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North Shelikof Strait 1988 Sockeye Catch-- Distribution, Timing, and Stock Composition

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By

Bruce M. Barrett

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (Continued)

ABSTRACT

In 1988, 524,911 sockeye salmon were caught in the north Shelikof Strait. On the mainland side the majority of the catch was in the Dakavak Bay Section, while on the Kodiak side the predominant catch area was in the Northwest Afognak Section. About 80% of the area catch occurred in the two weeks from 10 July through 23 July. Age-1.3 sockeye comprised 60% of the catch, and their average length was 592 mm.

Historic tagging information, timing data, age composition, and age-1.3 length data were evaluated to determine the probable stock composition of the catch. Approximately 95% of the catch was Upper Cook Inlet fish, while about 5% was local Kodiak fish. The dominant Upper Cook Inlet stock was Kenai River fish. The 1988 Upper Cook Inlet sockeye run was about 8,777,939 fish which includes an estimated 498,665 Cook Inlet fish caught in the north Shelikof Strait fishery. The estimated catch of Upper Cook Inlet fish in the north Shelikof Strait was 5.7% of the total Upper Cook Inlet run.

INTRODUCTION

North Shelikof Strait encompasses the marine waters east of the Alaska Peninsula from Dakavak Bay north to Cape Douglas and west of the Kodiak Archipelago from Raspberry Cape north to the northernmost end of Shuyak Island (Figure 1). Included within this area are the Dakavak Bay, Outer Kukak Bay, Hallo Bay, and Big River Sections of the Mainland District, and the Southwest Afognak, Northwest Afognak, and Shuyak Islands Sections of the Afognak District which are part of the Kodiak Management Area (Figures 2 and 3).

The intent of this report is to address where and when the 1988 sockeye catch occurred in the north Shelikof Strait and the probable stock composition of the catch. The management of the 1988 north Shelikof Strait fishery is covered in Malloy (1988).

CATCH DISTRIBUTION, AND TIMING

In 1988 a total of 524,911 sockeye salmon were caught in the north Shelikof Strait (Tables 1 and 2). The catch was 54% (240,524 sockeye) from the mainland side and 46% (284,387 sockeye) from the Afognak side (Figures 2 and 3). On the mainland side the catch was 94% from the Dakavak Bay Section, 3% from the Outer Kukak Bay Section, and 3% and from the Big River Section. Less than 1% of catch was from the Hallo Bay Section which lies between the Big River and Outer Kukak Sections. On the Afognak side the catch was more evenly distributed. The catch was 34% from the Southwest

Afognak Section, 46% from the Northwest Afognak Section, and 20% from the Shuyak Island Section.

Most of the north Shelikof Strait catch occurred in the two weeks from 10 July through 23 July (Figure 4). On the mainland side 63% of the catch was during this period, while on the Afognak side 94% of the catch was during this time (Figures 2 and 3).

STOCK COMPOSITION

To determine the probable stock composition of the north Shelikof Strait catch the report: 1.) reviews the available historic tagging data; 2.) compares the timing of the north Shelikof catch with the run timing of the Karluk River run and the Cook Inlet catch; 3.) compares the age composition of the north Shelikof catch with the age composition of the Kodiak Island and Cook Inlet late run stocks; and 4.) compares the age 1.3 average sockeye length in the north Shelikof catch with the age 1.3 average sockeye length in the Kodiak and Cook Inlet escapements.

Historic Tagging Data

On the west side of the Kodiak Archipelago, sockeye salmon have been tagged intermittently at various locations from 1927 (Rich and Morton 1929) through 1981 (Tyler et al. 1986). Prior to 1950 the fish were tagged from pile driven fish traps, while after 1950 the fish were tagged from purse seine boats (Nicholson 1978). Essentially all the tagging work on the west

side of Kodiak has had two common objectives: 1.) to determine the stock composition of the fish present at a particular time and location; and 2.) to determine the average travel time of individual major stocks through various fishery units.

For the purpose of this report the focus is on the sockeye tagging conducted from Uganik Bay north to Malina Bay (Malina Bay is the northernmost tagging location). This encompasses about a 35 mile reach and includes the Southwest Afognak Section which is located in the southeast corner of the north Shelikof Strait (Figure 5). Most of the tagging work in this area occurred in late June. The exceptions were at Broken Point on the south side of Uganik Bay for late August 1927, at Miners Point on the south side of Uganik Bay for early June 1981, and at Noisy Island on the west side of Uganik Island also for early June 1981.

Since 1927, a total of 11,043 sockeye salmon have been tagged at various locations from Uganik Bay to Malina Bay (Table 3). Approximately 5,000 recoveries have been obtained from the fish tagged in this area, and the majority of the recoveries have been in the Kodiak Archipelago. However, there have been recoveries in Cook Inlet, Chignik, the Alaska Peninsula, and Bristol Bay.

On the south side of Uganik Bay, which includes Miners Point and Broken Point, sockeye salmon were tagged in 1927, 1969, 1970, 1971, 1977, and 1981 (Table 3 and Figure 6). The results indicated that most of the fish on the south side of Uganik Bay in June are Kodiak stocks, but Chignik and Cook

Inlet stocks are occasionally present. Chignik fish comprised 22% of the June recoveries in 1971, 6% in 1977, and 1% in 1981, while Cook Inlet fish were represented only in June 1977, accounting for 1% of the recoveries. The only August tagging in this area was in 1927, and 99% of the recoveries were from the Kodiak Archipelago and 1% were from Cook Inlet.

On the north side of Uganik Bay, which includes Noisy Island and Uganik Island, sockeye salmon were tagged in June of 1948, 1949, 1961, 1970, 1971, 1977, and 1981 (Figure 7). All the recoveries from these June tagging studies were Kodiak fish except in 1949 when 1% of the recoveries were Cook Inlet fish.

At Outlet Cape on the southwest side of Kupreanof Strait, tagging was limited to a single release of 20 fish on 25 June 1971 (Figure 7). There were only two recoveries from this tagging effort, and both were from the Kodiak Archipelago at Karluk.

In the Southwest Afognak Section tagging has been conducted on the west end of Raspberry Island and in Malina Bay (Figure 8). Tagging on 24 June 1981 at Raspberry Cape showed a strong presence of Cook Inlet fish. The tag recoveries were 59% Cook Inlet fish, 30% Kodiak fish, and 11% Chignik fish. At the northwest end of Raspberry Island, Kodiak fish were dominant in the June tagging during 1948, 1949, and 1981. The only significant non-local stock contribution occurred in 1981 when 17% of the recoveries were Cook Inlet fish. The results of tagging at Malina Bay in June of 1948, 1949, and 1977 indicated a strong presence (87% to 100%) of Kodiak fish in this

area. Cook Inlet fish represented only 13% of the recoveries in 1948, and 2% of the recoveries in 1949.

In summary, the historic tagging information indicates that during June essentially all the sockeye salmon in the Uganik Bay to Kupreanof Strait area are of Kodiak origin. However in the Raspberry Cape to Malina Bay area a mixing of local and non-local stocks occurs in June. Depending on the year, the sockeye stock composition in this area ranges from 100% to 30% Kodiak fish, and from 59% to 0% Cook Inlet fish.

The historic tagging information for the Uganik Bay to Malina Bay area provides a good indication of the June stock composition for Shelikof Strait but is inconclusive on the post-June stock composition for this area. Since nearly all the 1988 north Shelikof Strait sockeye catch occurred post-June, no conclusion should be drawn from the historic tagging information on the probable stock composition of this catch.

Timing

The closest major sockeye system on the west side of the Kodiak Archipelago to the north Shelikof Strait area is the Karluk River. This system has two sockeye runs, an early and a late run. The early run escapement peaks in the Karluk River about 20 June, while the late run escapement peak is about 1 September (Prokopowich, ADF&G, Kodiak, personal communication). The closest non-local sockeye population to the north Shelikof Strait is in

Upper Cook Inlet. The Upper Cook Inlet run usually peaks in the commercial fishery there about 15 July (Cross et al. 1986).

In an effort to determine whether the 1988 north Shelikof Strait catch was mainly local Kodiak fish or Upper Cook Inlet fish, the timing of the Karluk River, and the Upper Cook Inlet runs in the north Shelikof Strait was compared with the timing of the catch there. To accomplish this information was required on the average migration time of these stocks from the north Shelikof Strait to their respective terminal areas. Tyler et al. (1986) reported that early-run Karluk River fish average 7-days travel from the north Shelikof Strait to Karluk River (Figure 9), and Malloy (ADF&G, Kodiak, personal communication) indicated that late-run Karluk River fish average 14-days travel from the north Shelikof Strait to the Karluk River. Tyler et al. (1986) also reported that Upper Cook Inlet sockeye salmon average 10-days travel from the north Shelikof Strait to Upper Cook Inlet (Figure 10). Applying these average migration times to the 1988 Karluk River weir escapement counts and 1988 Upper Cook Inlet CPUE data, allowed time-of-entry curves to be constructed for the early and late Karluk River and Upper Cook Inlet sockeye salmon in the north Shelikof Strait (Figure 11).

Based on a time-of-entry curve, the 1988 early-run Karluk River fish were abundant in the north Shelikof Strait from mid-May to mid-June, and the peak occurred in early June (Figure 11). The late-run Karluk River fish were abundant in the north Shelikof Strait from late July through late September, and their peak occurred in late August. Both early and late run

Karluk River fish were relatively scarce in the north Shelikof Strait from early July through mid-July. The Upper Cook Inlet run timing curve adjusted to the north Shelikof Strait indicates this population was abundant in the area from late June through mid-July, and the peak occurred in early July (Figure 11).

The 1988 north Shelikof Strait sockeye catch, which primarily occurred during the two weeks from 10 July through 23 July, overlaps the run timing of the latter half of the Upper Cook Inlet run and the beginning of the Karluk River late run (Figure 12). Although the catch overlapped the two runs, the timing of the north Shelikof Strait catch is more in line with the timing of the Upper Cook Inlet run than with the timing of the Karluk River run. Additionally the north Shelikof Strait catch timing curve matches the configuration of the Upper Cook Inlet run timing curve but is quite dissimilar to the Karluk River run timing curve.

From the above timing information it appears that Kodiak stocks were a minor component and Upper Cook Inlet stocks were the major component of the sockeye catch from the north Shelikof Strait.

Age Composition

A total of 1,602 sockeye salmon were sampled from the 1988 north Shelikof Strait catch for age (Table 4). The catch was 60.0% age 1.3, 17.3% age 2.3, 0.9% age 0.2, and 21.8% other ages (Figure 13).

The Kodiak late run stocks were 36.5% age 2.2, 21.3% age 0.2, 12.8% age 2.3, 4.9% age 1.3, and 29.4% other ages (Table 5). The age-0.2 component was nearly all from Upper Station Lakes which are located on the south end of Kodiak Island.

The Cook Inlet late run stocks were 65.0% age 1.3, 7.3% age 2.2, 0.1% age 0.2, 5.0% age 2.3, and 22.6% other ages (Table 6). The Kenai River had most (83%) of the age-1.3 fish, while the Susitna River had nearly all (98%) of the age-0.2 fish.

The age composition of the 1988 north Shelikof Strait catch was similar to the age composition of the Upper Cook Inlet run but dissimilar to the age composition of the Kodiak run (Figure 14). For example there were 60.0% age-1.3 fish in the north Shelikof Strait catch, 65.0% age-1.3 fish in the Cook Inlet stocks and 4.9% age-1.3 fish in the Kodiak stocks. The same relationships occurred among the age-1.2, age-2.2, and age-0.2 fish.

The above age composition information indicates that Cook Inlet stocks were probably a major component, while Kodiak stocks were probably a minor component of the north Shelikof Strait catch.

Utilizing the age composition data it was possible to estimate the stock composition of the north Shelikof Strait catch using the age-0.2 fish as a biological marker subject to three assumptions. The first assumption was that all of the age-0.2 fish in the combined Cook Inlet and Kodiak run were Kodiak fish. Actually 97.4% of the age-0.2 fish were of Kodiak origin and

2.6% of the age-0.2 fish were of Cook Inlet origin. The second assumption was that Upper Station sockeye salmon were present in the north Shelikof Strait. The 1981 tagging work by Tyler et al.(1986) confirmed the presence of Olga Bay sockeye stocks, which included the Upper Station fish, in the Southwest Afognak Section. The third assumption was that the age samples from the north Shelikof catch, and from the Cook Inlet and Kodiak escapements were representative of the populations. The combined sample from the north Shelikof catch was from the peak of the fishery (Tables 1 and 2) and was large enough to accurately describe the age composition (Thompson 1987). The Kodiak and Cook Inlet escapement samples also were large enough to provide accurate age compositions.

Based on sampling data, there were 4,915 age-0.2 fish in the north Shelikof catch, and 21.3% age-0.2 fish in the Kodiak run. Assuming that all age-0.2 fish were of Kodiak origin, the 4,915 age-0.2 fish in the Shelikof catch therefore represented about 21.3% of the Kodiak stock contribution to this fishery. Taking this a step further, the total Kodiak stock contribution was then 23,100 fish which amounted to 4% of the north Shelikof catch (95% confidence limits: 2.2% - 6.6%). The remaining 501,800 fish (96%) in the north Shelikof catch represented the Cook Inlet contribution.

