FRI-UW-9502
February 1995

FISHERIES RESEARCH INSTITUTE
SCHOOL OF FISHERIES
UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

SOCKEYE SALMON OF THE NORTH PENINSULA

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Approved

Submitted 2-6-95

Director

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

Brenda Rogers assisted in compilation of data and figures and Marcus Duke assembled the manuscript. Thanks also to Bruce Barrett of the Alaska Department of Fish and Game for providing several reports and preliminary catch and escapement statistics.

This project was funded jointly by Peter Pan Seafoods (major contributor), Trident Seafoods, Icicle Seafoods, and Crusader (through Pacific Seafood Processors Association), the Aleutian East Borough, and Concerned Area M Fishermen.

KEY WORDS

sockeye salmon, fisheries, distribution, timing, Bristol Bay, North Peninsula

INTRODUCTION

The salmon fisheries on the north side of the Alaska Peninsula have been conducted annually since the early 1900s. Most of the sockeye salmon (*Oncorhynchus nerka*) are caught in the Northern District, which is along the migratory route of the much more abundant Bristol Bay stocks (Fig. 1). Early in the history of the North Peninsula sockeye fishery, there was controversy as some Bristol Bay fishermen claimed the majority of the catch was from Bristol Bay stocks, while the Peninsula fishermen maintained that they were fishing on local stocks (Murphy and Barrett 1994). Several early tagging experiments and studies of the migrations of Bristol Bay sockeye (Straty 1975, Eggers 1984, Isakson et al. 1986, Rogers 1987a) demonstrated that most Bristol Bay sockeye salmon migrate well offshore and are unlikely to enter the nearshore salmon fisheries on the North Peninsula. However, some very large catches in this past decade and some scale pattern analyses indicating a significant presence of Bristol Bay sockeye (Geiger 1989, Swanton and Murphy 1992) have renewed the controversy as to the origins of sockeye caught in the North Peninsula fishery.

The most reliable method to determine the origins of salmon in a fishery is by tagging experiments, but such experiments are expensive and are unlikely to be conducted along the North Peninsula in the near future. However, some other methods, in addition to scale pattern analysis, can be used to examine this question. In this report we examine the North Peninsula runs and fisheries to determine whether there are any recent changes that are atypical of other sockeye salmon stocks. Then the Bristol Bay sockeye migrations are described with emphasis on run timing and onshore-offshore distribution. These data are combined to estimate the vulnerability of Bristol Bay sockeye to the North Peninsula fisheries. Finally, the age compositions in the North Peninsula catches are compared with those from offshore samples and the Bristol Bay catches to determine if any similarity exists.

METHODS

The description of the North Peninsula sockeye salmon runs and fisheries was based on reports by the Alaska Department of Fish and Game (ADF&G). The historical catches were compared graphically with other selected sockeye salmon runs to western and central Alaska to determine if the North Peninsula catch curve was typical or atypical of other sockeye stocks. The recent North Peninsula runs and harvest rates (exploitation rate or proportion caught) were compared with Bristol Bay statistics by linear correlation. The North Peninsula fishery is on a mixture of local and perhaps non-local stocks, and it is difficult to construct brood tables for the individual rivers, which would be desirable to compare with other sockeye salmon rivers. Therefore, most comparisons were made between composite North Peninsula and Bristol Bay runs.

A description of the adult migration of Bristol Bay sockeye from the North Pacific into the Bristol Bay fishing districts was made in past years by combining information from several sources (Straty 1975, 1977; French et al. 1976; Shumacher and Moen 1983; Pace 1984; Rogers 1987a, b; Eggers 1984) as well as our studies in 1984–85 (Isakson et al. 1986). The present

description incorporates results from the 1987 tagging experiment by ADF&G (Eggers et al. 1991 and Rogers 1990) and stock separation studies within Bristol Bay (Cross et al. 1989, Stratton and Cross 1990, Stratton et al. 1992).

Bristol Bay run timing past Port Moller was estimated annually (1987–94) by combining inshore run statistics collected by ADF&G (e.g., Stratton 1991) with Port Moller test boat catches collected by the Fisheries Research Institute (FRI). The Port Moller statistics begin in 1968; however, FRI has conducted the program only since 1987 (Helton 1991, Rogers 1994). Fishing begins June 11 and ends about July 5–10, and all statistics were summarized by 5-day periods. The daily runs in each fishing district were estimated by adding the catch to the escapement, which was lagged back to the fishing district from the counting towers. The daily runs to the Naknek/ Kvichak, Egegik, and Nushagak districts were combined by setting the Egegik runs 1 day earlier and the Nushagak runs 1 d later than the Naknek/Kvichak run. Daily proportions were calculated and then the Togiak and Ugashik runs were added (Appendix Table 1). This combined cumulative daily run was then graphically compared with the cumulative daily index catches at Port Moller to determine the best travel time to reconstruct the run past Port Moller. Since the Port Moller sampling did not extend to the end of the Bristol Bay run, the estimated travel time was greatly influenced by the timing of the early part of the run. Adjustments were made for some years based on the difference between the mid-point in the inshore runs and the 50% date of the Port Moller catches through July 5.

The onshore-offshore distribution of the Bristol Bay run along the North Peninsula was estimated from the index catches at four stations spaced from 33 to 63 nautical miles (nm) out from Port Moller (about 13 to 43 nm out from the Alaska Peninsula coastline, point-to-point). An index catch is the number caught by 100 fathoms (fm) fished for 1 hour with a monofilament net of 5-inch mesh. To expand the onshore-offshore distribution, index catches at stations 10 nm inshore and 10 nm offshore of the standard four stations were estimated from the closest stations. This provided annual estimates of the onshore-offshore distribution by 5-day periods and 10-nm intervals from 3 to 53 nm off the coastline. The North Peninsula fishing districts extend out 3 nm from the coastline. The estimates of the daily passage of Bristol Bay sockeye were then multiplied by the estimated proportion of the run that was within 3 nm of the coast to estimate the number of Bristol Bay sockeye potentially available to be caught in the North Peninsula fisheries (Appendix Table 2). The main assumption is that the onshore-offshore distribution in the remainder of the Northern District is the same as that estimated off Port Moller.

The ages of sockeye caught in the Port Moller test fishery were summarized by 5-day periods to correspond with the test-boat catches (Appendix Table 3). The annual age compositions of the sockeye caught in the North Peninsula fisheries were provided in ADF&G reports by weekly periods for two subdistricts: Bear River, Harbor Point to Cape Seniavin; and Ilnik/Three Hills, Cape Seniavin to Strogonof Point (Fig. 2 and Appendix Table 4). Age compositions from the two subdistricts were averaged through July 11 by weighting the subdistrict compositions by the catch. Catches made within Nelson Lagoon were not included because these were very unlikely to contain Bristol Bay fish. The annual age compositions of the North Peninsula escapements were estimated by weighting the individual river age compositions by the number in the escapement (Appendix Table 5). Unfortunately, the statistics were not available by date (the largest run, Bear River

extends from early June to September), ages were frequently missing for the smaller runs (e.g., Sandy River), and no data were available for 1993–94. For the remaining years the age composition of the North Peninsula escapement was estimated from Ilnik River, Bear River, and Nelson lagoon ages. Age compositions for the annual Bristol Bay catches are available in annual ADF&G reports (e.g., Stratton and Crawford 1992); however, I used statistics from annual run summaries provided by B. Cross (ADF&G, Anchorage, Alaska, unpubl. data) to calculate the age compositions in the catches (Appendix Table 6).

RESULTS

NORTH PENINSULA SOCKEYE FISHERIES

Most sockeye salmon caught in the North Peninsula are caught by drift gillnets and secondarily by set gillnets (mainly Nelson lagoon), but some areas are open to purse seine gear. The drift fleet is virtually the same fleet that fishes the South Peninsula June fishery (False Pass). Since this June fishery often does not end until late in the month, fishing effort on the north side is light until the last week of June. The largest concentration of sockeye on the North Peninsula is in the area of Port Moller (Nelson Lagoon and Bear River); however, most of the catch is made east of there, towards Bristol Bay. The early historical catches from the North Peninsula averaged just under 1 million sockeye with the highest annual catch at 2 million (Fig. 3). This was followed by a period of relatively low production, 1950–77, and then the recent period since 1978 when several annual catches have exceeded the highest catches made in the early history of the fishery. The large recent catches in the North peninsula fishery are not unique to that fishery; rather they have occurred in nearly all major sockeye fisheries in the Bering Sea and upper Gulf of Alaska. The recent increase in North Peninsula catches is in fact modest compared with the increases in catches from neighboring Ugashik and Egegik systems or in Cook Inlet. The changes in the North Peninsula catches are more in line with the Nushagak and Chignik stocks.

Estimates of the annual runs (catch plus escapement) to the North Peninsula are only available since 1962 (McCullough et al. 1994). The Bristol Bay and North Peninsula runs both increased in the late 1970s from relatively low runs during the early 1970s (Fig. 4). There is thus some correlation in runs between the locations ($r = .73$, $n = 31$); however, several years with large Bristol Bay runs (1960, '65, '70, '75) had average or below-average runs on the North Peninsula. There is no indication from these data that the North Peninsula catches are dependent on the abundance of Bristol Bay sockeye. The North Peninsula runs extend over a much longer period than the Bristol Bay runs, which typically end in the bay by July 20. Bear River has an early and late run. The early Bear River run, as well as most of the other North Peninsula runs, tends to overlap the period when Bristol Bay sockeye are migrating past the North Peninsula, June 20-July 11. The timing of the North Peninsula sockeye runs was approximated by the weekly catch plus escapements (with no lag time for travel from the fishing district to the counting stations) for 4 recent years with very large runs (Fig. 5). Much of the North Peninsula run and catch takes place while the Bristol Bay sockeye migration is underway; however, the division of catch and escapement is in line with

similar large runs within Bristol Bay. Along with the recent large runs to the North Peninsula, there have been escapements in excess of management escapement goals (Table 1). The same thing has happened in Bristol Bay with the recent large runs (Rogers et al. 1994). In both areas, fishermen have not harvested all the fish available in excess of management escapement goals with these large runs. Management based on fixed escapement goals should have low harvest rates when runs are small and high harvest rates when runs are large. This has been the case for the North Peninsula runs, but less so for Bristol Bay (Fig. 6).

BRISTOL BAY SOCKEYE MIGRATIONS

General Routes from the Pacific

The return migration of adult sockeye salmon to Bristol Bay begins in May as the maturing fish are distributed across the North Pacific from the eastern Gulf of Alaska to the western Aleutian Islands (French et al. 1976). The majority of the sockeye migrate through the Aleutian Island passes and the Bering Sea, but those located in the eastern and central Gulf of Alaska move north concentrating along the south side of the Alaska Peninsula, and then west to Unimak Pass and into the Bering Sea (Fig. 7). The fish returning from the Gulf of Alaska represent about 25% of the Bristol Bay run and are the sockeye that are fished by the False Pass fisheries at South Unimak and the Shumagin Islands (Rogers 1987a). During 1957–78 when there was a large high seas fishery north and south of the western Aleutians, 10% of the runs were caught by this fishery while 2% of the runs were caught by the False Pass fisheries (40% were caught in Bristol Bay and 48% went to the escapement). During 1979–94, when the Bristol Bay runs commonly exceeded 40 million and the high seas catch was negligible, the False Pass catch accounted for 3% of the runs with 62% going to the inshore catch and 34% to the escapement.

The very abundant Bristol Bay sockeye are joined on their migration by North Peninsula sockeye, Bristol Bay chum salmon (*O. keta*), and perhaps Kuskokwim chum salmon as well (Eggers et al. 1991). The migration route into Bristol Bay along the north side of the Alaska Peninsula is offshore with the main body of sockeye concentrated 10 to 50 nm from the coastline (Fig. 8). The adults are actively feeding, at least as far in as the area off Port Moller (Helton 1991). Their growth in the spring of their return is partially density dependent and is also affected by spring temperatures (Rogers and Ruggerone 1993). There is also a strong tendency for the adults returning to peninsula rivers from Nelson Lagoon to Ugashik to swim past their river of origin, into inner Bristol Bay, and then back out.

Inshore of the adult migration the Bristol Bay smolts are migrating seaward along the coast. They put on very little growth in inner Bristol Bay where food is scarce, but they grow rapidly in the vicinity of Port Moller (Straty and Jaenicke 1980). There is a progression in the seaward migration of Bristol Bay smolts as they migrate into the Bering Sea (Rogers 1987b and 1988). Ugashik smolt lead the way, followed by Egegik, Naknek, Kvichak, and finally Nushagak smolt. Little is known about the migrations of North Peninsula smolt; however, smolts from the major systems in Bristol Bay are spread out in time (May-August) in contrast to the concentrated adult

migration, and there is no evidence that growth in the first summer at sea is density dependent. The north side of the Alaska Peninsula serves as a nursery ground for several other fishes in addition to juvenile salmon (Isakson et al. 1986).

The salmon migrations along the north side of the Alaska Peninsula can be explained partly on the basis of the hydrology in this area (Pace 1984). There is a major flow of water into the Bering Sea through Unimak Pass that tends to circulate into Bristol Bay within about 5 nm of the coastline. This coastal current carries water from the peninsula rivers into Bristol Bay in the vicinity of Egegik where the current flows across towards the Nushagak and then back out into the Bering Sea. Smolts migrate seaward against this current whereas adult salmon migrate offshore, and those returning to peninsula rivers are out of the reach of their home-stream waters until they are well into Bristol Bay. In addition to the fact that the best fishing on peninsula stocks is usually on the north or bay side of the river, there is now evidence for this migration route from tagging on the South Peninsula and scale pattern analyses within Bristol Bay. Tagging in the False Pass fisheries demonstrated no difference in run timing of Bristol Bay stocks through the June fisheries on the south side (Eggers et al. 1991, Rogers 1990). The Ugashik stocks, which from their location relative to the tagging should have been the first to arrive at their home waters, were instead the last of the stocks to arrive. Scale pattern analyses of eastside stocks demonstrated that Ugashik sockeye were the most likely to be caught in another district (Table 2). During 1987–94, about 29% of the Ugashik runs were caught on the inside. Note also that more Egegik sockeye were caught inside in the Naknek/Kvichak district than outside at Ugashik. These recent studies provide further evidence of an offshore-inside and nearshore-outside migration route for Alaska Peninsula stocks.

Run Timing

The timing of the annual return of salmon to Bristol Bay is relatively precise, usually varying from year-to-year by only a few days. Compared with other salmon runs, Bristol Bay sockeye return over a very short period as the majority of the sockeye pass through the fishing districts in 2 weeks. The runs tend to begin earlier and end later when the runs are very large (>40 million). In the large runs since 1987, there have been days when as many as 4 million sockeye swam past Port Moller (Fig. 9). The large runs in 1993 and 1994 (~50 million) illustrate the extremes in the daily passage rates. The 1993 run was one of the earliest runs on record and the 1994 run was one of the latest runs. For both runs the daily passage rate by Port Moller declined to <500,000 after July 10 and the runs were nearly over by July 15. On the average the fish took 7 days to travel from Port Moller into the fishing districts with a range of plus or minus 2 days (Table 3). During the course of an annual run, water temperatures off Port Moller increase and there is a tendency for travel time to decrease (Rogers 1994). The early fish appear to take a day or two longer to reach the inner bay and the late arriving fish take a day of two less than the majority of fish in the middle of the migration.

Onshore-Offshore Distribution

During the early period of the Port Moller program (1968–85), ADF&G routinely fished at 11 stations spaced 5 nm apart along a transect out from Port Moller. Occasionally there was also fishing at station 0 (13 nm out from Port Moller) and station 12 (83 nm from Port Moller). The program was only moderately successful in forecasting the Bristol Bay run and was discontinued after 1985. These ADF&G catch statistics were examined in 1987 before FRI took over the program. We decided to routinely fish only at stations 2, 4, 6, and 8 because this is where large catches were consistently made; however, we would occasionally fish at stations 0 and 10 if the distribution was unusual (Table 4, Fig. 10). The present Port Moller program has been very successful in forecasting the abundance and timing of the Bristol Bay runs, and this is certainly due in large part to sampling the main body of sockeye salmon at stations 2–8 (Rogers et al. 1994).

