

SUBSISTENCE SALMON FISHING IN NUSHAGAK BAY,
SOUTHWEST ALASKA

by
Jody Seitz

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ABSTRACT

This paper provides information on subsistence salmon fishing in the Nushagak Commercial District, southwest Alaska. The study was carried out through fieldwork in Nushagak Bay fishcamps and the village of Clark's Point during the summer of 1989. As part of a more detailed study of harvest activities in Clark's Point, fieldwork continued in Clark's Point through the spring of 1990. Additional sources of information were: a harvest survey carried out in Clark's Point during the study year; historical literature from the United States Fish and Wildlife Service; Shore Fishery Lease reports from the Department of Natural Resources; special reports prepared by the Commercial Fisheries Entry Commission; and published histories and archaeological studies on the Nushagak River region and the Bristol Bay area.

Historic information is presented on the customary and traditional patterns of harvest and use of salmon within the area of the commercial district. The development of the present regulatory structure is outlined, based on USFWS and ADF&G annual management reports as well as interviews. The report presents current patterns of social organization, specifically, the infrastructure of fishcamps, the domicile and birthplaces of set net fishers, and their strategies for harvesting and processing subsistence salmon. Finally, there is a discussion of the way in which the current regulatory structure has affected the custom of fishing for subsistence within the Nushagak Commercial District.

The regulatory history of the Nushagak District demonstrates the focus management has historically had on the commercial fishery, as well as perceived and actual enforcement issues. Subsistence salmon fishing within the boundaries of the commercial district was prohibited during closed commercial periods since statehood, but the reasons for that prohibition stemmed back to enforcement problems which began to show up during the 1940s. According to historic records there was a protracted period of struggle between residents and managers over the best way to handle the enforcement problems and allow subsistence fishing to continue. The most enduring enforcement concern was how to prevent the commercialization of salmon taken during

subsistence openings. As a result of this tension, the Dillingham Beach area was created as a separate area for subsistence salmon fishing with distinct regulations from either the Nushagak River and other drainages associated with Nushagak Bay, or the Nushagak Commercial District. Seasonal and year-round residents of the commercial district were only allowed to fish for subsistence salmon during the open commercial fishing periods.

The study found that this structure made it hard for residents living within the commercial district to harvest salmon, especially king salmon, when there were extended closures during the month of June. June generally has the best weather for drying salmon, and residents did not want to wait until July to dry salmon because July usually has rainy weather which will spoil the fish. Additionally, the traditional processing of salmon takes two to three weeks and requires labor to tend the fish on the drying racks and once they are in the smokehouse. Labor is also needed to cut and carry wood to the smokehouse. During the main part of the commercial season, July, the weather is often poor and demands for labor are already high, if the household commercial fishes. If the household does not have a set net permit, then it probably does not have a set net site, and therefore no place to set out a subsistence net.

In addition, records suggest that set nets in Nushagak Bay catch fewer king salmon than drift nets. King salmon have historically followed deeper channels into the district. Setnetters over the last 20 years caught only about 15 percent of the commercial harvest and only about 6 percent of the kings in the commercial harvest.

In 1989, a majority (155 of 278) of seasonal households within the Nushagak Commercial District were residents of the watershed, who relocated to the district to fish commercially or to be with their relatives who fished commercially. Households at Igushik, Ekuk, and Clark's Point were predominantly from Dillingham, Aleknagik, Manokotak, Clark's Point, or the upriver villages. A majority of commercial setnetters from the watershed were women. Many other members of seasonal households were originally from the Nushagak watershed. Case examples were presented detailing the manner in which these residents harvested and processed salmon during 1989.

Interviews with watershed residents, as well as the literature review, showed that the regulatory structure since statehood made it more difficult for residents of Clark's Point, and others participating in the commercial salmon set net fishery to harvest salmon, particularly king salmon, and process it in the traditional manner. Additionally, those whom the prohibition against subsistence fishing during closed periods affected most disproportionately were women setnetters who relied on their commercial set net for both their subsistence salmon as well as their year's income.

In June of 1989 an extended emergency opening allowed fishers within the Nushagak Commercial District to harvest salmon while the commercial fishery was closed. Residents of Clark's Point harvested more salmon than in previous years. Residents of the Nushagak watershed harvested more salmon within the commercial district than in previous years, however, the overall harvest for the watershed was less than the 20 year average. Residents were able to fish for salmon in locations more convenient to them as subsistence and commercial fishers.

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INTRODUCTION

This paper provides background information on subsistence salmon fishing activities in the Nushagak Commercial District of the Bristol Bay area in Southwest Alaska. It derives from a study of subsistence patterns in Clark's Point, a village on the eastern shore of the Nushagak Commercial Fishing District. In 1987 and 1989 Nushagak watershed residents submitted proposals for change in the subsistence salmon fishing regulations to the Alaska Board of Fisheries. These proposals asked for time for subsistence salmon fishing when the Nushagak commercial district was closed to commercial fishing. Since statehood, in the Nushagak Commercial District salmon fishing was permitted only during commercial openings, or since 1988, by emergency order. Subsistence fishing time had shortened considerably as the June run of king salmon declined and commercial closures lengthened within the Nushagak Commercial District. Subsistence fishing time had not generally been provided for coho fishing in August. This report provides a context for understanding these issues by describing the social setting of the bay as well as the history of regulations which have directly or indirectly affected subsistence fishing. Also presented is a description of the 1989 subsistence fishery and a discussion of how the fishery was affected by the present regulatory system.

METHODOLOGY

Data gathering methods consisted of participant observation and interviews carried out in the village of Clark's Point, and in Ekuk and Nushagak Beach fishcamps during July and August of 1989. Follow-up visits to Clark's Point were conducted throughout the fall and into the winter of 1989. Harvest surveys were also conducted in the village of Clark's Point. The Division of Subsistence subsistence salmon permit data base provided historical and contemporary information regarding harvest levels, domiciles of households, and harvest locations of permitted fishers. Written resources included archaeological and anthropological publications on the Nushagak area, the Division of Subsistence Technical Paper Series, historical documents from the U. S. Department of Commerce - Bureau of Commercial Fisheries, the U.S. Fish and Wildlife

Service, Alaska Department of Fish and Game Division of Commercial Fisheries Bristol Bay Data Reports and Annual Management Reports, Commercial Fisheries Entry Commission special reports, and the Department of Natural Resources Shore Fishery Reports.

PHYSICAL DESCRIPTION OF THE AREA

Nushagak Bay is a large tidal embayment about 32 km. wide where it opens into Bristol Bay in southwestern Alaska. Funnel-shaped, it narrows to about 4 km. off Dillingham at the mouth of the Nushagak River (Fig. 1). From Etolin Point northward there are many shifting channels and shoals in the middle of the bay with extensive tidal flats and shoals along the west side as far as Coffee Point. The ship channel varies but generally lies west of the center of the bay and ranges in depth from eight fathoms off Coffee Point to about four fathoms off Dillingham. Tidal currents are said to be strong, with the ebb being slightly stronger because of the current from the Nushagak and Wood Rivers (VanStone 1971:72). The Nushagak District is that part of the bay located north of a line from Etolin Point to Nichols Hills. The district is divided into three different areas for the purposes of managing the salmon fisheries. The commercial fishing district includes all waters south of a line from Picnic Point on the northeastern shore to a marker two miles south of Bradford Point on the northwestern side of the bay. Above the commercial fishing district, the Nushagak River extends 242 miles upstream to the Nushagak Hills (Fig. 2). The Wood River branches off of the Nushagak River to the west at Snag Point into the Wood River lakes system. The beaches from Red Bluff to Bradford Point, known as the "Dillingham beaches" comprise a third regulatory area within the Nushagak District, distinct from the Nushagak River system. There are four other fishing districts within Bristol Bay: Naknek-Kvichak, Egegik, Ugashik, and Togiak, each of which has its own regulations on subsistence salmon fishing.

All five species of Alaskan salmon pass through Nushagak Bay to spawn in its associated drainages. Runs of king (chinook) salmon appear first, from late May-early June, peak sometime from mid to late June, and continue to arrive in lesser numbers along with the sockeyes as the sockeye run develops. Kings are highly prized for subsistence, commercial, and sport uses.

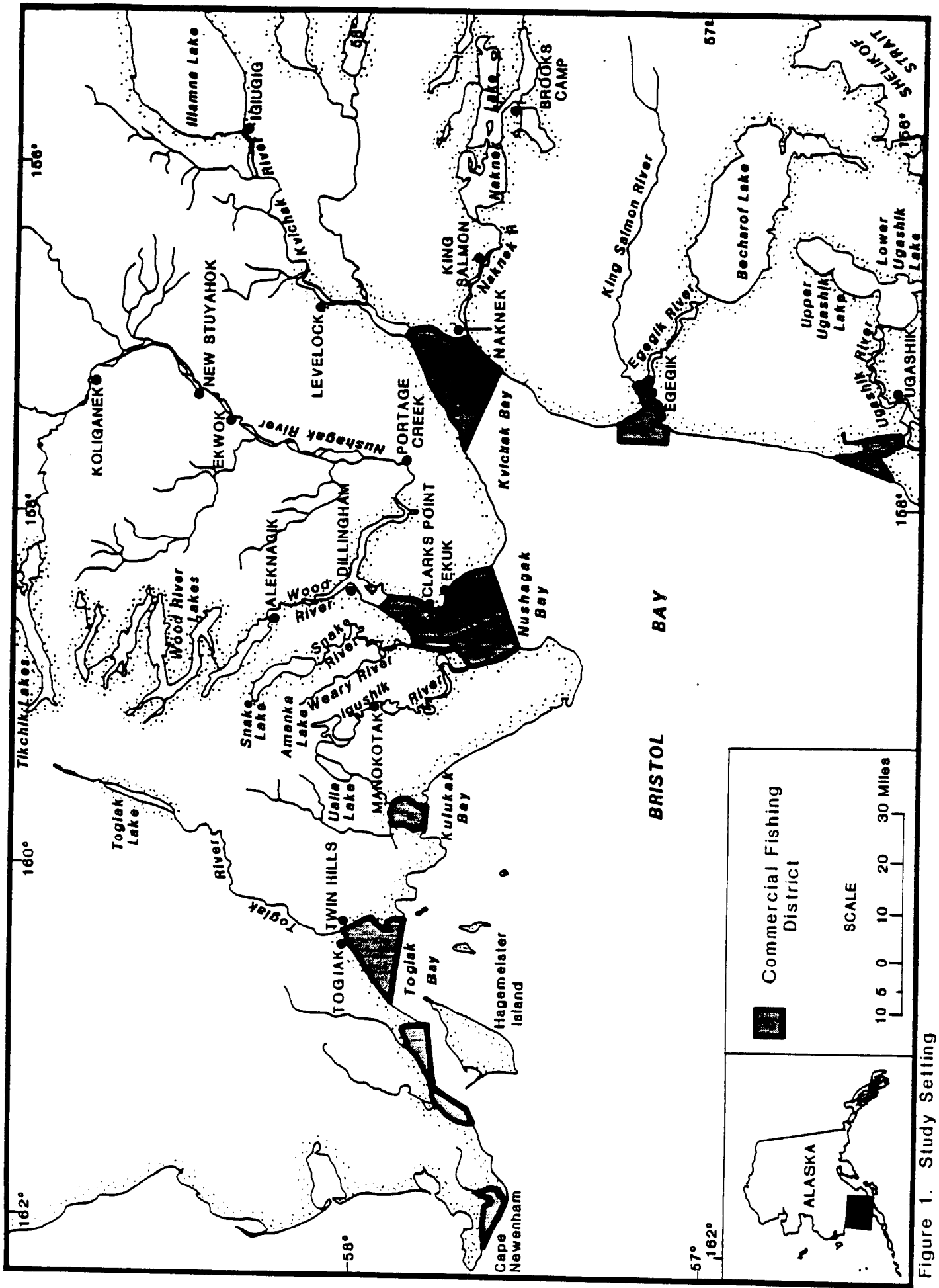


Figure 1. Study Setting

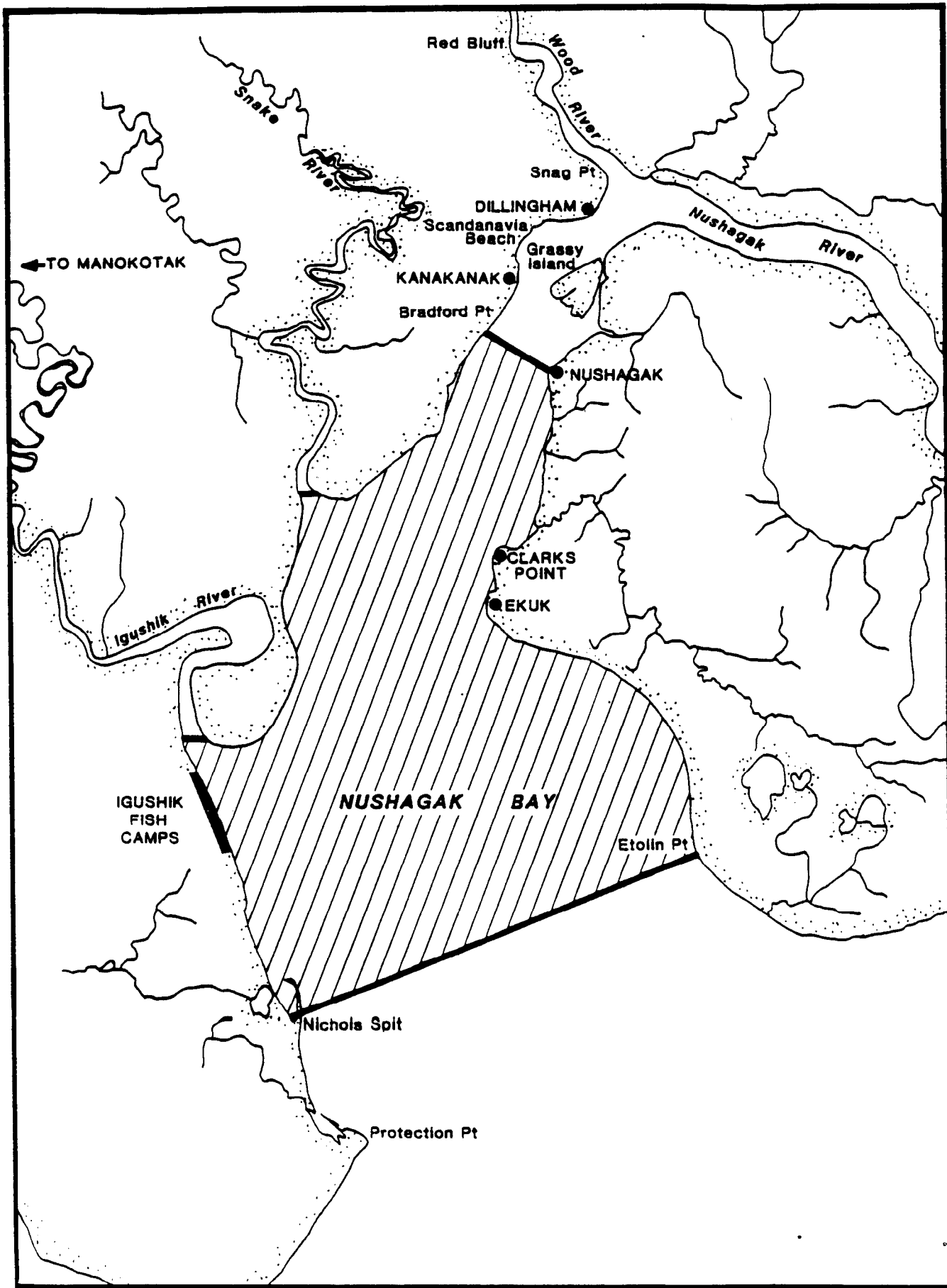


Figure 2. Nushagak Commercial District

The Nushagak District supports the largest king run in Bristol Bay, although in recent years stocks have been declining for undetermined reasons. From 1968 to 1987 total king runs in the Nushagak District ranged from a low of 65,470 in 1973 to a high of 343,461 in 1981. The average total run for the same period was 146,391 (ADF&G 1988:210). The 1988 run was far lower than anticipated. At 73,501 kings, it was the lowest total return since 1973 (ADF&G 1989a:247).

The king salmon migratory pattern follows the deeper water channels into the district. Nushagak kings are reported to mill and hold within the fishing district as well as in the larger bay and in the lower Nushagak River. Weather patterns are also known to affect king migration (Nelson 1987:8, 19).

Sockeye salmon arrive after the kings, and are the most abundant species in the Nushagak drainage. The 20 year average total run from 1969-1988 was over 4.5 million sockeyes for the Nushagak District alone. However, the run was also characterized by tremendous variation in size -- 900,000 sockeyes returned to the Nushagak District in 1972 compared to 12.8 million in 1980. The peak of the run usually occurs in early July. Sockeyes are important for subsistence and commercial uses (ADF&G 1989a).

Chums, locally known as dog salmon, begin returning to the bay in late June along with the sockeyes. They are usually caught incidentally with the targeted kings and sockeyes by commercial as well as subsistence fishers.

Significant numbers of pink salmon return to Nushagak Bay in even-numbered years during the latter part of July. They are not usually targeted by subsistence fishers because their flesh is quite soft; nor are pinks a prized commercial species, but they are harvested commercially when an acceptable price is offered.

The last salmon to arrive are the cohos, or silver salmon, in early August. Like kings, cohos are sought for subsistence, commercial, and sport uses. Although the Nushagak District appears to support the greatest population of cohos in Bristol Bay, recent low runs (33,298 in 1987 compared to 583,669 in 1982) have managers concerned about the health of the stock (ADF&G 1989a:252)

THE 1989 COMMERCIAL SALMON FISHERY

In 1989 the total inshore sockeye salmon return to the Nushagak district was 5,037,000 and the commercial harvest was 2,856,988 sockeyes. The Bristol Bay king run was small for the third consecutive year. It was the fourth consecutive year that commercial king harvests were below average. In the Nushagak District the harvest was 17,887 kings, considerably below the 1969-1988 average of 82,515 fish. The Nushagak District was closed to commercial fishing for nearly a month (until June 26) to obtain an escapement of approximately 78,000 kings in the Nushagak River. The chum harvest in the Nushagak district was slightly below average, at 446,155 salmon. As was usual for odd years, the pink run was weak, with a district return of 320 salmon and a harvest of 151. The 1989 coho harvest in the Nushagak was a little over half the 10 year average of 136,000 salmon (1979-1988). Commercial fishing time was reduced by emergency order at times to boost coho escapement rates (ADF&G 1989b).

After being closed for almost a month to improve king escapements, the Nushagak District was opened to commercial fishing June 26. Thereafter commercial fishing was allowed every other day for 12 hours (3 twelve hour openings) until July 3. From July 3 until July 22 9:00 a.m., there was continuous commercial fishing. After a two-day closure it reopened, followed by another two-day closure and then a two-day opening. This was succeeded by a closure of twelve days, followed by a 48-hour opening between August 14 and 16 (Table 1). The Nushagak District saw its peak commercial effort on July 8, with 230 boats and 266 set nets registered to fish in the district.

In 1989 residents of the Nushagak drainage owned a total of 206 commercial set net permits and 300 commercial drift permits. Less than one-half of all Bristol Bay commercial set net permits (445 of 941 permits) were held by residents of Bristol Bay and residents of the Nushagak watershed held about one-quarter of Bristol Bay set net permits (Table 2). Only 30 percent of all Bristol Bay commercial drift permits, (510 of 1749 permits) were owned by people who live in the Bristol Bay vicinity. About 15 percent of Bristol Bay commercial drift net permits were held by residents of the Nushagak drainage (Table 2).

TABLE 1. 1989 EMERGENCY OPENINGS FOR SUBSISTENCE AND COMMERCIAL SALMON FISHING, NUSHAGAK DISTRICT

Subsistence Opening		
5/29-6/24	633 hours	12:01 a.m. 5/29 - 9:00 a.m. 6/24
Subsistence and Commercial Opening		
6/26-27	12 hours	7:30 p.m.- 7:30 a.m. Mon/Tues
6/29	12 hours	9:00 a.m.- 9:00 p.m. Thursday
7/1	12 hours	11:00 a.m.-11:00 p.m. Saturday
Closed		
7/1-3	26 hours	11:00 p.m.Sat 7/1 to 1:00 a.m. Mon 7/3
OPEN		
7/3-17	344 hours consecutively.	
7/3	12 hours	1:00 a.m.- 1:00 p.m. Monday
7/3-4	12 hours	1:00 p.m.- 1:00 a.m. Mon/Tues
7/4	13 hours	1:00 a.m.- 2:00 p.m. Tuesday
7/4-5	25 hours	2:00 p.m.- 3:00 p.m. Tues/Weds
7/5-6	25 hours	3:00 p.m.- 4:00 p.m. Weds/Thurs
7/6-7	25 hours	4:00 p.m.- 5:00 p.m. Thurs/Fri
7/7-8	25 hours	5:00 p.m.- 6:00 p.m. Fri/Sat
7/8-17	207 hours	6 p.m. Sat. 7/8 - 9 a.m. Mon 7/17
7/17-22	120 hours	9 a.m. Mon. 7/17 to 9 a.m. Sat 7/22
Closed		
7/22-24	48 hours	9 a.m. Sat. 7/22 to 9 a.m. Mon. 7/24
OPEN		
7/24-26	48 hours	9 a.m. Mon. 7/24 to 9 a.m. Weds. 7/26
Closed		
7/26-31	120 hours	9 a.m. Weds. 7/26 to 9 a.m. Mon. 7/31
OPEN		
7/31-8/2	48 hours	9 a.m. Mon. 7/31 to 9 a.m. Weds. 8/2
Closed		
8/2-14	288 hours	9 a.m. Weds. 8/2 to 9 a.m. Mon. 8/14
OPEN		
8/14-16	48 hours	9 a.m. Mon. 8/14 to 9 a.m. Weds. 8/16
Closed		
8/16-28	279 hours	9 a.m. Weds. 8/16 to 12 am Mon. 8/28
Subsistence Opening		
8/28-9/30	816 hours	12:01 am Mon. 8/28 to 12 am Sat 9/30

Source: Division of Commercial Fisheries 1989 emergency orders. Division of Subsistence office files.

TABLE 2. NUMBER OF BRISTOL BAY COMMERCIAL SALMON PERMITS
BY PLACE OF RESIDENCY OF PERMIT HOLDER, 1989

ALASKA	SET NET	DRIFT
Alaska Rural Local ¹	445	510
Nushagak Watershed		
Aleknagik	12	25
Clark's Point	10	12
Dillingham	117	162
Ekuk	4	0
Ekwok	0	7
Koliganek	6	15
Manokotak	52	38
New Stuyahok	4	41
Portage Creek ²	1	0
Nushagak Total ³	206	300
Alaska Rural Nonlocal	67	138
Alaska Urban Nonlocal	200	301
ALASKA TOTAL	712	951
NONRESIDENT TOTAL	229	798
TOTAL BRISTOL BAY PERMITS ⁴	941	1749

1. The category of "Rural Local" refers to those persons living within the Bristol Bay area.

2. ACFEC 1989a.

3. ACFEC 1989c.

4. ACFEC 1989b.

While the majority of commercial permits of both types were held by Alaska residents in 1989, a much greater percent of drift permits were held by out-of-state residents than set net permits (46 percent compared to 24 percent). Most set netters in Bristol Bay were Alaska residents, and nearly two-thirds of the Alaskan set netters were residents of Bristol Bay area. Almost one-third of the Alaskans set netting in Bristol Bay were from the Nushagak drainage (Dinneford and Cohen 1989).

SUBSISTENCE SALMON HARVESTS 1970 - 1989

Over the past 20 years (from 1970 until 1989) subsistence salmon harvests in the Nushagak District have ranged from 38,500 fish (1972) to 113,000 fish (1980). The 20 year average harvest was 65,417 salmon (Table 3). Numbers of subsistence permits issued have ranged from 147 in 1970 to a high of 474 in 1987. That year the harvest was right at the 20 year average, at 65,500 salmon (ADF&G 1989a, 1990a).

Numbers of permits issued for the ten villages within the Nushagak watershed (including Manokotak) have remained relatively stable over the last seven years, between 341 - 436 permits (Table 3). The villages of Clark's Point and Manokotak had more permits issued in 1988 and 1989 than in the previous five years, although the absolute increase was small. Clark's Point residents used an average of 6 permits between the years of 1983 and 1987, but received 15 permits in 1988, and 14 permits in 1989 (Table 4). Manokotak residents received between 20 and 30 permits from 1983 to 1987, 40 in 1988, and 39 permits in 1989. These increases may reflect the greater opportunity to fish for subsistence in the Nushagak Commercial District which began in 1988. In 1988 regulations allowed some limited opportunity to fish for subsistence uses when commercial fishing had been closed for five days or more.