Since age-1.3 fish essentially only occurred in the Upper Cook Inlet run, age 1.3 can also be used as a biological marker (Cook Inlet has 97% of the age 1.3-fish). From this marker the north Shelikof Strait catch was approximately 8% Kodiak fish and 92% Cook Inlet fish.

Length Composition

In mixed stock fisheries length statistics are often useful in determining stock composition levels when the contributing stocks have different length characteristics.

Age-1.3 sockeye salmon were 60% of the north Shelikof Strait catch, and length information is available on this age class. To determine stock contribution this report section compares the length statistics of the age-1.3 sockeye for the north Shelikof Strait catch with the age-1.3 length statistics on the Kodiak and Cook Inlet escapements.

The average age-1.3 length in the north Shelikof Strait catch was 592 mm (Figure 15). The Kodiak average age-1.3 escapement length was 525 mm for Afognak River, 526 mm for Little River, 563 mm for Uganik Lake, 571 mm for Saltery Lake, 575 for Red River, and 583 mm for Upper Station Lakes (Figure 15). All but the Kodiak Upper Station Lakes age-1.3 sockeye salmon were significantly smaller in length than the age-1.3 sockeye salmon in the north Shelikof Strait catch. The Cook Inlet Kasilof River average age-1.3 escapement length was 552 mm, while the Susitna River average age-1.3 escapement length was 568 mm (Figure 16). Both the Kasilof River and Susitna River average age-1.3 escapement lengths were significantly smaller than the average 1.3-age fish length in the north Shelikof Strait catch. The Cook Inlet Kenai River escapement age-1.3 fish averaged 586 mm which is statistically similar to the 592 mm average age-1.3 length in the north Shelikof Strait catch.

Only the age-1.3 fish at Kodiak Upper Station Lakes and Cook Inlet Kenai River were the same approximate length as the age-1.3 fish in the Shelikof catch. Since there were relatively few age-1.3 fish in the Upper Station Lakes run (53,000) compared to the large number of age-1.3 fish in the Kenai River run (4,455,000), the Kenai River fish were likely the major contributor to the 1988 north Shelikof Strait catch.

SUMMARY

The historic tagging information presented was inconclusive on the probable stock composition of the north Shelikof Strait sockeye catch. A comparison of the timing of the north Shelikof Strait catch with the timing of the Cook Inlet run and the Karluk River run indicated that the catch was probably mostly Cook Inlet fish. The age data indicated that the catch was about 95% Cook Inlet fish and 5% Kodiak fish. The age-1.3 length data combined with the age composition information indicated that Cook Inlet Kenai River fish were the dominant component of the north Shelikof Strait catch.

By assuming 95% of the north Shelikof Strait catch was Cook Inlet fish, it is possible to estimate the impact of the North Shelikof Strait catch on the Upper Cook Inlet run. But before doing this it is essential to briefly cover the distribution and abundance of the Cook Inlet inshore run by stock.

The 1988 Cook Inlet inshore sockeye run was 8,279,274 fish (Table 7). The composition was 71% Kenai River, 14% Kasilof River, 7% Susitna River, 4% Crescent River, and 4% other fish. The Upper Cook Inlet sockeye catch was 6,676,580 fish, which was second only to 1987, and the escapement was 1,602,694 fish. The escapements into Kasilof and Crescent Rivers were within the management goal for these systems, while the escapements into Kenai River and Susitna River escapements were outside the management goal. The Kenai River escapement was 46% (320,978 fish) above the goal, while the Susitna River escapement was 50% (100,000 fish) lower than the goal.

The 1988 north Shelikof Strait fishery took approximately 498,665 Cook Inlet sockeye salmon (Table 8). Including this amount the total 1988 Cook Inlet sockeye run was about 8,777,939 fish. The catch of Cook Inlet fish in the north Shelikof Strait fishery was 5.7% of the total Cook Inlet run.

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Table 1. Salmon catch by species within selected sections of the Mainland District of the Kodiak Management Area, statisticial weeks 25-34, 1988.

District	Section	DATE	Stat. Week	Permits	Lndgs.	Number of Salmon					
						Chinook	Sockeye	Pink	Chum	Coho	Total
MAINLAND											
	BIG RIVER	02-Jul	27	2	2	122	988	0	715	0	1,825
		09-Jul	28	4	6	3	251	31	622	0	907
		16-Jul	29	5	5	6	1,621	1,417	4,173	44	7,261
		23-Jul	30	6	6	2	2,939	743	956	116	4,756
		30-Jul	31	7	12	0	554	16,900	21,907	1	39,362
			Totals		31	133	6,353	19,091	28,373	161	54,111
	HALLOW BAY	16-Jul	29	4	5	20	1,202	284	2,987	26	4,519
		30-Jul	31	5	6	1	12	3,706	7,775	0	11,494
			Totals		11	21	1,214	3,990	10,762	26	16,013
	KUKAK	18-Jun	25	2	2	1	1,602	0	22	0	1,625
		25-Jun	26	1	1	0	600	0	25	0	625
		02-Jul	27	7	7	68	3,203	69	982	3	4,325
		09-Jul	28	1	1	12	356	50	177	0	595
		23-Jul	30	2	2	0	819	164	278	21	1,282
		20-Aug	34	18	25	19	44	4,195	25,822	196	30,276
			Totals		38	100	6,624	4,478	27,306	220	38,728
	DAKAVAK BAY	09-Jul	28	38	40	388	48,521	3,259	18,713	41	70,922
		16-Jul	29	110	167	3,661	74,053	4,917	22,569	556	105,756
		23-Jul	30	57	72	305	72,643	16,311	15,782	1,492	106,533
		30-Jul	31	40	62	1,373	25,050	34,117	13,283	2,681	76,504
		06-Aug	32	16	20	153	568	25,398	8,265	897	35,281
		13-Aug	33	19	23	164	5,498	22,885	5,472	658	34,677
			Totals		384	6,044	226,333	106,887	84,084	6,325	429,673
	combined	18-Jun	25	2	2	1	1,602	0	22	0	1,625
		25-Jun	26	1	1	0	600	0	25	0	625
		02-Jul	27	9	9	190	4,191	69	1,697	3	6,150
		09-Jul	28	43	47	403	49,128	3,340	19,512	41	72,424
		16-Jul	29	119	177	3,687	76,876	6,618	29,729	626	117,536
		23-Jul	30	65	80	307	76,401	17,218	17,016	1,629	112,571
		30-Jul	31	52	80	1,374	25,616	54,723	42,965	2,682	127,360
		06-Aug	32	16	20	153	568	25,398	8,265	897	35,281
		13-Aug	33	19	23	164	5,498	22,885	5,472	658	34,677
		20-Aug	34	18	25	19	44	4,195	25,822	196	30,276
			Totals	344	464	6,298	240,524	134,446	150,525	6,732	538,525

Table 7. Salmon catch by species within selected sections of the Afognak District of the Kodiak Management Area, statisticial weeks 25-34, 1988.

District	Section	DATE	Stat. Week	Permits	Lndgs.	Number of Salmon					
						Chinook	Sockeye	Pink	Chum	Coho	Total
AFOGNAK											
	N.W. AFOGNAK	18-Jun	25	4	4	5	1,992	2	3	0	2,002
		09-Jul	28	2	2	0	527	87	14	0	628
		16-Jul	29	87	123	167	104,365	24,345	7,878	257	137,012
		23-Jul	30	78	102	64	21,988	42,262	6,921	944	72,179
		30-Jul	31	17	19	19	1,274	34,432	725	295	36,745
		06-Aug	32	17	21	32	780	85,807	1,971	951	89,541
		13-Aug	33	29	70	12	387	176,493	2,538	3,396	182,826
		20-Aug	34	20	32	0	102	48,814	172	2,176	51,264
		Totals			373	299	131,415	412,242	20,222	8,019	572,197
	S.W. AFOGNAK	18-Jun	25	2	2	45	178	0	130	0	353
		02-Jul	27	2	2	8	50	30	43	0	131
		09-Jul	28	17	17	11	2,275	5,738	2,738	16	10,778
		16-Jul	29	87	137	193	66,053	37,549	6,849	192	110,836
		23-Jul	30	74	93	126	18,034	60,796	6,109	1,069	86,134
		30-Jul	31	47	80	462	2,998	151,705	4,700	1,984	161,849
		06-Aug	32	55	127	523	3,435	349,540	11,702	5,815	371,015
		13-Aug	33	55	102	153	1,453	242,030	5,252	5,245	254,133
		20-Aug	34	52	108	31	1,612	230,682	6,467	7,148	245,940
		Totals			668	1,552	96,088	1,078,070	43,990	21,469	1,241,169
	SHUYAK IS.	16-Jul	29	18	20	54	34,055	3,774	2,808	145	40,836
		23-Jul	30	64	100	58	22,756	37,899	8,255	2,101	71,069
		30-Jul	31	1	1	0	0	1,425	115	1	1,541
		06-Aug	32	1	1	0	12	1,225	77	108	1,422
		13-Aug	33	3	4	0	61	18,577	0	1,437	20,075
		Totals			126	112	56,884	62,900	11,255	3,792	134,943
	combined	18-Jun	25	6	6	50	2,170	2	133	0	2,355
		25-Jun	26	0	0	0	0	0	0	0	0
		02-Jul	27	2	2	8	50	30	43	0	131
		09-Jul	28	19	19	11	2,802	5,825	2,752	16	11,406
		16-Jul	29	192	280	414	204,473	65,668	17,535	594	288,684
		23-Jul	30	216	295	248	62,778	140,957	21,285	4,114	229,382
		30-Jul	31	65	100	481	4,272	187,562	5,540	2,280	200,135
		06-Aug	32	73	149	555	4,227	436,572	13,750	6,874	461,978
		13-Aug	33	87	176	165	1,901	437,100	7,790	10,078	457,034
		20-Aug	34	72	140	31	1,714	279,496	6,639	9,324	297,204
		Totals			1,167	1,963	284,387	1,553,212	75,467	33,280	1,948,309

Table 3. Results of sockeye salmon tagging on the west side of Kodiak Island north of Miners Point, 1927 -1981.

Fishing District	Area	Year	Tagging Date(s)	Number Tagged	Number Recovered	Percent Recovery	Stock Composition Kodiak	Cook Inlet	Other a/	Dominant Stock(s)	Reference
Afognak	Malina Bay	1948	21-28 June	140	72	51%	87%	13%	0%	Kar./Ugan./C.I.	Bevan (1948)
	Malina Bay	1949	23 June - 3 July	1,641	669	41%	97%	2%	1%	Karluk/Uganik	Bevan (1949)
	Malina Bay	1977	6-28 June	37	8	22%	100%	0%	0%	Frazer	Malloy & Manthey (1977)
	N.W. Raspberry Is.	1948		150	86	57%	98%	1%	1%	Karluk/Uganik	Bevan (1948)
	N.W. Raspberry Is.	1949	21-28 June	976	513	53%	97%	0%	3%	Karluk/Uganik	Bevan (1949)
	N.W. Raspberry Is.	1981	20 June	120	30	25%	80%	17%	3%	Kar./Fraz./C.I.	Tyler et al. (1986)
	Raspberry Cape	1981	24 June	147	27	18%	30%	59%	11%	Upper Cook Inlet	Tyler et al. (1986)
Northwest Kodiak	Outlet Cape	1971		20	2	10%	100%	0%	0%	Karluk	Lechner & Eaton (1972)
	N. Uganik Is.	1948		942	429	46%	99%	1%	0%	Karluk/Uganik	Bevan (1948)
	N. Uganik Is.	1949		4,660	2,128	46%	100%	0%	0%	Karluk/Uganik	Bevan (1949)
	Cape Uganik	1961		7	2	29%	100%	0%	0%	Karluk	Roys & Simon (1961)
	Cape Uganik	1970	25 June - 3 July	36	11	31%	100%	0%	0%	Karluk/Uganik	Lechner & Eaton (1972)
	Uganik Is.	1971		20	2	10%	100%	0%	0%	Karluk	Lechner & Eaton (1972)
	N. Uganik Is.	1977	6-28 June	37	5	14%	100%	0%	0%	Red L./ Frazer	Malloy & Manthey (1977)
	Noisy Island	1977	6-28 June	37	3	8%	100%	0%	0%	Kar./Red L./Up. Stat.	Malloy & Manthey (1977)
	Noisy Island	1981	6 June	101	39	39%	100%	0%	0%	Frazer/Up. Station	Tyler et al. (1986)
	Miners Point	1969		202	38	19%	100%	0%	0%	Frazer/Karluk	Lechner & Eaton (1972)
	Miners Point	1970		74	8	11%	100%	0%	0%	Karluk/Uganik	Lechner & Eaton (1972)
	Miners Point	1971		194	23	12%	78%	0%	22%	Karluk/Chignik	Lechner & Eaton (1972)
	Miners Point	1977	6-28 June	553	217	39%	93%	1%	6%	Frazer/Karluk	Malloy & Manthey (1977)
	Miners Point	1981	7-June	214	97	45%	99%	0%	1%	Karluk/Frazer	Tyler et al. (1986)
	Broken Point	1927	19-20 August	700	403	58%	99%	1%	0%	Karluk/Uganik	Rich & Morton (1928)
	Broken Point	1971		35	4	11%	100%	0%	0%	Lit.R./Kar/Red/Fraz	Lechner & Eaton (1972)

a/ Includes tag returns from the Kodiak Mainland District, Chignik Management Area, and Alaska Peninsula Management Area.