Vulnerability to North Peninsula Fisheries

Although large numbers of Bristol Bay sockeye annually migrate past the North Peninsula while an intensive commercial fishing is taking place (June 21–July 11), relatively few are vulnerable to this fishery because most Bristol Bay sockeye are far offshore (Table 5). On a daily basis, the largest number of Bristol bay sockeye estimated to have been vulnerable to the North Peninsula fishery was only 36,000 (June 25, 1987), and typically the numbers vulnerable were <10,000. The numbers of sockeye caught in the Bear River and Ilnik/Three Hills sections during open fishing periods were compared with the number of vulnerable Bristol Bay sockeye at those times. It was assumed that the Bristol Bay sockeye would have been harvested at the same high rates of North Peninsula stocks (.64–.81). During 1987–94, it was estimated that Bristol Bay sockeye contributed ~3% to the total North Peninsula catch (annual range: 1–8%) and the subsequent loss to the inshore Bristol Bay runs was 0.2% (annual range: <0.1–0.3%).

AGE COMPOSITION

If Bristol Bay sockeye constituted a major portion of the North Peninsula catch as indicated by some scale pattern analyses (Geiger 1989, Swanton and Murphy 1992), then we should expect the age composition in the North Peninsula catch to be similar to that in Bristol Bay or at least an average of ages in Bristol Bay and the North Peninsula escapements. A comparison of age compositions can not be used to estimate the possible contribution of Bristol Bay sockeye, but it can rule out a majority contribution if the ages in Bristol Bay and North Peninsula are quite different.

Gillnets used in Bristol Bay tend to select for 3-ocean sockeye and against smaller 2-ocean fish and jacks. I assumed that the same held for gillnets used on the North Peninsula (i.e., greater proportion of 3-ocean fish in the catch than in the escapement) (Table 6). Therefore, to compare age compositions among fisheries and escapements, I used only the freshwater age compositions. This provided two observations for each location and year (the proportion of age 2.2 in ages 1.2 + 2.2; and the proportion of age 2.3 in ages 1.3 + 2.3). Freshwater age in Bristol Bay sockeye is influenced by spring and summer weather, which in turn affects growth and age of smoltification

(Rogers 1987c). We should thus expect some correlation in freshwater age composition between Bristol Bay and North Peninsula stocks because they are subject to similar weather.

There was a very high correlation in the freshwater ages of sockeye caught in the Port Moller test fishery and in the Bristol Bay catch (Fig. 11), which is further evidence that this test fishing is on a composite of all Bristol Bay stocks. The sockeye in the North Peninsula catches were (with one exception) older than the sockeye in the Port Moller and Bristol Bay catches but were comparable with the freshwater ages in the North Peninsula escapement. These age data are consistent with a North Peninsula fishery on North Peninsula stocks and with only a minor contribution from Bristol Bay stocks.

DISCUSSION

The preponderance of evidence indicates that the North Peninsula sockeye fishery fishes local stocks. Recent increases in the catches are little different than those seen in other sockeye salmon fisheries, and harvest rates, as well as escapement levels, are consistent with other sockeye salmon fisheries in the region. The major routes followed by Bristol Bay sockeye on their return migration from the North Pacific takes them well off the North Peninsula shore and effectively keeps them from contributing larger numbers to the nearshore North Peninsula fishery. There is considerable evidence for an offshore migration into Bristol Bay and then an inshore migration back out of Bristol Bay for stocks bound for rivers along the north side of the Alaska Peninsula from Nelson Lagoon to Ugashik. It appears just as likely that North Peninsula stocks are caught in eastside Bristol Bay fishing districts as it is that Bristol Bay stocks are caught in North Peninsula fisheries. Even with Bristol Bay runs as large as 50 million, the contribution to the North Peninsula catch was small and the impact on the Bristol Bay run was negligible.

These results are inconsistent with the scale pattern analyses conducted in recent years. A problem with scale pattern analysis is that all fish in the unknown sample, in this case the North Peninsula catch, are classified into the assumed standard categories. There is no allowance for an "other" category (i.e., fish originating from stocks not included in the standards). It is thus very important that all stocks potentially contributing to the suspected mixed-stock fishery be included in the set of standards. This is a problem for the North Peninsula since all stocks are not routinely sampled. In addition, Geiger's (1989) analyses assumed that all fish were either from the North Peninsula or Ugashik, and Swanton and Murphy (1992) assumed all sockeye to be from either eastside Bristol Bay stocks or North Peninsula stocks. In both cases the assumptions were not in agreement with our understanding of the Bristol Bay adult migration along the Alaska Peninsula.

Future investigations of the sockeye salmon of the North Peninsula should examine the timing of North Peninsula runs by river, and especially separate the early and late Bear River runs. It would be helpful to reconstruct the runs in the North Peninsula fishing districts by combining daily catches and lagged daily escapements. The Port Moller data should be examined to determine if there is any difference in age composition between inshore and offshore stations. Perhaps Nushagak sockeye are further offshore than eastside stocks, just as chum are farther offshore than

sockeye. A major assumption in our conclusions is that the onshore-offshore distribution at Port Moller persists in towards Bristol Bay at least as far as Strogonof Point. There is no way to test this assumption other than by sampling the migration at that point. We also assumed that Bristol Bay sockeye migrated at a constant speed during the course of the run. The effect of this assumption could be examined by methods similar to those employed by Eggers (1984). If future scale pattern analysis is undertaken, Bristol Bay standards should include all major rivers, and standards for the North Peninsula should include at least the four largest rivers.

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FIGURES

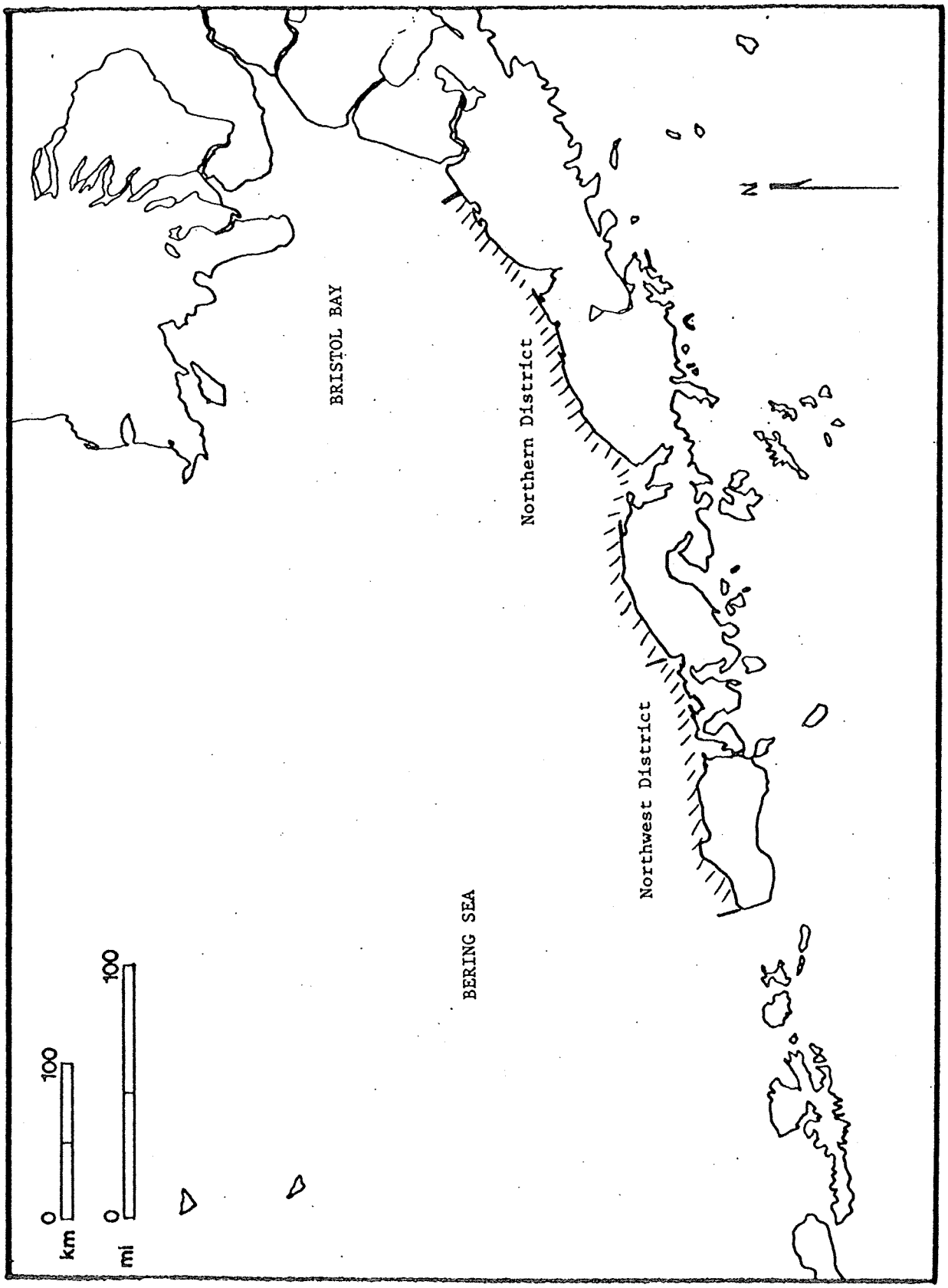

Figure 1. North Alaska Peninsula fishing districts.

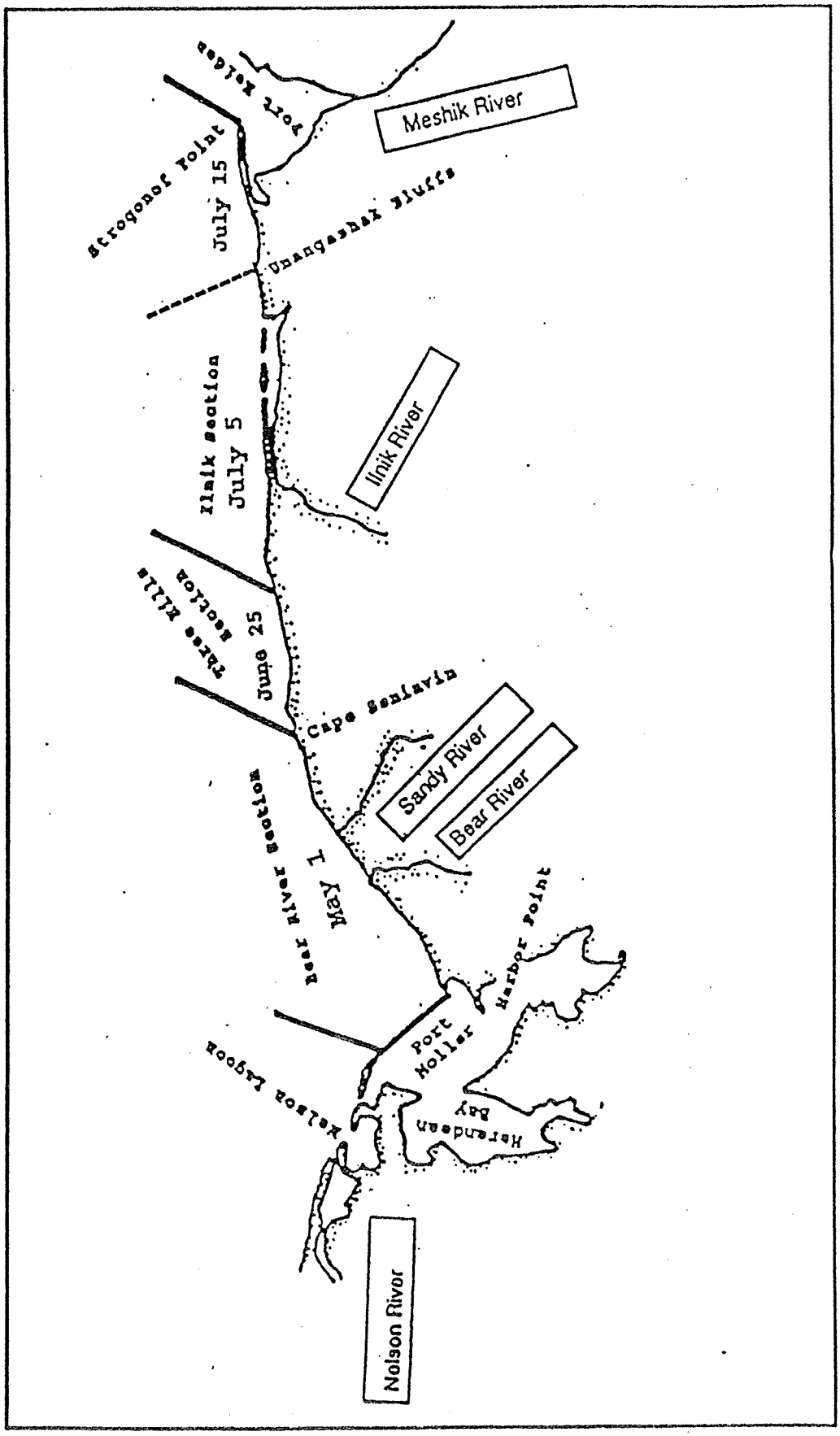

Figure 2. Fishing sections within the Northern District. Source: Murphy and Barrett (1994), Figure 2.

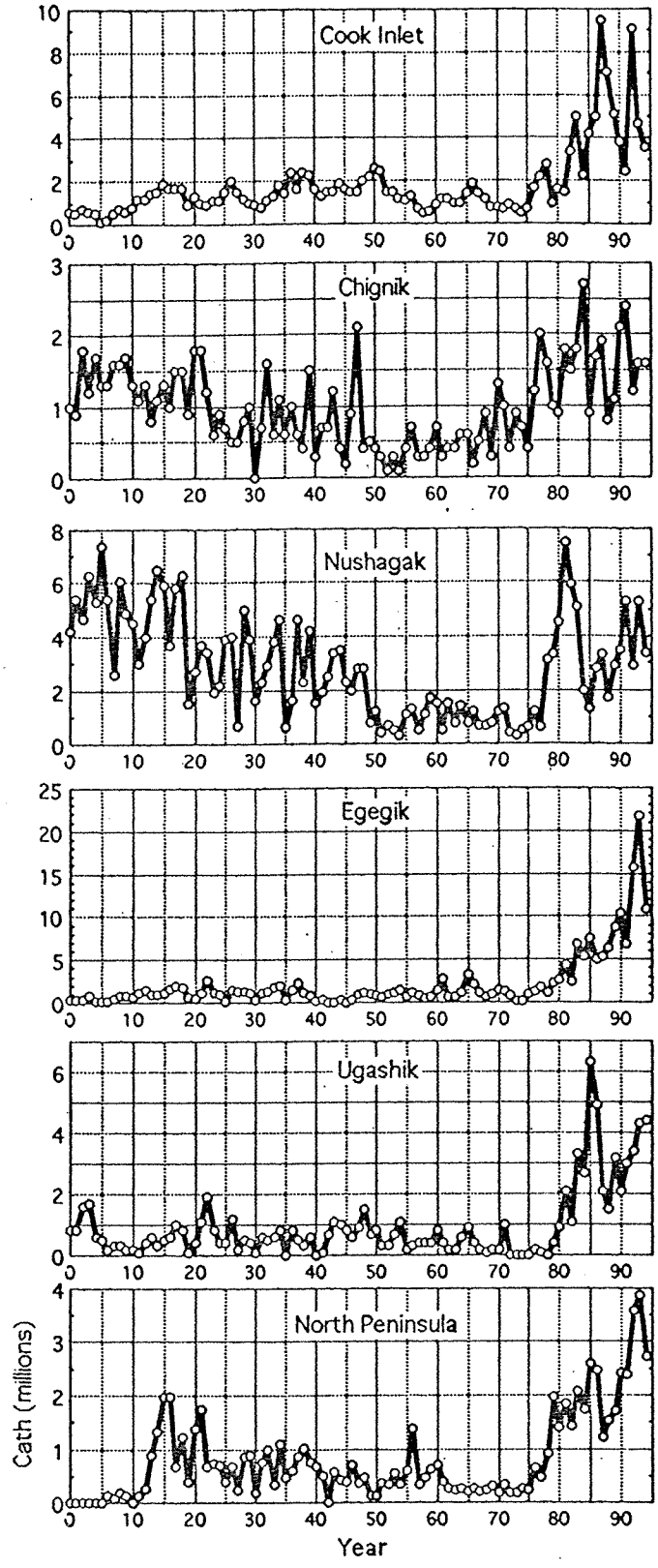

Figure 3. Historical sockeye salmon catches in selected Alaska fisheries, 1900–94.

