1984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

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1984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

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筆者等は、1972～83年（6月28日～8月10日）の期間、経度175°E～175°W並びに緯度50°～52°Nによって囲まれた水域において、日本のさけ・ます調査船が調査用流網（10種目合構成）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）。本報告は、これまでの報告に引続いて、1984年に得られた新しい情報の提供を目的とする。

図1は、1984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。1隻の調査船（北辰丸）が、1981～1982年と同様、177－30E定線及び177－30W定線調査と併せて上記研究水域内の定点調査を実施した。他の1隻（オ2りあす丸）は、定型的に継続してきた研究水域調査を補強するため、175°W以東のアリューシャン列島水域における調査操業を、はじめて実施した。

表1は、1984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。研究水域内における合計12回の調査操業による漁獲物の魚種組成をみると、ベニザケがオ1位（55.2％）、シロザケがオ2位（34.6％）及びギンザケがオ3位（9.3％）であった。カラフトマスの割合が低い（0.7％）のは偶数年の特徴である。12回の調査操業時における平均表面水温は7.9°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×付して表わした。例えば、×．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×．×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。また、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。

この文書を引用する場合は、下記による：

高木健治・伊藤外夫．1984．1984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。水産庁遠洋水産研究所。

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・水域内全体の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。1984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95.4％であった。

図２に、1984年に得られた海洋年令別ベニザケ未成熟魚のＣＰＵＥを、1°×1°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、研究水域内においても海洋年令組成の差が調査点間に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年未成熟魚が卓越するという顕著な特徴を示した。1984年の海洋年令組成にみられる水域間の差は、それほど顕著ではない。強いて述べれば、研究水域北東部に当るW 7851では海洋２年魚がやや卓越し、研究水域南西部付近のE 7950では海洋１年魚が卓越していたことが認められる。しかし、研究水域より東側において行なわれた調査結果は、上記の傾向と結びつかない。ベニザケ未成熟魚がまとまって漁獲された51°N以北をとりあげて175° W以東水域についてみると、研究水域のすぐ東側では海洋１年魚が卓越し、東へ移るにつれて海洋２年魚の相対的割合が増加する傾向が認められた。すなわち、W 7551及びW 7351では海洋１年魚が卓越し、W 7151では海洋１年魚と２年魚が拮抗し、W 7051及びW 6051では海洋２年魚が卓越していたことが認められた。つまり、175°W以東水域における海洋年令組成は、研究水域の調査結果との連続的傾向を示さず、むしろそれと独立してこゝだけで調査点間の特徴的な差を示した。175°W線を境にして西側を分担した調査船は東から西へ移動しながら調査操業を行ない、他方、東側を分担した他の調査船は約１週間後にこの水域へ入り、西から東へ移動しながら調査操業を行なった。図２に示す調査結果が、176 W線で不連続にみえることに関して、この要因を考慮する必要がある。

1984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57.6％及び、・２年魚40.8％であった。１サイクル前の1979年未成熟魚調査の場合は、・１年魚34.5％及び・２年魚64.6％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叉長頻度分布を全域及び1°×1°区画別にまとめて図示した。1°×1°区画は西から東へ向って上から下へ配列した。全域合計の海洋年令別尾叉長組成によると、1984年の海洋１年魚組成のモードは36 cmであったが、これは1981～83年の各年（32～35 cm）より大きく1979年（36 cm）と同じである。1984年の海洋２年魚組成のモードは48 cmであったが、これは1981年及び1983年（48 cm）と同じであり、1982年（45 cm）より大きい。研究水域だけをとりあげて経年比較をすると、1984年の1.2年魚46.6 cm及び2.2年魚48.7 cm（表４）は、1983年の48.5 cm及び49.6 cmよりいずれも小さい。図３においてみられるように、E 7751からW 7850にかけて西から東へ移るにつれて海洋１年魚の尾叉長が大きくなる傾向がみられた。しかし、さらに東側の水域ではこの傾向は不連続となり、W 7551～W 7151における海洋１年魚の尾叉長はむしろ小さかった。図２の場合と同様、こゝでも２隻の調査船の調査時期のずれを考慮する必要がある。

1984年7月5～16日の期間に、50°～52°N、175°E～175°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。1984年に得られた算術平均ＣＰＵＥは、海洋1年魚1.44及び海洋2年魚1.02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、$Y_1 = 3.79 + 16.23 X_1$、相関係数＝0.67であり、海洋2年未成熟魚（X_2）と翌年の海洋3年魚沿岸来遊量（Y_2）の場合は、$Y_2 = 4.74 + 3.20 X_2$、相関係数＝0.67であった。

アリューシャン列島南側水域に7月から8月初旬にかけて出現するベニザケ未成熟魚が主としてブリストル湾起源であることは、過去の調査研究結果から明らかである。この時期・水域に出現する未成熟魚の相対的豊度から、翌年のブリストル湾沿岸来遊量を予測する場合、その予測精度を左右する要因の1つとして、海洋域調査から得られる相対的豊度の代表性の問題がある。この時期・水域におけるベニザケ未成熟魚の出現状況は年々かなり変動し、限られた時空間内の調査によって代表性の高い計測値を得ることは難しい。1983年調査結果では、海洋1年未成熟魚の相対的豊度が極めて低かったが、その原因はわからなかった。調査時期をもっと遅くまで拡げるか、あるいは調査水域をより東方まで拡げることによって、より代表性の高い相対的豊度が得られるだろうと考えられた。1984年には、研究水域調査を補強するため、175°W以東水域調査が行なわれ、その結果51°N以北における密度の高いベニザケ未成熟魚群の存在が確認された。これらの魚群の1部は列島を抜けて北上するかもしれないが、大部分は西行し、やがて研究水域に出現するものと考えられる。もし1984年の調査期間をもっと後まで拡げたならば、研究水域の相対的豊度はより高い値が得られたかもしれない。

調査経費を無視すれば、ブリストル湾起源ベニザケ未成熟魚がアリューシャン列島南側を通過する時期及び水域の範囲全体をカバーするように調査努力を投入してまず輪郭を把握した後、回遊群の主要部分の出現水域に焦点をあてて豊度観測を行なうことが望ましい。回遊タイミング及び回遊経路が年々変動する場合には、研究水域・時期を固定しても経年的に比較可能な観測値が得られるとは限らない。調査努力の効果的利用という点からみれば、狭い調査水域を固定して調査期間を拡げるより、むしろアリューシャン列島南側の調査水域を東方へ拡げる方が、主群に遭遇する機会が増すであろう。

51°～52°N及び168°W～175°Wの水域において得られた調査結果を、研究水域調査結果に加えてベニザケ未成熟魚のＣＰＵＥを求めたところ、海洋1年魚1.67及び海洋2年魚1.32という値が得られた。

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TABLE 1. Fishing stations and number of salmonid caught by Japanese research gillnets in Aleutian waters (175°E - 168°W) during July 5 and July 21, 1984.