Table 4. Age composition of the sockeye catch from the Northwest Afognak Section, Shuyak Section, and Mainland District of the Kodiak Management Area during statistical weeks 29-30, 1988.

Area	Catch Date	Stat. Week	Sample Size	Age 0.2	1.2	1.3	2.2	2.3	others	Total
Northwest Afognak 251-30,40,50	15 July	29	442	0.2%	5.4%	64.9%	8.4%	15.8%	5.2%	100.0%
Northwest Afognak 251-40	21 July	30	44	0.0%	18.2%	47.7%	6.8%	18.2%	9.1%	100.0%
NW Afognak/Shuyak 251-30,40,50,60, 70,81	24 July	30	337	0.9%	11.0%	55.8%	9.5%	17.5%	5.3%	100.0%
NW Afognak/Shuyak/ Mainland 251-30,40,50,60, 70,81 and 262-	22 July	30	301	3.7%	8.3%	49.5%	12.6%	16.6%	9.3%	100.0%
Mainland 262-45	19 July	30	478	0.0%	6.3%	66.1%	6.3%	18.8%	2.5%	100.0%
combined	15-21 July	29-30	1,602	0.9%	7.7%	60.0%	8.7%	17.3%	5.4%	100.0%
			Numbers	4,915	40,630	314,881	45,872	90,762	27,851	524,911
			SE	1,263	3,506	6,427	3,705	4,961	6,938	

Table 5. Preliminary age composition of selected late run sockeye escapements, Kodiak Management Area, 1988.

SYSTEM	SAMPLE SIZE	Age 0.2	1.2	1.3	2.2	2.3	others	Total
Afognak River	425	0.5%	58.6%	12.0%	22.6%	1.4%	4.9%	100.0%
		51	6,325	1,295	2,438	152	533	10,794
Little River	456	0.0%	12.1%	6.8%	68.2%	4.2%	8.8%	100.0%
		0	724	408	4,092	250	526	6,000
Uganik Lake	418	0.7%	12.9%	47.4%	10.3%	23.4%	5.3%	100.0%
		36	646	2,368	514	1,172	264	5,000
Karluk River	1,099	0.0%	0.1%	0.2%	59.2%	25.9%	14.6%	100.0%
		0	373	497	162,954	71,421	40,223	275,468
Red River	676	0.0%	23.5%	4.1%	47.5%	7.3%	17.6%	100.0%
		0	22,557	3,920	45,550	7,040	16,851	95,918
Upper Station	1,683	56.1%	18.7%	5.3%	9.3%	0.5%	10.1%	100.0%
		140,249	46,716	13,257	23,127	1,288	25,199	249,836
Buskin River	415	0.0%	6.8%	15.0%	17.8%	58.8%	1.7%	100.0%
		0	212	469	559	1,844	53	3,137
Saltery Creek	477	0.0%	2.1%	80.9%	7.8%	9.2%	0.0%	100.0%
		0	258	9,946	953	1,134	0	12,291
Total		21.3%	11.8%	4.9%	36.5%	12.8%	12.7%	100.0%
		140,336	77,811	32,160	240,187	84,301	83,649	658,444

Table 6. Preliminary age composition of Kodiak and Upper Cook Inlet late run sockeye salmon, 1988.

Area			Age						
			0.2	1.2	1.3	2.2	2.3	others	All
Kodiak									
	run		369,195	204,705	84,606	631,883	221,779	220,063	1,732,231
			21.3%	11.8%	4.9%	36.5%	12.8%	12.7%	100.0%
Cook Inlet									
Kenai	run		0	389,935	4,454,582	185,952	83,735	777,727	5,891,931
				6.6%	75.6%	3.2%	1.4%	13.2%	100.0%
Kasilof	run		0	275,389	446,558	283,310	174,718	3,102	1,183,077
				23.3%	37.7%	23.9%	14.8%	0.3%	100.0%
Crescent	run		0	20,678	190,072	56,008	80,407	2,048	349,213
				5.9%	54.4%	16.0%	23.0%	0.6%	100.0%
Susitna	run		9,680	185,652	184,034	65,957	71,308	26,422	543,053
			1.8%	34.2%	33.9%	12.1%	13.1%	4.9%	100.0%
Fish Cr.	run		0	131,868	3,240	2,106	0	24,786	162,000
			0.0%	81.4%	2.0%	1.3%	0.0%	15.3%	100.0%
others	escap.		179	16,383	100,028	10,909	7,568	14,933	150,000
			0.1%	10.9%	66.7%	7.3%	5.0%	10.0%	100.0%
	total	run	9,859	1,019,905	5,378,514	604,242	417,736	849,018	8,279,274
			0.1%	12.3%	65.0%	7.3%	5.0%	10.3%	100.0%

Table 7. Preliminary sockeye catch, escapement, and run numbers for the Kodiak and Upper Cook Inlet Management Areas (late run stocks only), 1988.

Area	System	Catch	Escap.	Run
Kodiak				
	Karluk	-	275,468	
	Red River	-	95,918	
	Upper Station	-	249,836	
	Uganik	-	5,000	
	Little River	-	6,000	
	Saltery	-	12,291	
	Akalura	-	33,749	
	Pauls Lake	-	710	
	Afognak	-	10,794	
	Buskin	-	3,137	
	others	-	15,000	
	Totals	1,024,328	707,903	1,732,231 a/
Cook Inlet				
	Kenai River	4,870,953	1,020,978	5,891,931
	Kasilof	981,077	202,000	1,183,077
	Crescent	291,497	57,716	349,213
	Susitna	443,053	100,000	543,053
	Fish Cr.	90,000	72,000	162,000
	others	-	150,000	150,000
	Totals	6,676,580	1,602,694	8,279,274
Areas combined		7,700,908	2,310,597	10,011,505 a/

a/ Total does not include 524,911 sockeye caught in north Shelikof Strait. North Shelikof Strait includes the Mainland District from Dakavak Bay Section north and on the west side of the Afognak District from the Southwest Afognak Section north, Kodiak Management Area.

Table 8. The 1988 Upper Cook Inlet sockeye catch, escapement, run, and escapement goal by system, and the assigned catch of Upper Cook Inlet sockeye salmon in the 1988 north Shelikof Strait fishery in numbers of fish.

	Upper Cook Inlet					
	Escapement Goal		Escapement		Catch	Run
Distribution	Lower	Upper	Count (actual)	Surplus		
Kenai River	400,000	700,000	1,020,978	320,978	4,870,953	5,891,931
Kasilof River	150,000	250,000	202,000	(48,000)	981,077	1,183,077
Crescent River	50,000	100,000	57,716	(42,284)	291,497	349,213
Susitna River	-	200,000	100,000	(100,000)	443,053	543,053
Fish Creek	-	50,000	72,000	22,000	90,000	162,000
others	-	-	150000	-	-	150,000
subtotals		1,300,000	1,602,694	152,694	6,676,580	8,279,274
North Shelikof Strait					498,665	8,777,939

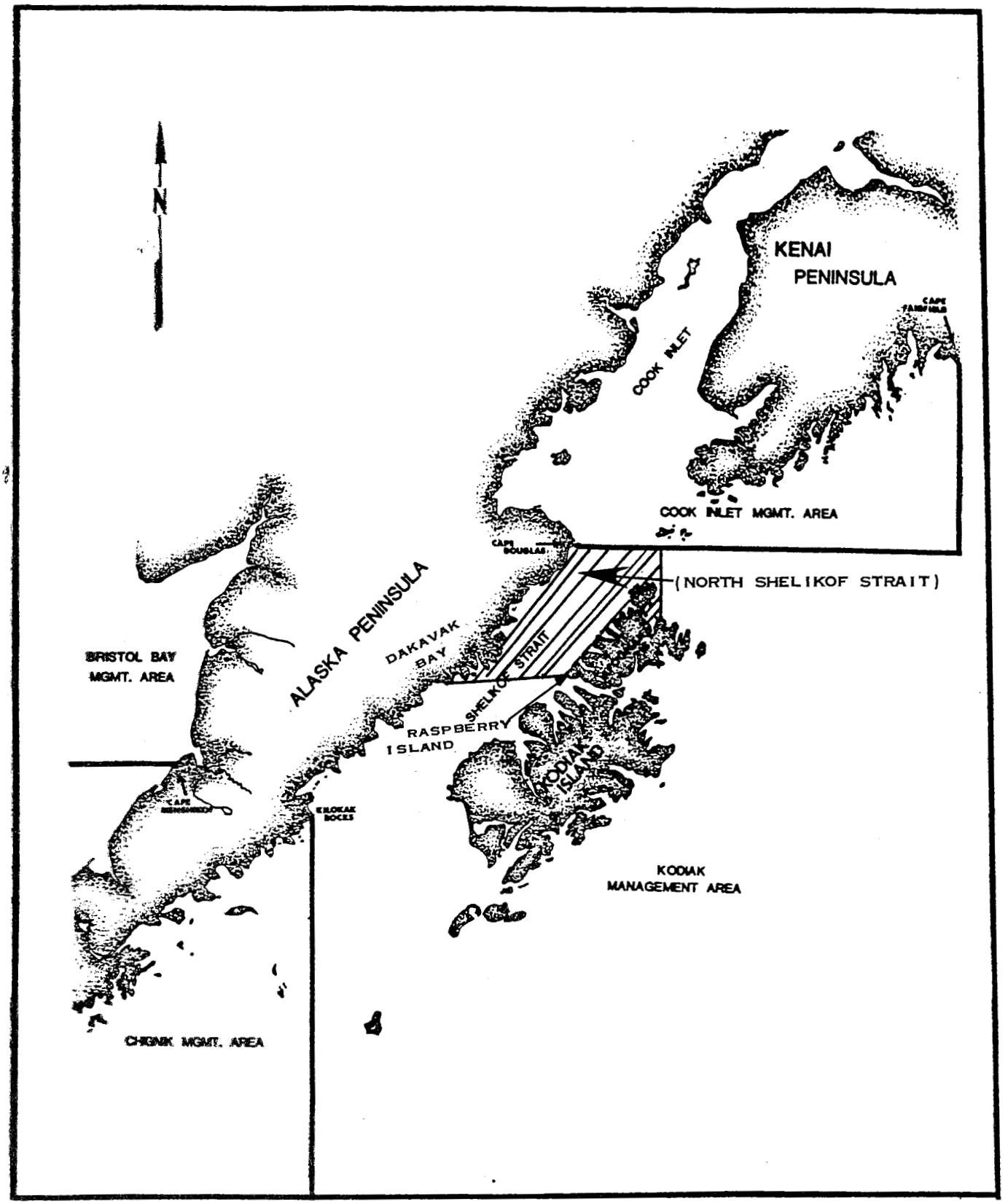
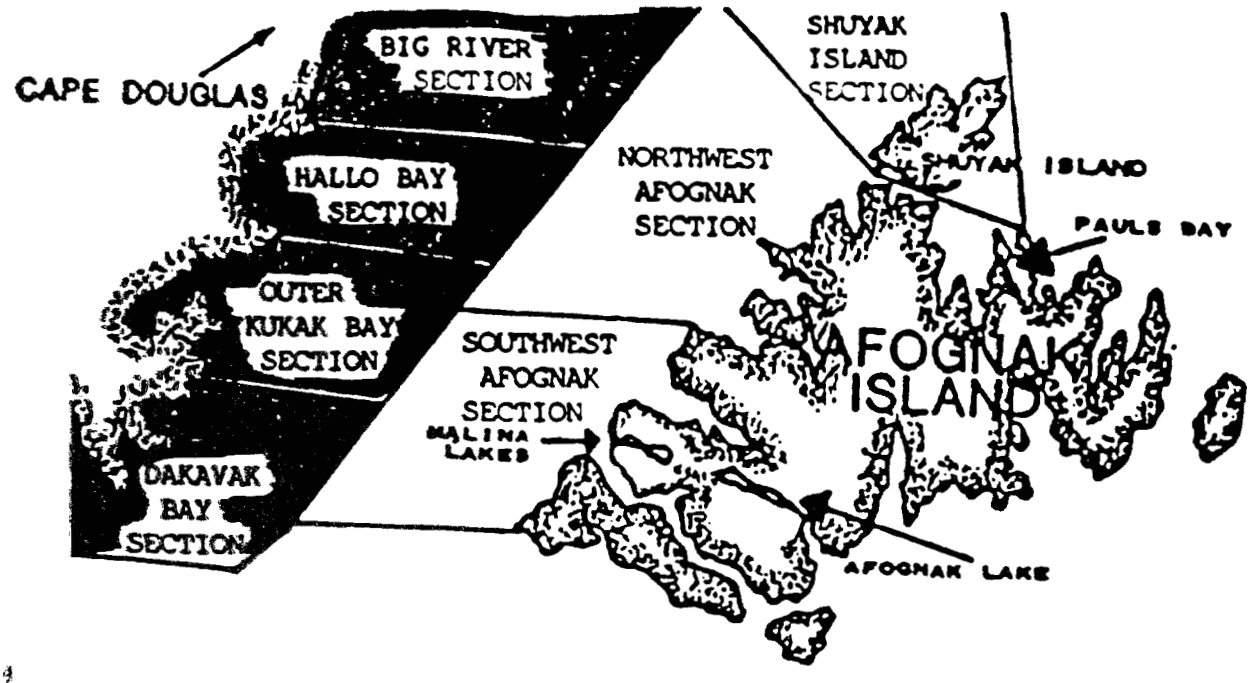


Figure 1. Map showing the location of north Shelikof Strait.