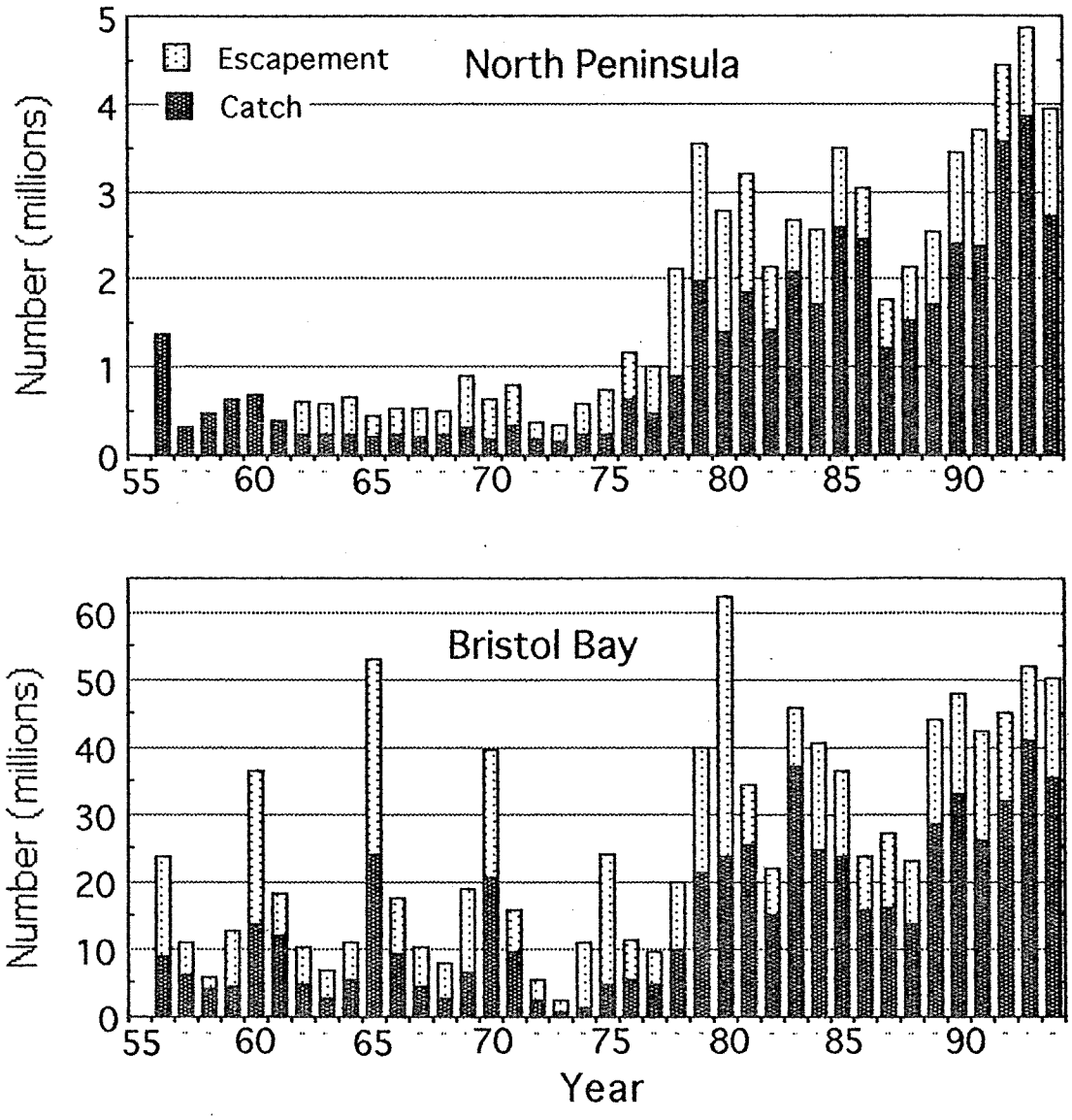

Figure 4. Annual sockeye salmon runs to Bristol Bay and North Peninsula, 1956–94.

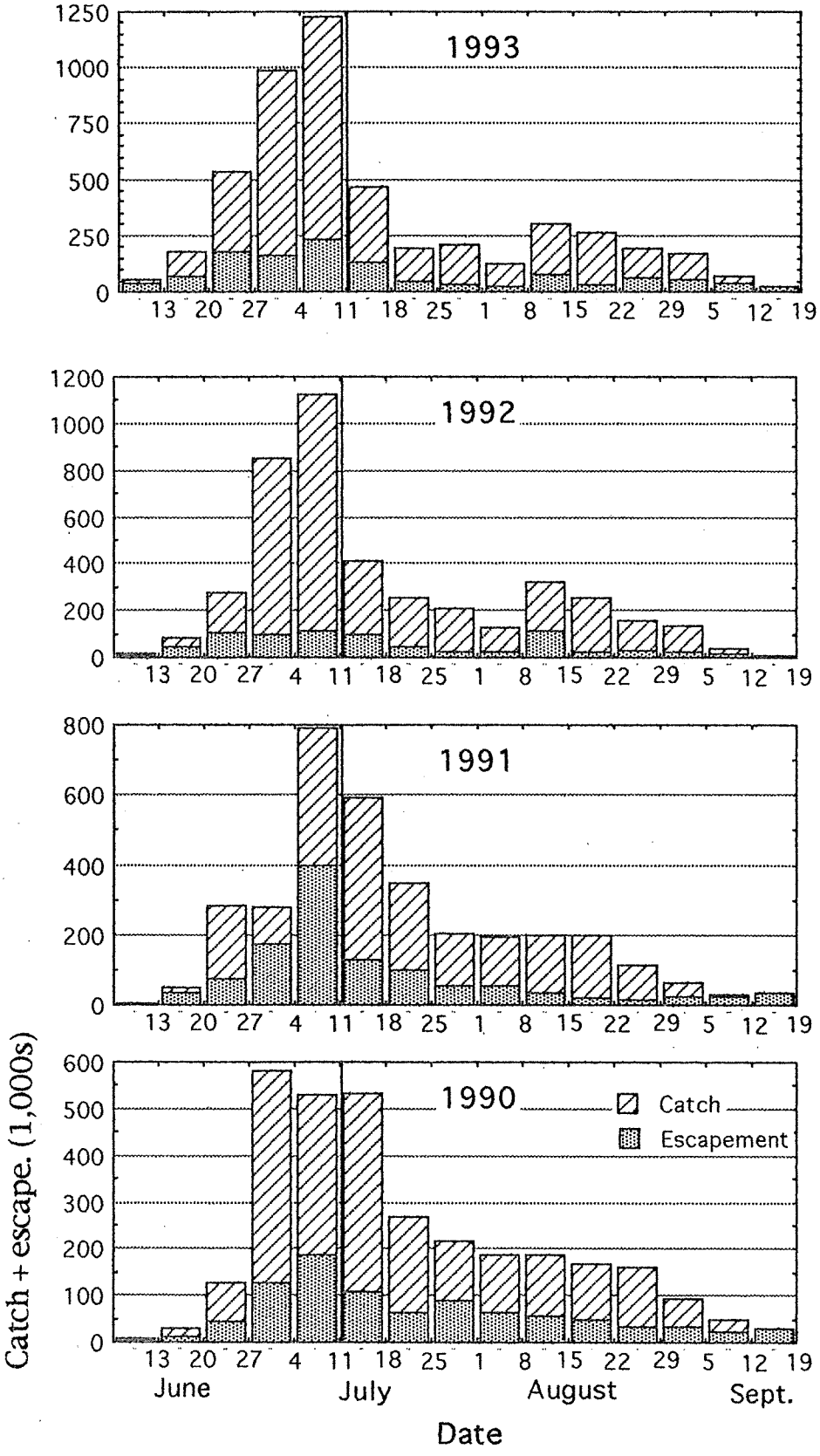

Figure 5. North Peninsula sockeye catch and escapement by weekly periods, 1990–93.

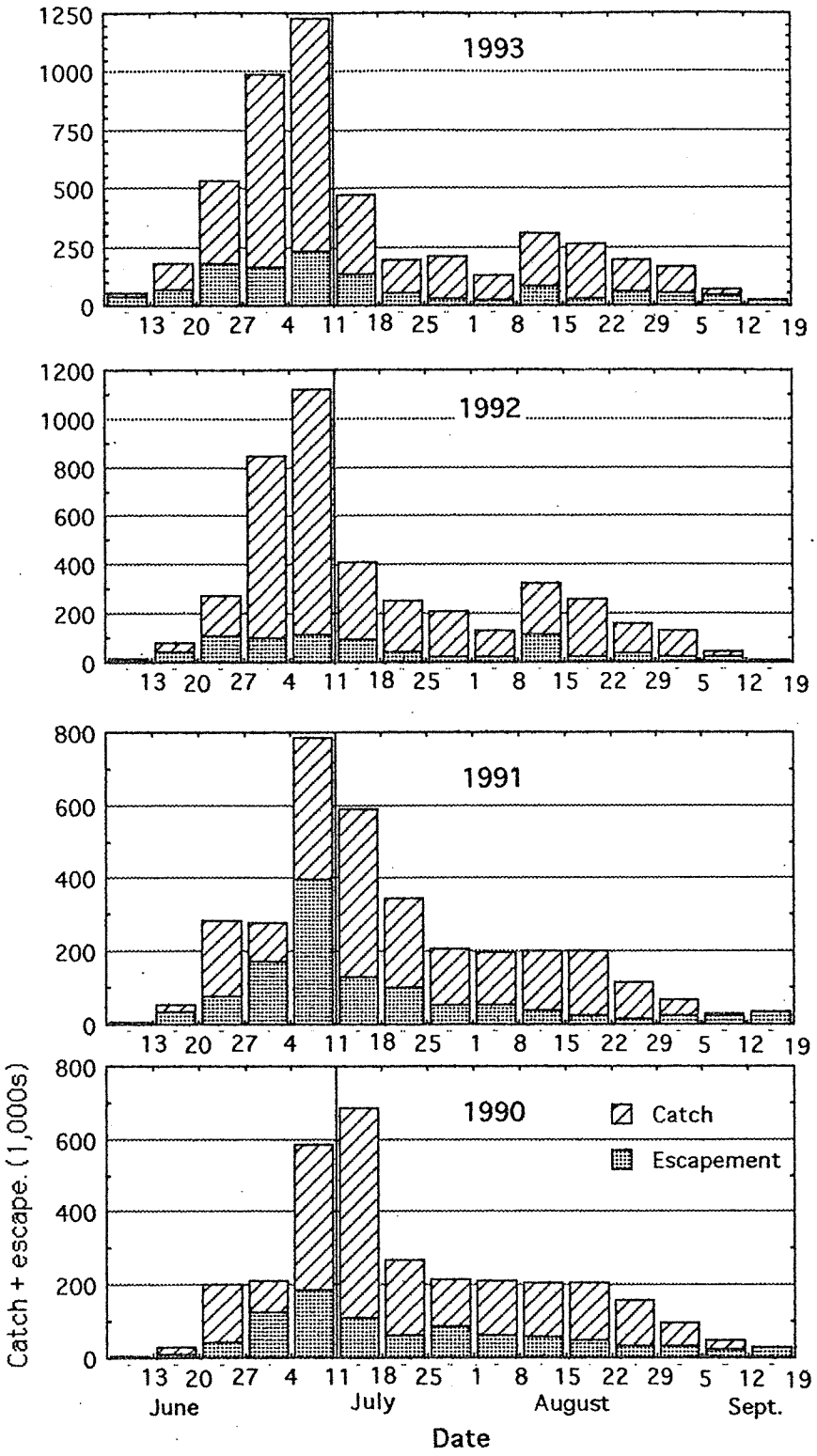

Figure 5. North Peninsula sockeye catch and escapement by weekly periods, 1990–93.

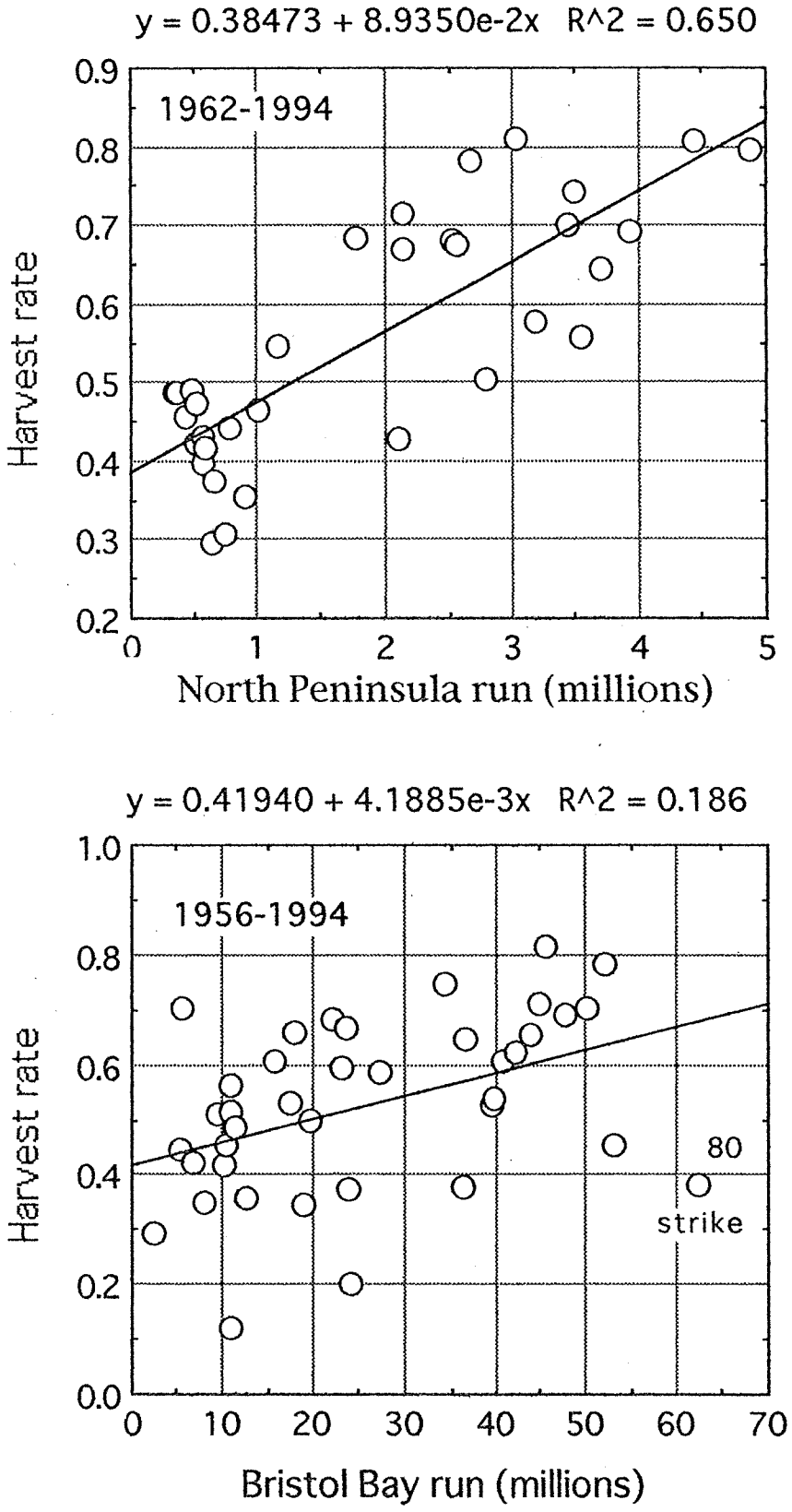

Figure 6. Regressions of harvest rate on Bristol Bay and North Peninsula sockeye runs.