Year	Series No.	Operation No.	Date	Fishing station Latitude	Longitude	Tan	Number of salmonid caught Sockeye	Chum	Pink	Coho	Chinook	Steelhead	Total	Surface temperature
1984	1	0050	7. 5	50-28N	177-41W	30	26	25	0	8	0	0	59	7.3°C
	2	0051	7. 6	50-58N	177-35W	30	55	16	0	6	0	0	77	7.3
	3	0052	7. 7	51-15N	177-36W	30	70	42	1	23	0	0	136	7.9
	4	0053	7. 8	51-16N	177-45W	30	169	29	1	14	0	0	213	7.7
	5	0054	7. 9	50-55N	179-07W	30	64	60	0	18	0	0	142	7.1
	6	0055	7.10	50-36N	179-49W	30	43	84	0	21	1	0	149	8.2
	7	0056	7.11	50-56N	179-51E	30	145	51	1	15	0	0	212	7.3
	8	0057	7.12	50-58N	179-51E	30	80	37	2	7	0	0	126	7.4
	9	0058	7.13	51-15N	177-42E	30	83	25	1	13	0	0	122	8.2
	10	0059	7.14	51-12N	177-11E	30	40	54	2	7	0	0	103	8.4
	11	0060	7.15	50-57N	177-40E	30	64	98	0	3	1	0	166	9.0
	12	0061	7.16	50-58N	177-40E	30	100	67	4	24	1	0	196	8.6
	Sustotal					360	939	588	12	159	3	0	1,701	7.9
	13	0235	7.12	50-25N	174-25W	30	20	56	5	20	0	3	104	8.7
	14	0236	7.13	51-30N	174-39W	30	181	81	33	60	1	1	357	8.8
	15	0237	7.14	51-30N	172-32W	30	205	102	31	22	0	2	362	9.6
	16	0238	7.15	50-34N	172-33W	30	26	25	4	15	0	7	77	9.5
	17	0239	7.16	50-26N	170-26W	30	25	48	10	11	0	1	95	8.5
	18	0240	7.17	51-34N	170-35W	30	163	79	18	16	0	9	285	8.5
	19	0241	7.18	51-28N	169-33W	30	65	32	22	35	3	6	163	9.4
	20	0242	7.19	51-23N	168-25W	30	82	75	7	25	0	3	192	9.8
	21	0243	7.20	50-58N	168-34W	30	29	19	9	16	0	31	104	9.6
	22	0244	7.21	50-33N	168-32W	30	7	30	13	6	0	4	60	9.0
	23	0049	7. 4	49-53N	177-46W	30	35	34	2	9	3	0	83	7.8
	24	0062	7.18	49-57N	175-42E	30	4	75	10	29	1	3	122	9.1

TABLE 2. CPUE of immature sockeye salmon by age class, 1984.

Year	Operation No.	Percentage of immature	CPUE immature	.1 immature fish					.2 immature fish					.3 immature fish				
				1.1	2.1	3.1	X.1	Subtotal	1.2	2.2	3.2	X.2	Subtotal	1.3	2.3	3.3	X.3	Subtotal
1984	0050	96.2	0.83	0.14	0.25			0.40	0.29	0.07		0.07	0.43					0
	0051	92.7	1.70	0.24	0.58		0.07	0.88	0.48	0.24		0.07	0.78				0.03	0.03
	0052	94.3	2.20	0.21	0.35		0.07	0.63	0.91	0.45		0.14	1.50	0.07				0.07
	0053	97.0	5.47	0.54	1.39		0.20	2.14	2.11	1.09	0.10	0.03	3.33					0
	0054	96.9	2.07	0.41	0.86		0.07	1.34	0.41	0.24		0.07	0.72					0
	0055	90.7	1.30	0.30	0.53			0.83	0.33	0.10		0.03	0.47					0
	0056	97.9	4.73	1.15	2.33		0.02	3.69	0.44	0.30	0.03	0.03	0.81	0.14	0.07		0.03	0.24
	0057	96.3	2.57	0.63	1.34		0.18	2.14	0.25	0.14			0.39	0.04				0.04
	0058	98.8	2.73	0.71	1.18		0.20	2.09	0.34	0.24		0.07	0.64					0
	0059	97.5	1.30	0.11	0.49		0.04	0.63	0.35	0.28		0.04	0.67					0
	0060	92.2	1.97	0.28	0.69		0.07	1.04	0.59	0.31			0.90				0.03	0.03
	0061	94.0	3.13	0.31	1.07		0.07	1.45	0.79	0.62		0.24	1.65	0.03				0.03
Arithmetic mean		95.4	2.50	0.42	0.92	0	0.08	1.44	0.61	0.34	0.01	0.05	1.02	0.02	0.01	0	0.01	0.04
1984	0235	95.0	0.63	0.04	0.07			0.11	0.28	0.11		0.07	0.46	0.04			0.04	0.07
	0236	91.2	5.50	1.21	2.26		0.12	3.60	1.05	0.53	0.04	0.04	1.66	0.16			0.08	0.24
	0237	96.1	6.57	1.48	2.20	0.08	0.17	3.94	1.61	0.64		0.13	2.37	0.21	0.04			0.25
	0238	100.0	0.87	0.10	0.13			0.23	0.53	0.10			0.63					0
	0239	100.0	0.83	0.03		0.03	0.03	0.10	0.59	0.14			0.73					0
	0240	99.4	5.40	1.10	1.06		0.30	2.45	1.55	0.98		0.19	2.72	0.23				0.23
	0241	98.5	2.13	0.22	0.33		0.04	0.58	0.83	0.43		0.11	1.37	0.18				0.18
	0242	96.3	2.63	0.34	0.27			0.62	1.30	0.48		0.17	1.95	0.03	0.03			0.07
	0243	100.0	0.97	0.03	0.03			0.07	0.69	0.10			0.79	0.07			0.03	0.10
	0244	100.0	0.23	0.08	0.04			0.11	0.04			0.08	0.11					0
	0049	91.4	1.07	0.24	0.07			0.31	0.45	0.24			0.69	0.03	0.03			0.07
	0062	100.0	0.13					0	0.07	0.03	0.03		0.13					0

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 Subtotal	0.2 0.3	1.2 1.3	2.2 2.3	3.2 3.3	X.2 X.3	Subtotal Subtotal	0.3 0.4	1.3 1.4	2.3 2.4	3.3 3.4	X.3 X.4	Subtotal Subtotal	Total 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	0.01	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	-	4,182	-	4	2	-	-	6	11,483
1976	Aleutian	6	-	-	-	-	-	0.15	0.50	0.02	0.05	0.72	0.01	0.14	0.37	-	0.02	0.54	-	-	0.01	-	-	0.01	1.27
1977	Bristol		17	5	-	22	2	1,587	2,809	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	-	0.06	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	6,841	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																								

TABLE 4. 1984 length statistics of .1 and .2 immature sockeye salmon in Aleutian waters.