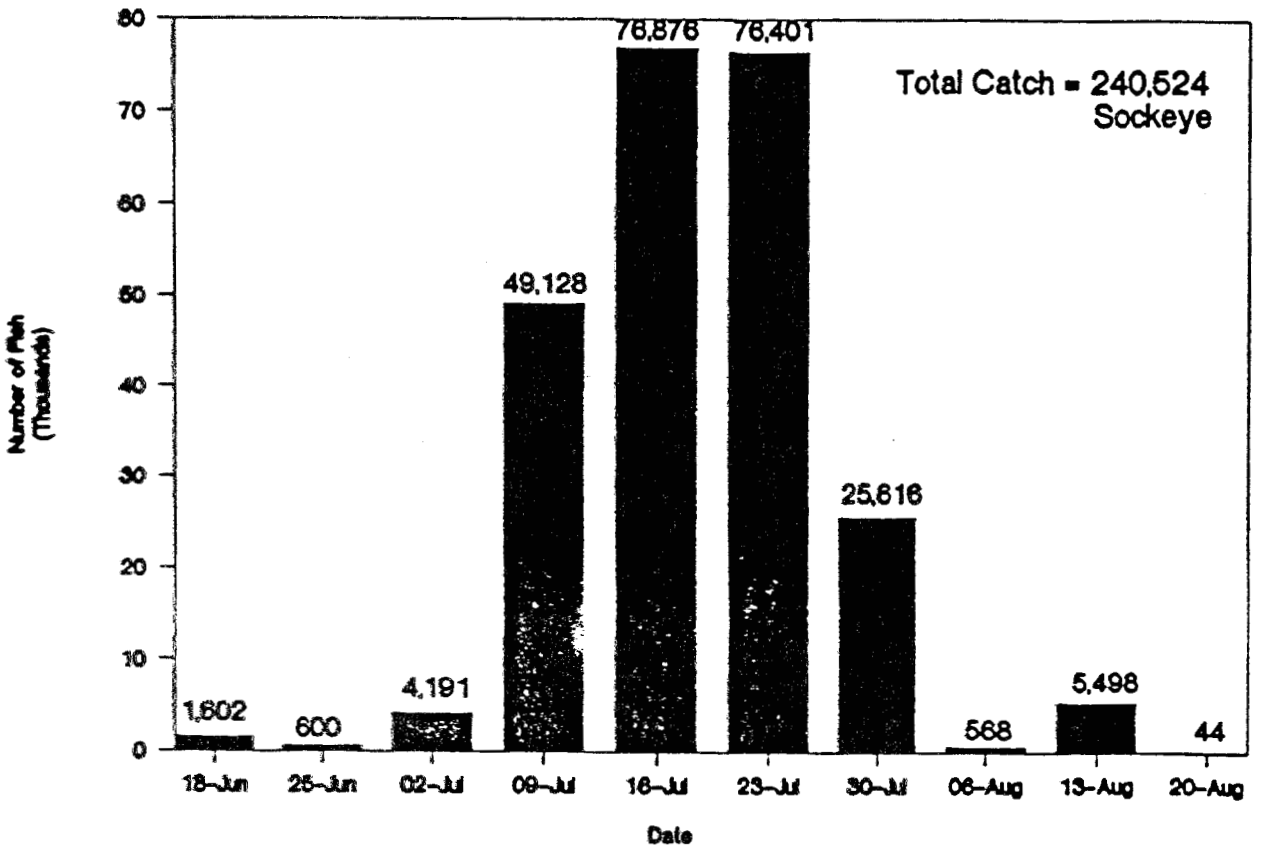
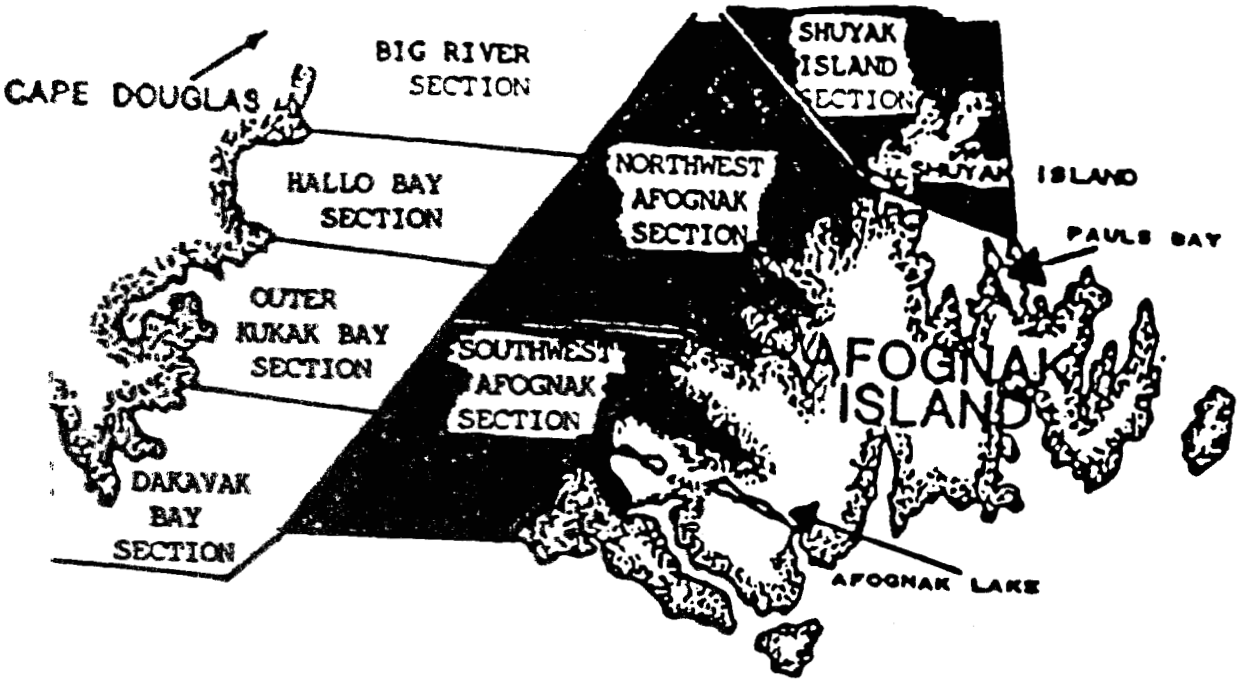


Figure 2. The combined, sockeye catch in north Shelikof Strait from the Dakavak Bay Section of the Mainland District north, 1988.



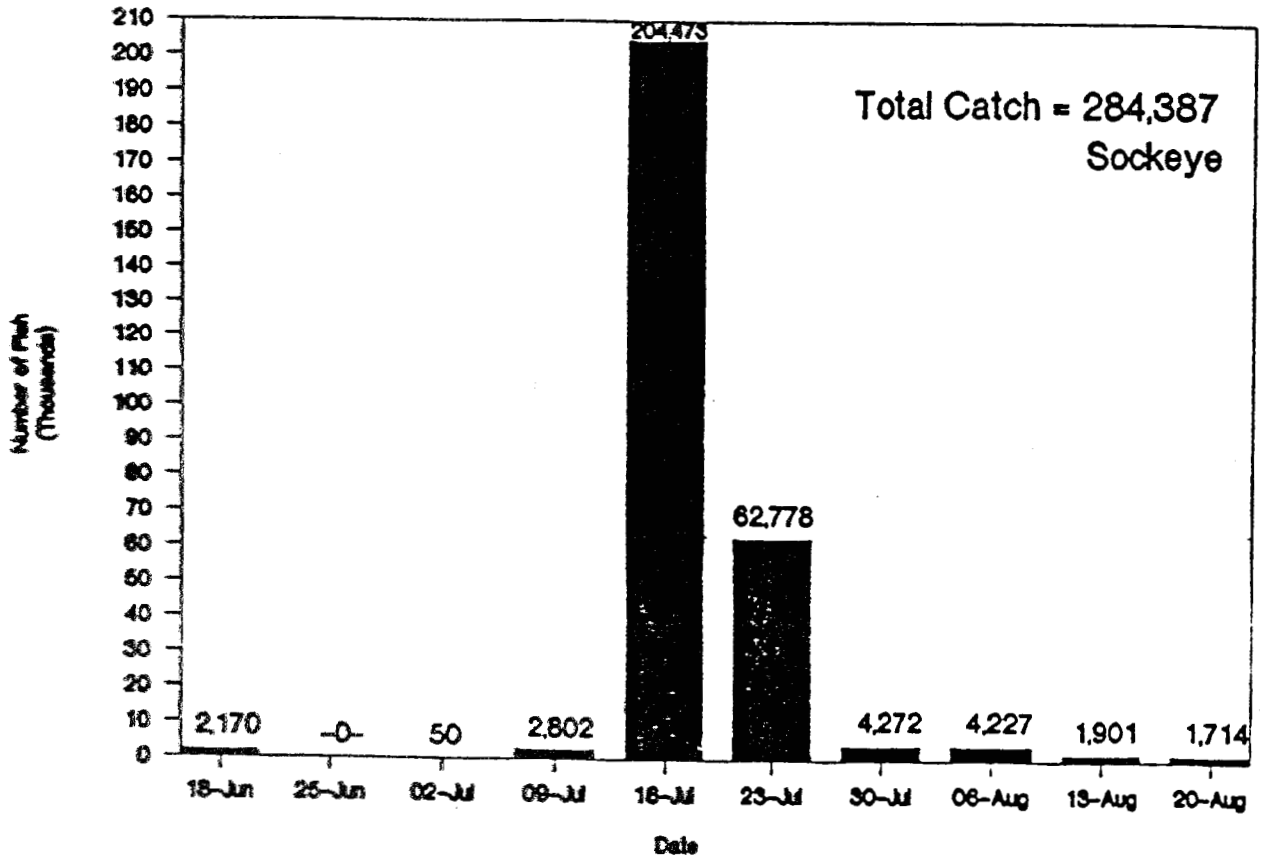
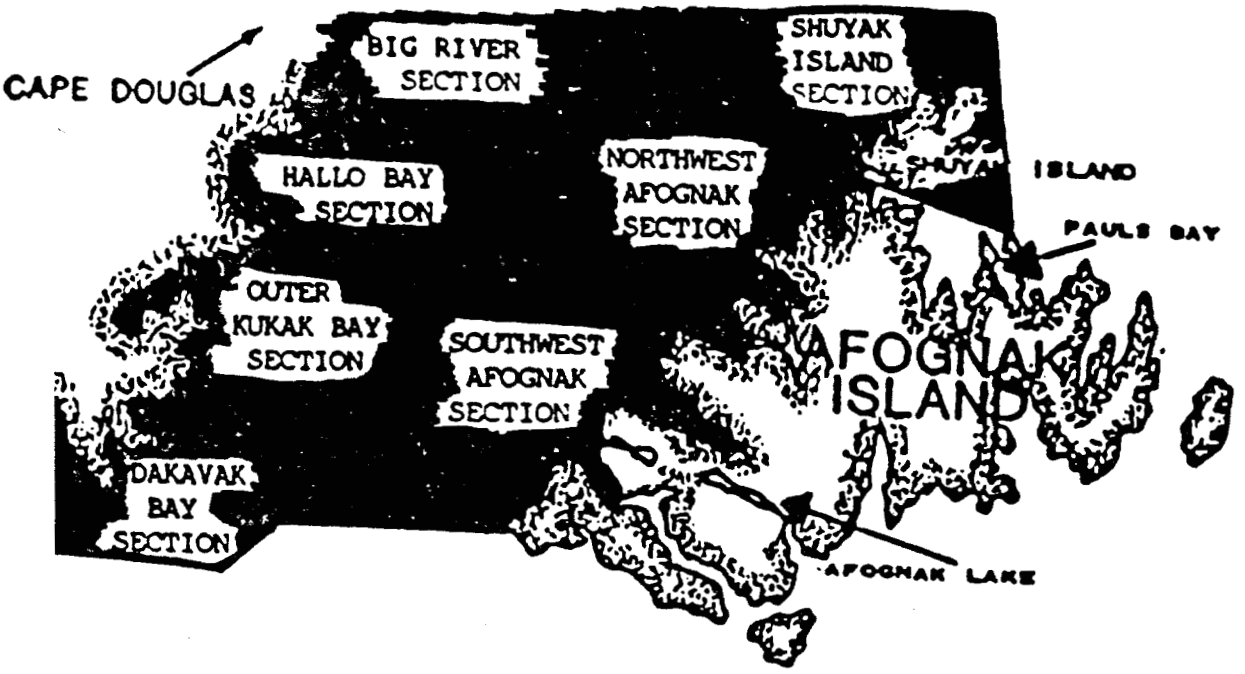


Figure 3. The combined, sockeye catch in the Northwest Afognak, Southwest Afognak, and Shuyak Island Sections of the Afognak District by week, 1988.