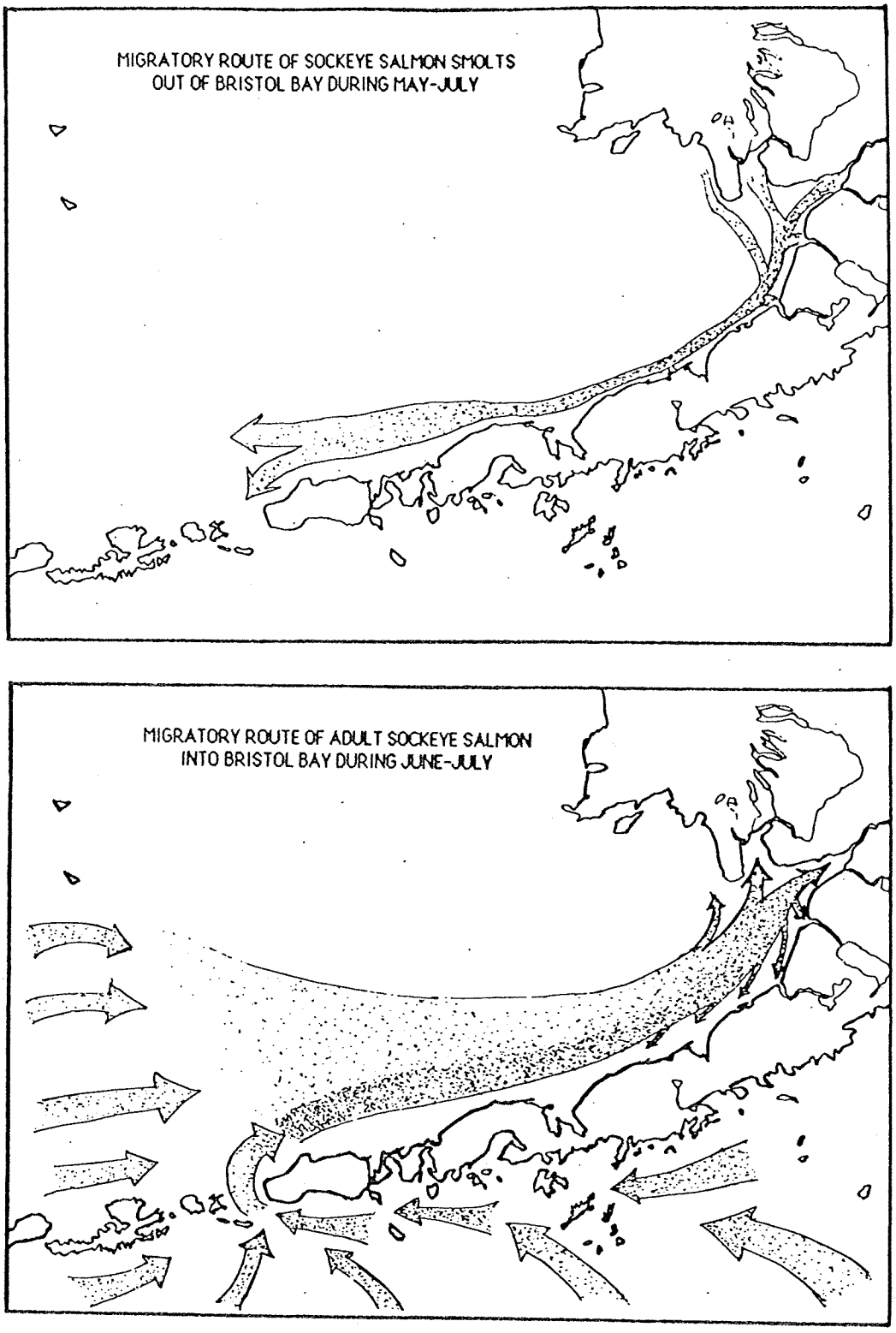

Figure 7. Migratory routes of Bristol Bay sockeye smolts and adults.

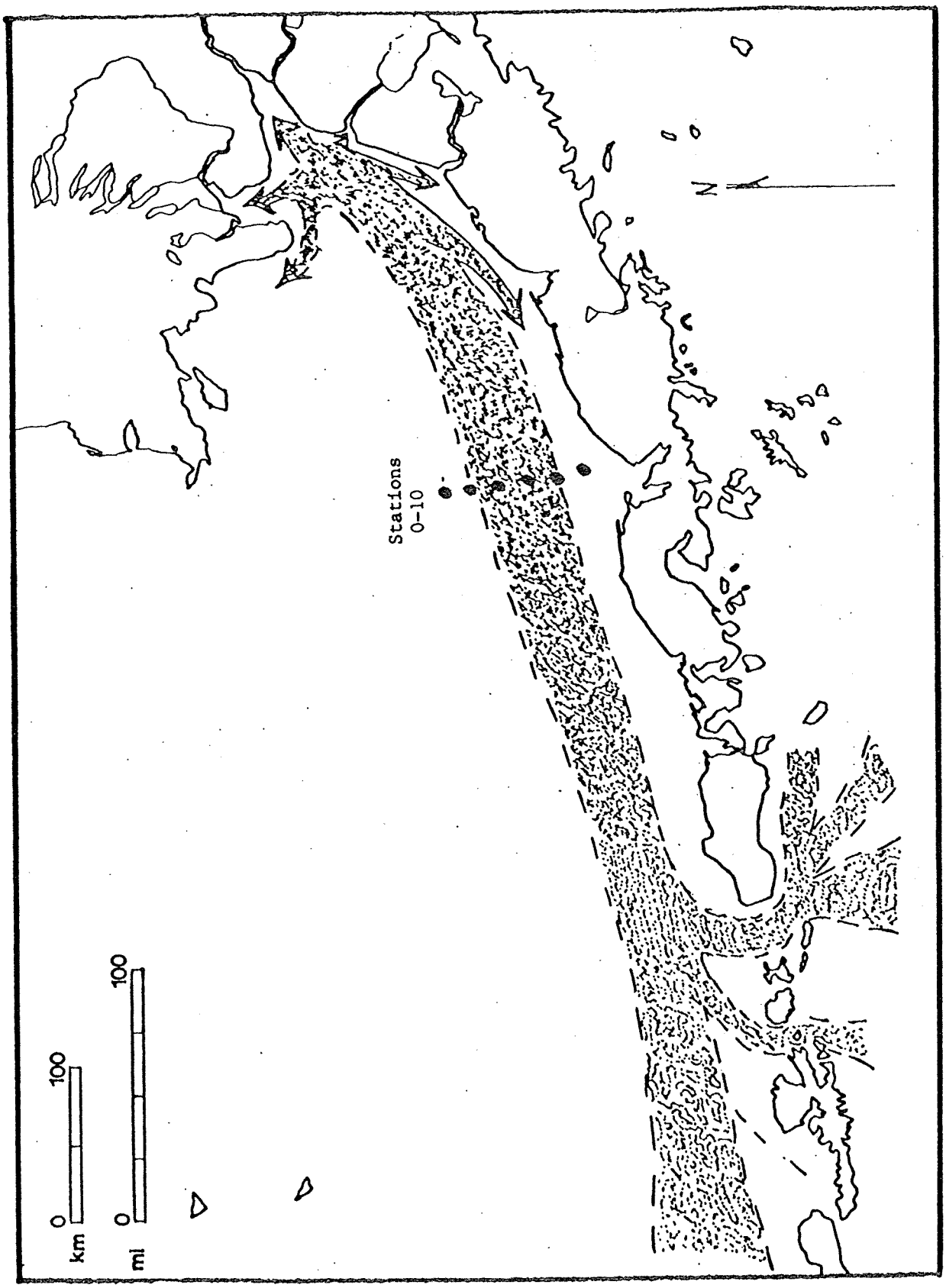

Figure 8. Port Moller test fishing stations and the Bristol Bay adult migration.

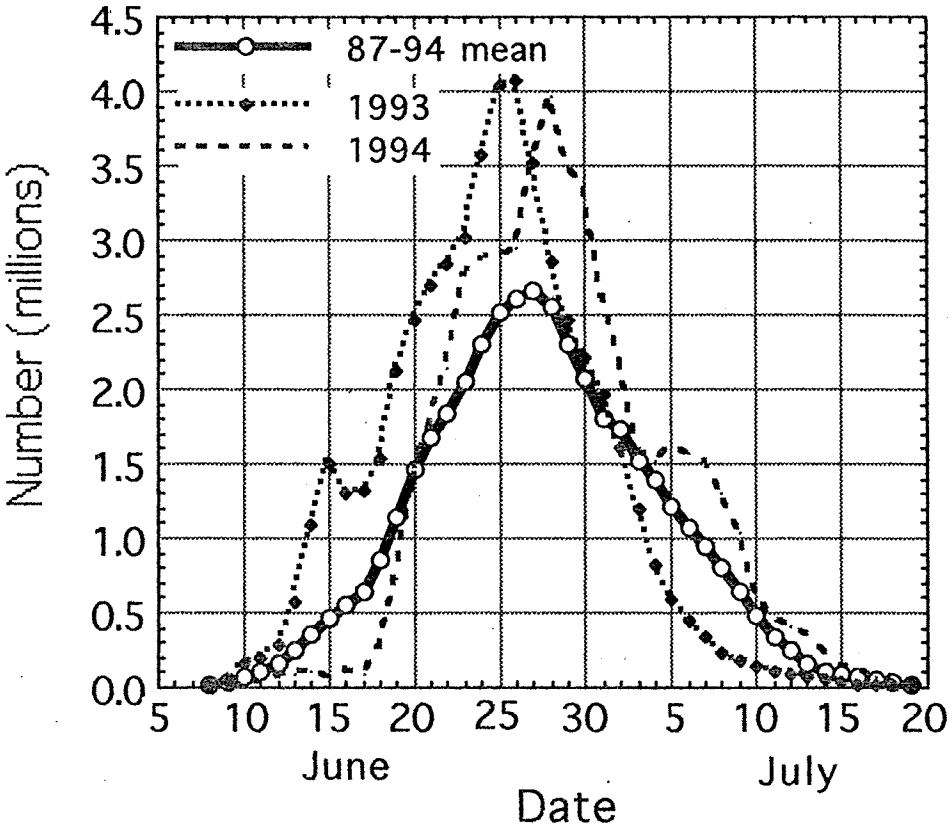

Figure 9. Timing of the Bristol Bay adult migration past Port Moller.

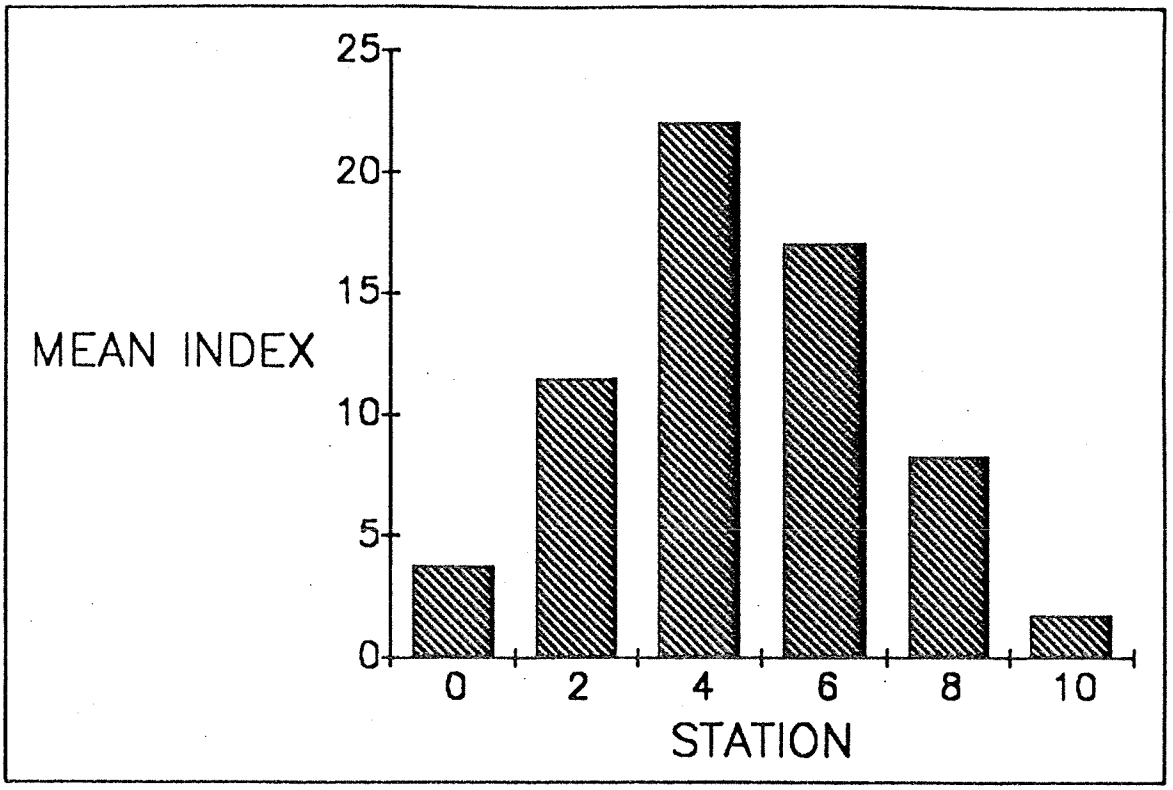

Figure 10. Averages of Port Moller sockeye index catches by station. Source: Helton (1991), Fig. 7.

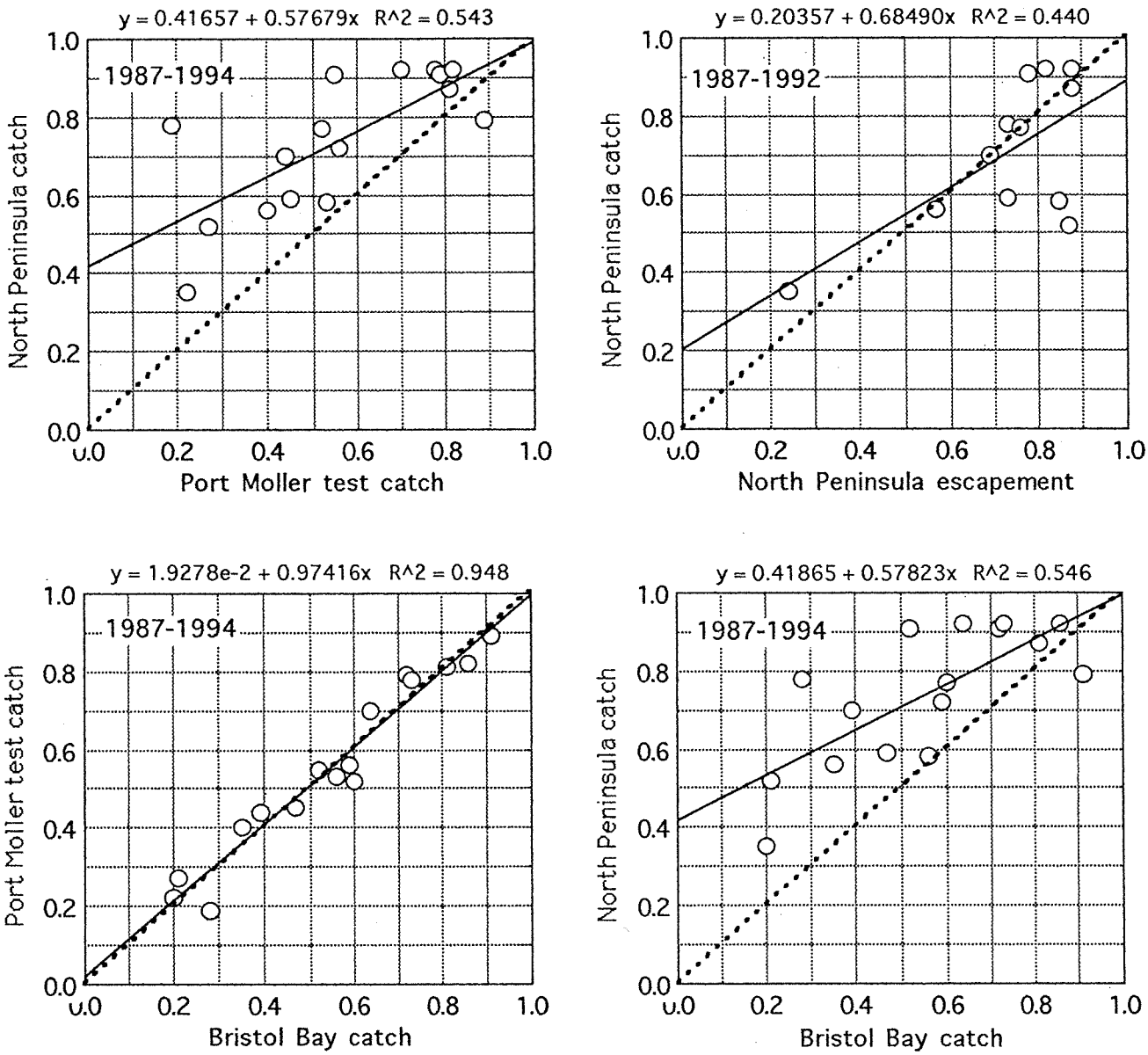

Figure 11. Regressions of age compositions (proportions age 2.x in age x.2 and x.3) between Bristol Bay, Port Moller, and North Peninsula.

