Alaska Habitat Management Guide

Southwest Region
Volume II:
Human Use of Fish and Wildlife

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Introduction

Human Use of Fish and Wildlife

In this volume, the types of human use of fish, wildlife, and selected plants in the region are discussed, as well as the managerial problems pertinent to each use. In addition, the characteristics of current human use are described and compared with historical uses. Although the majority of human uses in the Southwest Region are related to commercial, sport, or subsistence harvest, nonconsumptive use (wildlife viewing) is also discussed in cases such as the Walrus Islands State Game Sanctuary, where the available information allows this type of use to be determined. The small amount of reported nonconsumptive use in the region, however, reflects a lack of data more than a lack of use.

The managerial objectives and problems within each management area or subregion are addressed, because these factors strongly influence harvest levels and effort directly through the regulatory process and indirectly by affecting the species' population or availability for such uses as harvest and viewing.

The human use information presented in this guide is comprised of two sections: 1) maps of human use and 2) narratives of human use. The mapped information, which appears in the Southwest Region Map Atlas volume, is portrayed at 1:1,000,000 scale and can be used as an index for the more detailed reference maps. The original reference maps for this information were prepared at a scale of 1:250,000, and copies are filed in ADF&G offices of the region. The index maps (1:1,000,000) show the regional and subregional patterns of human use, whereas the reference maps illustrate specific use areas in relation to more detailed features on the landscape.

For each type of human use, characteristics such as the location of the use, species utilized, effort, harvest (where applicable), and seasonal participation are identified. In the case of commercial and sport harvest, regulations are the major factor influencing the opportunity to harvest. In the case of subsistence, or community use, opportunity is restricted by seasonal availability of the resource and by several of the department's regulations. Factors influencing human use are discussed extensively in narratives for each use, and the locations of each use are presented in mapped form.

Comparisons between current and historical use patterns for all types of use are important in order to understand the factors that influence use characteristics, the effects of historical use, and the history of management decisions that may have resulted in current management objectives and harvest characteristics. The department's wildlife management goals and objectives are identified in appendix C.

The human use maps and narratives are based on the most current available information. Area biologists and species experts should therefore be consulted for the most recent information, since this may change over time.

Commercial Fishing

Pacific Halibut Human Use

I. MANAGEMENT HISTORY

The International Pacific Halibut Commission (IPHC), originally called the International Fisheries Commission, was established in 1923 by a convention between Canada and the United States (IPHC 1978). The halibut commission has jurisdiction over the Canadian and United States halibut fisheries (both sport and commercial) but has no jurisdiction over foreign fisheries and cannot regulate domestic or foreign trawl fisheries to reduce the incidental catch of halibut (Skud 1976, IPHC 1978). The halibut commission does have the authority to monitor catch and effort, establish open and closed seasons, limit the size and quantity of fish taken, regulate the retention of the incidental catch of halibut in other fisheries, restrict gear type, and close halibut nursery areas to halibut fishing (ibid.).

Prior to 1977, restrictions on foreign fishing for halibut were achieved through separate agreements between the United States and the foreign nations involved. Since the passage in 1977 of the Magnuson Fishery Conservation and Management Act, halibut has been an unallocated species that must be avoided by United States and foreign groundfish fleets within the 200-mi fishery conservation zone (NPFMC 1983a). The NPFMC has included in their Gulf of Alaska and Bering Sea/Aleutians groundfish management plans time-area closures designed to minimize the incidental catch of halibut and to allow halibut grounds to remain undisturbed for a short time before the beginning of the halibut season (ibid.). Foreign groundfish trawling in the Gulf of Alaska is also restricted to pelagic trawls during late winter and early spring by the NPFMC, in order to minimize the incidental catch of halibut.

The minimum size for commercially caught halibut is 32 inches (with head on), and halibut can be taken only with hook and line gear. Sportfishing for halibut is permitted from March 1 to October 31, with a bag limit of two halibut of any size per day (IPHC 1983).

A. Management Objectives

The management goal of the IPHC is to maintain the stocks of halibut at levels that produce the maximum sustainable yield (IPHC 1978). Until recently, however, stock abundance has been low, and the commission's efforts are directed toward rebuilding the resource (Skud 1976).

The NPFMC's objectives for halibut management (NPFMC 1983) are to

1. ensure survival of the North Pacific halibut resource;
2. distribute the halibut fishery in time and place to ensure the harvest of the available surplus of all components of the halibut population over all areas of the North Pacific Ocean, including the Bering Sea;
3. continue to limit the harvesting of halibut to hook and line as the best means of utilizing and maintaining the resource at its highest sustained level of abundance;

4. retain the IPHC as the primary managerial authority over the coastwide range of the halibut population;
5. provide high quality fresh, frozen, or preserved halibut to the consumer throughout the year; and
6. strive to reduce incidental halibut mortality caused by gear that is not legal for a directed halibut fishery.