The overall subsistence salmon harvest for the Nushagak District in 1989 was below the 20 year average (Table 3). The total number of subsistence permits issued was 432, and the total extrapolated subsistence salmon harvest was 57,996 (ADF&G 1990b). The total number of kings harvested for subsistence in 1989 by all villages was the lowest for the period 1983 to 1989.

TABLE 3. SUBSISTENCE AND COMMERCIAL SALMON HARVESTS AND ESCAPEMENTS, NUSHAGAK DISTRICT

YEAR	SUBSISTENCE PERMITS	SUBSISTENCE HARVEST	% RUN	COMMERCIAL HARVEST	% RUN	TOTAL ESCAPEMENT	% RUN	TOTAL* RUN
1970	147	59,200	1.3%	2,132,636	46.0%	2,441,736	52.7%	4,633,572
71	164	53,300	1.6%	1,707,656	50.5%	1,619,382	47.9%	3,380,338
72	168	38,500	2.3%	809,125	48.9%	807,186	48.8%	1,654,811
73	216	44,500	2.9%	667,664	43.7%	816,307	53.4%	1,528,471
74	261	68,300	1.6%	1,126,747	26.7%	3,022,984	71.7%	4,218,031
1975	340	65,600	2.0%	827,715	25.0%	2,423,038	73.1%	3,316,353
76	317	53,600	0.9%	2,873,538	48.9%	2,949,710	50.2%	5,876,848
77	306	60,500	1.7%	1,659,379	45.9%	1,894,056	52.4%	3,613,935
78	331	67,700	0.3%	8,300,533	38.3%	13,295,009	61.4%	21,663,242
79	364	61,600	0.8%	4,056,340	54.4%	3,334,571	44.7%	7,452,511
1980	425	113,000	0.6%	7,594,946	37.7%	12,437,634	61.7%	20,145,580
81	395	77,300	0.6%	8,702,332	71.7%	3,357,637	27.7%	12,137,269
82	376	74,400	0.6%	8,235,232	65.3%	4,306,398	34.1%	12,616,030
83	389	65,100	0.8%	6,063,402	71.7%	2,325,492	27.5%	8,453,994
84	438	78,000	0.7%	6,291,636	53.7%	5,355,138	45.7%	11,724,774
1985	406	56,600	1.4%	1,792,690	44.5%	2,178,296	54.1%	4,027,586
86	424	86,700	1.4%	3,637,074	58.4%	2,501,387	40.2%	6,225,161
87	474	65,500	1.1%	3,716,996	62.7%	2,147,161	36.2%	5,929,657
88	441	60,938	1.3%	2,396,544	49.4%	2,393,463	49.3%	4,850,945
89	432	57,996	0.9%	3,398,254	55.1%	2,714,947	44.0%	6,171,197
20 year average	341	65,417	0.9%	3,799,522	50.8%	3,616,077	48.3%	7,481,015

Sources: ADF&G 1987, 1988, 1989a.

* The total run is the sum of the subsistence and commercial harvests and the estimated escapement. The sport harvest was not included. See Appendix A.

TABLE 4. HISTORIC EXTRAPOLATED SUBSISTENCE SALMON HARVEST BY VILLAGE,
NUSHAGAK DISTRICT, 1983 - 1989

	Permits							# Fish/ Permit
	Issued	Sockeye	King	Chum	Pink	Coho	Total	

ALEKNAGIK								
1983	23	2,441	113	83	4	164	2,805	122
1984	25	2,505	137	62	232	151	3,087	123
1985	20	1,804	51	33	0	28	1,916	96
1986	30	5,480	179	1,852	151	158	7,820	261
1987	31	3,528	252	137	4	87	4,008	129
1988	24	2,403	61	9	44	164	2,681	112
1989	27	2,398	168	84	1	181	2,832	105
CLARK'S POINT								
1983	5	487	55	44	15	131	732	146
1984	7	205	37	54	144	198	638	91
1985	6	73	23	12	0	0	108	18
1986	3	208	100	111	81	261	761	254
1987	9	55	307	514	0	10	886	98
1988	15	109	72	18	60	56	315	21
1989	14	475	136	84	9	382	1,086	78
DILLINGHAM								
1983	224	9,489	4,096	1,086	215	3,717	18,603	83
1984	266	11,947	3,938	1,615	3,465	4,845	25,810	97
1985	237	11,191	3,084	1,197	298	4,281	20,051	85
1986	242	11,593	6,094	2,170	1,392	5,959	27,208	112
1987	272	16,776	4,896	1,534	65	3,912	27,183	100
1988	290	12,305	4,462	2,496	4,506	3,511	27,280	94
1989	287	15,814	3,669	1,644	267	6,669	28,063	98
EKUK								
1983	1	0	5	0	0	90	95	95
1984	5	433	386	144	176	101	1,240	248
1985	NA	NA	NA	NA	NA	NA	NA	NA
1986	2	24	7	0	0	0	31	16
1987	NA	NA	NA	NA	NA	NA	NA	NA
1988	2	0	0	0	0	0	0	0
1989	1	24	30	11	0	0	65	65

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TABLE 4. (continued) HISTORIC EXTRAPOLATED SUBSISTENCE SALMON HARVEST
BY VILLAGE, NUSHAGAK DISTRICT, 1983 - 1989

	Permits						Total	# Fish/ Permit
	Issued	Sockeye	King	Chum	Pink	Coho		

EKWOK								
1983	9	2,655	1,214	1,191	0	209	5,269	527
1984	10	4,166	872	1,232	408	566	7,244	604
1985	12	4,562	1,113	468	284	569	6,996	636
1986	11	4,959	895	1,057	259	618	7,788	708
1987	15	3,427	1,233	914	38	893	6,505	434
1988	15	2,525	1,106	1,281	620	602	6,134	409
1989	17	2,314	662	1,185	112	439	4,712	277
KOLIGANEK								
1983	14	6,927	1,698	2,719	0	40	11,384	813
1984	15	11,424	1,935	5,157	164	137	18,817	1,254
1985	10	5,373	543	589	0	29	6,534	653
1986	13	8,709	837	1,998	425	231	12,200	938
1987	16	5,339	660	1,490	0	361	7,850	491
1988	10	4,273	980	1,743	0	0	6,996	700
1989	11	2,430	633	1,482	0	84	4,629	421
MANOKOTAK								
1983	20	7,607	222	153	0	262	8,244	412
1984	23	4,514	299	17	17	707	5,554	241
1985	25	4,463	371	13	0	22	4,869	195
1986	30	5,383	728	22	11	166	6,310	210
1987	25	4,042	1,290	19	2	711	6,064	243
1988	40	5,632	144	71	2	395	6,244	156
1989	31	5,015	804	84	10	300	6,213	200
NEW STUYAHOK								
1983	40	10,712	3,167	3,668	347	552	18,446	461
1984	37	10,142	2,231	2,396	1,189	908	16,866	456
1985	38	10,299	3,085	2,220	77	1,057	16,738	440
1986	36	11,949	3,814	2,562	2,359	1,644	22,328	620
1987	42	6,870	3,601	1,626	45	16	12,158	289
1988	39	4,325	3,465	2,857	764	543	11,954	307
1989	40	6,341	1,898	1,195	12	551	9,997	250

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TABLE 4. (continued) HISTORIC EXTRAPOLATED SUBSISTENCE SALMON HARVEST
BY VILLAGE, NUSHAGAK DISTRICT, 1983 - 1989

	Permits						Total	# Fish/ Permit
	Issued	Sockeye	King	Chum	Pink	Coho		

PORTAGE CREEK								
1983	3	173	35	0	0	292	500	167
1984	3	558	21	49	414	445	1,487	496
1985	4	142	14	10	0	33	199	50
1986	4	396	80	58	158	124	816	204
1987	2	26	47	6	0	13	92	46
1988	1	45	18	12	48	14	137	137
1989	3	146	88	59	0	106	399	133
TOTAL NUSHAGAK								
1983	339	40,491	10,605	8,944	581	5,457	66,078	195
1984	391	45,894	9,856	10,726	6,209	8,058	80,743	207
1985	352	37,907	8,284	4,542	659	6,019	57,411	163
1986	371	48,701	12,734	9,830	4,836	9,161	85,262	230
1987	412	40,063	12,286	6,240	154	6,003	64,746	157
1988	436	31,617	10,308	8,487	6,044	5,285	61,741	142
1989	431	34,957	8,088	5,828	411	8,712	57,996	135

Source: ADF&G 1990b. 1989 harvest statistics are based on permits
received by 4/23/90.

Nushagak harvests of subsistence sockeye salmon (34,702) were the second lowest harvest overall (Table 4).

Although there was increased opportunity to fish for salmon in June of 1989, Clark's Point's harvest of king salmon did not rise dramatically. Clark's Point residents harvested a few more kings, sockeyes, and cohos for subsistence than they had in preceding years. However, the harvest of 136 kings in 1989 was considerably less than the 307 kings taken in 1987, the biggest harvest during the period 1983-1989 (Table 4).

Although harvests of king salmon did not rise markedly, there was a shift in where residents harvested their salmon. A comparison of subsistence harvests over the period 1986 to 1989 from the Nushagak Commercial District shows that Clark's Point and Aleknagik residents harvested more salmon for subsistence within the commercial district in 1989 than previous years (Table 5). Dillingham harvests within the commercial district in 1989 were slightly higher than in 1988. Manokotak residents' harvests at Igushik also rose (Table 6). However, it is important to note that the overall harvest for the Nushagak watershed in 1989 was less than the three previous years.

HISTORICAL SETTING

The following historical background is intended to provide the context for the present regulatory issues affecting contemporary subsistence fishers in the Nushagak Commercial District. A brief description of indigenous historical uses of the area now referred to as the Nushagak Commercial District is followed by a summary of the regulatory history of the area as it developed vis-a-vis the commercial fishing industry and as it related to the tradition of fishing for home use.

At the time of the first European contact, sometime between 1791 and 1824, three groups of Eskimo peoples lived in the area surrounding Nushagak Bay. According to VanStone (1967:110), at the time of the first European explorations of western Alaska, three regional groups of Yup'ik Eskimos occupied the western Bristol Bay area: the Alekmiut along the coast of Nushagak Bay; the Kiatagmiut of the Nushagak River; and the Tuyuryarmiut, who lived along the Togiak River. Descendants of the latter live in Togiak today. These pre-contact distinctions between these

TABLE 5. EXTRAPOLATED SUBSISTENCE SALMON HARVEST BY COMMUNITY AND YEAR FOR PERMIT HOLDERS FISHING IN THE NUSHAGAK COMMERCIAL DISTRICT, 1986 - 1989

CLARK'S POINT

	1986	1987	1988	1989
King	80	24	74	136
Sockeye	202	28	112	475
Pink	81	0	62	9
Chum	111	0	18	84
Coho	261	0	57	382
Total	735	52	323	1086
Permits Issued	2	5	14	14

ALEKNAGIK

	1986	1987	1988	1989
King	16	15	10	42
Sockeye	18	30	55	538
Pink	0	3	20	0
Chum	0	10	0	29
Coho	0	0	15	78
Total	34	58	100	687
Permits Issued	2	1	2	5

DILLINGHAM

	1986	1987	1988	1989
King	171	83	185	324
Sockeye	1061	218	492	881
Pink	23	14	83	1
Chum	74	17	70	77
Coho	194	87	89	75
Total	1523	419	919	1358
Permits Issued	15	11	19	17

(continued next page)

TABLE 5. (continued) EXTRAPOLATED SUBSISTENCE SALMON HARVEST BY
 BY COMMUNITY AND YEAR FOR PERMIT HOLDERS FISHING IN THE NUSHAGAK
 COMMERCIAL DISTRICT, 1986 - 1989

EKUK	1986	1987	1988	1989
King	2	NA	0	30
Sockeye	4	NA	0	24
Pink	0	NA	0	0
Chum	0	NA	0	11
Coho	0	NA	0	0
Total	6	NA	0	65
Permits Issued	2	NA	2	1

EKWOK	1986	1987	1988	1989
King	NA	56	NA	NA
Sockeye	NA	156	NA	NA
Pink	NA	37	NA	NA
Chum	NA	25	NA	NA
Coho	NA	15	NA	NA
Total	NA	289	NA	NA
Permits Issued	NA	2	NA	NA

KOLIGANEK	1986	1987	1988	1989
King	158	116	197	156
Sockeye	180	300	450	280
Pink	0	0	0	0
Chum	75	45	75	67
Coho	0	33	0	80
Total	413	494	722	583
Permits Issued	3	6	3	4

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TABLE 5. (continued) EXTRAPOLATED SUBSISTENCE SALMON HARVEST BY
 BY COMMUNITY AND YEAR FOR PERMIT HOLDERS FISHING IN THE NUSHAGAK
 COMMERCIAL DISTRICT, 1986 - 1989

NEW STUYAHOK				
	1986	1987	1988	1989
King	0	0	25	0
Sockeye	0	0	0	0
Pink	0	0	0	0
Chum	0	0	0	0
Coho	0	0	0	0
Total	0	0	25	0
Permits Issued	1	1	1	1

PORTAGE CREEK				
	1986	1987	1988	1989
King	0	NA	NA	NA
Sockeye	0	NA	NA	NA
Pink	0	NA	NA	NA
Chum	0	NA	NA	NA
Coho	0	NA	NA	NA
Total	0	NA	NA	NA
Permits Issued	1	NA	NA	NA

Source: ADF&G 1990b.

N/A = not available. Harvest statistics are for the first site listed on the subsistence permit. Therefore, some persons may have fished more one place, and may not be included here. This table does not include the Igushik River.

TABLE 6. EXTRAPOLATED HARVEST BY COMMUNITY AND YEAR FOR PERMIT HOLDERS FISHING IN THE IGUSHIK RIVER*

ALEKNAGIK				
	1986	1987	1988	1989
King	12	0	0	43
Sockeye	350	371	197	448
Pink	0	0	0	0
Chum	0	0	0	12
Coho	32	0	0	47
Total	394	371	197	550
Permits Issued	2	1	2	2
DILLINGHAM				
	1986	1987	1988	1989
King	18	0	2	NA
Sockeye	25	84	130	NA
Pink	0	0	0	NA
Chum	0	0	0	NA
Coho	4	30	10	NA
Total	47	114	142	NA
Permits	2	3	2	NA
MANOKOTAK				
	1986	1987	1988	1989
King	700	1290	143	806
Sockeye	5093	3933	5075	5026
Pink	10	2	2	10
Chum	19	19	71	85
Silver	127	621	395	301
Total	5949	5865	5686	6228
Permits	30	25	40	30

Source: ADF&G 1990b.

* Harvest statistics are for the first site listed on the subsistence permit. Thus, though Dillingham residents did fish at Igushik in 1989, they were not included because they listed Igushik after other sites, primarily Dillingham beaches. Harvests are extrapolated based on permits returned by 4/23/90.

groups of people were blurred with later population movements brought on by trade, the rise of the commercial fisheries, and outbreaks of disease.

At least 18 historic village sites on Nushagak Bay have been documented and described by VanStone (1971:47). During the early nineteenth century there were four large and important settlements along Nushagak Bay, three on the east side and one on the west side (Fig. 3). Ekuk, Kanakanak, Nushagak, and Kanulik contained all or most of the population of the Nushagak Bay when the Russians first appeared and for some time thereafter (VanStone 1967:4-10, 110,115).

In 1818, at the northeastern corner of Nushagak Bay, at the base of a high bluff known as Nushagak Point, Russian-American Company employees established the trading post called Alexandrovski Redoubt. In 1841 it became the site of the first Russian Orthodox church north of the Alaska Peninsula, and missionaries began to penetrate the Nushagak River country from there (VanStone 1971:21). The village was abandoned sometime in the 1940's.

The contemporary fishcamp of Ekuk was a large and important village during the late prehistoric period. One reference to Ekuk in historic literature dates to 1822, and was made by a Russian naval officer who anchored off the Ekuk bluff. Residents of Ekuk went out to the ship in baidarkies and transferred his crew and equipment by small boats to Alexandrovski Redoubt (VanStone 1971:88). After that, Eskimo guides from Ekuk were used by most vessels bringing supplies to Alexandrovski, their captains being unwilling to risk running aground on the treacherous tidal flats of the bay (VanStone 1971:88). From 1842 to 1931 Ekuk was mentioned in the vital statistics of the Nushagak church (VanStone 1971:88). The village declined during the 1970's from 51 people to a population of 7 in 1980, consisting of the cannery watchman and his family.

In 1888, the Nushagak Packing Company established a cannery on the Clark's Point spit, at that time known as Stugarok (VanStone 1971:86). Stugarok is said to have been the site of an earlier Eskimo village (Brieby 1972:52). Clark's Point arose as a cannery town made up of Native women who married men who came from all over the world to work for the canneries (Brieby

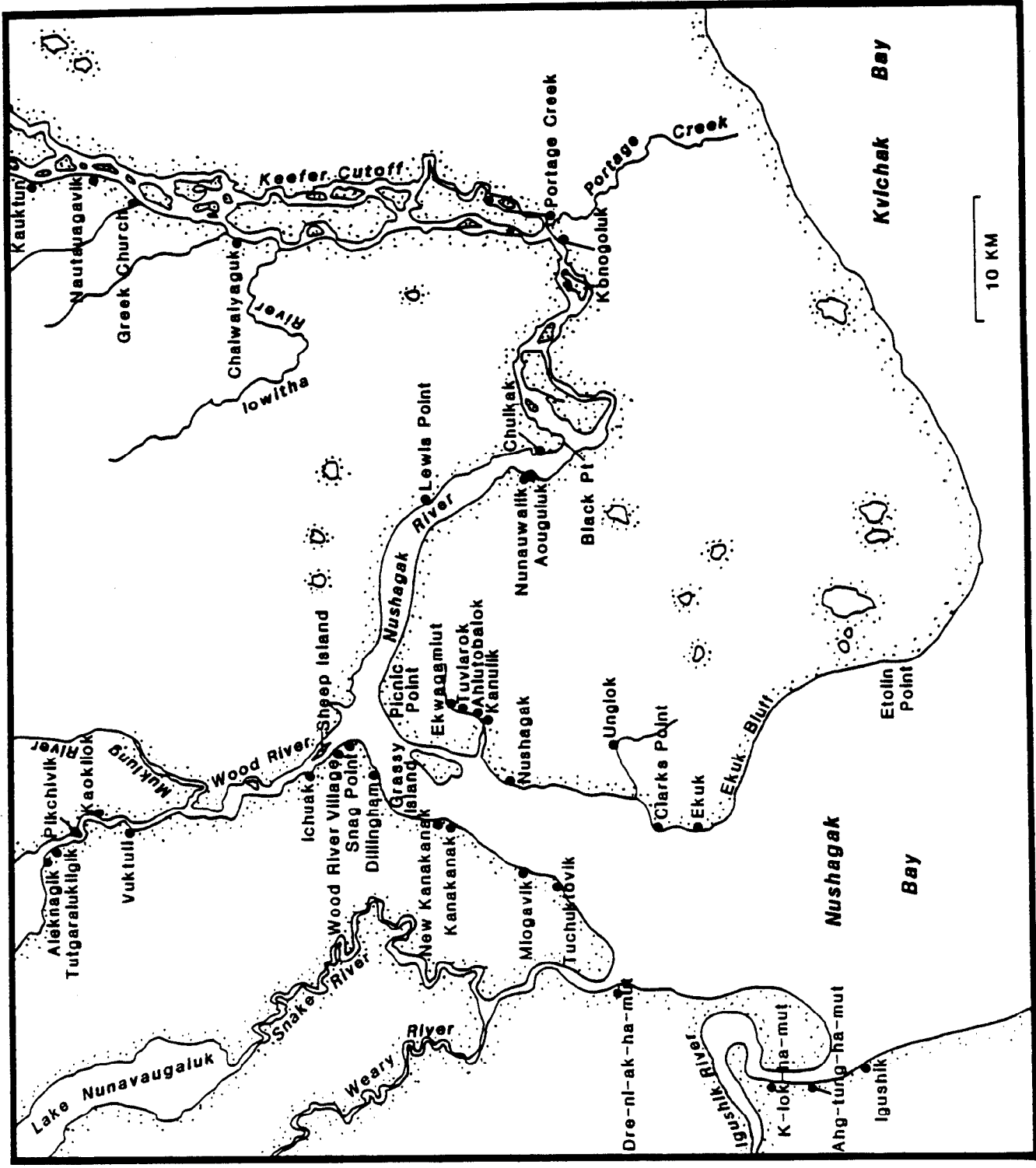


Figure 3. Historical settlements on the Nushagak River. Vanstone, 1971.

1972:72). Population declines over the years have been attributed to periodic flooding of the village before it relocated to the bluff, and to the lack of a high school.

Igushik was once one of the largest and most important villages on the west side of Nushagak Bay. At the time of earliest contact, it was one of four large settlements in Nushagak Bay, and the only one on the west side. It was mentioned regularly in the vital statistics of the Nushagak church between 1876 and 1894 (VanStone 1971:90). Petroff recorded the population as 74 in 1880 (Table 7). However, the population was depleted by the influenza epidemic of 1918-19 when every person in Igushik either died or moved away (VanStone 1967:103). The village was eventually re-established and a population of 28 was recorded in 1930 and 16 in 1940. During the 40's the village was abandoned as a year-round settlement (Schichnes and Chythlook 1988:19). Some of those who left Igushik were the earliest residents of the village of Manokotak, established in 1947.

Historical sources and older informants indicate that Nushagak Bay during the nineteenth century was the site of much subsistence activity (VanStone 1967). People living along the bay participated in a seasonal round of activities which included long hunting trips up the Mulchatna River for caribou in the fall; ice fishing near their villages for ling cod and blackfish; traveling to Lake Aleknagik to fish for trout; trapping; seal hunting; dipnetting for smelt and salmon fishing in the bay during the summer (Breiby 1972; VanStone 1967) Nushagak River people occasionally came down to the coast in the late spring to hunt seals, then stayed on to fish, commonly selling a few fresh fish to canneries in order to obtain money for food and other supplies before returning upriver. Sources indicate that although some Nushagak River families stayed on the river to fish during June and July, many more migrated to the coast to fish and visit the trading post. Moravian missionaries in 1887 noted that large numbers of Eskimos were attracted to Carmel (the site of the Moravian mission, near Alexandrovski Redoubt) and other points on the bay during the fishing season (VanStone 1967:73). Even before commercial fishing was established the pattern seems to have been for the Nushagak River Eskimos to visit the Nushagak post in early summer with their furs, and then either remain to put up fish or return up the river.

TABLE 7. CENSUS POPULATION OF NUSHAGAK BAY SUBREGION, 1880 - 1980

Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Aleknagik (Alaknak)			114				78	153	231	128	154
Clark's Point (Stugarok) (Saguyak)	7					25	22	128	138	95	79
Dillingham (Kanakanak) (Bradford) (Chogiung)	53 167	145		165	182	85	278	577	424	914	1563
Ekuk (Yekuk)	112	65				37		40	51	7	
Ekwok (Ekwak)			79			40	68	131	106	103	77
Igushik (Igushek)	74					28	16				
Koliganek (Kalignak)			114 91					90	100	142	117
Manokotak								120	149	214	294
New Stuyahok								88	145	216	331
Nushagak	178	268	324	74	16	43					
Portage Creek										60	48

Sources:

Alaska Department of Fish and Game 1985a:370, 384, 402, from U.S. census information.

Alaska Department of Labor 1985:53-54.