TABLES

Table 1. Northern District sockeye salmon escapements and catches, 1987–94.

System	Escapement goal range (1,000s)	Escapement (1,000s) 87	88	89	90	91	92	93	94
Nelson Lagoon	114-178	156	151	207	269	268	190	225	333
Bear River	200-250	267	310	451	547	606	450	452	465
Sandy River	40-60	9	43	45	22	94	35	80	115
Ilnik River	40-60	31	39	19	49	135	45	70	75
Subtotal	394-548	463	543	722	887	1103	720	827	988
Other rivers		43	19	12	29	76	41	93	223
District total		506	562	734	916	1179	761	920	1211
District catch		1065	1450	1668	2258	2210	3496	3798	2711
District run		1571	2012	2402	3174	3389	4257	4718	3922

Sources: McCullough (1990 and1991), Murphy (1991), Swanton and Murphy (1992), Murphy (1994), Barrett and Murphy (1992), Murphy and Barrett (1993 and 1994), and McMullough et al. (1994).

Table 2. Estimates of sockeye salmon runs (1,000s) and the distribution in eastside Bristol Bay districts, 1986–94.

	Naknek/Kvichak					Egegik					
		Dist-	Other		%		Dist-	Other district catch			%
Year	Escape-ment	rict catch	distr. catch	Run	other distr.	Escape-ment	rict catch	N/K	Ugashik	Run	other distr.
86	2765	2600	1474	6839	22	1152	4161	200	840	6353	16
87	7128	4415	1033	12576	8	1274	4016	134	112	5536	4
88	5103	3429	1585	10117	16	1613	4379	95	142	6229	4
89	9479	11766	2709	23954	11	1612	5248	608	264	7732	11
90	9063	15800	1327	26190	5	2192	7871	524	445	11032	9
91	7802	9508	1025	18335	6	2787	5150	1180	467	9584	17
92	6334	6961	1843	15138	12	1943	13078	1308	203	16532	9
93	5561	7670	2133	15364	14	1517	18912	802	521	21752	6
94	9329	15358	666	25353	3	1898	9885	0	358	12141	3
87-94 Means	7475	9363	1540	18378	9	1855	8567	581	314	11317	8

	Ugashik				
		Dist-	Other		%
	Escape-ment	rict catch	distr. catch	Run	other distr.
86	1016	3145	407	4568	9
87	687	1716	1029	3432	30
88	654	1193	657	2504	26
89	1713	2774	2395	6882	35
90	749	1582	1043	3374	31
91	2482	1576	754	4812	16
92	2174	2888	2081	7143	29
93	1413	2642	2005	6060	33
94	1081	3694	1469	6244	24
87-94 means	1369	2258	1429	5056	28

Data sources: Cross et al (1989), Stratton and Cross (1990), Stratton and Miller (1993), Stratton et al. (1992) and J.D. Miller (ADF&G) for 1992-94.

Table 3. Timing of Bristol Bay sockeye runs and between Bristol Bay and Port Moller.

	Mean date of run (July)				Mean date	Days P.M. to	P.M. mean temp. (C)
Year	Egegik	Nak/Kvi	Nush.	Wt'd mean	at P.M.*	B.B.	6/11 to 7/5
85	2.1	3.0	4.3	2.9	27.1	5.8	5.8
86	6.6	6.4	8.3	7.0			5.7
87	3.4	5.5	4.3	4.7	25.5	9.2	7.4
88	1.5	2.0	5.1	2.3	26.8	5.5	6.4
89	3.4	1.4	3.0	2.1	27.0	5.1	7.3
90	6.0	5.0	6.4	5.5	28.0	7.5	5.4
91	4.1	3.6	5.4	4.1	25.8	8.3	7.6
92	5.4	5.0	6.0	5.3	26.7	8.6	7.7
93	0.3	0.6	1.4	0.6	25.3	5.3	6.7
94	6.4	7.0	8.0	7.0	28.0	9.0	
Means (excl 86)	3.6	3.7	4.9	3.8	26.7	7.1	6.7

* Date in June of 50% of index through July 5.

Table 4. Locations of Port Moller test fishing operations.

Station	Miles (n.m.) offshore	Loran coordinates (9990-Z)	Loran coordinates (9990-Y)	Latitude (north)	Longitude (west)
0	23	46357.0	33591.3	56 19.99	160 41.50
2	33	46377.0	33574.0	56 25.48	160 44.88
4	43	46412.0	33542.0	56 35.15	160 50.71
6	53	46450.0	33508.0	56 45.07	160 56.96
8	63	46480.0	33472.0	56 54.43	161 01.96
10	73	46516.0	33436.0	57 03.86	161 07.83

Source: Helton (1991)

Table 5. Estimates of the daily passage of sockeye salmon off Port Moller, 1987–94.

		Daily passage 0-70mi off coast (millions)								Daily number within 3 mi (1,000s)							
Date		87	88	89	90	91	92	93	94	87	88	89	90	91	92	93	94
June	11	.08	.07	.26	.07	.05	.26	.22	.04	0	0	3	0	0	0	0	0
	12	.07	.12	.33	.03	.04	.12	.19	.07	0	0	3	0	0	0	0	1
	13	.08	.19	.48	.05	.07	.21	.29	.09	0	0	5	0	0	0	0	1
	14	.11	.30	.59	.10	.12	.34	.58	.10	0	0	6	0	0	0	1	1
	15	.11	.45	.83	.10	.18	.64	1.09	.07	0	0	9	0	0	0	1	1
	16	.19	.56	.97	.12	.30	.68	1.50	.10	1	1	4	0	2	1	1	0
	17	.39	.69	.97	.17	.50	.92	1.31	.09	1	1	4	0	3	1	1	0
	18	.72	.74	1.29	.36	.74	.69	1.33	.26	2	1	5	1	5	1	1	0
	19	.89	.73	1.53	.72	1.01	.97	1.53	.74	3	1	6	2	7	2	1	0
	20	1.16	.82	1.98	1.00	1.28	.98	2.12	1.42	3	1	8	2	9	2	1	0
	21	1.08	.94	2.72	1.44	1.72	1.50	2.46	1.76	20	7	8	1	3	1	9	16
	22	.99	.93	2.87	1.99	2.08	1.72	2.69	2.15	18	7	9	1	4	2	10	19
	23	1.28	1.07	2.92	1.87	2.36	2.00	2.84	2.77	23	8	9	1	4	2	10	25
	24	1.51	1.30	2.62	1.95	2.54	1.94	3.02	2.88	27	10	8	1	4	2	11	26
	25	1.97	1.72	2.79	2.61	2.64	2.25	3.57	2.89	36	14	8	1	4	2	13	26
	26	1.62	1.45	2.71	3.55	2.97	2.93	4.03	2.95	1	4	12	7	24	2	9	3
	27	1.63	1.19	2.19	4.06	2.82	3.34	4.08	3.48	1	3	10	8	23	3	9	3
	28	1.35	1.00	1.93	3.32	2.66	3.17	3.51	3.97	1	3	8	7	22	3	8	4
	29	1.19	.97	1.94	3.28	2.19	2.51	2.86	3.48	0	2	9	7	18	2	7	3
	30	1.06	.98	1.54	2.78	2.15	2.47	2.47	3.38	0	2	7	6	18	2	6	3
July	1	.91	.81	1.24	2.87	2.13	2.42	2.22	2.62	1	4	2	33	19	1	8	8
	2	1.00	.76	1.02	2.07	2.14	2.54	1.97	2.17	1	3	1	24	19	1	7	6
	3	1.15	.71	1.18	2.36	1.99	2.16	1.60	1.59	1	3	2	27	18	1	6	5
	4	1.29	.66	1.37	1.75	1.73	1.76	1.20	1.51	2	3	2	20	15	1	4	4
	5	1.31	.70	1.37	1.84	1.39	1.35	.83	1.60	2	3	2	21	12	1	3	5
	6	1.11	.59	1.14	1.28	.99	1.13	.59	1.57	1	0	4	15	5	0	3	2
	7	.86	.68	.84	1.38	.73	1.08	.44	1.51	1	0	3	16	4	0	2	2
	8	.65	.58	.52	1.16	.58	.94	.34	1.31	1	0	2	13	3	0	2	1
	9	.42	.55	.48	.99	.56	.73	.25	1.03	1	0	2	11	3	0	1	1
	10	.38	.35	.38	.67	.48	.49	.18	.64	0	0	1	8	2	0	1	1
	11	.22	.27	.34	.58	.35	.24	.14	.45	0	0	1	7	2	0	1	0
	12	.17	.17	.25	.41	.21	.16	.11	.40	0	0	1	5	1	0	0	0
	13	.13	.11	.14	.28	.13	.10	.09	.35	0	0	0	3	1	0	0	0
	14	.12	.08	.07	.17	.10	.07	.08	.24	0	0	0	2	1	0	0	0
	15	.29	.18	.21	.34	.38	.16	.18	.39	0	0	1	4	2	0	1	0
Totals		27	23	44	48	42	45	52	50	151	82	163	254	257	32	136	168

Table 6. Comparison of age compositions, 1987–94.

Year	Location	Age composition 1.2	2.2	1.3	2.3	Other	Year	Location	Age composition 1.2	2.2	1.3	2.3	Other
87	BB catch	.368	.133	.295	.161	.043	91	BB catch	.145	.186	.503	.128	.038
	PM catch	.505	.189	.176	.119	.011		PM catch	.127	.143	.535	.152	.043
	NP catch	.103	.113	.303	.385	.096		NP catch	.092	.129	.500	.266	.013
	NP escape.	.082	.547	.144	.193	.034		NP escape.	.091	.535	.274	.088	.012
88	BB catch	.159	.235	.418	.159	.029	92	BB catch	.080	.344	.284	.251	.041
	PM catch	.180	.196	.481	.115	.028		PM catch	.069	.298	.329	.269	.035
	NP catch	.056	.188	.159	.573	.024		NP catch	.053	.346	.233	.329	.039
	NP escape.	.110	.348	.136	.368	.038		NP escape.	.086	.609	.070	.186	.049
89	BB catch	.097	.611	.166	.108	.018	93	BB catch	.128	.331	.184	.329	.028
	PM catch	.110	.511	.199	.158	.022		PM catch	.072	.274	.190	.443	.021
	NP catch	.026	.305	.181	.419	.069		NP catch	.016	.156	.065	.732	.031
	NP escape.	.078	.589	.092	.200	.041		NP escape.					
90	BB catch	.132	.354	.229	.252	.033	94	BB catch	.054	.534	.155	.225	.032
	PM catch	.104	.363	.225	.278	.030		PM catch	.056	.435	.210	.269	.030
	NP catch	.023	.262	.060	.614	.041		NP catch	.040	.154	.208	.546	.052
	NP escape.	.110	.502	.076	.270	.042		NP escape.					

BB = Bristol Bay, PM = Port Moller, NP = North Peninsula.

NP catch for Bear River and Ilnik/Three Hills sections through July 11 or 14 only.

NP escapement for Ilnik, Sandy (88-89), Bear, and Nelson Rivers for entire season.

APPENDIX

Appendix Table 1. Reconstructed Bristol Bay sockeye run at Port Moller, 1987-94.

1987

Date	6 days Egegik	7 days Nak/Kvi	8 days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Daily %	Cum %	Port Moller index catch	9 days Date
-6/10	30	5	0	35	.001	40	40	0.1	0.1		8
11	30	5	0	35	.001	40	80	0.1	0.2	9	9
12	58	3	1	62	.003	71	151	0.3	0.5	9	10
13	65	2	5	72	.003	82	233	0.3	0.8	8	11
14	79	7	8	94	.004	108	341	0.4	1.2	9	12
15	79	6	12	97	.004	111	452	0.4	1.6	16	13
16	72	16	82	170	.007	194	646	0.7	2.3	11	14
17	44	179	115	338	.014	387	1033	1.4	3.7	10	15
18	55	373	202	630	.026	721	1754	2.6	6.3	10	16
19	43	521	217	781	.032	893	2647	3.2	9.6	17	17
20	260	497	253	1010	.042	1155	3802	4.2	13.8	62	18
21	245	396	302	943	.039	1079	4881	3.9	17.7	16	19
22	339	273	252	864	.036	988	5869	3.6	21.3	85	20
23	402	428	291	1121	.047	1282	7151	4.7	26.0	86	21
24	416	688	215	1319	.055	1509	8660	5.5	31.4	96	22
25	538	990	196	1724	.072	1972	10632	7.2	38.6	96	23
26	290	965	161	1416	.059	1620	12252	5.9	44.5	146	24
27	536	744	144	1424	.059	1629	13881	5.9	50.4	66	25
28	326	567	286	1179	.049	1349	15230	4.9	55.3	158	26
29	288	378	371	1037	.043	1186	16416	4.3	59.6	81	27
30	209	298	415	922	.038	1055	17470	3.8	63.5	75	28
7/1	207	276	312	795	.033	909	18380	3.3	66.8	22	29
2	317	359	200	876	.036	1002	19382	3.6	70.4	26	30
3	233	562	213	1008	.042	1153	20535	4.2	74.6	38	1
4	248	664	214	1126	.047	1288	21823	4.7	79.3		2
5	223	734	191	1148	.048	1313	23136	4.8	84.1		3
6	190	645	133	968	.040	1107	24243	4.0	88.1		4
7	169	490	97	756	.031	865	25108	3.1	91.3		5
8	148	337	86	571	.024	653	25761	2.4	93.6		6
9	84	237	49	370	.015	423	26185	1.5	95.2		7
10	120	186	26	332	.014	380	26564	1.4	96.5		8
11	74	99	22	195	.008	223	26787	0.8	97.4		9
12	63	63	20	146	.006	167	26954	0.6	98.0		10
13	36	56	21	113	.005	129	27084	0.5	98.4		11
14	34	63	12	109	.005	125	27208	0.5	98.9		12
15	39	47	8	94	.004	108	27316	0.4	99.3		13
16	32	26	7	65	.003	74	27390	0.3	99.6		14
17	15	26	5	46	.002	53	27443	0.2	99.7		15
18+	25	21	4	50	.002	57	27500	0.2	100.0		16
Totals	6661	12232	5148	24041	1.000	27500					

Daily Bristol Bay run includes Togiak and Ugashik.
Data source: Cross and Stratton (1988)

Appendix Table 1—cont.