Operation No.	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.
0050	7. 5	4	377.0	29.6	7	382.6	17.2	11	380.5	21.2	8	468.5	27.7	2	517.0	32.5	10	478.2	33.7
0051	7. 6	7	368.9	18.6	17	373.9	15.7	24	372.5	16.4	14	470.4	34.7	7	492.4	37.2	21	477.8	36.2
0052	7. 7	6	358.0	25.2	10	364.3	12.0	16	361.9	17.5	25	452.9	22.0	13	468.8	34.5	38	458.4	27.6
0053	7. 8	10	370.5	31.6	18	361.9	19.8	28	365.0	24.4	28	461.8	31.5	13	501.2	33.1	41	474.3	36.7
0054	7. 9	12	370.6	16.1	25	363.0	12.7	37	365.4	14.2	12	469.0	39.6	7	493.3	28.0	19	479.2	36.4
0055	7.10	9	352.6	23.3	16	369.6	15.3	25	363.4	19.9	10	467.2	35.9	3	471.7	18.2	13	468.2	32.0
0056	7.11	25	344.0	23.4	52	361.7	17.2	77	356.0	21.0	13	469.4	31.9	9	509.6	29.7	22	485.8	36.8
0057	7.12	17	349.6	26.3	38	359.9	24.1	55	356.8	25.0	7	457.1	26.3	4	476.8	50.6	11	464.3	35.8
0058	7.13	21	350.6	17.8	35	362.7	16.9	56	358.1	18.1	10	470.9	33.8	7	466.6	33.7	17	469.1	32.7
0059	7.14	3	332.0	15.9	14	362.3	20.7	17	356.9	22.8	9	465.0	30.9	8	474.6	42.8	17	469.5	36.1
0060	7.15	6	340.8	19.3	20	372.6	30.0	26	365.3	30.8	17	472.8	33.9	9	491.4	34.2	26	479.3	34.5
0061	7.16	7	346.7	23.7	31	372.0	22.1	38	367.3	24.2	23	473.0	23.7	17	487.2	25.3	40	479.1	25.1
Subtotal		127	353.8	25.5	283	365.4	20.4	410	361.8	22.5	176	465.9	31.4	99	487.1	36.2	275	473.6	34.1
0236	7.13	30	340.3	27.0	56	361.4	18.9	86	354.0	24.1	26	479.3	36.3	12	491.3	29.1	38	483.1	34.3
0237	7.14	34	335.6	22.8	52	362.9	31.4	86	352.1	31.2	36	469.3	27.4	15	504.4	27.8	51	479.6	31.7
0240	7.17	29	344.8	27.6	28	363.4	20.6	57	353.9	26.0	41	477.7	31.2	26	505.6	25.0	67	488.5	31.9
0241	7.18	6	358.3	24.8	9	381.3	18.2	15	372.1	23.3	23	483.6	30.8	11	522.7	36.4	34	496.2	37.1
0242	7.19	9	344.1	26.1	8	369.4	26.0	17	356.0	28.4	38	477.0	30.1	14	506.3	30.9	52	484.9	32.7

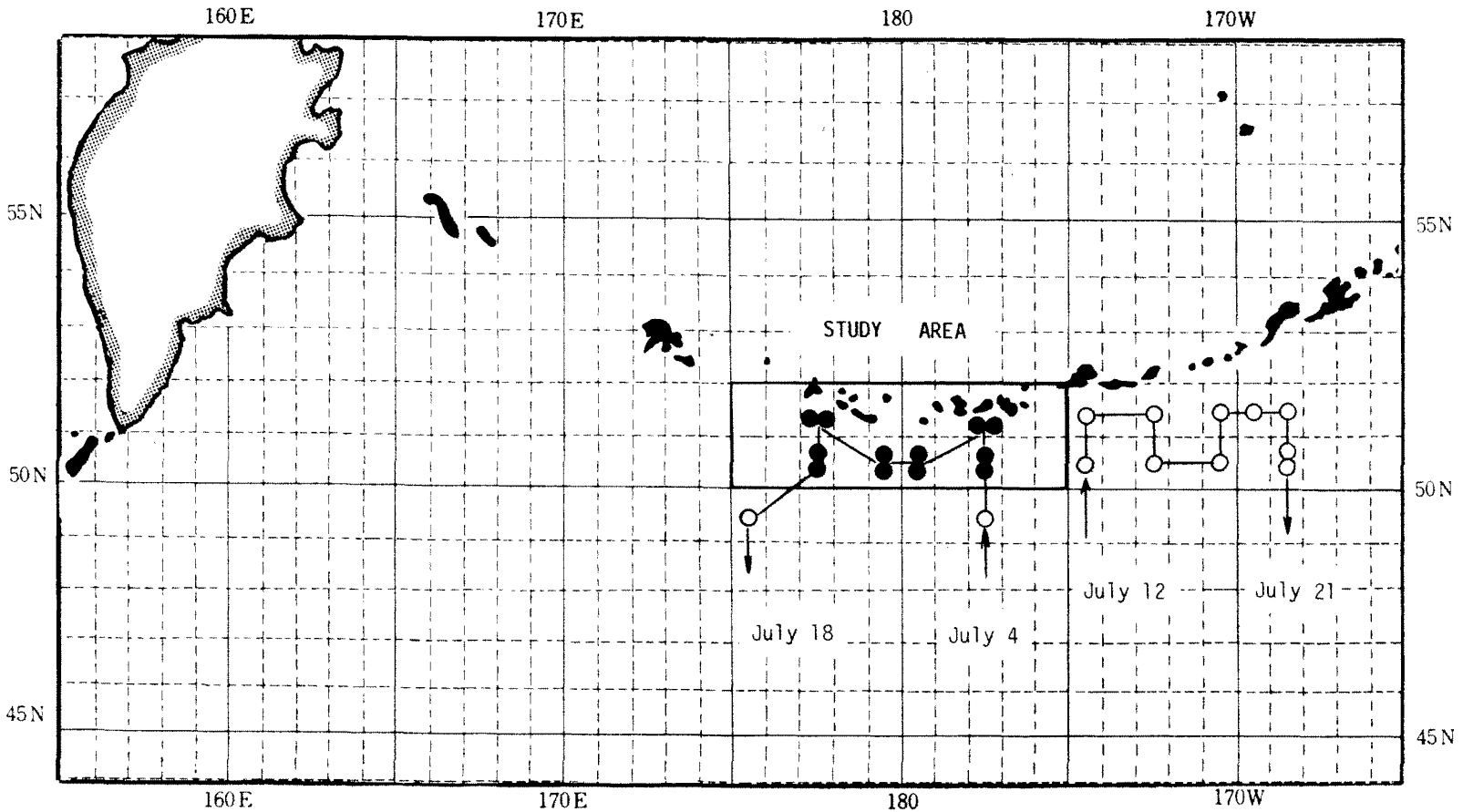

Figure 1. 1984 summer sampling stations of Japanese salmon research vessels in Aleutian waters.

