NO BW	13	6	9	28	4	5	-	9	-	-	-	-
		FEMALE	AV BW	217.2	338.3	226.7	243.3	1183.6	1220.0	2160.0	1307.1	2230.0	3120.0	-	2526.7
			SE BW	33.1	32.2	71.7	64.0	416.5	594.6	80.0	541.5	690.0	-	-	772.2
			NO BW	18	6	6	30	11	4	2	17	2	1	-	3
		COMB-	AV BW	212.9	307.5	242.7	240.2	1236.0	1791.1	2160.0	1499.2	2230.0	3120.0	-	2526.7
		INED	SE BW	30.6	65.5	70.6	63.3	401.9	377.1	80.0	660.5	690.0	-	-	772.2
			NO BW	31	12	15	58	15	9	2	26	2	1	-	3

TABLE 55 - 4 WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX PAGE 2

YEAR	Q. P. NO	SEX	ITEM	WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON				BY AGE AND SEX									
				CAUGHT IN JAPANESE OCEAN	AGE 1	NET IN ALUETIAN OCEAN	AGE 2	WATER DURING LATE JUNE AND EARLY AUGUST	AGE 3	SUB TOTAL	SUB TOTAL						
				1.1	2.1	X.1	SUB TOTAL	1.2	2.2	X.2	SUB TOTAL	1.3	2.3	X.3	SUB TOTAL		
1986	0121	MALE	AV BW	-	-	-	-	1400.0	2312.5	1690.0	1752.5	3120.0	-	-	-	3120.0	
			SE BW	-	-	-	-	365.9	596.0	510.0	629.3	-	-	-	-	-	-
			NO BW	-	-	-	-	6	4	2	12	1	-	-	-	-	1
	FEMALE	AV BW	265.0	-	-	265.0	1086.7	780.0	1040.0	1016.0	1933.3	2940.0	-	-	-	2165.0	
		SE BW	95.0	-	-	95.0	660.7	-	-	525.6	729.0	-	-	-	-	767.1	
		NO BW	2	-	-	2	3	1	1	5	3	1	-	-	-	4	
	COMB-	AV BW	265.0	-	-	265.0	1295.6	2006.0	1473.3	1535.9	2230.0	2940.0	-	-	-	2372.0	
		INED SE BW	95.0	-	-	95.0	506.4	812.4	517.1	688.0	813.9	-	-	-	-	781.4	
		NO BW	2	-	-	2	9	5	3	17	4	1	-	-	-	5	
1986	0174	MALE	AV BW	-	-	-	-	1150.0	1580.0	-	1365.0	-	3750.0	-	-	3750.0	
			SE BW	-	-	-	-	-	-	-	215.0	-	-	-	-	-	
			NO BW	-	-	-	-	1	1	-	2	-	1	-	-	1	
	FEMALE	AV BW	-	-	660.0	660.0	917.5	1000.0	800.0	911.7	3000.0	3700.0	-	-	-	3350.0	
		SE BW	-	-	-	-	163.0	-	-	145.1	-	-	-	-	-	350.0	
		NO BW	-	-	1	1	4	1	1	6	1	1	-	-	-	2	
	COMB-	AV BW	-	-	660.0	660.0	964.0	1290.0	800.0	1025.0	3000.0	3725.0	-	-	-	3483.3	
		INED SE BW	-	-	-	-	172.9	290.0	-	256.8	-	25.0	-	-	-	342.7	
		NO BW	-	-	1	1	5	2	1	8	1	2	-	-	-	3	
1986	0175	MALE	AV SW	-	-	-	-	1250.0	1520.0	-	1340.0	-	-	-	-		
			SE BW	-	-	-	-	292.9	286.7	-	317.5	-	-	-	-		
			NO BW	-	-	-	-	8	4	-	12	-	-	-	-		
	FEMALE	AV BW	-	-	-	-	1163.3	1016.0	-	1072.5	-	1540.0	-	-	1540.0		
		SE BW	-	-	-	-	477.3	286.1	-	376.2	-	-	-	-			
		NO BW	-	-	-	-	3	5	-	8	-	1	-	-	1		
	COMB-	AV BW	-	-	-	-	1226.4	1241.1	-	1233.0	-	1540.0	-	-	1540.0		
		INED SE BW	-	-	-	-	354.6	379.8	-	366.4	-	-	-	-			
		NO BW	-	-	-	-	11	9	-	20	-	1	-	-	1		