1988

Date	5 days Egegik	6 days Nak/Kvi	7 days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Daily %	Cum %	Port Moller index catch
-6/10	20	6	0	26	.001	30	30	0.1	0.1	
11	30	6	1	37	.002	43	73	0.2	0.3	7
12	65	33	2	100	.005	116	190	0.5	0.8	8
13	60	101	3	164	.008	191	381	0.8	1.6	12
14	106	136	11	253	.013	295	675	1.3	2.9	13
15	209	151	29	389	.019	453	1129	1.9	4.8	14
16	330	111	41	482	.024	561	1690	2.4	7.2	22
17	331	216	47	594	.030	692	2382	3.0	10.2	9
18	240	329	69	638	.032	743	3125	3.2	13.3	8
19	136	433	61	630	.031	734	3859	3.1	16.5	8
20	69	522	111	702	.035	818	4677	3.5	20.0	23
21	271	458	74	803	.040	935	5612	4.0	24.0	17
22	305	410	85	800	.040	932	6544	4.0	28.0	31
23	626	214	76	916	.046	1067	7611	4.6	32.5	35
24	438	407	268	1113	.055	1297	8908	5.5	38.1	62
25	760	376	336	1472	.073	1715	10623	7.3	45.4	28
26	424	530	293	1247	.062	1453	12075	6.2	51.6	63
27	423	487	111	1021	.051	1189	13265	5.1	56.7	54
28	131	659	67	857	.043	998	14263	4.3	60.9	37
29	200	529	104	833	.041	970	15234	4.1	65.1	86
30	300	375	165	840	.042	979	16212	4.2	69.3	58
7/1	279	206	209	694	.035	808	17021	3.5	72.7	50
2	310	167	175	652	.032	760	17780	3.2	76.0	50
3	287	150	172	609	.030	709	18490	3.0	79.0	28
4	228	191	143	562	.028	655	19144	2.8	81.8	28
5	171	272	162	605	.030	705	19849	3.0	84.8	53
6	151	235	119	505	.025	588	20437	2.5	87.3	28
7	238	263	85	586	.029	683	21120	2.9	90.2	42
8	204	229	63	496	.025	578	21698	2.5	92.7	
9	175	251	46	472	.023	550	22248	2.3	95.1	
10	126	143	31	300	.015	349	22597	1.5	96.6	
11	112	92	25	229	.011	267	22864	1.1	97.7	
12	81	49	15	145	.007	169	23033	0.7	98.4	
13	55	30	9	94	.005	110	23142	0.5	98.9	
14	44	21	5	70	.003	82	23224	0.3	99.2	
15	27	15	4	46	.002	54	23277	0.2	99.5	
16	18	12	2	32	.002	37	23315	0.2	99.6	
17	12	11	3	26	.001	30	23345	0.1	99.8	
18+	21	23	3	47	.002	55	23400	0.2	100.0	
Totals	8013	8849	3225	20087	1.000	23400				

Daily Bristol Bay run includes Togiak and Ugashik.
Data source: Stratton and Cross (1990)

Appendix Table 1—cont.

1989

Date	6 days Egegik	7 days Nak/Kvi	8 days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Cum %	Port Moller index catch	5 days Date
-6/10	40	25	0	65	.002	74	74	0.2		12
11	47	115	2	164	.004	186	260	0.6	21	13
12	51	232	8	291	.007	329	589	1.3	30	14
13	75	327	18	420	.011	475	1064	2.4	27	15
14	69	415	34	518	.013	586	1650	3.7	22	16
15	69	613	53	735	.019	832	2482	5.6	33	17
16	104	695	56	855	.022	968	3450	7.8	32	18
17	103	692	62	857	.022	970	4419	10.0	43	19
18	190	857	90	1137	.029	1287	5706	12.9	90	20
19	113	1107	132	1352	.035	1530	7236	16.4	79	21
20	132	1307	309	1748	.045	1978	9214	20.9	79	22
21	527	1517	364	2408	.062	2725	11939	27.1	79	23
22	569	1484	480	2533	.065	2866	14805	33.6	94	24
23	780	1465	336	2581	.066	2921	17726	40.2	90	25
24	386	1533	396	2315	.060	2620	20345	46.2	69	26
25	740	1380	346	2466	.063	2791	23136	52.5	61	27
26	544	1434	416	2394	.062	2709	25845	58.7	33	28
27	760	838	337	1935	.050	2190	28035	63.7	73	29
28	347	1094	266	1707	.044	1932	29966	68.1	117	30
29	617	928	165	1710	.044	1935	31901	72.5	95	1
30	432	811	119	1362	.035	1541	33443	76.0	95	2
7/1	498	463	134	1095	.028	1239	34682	78.8	92	3
2	268	460	174	902	.023	1021	35702	81.1	97	4
3	238	626	181	1045	.027	1183	36885	83.8	113	5
4	305	758	148	1211	.031	1370	38255	86.9	195	6
5	414	690	107	1211	.031	1370	39626	90.0	139	7
6	435	502	72	1009	.026	1142	40767	92.6	136	8
7	377	313	53	743	.019	841	41608	94.5	112	9
8	237	179	40	456	.012	516	42124	95.7		10
9	171	217	36	424	.011	480	42604	96.8		11
10	155	154	28	337	.009	381	42985	97.7		12
11	156	130	19	305	.008	345	43331	98.4		13
12	128	77	12	217	.006	246	43576	99.0		14
13	80	34	7	121	.003	137	43713	99.3		15
14	40	19	3	62	.002	70	43783	99.5		16
15	27	8	3	38	.001	43	43826	99.6		17
16	19	7	4	30	.001	34	43860	99.6		18
17	16	18	6	40	.001	45	43905	99.7		19
18+	53	31	0	84	.002	95	44000	100.0		20
Totals	10312	23555	5016	38883	1.000	44000				

Daily Bristol Bay run includes Togiak and Ugashik
Data source: Stratton (1990)

Appendix Table 1—cont.

1990

Date	7 days Egegik	8 days Nak/Kvi	9 days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Cum %	Port Moller index catch	7 days Date
-6/10	8	22	3	33	.001	36	36	0.1		11
11	5	21	5	33	.001	36	72	0.2	9	12
12	2	36	6	31	.001	33	105	0.3	13	13
13	30	53	6	44	.001	47	152	0.4	14	14
14	39	46	5	89	.002	96	248	0.6	13	15
15	51	60	4	90	.002	97	345	0.8	22	16
16	110	44	4	115	.003	124	469	1.1	25	17
17	212	110	8	158	.004	170	639	1.4	20	18
18	315	333	19	330	.007	356	995	2.2	46	19
19	274	598	59	667	.015	719	1714	3.7	48	20
20	222	980	131	931	.021	1003	2717	5.8	48	21
21	234	1319	295	1333	.030	1436	4153	8.8	48	22
22	205	1252	278	1848	.042	1991	6145	12.9	58	23
23	156	1341	309	1735	.039	1870	8014	16.9	69	24
24	451	1673	299	1806	.041	1946	9960	20.9	148	25
25	825	2035	433	2423	.055	2611	12571	26.4	160	26
26	890	2347	531	3293	.074	3548	16120	33.8	120	27
27	770	1823	493	3768	.085	4060	20180	42.3	147	28
28	806	1772	467	3086	.070	3325	23505	49.3	302	29
29	890	1331	360	3045	.069	3281	26787	56.2	227	30
30	952	1387	328	2581	.058	2781	29568	62.0	285	1
7/1	533	1076	315	2667	.060	2874	32442	68.0	202	2
2	770	1125	292	1924	.043	2073	34515	72.3	168	3
3	408	978	242	2187	.049	2357	36872	77.3	239	4
4	577	972	160	1628	.037	1754	38626	81.0	118	5
5	356	723	105	1709	.039	1842	40467	84.8	76	6
6	531	655	90	1184	.027	1276	41743	87.5		7
7	387	591	95	1276	.029	1375	43118	90.4		8
8	312	506	98	1073	.024	1156	44275	92.8		9
9	197	338	84	916	.021	987	45262	94.8		10
10	213	267	56	619	.014	667	45929	96.2		11
11	158	186	38	536	.012	578	46506	97.5		12
12	112	131	21	382	.009	412	46918	98.3		13
13	77	69	9	264	.006	284	47202	98.9		14
14	42	36	6	155	.003	167	47369	99.3		15
15	31	28	12	84	.002	91	47460	99.5		16
16	25	44	10	71	.002	77	47536	99.6		17
17	42	32	8	79	.002	85	47621	99.8		18
18+	60	20	0	82	.002	88	47710	100.0		19
Totals	12278	26360	5684	44275	.999	47709				

Daily Bristol Bay run includes Togiak and Ugashik.
Data source: Stratton (1991)

Appendix Table 1—cont.

1991

Date	6 days Egegik	7 days Nak/Kvi	8 days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Cum %	Port Moller index catch	8 days Date
-6/10	0	8	1	9	.000	11	11	0.0		9
11	15	13	2	30	.001	35	46	0.1	7	10
12	15	16	6	37	.001	44	90	0.2	9	11
13	17	24	22	63	.002	74	164	0.4	7	12
14	24	36	43	103	.003	121	285	0.7	6	13
15	36	55	58	149	.004	175	461	1.1	17	14
16	69	132	56	257	.007	303	763	1.8	27	15
17	107	261	52	420	.012	495	1258	3.0	47	16
18	191	383	59	633	.018	745	2003	4.7	58	17
19	254	529	74	857	.024	1009	3013	7.1	91	18
20	311	668	108	1087	.030	1280	4293	10.1	69	19
21	326	864	267	1457	.041	1716	6008	14.2	79	20
22	339	997	426	1762	.049	2075	8083	19.1	169	21
23	360	1082	559	2001	.056	2356	10439	24.7	70	22
24	537	1126	495	2158	.060	2541	12980	30.7	157	23
25	611	1033	594	2238	.062	2635	15616	36.9	57	24
26	715	1235	576	2526	.070	2974	18590	43.9	62	25
27	625	1179	588	2392	.067	2817	21407	50.6	152	26
28	642	1202	417	2261	.063	2662	24069	56.9	84	27
29	490	975	398	1863	.052	2194	26263	62.1	110	28
30	441	944	443	1828	.051	2153	28415	67.1	23	29
7/1	401	907	502	1810	.050	2131	30547	72.2	90	30
2	482	859	478	1819	.051	2142	32689	77.2	62	1
3	435	852	402	1689	.047	1989	34678	81.9	182	2
4	452	744	274	1470	.041	1731	36409	86.0	79	3
5	368	593	216	1177	.033	1386	37795	89.3	144	4
6	320	361	158	839	.023	988	38783	91.7	81	5
7	208	278	133	619	.017	729	39511	93.4	58	6
8	161	246	88	495	.014	583	40094	94.8	79	7
9	139	278	61	478	.013	563	40657	96.1	96	8
10	85	267	52	404	.011	476	41133	97.2		9
11	74	188	39	301	.008	354	41487	98.0		10
12	57	101	24	182	.005	214	41702	98.5		11
13	57	43	14	114	.003	134	41836	98.9		12
14	51	24	8	83	.002	98	41934	99.1		13
15	40	33	4	77	.002	91	42024	99.3		14
16	34	39	2	75	.002	88	42113	99.5		15
17	25	34	1	60	.002	71	42183	99.7		16
18+	74	34	0	108	.003	127	42310	100.0		17
Totals	9588	18643	7700	35931	1.000	42310				

Daily Bristol Bay run includes Togiak and Ugashik.
Data source: Stratton and Crawford (1992)

Appendix Table 1—cont.

1992

Date	7days Egegik	8days Nak/Kvi	9days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Cum %	Port Moller index catch	9 days Date
-6/10	58	34	43	135	.003	157	157	0.3		9
11	75	11	6	92	.002	107	264	0.5	15	10
12	85	10	5	100	.003	116	380	0.8	15	11
13	115	57	10	182	.005	212	592	1.3	15	12
14	119	128	44	291	.008	339	931	2.0	15	13
15	270	206	75	551	.014	641	1572	3.4	36	14
16	241	257	90	588	.015	684	2257	5.0	50	15
17	440	228	125	793	.021	923	3180	7.0	7	16
18	261	216	118	595	.015	692	3872	8.6	94	17
19	493	233	108	834	.022	971	4843	10.7	130	18
20	279	441	124	844	.022	982	5825	12.9	95	19
21	415	758	117	1290	.033	1501	7326	16.2	121	20
22	412	915	155	1482	.038	1725	9051	20.1	113	21
23	661	811	249	1721	.045	2003	11054	24.5	123	22
24	798	589	282	1669	.043	1942	12997	28.8	114	23
25	1010	548	379	1937	.050	2254	15251	33.8	96	24
26	1159	1046	312	2517	.065	2929	18180	40.4	44	25
27	1313	1252	303	2868	.074	3338	21518	47.8	101	26
28	1146	1333	245	2724	.070	3170	24688	54.8	117	27
29	977	954	229	2160	.056	2514	27202	60.4	137	28
30	799	934	390	2123	.055	2471	29673	65.9	205	29
7/1	757	932	388	2077	.054	2417	32091	71.3	163	30
2	984	835	366	2185	.057	2543	34634	76.9	97	1
3	998	638	221	1857	.048	2161	36795	81.7	168	2
4	882	437	189	1508	.039	1755	38550	85.6	79	3
5	553	451	157	1161	.030	1351	39901	88.6	120	4
6	431	411	127	969	.025	1128	41029	91.1	104	5
7	443	389	99	931	.024	1084	42112	93.5	80	6
8	460	278	71	809	.021	942	43054	95.6	138	7
9	377	193	55	625	.016	727	43781	97.2	39	8
10	266	121	37	424	.011	493	44275	98.3		9
11	115	69	25	209	.005	243	44518	98.9		10
12	70	49	16	135	.003	157	44675	99.2		11
13	43	33	8	84	.002	98	44773	99.4		12
14	33	21	6	60	.002	70	44843	99.6		13
15	23	16	4	43	.001	50	44893	99.7		14
16	19	18	4	41	.001	48	44941	99.8		15
17	20	10	1	31	.001	36	44977	99.9		16
18+	15	5		20	.001	23	45000	100.0		17
Totals	17615	15867	5183	38665	1.000	45000				

Daily Bristol Bay run includes Togiak and Ugashik.
Data source: B. Cross, ADF&G, Anchorage, AK.

Appendix Table 1—cont.

1993

Date	5 days Egegik	6 days Nak/Kvi	7 days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Cum %	Port Moller index catch	5 days Date
-6/10	25	14	20	59	.001	67	67	0.1		11
11	100	25	12	137	.003	155	222	0.4	16	12
12	125	27	17	169	.004	192	414	0.8	14	13
13	184	24	46	254	.006	288	702	1.4	24	14
14	287	142	86	515	.011	584	1287	2.5	80	15
15	400	386	173	959	.021	1088	2375	4.6	60	16
16	626	511	184	1321	.029	1499	3874	7.5	82	17
17	431	522	203	1156	.025	1312	5186	10.0	83	18
18	579	358	238	1175	.026	1333	6519	12.6	83	19
19	683	374	293	1350	.030	1532	8051	15.5	85	20
20	1127	435	306	1868	.041	2120	10171	19.6	106	21
21	1138	619	407	2164	.047	2456	12627	24.3	133	22
22	1243	683	443	2369	.052	2688	15315	29.5	189	23
23	1167	785	553	2505	.055	2843	18158	35.0	122	24
24	1096	953	612	2661	.058	3020	21177	40.8	99	25
25	958	1540	646	3144	.069	3568	24745	47.7	220	26
26	1501	1458	589	3548	.078	4026	28771	55.4	153	27
27	1875	1303	415	3593	.079	4077	32848	63.3	153	28
28	2011	731	349	3091	.068	3508	36356	70.1	185	29
29	1500	687	337	2524	.055	2864	39220	75.6	106	30
30	1215	649	309	2173	.048	2466	41686	80.3	238	1
7/1	1067	581	307	1955	.043	2218	43904	84.6	163	2
2	931	543	263	1737	.038	1971	45876	88.4	244	3
3	799	374	236	1409	.031	1599	47474	91.5	63	4
4	604	276	173	1053	.023	1195	48669	93.8	71	5
5	417	185	131	733	.016	832	49501	95.4	105	6
6	277	163	76	516	.011	586	50087	96.5	90	7
7	205	126	56	387	.008	439	50526	97.4	84	8
8	169	94	39	302	.007	343	50869	98.0	36	9
9	130	53	32	215	.005	244	51113	98.5	66	10
10	100	35	24	159	.003	180	51293	98.8	41	11
11	72	29	18	119	.003	135	51428	99.1		12
12	63	24	12	99	.002	112	51540	99.3		13
13	58	17	8	83	.002	94	51635	99.5		14
14	54	16	4	74	.002	84	51718	99.7		15
15	38	13	2	53	.001	60	51779	99.8		16
16	28	7	1	36	.001	41	51819	99.8		17
17	15	3	2	20	.000	23	51842	99.9		18
18+	39	10	2	51	.001	58	51900	100.0		19
Totals	23337	14775	7624	45736	1.000	51900				

Daily Bristol Bay run includes Togiak and Ugashik.
Data source: J. Miller, ADF&G, Anchorage, AK.

Appendix Table 1—cont.