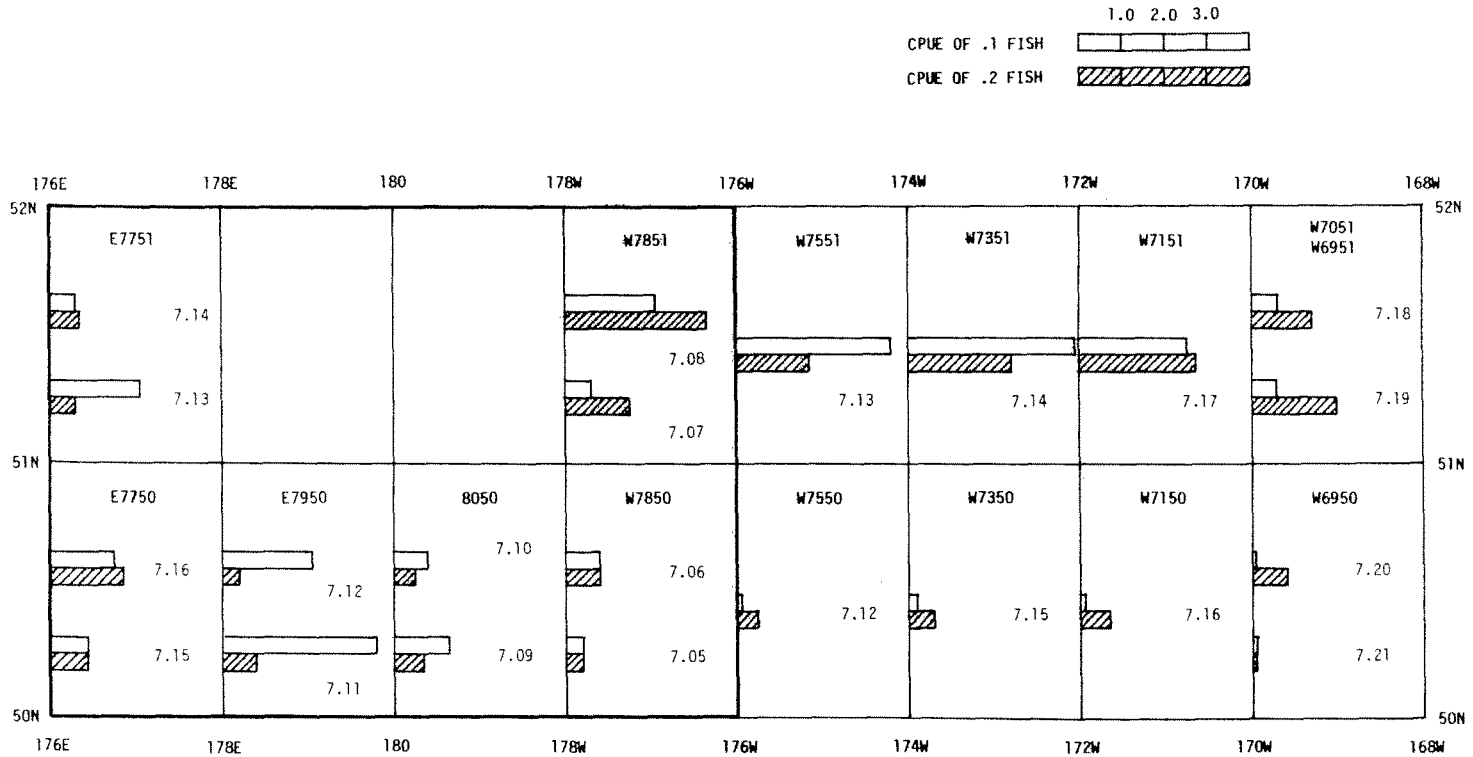

Figure 2. CPUE distribution of immature sockeye salmon by ocean-age, by set and by 1° X 1° area, 1984.

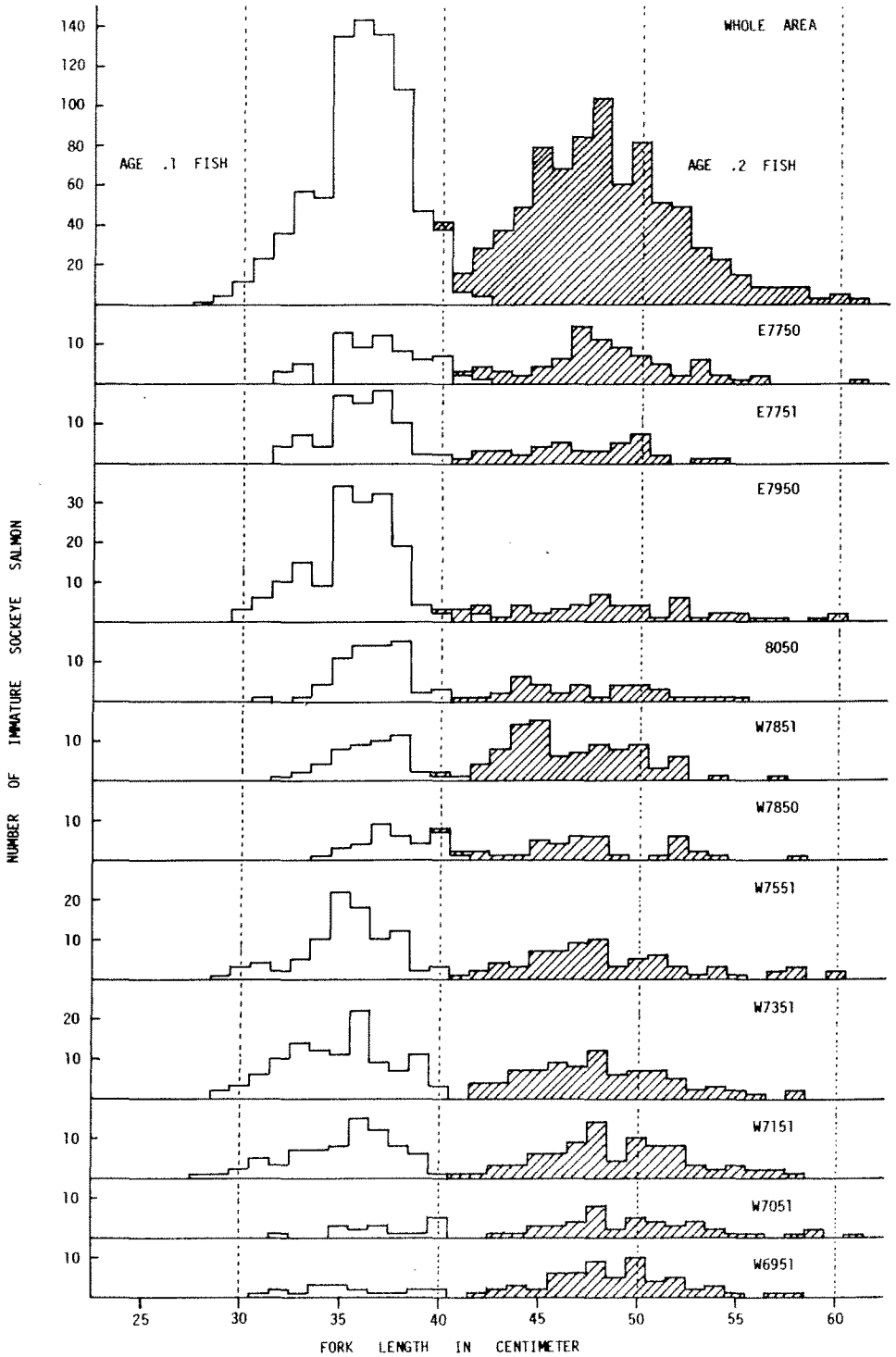

Figure 3. Frequency distribution of fork length of .1 and .2 immature sockeye salmon caught by Japanese research gillnets in each 1°X 1°area and whole area during July 4 - 21, 1984.

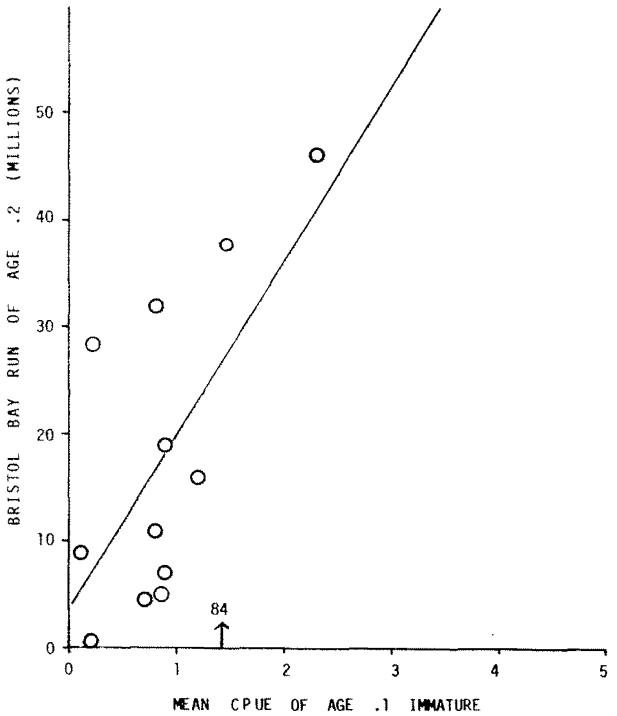

Fig. 4 Relationship between mean CPUE of age .1 immature sockeye salmon in Aleutian waters and number (millions) of age .2 fish of Bristol Bay inshore run in the next year.