II. MANAGEMENT CONSIDERATIONS

United States fishermen began halibut fishing in the Bering Sea in 1928, but development of the fishery was slow, with annual catches from the 1930's to mid 1950's ranging from 0 to 52 metric tons (Bakkala et al. 1976). To encourage fishing in the Bering Sea, the fishing season was opened one month earlier than in the Gulf of Alaska, beginning in 1958 (ibid.) The catch increased, reaching nearly 4,400 metric tons in 1962, divided about equally between United States and Canadian vessels (ibid.). Japan entered the fishery in 1963, and in the same year the INPFC established a catch limit of 5,000 metric tons, greatly in excess of the maximum sustained yield of 2,268 metric tons calculated by the IPHC (Best 1981). The total catch in 1963 was close to 5,000 metric tons, but in following years the catch declined sharply. Japan withdrew from the fishery after 1964. Despite time and area regulations imposed on the fishery, catches continued to decline, mainly because of large incidental catches of halibut in the foreign trawl fisheries and a reduction in the number of young halibut (IPHC 1978). Catches in the Bering Sea now are roughly 450 metric tons (1 million pounds) annually (McCaugharan 1981).

Regulations intended to reduce the incidental catch of halibut have apparently stopped the downward trend in halibut abundance, but catches in the North Pacific remain small: 10,400 to 11,800 metric tons during 1979-1981 (Natural Resources Consultants 1982). The incidental catch, though reduced, is still high. In 1981, the IPHC reported that incidental catches had risen nearly 50% between 1978 and 1980. In 1980, the estimated total incidental catch was 20.4 million pounds, compared to the commercial catch of 21.8 million pounds. The incidental catch of halibut is composed principally of prerecruit fish (less than eight years of age), therefore eliminating their spawning potential and reducing the size of future halibut year classes (McCaugharan 1981). The IPHC estimates that 35% of prerecruit halibut are lost to incidental catch (ibid.).

Since the 1970's, more and more small boats have joined the halibut fleet. The size of the Alaska fleet increased 36% from 1977 to 1981 (Anonymous 1983a). A majority of the newly participating vessels has come from the salmon fleet, now under a limited entry program (Natural Resources Consultants 1982). As a result of the growth in the fleet, fishing pressure on halibut stocks has increased, and quotas of halibut are caught in increasingly short periods of time (Anonymous 1983a, McCaughran 1983). In March 1983, the NPFMC approved a plan for a three-year moratorium on the halibut fishery that would have limited the United States halibut fleet to only those fishermen who made legal halibut landings during any season from 1978 to 1982 (Anonymous 1983b). The plan, however, was not approved by the federal Office of Management and Budget and so was dropped for the 1983 season (Anonymous 1983c). In

December 1983 the NPFMC voted to discontinue efforts to impose a moratorium. The NPFMC will, however, pursue consideration of other management alternatives for the fishery (NPFMC 1983b).

A local halibut fishery is currently being developed by residents of the Pribilof and Nelson islands (NPFMC 1984, Cullenberg 1984). The villagers from these communities do not have access to any viable commercial fishery other than halibut (NPFMC 1984), and the sale of halibut contributes money to the cash-poor economics of the areas (Cullenberg 1984). Despite efforts by the NPFMC to discourage participation by nonlocals in this fishery, large boats from outside the area still harvest a large part of the quota from IPHC Regulatory Area 4C, which includes the Pribilofs and Nelson Island (NPFMC 1984), Anonymous 1983d).

III. PERIOD OF USE

The halibut fishery in the Gulf of Alaska takes place in the summer months. In the 1960's, the commercial season was about six months long but has become shorter and shorter. The season is now limited to three approximately seven-day-long openings, which take place between May and September. In 1983, all areas of the Bering Sea were closed at the end of August because catch quotas had already been reached or exceeded (McCaughran 1983).

A. Significance of Particular Fishing Areas

The majority (70 to 75%) of the annual commercial catch of the North American halibut fishery comes from the Gulf of Alaska (Morris et al. in press). Halibut are fished throughout the gulf, with the highest production coming from the Kodiak Island area (table 1) (ibid.). Sportfishing for halibut also takes place in the Kodiak and Alaska Peninsula areas.

Traditional commercial halibut fishing grounds in the Bering Sea are along the 200 m shelf edge and north of Unimak and Unalaska islands (Bakkala et al. 1976).

The Pribilof fisheries mainly take place within 12 mi of each village community (NPFMC 1984).

B. Harvest Method

Commercial fishing for halibut is restricted to hook and line gear. Most halibut are taken with longline gear.

Because their villages do not have harbor facilities, fishermen from the Pribilof Islands use small boats (less than five net ton) that can be hauled ashore at the end of each fishing trip.

These fishermen have traditionally caught halibut by jigging, with the line dropped straight down from a wooden spool (Cullenberg 1984). Longline gear, however, is now being used. Villagers from St. George and St. Paul are planning to use hand and power gurdies to haul in long-line gear from larger (29 to 32 ft boats) in 1984.