Historic sources documented indigenous people fishing for salmon with traps at the mouth of the Nushagak River, and spearing and dip netting salmon at the rapids on the upper Nuyakuk (Vanstone 1967:128). Early Bureau of Fisheries (U.S. Department of Commerce 1906 - 1940) reports also contain numerous references to indigenous subsistence fishing. For example, a 1906 Bureau of Fisheries report documented the use of gill nets for harvesting fish for home use in Lake Aleknagik (U.S. Department of Commerce 1906). In 1922, gill nets were reported in use on Lake Aleknagik, and on the Aguluwok River in 1927. During the fall of 1923, fishing for home use was observed in three villages on the Nushagak River. Fish traps and weirs made of split spruce strips were in use (USDOC 1922, 1923). One report documented the importance of salmon to the Native population:

Their main food supply was red salmon, although they purchase some articles of food at the trading posts, such as flour, sugar, tea, and just the bare necessities of a similar nature. Red salmon was entirely cured by the natives for winter food, as this species of salmon constitutes the bulk of the fish in this section of the country. The men and women catch the salmon in the rivers, or along the lake shores, but the work of curing the salmon was attended to by the women. The salmon was split and hung on racks under a shed where it was dried and smoked, and later tied in bundles. Forty salmon constitute a bundle. They know that so many bundles will be required to last them through the winter for their own uses, and for dog feed. They will cure that amount of salmon, but if during the winter before they ran short, they will make no attempt to cure an additional amount for the coming winter. Salmon are plentiful and the natives have no trouble in taking any amount they require (USDOC 1929:9).

The 1933 Bureau of Fisheries report (1933:7) on the run and escapement of salmon in Nushagak Bay, observed that after the commercial season was over "local stakenetters made good catches fishing for dog feed."

Commercial fishing began in Nushagak Bay in the 1870s and by 1903 ten canneries had been constructed. According to VanStone (1971:22), the commercial salmon fishing industry was of far greater significance for the acculturation of all the people of the Nushagak River region than either Christianity or the fur trade. It was responsible for bringing about major seasonal fluctuations of population which brought Eskimos from even the most remote villages to the area and into direct contact with many different races and nationalities. Tent settlements of indigenous

people are reported to have sprung up near the canneries every summer. The years 1908 to 1910 were a high point of the fishing industry in Nushagak Bay. There were at least ten canneries in operation at that time and the permanent Eskimo population of Nushagak Bay was estimated to have been 500-600 persons, augmented to a much larger number during the summer months by Asian laborers, Eskimos from all over southwestern Alaska, and possibly Indians from the Iliamna Lake area (VanStone 1971:138). The peak was reached with 25 active canneries on Nushagak Bay in 1920. As a result of overfishing, commercial fishing was restricted in the 1930s and the number of processors declined. Only six were in operation in 1939 (VanStone 1967:63-72).

However, primarily imported labor was used in the canneries and for fishing (VanStone 1967:73). The vast majority of the fishermen came seasonally from outside the region and outside Alaska. This situation began to change when World War II created a labor shortage in the fishery. As a consequence, more employment opportunities for local residents appeared in the salmon processing industry. Nushagak Eskimo fishermen, however, did not comprise a substantial portion of the commercial fishermen of Bristol Bay until the 1960s (VanStone 1967:73-81).

Although commercial fishing became quite important to the area, subsistence fishing continued as a major source of winter food (VanStone 1967:138). At summer fish camps on the bay in the 1960s, Clark's Point residents fished for king salmon before the commercial season began, from June 1 to June 15. According to a woman who grew up in Clark's Point, women handled every aspect of the subsistence salmon fishery except the construction of drying racks. When the commercial sockeye season started, about a week after king season, they set out nets for sockeyes during the closed periods (Breiby 1972:92). Kings were cut into strips, dried and smoked. The sockeyes were used for making dryfish. The salmon were first split, cut differently depending on the species of salmon and if it was to be used for human consumption or for dogs, then placed on drying racks. Racks were simple, often having a roof frame so that a tarp could be stretched over the top to protect the fish from rain. Residents made saltfish (salunag), "stinkheads" (tepa), dryfish, half-dried fish, dog food, and strips out of salmon. The roe was dried for use as dog food in the winter. During the first part of July the smoking of dryfish "for eating" began. This

process lasted through August (Breiby 1972:93). Half-dried fish were boiled and eaten with seal oil obtained from Togiak people or from other residents of Nushagak Bay (VanStone 1967:138).

HISTORY OF SUBSISTENCE SALMON FISHING REGULATIONS

Historical sources and archaeological evidence substantiate the claim that indigenous peoples were using the salmon of the Nushagak watershed for subsistence long before the establishment of the first cannery in 1884 in Nushagak Bay. Regulations regarding fishing in Alaska were first created in 1906 by the U.S. Department of Commerce. Although they were created for the purpose of regulating the commercial fishery, these regulations affected the regulatory status of subsistence fishing as well. It was important to make a distinction between regulations and actual practice because the extent to which the regulations were enforced against individuals carrying out subsistence activities is open yet to investigation.

Some regulatory actions for fisheries management in Alaska have been: the restriction of time, locations, or gear; the imposition of bag limits; creation of permit systems; and restriction of the numbers of permits per social unit, i.e. household. One significant influence on the legal status of subsistence was simply the imposition of commercial closures, during which fishing with efficient technologies such as traps or nets was prohibited. Such regulations were first adopted on June 26, 1906. Section 5 of this early legislation restricted gear types to rod, spear, or gaff for personal use and not for sale or barter between 6 p.m. Saturday and 6 a.m. Monday each week throughout Alaska (USDOC 1920:1-4). It is unknown whether this law was enforced against individuals putting up fish for home use. However, in 1924, the 1906 Act was amended to specifically exempt persons harvesting salmon for home use from those restrictions. The 1924 amendment specified that "such authority shall not be exercised to prohibit the taking of fish for local food requirements or for use as dog feed" (United States Fish and Wildlife Service 1941:3).

In 1934 this exemption was modified to read "Provided, that nothing herein contained shall prevent the taking of fish for local food requirements or for use as dog feed" (USFWS 1935:2). This exemption remained part of the general regulations for the Alaska territory until statehood. The result of the exemption was to permit the use of efficient means such as nets for fishing for home use. The effect of commercial closures during which only less efficient gear was allowed was only felt much later, in the 1950s, when all subsistence fishing in the commercial district was "tied" to open commercial periods, that is, fishing with nets for home use was only permitted during open commercial periods.

The Bristol Bay District was established by the Department of Commerce in 1922. Regulations were thereafter adopted pertaining specifically to Bristol Bay. In 1934, regulations for the area specified that commercial fishing for salmon was prohibited before and after the commercial salmon fishing season, from 6 a.m. June 25 to 6 a.m. August 3, and included the proviso that "this prohibition shall not prevent the taking of fish for local food requirements or for use as dog feed" (USFWS 1935:9).

The tenor of Bureau of Fisheries annual reports from the turn of the century until the 1940s indicates that observations of the Natives' salmon harvests were used as additional indicators of the strength of the salmon runs. Some examples are these references to subsistence fishing in annual reports:

Indian [sic] set nets showed good small runs before opening of the commercial season and fair schools in the river when the seasons opened which continued until June 29th..." (1929:6).

The stake gill nets, which are a very good indicator of the strength of the run entering the bay, made very poor catches the entire season, especially the ones farthest up the river. This would indicate that the fishing boats had gotten by far the greater number of fish entering the river, on the open days. Also the fair catches of the set nets fishing dog feed during the closed periods would indicate that a fair escapement was ascending the river during the closed periods (1933:6).

It has been reported that set nets used for catching fish for dog feed averaged about 250 fish per tide. This showing was indicative of a good run (1935:9).

The Nushagak run was intermittently heavy and light. The preseason run was encouraging as regards King Salmon. On several occasions residents, who were

fishing for domestic purposes, were forced to roll up their nets, being unable to take care of the large catches (1935:21).

The last reference was the earliest foreshadowing of later regulations which called for shorter nets and non-continuous fishing time under the justification of preventing waste of the resource.

In 1941, the management of the fisheries in Alaska was transferred to the U.S. Fish and Wildlife Service, under the aegis of the Department of the Interior. During the 1940s and 1950s the length of time which Nushagak Bay was closed to commercial fishing increased. Also during that period, observations of subsistence fishing were rarely mentioned in the Bureau of Fisheries agent's annual reports. From lists of violations maintained as part of the agents' annual reports it was not clear how USFWS enforcement agents distinguished between illegal commercial operations and legitimate subsistence fishing efforts during closed periods. Evidence that this may have been an issue can be seen in recommendations by the Bureau of Fisheries agents to prohibit commercial fishers from fishing for subsistence during closed periods in the commercial season. The 1946 annual report (1946:25) contains a recommendation that the statute permitting the taking of fish for local food requirements or dogfood be changed, so that no one fishing commercially during the summer season could also fish for dogfood or local food requirements except in strict compliance with regulations for the taking of fish commercially. The justification proffered was that

There are less and less dogteams in the area and very little dogfood put up. Such as there was could easily be put up from the fall fishing season or taken from fish caught during legal hours for commercial fishing. Anyone not fishing commercially would still be permitted to fish for their own use or for dogfood as before...and it was suggested only that this be done as it applies to the Bristol Bay District. The use of this means to circumvent the intent of the regulations establishing weekend closed periods etc. was very definitely increasing (1946:25).

In 1947 the same recommendation was repeated, with the qualification that it would only apply during the summer commercial season.

Any one fishing for themselves only would be permitted to fish as they are now. This was increasingly used as an escape mechanism to circumvent the weekend closed period law rather than for its intended use (1947:40).

During this period the reports of the Bureau developed a tendency to refer exclusively to the subsistence efforts of local residents as "fishing for dog feed." Conspicuously absent in their

reports during the late 1940s and early 1950s was any mention of the human consumption aspect of the subsistence fishery. Rather, emphasis was placed on the economic importance of the commercial fishery. For example, if the commercial harvest was a poor one, as in 1949, the comment was that local residents would have a hard time "stretching their pennies" until the next season.

Due to the extremely low pack this past season and the high cost of living the local people both whites and Natives are faced with a huge problem as there was not other employment to be had in the Bristol Bay area and most do not have any grubstakes with which to carry on through the long winter. It has been a common practice for people of the watershed to plan on making enough during the summer season to hold them over until the next year, this of course was something that not many people can plan on doing and it was felt by most that these people should in a case of this kind move on to greener pastures as others have been forced to do as in cases of lumber camp and mill closures, mine closures and severe drouth conditions such as those experienced by complete communities in the states. There was of course, another way to look at the situation and because of the differing opinions there are sharp arguments presented by both factions, however, the fact remains that the people of Bristol Bay especially those of the Naknek, Kvichak and Nushagak Rivers will have an extremely hard time trying to stretch their pennies to last until the new season begins next year (USFWS 1953:20)

There were no comments as to the success of local fishing and processing for home use, or to the actual need for cash income. For comparison, in 1929 it was remarked that natives needed only a few hundred dollars income to survive the winter (USDOC 1929:10). Twenty-four years later the assumption was that they were dependent on the monetary income derived primarily from commercial fishing (USFWS 1953:20). VanStone reports that participation of Alaskan residents was low and sporadic prior to World War II. The second World War brought about labor shortages which made entry into the commercial fisheries easier for Alaskan residents. Following the war there was a partial return to reliance upon outside labor sources, but the proportion of residents continued greater than before the war. By 1967, VanStone observed that nearly all male residents of the villages on the Nushagak river participated in the commercial salmon fishery as fishermen (1967:79-82;138). However, VanStone also gave the following assessment of the importance of the subsistence fishery vis-a-vis the commercial fishery.

Although the importance and all-pervading influence of commercial fishing in the Nushagak River region tends to overshadow the subsistence fishery, it is necessary not to underestimate the importance of the latter in the economy of the river Eskimos. The fish put up and dried in the summer fish camps along the bay or during late summer and early fall in the river villages is of vital importance as a winter food supply for both humans and dogs (1967:137)

In light of observations both before and after these years, on the vitality of the subsistence fishery, these reports appear to indicate that rather than becoming less important to local residents, the subsistence fishery in Bristol Bay was becoming less important to the management of the commercial fisheries.

During the 1950s the regulations which had been recommended by the USFWS agent in the 1940s regarding subsistence were put into effect. The following was a summary of the significant changes:

1951 Subsistence fishers were required to give notice of the area to be fished, gear type, time of fishing, the approximate number of fish to be taken in any closed waters, and the intended disposition of the catch (USFWS 1951:23).

1952 Previous 1951 notice requirements were dropped, and commercial salmon fishers were prohibited from taking fish during any commercial season, except in compliance with commercial fishing regulations, or within 48 hours before or after any such season; snagging salmon was also prohibited in waters not open to commercial fishing (USFWS 1952:15-23).

1953 "All" personal use fishers were subject to commercial fishing regulations 48 hours prior to and after the sockeye salmon commercial season (June 25-August 3); fishing was permitted at any place which was greater than 12 miles from the commercial district (USFWS 1953:1-23).

1954 Gill net fishing was prohibited during weekly closed periods and 48 hours before and after any commercial season (June 1 - August 31); personal use fishing, using hand rod, spear, gaff and trolling was permitted at all times, except in areas closed to all fishing; the 12 mile rule from 1953 was modified to allow personal use set nets of no more than 15 fathoms to fish from the Pacific American Fisheries Co. dock at Dillingham to Bradford Point (USFWS 1954:1-24).

1955 Personal use gill nets were permitted each Wednesday (6 a.m. to 6 p.m.) throughout Nushagak District, and at any time 12 miles from the commercial district, and the special 15 fathom area in Dillingham was expanded to include beaches between Snag Point (at the mouth of Wood River) and Bradford Point, and nets in this area were also required to be registered (USFWS 1955:1-25).

1956-58 Only set gill nets were allowed to fish in the Wednesday weekly 12 hour period (USFWS 1956, 1957, 1958).

1959 Personal use fishing with nets was prohibited from noon, June 20, until noon, July 27, except set nets were allowed in waters open to commercial fishing from 6 a.m.

to 6 p.m. each Saturday; the 12 mile rule and special Dillingham 15 fathom set net area was retained (USFWS 1959).

In 1951, allowable gear was still limited only to hand, rods, spears or gaffs during closed commercial periods, as it had been since 1906. However, Nelson notes that gill nets continued to be the primary capture gear (USFWS 1941-59; Nelson 1987:25). It was possible to see how this condition could persist. For, while the early regulations had specified far less efficient gear types for closed periods and waters, an exemption had continued to exist for the purpose of allowing local people to preserve a food supply. In 1951 a letter from the enforcement agent to the Regional Director of the U.S. Fish and Wildlife Service documented the enforcement problems resulting from this situation.

Personal use irregularities which continue to invalidate fishery enforcement efforts were not solved by the enactment of Section 104.50 of Regulatory Announcement 31. The effect of the regulation was that fishermen who would ordinarily violate the regulations quickly recognized the inability of the FWS to restrict personal use fishing under the above regulation. These fishermen either sent in a continual series of notifications of intent to fish for personal use, or flatly notified FWS personnel that they were going to fish for "personal use fish" during closed periods throughout the entire season. The considerable additional work imposed by this regulation on Service employees also took time from more important patrol activities. The only feasible solution to the problem was to prevent the taking of personal use fish at any time when a danger of commercialization exists. It was suggested that this be accomplished by prohibiting personal use fishing entirely during the period of the red salmon season in Bristol Bay. Any lesser measure will inevitably prove unsuccessful (Mahaffey 1951, in USFWS 1951).

During the 1950s, although the exemption continued to exist, its significance was much reduced by increasing gear restrictions in Bristol Bay, and limits on the times when fishing for personal use was allowed both for commercial fishers and those fishing solely for personal use. Moreover, those regulations began to be enforced. Another result of the 1950s' changes was that the laws pertaining to fishing for personal use became more complex, as a third area was created with regulations distinct from the other two. In 1954 the Dillingham beach area was created, with different regulations from either the upriver area or the Nushagak Commercial District.

Throughout this period, gear was restricted to less efficient means in waters closed to commercial fishing and the length of closures increased in the commercial district. In 1951 the length of the commercial closures went from 36 hours per week, the statutory closed time since

1924, to 84 hours per week. From 1953 through 1955, the Nushagak Commercial District was closed five days per week. In 1956, rather than have regularly scheduled commercial closures, commercial fishing time was regulated by the amount of gear registered to fish in each district. In 1956, fishing time from 6/24 until 7/24 was 10.5 days, with fishing five 12 hour periods per week from 7/26 until 8/31.

These changes did not go uncontested, as the USFWS agent's reports demonstrate. The Bristol Bay Annual Report for 1952 reported that a local priest had brought news during the early fishing season of several cases of undue hardship among the natives due to the FWS regulation not permitting fishing for local use during periods when the commercial fisheries were closed. Sources which the agent checked claimed the priest's reports were exaggerated. However, the local enforcement agent stated that he had adopted a broad policy in the interpretation of the regulations as applied to bona fide cases in the vicinity of Lewis Point and Ekwok where he personally knew this regulation would impose hardship on a family (USFWS 1952:59).

For the next two years complaints continued. In 1953 there was a partial closure of the Nushagak District. According to the agent, curtailment of fishing time on the Nushagak was compensated for by movement of set netters and floating gear to other rivers. However, the agent noted

throughout the entire season we were besieged by correspondence and visits from Mr. Downey and Father Engdal citing cases of hardship which our present regulations were inflicting on the local populace, both white and native (USFWS 1953:72).

The creation of the Dillingham beach area was a result of the pressure from local people to open the commercial district to personal use fishing. However, the recommendation to establish this area (and one like it in Ugashik) was made at the request of the USFWS Regional Office. The agent was concerned about enforcement, but granted that the status quo had caused hardship to the older people and those without transportation to go other places.

This recommendation was one which we were requested to include in our public hearings by the Regional Office. Although it will present a problem from the standpoint of enforcement, it will alleviate the situation whereby deserving residents of both Dillingham and Ugashik will be able to fish in the vicinity of their

villages and not be compelled to move to areas which are open to commercial fishing to put up the dog feed and personal food supply. It has been agreed that our present regulations impose undue hardship on old native people who are either reluctant to move to open areas or who cannot do so for lack of transportation (USFWS 1953:136-137).

It is interesting to note that older people living in the Nushagak Commercial District were not taken into consideration for they still would have needed to have someone fish for them outside the commercial district in order to fish when commercial fishing was closed. In 1950, Clark's Point had a population of 128. Ekuk had a population of 37 in 1930 and 40 in 1960 and 51 in 1970; though there was no record of the population in 1940 and 1950. Dillingham's population, for comparison, was 278 in 1940 and 577 in 1950 (Table 7).

According to the 1953 Bureau of Fisheries Annual Report there was a significant amount of publicity regarding hardship caused by curtailed fishing time and the regulations promulgated by the Fish and Wildlife Service. President Eisenhower declared Bristol Bay a disaster area (USFWS 1954:69). The following year FWS opened the Nushagak District for personal use fishing only, for one day, from 6 a.m. to 6 p.m. July 14, at the request of the Governor of Alaska.

As a result of constant pressure and agitation throughout the season and at the request of the Governor of Alaska we issued an announcement opening up the Nushagak District for personal use fishing only from 6 a.m. July 14 to 6 a.m. July 15. During this period some 56 independent boats and 37 setnetters fished. Nine thousand fish were caught and cased up. Cans, cannery help and warehouse space was donated by the Industry. This fish was stored to be distributed among needy families at a later date (USFWS 1954:69).

Although another season of protest was expected by the FWS agent, in 1955 the Nushagak District was comparatively quiet. This was attributed to a good run on the Nushagak, however, it must be noted that a weekly subsistence fishing period was allowed in 1955 (USFWS 1955:88). There was no mention of any protest in 1956 or 1957. In 1958 the recommendation was made to shift the personal use fishery to Saturday, in waters open to commercial fishing. The purpose was to

re-phrase the section 104.90 into a more understandable regulation, and to move the personal use fishing day from Wednesday to Saturday. Very little bona fide personal use fishing was done during the commercial season and there was too much chance of Wednesday's caught fish entering the commercial market on Thursday.

Discussions with local residents in the Ugashik, Egegik and Nushagak districts indicated that these local people would offer no objections to personal use fishing on Saturday instead of Wednesday. They also mentioned that they preferred to take personal use reds after the fish had migrated upstream, which would generally be after July 27 (USFWS 1958:78).

In 1960 the Alaska Department of Fish and Game took over management of fisheries from the federal government. There were a few regulatory changes in the Nushagak District. First, the commercial district was divided into 3 subdistricts, which could be opened independently of one another. In the regulations the "personal use fishery" was referred to as the "subsistence fishery."

As shown in Table 8, ADF&G continued the pattern set by USFWS of allowing subsistence fishing within the commercial district only if it was done with legal commercial gear during open commercial fishing periods.

1960 Only Alaska residents could take salmon for subsistence purposes; set nets outside of commercial district were limited to 50 fathoms; fishing was prohibited during closed periods within a commercial fishing district; within the open commercial district both drift and set net gear were legal.

1961 A permit was needed for individuals who were not licensed as commercial fishermen and who were fishing less than 12 miles from the commercial district. All other requirements remained in effect.

1963 Subsistence fishing was prohibited within the commercial district during closed periods; limits could be imposed on subsistence catches through the permits and the subsistence fishery could be further restricted by field announcement for conservation purposes.

1965 A permit was required for "all" subsistence fishing, which would be given if ADF&G deemed the fishing "compatible with proper utilization of stocks." Waters within 300 feet of any stream mouth were closed to all subsistence fishing. Nets were prohibited from obstructing more than 1/2 the width of any stream.

1966 The minimum distance between nets in a stream was established at 300 ft. The rest of the previous year's regulations held.

1965 - 1973 Regulations affecting fishing for home use remained essentially the same for the Nushagak District. Fishing with legal commercial gear was allowed in waters open to commercial fishing and not allowed during closed periods. Outside the commercial district 50 fathom set nets were the only legal gear.

1974 Fishing for subsistence on the beaches between Bradford Point and Red Bluff (the "Dillingham beaches") was restricted to three days per week, with 10 fathom nets from June 16 to July 17.