TABLE 55 - 4

WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

PAGE 3

YEAR	D. P. N O	SEX	ITEM	CAUGHT IN JAPANESE C NET IN				ALUTIAN WATER DURING LATE				JUNE AND EARLY AUGUST			
				OCEAN		AGE	.1	OCEAN		AGE	.2	OCEAN		AGE	.3
				1.1	2.1	X.1	SUB TOTAL	1.2	2.2	X.2	SUB TOTAL	1.3	2.3	X.3	SUB TOTAL
1986	0176	MALE	AV BW	285.0	342.2	240.0	300.7	1050.4	1326.0	1120.0	1102.2	-	-	-	-
			SE BW	64.6	71.9	20.0	72.4	280.0	238.1	247.0	287.3	-	-	-	-
			NO BW	16	9	2	27	23	5	4	32	-	-	-	-
		FEMALE	AV BW	273.1	336.7	-	299.1	922.6	863.8	1100.0	919.6	-	-	-	-
			SE BW	50.2	32.3	-	53.9	204.6	139.3	200.0	199.1	-	-	-	-
			NO BW	13	9	-	22	31	8	2	41	-	-	-	-
		COMB-	AV BW	279.7	339.4	240.0	300.0	977.0	1041.5	1113.3	999.7	-	-	-	-
		INED	SE BW	58.7	56.1	20.0	64.6	248.1	290.6	232.7	258.4	-	-	-	-
			NO BW	29	18	2	49	54	13	6	73	-	-	-	-
1986	0177	MALE	AV BW	280.5	340.0	280.0	296.3	926.7	1076.0	1000.0	981.3	-	-	-	-
			SE BW	49.2	76.2	-	62.3	83.8	207.1	-	153.1	-	-	-	-
			NO BW	10	4	1	15	9	5	1	15	-	-	-	-
		FEMALE	AV BW	249.3	360.0	350.0	280.5	956.7	1080.0	1050.0	1011.2	-	-	-	-
			SE BW	35.4	-	50.0	60.5	231.6	128.2	50.0	194.7	-	-	-	-
			NO BW	7	1	2	10	9	6	2	17	-	-	-	-
		COMB-	AV BW	267.6	344.0	326.7	290.0	941.7	1078.2	1033.3	997.2	-	-	-	-
		INED	SE BW	47.0	68.6	52.3	62.0	174.8	168.6	47.9	176.9	-	-	-	-
			NO BW	17	5	3	25	18	11	3	32	-	-	-	-
1986	0178	MALE	AV BW	-	385.0	-	385.0	1090.0	1180.0	1400.0	1130.8	-	-	-	-
			SE BW	-	-	-	-	199.2	40.0	-	194.4	-	-	-	-
			NO BW	-	1	-	1	9	2	1	12	-	-	-	-
		FEMALE	AV BW	-	300.0	-	300.0	1033.3	1260.0	-	1124.0	-	-	-	-
			SE BW	-	-	-	-	47.9	100.0	-	132.9	-	-	-	-
			NO BW	-	1	-	1	3	2	-	5	-	-	-	-
		COMB-	AV BW	-	342.5	-	342.5	1075.6	1220.0	1400.0	1126.8	-	-	-	-
		INED	SE BW	-	42.5	-	42.5	176.1	86.0	-	178.6	-	-	-	-
			NO BW	-	2	-	2	12	4	1	17	-	-	-	-