C. Projected Increase in Demand

Halibut abundance appears to be increasing, and the yield available to the fishery should increase during the 1980's (IPHC 1982). This increase in stock size, however, will not fully benefit the halibut fishermen in the Bering Sea and Gulf of Alaska unless the incidental catch of halibut in other fisheries continues to be reduced.

The number of boats in the halibut fleet is currently so high, 3,073 boats in 1981 (Anonymous 1983a), that the profit made by any one boat during the halibut season must be relatively small. The future size and economic outlook for the halibut fleet rests largely on the nature and success of methods to be used by NPFMC to reduce effort in this fishery.

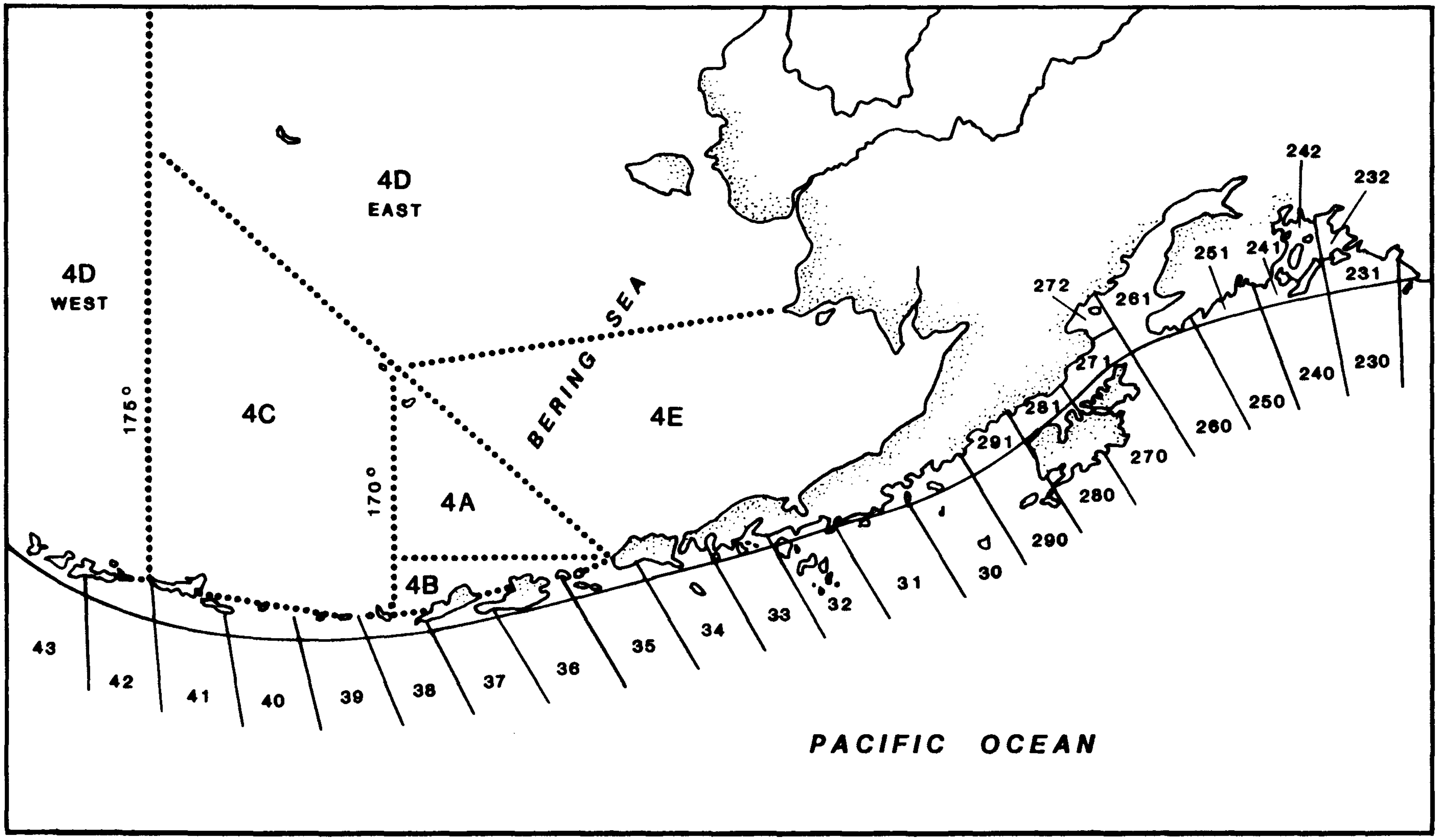
In 1984, approximately 40 fishermen from St. George Island and 40 from St. Paul Island are expected to participate in the small-boat fisheries (NPFMC 1984). The potential for expansion of these fisheries will be largely influenced by the success of the NPFMC's efforts to discourage participation by large, nonlocal boats.