TABLE 8. HISTORY OF REGULATIONS REGARDING SUBSISTENCE FISHING IN THE NUSHAGAK WATERSHED

AGENCY	PERMITS	TIMES	LOCATIONS	ALLOWABLE GEAR	PROVISION
1924 43 Stat. 465; 48 U.S.C. 225, 234, 226-228 U.S. Dept. of Commerce Bureau of Fisheries	not required	6pm Sat - 6 pm Mon 36 hrs/wk closed	closed waters	hand, rod, spear, gaff (prohibited use of commercial gear during) weekly closed periods	personal use fish could not be used for sale or barter, provided that taking fish for local food requirements or for use as dog feed was not prohibited in any way.
1934 48 Stat. 594:4 U.S.C. 233, 232 U.S. Dept. of Commerce Bureau of Fisheries	not required		where streams are less than 1000 ft. wide or within 500 yards of the mouth of any creek, stream, or river into which salmon run (except the Karluk, Ugashik, Kuskokwim, and Yukon Rivers)	prohibits use of dams, barricade, fence, trap, fishwheel or other obstructions in Alaska	
3 4			any of the creeks, streams, or rivers of Alaska; or within 500 yards of the mouth of any such creek, stream, or river, except Karluk, Ugashik, Yukon and Kuskokwim Rivers	only hand, rod, spear, or gaff	same as above
1941 U.S. Dept. of the Interior Fish and Wildlife Service	not required	closed 6pm Sat - 6am Mon 6am Wed - 6am Thur 60 hrs/wk closed	same	same	same
1951 USFWS	not required, but subsistence fishers required to give prior notice of the area to be fished, gear type, time of fishing, estimated catch, and use of the catch	closed 84 hrs/wk	same as above	same as above	same

TABLE 8. (continued) HISTORY OF REGULATIONS REGARDING SUBSISTENCE FISHING IN THE NUSHAGAK WATERSHED

AGENCY	PERMITS	TIMES	LOCATIONS	ALLOWABLE GEAR	PROVISION
1952 USFWS	dropped	no fishing 48 hrs before or 48 hrs after a commercial salmon season	no fishing within 300 ft. of weirs, ladders, dams, culverts or other artificial obstructions	same as above, but snagging prohibited in waters closed to commercial fishing	commercial salmon fishers were to be in compliance with commercial fishing regulations during any commercial salmon season
1953 USFWS	same	same as above	Established two separate areas with different regulations for subsistence: a. 12 miles from commercial district fishing permitted anyplace b. Areas open to commercial fishing subject to above regulations	same	all personal use fishers subject to commercial fishing regulations during the period 48 hrs before and continuing until 48 hrs after the sockeye salmon commercial season (June 25 - August 3)
1954 USFWS G G		commercial closures	PAF dock to Bradford Pt. Commercial District	DLG Beaches: 15 fathom set nets substance gill net fishing was prohibited during commercial closures	
1955 USFWS	net must be registered	6am - 6pm Wed anytime anytime	commercial district 12 miles outside commercial district "Snag Pt. to Bradford Pt.	15 fathom set nets	
1956-58 USFWS		6am - 6pm Wed before noon 6/23 after noon 7/27 anytime	commercial district commercial district "Dillingham Beaches" 12 mile area	set or anchored gill nets 15 fathom set nets	

TABLE 8. (continued) HISTORY OF REGULATIONS REGARDING SUBSISTENCE FISHING IN THE NUSHAGAK WATERSHED

AGENCY	PERMITS	TIMES	LOCATIONS	ALLOWABLE GEAR	PROVISION
1960 ADF&G	Permit required	anytime	less than 12 miles upstream from waters open to commercial fishing	set gill nets not to exceed 50 fathoms	
	must show cause to ADF&G	open commercial fishing periods closed 9am Sat - 9am Mon	a defined commercial district	-legal commercial gear in commercial districts during open commercial periods	
1961 ADF&G	permit required for those not licensed as commercial fishers	open commercial fishing periods	commercial district	commercial gear	those not licensed as commercial fishers
1962		same	commercial district	set nets	those not licensed as commercial fishers
1963 ADF&G	Same as above. Numbers of salmon could be limited	same	same	same	In places where a subsistence fishery could have injurious effects on inadequate number of spawners, the fishery could be limited.
1964 ADF&G	no need to show cause for the permit	same anytime	commercial district outside commercial district	legal commercial gear 50 fathom set nets	same
1965-70 ADF&G	permits required for all subsistence fishers in the drainage	same	same, plus; waters within 300' of any stream mouth utilized by salmon are closed to all subsistence fishing	same	same
			No nets may obstruct more than 1/2 the width of a stream Minimum distance between nets in a stream shall be 300'		
1971-73 ADF&G	permits required to take salmon	same	same, plus; minimum distance between nets is 300'	same	same

TABLE 8. (continued) HISTORY OF REGULATIONS REGARDING SUBSISTENCE FISHING IN THE NUSHAGAK WATERSHED

AGENCY	PERMITS	TIMES	LOCATIONS	ALLOWABLE GEAR	PROVISION
1974 ADF&G	same	anytime	Outside the defined commercial district	set gill nets no longer than 50 fathoms 10 fathoms	same
		9am Mon - 9am Tue 9am Wed - 9am Thur 9am Fri - 9am Sat	Red Bluff to Bradford Point	All set nets must be staked and buoyed.	
1975-77 ADF&G	same	anytime 1/1-12/31	Outside the commercial district	25 fathom set gill nets	
1977	same	same	Red Bluff to Bradford Point	10 fathom set gill nets set 100 ft. apart.	same
1978-79 ADF&G	same	same	same	same	no person may operate or assist in operating subsistence salmon net gear while operating or assisting in commercial gill net fishing
1980-86 ADF&G	only one permit per household	same	same	same	same
1988 ADF&G	same	within the waters of a district open during the commercial salmon fishing season, salmon may only be taken during open commercial fishing periods.	commercial district	same	same
		Emergency orders for subsistence salmon fishing	commercial district	10 fathom set gill nets 450 ft. apart	catches during emergency order periods must be reported to the Dillingham ADF&G within 24 hours of the closure.
1989 ADF&G	same	same	same	same	same

1975 Set net lengths were reduced from 50 to 25 fathoms for fishing outside the defined commercial fishing district and the special 10 fathom area.

1977 The minimum distance between the nets on the beaches between Red Bluff and Bradford Pt was reduced to 100 feet.

1978 The same regulations held, with an additional prohibition against operating or assisting with subsistence salmon gear while operating or assisting with commercial gear.

1980 Only one person per household was allowed to obtain a subsistence permit.

From 1963 to 1979, there were provisions in the regulations to impose quotas through the permitting process. However, no quotas have ever been imposed for the Nushagak District in the regulations themselves. Over the years a number of other restrictions were added to the regulations, all of which have remained. Nelson (1987:26) noted that the regulations passed in 1974 had the most impact on the king salmon subsistence harvest rates.

Before 1974, unrestricted fishing time and the unpredictable migratory routine of Nushagak kings, often resulted in large subsistence catches and waste of the resource. In recognition of this problem, local subsistence users and fishery managers jointly co-sponsored regulatory changes in 1974, which allowed only three 24 hour periods per week with 10 fathoms of gear between June 16 and July 17. Since over 75% of subsistence caught kings are taken in this time period, the wastage problems encountered with unrestricted fishing time were virtually eliminated (Nelson 1987:26).

After the State of Alaska took over management in 1960, nothing was written in the annual management reports regarding subsistence until 1963, the year the subsistence permit system was initiated. That year, however, the report referred to the need for monitoring the subsistence fishery in order to better calculate escapements, as well as the continued vital importance of the subsistence salmon fishery in some areas of Bristol Bay: Togiak, Nushagak, and Lake Iliamna-Lake Clark drainages were mentioned as "the only areas of substantial subsistence fishing at present" (ADF&G 1963:34). From 1966-1982 most of the reports were very standardized, referring to a number of trends: to the decrease in subsistence salmon harvests due to the replacement of dog teams by snowmobiles as a means of winter transportation in Bristol Bay; to the permit system and the increase in reporting of harvests; and to the overall stability of the subsistence salmon

harvests over the years at levels between 100,000 and 200,000 salmon for the entire Bristol Bay area.

In 1978 the Alaska legislature passed the state subsistence law, Chapter 151, SLA 1978. This law established subsistence as a "priority use" among beneficial uses of fisheries and game resources. During March of 1979, the Joint Boards of Fisheries and Game established policy #79-5-JB and procedures for implementing the subsistence priority called for in the state law.

In 1986 the Alaska legislature amended the state subsistence statute, specifying that subsistence uses of fish and game be limited to customary and traditional uses by residents of rural areas. It also confirmed subsistence as a priority use over all other uses and stated that hunting and fishing regulations should provide for subsistence uses. In 1988, the Alaska Board of Fisheries determined that only those persons domiciled in the Nushagak District or its freshwater drainages had subsistence uses of Nushagak salmon, and only they were eligible to participate in the Nushagak subsistence fishery.

Regulations since 1988 called for the provision of subsistence openings by emergency order in the commercial district after closures of five days or more. During these emergency order openings the only allowable gear was set gill nets of no more than 10 fathoms operated at least 450 feet from surrounding set nets. Catches were to be reported to the Dillingham ADF&G office within 24 hours after the closure. The remainder of the regulations were the same.

In 1988 a "personal use" salmon fishery was created by regulation in the Nushagak District, south of a line from Snag Point to Picnic Point. The intent of the regulation was to allow Alaska residents not domiciled in the Nushagak drainage to take fish for home use. The fishery was open from July 1 through July 31. The season catch limit was 70 salmon, no more than 5 of which could be kings. Gear was restricted to 10 fathoms of 5 3/8 inch mesh, and the distance between nets was the same as for commercial gear, 450 feet, within the commercial district. On the Dillingham beaches, personal use regulations were the same as for the subsistence fishery; 10 fathom nets, 100 feet apart, from 9 a.m. Monday to 9 a.m. Tuesday, 9 a.m. Wednesday to 9 a.m. Thursday, and from 9 a.m. Friday to 9 a.m. Saturday.

To summarize, in 1989 there were three areas within the Nushagak watershed that were open to subsistence salmon fishing by Nushagak watershed residents, each of which had a different set of regulations. The least restricted area was that area immediately above the commercial district which extends upriver. Here the gear was limited to 25 fathom set nets which did not cover more than 1/2 the width of the stream. Nets were to be at least 300 feet apart. There were no periods closed to subsistence salmon fishing.

On the Dillingham beaches salmon could be taken 7 days a week until June 16; from June 16 through July 17 every other day, for a 24 hour period beginning at 9:00 a.m. Mondays, Wednesdays and Fridays; and 7 days a week after July 17. In the third area, the commercial district, subsistence fishing could occur only during open commercial fishing periods, with legal commercial fishing gear, and during emergency subsistence openings, with 10 fathom set nets 450 feet from any other set net (Table 8).

A review of the regulations promulgated for the Nushagak District of Bristol Bay shows that federal and state regulations have primarily been for the purpose of conserving the fisheries and managing the commercial harvest. Subsistence uses continued to occur from earliest records until the present, but until 1986, have been considered a use of secondary importance to the management of the commercial fishery. Although regulations have provided opportunity for subsistence, that opportunity has not been uniformly available to all subsistence users within the Nushagak District. Those persons living within the boundaries of the commercial district have had to live with the inconvenience of more restrictive regulations for that area. Those regulations have been promulgated because of fears of commercialization of fish caught during periods open to subsistence; fears of harvest and waste of subsistence salmon; and the difficulty of enforcing the regulation against selling subsistence-caught salmon.

Several long-term residents of the Nushagak area were interviewed with regard to this issue in the fall of 1989. Changes in the commercial fishery mentioned by all of them are pertinent to the subject at hand. According to these residents the efficiency of the commercial fleet has risen tremendously since the 1950s. Fishing boats were allowed to have motors in 1951. Gradually

fishermen changed from wooden boats to fiberglass to aluminum boats. Cotton nets which rotted unless cared for, were replaced with nylon nets. One man remembered when a well-equipped boat had a stick for a depth finder and a compass! Another remembered that not so long ago there were wooden boats which travelled at ten miles per hour.

The efficiency of the fleet has risen dramatically. According to one resident, in 1978 the average boat had a 12,000 lb capacity, but by 1989 the average was 20 - 22,000 lbs. New aluminum boats are as much as 16 feet wide and 4 storeys tall and can hold 50,000 lbs.

Bristol Bay is a fiercely competitive fishery. Some residents feel that limited entry has been the motor behind the rise in the efficiency and competitiveness of the Bristol Bay salmon fleet. Petterson et al. (1984:132-33) also documented the increased competition among fishermen resulting from the limited entry permit system and the resulting changes in gear, boats, and the overall character of the fishery. Commercial and subsistence fishermen from the Nushagak Advisory Committee stressed that the possibility that subsistence openings could become a means for some to gain a competitive advantage was generally untenable, and raised common concerns for conservation of the resource among all users (Seitz, Fieldnotes, 9/2, 10/3, 10/4, 1989).

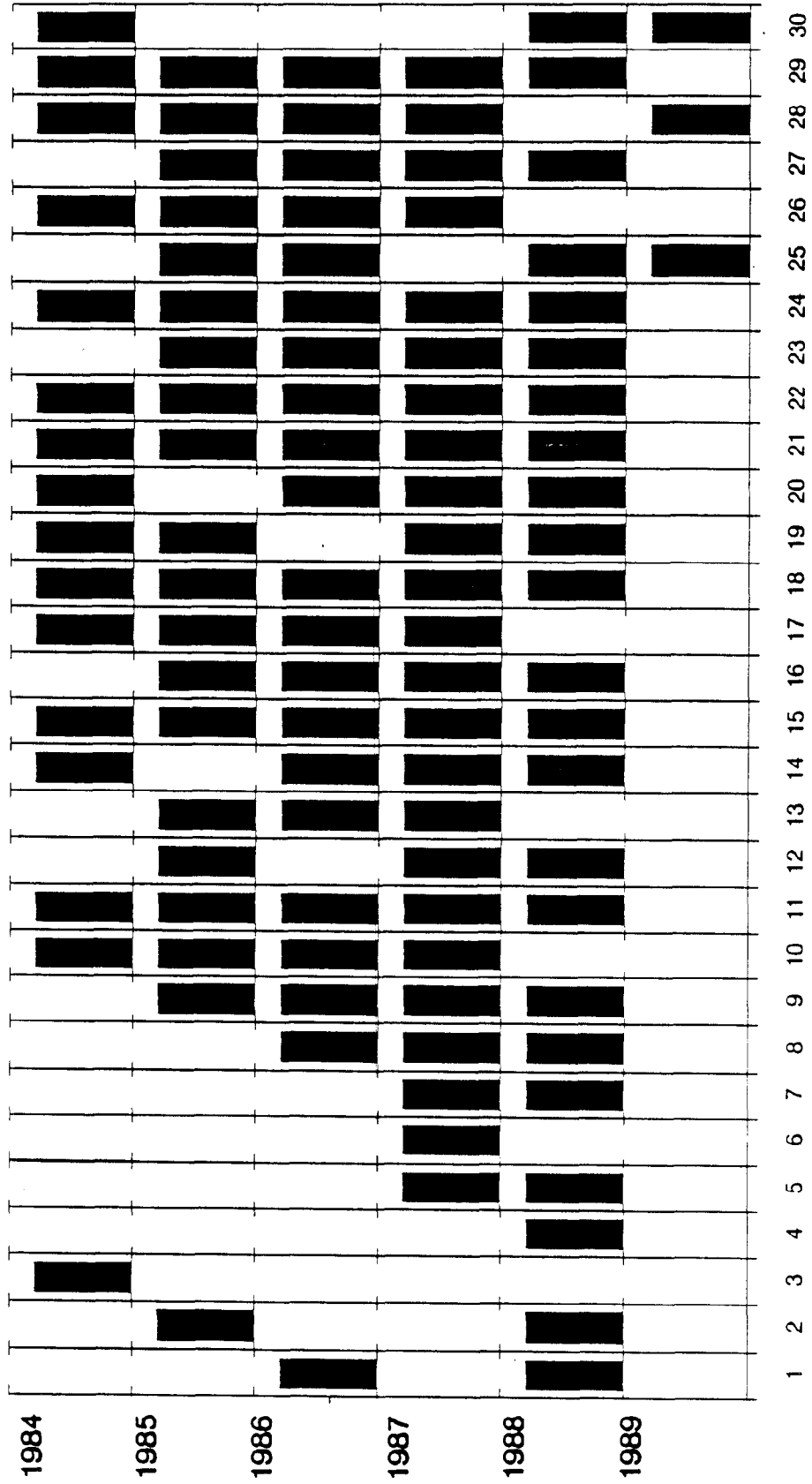
It was feared that if fixed times were to be provided for subsistence-only fishing, a "back-to-back" subsistence/commercial opening could occur, with the majority of fish caught during the subsistence period being sold as commercially caught fish. The latter scenario is envisioned when managers have called an opening for subsistence, but then discover a huge school of salmon moving into the bay and want to call a commercial opening. If they call the commercial opening immediately after the subsistence opening, or close the subsistence fishery and then open the commercial fishery within, say, a 24 hour period, it is feared that subsistence salmon will be sold as commercially caught fish. If managers wait too long to open the bay to commercial fishing the commercial fleet could miss the opportunity to fish and the possibility exists of thus allowing an overescapement of salmon.

fisher was fishing for subsistence but did not have time to take the salmon home to be processed before the commercial opening started. Another possibility would be that unscrupulous people might fish during the subsistence opening precisely in order to stock up on salmon to sell commercially. Other, more innocent circumstances might be that a person's equipment failed and they were unable to return home before the commercial season began. There are several ways that subsistence caught fish could enter the commercial market. However, commercial fisheries management's primary concern was that there be windows of time in which no fishing occurred so that they could monitor the escapement well, and allow the salmon the opportunity to escape to spawn without interference. As management has seen it, the best scenario is not to have fixed openings or set "windows" of time before and after commercial salmon fishing periods, as this would reduce their flexibility to respond to the movement of salmon into the bay with a commercial opening (Skrade, pers. communication, 7/89; Bucher, pers. communication 8/25/89).

On the other hand, in recent years residents of the watershed have again pushed for subsistence opportunities, since commercial openings have decreased to such an extent that there was little or no time at all for fishing within the commercial district for either kings or cohos over a period of several years (1987 Board of Fisheries proposal 177; 1989 Board of Fisheries proposals 130-133). As shown in Figure 4, commercial closures during June increased from 1984 until 1989 and during the same period most of the month of August was closed to both commercial and subsistence salmon fishing. Regulations have resulted from this tension between subsistence and commercial interests and the difficulty of enforcing the prohibition against selling subsistence salmon.

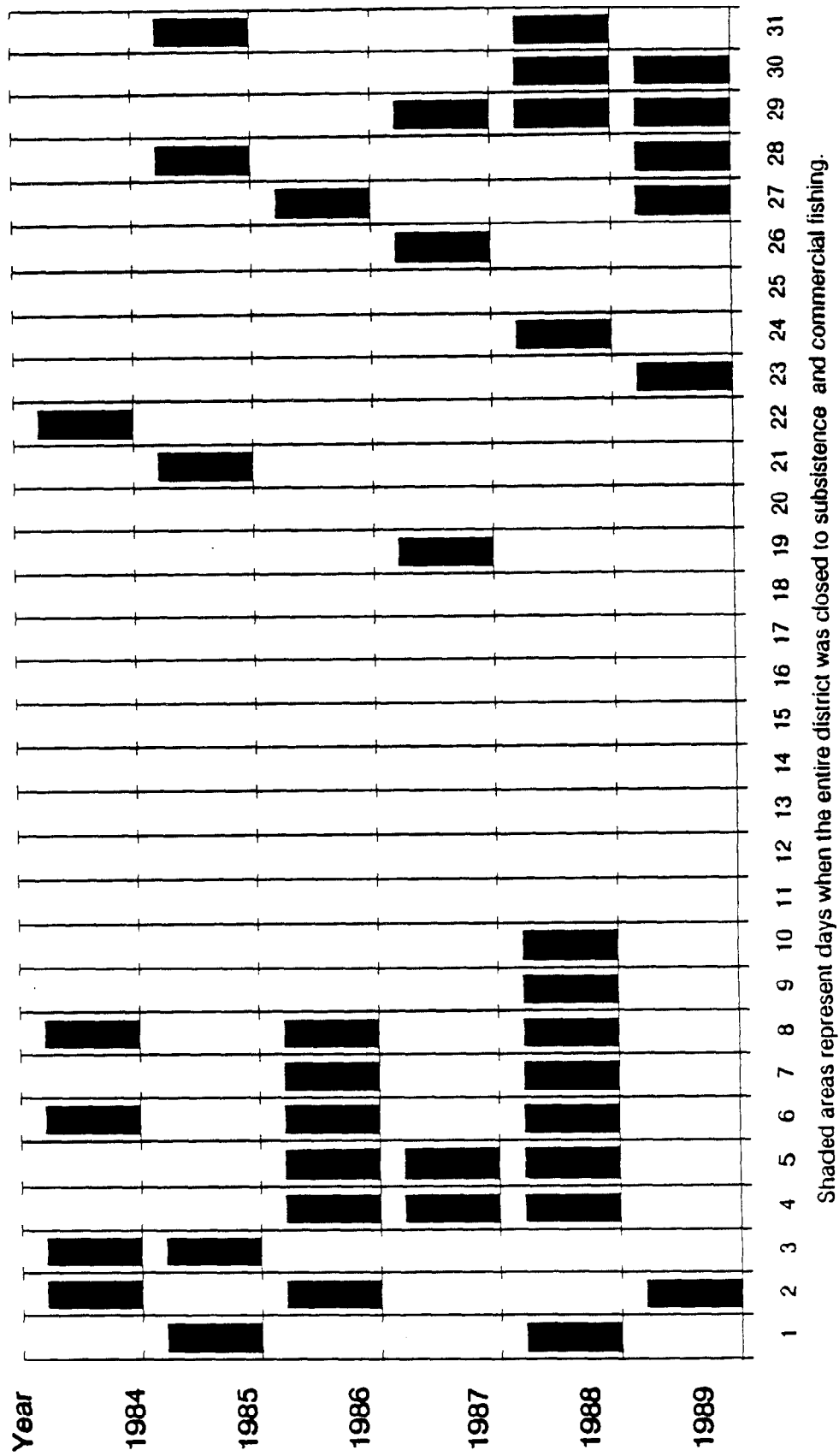
**Figure 4a. Closed Periods in the Nushagak Commercial District,
June: 1984 - 1989**

Year

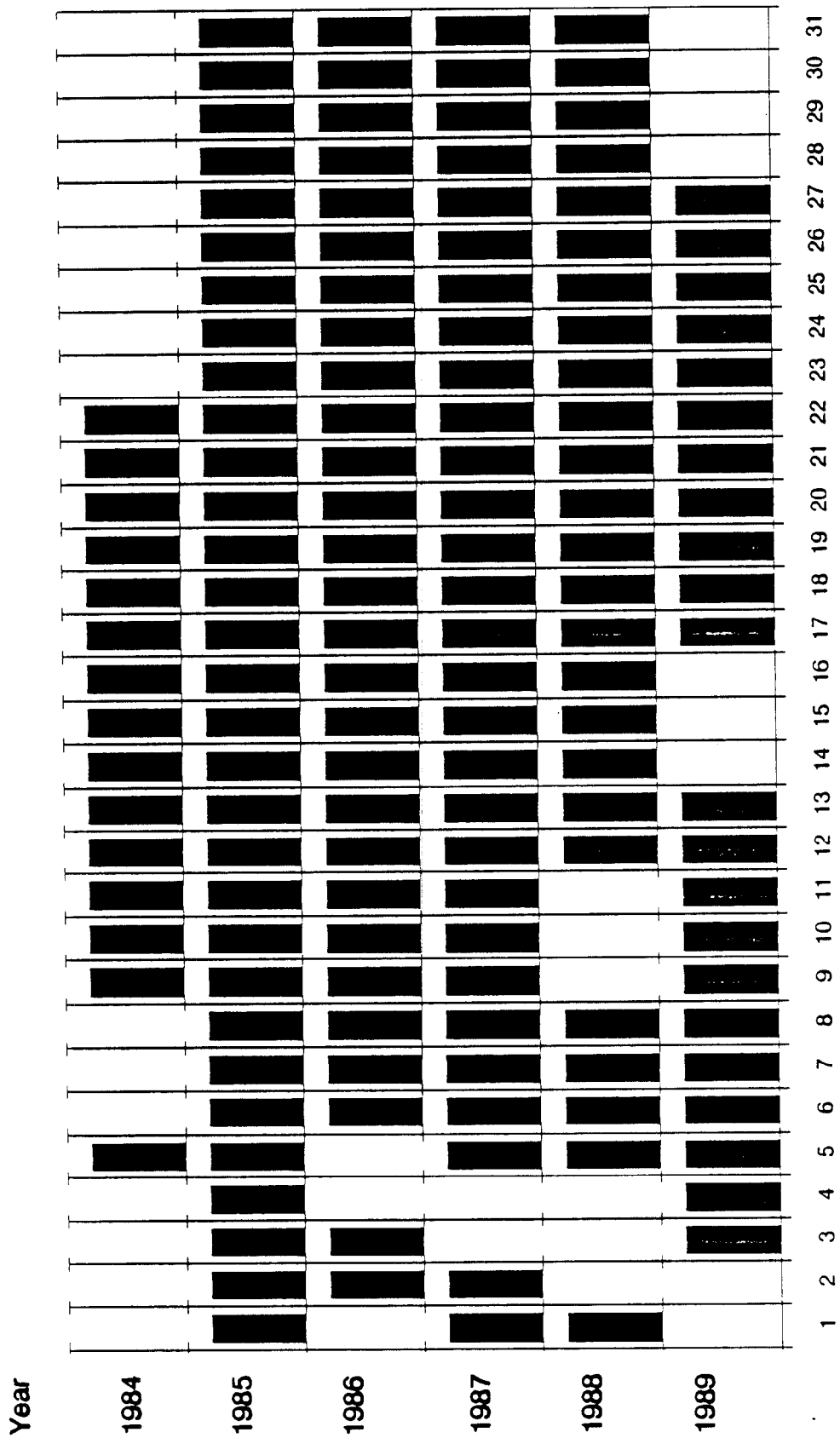


Shaded areas represent days when the entire district was closed to subsistence and commercial fishing.