TABLE 55 - 4 WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

PAGE 4

YEAR	O P N O	SEX	ITEM	WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON			BY AGE AND SEX			CAUGHT IN JAPANESE C NET IN ALUTIAN WATER DURING LATE JUNE AND EARLY AUGUST				
				OCEAN 1.1	AGE 2.1	X.1 SUB TOTAL	OCEAN 1.2	AGE 2.2	X.2 SUB TOTAL	OCEAN 1.3	AGE 2.3	X.3 SUB TOTAL		
1986	0179	MALE	AV BW	320.0	-	320.0	800.0	660.0	-	730.0	-	-	-	-
			SE BW	-	-	-	-	-	-	70.0	-	-	-	-
			NO BW	1	-	1	1	1	-	2	-	-	-	-
		FEMALE	AV BW	-	420.0	420.0	902.5	-	-	902.5	-	-	-	-
			SE BW	-	-	-	148.6	-	-	148.6	-	-	-	-
			NO BW	-	1	1	4	-	-	4	-	-	-	-
		COMB-	AV BW	320.0	420.0	370.0	882.0	660.0	-	845.0	-	-	-	-
		INED	SE BW	-	-	50.0	139.1	-	-	151.5	-	-	-	-
			NO BW	1	1	2	5	1	-	6	-	-	-	-
1986	0180	MALE	AV BW	-	310.0	310.0	1200.0	-	-	1200.0	-	-	-	-
			SE BW	-	-	-	-	-	-	-	-	-	-	-
			NO BW	-	1	1	1	-	-	1	-	-	-	-
		FEMALE	AV BW	-	-	-	-	720.0	-	720.0	-	-	-	-
			SE BW	-	-	-	-	-	-	-	-	-	-	-
			NO BW	-	-	-	-	1	-	1	-	-	-	-
		COMB-	AV BW	-	310.0	310.0	1200.0	720.0	-	960.0	-	-	-	-
		INED	SE BW	-	-	-	-	-	-	240.0	-	-	-	-
			NO BW	-	1	1	1	1	-	2	-	-	-	-
1986	0181	MALE	AV BW	313.3	-	313.3	950.0	-	-	950.0	-	-	-	-
			SE BW	31.3	-	31.3	108.0	-	-	108.0	-	-	-	-
			NO BW	3	-	3	3	-	-	3	-	-	-	-
		FEMALE	AV BW	287.5	300.0	291.7	796.7	800.0	-	797.5	-	-	-	-
			SE BW	52.1	10.0	43.2	86.2	-	-	75.0	-	-	-	-
			NO BW	4	2	6	3	1	-	4	-	-	-	-
		COMB-	AV BW	298.6	300.0	298.9	873.3	800.0	-	862.9	-	-	-	-
		INED	SE BW	45.9	10.0	40.9	124.6	-	-	117.6	-	-	-	-
			NO BW	7	2	9	6	1	-	7	-	-	-	-