Table 1. Pacific Halibut Commercial Catch from the Southwest Area in Metric Tons Dressed Weight

Stat. Area	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
270	750	322	277	401	299	359	213	202	493	735
271	241	100	177	148	75	30	16	17	51	29
272	15	---	6	17	26	46	14	---	18	---
27 total	1,006	422	460	566	402	436	243	218	562	764
280	440	221	189	248	241	515	273	133	276	499
281	344	110	138	267	171	57	46	27	38	55
28 total	784	331	326	515	414	571	319	160	314	554
290	298	164	155	215	216	146	106	9	87	590
291	535	159	260	307	300	44	11	13	64	341
29 total	833	323	415	521	514	190	117	36	151	931
30	513	150	253	297	220	117	16	8	---	396
31	396	162	245	152	136	139	18	11	23	224
32	280	87	137	185	254	121	19	---	25	527
33	112	14	98	33	263	22	5	---	5	91
34	41	21	12	49	60	11	0+	---	---	8
35	34	1	2	13	14	1	0+	---	1	152
36	17	31	15	16	8	2	1	---	1	187
37	18	6	12	8	19	0+	---	---	---	56
38	15	37	15	---	21	---	---	---	---	64
39	---	---	0+	---	1	---	---	2	12	---
40	---	---	---	---	---	---	0+	---	---	---
41	---	0+	---	---	5	6	40	19	29	---
42+	21	47	2	50	176	306	148	120	68	---
4A	3	1	1	15	9	20	1	7	21	7
4B	68	81	121	86	122	94	57	74	209	68
4C	---	1	20	20	58	34	93	43	121	106
4DE	---	---	---	---	2	128	14	0+	2	3
4DW	59	116	96	114	117	22	268	59	76	3
4E	---	---	---	3	---	---	---	---	---	---
Total	4,200	1,831	2,232	2,645	2,813	2,220	1,359	841	1,620	4,141

Sources: Myhre et al. 1977, IPHC ann. repts. 1978-82, and computer printouts from IPHC.

Note: Statistical areas are illustrated in map 1. Values for total area (2-digit numbers) catches have been more extensively edited and revised by IPHC than subarea (3-digit number) catches. Thus, in some cases, catch by subareas may not exactly correspond to, and is not as accurate as, the respective total area catch.



Map 1. Approximate location of IPHC statistical areas in the central and western Gulf of Alaska and Bering Sea (redrawn from Myhre et al. 1977 and IPHC unpubl.).

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Groundfish Human Use

I. MANAGEMENT HISTORY

A. State or Other Agency Jurisdiction

The Magnuson Fishery Conservation and Management Act, implemented in 1977 and amended in 1980, provides for the conservation and exclusive United States management of all fishery resources within the U.S. Fishery Conservation Zone (3 to 200 nautical miles from shore).

As a result of this act, management plans for the marine fisheries of Alaska within the Fishery Conservation Zone are developed by the North Pacific Fishery Management Council (NPFMC). These plans are submitted to the U.S. secretary of commerce for review and implementation (Frank Orth & Associates, 1980?). The Fishery Conservation and Management Act gives preference to domestic fishermen; however, when domestic fishermen are unable to harvest the entire allowable catch, foreign fleets may harvest the remainder.

Foreign catch allocations are awarded by the assistant administrator for fisheries of the National Marine Fisheries Services (NMFS), following recommendations of the NPFMC, the U.S. Coast Guard, and the general public, and after consultation with the U.S. Department of State and the U.S. Coast Guard (USDC 1982).

Management of fisheries in state waters (0 to 3 nautical miles from shore) is the responsibility of the State of Alaska. The NPFMC works closely with the state to avoid disrupting ongoing fisheries (Frank Orth & Associates, 1980?).