**Figure 4b. Closed Periods in the Nushagak Commercial District,
July: 1984 - 1989**

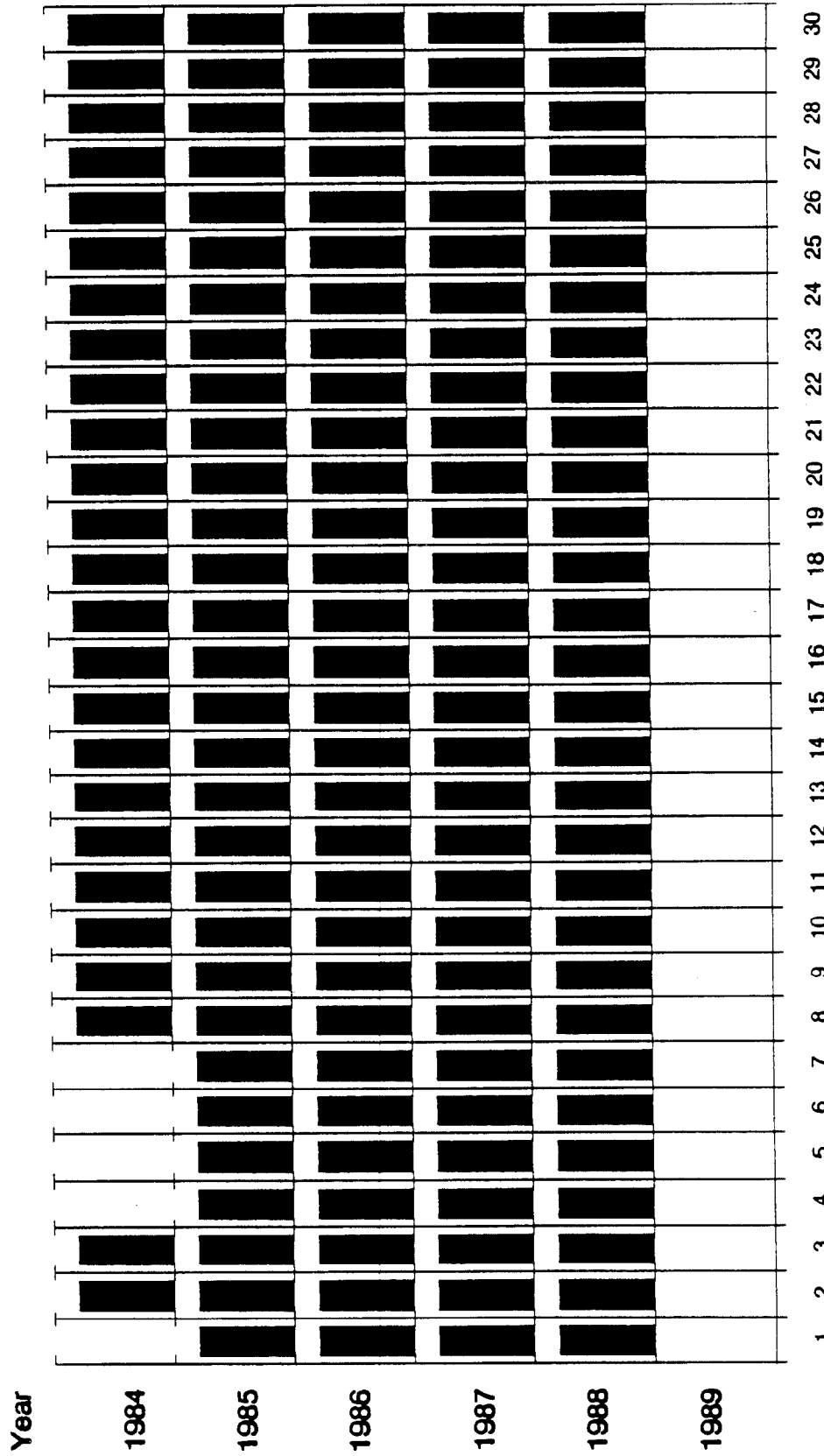


**Figure 4c. Closed Periods in the Nushagak Commercial District,
August: 1984 - 1989**



Shaded areas represent days when the entire district was closed to subsistence and commercial fishing.

**Figure 4d. Closed Periods in the Nushagak Commercial District,
September: 1984 - 1989**



Shaded areas represent days the entire district was closed to subsistence and commercial fishing.

CONTEMPORARY SOCIAL ORGANIZATION WITHIN THE BAY

For the purposes of understanding how the regulations affect the practice of harvesting salmon for subsistence, this section will outline the social organization of fishcamps in Nushagak Bay. Aspects of social organization considered are: population size, the birthplace and domicile of families and individuals who set net in Nushagak Bay; the infrastructure present at fishcamps, such as electricity and freezers; and forms of transportation. Limited entry salmon permit ownership and shore fishery leases issued by the Department of Natural Resources are two additional influences on contemporary social organization of subsistence fishing.

Fishcamps in Nushagak Bay may be organized into roughly three groups. There was one permanent village (Clark's Point) and two seasonal clusters of fishcamps which shared similar patterns of social organization and fish harvesting and processing strategies (Ekuk and Igushik). Another cluster of fishcamps differed markedly from these two in terms of its composition and the degree and methods of harvesting salmon (Nushagak Beach). The third group consisted of much smaller clusters of cabins about which less was known due to the lack of transportation to these locations (Coffee Point, Flounder Flats, Queen's Slough).

All of the fishcamps were organized around commercial set net salmon fishing in the summertime. The village of Clark's Point continued to have fishing as its primary summer activity. In order for a person to participate in the commercial salmon set net fishery one needed to have a limited entry set net permit as well as a site on which to set a net. In 1989 many sites in the Nushagak Commercial District were held primarily by traditional occupation of the same site or sites by the same family over a very long time. Other sites were held through the Alaska Department of Natural Resources Shore Fishery Lease Program.

A shore fishery lease entitles the lessee to exclusive use of state tidelands for a shore fishery site or sites when the fisher is present and fishing. In order to attain a shore fishery lease for a set net site one must be at least 10 years old and possess a valid salmon set net limited entry permit

VILLAGE OF CLARKS POINT 1989

- Seasonal or Year Round
- Vacant Building
- ⊞ Public Facility
- ⊞ Fishrack
- Fishing Site
- () Cemetery

YEAR ROUND HOUSEHOLDS: 16

SEASONAL HOUSEHOLDS

Birthplace	Water Residence
Nushagak Drainage	29
Other Alaskan	4
Other U.S.	20
Unknown	0

Subsistence Permits 14
Personal Use Permits 0

Birthplace is based on

- 1) Households having one of the two heads born in the watershed
- 2) Remaining households having one of the two heads being born either village in Alaska
- 3) Remaining households having one of the two heads born outside Alaska
- 4) Remaining households whose origins are unknown

The same procedure is used to determine residency.

- 1) Waterhead
- 2) Other Alaskan location
- 3) Outside Alaska
- 4) Unknown

SOURCES: Dept. of Fishery, Lateral records / 1/15/89; Interviews conducted July-August 1989 and Subsistence Unusual subsistence and personal use permits

December 1989

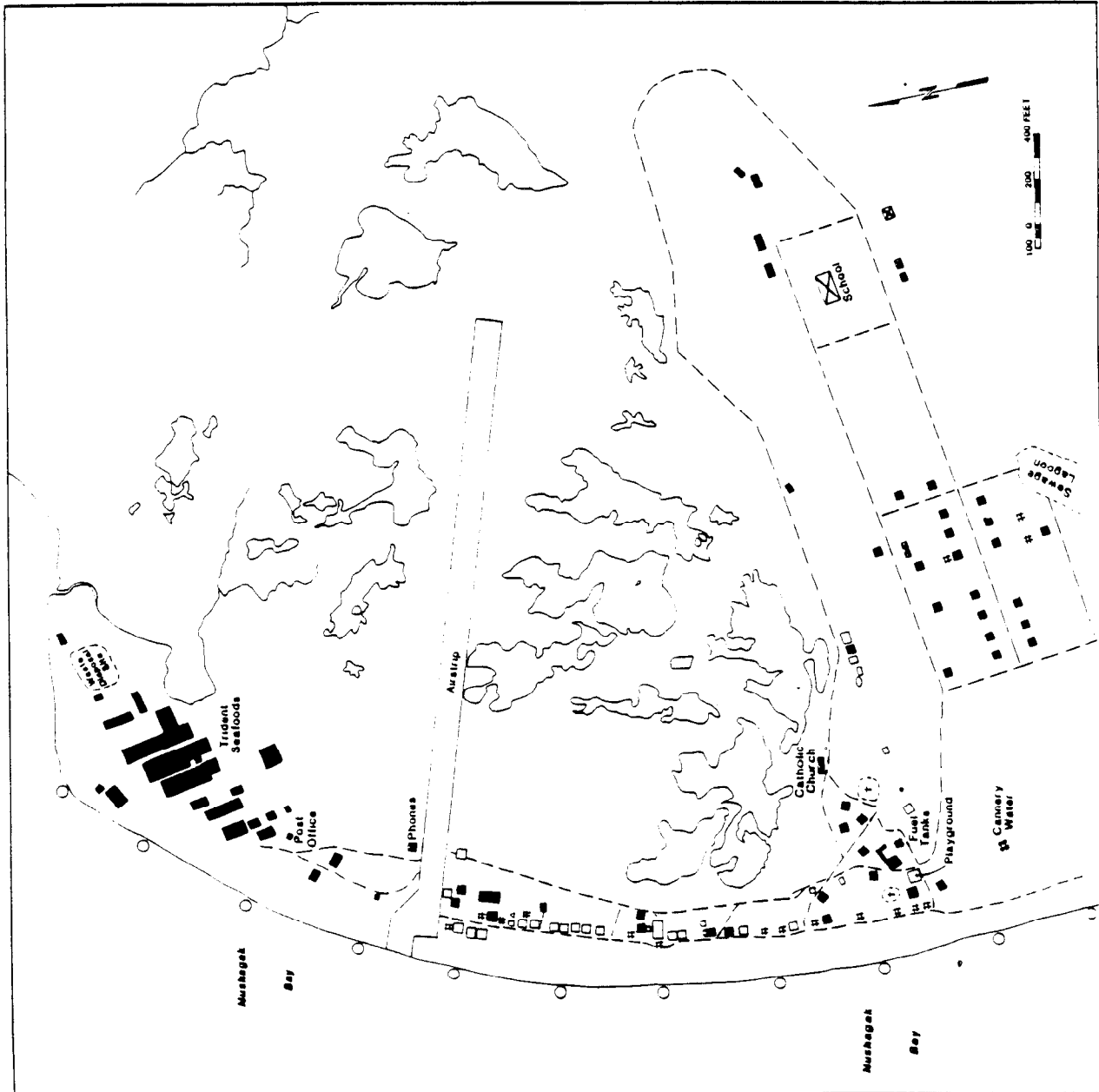


FIGURE 5.

(DNR 1989). Subsistence fishers who do not possess salmon set net limited entry permits are not eligible to apply for a shore fishery lease.

Clark's Point

Clark's Point is located on a spit and adjacent bluff which projects out into the bay south of Clark's Slough (Fig. 5). The cannery, the old village, and the clinic are located on the spit below the bluff. In 1989 Clark's Point was a second class city and provided electricity to all the village houses on the bluff. Several of the year round residents did not have running water or sewage disposal, though all the HUD housing did. The city also maintained a dump and the roads. There was a tribal council as well. The village had a tribal enrollment of 115 (Sharon Clark, pers. communication 11/89).

The population of Clark's Point in 1989 was approximately 54 people, in 16 households. Roughly 33 additional households returned to visit with relatives and engage in commercial fishing. Of these seasonal households, one-third (12) were domiciled in the Nushagak drainage. Of the remaining two thirds of the seasonal households, only one wintered in the contiguous U.S., while the other 20 spent most of the year in other parts of Alaska (Table 9). All but four of the seasonal households had at least one person who spent a significant portion, if not all of their childhood in Clark's Point. Of those four households, three were originally from other Alaskan villages and the origin of one was unknown (Table 10).

When they moved permanently away from Clark's Point, the majority of its former residents permanently relocated to either Dillingham (one third-11 households) or Anchorage (about one third-11 households). Reasons for moving, according to one woman, were the periodic flooding of the old village and the need to send the children to high school (Breiby 1972).

Most of the year round residents of Clark's Point have relocated to the bluff above the old village since the HUD housing was built in 1982. In 1989, the summer residents used cabins in the old village or in some cases, moved in with permanent residents for the duration of the 1989 fishing

TABLE 9. DOMICILE OF NUSHAGAK BAY SEASONAL HOUSEHOLDS, 1989

	a Winter Residence				Number of HHs
	Nushagak Watershed	Other Alaska	Other U.S.	Unknown	
Clark's Point	12	20	1	0	33
Ekuk	41	13	10	1	65
Igushik	70	2	0	NA	72
Nushagak	12	13	24	NA	49
Coffee Point	6	8	1	NA	15
Queen's Slough	9	5	9	NA	23
Flounder Flats	5	9	6	1	21
					b
Total Nushagak	155	70	51	2	278

- a. Nushagak Watershed: A least one head of the household was domiciled in the Nushagak Watershed.
 Other Alaska: Neither household head was domiciled in the Nushagak watershed and at least one of the heads was domiciled in another Alaska community.
 Other U.S.: Households domiciled in the contiguous United States or in another country.
 Unknown: Households whose domicile is unknown.

- b. In addition, 16 households lived year-round at Clark's Point, and one lived year round at Ekuk.

NA=not available.

Sources: DNR Shore Fishery Lease records 7/15/89; Interviews conducted July - August of 1989; ADF&G 1990b.

TABLE 10. BIRTHPLACE OF NUSHAGAK BAY SEASONAL HOUSEHOLDS, 1989

	a Birthplace				Number of HHs
	Nushagak Watershed	Other Alaska	Other U.S.	Unknown	
Clark's Point	29	4	0	0	33
Ekuk	50	9	2	4	65
Igushik	58	11	1	2	72
Nushagak	NA	NA	NA	49	49
Coffee Point	NA	NA	NA	15	15
Queen's Slough	NA	NA	NA	23	23
Flounder Flats	NA	NA	NA	21	21
Total Nushagak	137	24	3	114	278 ^b

- a. Nushagak Watershed: A least one head of the household was domiciled in the Nushagak Watershed.
 Other Alaska: Neither household head was domiciled in the Nushagak watershed and at least one of the heads was domiciled in another Alaska community.
 Other U.S.: Households domiciled in the contiguous United States or in another country.
 Unknown: Households whose domicile is unknown.

- b. In addition, 16 households lived year-round at Clark's Point, and one lived year round at Ekuk.

NA=not available.

Sources: DNR Shore Fishery Lease records 7/15/89; Interviews conducted July - August of 1989; ADF&G 1990b.

season. Many seasonal families returned to their families' old houses on the beach where fishing occurred.

There are 19 set net sites located along the roughly two miles of beach from Clark's Slough to the creek which separates the village of Ekuk from Clark's Point. Of those 19 sites, only 5 of them "belonged" to year-round Clark's Point households. Four of the 16 year-round households did not have commercial set net permits and therefore did not have set net sites to fish during open commercial fishing periods. Most (12) of the set net sites at Clark's Point were held by households which were not domiciled in the Nushagak watershed in 1989. Of the 19 sites, 10 were held with shore fishery leases on August 15, 1989.

Trident Seafoods had a boat storage facility, lockers, housing, dock and business office at Clark's Point. They processed raw fish from all over Bristol Bay, in six floating processors. Almost all their frozen salmon was sold to Japan. Trident provided a number of services for the fishermen such as purchasing, accounting, boat storage and insurance (John Thompson, pers. communication, 7/20/89).

Ekuk

In 1989, the Ekuk fishcamp extended two miles down the beach to where a bluff marked its southernmost point (Fig. 6). Ekuk had one year-round family which watched the cannery located at the northern end of the village. There were 90 set net sites between Ekuk and Etohin Point (ADCRA 1982b).

At least 65 households returned in 1989 to subsistence and commercial fish off the beach and in Bristol Bay. Sixty-two percent (41) of all returning households were residents of the watershed while a total of 23 (35 per cent) were domiciled outside the watershed (Table 9). Of those households which returned to Ekuk, seventy-five percent (50) had at least one person who was originally from the Nushagak drainage (Table 10).

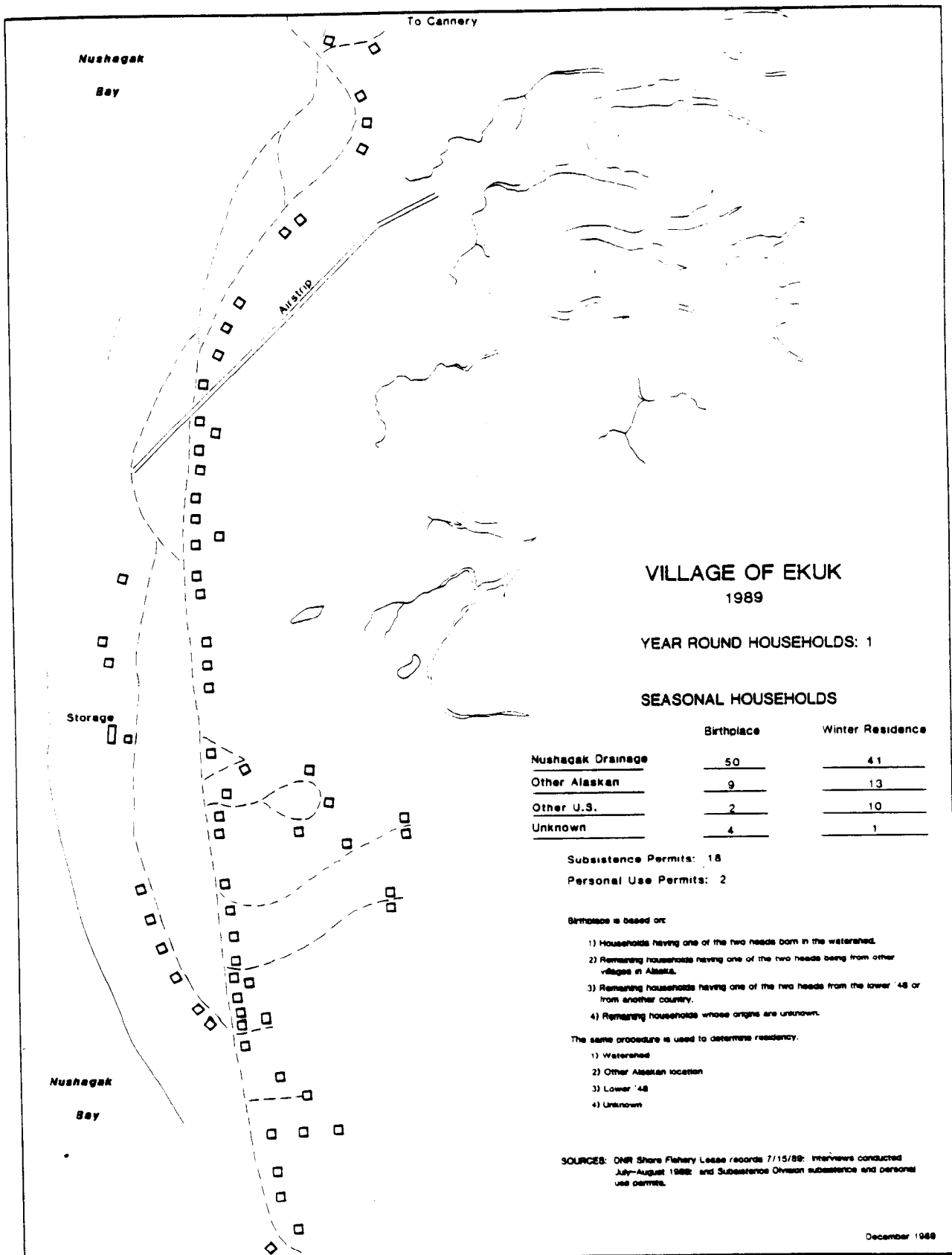


FIGURE 6.

There was no running water, electricity, or sewage facility at Ekuk. People hauled water from Dillingham or from creeks near the bluff. Outhouses and honey buckets were the usual means of disposing of human waste. Some individuals had their own generators.

Columbia-Ward Fisheries bought the Ekuk cannery in 1958. In 1989 they processed canned, frozen, and fresh fish. Approximately one-half of their 300 employees were local to the area. A union shop, wages ranged from \$6.00 to \$7.50 an hour. They had bunkhouses, a cafeteria, and storage for the fishers and workers. Laundry, steam bath, and arranged transportation were provided at no cost to the fishers. The processor also purchased supplies for them. The fishers would generally draw on their accounts and settle up at the end of the season.

Smaller concentrations of summer cabins were found south of Ekuk along the stretch of beach known as Flounder Flats. Roughly twenty-one or more households returned to this area to commercial fish in 1989.

Igushik

Further down the bay, at the mouth of the Igushik River were the fishcamps of Igushik, which extended along a stretch of beach approximately two miles long. Here there were 72 set net sites. The people of Manokotak, with few exceptions, relocate to Igushik during the early part of June every year. A few families from Dillingham and Aleknagik as well as one group of fishermen from the lower 48 also return yearly. In 1989 there was no running water, plumbing, or sewage system at Igushik. Drinking water was packed in from Manokotak, or Dillingham, or a stream five miles below the mouth of the river. There was no central power, although some families had their own generators. As was the case at Ekuk and Clark's Point, travel within the fish camp was most frequently by all-terrain vehicle, also essential to the commercial fishing operation (Schichnes and Chythlook 1988:93).

Nushagak Beach

In the summer of 1989, Nushagak Beach was inhabited by approximately 49 households, some of which shared the same cabin during the summer, but became independent family units

during the winter. Of the households accounted for, almost one half (24) spent the greater portion of the year in the contiguous U.S. One quarter of them wintered in other places in Alaska (13), and about one fifth were domiciled in the Nushagak watershed (Table 9). There were no services such as indoor plumbing, running water, or electricity. A couple of individuals had airplanes with which they were able to travel between Nushagak Beach and Dillingham. However, most travel between the fishcamp and Dillingham was by skiff (Seitz, Fieldnotes, July 1989).

Rounding the southern point of Nushagak Beach is a stretch of coastline six miles long known as Combine Flats. Most of those who had cabins at Nushagak Beach set net in this area and on the mudflats immediately in front of the fishcamp, although some had other sites around the bay. Setnetters in this part of the bay were able to fish both at low tide and high tide because they were allowed to move their nets out onto the mudflats at low tide. Much of Combine Flats had been leased by private fishers for the commercial fishing season through the Alaska Department of Natural Resources. In 1989 there were 61 shore fishery leases between Nushagak Point and Queen's Slough. Some commercial fishers on Combine Flats have two shore fishery leases, one for high and one for low tide.

The commercial fishing season here is roughly one month. In 1989 the majority of the fishers arrived about mid-June and were leaving by mid-July. Fish buyers near Combine Flats were Peter Pan and Seatuck.

Smaller Camps

At the southern end of Combine Flats is a creek referred to locally as Clark's or Queen's Slough. The Queen Cannery was located there. An aerial count of the structures at Queen's Slough found there to be eleven cabins located at various points along the slough independent from the cluster near the cannery. The DNR shore fishery report (7/15/89), along with subsistence and personal use permit records, and in-person interviews indicated that at least 23 persons with either commercial set net permits or subsistence or personal use permits were fishing in Clark's Slough in 1989. Around 40 percent (9) lived in villages or towns of the Nushagak watershed, and

another 40 percent were from the contiguous U.S. and just five persons (20 percent) were domiciled elsewhere in Alaska. Twenty shore fishery leases were held by Queen's Slough fishers in August of 1989 (DNR 1989).

Flounder Flats is the extension of beach that forms an arc on the eastern side of Nushagak Bay between the Ekuk bluff and Etolin Point. Many households who lived in the fishcamp of Ekuk also fished in this area. However, in 1989, there were approximately 21 other households with cabins in this area, separate from the summer community of Ekuk. DNR shore fishery lease records show that most (14) of these households were Alaska residents and that most lived outside the Nushagak watershed (15). Of the latter, approximately six households were domiciled outside Alaska. The shore fishery leases mentioned for Ekuk included Flounder Flats.

In 1989 there was also a tent camp on the northwestern side of Nushagak Bay, south of Kakanak where some of the setnetters stayed who fished at Coffee Point. The Coffee Point area had 20 shore fishery leases on August 15, 1989 (DNR 1989). Most of those who had leases and fished this area were Alaska residents, although about half (8) lived outside the Nushagak watershed. Only one household was from outside Alaska who had a shore fishery lease (DNR 1989).

THE SUBSISTENCE FISHERY IN 1989

Location of Effort

Within the entire Nushagak management area, the stretch of shoreline known as the Dillingham beaches saw the highest concentration of fishing effort during 1989. There were 108 permits issued to fish Kakanak beach; 52 permits issued to fish Scandinavia beach; Snag Point had 30 permits; and Squaw Creek had 19 permits issued to fish there. The total number of permits from Red Bluff to a point two miles south of Bradford Point was 224. Nushagak River had a total of 86 permits issued to fish in the locations of Black Point, Ekwok Area, Grassy Island, Iowithla river, Klutuk River, Koliganek Area, Lewis point, Mulchatna River, New Stuyahok, and Portage Creek. A total of 74 permits were issued for subsistence fishing within the Nushagak Commercial District.