TABLE 55 - 4

WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

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YEAR	O. P. N. O.	SEX	ITEM	CAUGHT IN JAPANESE C. NET IN				ALUETIAN WATER DURING				LATE JUNE AND EARLY AUGUST			
				OCEAN		AGE	SUB TOTAL	OCEAN		AGE	SUB TOTAL	OCEAN		AGE	SUB TOTAL
				1.1	2.1	X.1		1.2	2.2	X.2		1.3	2.3	X.3	
1986	0346	MALE	AV BW	-	-	-	-	1220.0	1580.0	-	1460.0	2580.0	3700.0	-	2953.3
			SE BW	-	-	-	-	223.9	701.7	-	611.4	770.0	-	821.1	
			NO BW	-	-	-	-	4	8	-	12	2	1	3	
		FEMALE	AV BW	-	360.0	-	380.0	1171.4	1235.7	1420.0	1216.0	-	3500.0	-	3500.0
			SE BW	-	-	-	-	292.0	468.9	-	382.4	-	-	-	
			NO BW	-	1	-	1	7	7	1	15	-	1	1	
		COMB-	AV BW	-	380.0	-	380.0	1189.1	1419.3	1420.0	1325.6	2580.0	3600.0	-	3090.0
		INED	SE BW	-	-	-	-	270.2	628.3	-	511.6	770.0	100.0	-	749.4
			NO BW	-	1	-	1	11	15	1	27	2	2	4	
1986	MEAN	MALE	AV BW	240.8	306.1	233.9	257.5	1175.0	1538.1	1320.0	1246.7	3216.7	3536.0	-	3330.7
			SE BW	52.1	72.4	50.6	65.2	360.0	635.7	368.3	493.1	889.7	644.8	-	825.2
			NO BW	90	42	23	155	107	53	10	170	9	5	-	14
		FEMALE	AV BW	235.4	317.3	265.0	260.8	1006.8	1138.9	1315.0	1070.3	2307.9	2923.3	1640.0	2461.4
			SE BW	48.8	53.3	111.2	73.1	309.5	439.2	466.4	377.7	727.4	698.0	-	766.3
			NO BW	70	30	20	120	95	45	12	152	14	6	1	21
		COMB-	AV BW	238.5	310.8	248.4	258.9	1095.9	1354.8	1317.3	1189.8	2663.5	3201.8	1640.0	2809.1
		INED	SE BW	50.5	65.2	85.7	68.9	347.5	588.8	424.6	456.7	910.3	740.1	-	897.9
			NO BW	160	72	43	275	202	98	22	322	23	11	1	35

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TRANSLATION

ABUNDANCE AND BIOLOGICAL INFORMATION OF IMMATURE SOCKEYE SALMON  
IN WATERS SOUTH OF THE ALEUTIAN ISLANDS IN 1987 JULY

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Fisheries Agency of Japan

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Previous reports (Takagi and Ito 1980, 1981, 1982, 1983, 1984, 1985 and 1986) provided information on immature sockeye salmon collected with research gillnets (10 different mesh sizes) by Japanese salmon research vessels in waters of 175°E to 175°W and 50°N to 52°N (including neighboring waters) in the period June 28 to August 10 in 1972 to 1986. This report provides comparable information obtained in 1987.

The research area on the south side of the Aleutian Islands in 1987 July is shown in Fig. 1. In previous years, the analysis was made by selecting data corresponding to the above-mentioned specific areas and periods from all data obtained at the grid stations arranged to obtain information on overall distribution and abundance of salmonids. In 1987, however, while moving from east to west, the research vessel Hokushin maru conducted one gillnet research operation at each station from July 7 to 12 and the research vessel Shin Riasu maru conducted two gillnet operations at each station from July 13 to 23 while moving from east to west.

The locations of setting, dates of retrieval, number of tans used, number of salmonids caught by species, and the surface water temperature by station in the above periods and areas are shown in Table 1. The species composition of catches in a total of 16 research operations showed that chum salmon constituted the largest proportion of the catches (44.4%), as in 1986 with pinks second (29.8%). Sockeye salmon that had constituted the largest proportion of the species composition annually from 1972 to 1985 was the third this year (20.7%). Other species amounted to only 5.1% in total. Average water temperature in the 16 operations was 7.8°C.

Records of species, fork length, body weight, sex, and gonad weight were taken and scales were collected, as a rule, for all individual salmonids caught by the research gillnets. For determination of maturity in sockeye salmon, the Takagi method (1961), based on gonad weight, was used. Age expression followed Koo's (1962) method. When

complete age determination was not possible, ages in tables have been designated with an X. For example, X.2 indicates that the freshwater age is unknown and ocean age is two years. All gonad weights recorded, including individuals of age X.X, were used in determining the proportion (%) of immature sockeye salmon by station. Fish for which age was known and gonad weight unknown were allocated according to the corresponding proportion of immature fish at each age.