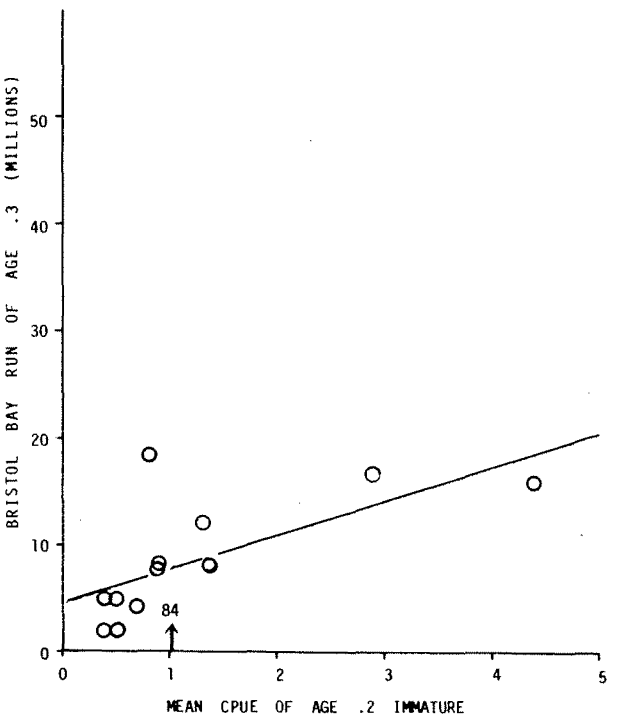

Fig. 5 Relationship between mean CPUE of age .2 immature sockeye salmon in Aleutian waters and number (millions) of age .3 fish of Bristol Bay inshore run in the next year.

APPENDIX TABLE

TABLE 55 - 3 LENGTH STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

CAUGHT IN JAPANESE C NET IN ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST

YEAR	D P N O	SEX	ITEM	OCEAN AGE .1 1.1	2.1	X.1	SUB TOTAL	OCEAN AGE .2 1.2	2.2	X.2	SUB TOTAL	OCEAN AGE .3 1.3	2.3	X.3	SUB TOTAL
1983	0221	MALE	AV FL	-	331.0	346.0	336.0	510.3	541.7	484.0	514.1	-	-	-	-
			SE FL	-	5.0	-	8.2	37.2	21.6	2.0	35.3	-	-	-	-
			NO FL	-	2	1	3	6	3	2	11	-	-	-	-
		FEMALE	AV FL	-	318.3	326.0	320.3	460.8	484.4	494.0	467.7	611.0	-	648.0	623.3
			SE FL	-	13.4	-	9.8	28.4	19.7	-	27.9	39.0	-	-	36.9
			NO FL	-	3	1	4	16	5	1	22	2	-	1	3
		COMB-	AV FL	-	323.4	336.0	327.0	474.3	505.9	487.3	483.2	611.0	-	648.0	623.3
		INED	SE FL	-	11.9	10.0	12.8	38.1	34.3	7.6	37.2	39.0	-	-	36.9
			NO FL	-	5	2	7	22	8	3	33	2	-	1	3
1983	0222	MALE	AV FL	-	313.7	303.0	311.0	493.3	512.7	456.5	497.5	628.0	600.0	-	618.7
			SE FL	-	9.8	-	10.4	44.8	25.4	41.5	42.0	21.0	-	-	20.7
			NO FL	-	3	1	4	20	11	2	33	2	1	-	3
		FEMALE	AV FL	-	352.3	-	352.0	473.0	498.8	488.0	484.9	603.0	587.0	-	592.3
			SE FL	-	-	-	-	23.0	25.9	13.0	27.3	-	19.0	-	18.4
			NO FL	-	1	-	1	10	11	2	23	1	2	-	3
		COMB-	AV FL	-	323.3	303.0	319.2	486.5	505.8	462.3	492.4	619.7	591.3	-	605.5
		INED	SE FL	-	18.2	-	18.9	40.5	25.6	30.5	36.2	19.8	17.8	-	23.6
			NO FL	-	4	1	5	30	22	4	56	3	3	-	6
1983	0223	MALE	AV FL	310.0	331.8	345.0	330.3	503.5	511.8	520.7	508.8	647.3	574.0	-	629.0
			SE FL	8.0	5.7	5.0	13.7	44.0	37.4	34.5	40.7	13.3	-	-	33.3
			NO FL	2	8	2	12	13	11	3	27	3	1	-	4
		FEMALE	AV FL	310.0	333.3	346.0	327.6	470.5	476.3	460.5	471.4	500.0	-	520.0	510.0
			SE FL	9.9	21.3	-	20.9	18.7	36.6	11.5	27.2	-	-	-	10.0
			NO FL	3	6	1	10	8	6	2	16	1	-	1	2
		COMB-	AV FL	310.0	332.4	345.3	329.1	490.9	499.3	496.6	494.9	610.5	574.0	520.0	589.3
		INED	SE FL	9.2	15.6	6.3	16.8	40.2	40.5	40.7	40.3	64.6	-	-	62.9
			NO FL	5	14	3	22	21	17	5	43	4	1	1	6

TABLE 55 - 3 LENGTH STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

CAUCHT IN JAPANESE C NET IN ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST

YEAR	O P N O	SEX	ITEM	OCEAN AGE .1 1.1	2.1	X.1	SUB TOTAL	OCEAN AGE .2 1.2	2.2	X.2	SUB TOTAL	OCEAN AGE .3 1.3	2.3	X.3	SUB TOTAL
1983	0224	MALE	AV FL	320.0	332.0	-	329.6	476.6	525.5	505.3	498.8	651.0	612.0	-	625.0
			SE FL	-	19.6	-	18.2	21.1	36.9	13.2	35.9	3.0	47.6	-	43.0
			NO FL	1	4	-	5	19	15	3	37	2	4	-	6
		FEMALE	AV FL	336.0	327.0	339.5	333.8	474.6	502.6	467.3	482.5	-	596.0	-	596.0
			SE FL	-	5.0	7.5	8.1	30.6	38.6	21.2	35.7	-	6.0	-	6.0
			NO FL	1	2	2	5	17	9	3	29	-	2	-	2
		COMB-	AV FL	328.0	330.3	339.5	331.7	475.6	516.9	486.3	491.6	651.0	606.7	-	617.8
		INED	SE FL	8.0	17.1	7.5	14.3	27.0	39.3	25.9	37.2	3.0	39.2	-	38.6
			NO FL	2	6	2	10	36	24	6	66	2	6	-	8
1983	0225	MALE	AV FL	330.0	-	-	330.0	505.6	496.7	493.7	502.4	-	-	-	-
			SE FL	-	-	-	-	24.3	23.8	16.7	22.7	-	-	-	-
			NO FL	1	-	-	1	33	11	6	50	-	-	-	-
		FEMALE	AV FL	-	350.0	-	350.0	483.6	490.7	487.0	486.5	-	-	-	-
			SE FL	-	10.0	-	10.0	22.0	31.2	13.0	25.2	-	-	-	-
			NO FL	-	2	-	2	9	6	2	17	-	-	-	-
		COMB-	AV FL	330.0	350.0	-	343.3	501.1	494.6	492.0	498.3	-	-	-	-
		INED	SE FL	-	10.6	-	13.4	24.4	26.5	16.9	25.7	-	-	-	-
			NO FL	1	2	-	3	42	17	8	67	-	-	-	-
1983	0226	MALE	AV FL	-	339.6	-	339.6	495.2	494.5	501.2	496.0	-	608.0	-	608.0
			SE FL	-	19.3	-	19.3	28.2	29.3	43.0	32.1	-	-	-	-
			NO FL	-	5	-	5	13	10	5	28	-	1	-	1
		FEMALE	AV FL	-	-	321.0	321.0	475.7	480.0	470.0	477.2	528.0	-	-	528.0
			SE FL	-	-	-	-	26.3	42.1	-	33.1	-	-	-	-
			NO FL	-	-	1	1	14	10	1	25	1	-	-	1
		COMB-	AV FL	-	339.6	321.0	336.5	485.1	487.3	496.0	487.2	528.0	608.0	-	568.0
		INED	SE FL	-	19.3	-	18.9	28.7	36.3	41.0	32.9	-	-	-	40.0
			NO FL	-	5	1	6	27	20	6	53	1	1	-	2