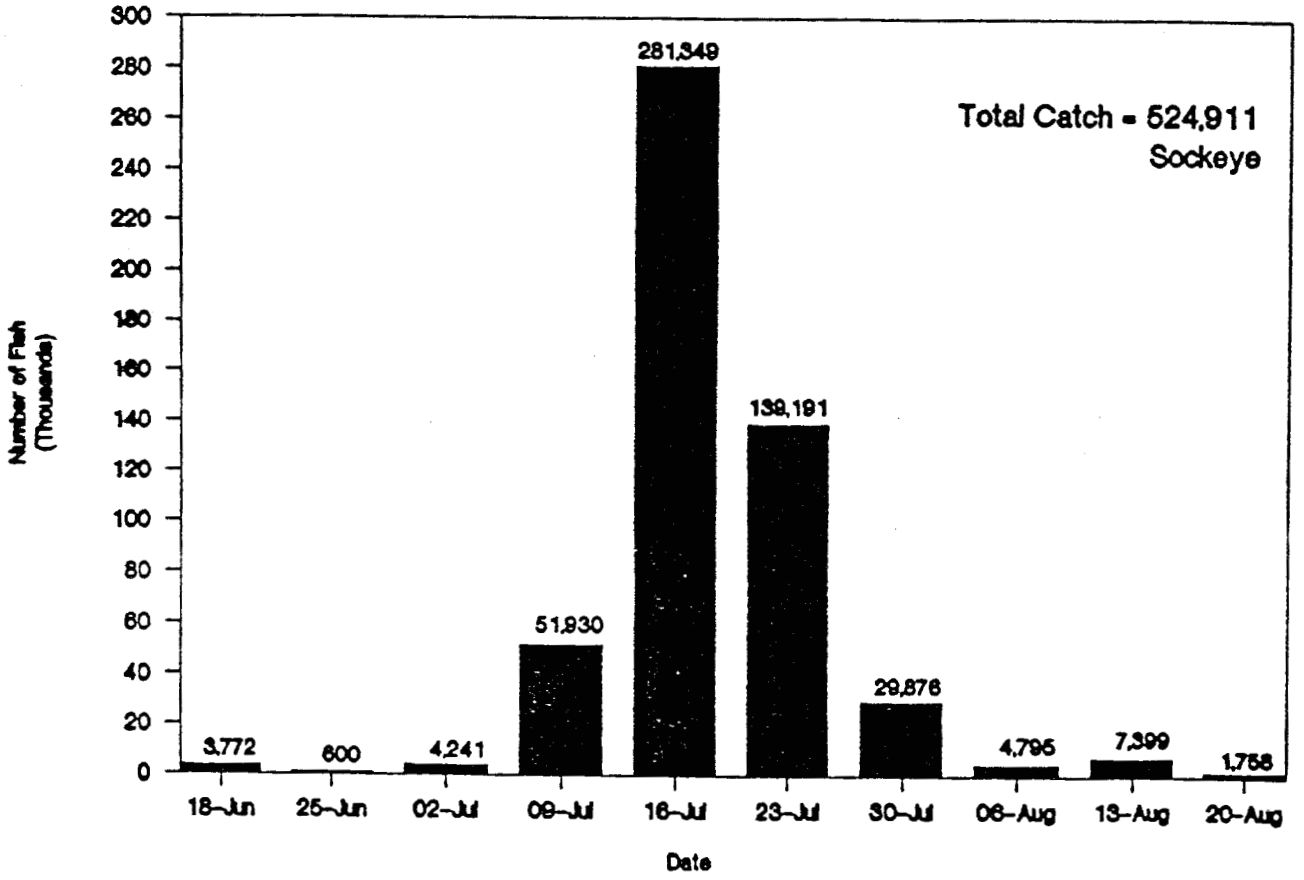


Figure 4. The 1988 north Shelikof Strait sockeye catch by week.

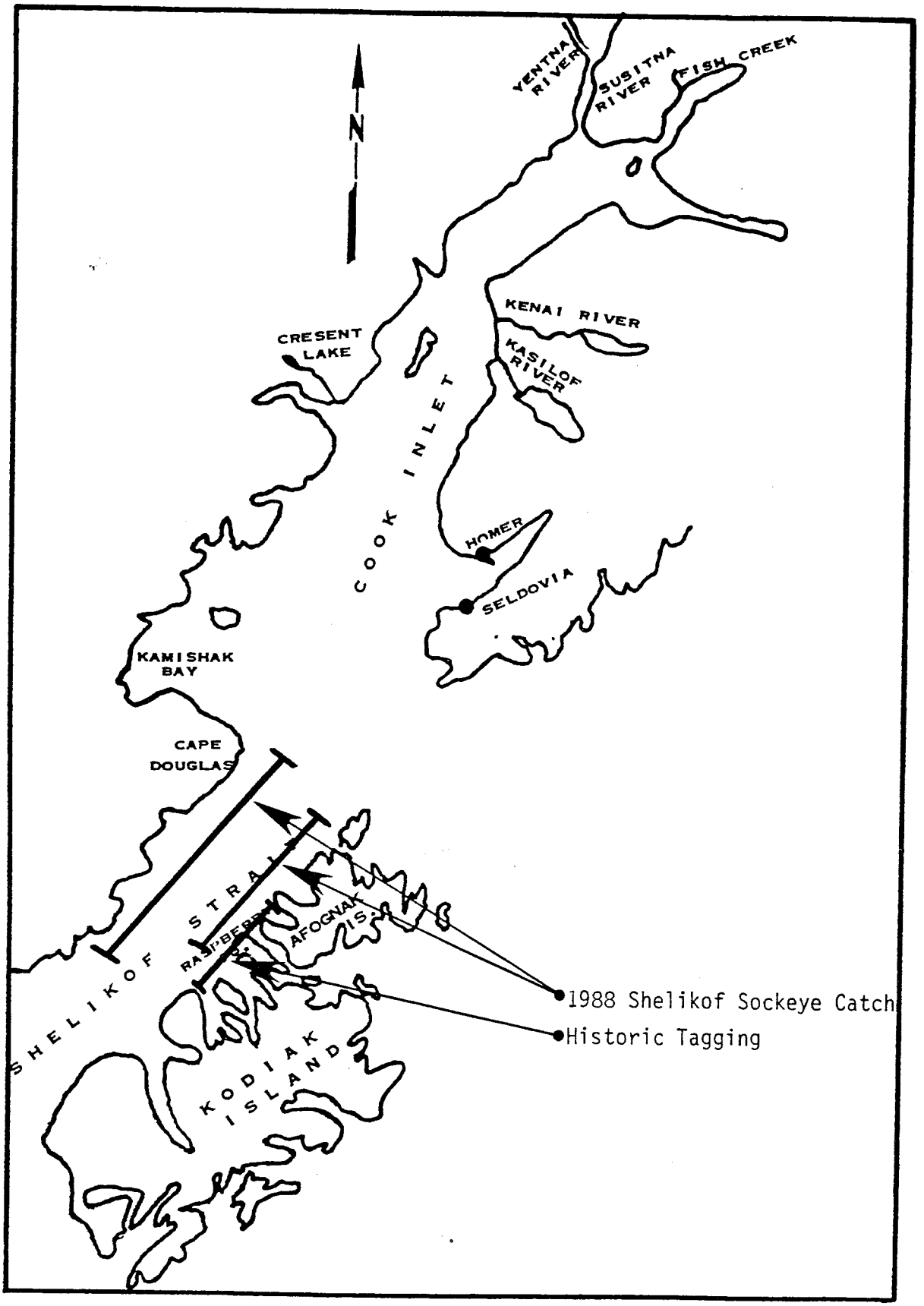


Figure 5. Map showing the location of the north Shelikof 1988 sockeye catch area relative to where historic tagging has occurred from Uganik Bay north.

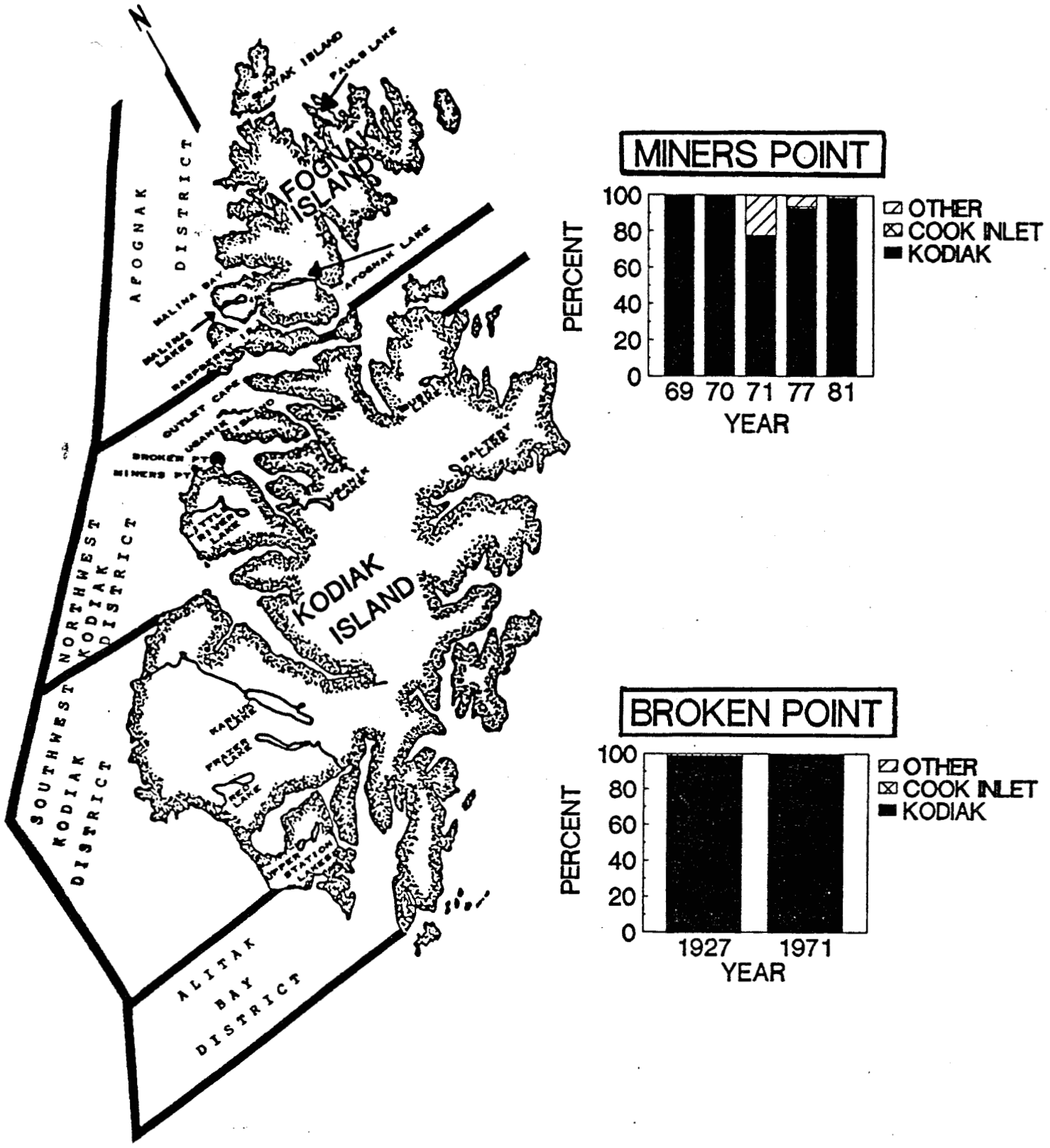


Figure 6. The percent composition of Kodiak, Cook Inlet, and other sockeye salmon at Miners and Broken Points in year-specific tagging studies.