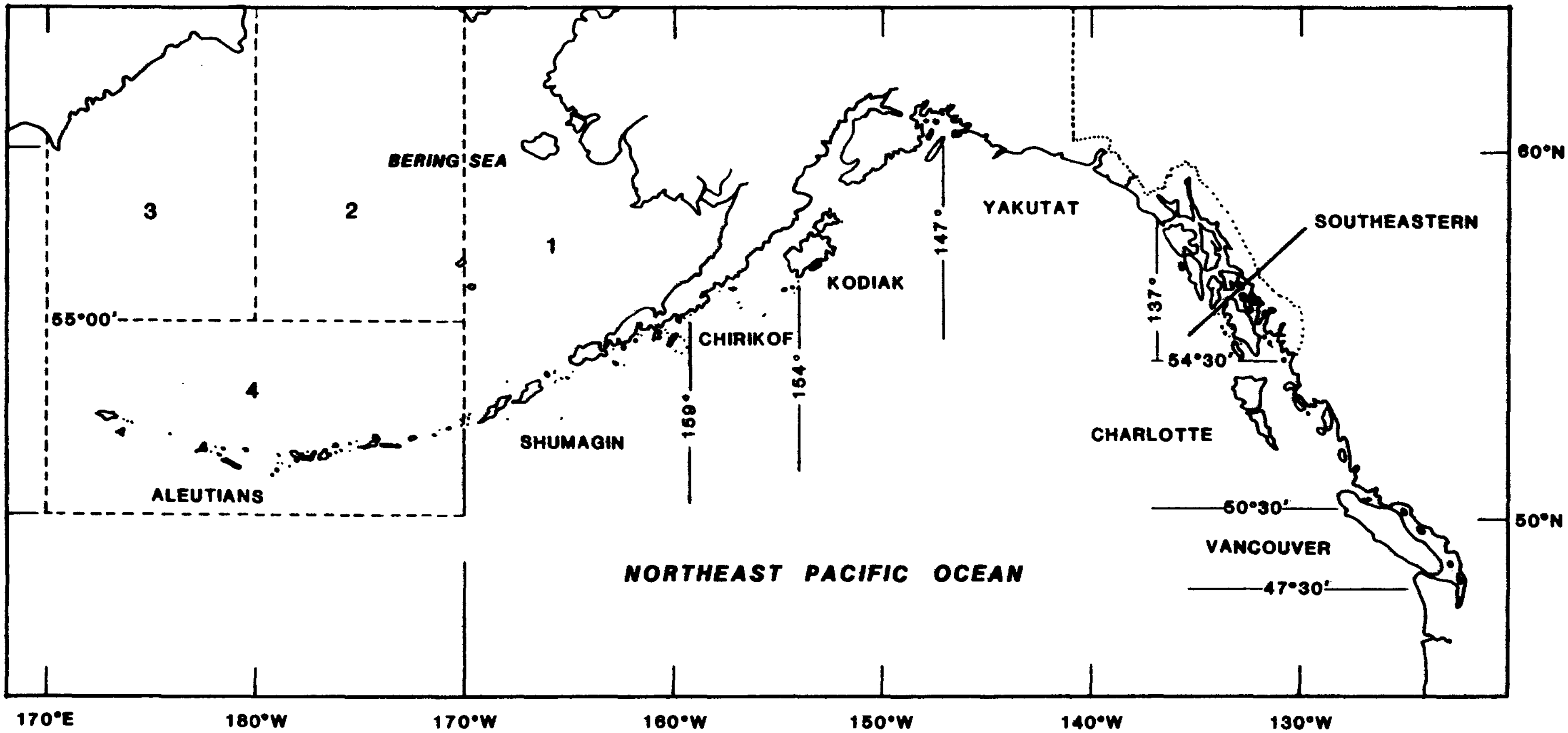
Catch allocations and harvest values for groundfish are reported by large areas in the Gulf of Alaska and Bering Sea (map 2).

B. Management Objectives

The objectives of NPFMC's groundfish management plans for the Gulf of Alaska and for the Bering Sea/Aleutian Islands area are as follows:

1. To provide for the rational and optimal biological and socioeconomic use of the resource;
2. to protect halibut;
3. to provide for the orderly development of domestic groundfisheries consistent with 1 and 2 at the expense of foreign participation;
4. to provide for foreign fisheries consistent with 1, 2, and 3, and,
5. in the Gulf of Alaska, for sablefish only, to manage the entire gulf to benefit the domestic fishery (NPFMC 1983a and 1983b).

The Gulf of Alaska plan covers all foreign and domestic fisheries for all finfish except salmon, steelhead, halibut, herring, and tuna. The Bering Sea/Aleutian Islands plan covers all foreign and domestic fisheries for all finfish and marine invertebrates except



Map 2. Statistical areas for groundfish in the Gulf of Alaska and Bering Sea. For some management purposes, Gulf of Alaska areas have also been designated as Western (Shumagin), Central (Chirikof and Kodiak), and Eastern (Yakutat and Southeastern) areas.

salmonids, shrimps, scallops, snails, king crabs, Tanner crabs, Dungeness crabs, corals, surf clams, horsehair crabs, lyre crabs, Pacific halibut, and Pacific herring.

State of Alaska program goals for groundfish management as stated in the Westward Region's 1984 budget request are 1) to promote orderly development of the domestic groundfish fishery while protecting other marine resources and 2) to develop biological information to improve management and promote recovery of badly depleted groundfish resources (ADF&G 1983).

II. MANAGEMENT CONSIDERATIONS

Groundfish exploitation in the Gulf of Alaska and Bering Sea has long been dominated by foreign fishing vessels. In the postwar era, Japan in 1954 and the USSR in 1959 began extensive Bering Sea fisheries, targeting on yellowfin sole. This resource was apparently overharvested, as stocks declined drastically in the early 1960's (Morris 1981). Following the decline of yellowfin sole, Japan and the USSR turned to walleye pollock as their target species in the Bering Sea (ibid.). In the Gulf of Alaska, first the USSR in 1962 and then Japan in 1963 began large-scale fisheries targeting on Pacific ocean perch. By 1965, perch stocks had begun to decline, probably as a result of overfishing. As these stocks declined, fishing effort in the Gulf of Alaska expanded to include pollock, sablefish, flounders, and Atka mackerel (OCS Socioeconomic Studies 1980).