TABLE 55 - 3 LENGTH STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX

CAUGHT IN JAPANESE C NET IN ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST

YEAR	O P N O	SEX	ITEM	OCEAN AGE .1 1.1	2.1	X.1	SUB TOTAL	OCEAN AGE .2 1.2	2.2	X.2	SUB TOTAL	OCEAN AGE .3 1.3	2.3	X.3	SUB TOTAL
1983	0227	MALE	AV FL	-	-	-	-	490.5	485.5	-	488.0	592.0	-	-	592.0
			SE FL	-	-	-	-	9.9	15.3	-	13.1	-	-	-	-
			NO FL	-	-	-	-	4	4	-	8	1	-	-	1
		FEMALE	AV FL	-	-	-	-	484.0	486.5	472.0	483.8	606.0	591.5	616.0	599.1
			SE FL	-	-	-	-	15.1	18.6	-	16.4	18.0	9.8	-	17.0
			NO FL	-	-	-	-	5	4	1	10	2	4	1	7
		COMB-	AV FL	-	-	-	-	486.9	486.0	472.0	485.7	601.3	591.5	616.0	598.3
		INED	SE FL	-	-	-	-	13.1	17.0	-	14.1	17.3	9.8	-	12.3
			NO FL	-	-	-	-	9	8	1	18	3	4	1	8
1983	0328	MALE	AV FL	-	370.7	-	370.7	487.6	514.8	539.7	499.7	579.3	584.0	-	581.2
			SE FL	-	43.4	-	43.4	23.0	37.1	38.5	33.7	9.9	38.0	-	24.9
			NO FL	-	3	-	3	51	25	6	82	3	2	-	5
		FEMALE	AV FL	-	316.0	-	318.0	476.1	490.3	478.3	481.1	547.0	-	-	547.0
			SE FL	-	-	-	-	23.1	23.9	25.9	25.5	37.0	-	-	37.0
			NO FL	-	1	-	1	39	24	8	71	2	-	-	2
		COMB-	AV FL	-	357.5	-	357.5	482.6	502.8	504.6	491.1	566.4	584.0	-	571.4
		INED	SE FL	-	44.1	-	44.1	24.1	33.6	44.2	31.1	28.9	38.0	-	33.2
			NO FL	-	4	-	4	90	49	14	153	5	2	-	7
1983	MEAN	MALE	AV FL	317.5	335.8	334.8	333.5	493.6	511.1	506.1	500.5	620.9	599.8	-	611.4
			SE FL	10.0	24.9	17.8	23.0	31.6	34.5	39.6	34.9	32.5	38.8	-	37.1
			NO FL	4	25	4	33	159	90	27	276	11	9	-	20
		FEMALE	AV FL	316.5	331.9	334.4	329.9	474.0	490.0	474.8	479.7	573.2	591.5	594.7	583.8
			SE FL	14.2	19.2	10.5	17.1	26.1	30.9	20.5	28.6	48.7	12.6	54.0	39.9
			NO FL	4	15	5	24	118	75	20	213	9	8	3	20
		COMB-	AV FL	317.0	334.4	334.6	331.9	485.3	501.5	492.8	491.5	599.5	595.9	594.7	597.6
		INED	SE FL	12.3	22.0	13.7	22.1	30.2	34.7	36.1	33.0	46.2	29.7	54.0	40.9
			NO FL	8	40	9	57	277	165	47	489	20	17	3	40

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

CAUGHT IN JAPANESE C NET IN ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST

YEAR	O P N O	SEX	ITEM	OCEAN AGE .1 1.1	2.1	X.1	SUB TOTAL	OCEAN AGE .2 1.2	2.2	X.2	SUB TOTAL	OCEAN AGE .3 1.3	2.3	X.3	SUB TOTAL
1983	0221	MALE	AV BW	-	372.5	450.0	398.3	1516.7	1793.3	1305.0	1553.6	-	-	-	-
			SE BW	-	27.5	-	43.2	449.9	279.4	65.0	400.3	-	-	-	-
			NO BW	-	2	1	3	6	3	2	11	-	-	-	-
		FEMALE	AV BW	-	348.3	345.0	347.5	1136.9	1334.0	1460.0	1196.4	3125.0	-	3300.0	3183.3
			SE BW	-	34.6	-	29.7	213.5	222.0	-	233.1	325.0	-	-	278.3
			NO BW	-	3	1	4	16	5	1	22	2	-	1	3
		COMB-	AV BW	-	358.0	397.5	369.3	1240.5	1506.3	1356.7	1315.5	3125.0	-	3300.0	3183.3
		INED	SE BW	-	33.9	52.5	43.8	341.9	330.6	89.8	343.4	325.0	-	-	278.3
			NO BW	-	5	2	7	22	8	3	33	2	-	1	3
1983	0222	MALE	AV BW	-	323.3	265.0	313.8	1376.0	1610.0	1075.0	1435.8	3490.0	3000.0	-	3326.7
			SE BW	-	45.2	-	42.0	450.1	283.0	325.0	419.4	340.0	-	-	360.8
			NO BW	-	3	1	4	20	11	2	33	2	1	-	3
		FEMALE	AV BW	-	455.0	-	455.0	1264.0	1482.7	1185.0	1361.7	2720.0	2615.0	-	2650.0
			SE BW	-	-	-	-	241.9	282.2	265.0	289.1	-	115.0	-	106.1
			NO BW	-	1	-	1	10	11	2	23	1	2	-	3
		COMB-	AV BW	-	356.3	285.0	342.0	1338.7	1546.4	1130.0	1405.4	3233.3	2743.3	-	2988.3
		INED	SE BW	-	68.8	-	68.0	396.6	289.4	301.6	373.1	457.2	204.8	-	430.7
			NO BW	-	4	1	5	30	22	4	56	3	3	-	6
1983	0223	MALE	AV BW	295.0	397.4	402.5	381.2	1557.7	1693.6	1716.7	1630.7	3626.7	2630.0	-	3377.5
			SE BW	15.0	32.7	32.5	49.0	604.2	492.4	316.5	539.2	261.5	-	-	487.6
			NO BW	2	8	2	12	13	11	3	27	3	1	-	4
		FEMALE	AV BW	316.7	375.0	390.0	359.0	1165.0	1243.3	1155.0	1193.1	1530.0	-	1530.0	1530.0
			SE BW	23.1	73.0	-	64.5	140.4	463.1	165.0	308.6	-	-	-	-
			NO BW	3	6	1	10	8	6	2	16	1	-	1	2
		COMB-	AV BW	308.0	387.8	398.3	371.1	1408.1	1534.7	1492.0	1467.9	3102.5	2630.0	1530.0	2761.7
		INED	SE BW	23.2	55.0	27.7	57.7	519.5	528.0	383.1	512.5	935.8	-	-	957.5
			NO BW	5	14	3	22	21	17	5	43	4	1	1	6