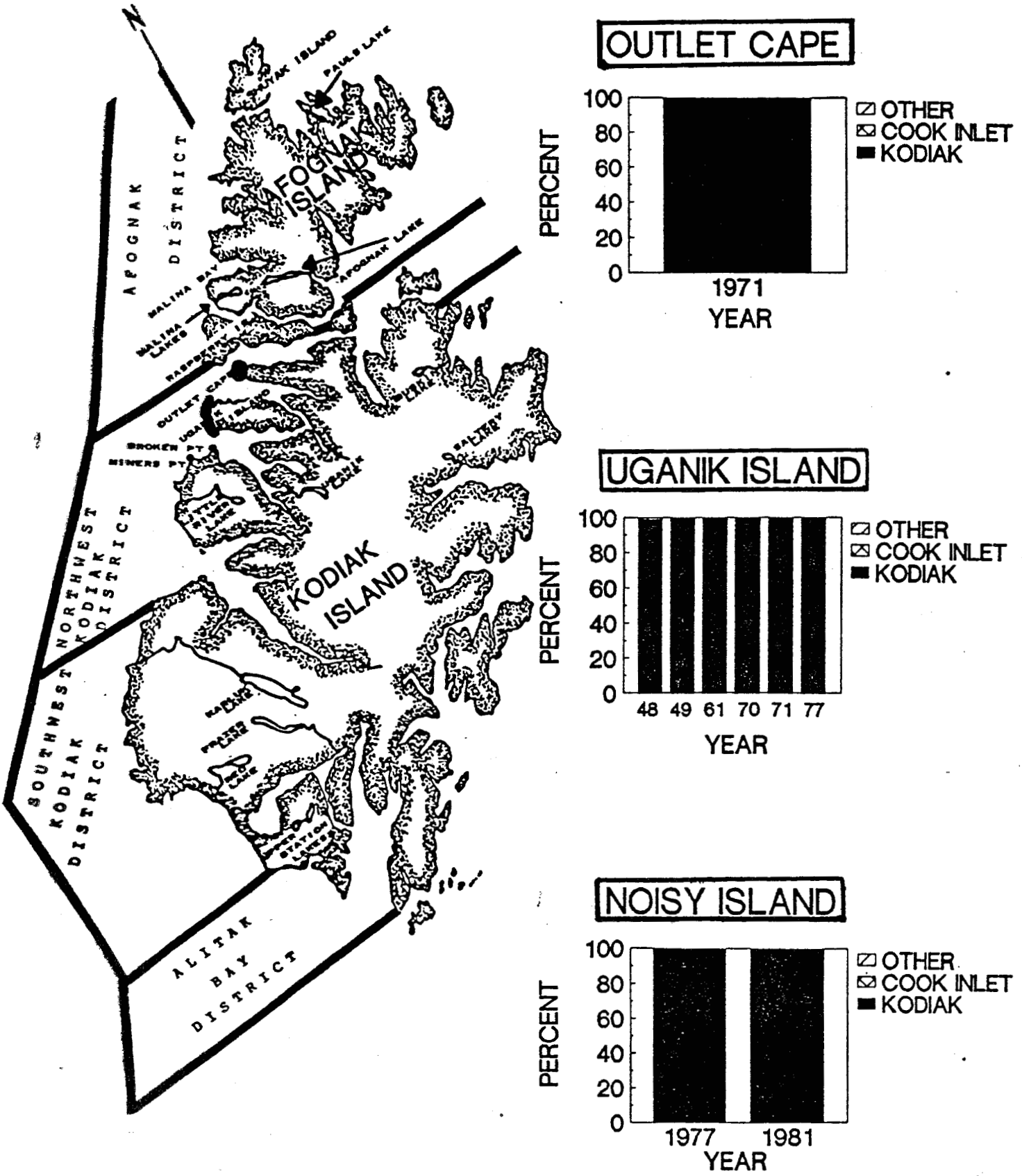


Figure 7. The percent composition of Kodiak, Cook Inlet, and other sockeye salmon at Outlet Cape, Uganik Island, and Noisy Island in year-specific taggings studies.

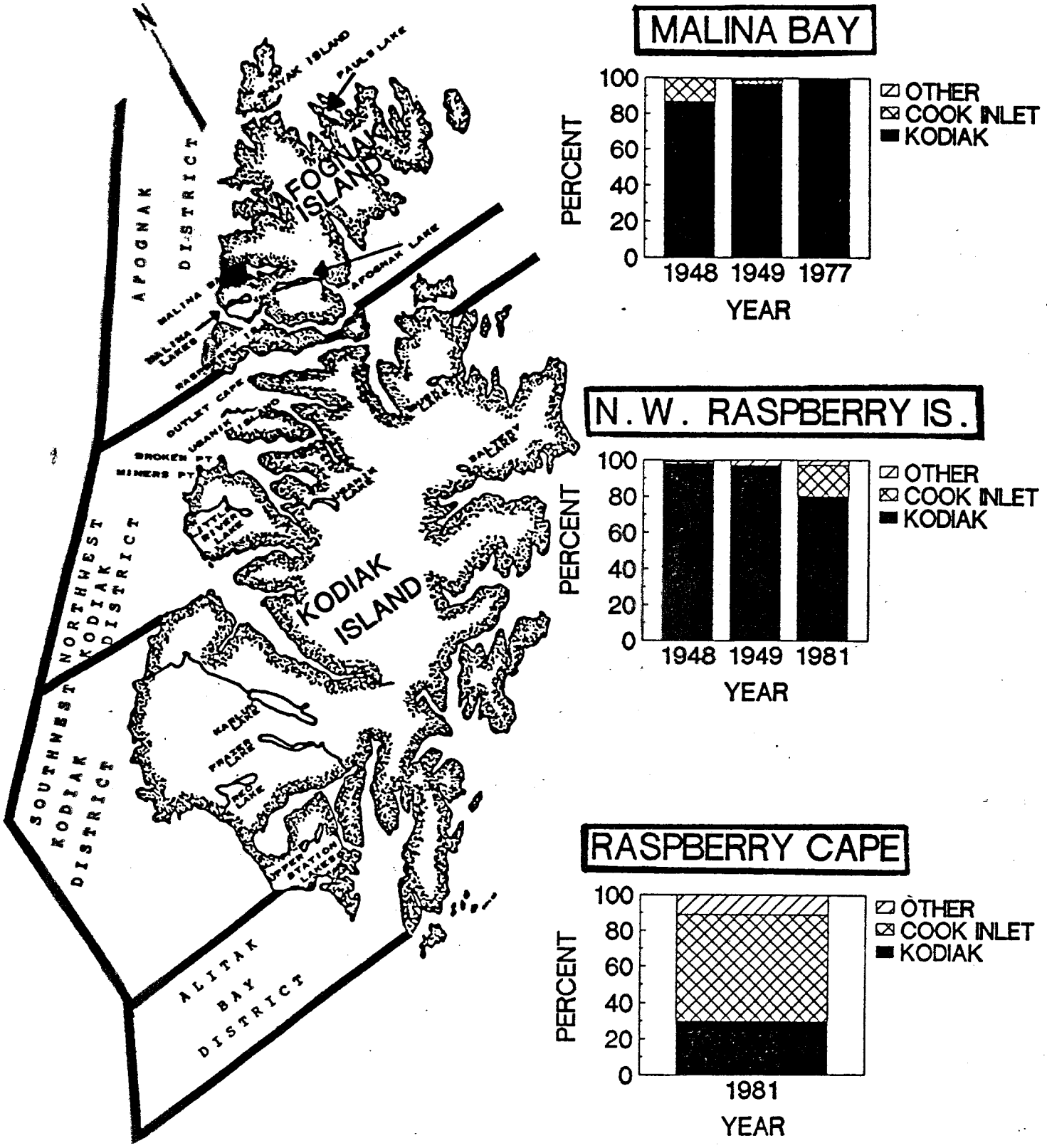


Figure 8. The percent composition of Kodiak, Cook Inlet, and other sockeye salmon at Malina Bay, N.W. Raspberry Island, and Raspberry Island in year-specific tagging studies.

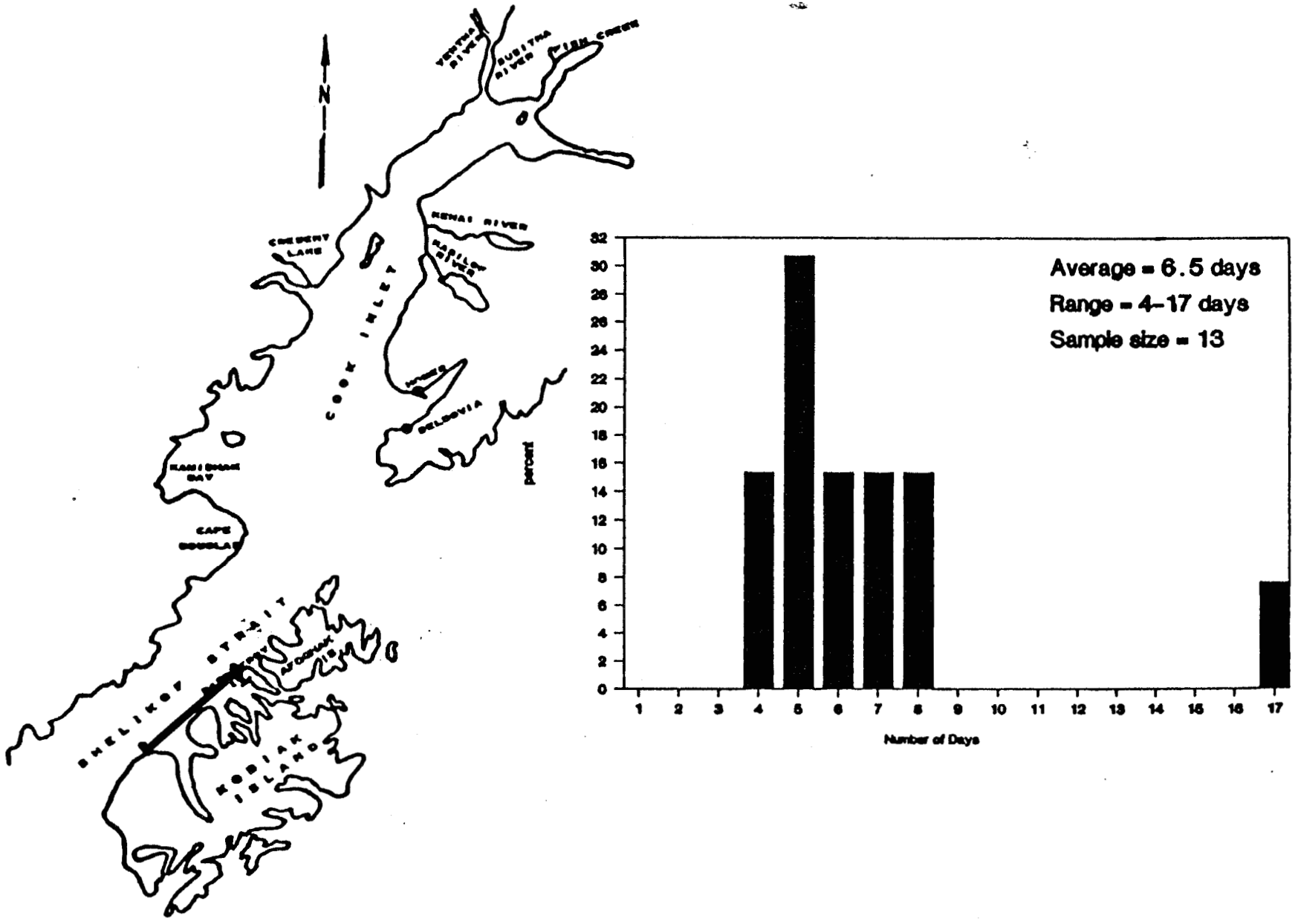


Figure 9. Travel time in days of 13 tagged sockeye salmon in late June 1981 from Raspberry Island in north Shelikof Strait to the Karluk River weir, a distance of about 60 miles.