Domestic groundfish fisheries have never been conducted on the same scale as foreign ventures, though cod and sablefish have historically been harvested by United States fleets in Alaskan waters. Since the passage of the Magnuson Fishery Conservation act in 1977, however, domestic interest in the groundfish industry has increased. Joint-venture fisheries, which involve American trawlers delivering groundfish catches to foreign processing vessels, have been the fastest-growing domestic groundfish strategy to date (National Resources Consultants 1982).

Management of groundfish is complicated by the fact that no one species can be managed independently of others occurring with it. Interception of nontarget species by fisheries directed towards other species may be unavoidable and may have a significant effect on the nontarget species population. A strong example of this is the incidental catch of juvenile halibut in the foreign groundfish trawl fishery. Most of the regulatory measures pertaining to foreign groundfish fisheries in the eastern Bering Sea and Aleutians and in the Gulf of Alaska were implemented in an effort to prevent large incidental catches of halibut stocks as well as to prevent gear conflicts between foreign mobile gear (trawls) and domestic fixed gear (crab pots and halibut set lines) (NPFMC 1978, 1979).

III. REPORTED ANNUAL USE AND HARVEST DATA

The magnitude of the foreign groundfish catch as compared to the domestic catch can be seen in tables 2-11. Changes in catch levels since 1978 may be the result of quotas imposed by the NPFMC rather than the result of recent fluctuations in groundfish biomass.

IV. PROJECTED INCREASE IN DEMAND

After passage of the Magnuson Fishery Conservation and Management Act, prospects for the development of a strong domestic groundfish industry received a great deal of attention (Natural Resources Consultants 1982). Growth of this industry, however, has not occurred as rapidly as was hoped. A rapid rise in energy costs combined with inflation and high interest rates invalidated the assumptions upon which growth forecasts had been based (ibid.). In today's market, salmon and crab processors are generally not in a financial position to make significant commitments to the development of a groundfish industry. United States laws and trade policies are structured in such a way as to maximize the cost of vessel construction, and of fishing gear and equipment purchased abroad, while imposing low duties on imported white fish products (ibid.). This allows easy access for foreigners to the United States white fish markets and makes it more difficult for domestic fishermen to compete in the industry.

In the Gulf of Alaska, the only significant joint-venture activity has been in Shelikof Strait, where spawning pollock have been harvested (ADF&G 1982). In the Bering Sea and Aleutian area, joint ventures have targeted on yellowfin sole, pollock, cod, and Atka mackerel (Natural Resources Consultants 1982, ADF&G 1982). Two recent events, however, will negatively influence the growth of the joint-venture fisheries: 1) the deteriorating diplomatic relationship with the USSR and Poland (both joint-venture participants) and 2) the poor outlook for king and Tanner crab fisheries in the Bering Sea (Natural Resources Consultants 1982).

The decline in the crab fisheries has caused a large number of crabber/trawlers to compete for a limited number of joint-venture opportunities. This competition has led to lower prices being paid by foreign buyers (ibid.).

Currently, some efforts are being made to encourage domestic processing of groundfish. A salt cod plant was built in the Aleutian Islands at Akutan (ibid.). This plant was destroyed in a fire in 1983 but is now being rebuilt (Anonymous 1983). The Alaska Fisheries Development Foundation is sponsoring a "Pollock Industry Development Program" aimed at developing a domestic pollock processing industry (Knowlton 1983).

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Pacific Cod Human Use

I. MANAGEMENT HISTORY

Pacific cod in the Fishery Conservation Zone (3 to 200 nautical miles from shore) are managed as one of a number of groundfish species under the Gulf of Alaska and Bering Sea/Aleutians groundfish management plans. A general history of groundfish management can be found in the Groundfish Human Use section of this report.

After passage of the Magnuson Fishery Conservation and Management Act, the area east of 157°W and landward of the 500 m isobath was closed to foreign setline (including longline) fishing to prevent taking of juvenile sablefish (NPFMC 1978). This restriction was significant to foreign cod harvest, as most Pacific cod in the Gulf of Alaska are taken by longline gear. In 1979, the Gulf of Alaska Groundfish Management Plan was amended to allow a directed Pacific cod longline fishery between 140 and 157°W beyond 12 mi from shore, except as prohibited within the 400 m isobath during halibut season (NPFMC 1983a).

A. Management Objectives

See Groundfish Human Use.

II. MANAGEMENT CONSIDERATIONS

A United States fishery for Pacific cod began in Alaskan waters in 1864 and continued to the 1950's. Fishing areas of this early fishery were on three cod banks located along the north side of the Alaska Peninsula at depths of about 25 to 100 m (Bakkala 1981).