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

CAUCHT IN JAPANESE C NET IN ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST

YEAR	O P N O	SEX	ITEM	OCEAN AGE .1 1.1	2.1	X.1	SUB TOTAL	OCEAN AGE .2 1.2	2.2	X.2	SUB TOTAL	OCEAN AGE .3 1.3	2.3	X.3	SUB TOTAL
1983	0224	MALE	AV BW	350.0	370.5	-	366.4	1238.9	1713.3	1490.0	1451.6	3400.0	2967.5	-	3111.7
			SE BW	-	46.1	-	42.0	206.7	427.6	220.2	388.7	200.0	755.4	-	659.7
			NO BW	1	4	-	5	19	15	3	37	2	4	-	6
		FEMALE	AV BW	410.0	340.0	387.5	373.0	1242.9	1496.7	1166.7	1313.8	-	2780.0	-	2780.0
			SE BW	-	5.0	52.5	43.7	286.8	484.5	122.5	371.7	-	300.0	-	300.0
			NO BW	1	2	2	5	17	9	3	29	-	2	-	2
		COMB-	AV BW	380.0	360.3	387.5	369.7	1240.8	1632.1	1328.3	1391.1	3400.0	2905.0	-	3028.8
		INED	SE BW	30.0	40.7	52.5	43.0	247.7	461.8	240.8	387.2	200.0	646.7	-	607.7
			NO BW	2	6	2	10	36	24	6	66	2	6	-	8
1983	0225	MALE	AV BW	330.0	-	-	330.0	1476.4	1389.1	1380.0	1445.6	-	-	-	-
			SE BW	-	-	-	-	202.7	210.0	139.3	202.7	-	-	-	-
			NO BW	1	-	-	1	33	11	6	50	-	-	-	-
		FEMALE	AV BW	-	442.5	-	442.5	1297.8	1366.7	1285.0	1320.6	-	-	-	-
			SE BW	-	57.5	-	57.5	190.7	204.2	185.0	198.0	-	-	-	-
			NO BW	-	2	-	2	9	6	2	17	-	-	-	-
		COMB-	AV BW	330.0	442.5	-	405.0	1438.1	1381.2	1356.3	1413.9	-	-	-	-
		INED	SE BW	-	57.5	-	70.8	213.4	208.2	157.0	208.6	-	-	-	-
			NO BW	1	2	-	3	42	17	8	67	-	-	-	-
1983	0226	MALE	AV BW	-	405.0	-	405.0	1398.5	1447.0	1516.0	1436.8	-	2870.0	-	2870.0
			SE BW	-	66.6	-	66.6	262.2	284.5	432.9	310.1	-	-	-	-
			NO BW	-	5	-	5	13	10	5	28	-	1	-	1
		FEMALE	AV BW	-	-	368.0	368.0	1228.6	1318.0	1320.0	1268.0	1760.0	-	-	1760.0
			SE BW	-	-	-	-	237.5	436.0	-	331.2	-	-	-	-
			NO BW	-	-	1	1	14	10	1	25	1	-	-	1
		COMB-	AV BW	-	405.0	368.0	398.8	1310.4	1382.5	1483.3	1357.2	1760.0	2870.0	-	2315.0
		INED	SE BW	-	66.6	-	62.6	263.8	373.8	402.0	331.0	-	-	-	555.0
			NO BW	-	5	1	6	27	20	6	53	1	1	-	2

TABLE 55 - 4 WEIGHT STATISTICS OF IMMATURE SOCKEYE SALMON BY AGE AND SEX PAGE 3

CAUCHT IN JAPANESE C NET IN ALUETIAN WATER DURING LATE JUNE AND EARLY AUGUST

YEAR	O P N O	SEX	ITEM	OCEAN AGE .1 1.1	2.1	X.1	SUB TOTAL	OCEAN AGE .2 1.2	2.2	X.2	SUB TOTAL	OCEAN AGE .3 1.3	2.3	X.3	SUB TOTAL
1983	0227	MALE	AV BW	-	-	-	-	1382.5	1280.0	-	1331.3	2450.0	-	-	2450.0
			SE BW	-	-	-	-	154.3	102.7	-	140.3	-	-	-	-
			NO BW	-	-	-	-	4	4	-	8	1	-	-	1
		FEMALE	AV BW	-	-	-	-	1302.0	1272.5	1250.0	1285.0	2900.0	2615.0	3030.0	2755.7
			SE BW	-	-	-	-	137.0	229.5	-	175.5	400.0	117.8	-	285.9
			NO BW	-	-	-	-	5	4	1	10	2	4	1	7
		COMB-	AV BW	-	-	-	-	1337.8	1276.3	1250.0	1305.6	2750.0	2615.0	3030.0	2717.5
		INED	SE BW	-	-	-	-	150.2	177.5	-	162.2	389.4	117.8	-	285.8
			NO BW	-	-	-	-	9	8	1	18	3	4	1	8
1983	0328	MALE	AV BW	-	563.3	-	563.3	1404.7	1648.4	1985.0	1521.5	2513.3	2550.0	-	2528.0
			SE BW	-	224.9	-	224.9	240.7	477.8	526.9	393.6	229.2	750.0	-	506.7
			NO BW	-	3	-	3	51	25	6	82	3	2	-	5
		FEMALE	AV BW	-	320.0	-	320.0	1291.5	1424.6	1313.8	1339.0	2280.0	-	-	2280.0
			SE BW	-	-	-	-	228.3	277.5	228.6	253.6	540.0	-	-	540.0
			NO BW	-	1	-	1	39	24	8	71	2	-	-	2
		COMB-	AV BW	-	502.5	-	502.5	1355.7	1538.8	1601.4	1436.8	2420.0	2550.0	-	2457.1
		INED	SE BW	-	221.4	-	221.4	241.7	408.2	509.3	348.2	401.4	750.0	-	528.6
			NO BW	-	4	-	4	90	49	14	153	5	2	-	7
1983	MEAN	MALE	AV BW	317.5	403.6	385.0	390.9	1411.8	1594.4	1561.1	1486.0	3150.0	2830.0	-	3006.0
			SE BW	25.9	109.9	65.1	102.6	329.1	410.5	445.7	379.7	557.4	642.1	-	617.9
			NO BW	4	25	4	33	159	90	27	276	11	9	-	20
		FEMALE	AV BW	340.0	375.7	375.6	369.7	1246.1	1394.3	1264.5	1300.0	2513.3	2656.3	2620.0	2586.5
			SE BW	45.3	65.8	37.4	59.5	234.4	350.3	206.7	287.3	654.0	193.9	778.6	550.4
			NO BW	4	15	5	24	118	75	20	213	9	8	3	20
		COMB-	AV BW	328.8	393.2	379.8	382.0	1341.2	1503.5	1434.9	1405.0	2863.5	2748.2	2620.0	2796.3
		INED	SE BW	38.1	96.5	51.6	87.6	303.8	396.8	392.1	1385.3	680.9	493.8	778.6	621.4
			NO BW	8	40	9	57	277	165	47	489	20	17	3	40

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TRANSLATION

ABUNDANCE AND BIOLOGICAL INFORMATION OF IMMATURE SOCKEYE SALMON IN WATERS SOUTH OF THE ALEUTIAN ISLANDS IN 1984 JULY

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In previous reports, Takagi and Ito (1980, 1981, 1982, and 1983) provided information on immature sockeye salmon collected with research gillnets (10 different mesh sizes) by Japanese research vessels in waters of 175°E to 175°W and 50°N to 52°N in the period June 28 to August 10 in 1972 to 1983. This report provides information newly obtained in 1984 as a continuation of the previous reports.