Within that area, Clark's Point and Ekuk were the primary fishing sites (14 and 18 permits respectively). Thirty-two permits were issued for fishing at Igushik (Figure 7 and Table 11).

Subsistence Salmon Harvest by Species and Method Used

In 1989, salmon made up 48.8 percent (by weight) of the overall harvest of wild resources by Clark's Point residents (Seitz, 1990b). The primary salmon species harvested were sockeyes (45.5 percent), kings (20.2 percent) and cohos (20.6 percent). Most of the salmon were caught by the community were caught by subsistence methods (56.7 percent). The species of salmon harvested in highest quantity was sockeye (745) and made up 45.5 percent of the total subsistence salmon harvest. Nearly half the subsistence harvest of sockeyes (48.3 percent) was taken with subsistence nets and over half was achieved by removal from the commercial catch (51.5 percent). Most of the coho (82.5 percent), chum (94.6 percent), and the few pinks harvested for subsistence were taken with subsistence nets during the emergency order periods (mainly the June opening). However, 75.8 percent of the subsistence kings harvested by Clark's Point residents were removed from their commercial catches. The reason for the high percentage of harvesting by subsistence nets for the species of chum, sockeye and pink salmon was a matter of when the fish actually ran. During the 1989 June subsistence emergency order period, sockeyes, chums and a few pinks passed near the beach at Clark's Point. Not until June 19, toward the end of the subsistence emergency opening, did king salmon begin to show up in any numbers. The 1989 run of king salmon was strongest in the latter part of June and was mixed with the run of sockeyes during the commercial season. The most common harvest method among Clark's Point residents was the removal of fish from the commercial catch. Seventy percent of households removed fish, usually sockeyes and kings, from their commercial drift or set nets, while 58.8 percent harvested salmon with subsistence nets. Some households used both opportunities to harvest salmon (Division of Subsistence Harvest Survey, 1989)

Residents saved kings out of their commercial catch if they did not harvest sufficient salmon during the subsistence fishing period in June, and because the price the cannery was paying for

Figure 7.
1989

**SUBSISTENCE
FISHING EFFORT**

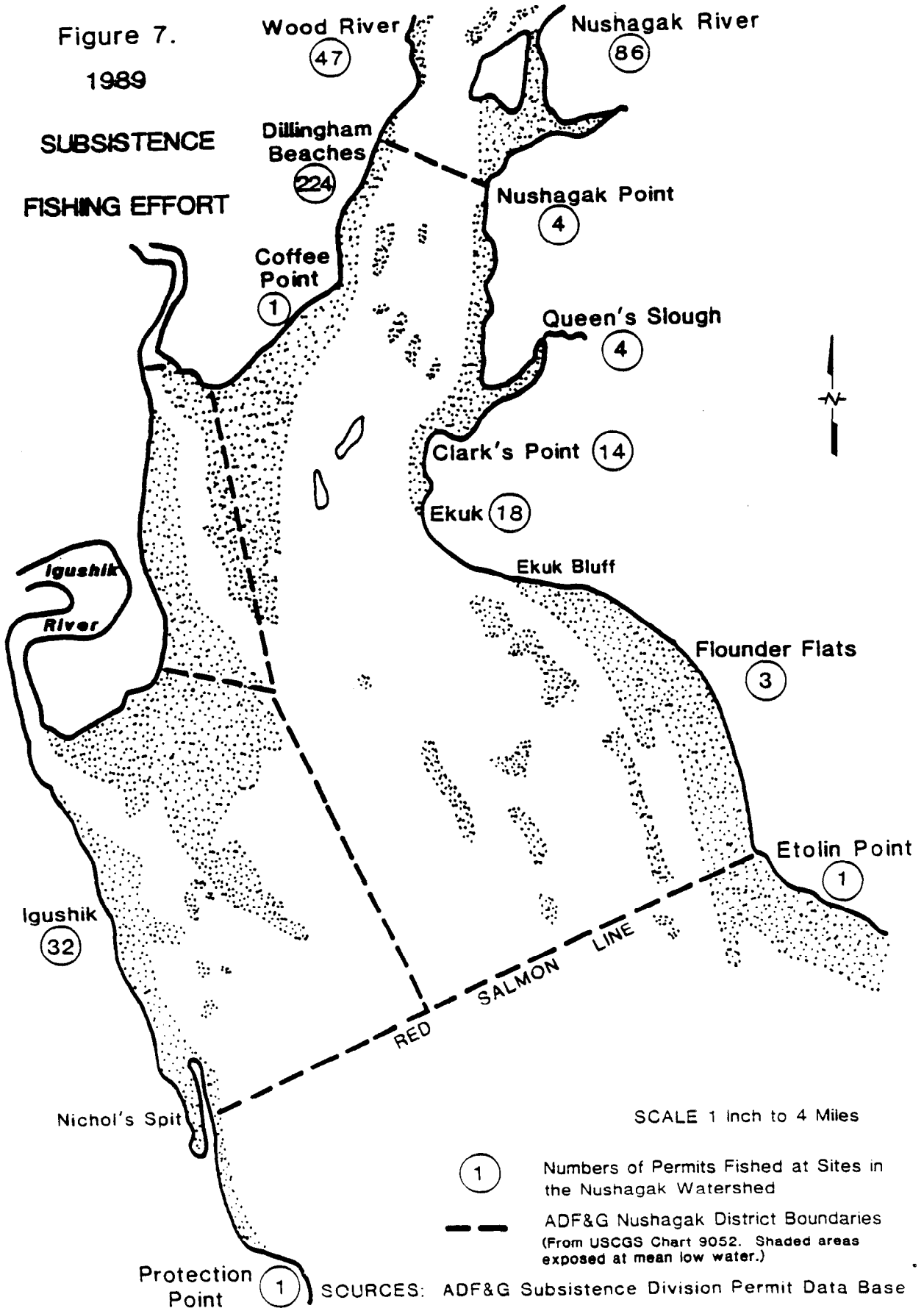


TABLE 11. EXTRAPOLATED SUBSISTENCE SALMON HARVESTS IN 1989 BY FISHING SITE, NUSHAGAK WATERSHED

Fishing Site	# Permits	Sockeye	King	Chum	Pink	Coho	Total
Igushik	32	5482	848	97	10	350	6787
Nushagak Commercial District							
Clark's Point	14	475	136	84	9	382	1086
Ekuk	18	1495	342	110	1	96	2044
Etolin Point	1	19	0	0	0	0	19
Nushagak Point	4	120	133	67	0	147	467
Protection Point	1	20	19	0	0	0	39
Queen's Slough	4	38	28	4	0	2	72
Subtotal	42	2167	658	265	10	627	3727
Dillingham Beaches							
Bradford Point	1	212	18	23	0	66	319
City Dock/Beach	1	15	17	14	0	35	81
Icicle	6	93	17	3	0	23	136
Kanakanak	108	4610	1281	587	123	2783	9384
Olsonville	2	64	22	9	0	64	159
Scandinavia	52	4077	671	409	80	918	6155
Skinner	5	1527	180	126	6	332	2171
Snag Point	30	1367	237	193	27	1345	3169
Squaw Creek	19	808	419	73	1	414	1715
Subtotal	224	12773	2862	1437	237	5980	23289
Nushagak River							
Black Point	2	4	26	0	0	0	30
Ekwok Area	19	2434	719	1246	117	573	5089
Grassy Island	3	75	161	59	0	41	336
Iowithla River	1	0	5	0	0	0	5
Klutuk River	1	0	0	0	0	0	0
Koliganek Area	7	1999	458	1297	0	16	3770
Lewis Point	19	1589	975	88	11	74	2737
Mulchatna River	1	779	90	375	0	67	1311
New Stuyahok Area	21	3572	793	665	0	223	5253
Portage Creek Area	12	536	180	112	0	187	1015
Subtotal	86	10988	3407	3842	128	1181	19546
Wood River							
Lower Wood River							
Hansen Point	2	105	11	2	0	8	126
Lower Wood River	15	1351	234	34	21	249	1889
Red Bluff	2	144	0	0	0	86	230
Upper Wood River							
Agulowak and Above	1	0	0	0	0	0	0
Aleknagik Area	17	974	23	16	1	122	1136
Muklung River	1	0	0	0	0	32	32
Upper Wood River	9	503	55	1	0	44	603
Subtotal	47	3077	323	53	22	541	4016
Unknown Site	1	48	24	10	0	0	82
Watershed Total	432	34535	8122	5704	407	8679	57447

Source: ADF&G 1990b. Harvests are extrapolations based on permits returned by 4/23/90. Includes one Fairbanks permit.

them was lower than their value to the family as food - whether frozen, smoked, salted or dried. Chums and pinks were generally not saved out of the commercial catch unless they were too scarred to sell.

Harvest Strategies

Harvest strategies may be grouped according to place and whether one was domiciled in the Nushagak watershed or not, or if one was not an Alaska resident. In 1989, regulations restricted subsistence fishing in the Nushagak Commercial District to emergency openings for subsistence or to open commercial fishing periods. During emergency openings in the Nushagak District allowable gear consisted of 10 fathom set nets set 450 feet apart. During commercial openings legal gear consisted of set or drift gill nets. Commercial set gill nets were restricted to 50 fathoms and drift nets to 150 fathoms.

Timing of Harvest

Through the Subsistence Division permit data base timing of harvest can be seen for the Nushagak Commercial District. Permits fishing in the Nushagak Commercial District showed higher daily percentage catches of king and sockeye salmon, particularly sockeyes, beginning June 11 through June 30. At least one third of the kings and one third of the sockeyes were harvested by July 1. Thus, a substantial portion of the harvest took place just prior to the first commercial opening.

The Commercial Fishery as a Source of Subsistence Salmon

The commercial fishery has been an important source of subsistence king salmon for most people trying to harvest fish for home use in the Nushagak Commercial District. The peak of the run is around the 18th of June. However, the early part of the king run, during the first couple of weeks in June, has declined. When commercial fishing is targeting sockeyes in July, kings are caught incidentally. Kings tend to migrate up through the bay in the deeper channels and are more likely to be caught in the drift nets used in the commercial fishery than in the set nets used in

the subsistence fishery within the commercial district (Nelson 1987:15). From 1953 until 1988, subsistence fishing was prohibited in the commercial district except during open commercial fishing periods. So, although people did report some "extralegal" harvesting, the primary legal method of obtaining fish for home use in the vicinity of Clark's Point and Ekuk was from the commercial catch. With the decline in the king run since 1984 the amount of time in June that the bay was closed to commercial and subsistence fishing increased also. This more than likely increased people's reliance on the commercial fishery in July to get kings for home use. Commercial set netters from Clark's Point and Ekuk reported that they usually only catch one or two kings, sometimes a few more, per tide. Retaining these from the commercial catch was the primary way they have been able to catch kings for home use.

Commercial Fishery Influences on Subsistence

Once set net lines and pulleys were set out for commercial fishing, those who did not have limited entry permits and sites had difficulty locating a site to put out a net. However, those Clark's Point residents who had limited entry permits and sites were able to use their sites during the emergency openings and retain fish from their commercial catches during commercial salmon fishing periods. After the commercial season, commercial setnetters living in Clark's Point were able to use their own sites or change sites as the seasonal people left, in order to fish the emergency opening for silvers. After the seasonal set netters began to leave and sites began to open up, those without limited entry permits could set out nets during the remaining commercial periods and during the emergency opening in late August. In 1989 the emergency opening for cohos occurred August 28 until September 30. Some families set out nets during the closed periods earlier in August in order to take advantage of a run of coho salmon off the Clark's Point beach during favorable weather. Most Clark's Point residents said that the emergency opening for subsistence in August occurred too late to catch enough silvers.

Case Examples

The following examples are presented here in order to illustrate some of the strategies used to harvest and preserve salmon for home use. Families and individuals adopted different ways of organizing production depending on their status as domiciled in the watershed or not, the availability of labor, limited entry permit ownership, and access to fishing sites. Above all, the presence of salmon and weather conditions dictated the timing of harvest.

Case Example A: Clark's Point

This woman did not have a commercial set net permit, but received a subsistence permit and fished the emergency opening. During the commercial sockeye season she was not able to find a site on the beach since all were occupied by commercial set netters. However, during closed commercial periods her brothers and her father brought king, sockeye, and coho salmon home from their commercial drift operations for her to process.

Case Example B: Clark's Point

This woman had a commercial set net site which she fished with the help of her daughters and grandchildren. In 1989 they fished for subsistence salmon during the emergency order for subsistence in June, using her commercial set net site. They caught five kings during that period. Her grandson worked with a commercial drift operation but was not able to bring home salmon because he was not the permit holder. They retained scarred fish and king salmon from their commercial set net. They caught one to two king salmon per tide, roughly 40 per season. They divided their salmon among four households.

Ekuk

At Ekuk in 1989, families preferred to separate commercial and subsistence fishing activities. Some Dillingham residents who returned to Clark's Point or Ekuk for the summer tried to finish their subsistence fishing for kings early by setting out a net on one of the Dillingham beaches. However, the Dillingham beaches were also crowded (Fall et al. 1986:94). Once they

had relocated to Ekuk beach for the commercial fishing season, households which did not have set net sites were forced to look hard for an open spot to put out a net during open commercial fishing periods.

In 1989, 20 households listed Ekuk on their subsistence permits as a site for subsistence fishing.⁵ Eighteen of these listed Ekuk as the first site to be fished on their permit. During the emergency opening in June, 15 families with subsistence permits fished at Ekuk. Most of the households at Ekuk in 1989 had set net permits. Several families had members who participated in the commercial drift net salmon fishery, but in 1989, only two households of the 66 at Ekuk had drift permits and no set net permit. Fishcamp was generally looked forward to as a kind of working family reunion. A common pattern of social organization was for an older woman (often widowed) to reunite with her non-married and married children and their families. While the second generations' husbands might work a full-time job, or participate in the commercial drift net salmon fishery, the women would help their mothers with subsistence fishing or commercial set netting. Occasionally husband, wife, and their children would all work in the commercial and subsistence set net operations. Brothers and sisters whose parents had passed away, or could no longer do heavy labor, continued to work together to commercial and subsistence fish.

Despite the emergency subsistence opening, many strategies used in the past were continued this summer. Families searched the beach in between the commercial openings and at low tides for sockeyes, kings, and chums which had fallen out of the nets but were still fresh, to split and dry. Salmon which were too scarred to sell to the cannery were also split and hung to dry. King salmon were withheld from the commercial set nets if the family felt they could afford to withhold them. Set netters reported getting 1-2 kings each tide, sometimes a few more. If lucky, they could put away 30 to 50 kings from their commercial set nets each summer. Finally, drift fishers, usually husbands, or sons, would bring commercially caught salmon back to the camp for wives and sisters to process for home use. They would usually bring home kings as well as

5. The Subsistence Division permit data base only records the first site listed on the permit. If an individual lists more than one site, the others are not recorded. Therefore the permit data base shows only 18 permits for Ekuk.

sockeyes when there was a break in commercial fishing. At the end of the season the drift fisher's family would receive fish after it had been preserved by any of a number of methods.

In 1989 the extent to which watershed residents fishing at Clark's Point and Ekuk reported taking fish from their commercial set nets for home use seemed to depend on a combination of factors: whether they had had the opportunity to put up fish during the emergency opening; the price of the fish; whether they could get fish from a relative or friend with a commercial drift net; the possibility of preserving the fish quickly, for example through freezing; and the weather. Those who brought home 20 to 30 fish or more from their drift nets were usually bringing back fish to other individuals who were splitting, smoking, and drying them. Those who were keeping fish out of their set net operations were often freezing them when they had access to freezers. They generally reported taking only a few fish at the time. A few individuals had fish stored in the Ekuk cannery freezers for the duration of the season.

Case Example C: Ekuk

This family moved to Ekuk from Aleknagik every year. Some of the daughters lived in Dillingham and joined their mother and other siblings in Ekuk for the commercial salmon season where they set net commercially. Until 1989 one of the daughters and her husband fished for kings on one of the Dillingham beaches and then flew the fish to Ekuk for her mother to split, hang and smoke. They did not have enough time to dry the fish and smoke them in Dillingham before the start of the commercial salmon season. They also scavenged the beaches for salmon which had fallen from the set nets and retained the scarred salmon and kings from the commercial set net. However, in 1989 they fished during the emergency opening for subsistence in June. They got enough for their households from the subsistence opening that they did not have to scavenge for salmon and they were able to sell all their commercial catch. The processed salmon were divided among seven households.

Case Example D: Ekuk

This man received a subsistence permit and had a commercial set net operation at Ekuk. His wife had recently passed away. He and his family, his mother, and his sisters (one of which was married and had children), all returned to Ekuk to commercial fish and put up salmon for home use. When his sister (who, like himself was from Dillingham) married, she and her husband moved to her husband's village, Hooper Bay, and she lost her right to fish for subsistence in the Nushagak Watershed. So her brother caught the fish under his subsistence permit and everyone helped process it. When the season was over they divided it up among their families (Seitz 1990).

Igushik

At Igushik, within the sections of the Nushagak District used by Manokotak residents, subsistence salmon could only be taken by drift or set gill nets. In the Igushik River, outside the commercial district, up to 25 fathoms of set gill net was allowed with at least 300 feet required between sites. Outside the commercial district, set gill nets were the only allowed subsistence gear for salmon. Nets were required to be staked and buoyed and no net was permitted to obstruct more than one half the width of a stream. No person was permitted to operate subsistence gear and commercial gear simultaneously.

Harvesting strategies varied and were strongly influenced by the regulations as indicated above. In general, residents preferred to separate their labor between commercial and subsistence efforts. During a commercial closure, women were eager to put up fish when the weather was good and fish were running. However, they could only do so legally by harvesting them outside the commercial district. Since the women were usually not the skiff operators, they were dependent on the presence of their male relatives, who were often away from the camp awaiting fishing announcements or working on their boats. During commercial openings, women had the option to remove fish from their commercial set net catches, but the local preference was to sell all the fish caught with set net gear. For many people, the fishing season was the only

opportunity of the year to earn money. There was also confusion about which times residents were allowed to put out subsistence nets.

In 1985, the largest number (83.3 percent) of subsistence salmon, primarily sockeyes, were harvested in subsistence nets. Nets were set in the Igushik River or at the beach in front of the fish camp. Although the river was just a short distance from the fish camp, access required a skiff, consequently, men were the predominant harvesters since operating a skiff was generally considered a male role. Other family members might also accompany them for the outing. Subsistence nets could be set legally in the river at any time, and could therefore be harvested whenever the men had time and the tide was high enough to launch a skiff. When nets were set for subsistence purposes in front of the fish camp, they might be set by either men or women, but they were more frequently set by women. This was because women wished to take advantage of good drying weather when they had time to process fish, most frequently when commercial fishing was closed.

Some fish were removed from commercial catches as well, most frequently king salmon caught by drifters in Nushagak Bay. This was because the Igushik River does not have a strong king run. Subsistence fish taken from commercial set net catches were predominantly sockeye and usually harvested by women at Igushik Beach. However, this did not occur ordinarily since residents preferred to sell all fish caught commercially (Schichnes and Chythlook, 1988:101-103).

Seasonal Residents

Non-residents of the watershed may be divided into two groups based on domicile: Alaska residents (70 households) and non-residents of Alaska (51 households). The patterns of non-commercial salmon harvesting were consistent throughout Nushagak Bay. Alaska residents were permitted to harvest fish for personal use from July 1 until July 31 during commercial fishing periods and during any subsistence opening which might be called that month. In 1989 no emergency openings for subsistence were called in July. Therefore, during July, both Alaska

residents and non-residents were largely restricted to taking salmon from their commercial catch for home use within the waters of the commercial district.

Alaskans who had traditionally put up salmon for home use and who were ex-residents of the Nushagak watershed continued to employ similar strategies as the residents of the watershed during open commercial fishing periods. They would retain fish from the commercial catch, receive fish from relatives and friends who had drift operations, and scavenge the beach for fish which had fallen unnoticed on the beach, but which were still fresh. Some were able to join siblings or parents who were still domiciled in the Nushagak watershed and had their fishcamps within the Nushagak Commercial District. At Clark's Point, 14 of the 33 seasonal households reunited with year-round village households for the summer; seven of these were non-Nushagak domiciled households. Four separate extended families (three of which were not domiciled in the Nushagak watershed) returned to subsistence and commercial fish. They did not any longer have relatives living year-round in the village, but continued to cooperate as extended families in the processing of fish for home use and in the commercial operation. Two non-domiciled households put up fish independently of other households. The central households which processed salmon for home use divided up the salmon among an average of three households, and the largest number was divided among seven households.

The majority of non-residents at Clark's Point, Ekuk, and Nushagak Beaches reported very little retention of salmon from their commercial catches. Most reported taking salmon for immediate consumption and taking a few frozen fish with them when they returned home.

Nushagak Beach

Almost half (24 of 49) of the summer residents of Nushagak Beach in 1989 were from the contiguous United States. Twelve households were from the Nushagak watershed and the remainder (13) were domiciled in other places in Alaska. Three households received subsistence permits and fished for salmon during the subsistence emergency order period in June. This beach borders the northern boundary of the commercial district, so Alaska residents

who were not simultaneously assisting in operating a commercial net could use their personal use permits to set a net above the commercial district northern marker. Five households had them. Most of the households interviewed at Nushagak Beach (18) in 1989 do not eat fish on a daily basis. Estimates were that one to four salmon were consumed per household at fishcamp during the commercial season. However, most will take salmon home as part of their luggage.

PROCESSING SALMON

The timing of fishing for home use depends upon a combination of a number of factors, many of which are completely out of the individual's control. Traditional methods of harvesting fish for home use involve calculating the optimum combination of weather, tides, and fish migration. If salmon are migrating up through the district close enough to the beaches to be caught by a 10 fathom net, late May or early June is generally considered to be the best time to harvest them. Early June weather is generally the most favorable time for drying salmon since it is usually dry and somewhat breezy. The rainy season begins in late June. Flies start to show up. Flies are considered to be a real menace to drying salmon. While the salmon are hanging to dry, they cover the fish, lay their eggs in the flesh, and spoil it for human consumption. During early June steady winds throughout the district help dry the fish quickly and keep insects from congregating on them. However, the kings have been running later, so that it may no longer be possible to dry them during early June.

There are several ways of processing salmon for home use. Those who have electricity may simply freeze them whole. Those without electricity may opt for any or all of the following methods. Most of these involve first filleting the salmon or "splitting" it. The preparation of "strips" was the most popular way to prepare king salmon. The fish were first filleted and cut into thin strips. These were soaked in a brine, then tied together and hung on drying racks. When well-dried they were hung in the smokehouse to be smoked over a smoldering fire until the skins turned golden. Cottonwood was a favorite wood for smoking. Care was taken to make sure the salmon did not sour from too little heat, or cook, from too hot a fire. Women watched the smokehouse

throughout the day. If the outside temperature was too warm or the sun too strong the fire might not be stoked until evening. Smoking and drying time varied depending on the weather and taste preference. Coho salmon could also be prepared in the same way.

Some meat was left on the bones which were also hung to dry for dogfood. Often there was enough flesh on king fillets to dry a layer of thin fillets along with the strips and the bones. The heads of king salmon also have a lot of meat in them and were often split open and dried along with the rest.

King heads were also used to make the traditional delicacy known as "stinkheads" (*tepa*). Stinkheads were prepared by combining a variety of the internal organs of the salmon along with the heads in a bucket or basket and burying it or storing it in a dark place. The traditional way to prepare *tepa* was to bury the heads in the ground along with most of the fish guts in a wooden barrel covered with burlap. This was allowed to ferment for about a week, depending on weather conditions. Today plastic bags and buckets have added the danger of botulism to this traditional delicacy. Women stressed the importance of avoiding these modern conveniences because of the possibility of botulism developing.

Kings were also made into half-dried fish. In this method the fillets were scored across their width then partially dried and smoked. They were later eaten plain or boiled.

Smaller salmon such as sockeyes, chums, pinks, and cohos were commonly split so that the two sides remained connected to the tail. The meat was then scored across its width at one inch intervals and at a downward angle to the skin so that when it was hung on the drying rack the sections of flesh opened outward and dried more easily. Sockeyes and chums were also smoked or just dried. Dryfish was considered an important winter staple. It could be boiled or eaten with seal oil and was often served with *akutaq*.

Salting (*salunaq*) was another method for preparing both kings and coho salmon. King heads and tails were often prepared this way. The salmon was layered with salt in plastic buckets and stored until needed. It was prepared for eating by soaking in clear water for two to three days, and changing the water often.