A Japanese mothership fleet operated in the Bering Sea from 1933 to 1941, targeting on pollock and yellowfin sole. Cod were probably taken as a by-catch in these fisheries (ibid.). The Japanese resumed fishing in 1954, followed by the USSR, Republic of Korea, Taiwan, Poland, and the Republic of Germany. The main emphasis of all these fleets since the 1960's has been on pollock. Pacific cod have not been a target species of foreign trawl fisheries in the eastern Bering Sea, except when concentrations are encountered during fishing operations for other species (ibid.). They are, however, a target species of the Japanese longline fishery (Bakkala et al. 1983).

Foreign exploitation of cod in the Gulf of Alaska began with Japan and the USSR in the 1960's, and they were in later years joined by Poland, Korea, and Mexico (Zenger and Cummings 1982). The catch of cod from the Gulf of Alaska is small compared to the numbers taken from the Bering Sea, but it has increased in importance in recent years (Natural Resources Consultants 1981). Japan increased its longline effort in the gulf in 1979, targeting on cod, sablefish, and Greenland turbot (ibid.). There has also been a tendency in recent years for trawlers in the Gulf of Alaska to target on cod (ibid.).

United States domestic trawl fishery and joint-venture fisheries between the United States and the Republic of Korea, and the United States and USSR, began in 1980 in the Bering Sea and Aleutian Islands area (Bakkala et al. 1983, Natural Resources Consultants 1982). Since

1979, joint-ventures have also been taking cod in the Chirikof and Kodiak areas of the Gulf of Alaska (tables 2 and 3) (Zenger and Cummings 1982).

Cod stocks in the Bering Sea and Gulf of Alaska are currently at high levels (NPFMC 1983a, Bakkala et al. 1983). The population in the Bering Sea/Aleutians area is at a high point in its natural abundance cycle as a consequence of a very strong 1977 year class (Bakkala et al. 1983). The abundance of this year class is expected to decline from natural causes in the next few years, and the size of the whole population will decline with it (ibid.). Because of this, optimum yields are now set well above the calculated maximum sustainable yield in order to take advantage of the surplus population before it is lost to natural mortality (NPFMC 1983b, Bakkala et al. 1983).

III. PERIOD OF USE

Harvest of cod takes place year-round, though no Japanese mothership trawl fishery has taken place in the Bering Sea in winter since 1977 (Teshima 1983).

A. Significance of Particular Harvest Areas

During winter and spring, productive cod fishing areas are located near Albatross Bank south of Kodiak Island and near Sanak Island west of the Shumigan Islands. Large trawl catches of cod have also been taken in deeper portions of bays along the Alaska Peninsula and around Kodiak Island (Morris et al. in press).

In the Bering Sea, highest catches of cod generally occur along the shelf edge in waters extending from near Unimak Pass to about 60°N (Bakkala 1981).

B. Harvest Method

Cod are taken by trawling and by longlines. Longline vessels accounted for approximately 90% of the total Japanese cod catch in the Gulf of Alaska from 1979 to 1981 (Zenger and Cummings 1982). Most of the cod catch in the Bering Sea is taken by trawlers.

C. Projected Increase in Demand

The expansion of foreign cod fisheries is hampered by the need to avoid taking prohibited species in the catch. Domestic cod fisheries in the western gulf have dramatically expanded in recent years, but further expansion of the domestic cod industry is tied to international market demand. Atlantic cod catches have been low, causing European nations to buy Pacific cod. Most of the cod produced in the western gulf is sent to Norway (Natural Resources Consultants 1982). Development of markets within the United States for domestically produced cod will be important to the expansion of the cod industry. The success of the United States cod fishery will also be greater if the pollock caught along with the cod can be profitably utilized (Natural Resources Consultants 1981).

Table 2. Pacific Cod Foreign (F), Domestic (D), and Joint-Venture (JV) Catch in the Western Gulf of Alaska INPFC Areas in Metric Tons (Round Weight)

	Kodiak			Chirikof			Shumagin		
Year	F	D	JV	F	D	JV	F	D	JV
1977	855	140	--- [a]	437	16	---	410	53	---
1978	983	443	---	3,624	167	---	4,817	64	---
1979	2,540	606	683	6,258	267	18	3,969	---	8
1980	5,227	415	230	18,354	49	223	8,620	71	13
1981	2,359	676	---	18,970	86	58	11,314	265	Tr[b]
1982	3,668	1,869	5	14,168	26	167	7,031	292	21

Sources: Foreign catch 1977-79 are foreign reports from data on file, Northwest and Alaska Fisheries Center, Seattle; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 from Rigby 1984; 1978-82 from ADF&G Commercial fisheries catch-reporting system 1983.
Joint-venture catch 1979 from Rigby 1984; 1980-82 are best-blend reports from French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a --- indicates no catch.

b Tr: Trace less than 0.5 metric tons.