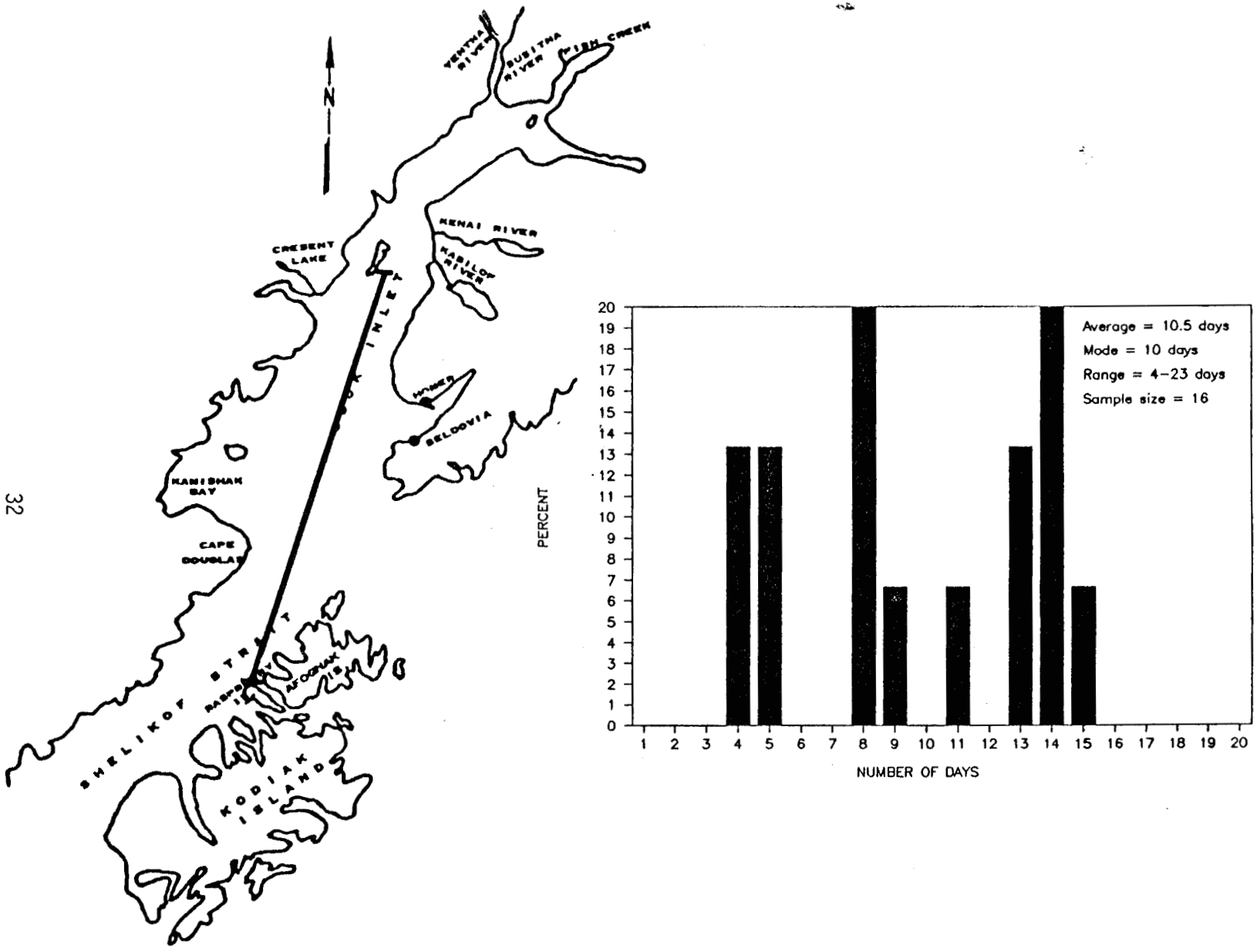


Figure 10. Travel time in days of 15 tagged sockeye salmon in late June 1981 from Raspberry Island in north Shelikof Strait to Upper Cook Inlet, a distance of about 170 miles.

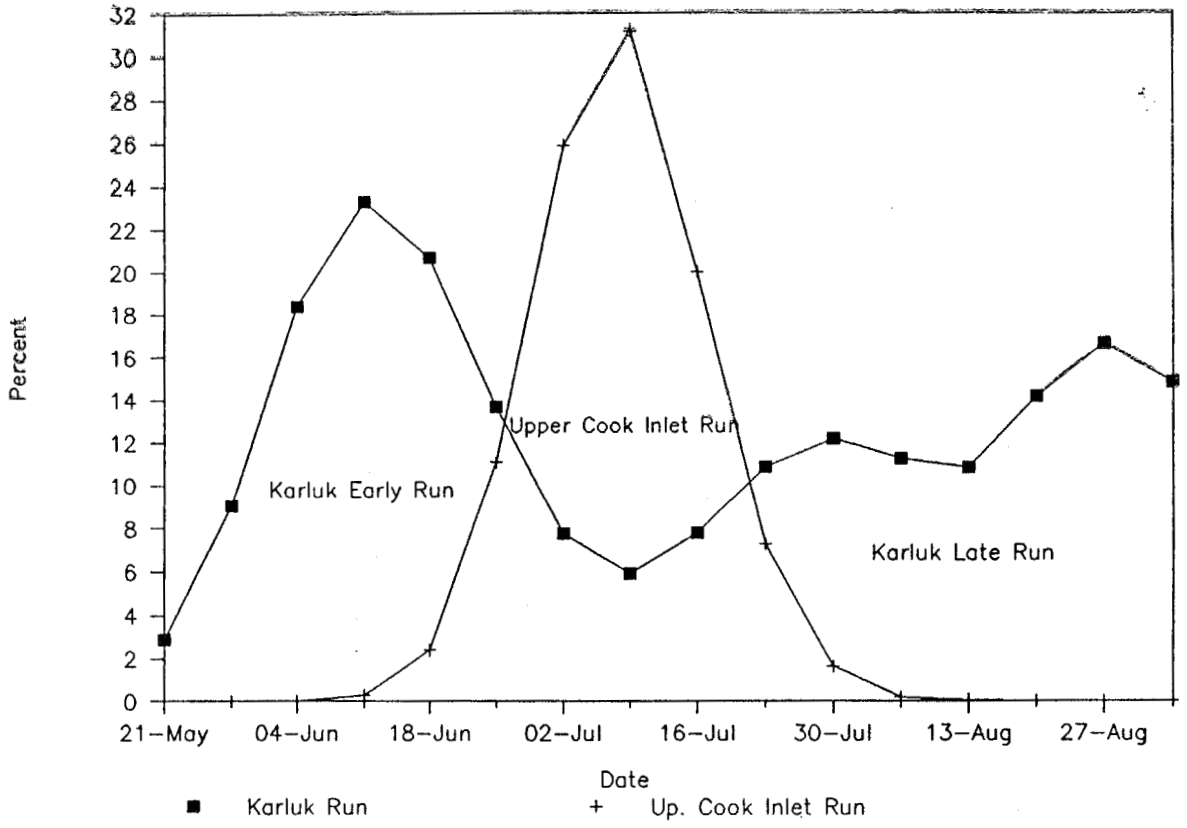


Figure 11. Timing of the Karluk River early and late sockeye runs and the Upper Cook Inlet run in north Shelikof Strait, 1988.

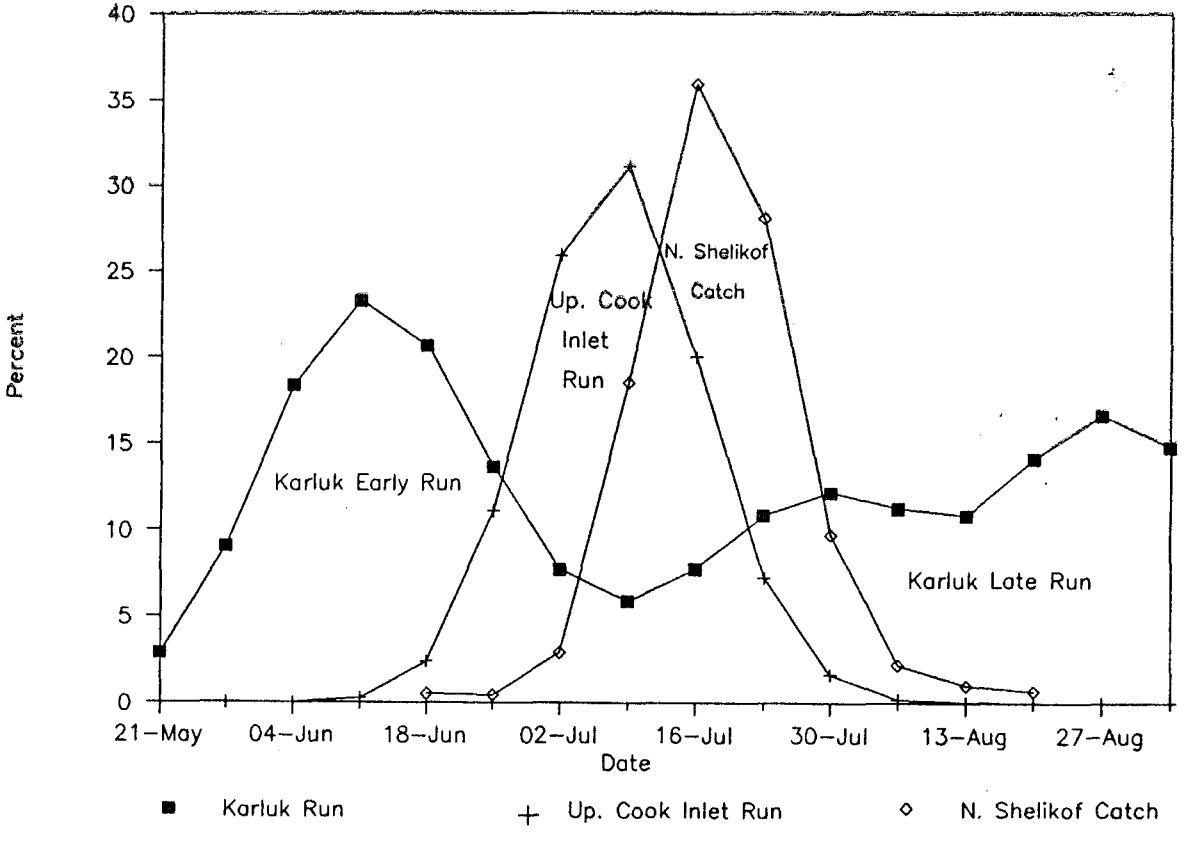
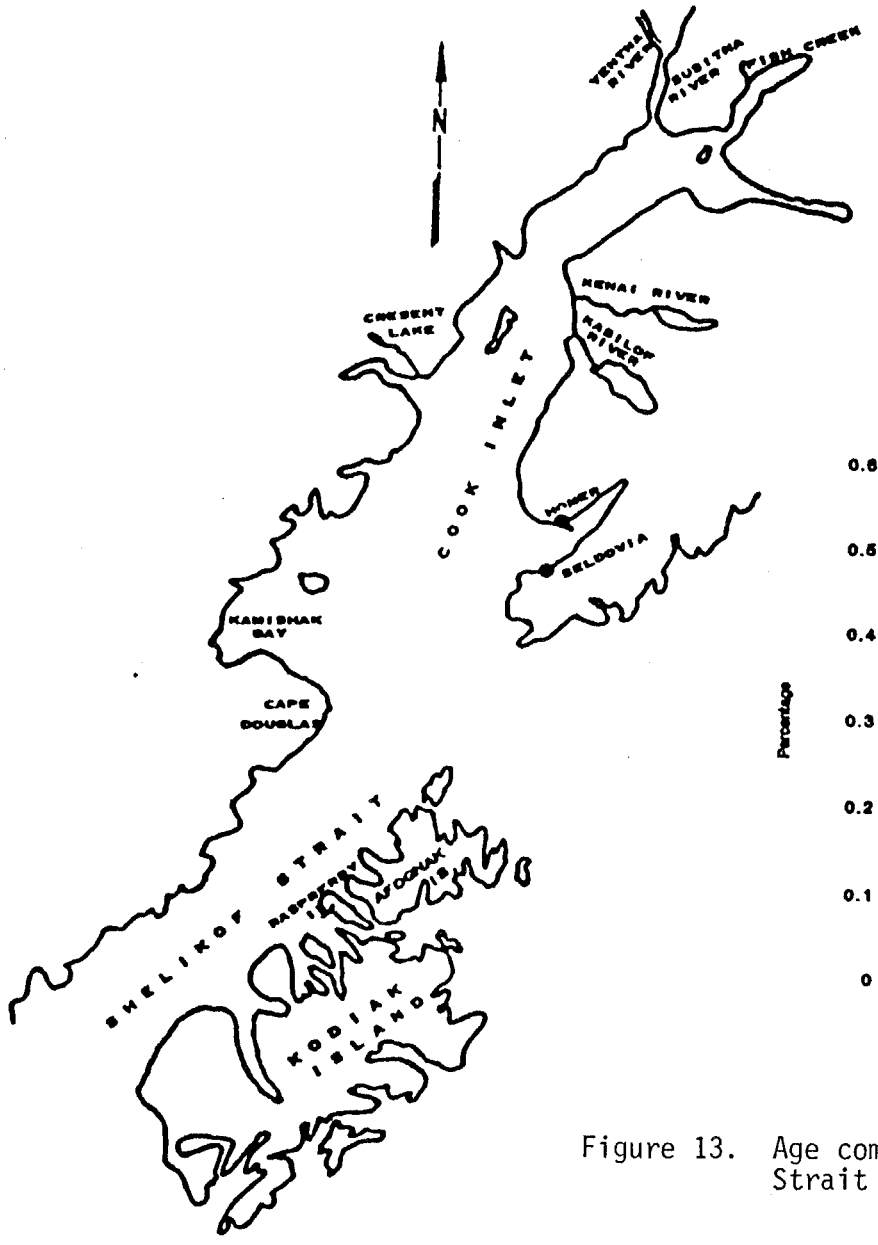


Figure 12. Timing of the Karluk River early and late sockeye runs and the Upper Cook Inlet sockeye run in north Shelikof Strait relative to the timing of the north Shelikof Strait sockeye catch, 1988.