DISCUSSION

From 1960 through 1987 subsistence fishing was only permitted within the Nushagak Commercial District during open commercial fishing periods. Issues regarding subsistence arose for those who live within the bay all year as well as those who live in the bay during the summer months. This section will further discuss the particular ways in which the present regulatory structure has been problematic for a significant number of residents of the Nushagak watershed and the steps which have been taken to mediate those problems.

Over the last few years two situations which affect subsistence salmon fishing have developed in the Nushagak district. The first is that commercial closures have lengthened during June due to a dramatic decline in the June run of king salmon. Until 1988 there were no subsistence openings to allow residents of the bay and commercial fishers opportunities to fish for kings prior to the commercial salmon season or after the season opened, during long closures. Since subsistence salmon fishing within the bay was supposed to occur only during open commercial fishing periods, long commercial closures made it difficult for year-round and seasonal bay residents to get salmon for home use. In order to catch king salmon before the commercial season, or during long closures, residents were supposed to catch them outside the commercial district.

Traveling outside the commercial district to harvest kings was hard for many households. First and foremost, one had to have the equipment to travel upriver. Then the weather had to be decent enough to travel by skiff or boat. The salmon had to be present, or the fisher had to wait for them. Finally, the gender of the fisher also influenced the ability of individuals to harvest salmon this way. Preserving food was generally taken to be a woman's role, and in the Nushagak watershed women also set out nets and harvested salmon. However, operating a skiff was generally taken to be a male occupation. Older women especially, and those without equipment, were less inclined to travel by skiff to set a net outside the commercial district. However, during the long closures in 1989, men sometimes went outside the district and harvested what was needed and brought it back to a female relative to do the processing. Before the commercial

fishing season, many men were busy preparing to go commercial fishing and during the commercial fishing season they were awaiting the next commercial opening. Thus, tension was created over whether to take the time to go fishing outside the boundaries of the commercial district and possibly miss the beginning of a commercial opening, or miss the June run of king salmon entirely.

The second factor which influences subsistence harvesting within the commercial district is that subsistence-only fishers and commercial fishers were in competition for sites when commercial fishing and subsistence fishing were designated to occur at the same time, during the open commercial fishing periods. During the commercial fishing season, all set net sites at Clark's Point were occupied and most of those at Ekuk were occupied with people waiting to fish commercially, or actually fishing. The quality of sites was quite variable. Some were covered by water only on the higher tides, for only a few hours each high tide. If a person had a muddy site, which was only reached by the highest tide, they had less opportunity to catch fish. They must work harder to coordinate fishing time with the salmon runs.

Families established rights of ownership through two means. In 1989 sites which were traditionally occupied by one family were perceived as "belonging" to that family by virtue of customary use. DNR shore fishery leases were another way to hold a site, if one had a limited entry set net permit. Although the sites were leased for the exclusive use of the permit holder during open commercial fishing periods when the fisher is present and fishing, the sites were supposed to be available for subsistence use before and after commercial fishing periods. However, setnetting at Clark's Point, Ekuk and Nushagak Beach involved setting up a pulley system for hauling the net on and off the beach. The system consisted of pulleys and lines in addition to the actual nets and anchors. Once an individual had set out their gear others were reluctant to ask to use the person's site. The site was perceived as occupied. The commercial fisher discouraged others from the use of the site and gear before commercial fishing, in anticipation of an opening. In 1989 subsistence fishers who did not possess limited entry permits were not eligible to apply for shore fishery leases. Therefore they were at a competitive

disadvantage in securing a place to set a net during open commercial periods as well as during closed periods.

Long commercial closures in June appeared to be hardest on women setnetters who relied on their set net for their year's income. Women without relatives who could bring home fish from a drift net operation had to rely on their harvest during open commercial periods for both income and subsistence salmon. Additionally, the most common pattern of organizing subsistence salmon production was to have the oldest woman in the family be responsible for processing, with the help of her children.

Yet, set nets generally harvest much less than drift operations. The 20 year average harvest for set nets in the Nushagak Commercial District is 15 percent of the commercial harvest (ADF&G 1989a:213). Set nets usually harvest only about 6 percent of the kings in the commercial harvest (Ibid:212). Setnetters generally earn much less than drift fishers (Peterson et al. 1984:113). Most set net permit holders from Manokotak, Clark's Point, and Ekuk in 1989 were women (Schichnes and Chythlook, 1988:35; Seitz, 1990a).

For commercial setnetters living in villages outside the commercial district, making the decision to harvest and dry salmon before commercial fishing began was a hard one. Kings have tended to run later in June, which meant taking the risk of being late to start commercial fishing if one stayed home to fish for them. There was not enough time to dry and smoke salmon before commercial fishing began unless the commercial fisher had someone else to do the harvesting and processing outside the commercial district while he or she got ready for commercial fishing. This solution effectively divided family labor, where it had once been unified in both production of salmon for home use and commercial fishing.

For those holding limited entry permits, one problem with getting fish for home use was that there was little time for processing fish during the commercial openings. In 1989 there were long periods of commercial fishing without a break, during the time when the weather was good. One of the ironies of taking fish home was pointed out by a local set net fisherman. When they catch a lot of fish he said, they might be inclined to take some home, except that by the time the net is

picked and the delivery is made (which could take a while if others had large catches) one has little time to put up fish in the traditional or any other way. Splitting fish takes time. On the other hand, if they do not catch much fish, less time is needed to pick the net and sell the catch, but one is much less inclined to keep salmon out of a meager harvest (Seitz 1990).

Another month characterized by long commercial closures is August. Historically there has been relatively little commercial activity in the Nushagak Commercial District during August, yet an opening for subsistence coho fishing was never called until 1989. Regulations in 1989 called for the provision of a subsistence opening any time the commercial district had been closed to commercial fishing for five days or more. In 1989 commercial fishing ended August 15 and the emergency order for subsistence went into effect August 28, allowing fishing for home use through September 30. According to residents of Clark's Point, this was after most of the run had passed the village.

CONCLUSION

The regulatory issue which was researched for this report is that of subsistence salmon fishing within the boundaries of the Nushagak Commercial District. The project found that a majority of those who participated in the 1989 commercial salmon set net fishery were domiciled in the Nushagak watershed. There are those who did not participate in the commercial salmon set net fishery and yet traditionally move their households to fishcamp within the Nushagak Commercial District for the summer to be with other family members.

A review of the literature showed that although Nushagak Bay was the site of traditional subsistence activity, the present regulatory structure made it more difficult for residents of the commercial district and those participating in the commercial fishery to harvest salmon for subsistence. The history of regulations regarding the Nushagak District demonstrated the focus management had historically on the commercial fishery, as well as pertinent enforcement issues. Increased competition in the industry perhaps contributed to the intolerance toward creating any opportunities in which subsistence "irregularities" might occur and thus supported the view that the

best option was to separate subsistence fishing areas from commercial fishing areas and allow subsistence fishing only during open commercial fishing periods.

In 1988 these tensions led to changes in the regulations which allowed managers to call emergency openings for subsistence within the Nushagak Commercial District after commercial closures of five days or more. The 1988 emergency openings were fairly conservative and offered only five 24 hour periods during which residents reported there were hardly any salmon to be caught.

In 1989 and 1990 the problems arising from long commercial closures were addressed to a significant degree by emergency openings which lasted from late May until the latter part of June. During these two openings year-round residents and seasonal residents of the Nushagak Commercial District had the opportunity to take advantage of king runs during June, when the weather is generally favorable for drying salmon. They were also able to harvest salmon in places more convenient for them and utilize family labor for subsistence while preparing for commercial fishing. Earlier openings in August would make it easier for watershed residents to also harvest coho salmon for home use.

In conclusion, in 1989 residents of the Nushagak watershed harvested more salmon for subsistence in the Nushagak Commercial District than in previous years. More permits were issued to harvest within the commercial district as well. This represents a shift in the use of fishing sites rather than a dramatic change in the total harvest for the Nushagak District. The total subsistence harvest for the Nushagak District was, in fact, below the 20 year average. Residents of the watershed were able to fish in locations which were more convenient for them as subsistence and commercial fishers. As a result of the long opening for subsistence in June residents were able to dry and smoke salmon before the commercial season began for the first time in many years.

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APPENDIX A. COMPUTATION OF TABLE 1.

Table 1 "Historic Allocation of Salmon to Subsistence and Commercial Harvest and Escapement" was created by adding together each year's estimated escapement and commercial catch for each species for the Nushagak District. The sport harvest was not included in the tabulations.

The total run calculated in this table does not agree with the sum of the total runs calculated for individual species in the 1987 and 1988 Annual Management Reports or the figures available for the 1989 season. In the Annual Management Reports the subsistence harvest was not included in those tables in which the total run was calculated. Those tables follow.

APPENDIX A 1

Source: ADF&G 1989a

Appendix Table 22. Inshore commercial catch and escapement of sockeye salmon in the Mushagak District by river system, in numbers of fish, Bristol Bay, 1969-88.

Year	Catch	Escapement					Total	Total Run
		Wood ¹	Igushik ¹	Muyakuk ¹	Mush/Mul ²	Snake ³		
1969	773,207	604,338	512,328	69,828	16,792	9,300	1,212,586	1,985,793
70	1,188,534	1,161,964	370,920	364,648	44,824	23,800	1,966,156	3,154,690
71	1,256,799	851,202	210,960	224,382	58,336	8,500	1,353,380	2,610,179
72	381,347	430,602	60,018	28,596	7,434	2,000	528,650	909,997
73	272,093	330,474	59,508	110,016	80,394	915	581,307	853,400
1974	510,571	1,708,836	358,752	154,614	30,000	15,266	2,267,468	2,778,039
75	645,902	1,270,116	241,086	669,918	82,400	9,518	2,273,038	2,918,940
76	1,265,422	817,008	186,120	425,220	45,200	12,728	1,486,276	2,751,698
77	619,025	561,828	95,970	232,554	320,400	9,304	1,220,056	1,839,081
78	3,137,166	2,267,238	536,154	576,666	87,400	18,074	3,485,532	6,622,698
1979	3,327,346	1,706,352	859,560	360,120	139,100	8,439	3,073,571	6,400,917
80	4,497,787	2,969,040	1,987,530	3,026,568	290,800	36,500	8,310,438	12,808,225
81	7,493,093	1,233,318	591,144	834,204	177,400	14,571	2,850,637	10,343,730
82	5,916,187	976,470	423,768	537,864	63,000	11,640	2,012,742	7,928,929
83	5,119,744	1,360,968	180,438	318,606	85,400	3,080	1,948,492	7,068,236
1984	1,992,681	1,002,792	184,872	472,596	120,586	33,840	1,814,686	3,807,367
85	1,307,889	939,000	212,454	429,162	69,300	34,880	1,684,796	2,992,685
86	2,757,730 ^a	818,652	307,728	821,898	168,340	16,780	2,133,398	4,891,128
87	3,252,902 ^a	1,337,172	169,236	163,000	225,033	1,520	1,895,961	5,148,863
88	1,708,039 ^a	866,778	170,454	319,992	163,208	4,320	1,524,752	3,232,791
20 Year Average	2,371,173	1,160,707	385,950	507,023	113,767	13,749	2,181,196	4,552,369
1969-78 Average	1,005,007	1,000,361	263,182	285,644	77,318	10,941	1,637,445	2,642,452
1979-88 Average	3,737,340	1,321,054	508,718	728,401	150,217	16,557	2,724,947	6,462,287

¹ Lower count.

² Lower counts 1969-70 and 1973-74, aerial survey estimates 1977-83, 1985, and 1987; sonar count 1984.

Lower not operated in 1971-72 and 1975-76; escapement estimates for these years and 1986 were based on the average ratio of Muyakuk/Mushagak-Mulchatna River system in those years when data was available.

³ Aerial survey estimate 1967-72, 1980 and 1982-86; weir count 1973-79 and 1981.

^a Preliminary.

Source: ADF&G 1989a

Appendix Table 39. Inshore commercial catch and escapement of chinook salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1969-88.^a

Year	Nushagak District			Togiak District		
	Catch	Escapement ¹	Total Run	Catch	Escapement	Total Run
1969	80,803	35,000	115,803	20,181	8,000	28,181
70	87,547	50,000	137,547	28,664	15,000	43,664
71	82,769	40,000	122,769	27,026	20,000	47,026
72	46,045	25,000	71,045	19,976	14,000	33,976
73	30,470	35,000	65,470	10,856	11,000	21,856
1974	32,053	70,000	102,053	10,798	15,000	25,798
75	21,454	70,000	91,454	7,226	11,000	18,226
76	60,684	100,000	160,684	29,744	14,000	43,744
77	85,074	65,000	150,074	35,218	20,000	55,218
78	118,548	130,000	248,548	57,000	40,000	97,000
1979	157,321	95,000	252,321	30,022	20,000	50,022
80	64,958	141,000	205,958	12,543	12,000	24,543
81	193,461	150,000	343,461	23,911	27,000	50,911
82	195,287	147,000	342,287	33,786	17,000	50,786
83	137,123	162,000	299,123	38,497	22,000	60,497
1984	61,378	81,000	142,378	22,179	26,000	48,179
85	67,783	116,000	183,783	37,106	14,000	51,106
86	63,859 ^b	43,000	106,859	19,895 ^b	8,000 ^c	27,895
87	47,592 ^b	84,000	131,592	17,618 ^b	11,000	28,618
88	16,501 ^b	57,000	73,501	15,615 ^b	10,000	25,615
20 Year Average	82,536	84,800	167,336	24,893	16,750	41,643
1969-78 Average	64,545	62,000	126,545	24,669	16,800	41,469
1979-88 Average	100,526	107,600	208,126	25,117	16,700	41,817

1 Escapements were estimated from the following:

1969-70 - comprehensive aerial surveys.

1971 - mean exploitation rates from 1966-70 and 1972-76.

1972-81 - comprehensive aerial surveys.

1982-85 - correlation between index counts and total escapement estimates when aerial surveys were complete.

1986-88 - sonar estimate.

a Escapement estimates supersede those previously reported and are rounded to the nearest thousand fish.

b Preliminary.

c Minimal estimate based on incomplete data.

(Sources: 1, 5 and 13)

Source: ADF&G 1989a

Appendix Table 40. Inshore commercial catch and escapement of chum salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1969-88.^a

Year	Nushagak District			Togiak District		
	Catch	Escapement ¹	Total Run	Catch	Escapement ²	Total Run
1969	214,235	130,000	344,235	66,389	85,000	151,389
70	435,033	273,000	708,033	100,711	241,000	341,711
71	360,015	226,000	586,015	123,847	229,000	352,847
72	310,126	195,000	505,126	178,885	170,000	348,885
73	336,331	200,000	536,331	195,431	163,000	358,431
1974	157,941	100,000	257,941	80,710	161,000	241,710
75	152,891	80,000	232,891	87,058	114,000	201,058
76	801,064	500,000	1,301,064	153,559	392,000	545,559
77	899,701	609,000	1,508,701	270,649	496,000	766,649
78	651,743	293,000	944,743	274,967	396,000	670,967
1979	440,279	166,000	606,279	219,942	293,000	512,942
80	681,930	969,000	1,650,930	299,682	415,000	714,682
81	795,143	177,000	972,143	229,886	331,000	560,886
82	434,817	256,000	690,817	151,000	86,000	237,000
83	725,060	164,000	889,060	322,691	165,000	487,691
1984	850,114	362,000	1,212,114	336,660	204,000	540,660
85	396,740	288,000	684,740	203,302	212,000	415,302
86	461,966 ^b	200,000	661,966	269,722 ^b	330,000	599,722
87	403,399 ^b	147,000	550,399	421,684 ^b	361,000	782,684
88	370,224 ^b	186,000	556,224	470,721 ^b	282,000	752,721
20 Year Average	493,938	276,050	699,989	222,875	256,300	435,613
1969-78 Average	431,908	260,600	629,553	153,221	244,700	361,746
1979-88 Average	555,967	291,500	770,425	292,529	267,900	509,481

1 Escapements were estimated from the following:

1970-72 - average catch/escapement ratio for 1968-69 and 1973-81;

1973-74 - tower enumeration and aerial survey data;

1975-78 - aerial survey data;

1979-86 - adjusted sonar estimate from Portage Creek site.

2 Escapement estimates based on aerial surveys; however, surveys were not conducted in 1986 due to budget constraints. Estimate based on catch/escapement proportion using most recent 10-year average data.

a Escapement estimates supersede those previously reported and are rounded to the nearest thousand fish.

b Preliminary.

(Sources: 1, 5 and 13)

APPENDIX A 4

Source: ADF&G 1989a

Appendix table 42. Inshore commercial catch and escapement of pink salmon in the Mushagak District, by river system, in numbers of fish, Bristol Bay, 1958-88.^a

Year	Catch	Escapement					Total Run
		Wood ¹	Igushik ²	Muyakuk ³	Mush/Mul. ⁴	Snake ⁵	
1958	1,113,794			4,000,000			5,113,794
60	289,781		146,359			146,359	436,140
62	880,424	25,000	12,000	493,914	6,100	6,000	1,423,438
64	1,497,817	1,560	450	883,500	25,000	50	2,408,377
66	2,337,066			1,442,424			3,779,490
1968	1,705,150			2,161,116			3,866,266
70	417,834			152,580			570,414
72	67,953			58,536			126,489
74	413,613	44,800	7,500	529,216	3,100	900	999,129
76	739,580	21,986	5,070	794,478	41,800	100	1,603,014
1978	4,348,336	205,000	16,210	8,390,184	771,600	3,483	13,734,813
80	2,202,545	31,150	3,500	2,626,746	123,000	800	4,987,741
82	1,339,272	36,100	8,430	1,592,096	19,130	900	2,995,928
84	3,127,153	81,400	6,190	2,760,312	73,050	5,500	6,053,605
86	280,623 ^b			72,189 ^c			352,812
1988	248,656 ^b			494,610 ^c			743,266
16 Year Average ⁶	1,313,100	55,875	7,419	1,662,391	132,848	2,217	3,074,670

1 Aerial survey estimate 1962 and 1974-84; tower count 1964.
 2 Aerial survey estimate 1962-80; aerial survey estimate and tower count 1976 and 1982-84.
 3 Tower count 1960-84; aerial survey estimate 1958, and below counting tower 1962-64 and 1974-84.
 4 Aerial survey estimate.
 5 Aerial survey estimate 1962-64, 1974-76 and 1980-84, and weir count 1978.
 6 Only years and systems with escapement data were included in averages.
 a Includes even-years only.
 b Preliminary.
 c Sonar estimate from Portage Creek; no tower count conducted; Mush/Mul. included in the estimate.

Source: ADF&G 1989a

Appendix Table 44. Inshore commercial catch and escapement of coho salmon in the Nushagak and Togiak Districts, in numbers of fish, Bristol Bay, 1980-88.^a

Year	Nushagak District			Togiak District		
	Catch	Escapement ¹	Total Run	Catch	Escapement	Total Run
1980	147,726	232,000	379,726	151,000	96,000 ^c	247,000
81	220,290	180,000 ^b	400,290	29,207	61,000 ^d	90,207
82	349,669	234,000	583,669	133,765	81,000 ^c	214,765
83	81,338	51,000	132,338	5,711	12,000 ^e	17,711
84	260,310	171,000	431,310	176,053	104,000 ^f	280,053
85	20,230	89,500	109,730	38,636	61,300 ^g	99,936
86 ^h	72,896	52,800	125,696	48,440	30,200 ^c	78,640
87 ^h	13,098	20,200	33,298	1,433	64,900 ⁱ	66,333
88 ^h	53,125	131,101	184,226	18,595	86,330 ^j	104,925
9 Year Average	135,409	116,160	238,028	66,982	66,303	119,957

- 1 Sonar enumeration has not always covered the complete season; in these cases a proportional method was used to estimate escapement after the sonar operation terminated.
- a Escapement estimates based on data collected from sonar enumeration and on aerial surveys of the spawning grounds; these escapement estimates supersede previously reported escapements.
- b Sonar enumeration precluded by lack of funding; escapement was estimated from mean exploitation rates from 1980 and 1982-84.
- c Includes Togiak and Kulukak River drainages.
- d Includes Togiak, Kulukak, Ungalikthluk/Kukayachagak and Nunavachak drainages.
- e Aerial escapement precluded by adverse weather and water conditions; estimate based on exploitation rate.
- f Togiak, Kulukak, Slug, Osviak and Matogak River drainages.
- g Togiak, Kulukak, Quigmy, Matogak, and Osviak drainages.
- h Catches are preliminary.
- i Estimate of Togiak River drainage derived from sonar enumeration (USFWS) in conjunction with aerial surveys of Kulukak, Osviak, Matogak, Quigmy, and Ungalikthluk drainages.
- j Togiak, Kulukak, Slug, Osviak, Matogak, Quigmy, Negukthlik, and Ungalikthluk.

(Sources: 1, 5 and 13)



APPENDIX B
Alaska Department of
**NATURAL
RESOURCES**

FACT SHEET
CONCERNING SHORE FISHERY (SETNET) LEASES

1. Q - Who can apply for a lease?

A - A U.S. citizen who is 10 or more years old and possesses a valid salmon (setnet) limited entry or interim use permit may apply for a lease.

2. Q - What areas are open to setnet leasing?

A - The areas presently open are located in Bristol Bay, Kodiak Island, Cook Inlet and the Eshamy Bay district in Prince William Sound as defined by Alaska Department of Fish and Game Commercial Finfish Regulations.

3. Q - Can I locate anywhere I wish in the above areas?

A - No. You must contact the Alaska Department of Fish and Game to find out which tide and submerged lands are open to setnet fishing on a permanent basis. Setnet leases will not be issued in areas that are opened on a temporary, irregular basis.

4. Q - Does the State have a list of setnet sites available for leasing?

A - No. A person must locate a site for himself.

5. Q - Do I have to have a shore fishery lease to setnet fish?

A - No. A lease is not required to setnet fish.

6. Q - How many setnet sites can I lease?

A - The maximum number of sites allowed one applicant is the maximum number of nets allowed by the Alaska Department of Fish and Game Commercial Finfish Regulations for the area in which fishing occurs, except for Cook Inlet, where the maximum is three sites.

7. Q - How long is a shore fishery lease valid?

A - A lease term is one to ten years. A lease term may be extended by a lease amendment.

8. Q - May I sublease my setnet site(s) to another individual?

A - No. No less than every other year the lessee must personally fish each site of each tract for at least four legal fishing periods during commercial fishing season. Failure to do so is grounds for lease termination.

9. Q - Can I put improvements on my shore fishery lease site?

A - Improvements on a leased site are limited to items directly related to the setnet operation, such as stakes, anchors, markers, etc. Installation of buildings or structures is not allowed, and use of the uplands above mean high tide is subject to authorization by the upland owner.

10. Q - Can I lease a setnet site for other than salmon fishing?

A - No. A shore fishery lease is issued only for the purpose of salmon shore fisheries development.

11. Q - What does the shore fishery lease give me?

A - A shore fishery lease gives the fisherman the exclusive use of state tidelands for a shore fishery site or sites when the fisherman is present and fishing. The lease does not permit the fisherman to use the tidelands for any enterprise other than salmon shore fishery.

12. Q - Do I have to apply separately for each setnet site?

A - No. When a fisherman has more than one setnet site and the sites are adjacent or within close proximity to each other, the fisherman may include all such sites in one application. These are referred to as tracts.

13. Q - When may I apply for a shore fishery lease?

A - A fisherman may stake a setnet site and file an application for a shore fishery lease annually between May 1 and September 1.

14. Q - Do I have to stake my site?

A - Yes. A fisherman must stake each site or tract before submitting an application by placing a stake at the net anchor point. The stake must be 3 feet above ground and support a sign showing the fisherman's name, mailing address, limited entry permit and date of staking.

15. Q - What right does staking a site give me?

A - It gives you the right to apply for a shore fishery lease and it posts notice that you have applied to lease the site. Staking a site does not give you any interest to fish that site to the exclusion of all others. Only after a lease has been issued can you exclude others from fishing your site when you are present. If you want to insure exclusive use of a site while awaiting the issuance of a lease, you must be the first to set a net on the site and fish it continuously during the commercial salmon fishing season.

16. Q - Can I apply for a lease in an area closed to setnetting?

A - No. The department will not accept or issue a lease in an area closed to commercial fishing by the Department of Fish and Game.

17. Q - If I am a minor under 18 years of age, may I apply for a shore fishery lease?

A - Yes, you may apply for a lease if you are at least 10 years old, a U.S. citizen and have a limited entry permit. The lease, however, will be issued to a trustee (such as your father, mother, uncle, etc.) until you reach the age of 18. At that time the lease will be transferred automatically to your name.