1994

Date	8 days Egegik	9 days Nak/Kvi	10 days Nushagak	Total	Daily prop.	Daily BB run	Cum BB run	Daily %	Cum %	Port Moller index catch
-6/10	2	2	13	17	.000	19	19	0.0	0.0	
11	12	7	4	23	.001	26	45	0.1	0.1	5
12	36	14	11	61	.001	69	114	0.1	0.2	3
13	40	20	23	83	.002	94	207	0.2	0.4	6
14	50	16	27	93	.002	105	312	0.2	0.6	10
15	29	10	22	61	.001	69	381	0.1	0.7	21
16	76	2	13	91	.002	103	484	0.2	0.9	20
17	65	3	13	81	.002	91	575	0.2	1.1	12
18	127	79	28	234	.005	264	839	0.5	1.6	35
19	85	518	54	657	.015	741	1581	1.5	3.1	52
20	199	951	109	1259	.028	1421	3001	2.8	6.0	43
21	222	1212	124	1558	.035	1758	4759	3.5	9.5	87
22	411	1282	208	1901	.043	2145	6904	4.3	13.8	100
23	831	1378	247	2456	.055	2771	9676	5.5	19.3	155
24	816	1410	328	2554	.058	2882	12558	5.8	25.0	121
25	800	1397	360	2557	.058	2885	15443	5.8	30.8	110
26	593	1497	525	2615	.059	2951	18394	5.9	36.7	121
27	850	1726	505	3081	.069	3477	21870	6.9	43.6	124
28	1038	1897	581	3516	.079	3967	25838	7.9	51.6	136
29	878	1729	476	3083	.069	3479	29316	6.9	58.5	133
30	912	1648	439	2999	.068	3384	32700	6.8	65.3	224
7/1	737	1321	265	2323	.052	2621	35322	5.2	70.5	151
2	664	1109	154	1927	.043	2174	37496	4.3	74.8	166
3	458	812	143	1413	.032	1594	39091	3.2	78.0	123
4	331	795	213	1339	.030	1511	40601	3.0	81.0	218
5	299	870	248	1417	.032	1599	42200	3.2	84.2	146
6	296	862	236	1394	.031	1573	43773	3.1	87.4	134
7	312	868	155	1335	.030	1506	45280	3.0	90.4	108
8	344	716	101	1161	.026	1310	46590	2.6	93.0	120
9	259	559	92	910	.021	1027	47617	2.1	95.0	53
10	212	293	61	566	.013	639	48255	1.3	96.3	
11	163	197	36	396	.009	447	48702	0.9	97.2	
12	141	206	12	359	.008	405	49107	0.8	98.0	
13	131	176	7	314	.007	354	49462	0.7	98.7	
14	87	111	11	209	.005	236	49697	0.5	99.2	
15	49	74	8	131	.003	148	49845	0.3	99.5	
16	57	47	5	109	.002	123	49968	0.2	99.7	
17	44	15	1	60	.001	68	50036	0.1	99.9	
18+	40	5	1	46	.001	52	50088	0.1	100.0	
Totals	12696	25834	5859	44389	1.000	50088				

Daily Bristol Bay run includes Togiak and Ugashik.
Data source: J. Miller, ADF&G, Anchorage, AK.

Appendix Table 2. Port Moller sockeye salmon index catches by station and 5-day periods.

Year	Date ending	Station 0* 3mi	2 13mi	4 23mi	6 33mi	8 43mi	10* 53mi	Sum**	Proportion 0-3mi
87	15	0	1	3	6	1	0	11	.011
	20	3	7	18	3	2	1	34	.030
	25	38	24	15	20	4	1	79	.182
	30	1	7	40	47	18	7	126	.004
	5	2	4	10	7	8	9	48	.013
88	15	0	0	2	4	3	2	14	.000
	20	0	1	3	9	1	0	14	.009
	25	8	11	15	8	1	0	38	.079
	30	5	10	22	21	8	3	69	.025
	5	5	9	17	8	2	1	39	.046
	10	0	2	18	12	4	1	39	.002
89	15	8	8	8	9	1	0	29	.103
	20	12	12	12	16	19	23	109	.041
	25	9	14	22	27	19	13	112	.030
	30	12	14	17	29	16	9	98	.044
	6	7	19	50	23	32	45	216	.013
	10	22	32	47	16	29	53	237	.034
90	15	1	2	5	6	1	0	15	.021
	20	2	5	12	13	4	1	37	.021
	25	1	8	45	39	16	7	122	.004
	30	13	35	96	60	25	10	242	.020
	5	61	53	46	43	18	8	198	.116
91	15	1	2	5	1	1	1	11	.027
	20	12	14	16	21	7	2	67	.068
	25	9	15	24	36	39	42	202	.017
	30	21	26	32	22	6	2	97	.082
	5	31	33	35	32	12	5	133	.088
	10	12	17	24	29	8	2	87	.052
92	15	1	1	2	5	11	24	68	.003
	20	7	10	15	21	29	40	158	.016
	25	7	13	26	28	46	76	267	.009
	30	4	11	29	43	38	34	190	.008
	5	2	10	55	42	25	15	162	.004
	10	0	3	33	41	13	4	98	.001
93	15	2	3	6	17	13	10	59	.009
	20	2	5	14	38	30	24	135	.005
	25	24	29	35	45	44	43	248	.036
	30	21	28	37	42	60	86	346	.023
	5	19	24	30	40	35	31	197	.036
	10	9	15	25	16	8	4	75	.045
94	15	3	3	3	2	0	0	9	.123
	20	0	2	13	13	4	1	35	.003
	25	34	32	30	27	18	12	144	.089
	30	6	14	31	51	52	53	256	.009
	5	18	30	51	43	37	32	231	.029
	10	4	11	31	37	25	17	139	.011

*Station 0 catch estimated from (sta 2/sta 4) x (sta 2), and station 10 catch estimated from (sta 8/sta 6) x (sta8).
**Sum = (.375 x sta 0)+(sta 2)+(sta 4)+(sta 6)+(sta 8)+(2 x sta10).

Appendix Table 3. Age compositions of sockeye salmon from Port Moller test boat catches by 5-day periods.

		Age composition (%)					Mean daily
Year	Dates	1.2	2.2	1.3	2.3	Other	index catch
1987	6/11-15	26.3	17.6	24.5	31.6	0.0	10
	6/16-20	38.1	18.3	21.4	20.6	1.6	22
	6/21-25	45.4	19.6	24.5	9.8	0.7	76
	6/26-30	55.2	19.7	14.2	9.3	1.6	105
	7/01-05	64.0	14.9	7.0	13.3	0.8	30
	Combined	50.5	18.9	17.6	11.9	1.2	49
1988	6/11-15						11
	6/16-20	17.3	16.8	55.1	4.9	5.9	14
	6/21-25	18.2	22.6	47.0	9.3	2.9	34
	6/26-30	14.2	20.6	46.3	16.4	2.5	60
	7/01-05	23.7	17.4	47.3	10.1	1.5	42
	Combined	18.0	19.6	48.1	11.5	2.9	32
1989	6/11-15	3.6	34.3	21.7	36.2	4.2	27
	6/16-20						67
	6/21-25	15.5	39.4	27.5	15.7	1.9	78
	6/26-30	12.9	57.0	14.0	12.9	3.2	83
	7/01-05	9.3	65.5	16.1	8.3	0.8	127
	Combined	11.0	51.1	19.9	15.8	2.2	76
1990	6/11-15	10.6	50.6	21.1	16.5	1.2	14
	6/16-20	9.4	41.4	28.9	18.0	2.3	37
	6/21-25	12.6	38.0	19.1	26.7	3.6	97
	6/26-30	9.6	35.1	25.6	27.0	2.7	216
	7/01-05	10.2	34.4	19.0	32.7	3.7	159
	Combined	10.4	36.3	22.5	27.8	3.1	105
1991	6/11-15	16.4	19.6	29.0	28.0	7.0	9
	6/16-20	10.7	11.3	44.0	22.5	11.5	59
	6/21-25	14.7	15.0	53.1	13.6	3.6	111
	6/26-30	12.7	16.7	59.6	9.0	2.0	86
	7/01-05	12.1	12.1	59.3	14.7	1.8	111
	7/06-09	12.0	15.7	49.4	18.2	4.7	78
	Combined	12.7	14.3	53.5	15.2	4.1	75
1992	6/11-15	10.1	33.0	33.9	21.1	1.9	19
	6/16-20	10.6	38.0	29.8	18.9	2.7	75
	6/21-25	6.3	33.3	31.5	24.9	4.0	113
	6/26-30	7.0	28.6	32.9	28.1	3.4	121
	7/01-05	4.1	22.8	41.0	28.1	4.0	132
	7/06-09	8.0	30.0	24.9	33.9	3.2	90
	Combined	6.9	29.8	32.9	26.9	3.5	92
1993	6/11-15	2.0	17.2	23.7	55.4	1.7	39
	6/16-20	2.8	27.5	18.3	50.1	1.3	88
	6/21-25	4.4	25.0	19.6	48.3	2.7	153
	6/26-30	8.2	27.9	17.8	43.8	2.3	167
	7/01-05	13.4	32.3	18.5	32.9	2.9	129
	7/06-10	7.5	27.7	19.4	43.9	1.5	55
	Combined	7.2	27.4	19.0	44.3	2.3	115
1994	6/11-15	8.0	23.0	19.5	47.1	2.3	9
	6/16-20	6.6	38.5	15.6	34.4	4.9	32
	6/21-25	8.7	41.5	19.6	26.7	3.5	115
	6/26-30	5.6	44.8	20.5	26.1	3.0	148
	7/01-05	3.9	44.9	22.4	26.4	2.4	161
	7/06-09	4.1	45.0	22.9	24.7	3.3	104
	Combined	5.6	43.5	21.0	26.9	3.1	93

Appendix Table 4. Age compositions of North Peninsula sockeye salmon catches by week.

Year	District	Week	2-ocean				3-ocean				4-ocean			Catch
			0.2	1.2	2.2	3.2	0.3	1.3	2.3	3.3	0.4	1.4	2.4	1,000s
87	Bear River													
	June	20	.000	.078	.251		.012	.446	.208		.002	.000	.002	9
		27	.000	.076	.161		.094	.438	.219		.005	.008	.000	49
	July	4	.002	.092	.249		.045	.346	.253		.006	.004	.000	38
		18	.000	.034	.154		.009	.251	.544	.002	.000	.000	.002	63
		25	.000	.030	.165		.018	.170	.608	.002	.000	.002	.004	24
	Aug.	1	.002	.032	.112	.002	.023	.252	.573		.000	.000	.005	3
	Total number		0	11	34	0	7	59	73	0	0	1	0	186
	Proportion		.000	.058	.181	.000	.040	.319	.391	.001	.003	.003	.001	
87	Ilnik/Three Hill													
	June	27	.000	.044	.116	.000	.009	.307	.420	.000	.021	.003	.000	20
	July	4	.002	.234	.234	.002	.035	.203	.274	.000	.007	.004	.007	109
		11	.000	.064	.071	.000	.067	.307	.478	.002	.002	.000	.009	281
		18	.000	.058	.059	.000	.023	.256	.591	.004	.002	.004	.004	191
		25	.000	.050	.107	.000	.012	.233	.583	.000	.003	.005	.005	74
	Aug.	1	.000	.033	.075	.000	.010	.197	.680	.003	.000	.000	.002	25
	Total number		0	60	69	0	28	186	346	1	2	2	4	699
	Proportion		.000	.086	.098	.000	.041	.266	.494	.002	.003	.002	.006	
88	Bear River													
	June	11		.019	.010	.000	.010	.288	.654		.000	.019	.000	1
		18		.021	.031	.000	.010	.242	.687		.002	.005	.002	6
		25		.007	.038	.000	.009	.194	.745		.000	.007	.000	56
	July	2		.026	.166	.000	.013	.201	.578		.002	.011	.004	82
		9		.015	.094	.000	.017	.149	.719	.002	.000	.004	.002	61
		16		.029	.151	.000	.005	.209	.600		.002	.002	.002	20
		23		.009	.217	.000	.000	.076	.694		.000	.002	.000	35
		30		.007	.249	.002	.004	.080	.653		.000	.002	.000	27
	Aug.	6		.004	.222	.000	.000	.054	.710		.000	.000	.002	35
		13		.019	.242	.000	.002	.087	.646		.000	.000	.000	54
		20		.009	.244	.004	.002	.071	.671		.000	.000	.000	34
		27		.002	.238	.000	.000	.048	.712		.000	.000	.000	59
	Sept.	10		.004	.325	.004	.000	.045	.620		.000	.000	.000	29
	Total number		0	6	92	0	3	60	334		0	2	1	498
	Proportion		.000	.013	.184	.001	.006	.121	.670	.000	.000	.004	.001	
88	Ilnk/Three Hll													
	July	2		.082	.228		.033	.158	.484	.000	.002	.007	.006	100
		9		.069	.221		.013	.146	.546	.002	.002	.000	.000	396
		16		.071	.288		.011	.184	.442	.002	.002	.000	.000	183
		23		.073	.230		.013	.192	.490	.000	.000	.002	.000	35
		30		.033	.299		.006	.148	.509	.000	.000	.002	.002	11
	Aug.	6		.020	.255	.002	.005	.087	.624	.002	.000	.002	.000	9
		13		.010	.214	.006	.004	.077	.689	.000	.000	.002	.000	3
		10		.013	.150		.007	.112	.715	.003	.000	.000	.000	9
	Total number			52	179	0	11	118	382	1	1	1	1	746
	Proportion			.069	.239	.000	.015	.158	.513	.002	.002	.001	.001	

Source: McCullough (1989a and 1989b)

Appendix Table 4—cont.

Year	District		Week ending	2-ocean 0.2	2-ocean 1.2	2-ocean 2.2	2-ocean 3.2	3-ocean 0.3	3-ocean 1.3	3-ocean 2.3	3-ocean 3.3	4-ocean 0.4	4-ocean 1.4	4-ocean 2.4	Catch 1,000s
89	Bear River														
		June	17		.009	.030		.019	.196	.706	.000	.004	.006	.032	9
			24		.009	.048		.020	.216	.673	.000	.002	.005	.027	29
		July	1		.036	.290	.004	.011	.172	.463	.006	.009	.004	.006	114
			8		.017	.117		.003	.162	.656	.002	.000	.011	.028	1
			15		.042	.388		.004	.141	.408	.004	.000	.005	.007	38
			22		.032	.397		.005	.110	.442	.000	.000	.007	.004	27
			29		.015	.404		.000	.049	.525	.000	.000	.000	.005	35
		Aug.	5		.027	.344		.000	.069	.553	.004	.000	.004	.000	58
			12		.100	.412	.004	.002	.071	.405	.002	.000	.002	.002	67
			19		.034	.510	.005	.000	.020	.420	.005	.000	.000	.005	69
		Sept.	16		.062	.431	.000	.000	.062	.446	.000	.000	.000	.000	114
	Total number			0	25	206	1	2	55	264	2	1	1	3	561
	Proportion			.000	.045	.368	.002	.004	.098	.471	.003	.002	.003	.005	
89	Ilnik/Three Hill														
		July	1	.000	.028	.283	.002	.015	.204	.463	.000	.002	.002	.002	450
			8	.000	.021	.553	.002	.016	.148	.254	.000	.004	.002	.000	127
			15	.000	.027	.443	.000	.005	.121	.395	.002	.002	.002	.004	79
			22	.002	.030	.341	.000	.006	.163	.450	.002	.002	.002	.002	29
			29	.002	.053	.345	.005	.007	.168	.414	.002	.000	.004	.000	21
		Aug.	5	.000	.042	.299	.004	.006	.185	.457	.004	.000	.004	.000	20
			12	.000	.067	.374	.002	.004	.113	.434	.002	.000	.004	.002	9
			19	.000	.068	.422	.007	.002	.071	.425	.000	.000	.002	.004	8
			26	.000	.047	.441	.007	.002	.073	.426	.002	.000	.000	.002	2
	Total number			0	21	263	1	10	134	311	0	2	2	1	746
	Proportion			.000	.029	.353	.002	.013	.179	.417	.000	.002	.002	.002	
90	Bear River														
		June	23	.000	.020	.144	.003	.032	.187	.592		.003	.003	.017	10
			30	.000	.017	.142	.002	.042	.115	.675		.000	.000	.006	46
		July	14	.000	.004	.114	.000	.002	.028	.845		.000	.000	.007	58
			21	.000	.007	.254	.000	.003	.039	.685		.002	.005	.005	60
			28	.002	.021	.315	.005	.002	.069	.582		.000	.000	.003	81
		Aug.	4	.002	.074	.277	.002	.014	.324	.304		.000	.000	.002	89
			11	.000	.067	.389	.002	.002	.345	.195		.000	.000	.000	103
			18	.000	.130	.479	.004	.004	.298	.086		.000	.000	.000	157
			25	.000	.040	.598	.002	.002	.133	.225		.000	.000	.000	138
		Sept.	1	.002	.046	.549	.002	.000	.201	.199		.000	.000	.000	84
			15	.000	.029	.700	.007	.000	.088	.176		.000	.000	.000	54
	Total number			1	48	362	2	5	168	292		0	0	2	880
	Proportion			.001	.055	.411	.003	.006	.191	.332		.000	.000	.002	
90	Ilnik/Three Hill														
		June	30		.007	.109	.006	.022	.109	.720	.006	.004	.000	.018	72
		July	14		.028	.319	.027	.014	.050	.561	.000	.000	.000	.002	456
			21		.030	.443	.040	.003	.043	.436	.002	.000	.000	.003	307
			28		.049	.303	.051	.007	.082	.475	.018	.000	.007	.009	54
		Aug.	4		.064	.277	.051	.027	.159	.414	.000	.000	.004	.004	18
			11		.115	.382	.002	.011	.243	.245	.000	.000	.000	.002	7
			18		.076	.491	.012	.002	.197	.222	.000	.000	.000	.000	16
		Sept.	15		.127	.473	.000	.006	.257	.138	.000	.000	.000	.000	12
	Total no.				30	327	29	10	59	482	2	0	0	4	943
	Percent				.032	.347	.031	.011	.063	.511	.002	.000	.000	.004	

Source: McCullough (1990), Swanton and Murphy (1992)

Appendix Table 4—cont.