The CPUE values for immature sockeye by station and by age were obtained by allocating the CPUE values of all sockeye salmon according to the numbers of fish by maturity, by age, and by ocean age group (Table 2). Thus, there are instances where the CPUE values by age are not consistent with the total value. The arithmetic mean CPUE values throughout periods and areas were calculated from values at each station. The ratio of immature sockeye salmon caught within this period and area in 1987 was an average of 92.0%.

The CPUE values of immature sockeye salmon obtained in 1987 by ocean age, by 1°x1° area, and by station are shown in Fig. 2. The numbers in this figure indicate the gear retrieval date, i.e. month and date in order. Results of research in previous years showed some years in which differences in ocean age composition were observed among areas. A remarkable feature observed in 1980 and 1981 was that immature fish of ocean age one (.1) were predominant in the southwestern portion of the research area. Such a feature was not observed in the 1987 ocean age composition. A notable feature observed in the research in 1987 was that there were some differences in the results obtained from the research by the Hokushin maru (from July 7 to 12) and those from the Shin Riasu maru (from July 13 to 23) conducted in the same area. During the research cruise by the Hokushin maru conducted in the earlier period, virtually no age .2 fish were encountered, but age .1 fish were recognized (8050, E7950 and E7750). In contrast, during the research cruise by the Shin Riasu maru conducted in the same areas (from 50°N to 51°N, 175°E to 175°W) about one week later, almost no

age .1 fish were present, but age .2 fish were obvious, and replacement of fish surveyed was indicated. The trend for age .2 fish to be dominant during the latter half of the research period, compared with the earlier period can be clearly recognized also in area E7751.

The ocean age composition of immature sockeye salmon obtained by research conducted in 1987 was 20.9% age .1 and 73.1% age .2. In the case of immature sockeye salmon one cycle before, i.e. 1982, it was 48.7% age .1, and 46.4% age .2.

The fork length frequency distributions of immature sockeye salmon caught during the research operations are shown in Fig. 3 for 1°x1° areas, for all areas and periods combined. The 1°x1° areas are ordered from top to bottom in sequence of date. The body length for all areas combined for ocean age .1 in 1987 ranged from 27 to 38 cm with the mode in the composition at 34 cm. Body length for age .2 fish in 1987 ranged from 41 to 58 cm, with the mode in fork length composition at 48 cm. Table 5 shows the average fork length of catches from this research area for each year from 1972 to 1987. The average fork length of ocean age .1 fish of 33.96 cm in 1987 was closest to the average (33.82) for the 8 year period of 1980 to 1987. Similarly, the average value (47.98) for age .2 fish in 1987 was also closest to the average (48.10) for these 8 years.

As in previous studies, effort was made in 1987 to determine the CPUE values by ocean age of immature sockeye salmon caught with research gillnets within the area of 175°E to 175°W and 50°N to 52°N in the period July 7 to 23. The arithmetic mean of CPUEs obtained in 1987 was 0.14 for fish of ocean age one year and 0.49 for fish of ocean age two years.

The regression equations for CPUE values of immature fish and the run to Bristol Bay coastal areas, calculated using available data, are as follows: for immature ocean age one year fish ( $X_1$ ) and the coastal

run of fish of ocean age two years in the following year ( $Y_1$ ), the equation is  $Y_1 = 3.98 + 15.54X_1$ , with a correlation coefficient of 0.66. For immature ocean age two year fish ( $X_2$ ) and the coastal run of fish of ocean age three years in the following year ( $Y_2$ ),  $Y_2 = 5.39 + 3.11X_2$ , and the correlation coefficient was 0.63.

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TABLES 1 TO 5, FIGS. 1 TO 5  
ARE IN ENGLISH IN THE JAPANESE DOCUMENT