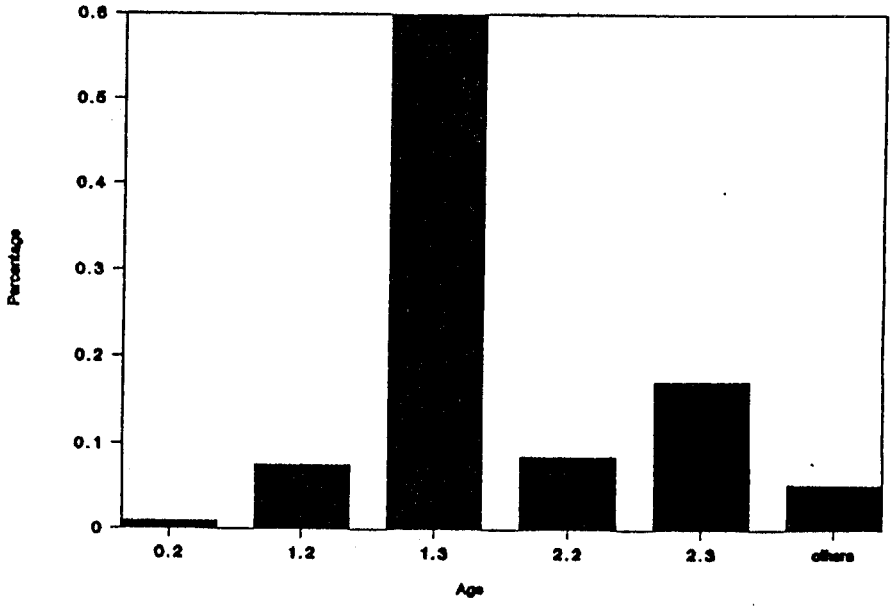


Figure 13. Age composition of the sockeye catch in north Shelikof Strait by percent, 1988.

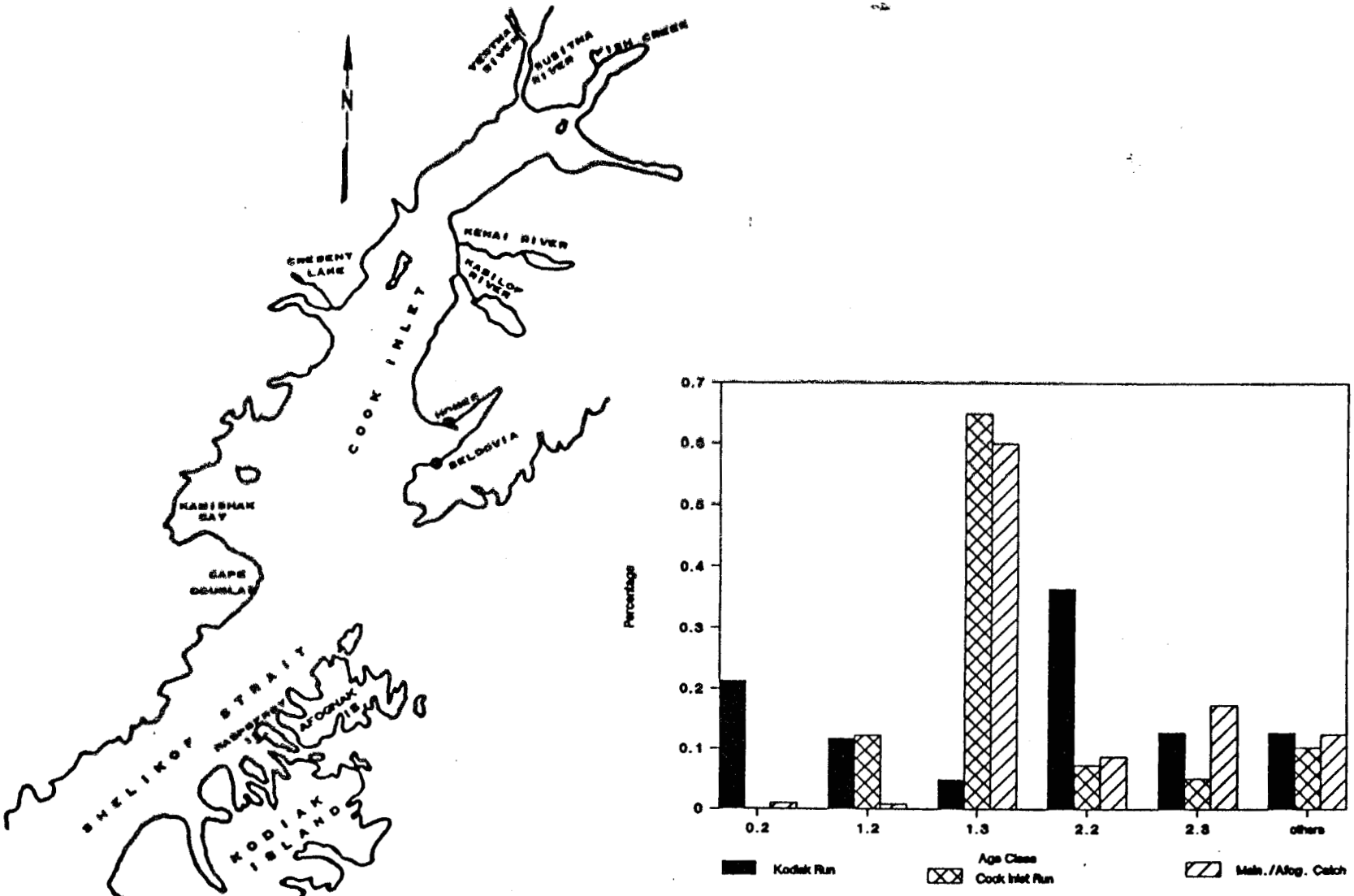


Figure 14. Age composition of the Kodiak and Upper Cook Inlet sockeye runs and the sockeye catch in north Shelikof Strait, 1988.

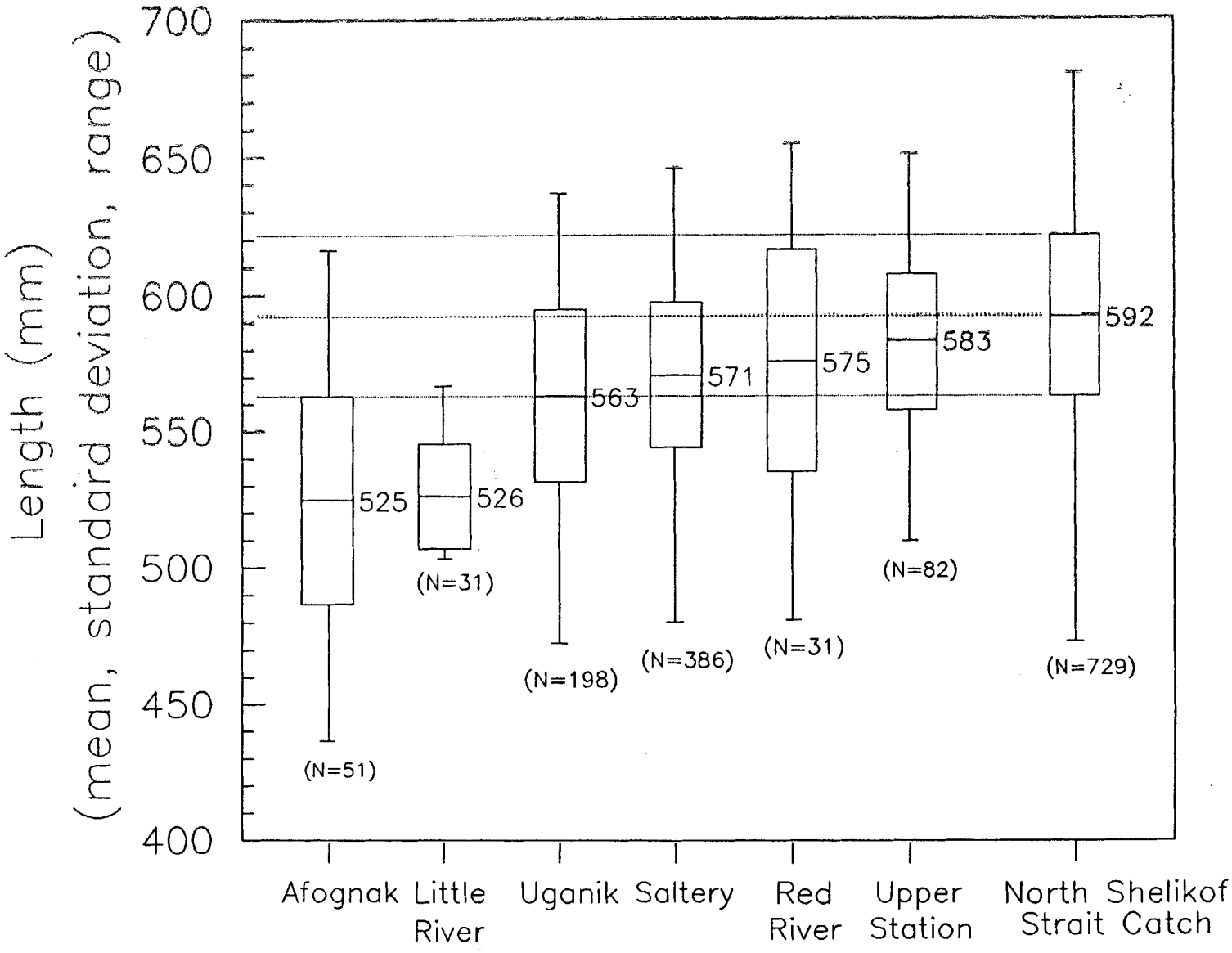


Figure 15. Comparison of age -1.3 sockeye lengths between selected Kodiak stocks and the Kodiak Mainland-Afognak Districts catch, 1988.

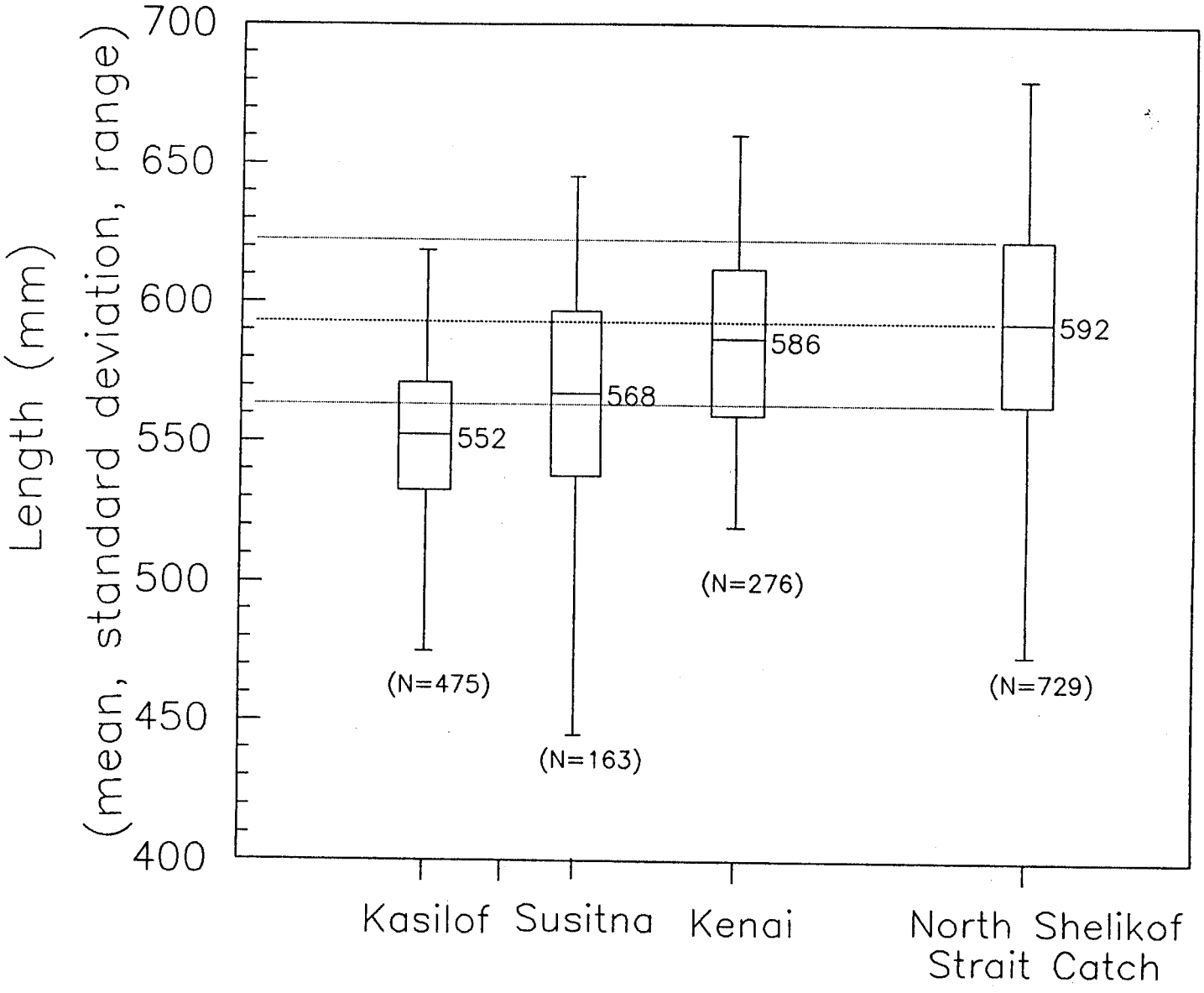


Figure 16. Comparison of age -1.3 sockeye lengths between selected Upper Cook Inlet stocks and the Kodiak Mainland-Afognak Districts catch, 1988.