Year	District	Week ending	2-ocean 0.2	2-ocean 1.2	2-ocean 2.2	2-ocean 3.2	3-ocean 0.3	3-ocean 1.3	3-ocean 2.3	3-ocean 3.3	4-ocean 0.4	4-ocean 1.4	4-ocean 2.4	Catch 1,000s
91	Bear River													
	June	20		.025	.101	.002	.000	.421	.446	.000	.000	.000	.000	14
		27		.041	.109	.000	.000	.485	.362	.004	.000	.000	.004	119
	July	11		.072	.179	.000	.000	.514	.230	.004	.000	.000	.004	93
		18		.085	.247	.000	.000	.440	.224	.003	.000	.000	.003	107
		25	.001	.081	.366	.001	.001	.305	.241	.000	.001	.002	.000	77
	Aug.	1	.001	.100	.335	.000	.007	.263	.293	.000	.000	.001	.003	61
		8	.001	.085	.353	.000	.005	.184	.371	.000	.000	.003	.000	73
		15		.074	.539	.000	.002	.085	.301	.000	.000	.000	.000	103
		22		.099	.470	.000	.000	.095	.335	.000	.000	.000	.000	133
		29		.088	.464	.000	.000	.082	.365	.000	.000	.000	.001	147
	Sept.	19		.083	.466	.000	.000	.076	.373	.000	.000	.000	.002	121
	Total number		0	83	374	0	1	254	333	1	0	0	2	1049
	Proportion		.000	.079	.357	.000	.001	.242	.317	.001	.000	.000	.002	1.00
91	Ilnik/Three Hill													
	June	27	.002	.091	.075	.000	.003	.513	.311	.000	.002	.004	.000	61
	July	11	.007	.130	.136	.000	.009	.504	.209	.000	.000	.004	.000	231
		18	.002	.116	.166	.000	.005	.487	.213	.003	.000	.004	.004	322
		25	.000	.105	.181	.002	.004	.467	.234	.003	.001	.002	.001	152
	Aug.	1	.000	.158	.236	.002	.004	.365	.234	.001	.000	.000	.000	59
		8	.003	.145	.384	.002	.000	.214	.250	.000	.000	.002	.000	20
		15	.001	.144	.415	.000	.000	.199	.235	.000	.000	.003	.002	8
		22	.000	.082	.533	.000	.006	.146	.231	.000	.000	.000	.000	7
	Sept.	5	.000	.077	.541	.000	.006	.143	.232	.000	.000	.000	.000	4
	Total number		2	103	148	0	5	405	195	1	0	3	1	864
	Proportion		.003	.119	.171	.001	.006	.468	.225	.002	.000	.003	.002	1.00
92	Bear River													
	June	13	.000	.046	.103	.000	.014	.221	.501	.003	.004	.098	.009	6
		20	.003	.070	.169	.000	.026	.199	.479	.000	.003	.045	.006	34
		27	.000	.068	.216	.000	.006	.250	.416	.000	.005	.035	.002	109
	July	4	.000	.041	.353	.000	.000	.189	.383	.000	.001	.025	.003	209
		11	.000	.048	.464	.000	.000	.155	.309	.000	.000	.020	.001	184
		18	.000	.088	.370	.000	.002	.192	.314	.000	.000	.024	.006	139
		25	.000	.117	.391	.000	.001	.147	.317	.000	.000	.016	.004	71
	Aug.	1	.001	.066	.428	.000	.001	.093	.398	.000	.000	.007	.004	73
		8	.001	.041	.479	.001	.002	.046	.421	.001	.000	.004	.002	52
		15	.000	.005	.518	.008	.001	.009	.451	.003	.000	.001	.005	200
	Sept.	12	.000	.009	.567	.012	.000	.017	.389	.002	.000	.002	.003	326
	Total number		0	59	613	6	2	157	536	1	1	21	5	1400
	Proportion		.000	.042	.437	.004	.002	.112	.382	.001	.001	.015	.003	
92	Ilnik/Three Hill													
	June	27	.002	.070	.147	.000	.071	.327	.296	.000	.008	.075	.003	51
	July	4	.000	.046	.335	.000	.014	.255	.327	.000	.001	.021	.002	490
		11	.000	.058	.364	.000	.010	.243	.300	.000	.000	.022	.002	761
		18	.002	.088	.303	.000	.004	.226	.356	.000	.001	.019	.002	205
		25	.007	.123	.340	.000	.004	.206	.302	.000	.001	.016	.001	99
	Aug.	1	.012	.133	.360	.001	.003	.170	.309	.000	.002	.008	.001	53
		8	.011	.098	.427	.002	.002	.095	.356	.000	.002	.003	.003	11
		15	.000	.021	.423	.005	.000	.033	.511	.003	.000	.002	.002	10
		29	.000	.033	.424	.002	.000	.038	.489	.007	.000	.002	.005	20
	Total number		2	109	581	0	19	404	542	0	1	37	3	1700
	Proportion		.001	.064	.342	.000	.011	.238	.319	.000	.001	.022	.002	

Source: B. Barrett (ADF&G, Kodiak) unpublished data

Appendix Table 4—cont.

Year	District	Week ending	2-ocean 0.2	2-ocean 1.2	2-ocean 2.2	2-ocean 3.2	3-ocean 0.3	3-ocean 1.3	3-ocean 2.3	3-ocean 3.3	4-ocean 0.4	4-ocean 1.4	4-ocean 2.4	Catch 1,000s
	Bear River													
93	June	13		.003	.055	.007	.009	.218	.684	.002	.000	.007	.015	11
		20		.006	.085	.024	.001	.171	.702	.002	.001	.004	.004	92
		27		.005	.098	.026	.001	.078	.783	.002	.000	.002	.005	304
	July	4		.018	.134	.023	.001	.049	.764	.003	.000	.003	.004	429
		11	.002	.056	.213	.016	.004	.086	.606	.002	.000	.008	.004	190
		18	.000	.025	.217	.005	.008	.050	.675	.004	.000	.012	.000	87
		25	.000	.012	.281	.023	.001	.014	.657	.006	.000	.003	.001	96
	Aug.	1	.000	.012	.247	.031	.003	.029	.670	.005	.000	.000	.002	125
		8		.005	.244	.039	.000	.029	.680	.003	.002	.000	.000	91
		15		.002	.316	.039	.000	.017	.618	.007	.000	.000	.000	186
		22		.001	.404	.026	.000	.015	.549	.004	.000	.000	.000	206
	Sept.	12		.000	.431	.029	.000	.008	.530	.004	.000	.000	.000	234
	Total number		0	26	478	53	3	99	1373	7	0	5	5	2050
	Proportion		.000	.013	.233	.026	.001	.048	.670	.004	.000	.003	.002	
93	Ilnik/Three Hill													
	July	4	.000	.012	.152	.002	.004	.057	.757	.007	.002	.002	.004	285
		11	.000	.013	.193	.002	.008	.049	.718	.010	.001	.002	.004	680
		18	.000	.012	.239	.004	.004	.044	.682	.004	.000	.005	.005	207
		25	.002	.022	.270	.006	.006	.047	.635	.002	.000	.004	.006	30
	Aug.	1	.000	.023	.264	.018	.019	.043	.625	.002	.000	.003	.003	32
		8	.000	.020	.287	.032	.019	.023	.609	.006	.000	.002	.002	3
		15	.000	.008	.344	.025	.005	.028	.577	.009	.000	.002	.000	12
		22	.000	.009	.434	.026	.003	.026	.495	.004	.000	.001	.001	0
		29	.000	.009	.483	.023	.001	.026	.454	.002	.000	.000	.001	7
	Total number		0	16	249	4	8	62	896	10	1	3	5	1255
	Proportion		.000	.013	.198	.003	.007	.049	.713	.008	.001	.003	.004	
94	Bear River													
	June	6		.023	.000	.000	.012	.128	.756	.023	.000	.012	.047	1
		13		.012	.020	.000	.013	.118	.787	.006	.002	.013	.028	5
		20		.016	.031	.001	.008	.119	.788	.004	.002	.009	.023	13
		27		.024	.037	.002	.002	.122	.780	.006	.002	.004	.022	54
	July	4		.024	.037	.002	.002	.122	.780	.006	.002	.004	.022	30
	Total number			2	4	0	0	13	80	1	0	1	2	103
	Proportion			.022	.035	.002	.003	.121	.781	.006	.002	.005	.023	
94	Bear R. to Ilnik													
	June	27	.000	.041	.147	.007	.026	.227	.496	.000	.004	.030	.020	98
	July	4	.000	.040	.139	.004	.011	.204	.563	.002	.002	.013	.022	248
		11	.000	.044	.192	.004	.011	.227	.493	.004	.000	.007	.018	446
		18	.001	.051	.267	.004	.011	.277	.363	.003	.001	.009	.014	370
		25	.000	.081	.392	.005	.005	.225	.267	.001	.000	.008	.014	303
	Aug.	1	.000	.070	.667	.001	.003	.101	.148	.000	.000	.002	.007	184
		8	.000	.063	.668	.000	.004	.085	.176	.002	.000	.000	.002	133
		15	.000	.043	.573	.000	.001	.077	.301	.003	.000	.000	.002	199
		22	.000	.021	.541	.001	.001	.039	.391	.005	.000	.000	.002	165
		29	.000	.020	.522	.001	.001	.068	.382	.002	.000	.001	.001	140
	Sept.	19	.000	.074	.650	.000	.000	.051	.212	.005	.000	.000	.005	95
	Total number		0	120	902	7	17	411	872	6	1	16	28	2380
	Proportion		.000	.050	.379	.003	.007	.172	.366	.003	.001	.007	.012	

Source: B. Barrett (ADF&G, Kodiak) unpublished data

Appendix Table 5. Age compositions of sockeye salmon from North Peninsula rivers.

Year	River	1-ocean			2-ocean				3-ocean				4-ocean			Escape.
		1.1	2.1	3.1	0.2	1.2	2.2	3.2	0.3	1.3	2.3	3.3	0.4	1.4	2.4	1,000s
1987	Ilnik				.023	.012	.012		.407	.442	.023		.007	.012	.000	31
	Bear		.002			.026	.526			.134	.307			.001	.004	267
	Nelson		.006			.189	.678			.100	.027					156
	Combined		.003	.000	.002	.081	.543		.028	.143	.191		.000	.001	.002	454
88	Meshik				.004	.009	.006		.284	.093	.015		.411	.120	.022	36
	Ilnik	.002			.017	.058	.009		.406	.430	.039		.015	.002	.004	39
	Sandy	.009				.620	.017			.342	.003					43
	Bear		.093			.004	.406			.048	.448				.001	310
	Nelson	.013	.131			.187	.271	.004	.006	.146	.241					151
	Combined	.004	.084		.003	.060	.290	.001	.077	.130	.309		.028	.008	.002	579
89	Meshik		.006		.025	.078	.019		.207	.479	.163		.010	.012	.002	11
	Ilnik	.003			.006	.038	.025		.032	.733	.076		.048	.038	.000	19
	Sandy	.003	.008		.003	.214	.011		.003	.714	.044					45
	Bear	.002	.083			.031	.589	.001		.003	.273			.006	.011	451
	Nelson	.002	.035			.144	.681	.001		.078	.057				.003	207
	Combined	.002	.062		.001	.075	.556	.001	.004	.094	.191		.001	.005	.008	733
90	Ilnik					.506	.061		.078	.237	.057		.008	.053		49
	Bear		.012			.112	.620	.032		.021	.200	.001			.002	547
	Nelson (C)					.032	.332	.017	.007	.156	.446	.005		.001	.005	269
	Combined		.008			.109	.499	.026	.007	.075	.268	.002	.000	.003	.003	865
91	Ilnik	.001	.002		.002	.008	.001		.051	.908	.024		.002	.002		135
	Bear	.007	.071			.061	.605	.001		.184	.067			.003	.002	606
	Nelson	.011	.015		.002	.184	.537		.001	.102	.149					268
	Combined	.007	.047		.001	.087	.506	.001	.007	.259	.083		.000	.002	.001	1009
92	Ilnik	.001			.019	.166	.034		.143	.299	.021		.047	.269	.001	45
	Bear	.009	.128	.002		.020	.641	.004		.019	.167			.008	.001	450
	Nelson		.046		.003	.190	.439		.004	.110	.201			.004	.004	190
	Combined	.006	.097	.001	.002	.077	.545	.003	.011	.063	.167	.000	.003	.024	.002	685

(C) Nelson Lagoon sample from commercial catch.

Source: Schaul et al (1993),Swanton and Murphy (1992), Murphy (1994), Murphy and Barrett (1994)

Appendix Table 6. Age compositions (proportions) of Bristol Bay sockeye runs and catches, 1987–94.

Year		2-ocean				3-ocean				4-ocean			Run
		0.2	1.2	2.2	3.2	0.3	1.3	2.3	3.3	0.4	1.4	2.4	millions
1987	R	.000	.492	.115	.000	.022	.236	.129	.000	.002	.004	.000	27.3
	C	.000	.368	.133	.000	.034	.295	.161	.000	.003	.005	.001	16.0
88	R	.004	.208	.224	.000	.011	.413	.128	.000	.006	.006	.000	23.0
	C	.002	.159	.235	.001	.012	.418	.159	.001	.007	.006	.000	13.8
89	R	.002	.108	.624	.000	.013	.159	.092	.000	.001	.001	.000	43.8
	C	.002	.097	.611	.001	.013	.166	.108	.000	.001	.001	.000	28.7
90	R	.004	.141	.414	.005	.021	.208	.204	.000	.001	.002	.000	47.6
	C	.003	.132	.354	.005	.020	.229	.252	.001	.001	.002	.001	33.1
91	R	.002	.188	.203	.000	.025	.463	.114	.001	.002	.002	.000	42.1
	C	.002	.145	.186	.000	.031	.503	.128	.001	.002	.002	.000	26.2
92	R	.002	.129	.342	.002	.012	.267	.223	.001	.004	.017	.001	44.7
	C	.001	.080	.344	.003	.012	.284	.251	.001	.006	.017	.001	31.7
93	R	.001	.128	.331	.003	.012	.184	.329	.001	.002	.007	.002	51.9
	C	.000	.107	.345	.003	.011	.162	.360	.001	.002	.006	.003	40.8
94	R	.000	.085	.564	.006	.016	.145	.177	.002	.001	.003	.001	50.1
	C	.000	.054	.534	.007	.017	.155	.225	.002	.001	.003	.002	35.2

Run excludes jacks (1-ocean)

Source: A compilation of catch and escapement statistics by age class, 1956-1994 provided by B. Cross, ADF&G, Anchorage, AK.