The research area on the south side of the Aleutian Islands in 1984 July is shown in Fig. 1. In 1984, the research vessel Hokushin maru conducted research operations on lines of 177°30'E and 177°30'W as well as at stations between these lines as in 1981 and 1982. Another research vessel, Riasu maru No. 2, conducted research operations on the south side of the Aleutian Islands east of 175°W for the first time in order to reinforce the routine research operations.

The dates and locations of operations, number of tans used, number of salmon caught, 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 12 research operations showed sockeye salmon to constitute 55.2% of catches with chum second (34.6%) and coho third (9.3%). The low proportion of pink salmon (0.7%) is a distinct feature in odd years for this species. The average water temperature in 12 research operations was 7.9°C.

Measurements of fork length, body weight, gonad weight, sex, and collection of scales were made, as a rule, for all salmonid individuals caught by 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 are not consistent with the total value. The arithmetic mean CPUE values throughout periods and areas were calculated from values at each station. The percentage of immature sockeye salmon caught within this period and area in 1984 was an average of 95.4%.

The CPUE values of immature sockeye salmon obtained in 1984 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. According to the results of research operations in previous years, there were some years in which differences in the ocean age composition were observed among areas. A remarkable feature observed in 1980 and 1981 was that immature fish of ocean age one were predominant in the southwestern portion of the research area. The results in 1984, however, did not show great differences in the ocean age composition among areas. To some extent, ocean age .2 fish were predominant in area W7851 which was in the northeastern research area and ocean age .1 fish were predominant in area E7950 which was closely related to the southwestern research area. However, the research results conducted on the east side of the standard research area were not linked with the above trend.

Many immature sockeye were caught in waters north of 51°N. When we look at areas east of 175°W, among the waters above, ocean age .1 fish were predominant on the side adjacent to the standard research area and an increasing trend in relative proportion of ocean age .2 fish was observed moving east. That is, ocean age .1 fish were predominant in areas W7551 and W7351 while ocean age .1 and .2 fish were equally

represented in area W7151 and ocean age .2 fish were predominant in areas W7051 and W6951. In short, the ocean age composition in waters east of 175°W did not show a trend consecutive to that of the survey results in the standard research area and showed independent characteristics different to those observed among the research stations in only this area. The research vessel operating in the portion west of 175°W conducted operations moving from east to west and the other research vessel (east of 175°W) started operations about one week later and moved from west to east. The research results shown in Fig. 2 seem to be discontinuous at the line of 176°W. The research schedule may be the reason for this.

The ocean age composition of immature sockeye salmon obtained by research conducted in 1984 was 57.6% age .1 and 40.8% age .2 fish. In the case of research for immature sockeye salmon one cycle before, i.e. 1979, it was 34.5% age .1 and 64.6% age .2.

The length frequency distributions of immature sockeye salmon caught during the research operations are shown in Fig. 3 for 1°x1° areas and for all areas combined. The 1°x1° areas are ordered from west to east in order from top to bottom. According to the fork length composition for all areas combined by ocean age, the mode in the composition for ocean age .1 fish in 1984 was 36 cm which was larger than in 1981 to 1983 (32 to 35 cm) and the same as that in 1979 (36 cm). The mode in fork length composition of age .2 fish in 1984 was 48 cm which was the same as those in 1981 and 1983 (48 cm) and larger than in 1982 (45 cm). Yearly comparisons for the standard research area show that the means of 46.6 cm for age 1.2 fish and 48.7 cm for age 2.2 fish in 1984 (Table 4) were smaller than the 48.5 cm and 49.6 cm, respectively, in 1983. It was observed that fork length of ocean age .1 fish became larger moving from west to east in areas E7751 to W7850, as shown in Fig. 3. However, in waters further east of those areas, this trend discontinued and the fork length of ocean age .1 fish became somewhat smaller. As in the case of Fig. 2, it is also necessary to consider differences in the research periods by the two research vessels.

As in previous studies, effort was made in 1984 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 5 to July 16. The arithmetic mean of CPUEs obtained in 1984 was 1.44 for fish of ocean age one year and 1.02 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 (X1) and the coastal run of fish of ocean age two years in the following year (Y1), the equation is $Y1=3.79+16.23X1$, with a correlation coefficient =0.67. For immature ocean age two year fish (X2) and the coastal run of fish of ocean age three years in the following year (Y2), $Y2=4.74+3.20X2$, and the correlation coefficient =0.67.

It is obvious from previous research results that immature sockeye salmon found on the south side of the Aleutian Islands from July to early August originate mainly in Bristol Bay. When we forecast the runs to Bristol Bay coastal areas in the following year from the relative abundance of immature sockeye salmon in this period and area, the problem of representativeness of the value of relative abundance obtained from the research in the ocean is one of the factors which influence the accuracy of the forecast. As the occurrence of immature sockeye salmon in this period and area changes considerably every year, it is difficult to get good representative measurement values from the limited area and period. According to research results in 1983, the relative abundance of immature ocean age one year fish was extremely low but we could not detect the cause. It was considered that a better representation of relative abundance might be obtained by extending the research period later and the research area further east. In 1984, research operations were conducted in waters east of 175°W in order to supplement research in the standard research areas. As a result, the existence of immature sockeye salmon of high density was confirmed in waters north of 51°N. Part of this fish group may

migrate towards the north through the Islands, but most of them appear to migrate towards the west soon after they appear in the routine research areas. If the 1984 research period was extended to an even later period, higher relative abundance values might be obtained in the standard research areas.

Ignoring the research cost, it would be desirable to conduct research first throughout the whole range of the period and area in waters in which immature sockeye originating in Bristol Bay pass through south of the Aleutian Islands for the sake of understanding the outline of the movement of the immature sockeye, and to conduct abundance observations subsequently in areas where the main migrating group is expected to appear.

When the migration timing and route are changed each year, if we maintain a standard research area and period, it is not always possible to obtain each year values which are comparable. Looking towards effective utilization of research effort, if we extended the research areas on the south side of the Aleutian Islands towards the east, we would be able to have more opportunities to encounter the main group of fish which is better than maintaining a narrow research area and extending the research period.

CPUE values for immature sockeye salmon, by adding the research results obtained between 51° to 52°N and 168°W to 175°W and the research results in the standard research area, were 1.67 for ocean age one year fish and 1.32 for ocean age two year fish.

TABLES 1 TO 4, FIGS. 1 TO 5, AND APPENDIX TABLES 55-3 AND 55-4 ARE IN ENGLISH IN THE JAPANESE DOCUMENT