18. Q - Will I be required to survey my site?

A - Generally, there is no requirement to survey the site(s). However, under unusual circumstances such as severe erosion or neighbor/land owner conflicts, the director may require the fisherman to survey the site(s).

19. Q - Can I protest another fisherman's shore fishery lease application?

A - Yes. You may protest an application for or the location of a shore fishery lease site by mailing a statement of protest to the applicant and to the director and by following the instructions as outlined in paragraph .450 of the Shore Fishery Regulations. The protest may be filed from the time a site has been staked until the last date for filing a protest as determined and published in writing by the department.

20. Q.- Who owns the tidelands where I am setnetting?

A - Generally, all rights, title and interest in tide and submerged lands from mean high tide out to 3 miles seaward is held by the State of Alaska. However, a few individuals and businesses that had occupied and had made improvements to tidelands before statehood were allowed to apply for and acquire ownership of small tracts of tidelands.

21. Q.- My family and I have been fishing the same section of beach for 35 years. Does this give us "grandfather" rights to fish this beach to exclusion of all others?

A - Fishing a setnet site on State owned tide and submerged lands does not give a person exclusive use or any proprietary interest in the tidelands no matter how long he or his family have fished a site(s). Unleased public tidelands are open to commercial setnetting on an equal basis when commercial setnetting season opens. The first person to personally fish a site on the tidelands has the use of that site for the commercial salmon season as long as he fishes it continuously during all the openings allowed by Fish and Game. The length of time one has fished a certain site is important only to the extent that it is one of the major factors the director considers when determining who is most qualified to lease the site when two or more persons are competing for it.

22. Q.- If I acquire an unleased site from a family member or another setnetter who has fished it for 10 years can I claim his time when I apply to lease the site?

A - No, a person must personally fish a site in order to have the time spent fishing it apply towards the issuance of a lease for the site.

23. Q.- If I acquire a lease application from another person, does the application give me the exclusive right to fish the site while I'm waiting for the lease to be issued?

A - No, applying for a lease on a setnet site or acquiring a setnet lease application from another person gives the applicant or assignee no proprietary or exclusive interest in the site. A shore fishery application only provides a person an opportunity to acquire a shore fishery lease on a schedule determined by the date of application and submission of a completed shore fishery diagram. A person has no exclusive right to fish a setnet site until he or she receives a lease for that site.

24. Q.- Will the Division of Land and Water Management prepare a shore fishery diagram depicting the true location of the shore fishery site I fish from the USGS map, setnet site sketch and application?

A - No, the detailed information you submit with your applications is used to identify duplicate or conflicting applications and insures that the application is accurately recorded on the Division of Land's status plats. Upon acceptance of your lease application, the division will send you a shore fishery diagram preparation packet. You are responsible for completing and submitting a shore fishery diagram that accurately depicts the size and location of your sites within 90 days after you have received the shore fishery diagram preparation packet.

25. Q.- Can I amend the location of my setnet site after my lease has been issued?

A - Yes, a site amendment, which is subject to the same staking and public notice procedures as a new shore fishery lease application, may be submitted between May 1 and September 1 yearly. An amended site must be located within the current shore fishery diagram or within a reasonable distance from it as determined by the department. Amended site locations outside this area must be applied for as new leases.

26. Q.- Can I move my net within my lease area?

A - Yes, if your tract contains two or three net sites spaced farther apart than the minimum distance established by Commercial Finfish Regulations and you do not move your net closer to the sides of the tract than one half the minimum distance allowed between nets by these regulations. This area around the perimeter of a tract is called the "zone of protection" for a setnet site(s).

APPENDIX C. TABLES USED TO COMPOSE FIGURE 4

Table 15. Commercial salmon catch by period and species, Nushagak district, Bristol Bay, 1984.

Period	Time	Effort 1/		Number of Fish					Total
		Drift	Set	Sockeye	King	Chum	Pink	Coho	
5/22	24 hrs.				1				1
24	24 hrs.				12				12
25	24 hrs.				32				32
26	9 hrs.				32				32
28	15 hrs.				21				21
29	24 hrs.				501				501
30	24 hrs.				655				655
31	24 hrs.				207				207
6/ 1	24 hrs.				236	1			237
2	9 hrs.				201	1			202
4	15 hrs.	132			2,472	6			2,478
5	24 hrs.	170			4,062	4			4,066
6	24 hrs.	165		3	1,510	9			1,522
7	24 hrs.	230		2	4,097	35			4,134
8	24 hrs.	342		17	3,386	61			3,464
9	9 hrs.	24		2	547	14			563
12-13	24 hrs.	550		384	12,461	689			13,534
23 2/	12 hrs.	220	41	26,972	918	3,942			31,832
25	12 hrs.	350	227	211,338	12,040	106,828	3		330,209
26 2/	14 hrs.	300	68	67,447	2,190	33,928			103,565
27 3/	23 hrs.	400		214,453	2,005	104,536	1		320,995
7/ 1	12 hrs.	400		302,580	2,623	123,685	15		428,903
4- 5	12 hrs.	434	259	288,578	1,795	67,649	1		358,023
7	12 hrs.	330	180	254,889	1,064	42,822	9		298,784
9 4/	15 hrs.	332	184	208,040	1,101	37,394	57	5	246,597
10 4/	24 hrs.			118,425	597	24,182	194	1	143,399
11 4/	24 hrs.	185	137	95,227	630	21,228	360	5	117,450
12 4/	24 hrs.			77,420	367	16,812	536	31	95,166
13 4/	24 hrs.	142	13	83,804	336	14,934	1,272	21	100,367
14 4/	24 hrs.	127		72,139	369	15,025	1,591	174	89,298
15 4/	24 hrs.	144		43,728	444	9,664	4,123	283	58,242
16 4/	24 hrs.	142		34,454	1,173	17,966	13,000	1,760	68,353
17 5/	24 hrs.	126		20,966	1,061	10,686	11,520	2,612	46,845
18	24 hrs.	163		11,786	392	5,970	24,467	1,890	44,505
19	24 hrs.	136		5,295	138	4,544	25,861	5,452	41,290
20	24 hrs.	130		6,583	133	2,679	34,887	5,715	49,997
21	9 hrs.			2,533	36	467	16,099	1,042	20,177
23	15 hrs.	371		2,559	203	3,975	178,982	13,500	199,219
24	24 hrs.	395		4,297	187	2,776	283,032	10,702	300,994
25	24 hrs.	379		2,719	269	2,015	316,939	10,601	332,543

(continued)

APPENDIX C. TABLES USED TO COMPOSE FIGURE 4

Table 15. (continued)

Period	Time	Effort 1/		Number of Fish					
		Drift	Set	Sockeye	King	Chum	Pink	Coho	Total
7/26	24 hrs.	364		1,443	107	1,232	265,926	5,211	273,919
27	24 hrs.	361		891	102	905	282,671	6,128	290,697
28	24 hrs.	273		1,511	136	1,530	311,552	24,945	339,674
29	24 hrs.	325		1,116	48	175	157,238	35,361	193,938
30	24 hrs.	387		1,864	46	488	293,657	19,146	315,201
31	24 hrs.	450		785	16	496	214,103	35,900	251,300
8/ 1	24 hrs.	468		110	39	91	208,867	10,803	219,910
2	24 hrs.	454		109	29	108	184,449	12,681	197,376
3	24 hrs.	490		64	41	61	163,995	4,681	168,842
4	9 hrs.			36	5	16	23,700	666	24,423
6	15 hrs.	315		31	20	44	60,218	22,365	82,678
7	24 hrs.	445		30	20	123	57,851	26,268	84,292
8	9 hrs.			13	4	43	16,709	5,186	21,955
23	15 hrs.	67	29	11		1	152	1,112	1,276
24	24 hrs.	5		2	1	2	147	3,318	3,470
25	24 hrs.	11		3			31	1,322	1,356
26	24 hrs.	29				3	30	666	699
27	24 hrs.	54		3			72	274	349
28	24 hrs.	12					2	26	28
29	24 hrs.	15			1		2	185	188
30	24 hrs.	25		3	5			437	445
31	24 hrs.	1						35	35
9/ 1	9 hrs.	1		2				56	58
4	24 hrs.	1						60	60
5	24 hrs.	7						347	347
6	24 hrs.	4						131	131
7	24 hrs.	11						376	376
Total				2,164,667	61,124	679,845	3,154,339	271,570	6,331,545
Percent of District Catch				34.2	1.0	10.7	49.8	4.3	100.0

- 1/ Estimated fishing effort based on aerial surveys and on reliable CPUE data from selected processors; beginning July 14 drift effort totals includes some set nets.
- 2/ Igushik section only.
- 3/ Igushik section 12 midnight to 11 a.m., entire district 11 a.m. to 11 p.m.
- 4/ Mushagak section only.
- 5/ Mushagak section only 12 midnight to 9 a.m., entire district 9 a.m. to 12 midnight.

APPENDIX C. TABLES USED TO COMPOSE FIGURE 4

Table 16. Commercial salmon catch by period and species, Nushagak district, Bristol Bay, 1985.

Period	Time	Effort 1/		Number of Fish					Total
		Drift	Set	Sockeye	King	Chum	Pink	Coho	
5/28	24 hrs.				27				27
29	24 hrs.								0
30	24 hrs.				174	1			175
31	24 hrs.				227				227
6/ 1	9 hrs.				236				236
3	15 hrs.				871				871
4	24 hrs.			1	1,501	4			1,506
5	24 hrs.				957	1			958
6	24 hrs.				342	1			343
7	24 hrs.				1,475	25			1,500
8	9 hrs.			1	4,144	22			4,167
14	12 hrs.	255	18	162	5,744	435			6,341
20	12 hrs.	165	79	4,105	5,497	4,314			13,916
30 2/3/	12 hrs.	179	234	277,550	23,863	77,681			379,096
7/ 2 2/3/	12 hrs.	182	233	206,626	5,173	38,406			250,205
4-5 2/3/	12 hrs.			149,684	5,561	25,503	1		180,749
6-7 3/	12 hrs.	194	193	379,023	5,862	34,369			419,254
8-9 3/	12 hrs.	217	247	107,445	1,378	20,008			128,831
10 3/4/	17 hrs.		57	19,970	330	2,784			22,084
11 3/4/	24 hrs.		58	5,707	131	66			5,904
12 3/4/	24 hrs.		58	7,700	200				7,900
13 4/5/	24 hrs.		58	15,407	182	1			15,590
14 4/	24 hrs.			15,318	152	403			15,873
15 4/6/	24 hrs.	35		33,798	841	5,954	2	23	40,620
16	24 hrs.			33,762	880	12,094	3	70	46,809
17	24 hrs.			23,074	567	8,900	5	107	32,653
18	24 hrs.			14,384	247	5,283	2	75	19,991
19	24 hrs.			10,361	130	3,855	2	260	14,618
20	9 hrs.			2,868	34	510		413	3,825
22	15 hrs.			6,389	141	3,157	9	515	10,211
23	24 hrs.			3,360	65	1,594	3	385	5,407
24	24 hrs.			2,530	69	1,101	7	1,152	4,959
25	24 hrs.			2,384	110	1,265	3	2,498	6,250
26	24 hrs.			1,396	183	2,035	4	3,461	7,079
27	9 hrs.			473	21	233	4	510	1,241
29	18 hrs.			533	94	531	2	1,227	2,387
30	18 hrs.			381	212	2,202	7	9,587	12,389
Total				1,323,492	67,623	252,748	54	20,285	1,664,202
Percent of District Catch				79.5	4.1	15.2	+	1.2	100.0

- 1/ Estimated fishing effort based on aerial surveys.
- 2/ Large mesh king salmon gill net gear prohibited.
- 3/ Only set net gear allowed in the Igushik section.
- 4/ Igushik section only; Nushagak section remains closed.
- 5/ Drift net gear allowed effective 7:00 p.m.
- 6/ Nushagak section open 11:00 a.m. to 11:00 p.m., Igushik section open continuously through 9:00 a.m. July 20.

Table 16. Commercial salmon catch by period and species, Nushagak District, Bristol Bay, 1986.

Period	Time	Effort 1/		Number of Fish					Total
		Drift	Set	Sockeye	King	Chum	Pink	Coho	
5/27	24 hrs.				6				6
28	24 hrs.				7				7
29	24 hrs.				63				63
30	24 hrs.				181				181
31	9 hrs.				139				139
6/ 2	15 hrs.	50			903				903
3	24 hrs.	119			1,824	1			1,825
4	24 hrs.	79			1,082				1,082
5	24 hrs.	56			305	1			306
6	24 hrs.	113			654	2			656
7	9 hrs.			2	3,240				3,242
12	12 hrs.	258	10	35	21,077	124			21,236
19	12 hrs.	279	124	3,765	6,569	9,047			19,381
30-7/1 2/	12 hrs.	380	253	208,305	14,214	201,425			423,944
3 2/	12 hrs.	353	221	693,779	9,236	108,276	1		811,292
7/ 9 3/	20 hrs.	212	66	91,008	189	3,500	1		94,698
10 3/	24 hrs.	145	66	63,692	177	3,412			67,281
11 4/	24 hrs.	237		492,965	1,528	34,641	8	1	529,143
12	24 hrs.	251		339,736	319	24,601	24	1	364,681
13	24 hrs.	255		210,209	208	14,680	974	146	226,217
14	24 hrs.	260		163,414	198	9,554	403	46	173,615
15	24 hrs.	299		122,991	146	8,410	1,247	185	132,979
16	24 hrs.			77,403	137	7,006	2,839	238	87,623
17	24 hrs.			52,242	56	4,781	3,147	296	60,522
18	24 hrs.			67,695	92	7,145	6,259	223	81,414
19	24 hrs.			59,176	86	6,558	8,501	339	74,660
20	24 hrs.			41,395	142	8,517	12,960	1,538	64,552
21	24 hrs.			27,661	170	2,205	11,615	902	42,553
22	24 hrs.			10,610	138	1,679	9,419	2,742	24,588
23	24 hrs.			5,055	97	604	6,959	1,528	14,243

(continued)

Table 16. (continued)

Period	Time	Effort 1/		Number of Fish					
		Drift	Set	Sockeye	King	Chum	Pink	Coho	Total
7/24	24 hrs.			5,662	45	702	11,831	1,604	19,844
25	24 hrs.			7,539	53	1,213	22,764	1,443	33,012
26	9 hrs.			2,077	14	221	7,309	143	9,764
28	15 hrs.			3,814	188	1,216	44,395	8,051	57,664
29	24 hrs.			2,912	97	866	47,033	6,954	57,862
30	24 hrs.			2,044	117	555	38,819	16,463	57,998
31	24 hrs.			1,088	111	598	21,860	13,283	36,940
8/ 1	9 hrs.			568	34	117	5,901	4,119	10,739
4	15 hrs.			500	7	87	10,987	2,878	14,459
5	9 hrs.			388	10	222	5,367	9,773	15,760
Total				2,757,730	63,859	461,966	280,623	72,896	3,637,074
Percent of District Catch				75.8	1.8	12.7	7.7	2.0	100.0

- 1/ Estimated fishing effort based on aerial survey counts and daily registration summaries.
- 2/ Large mesh king salmon gill net gear prohibited.
- 3/ Igushik section only; Nushagak section remains closed.
- 4/ Nushagak section open 4:00 a.m. through 12:00 midnight, Igushik section open the entire 24 hour period.

Table 17. Commercial salmon catch by period and species, in number of fish, Nushagak District, Bristol Bay, 1987.

Period	Time	Effort ¹		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
6/ 1	15 hrs.	81	-	0	2,233	1	0	0	2,234
6/ 2	24 hrs.	114	-	3	2,957	7	0	0	2,967
6/ 3	24 hrs.	29	-	1	56	1	0	0	58
6/ 4	9 hrs.	6	-	0	7	0	0	0	7
6/25	12 hrs.	258	-	195,606	19,054	54,744	0	0	269,404
6/30	6 hrs.	428	257	305,329	529	27,172	0	0	333,030
7/ 1a	24 hrs.	117	51	77,602	916	6,627	0	0	85,145
7/ 2	12 hrs.	350	247	299,456	2,062	28,023	0	0	329,541
7/ 3	12 hrs.	392	243	161,955	1,068	22,237	1	0	185,261
7/ 6	6 hrs.	453	242	10,643	27	152	0	0	10,822
7/ 7	12 hrs.	400	289	455,314	855	34,128	0	1	490,298
7/ 8	12.5 hrs.	-	-	454,006	4,178	48,042	1	0	506,227
7/ 9	24 hrs.	-	-	249,416	2,725	31,456	0	0	283,597
7/10b	24 hrs.	-	-	161,842	981	25,311	0	0	188,134
7/11	24 hrs.	238	210	112,946	658	15,017	0	0	128,621
7/12c	15 hrs.	-	-	278,034	1,143	38,650	0	1	317,828
7/13b	24 hrs.	-	-	160,299	2,446	23,211	0	1	185,957
7/14b	24 hrs.	-	-	48,766	1,075	8,227	0	1	58,069
7/15b	24 hrs.	-	-	109,330	1,997	10,042	0	0	121,369
7/16b	24 hrs.	-	-	60,693	682	6,854	1	20	68,250
7/17b	24 hrs.	-	-	31,083	350	3,290	0	5	34,728
7/18b	9 hrs.	-	-	6,534	132	398	0	0	7,064
7/20	15 hrs.	-	-	32,545	442	5,848	0	66	38,901
7/21	24 hrs.	-	-	15,601	149	2,807	1	23	18,581
7/22	24 hrs.	-	-	9,766	216	1,447	0	59	11,488
7/23	24 hrs.	-	-	5,879	102	866	0	8	6,855
7/24	24 hrs.	-	-	5,323	210	965	0	340	6,838
7/25	24 hrs.	-	-	2,370	90	229	1	297	2,987
7/27	15 hrs.	-	-	927	37	1,110	0	155	2,229
7/28	9 hrs.	-	-	1,011	39	558	0	63	1,671

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Table 17. (Page 2 of 2)

Period	Time	Effort ¹		Number of Fish					
		Drift	Set	Sockeye	Chinook	Chum	Pink	Coho	Total
7/30	15 hrs.	-	-	202	48	3,740	0	461	4,451
7/31	9 hrs.	-	-	386	56	1,672	0	439	2,553
8/ 3	15 hrs.	-	-	23	43	284	0	6,302	6,652
8/ 4	9 hrs.	-	-	11	29	283	0	4,856	5,179
Total				3,252,902	47,592	403,399	5	13,098	3,716,996
Percent of District Catch				87.5	1.3	10.8	+	.4	100.0

1 Estimated fishing effort based on aerial survey count.

a Igushik Section only.

b Nushagak Section only.

c Nushagak District until 1:00 p.m. and Nushagak Section only from 1:00 p.m. until midnight.

APPENDIX C. TABLES USED TO COMPOSE FIGURE 4

Table 18. Commercial salmon catch by period and species, in numbers of fish, Nushagak District, Bristol Bay, 1988.^a

Period	Time	Effort ¹		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
6/26	6 hrs.	300	164	100,306	3,037	57,167	1	0	160,511
6/28	12 hrs.	335	262	180,503	5,197	76,543	3	0	262,246
7/02	7 hrs.			490,426	449	80,622	1	0	571,498
7/03	6 hrs.	382	259	219,001	1,754	29,696	5	0	250,456
7/11	6 hrs.	420	258	209,185	1,139	31,574	11	0	241,909
7/12	24 hrs.	347		162,609	1,567	27,721	125	0	192,022
7/13	24 hrs.	299		92,887	929	18,902	160	5	112,883
7/14	24 hrs.	291		74,496	421	12,603	267	4	87,791
7/15	14 hrs.	299		60,611	494	8,836	362	33	70,336
7/16	9 hrs.	292		30,608	168	1,926	1,053	23	33,778
7/17	9 hrs.	279		32,792	234	5,158	1,095	33	39,312
7/18	15 hrs.			21,971	183	3,439	4,824	194	30,611
7/19	24 hrs.			13,112	155	5,203	5,308	374	24,152
7/20	24 hrs.			5,325	153	1,625	6,316	270	13,689
7/21	24 hrs.			5,442	134	2,499	9,680	1,117	18,872
7/22	24 hrs.			2,560	102	1,316	12,942	476	17,396
7/23	9 hrs.			2,291	82	516	12,394	329	15,612
7/25	15 hrs.			1,637	126	2,732	26,844	8,253	39,592
7/26	24 hrs.			785	72	980	33,734	3,099	38,670
7/27	24 hrs.			553	18	365	11,422	968	13,326
7/28	9 hrs.			374	28	284	23,742	744	25,172
8/02	9 hrs.			173	21	100	29,110	7,860	37,264
8/03	24 hrs.			168	11	107	13,292	1,642	15,220
8/04	9 hrs.			102	7	173	30,671	789	31,742
8/09	15 hrs.			62	10	78	15,752	8,728	24,630
8/10	24 hrs.			60	10	48	8,064	15,905	24,087
8/11	9 hrs.			0	0	10	1,478	2,279	3,767
Total	423 hrs.			1,708,039	16,501	370,223	248,656	53,125	2,396,544
Percent of District Catch				71.3	0.7	15.4	10.4	2.2	100.0

1 Estimated fishing effort based on aerial survey count or district registration.
a Includes fish landed in district test fish project.

APPENDIX C. TABLES USED TO COMPOSE FIGURE 4

Table 18. Commercial salmon catch by period and species,
in numbers of fish, Nushagak District, Bristol Bay, 1989.

Date	Time		Effort ⁱ		Chinook	Chum	Pink	Coho	Total
	Hrs.	Drift	Set	Sockeye					
6/22 ^a	12	1		15	2	3	0	0	20
23 ^a	12	1		162	7	41	0	0	210
24 ^a	12	1		265	4	13	0	0	282
25 ^a	12	1		180	4	71	0	0	255
26 ^b	4.5	66	253	8,996	8	482	0	0	9,486
27	7.5			84,341	826	23,137	2	0	108,306
28 ^c				2,397		951	0	0	3,348
29	12	117	266	313,044	3,164	42,119	0	0	358,327
30 ^c				37,181	149	6,868	0	0	44,198
7/ 1	12	97	192	276,204	1,876	24,051	0	0	302,131
2 ^d				70,030	334	8,281	0	0	78,645
3	12			370,080	2,024	33,295	0	0	405,399
4	24			237,716	2,784	34,029	0	0	274,529
5	24			286,900	2,353	37,937	1	0	327,191
6	24			205,491	501	22,706	1	0	228,699
7	24			116,200	266	13,517	0	0	129,983
8	24			38,369	152	4,923	0	0	43,444
9	24			82,566	296	17,599	2	0	100,463
10	24			146,406	524	36,587	2	0	183,519
11	24			154,676	608	26,876	0	4	182,164
12	24			117,311	376	19,441	0	0	137,128
13	24			85,510	253	16,991	4	18	102,776
14	24			61,623	287	11,987	2	77	73,976
15	24			24,655	59	5,379	0	0	30,093
16	24			32,810	68	9,656	2	250	42,786
17	24			32,639	260	9,342	1	887	43,129
18	24			25,241	186	10,033	3	830	36,293
19	24			15,798	129	5,884	2	1,182	22,995
20	24			9,747	79	4,186	91	1,523	15,626
21	24			7,107	101	3,606	1	2,403	13,218
22	9			1,758	9	246	0	185	2,198
24	15			4,173	73	8,687	0	12,997	25,930
25	24			5,920	75	5,416	0	15,414	26,825
26	9			812	11	435	0	806	2,064

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APPENDIX C. TABLES USED TO COMPOSE FIGURE 4

Table 18. (page 2 of 2)

Date	Hrs.	Effort ¹		Sockeye	Chinook	Chum	Pink	Coho	Total
		Drift	Set						
31	15			187	15	500	0	8,140	8,842
8/ 1	24			224	14	708	31	17,265	18,242
2	9			140	6	151	0	3,736	4,033
14	15			3		8	4	3,996	4,011
15	24			80	4	12	2	7,296	7,394
16	9			31		1	0	64	96
Total				2,856,988	17,887	446,155	151	77,073	3,398,254
% of District Catch				84	1	13	0	2	100

¹ Estimated fishing effort based on aerial surveys.

^a ADF&G test fishing catches.

^b ADF&G test boat catch and early deliveries from the commercial opening.

^c ADF&G test boat catch and late deliveries from first opening.

^d Late deliveries from 7/1 fishing period.