Table 3. Pacific Cod Foreign (F), Domestic (D), and Joint-Venture (JV) Catch in the Bering Sea/Aleutian INPFC Areas in Metric Tons (Round Weight)

Year	Aleutians			Bering Sea I			Bering Sea II		
	F	D	JV	F	D	JV	F	D	JV
1977	3,262	Tr [a]	--- [b]	14,817	---	---	18,503	---	---
1978	3,279	4	---	18,530	31	---	24,008	---	---
1979	5,407	2	---	19,264	585	---	16,740	---	---
1980	2,927	---	86	19,033	5,606	8,333	15,359	---	26
1981	2,915	5,249	1,749	27,564	8,888	7,410	8,634	---	---
1982	1,995	5,213	4,280	19,216	19,585	9,312	6,963	---	Tr [a]

Sources: Foreign catch 1977-78 are foreign reports from data on file, Northwest and Alaska Fisheries Center, Seattle; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 and 1980 from Rigby 1984; 1978-79 and 1981-82 from ADF&G commercial fisheries catch-reporting system 1983.
Joint-venture catch 1980-82 are best-blend reports from French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a Tr: Trace less than 0.5 metric tons.

b --- indicates no catch.

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Pacific Ocean Perch Human Use

I. MANAGEMENT HISTORY

Pacific ocean perch in the Fishery Conservation Zone (3 to 200 nautical miles from shore) are managed as one of a number of groundfish species under the Gulf of Alaska and Bering Sea/Aleutians groundfish management plans. General groundfish management history can be found in the Groundfish Human Use section of this report.

Because of drastic declines in stock abundance, optimum yield for Pacific ocean perch in the Gulf of Alaska and Bering Sea is currently held at a very low level. More details of catch quotas can be found in the section on abundance in this account.

A. Management Objectives

See Groundfish Human Use.

II. MANAGEMENT CONSIDERATIONS

Japanese and Soviet fisheries for Pacific ocean perch in the Bering Sea, Aleutian, and Gulf of Alaska areas began in the early 1960's (Morin and Dunn 1976, Shippen and Stark 1982). Highest total catch in the eastern Bering Sea was 47,000 metric tons in 1961 (Morin and Dunn 1976) and in the Aleutian region 109,000 metric tons in 1965 (Ito 1983). Japan's catch in the Gulf of Alaska peaked in 1966 at 65,988 metric tons. Catches in all regions have declined since the 1960's, and few directed fisheries for perch now take place (ibid).

Domestic Pacific ocean perch catches are minimal (tables 4 and 5) and are usually reported together with other species of rockfish on fish ticket statistics. Small catches of perch appear in the United States joint-venture fisheries (12.3 metric tons in the central Gulf of Alaska in 1980) (French et al. 1981) but are incidental to the larger pollock joint-venture catch.

Catch per unit effort (CPUE) data from the Bering Sea and trawl surveys conducted in the Gulf of Alaska in 1961 before the beginning of intensive foreign fishing and again in 1973-1976 document the decline in abundance of Pacific ocean perch during this time (Shippen and Stark 1982, Ronholt et al. 1976, Ito 1983). Perch stocks in the central gulf may now be no higher than 5% of their virgin abundance (Ito 1982) and are also very low in the Bering Sea/Aleutians area (Ito 1983). Management measures are now directed at holding the catch of Pacific ocean perch at a low level to allow the stocks to recover from the earlier period of overfishing.

III. PERIOD OF USE

Fishing periods in the Bering Sea are restricted by weather patterns and movements of the fish. Bad weather north of 57°N in the Bering Sea restricts fishing in that area from November to May (Major and Shippen 1970). During winter and spring, the mature Pacific ocean perch move to deeper water, so the duration of the fishing season depends on the willingness of the fleets to pursue the fish into deeper water and upon the economic feasibility of such fishing (ibid.).

Most of the Pacific ocean perch catch in the Gulf of Alaska takes place in the summer and fall (June and November) (Shippen and Stark 1982). This seasonal fishing pattern is probably influenced by NPFMC trawl restrictions in effect earlier in the year to protect the United States halibut fishery (ibid.).

A. Significance of Particular Fishing Areas

Harvest of Pacific ocean perch in the Gulf of Alaska and Aleutian region takes place along the 200 m depth contour. Perch catches in the Bering Sea are made mainly west of 165°W, along the shelf edge (Morris 1981).

B. Harvest Method

Perch are harvested by means of bottom trawls (Major and Shippen 1970).

C. Projected Increase in Demand

Pacific ocean perch stocks are at a very low level. Because of the slow growth rate of Pacific ocean perch and the repeated failure of year classes, it may be several years before the stock can recover enough to support an increased level of harvest (Shippen and Stark 1982).

Table 4. Pacific Ocean Perch Foreign (F), Domestic (D), and Joint-venture (JV) Catch in the Western Gulf of Alaska INPFC Areas in Metric Tons (Round Weight)

	Kodiak			Chirikof			Shumagin		
Year	F	D	JV	F	D	JV	F	D	JV
1977	4,977	--- [a]	---	2,531	---	---	2,125	---	---
1978	1,003	---	---	416	[d]	---	3,876	---	---
1979	2,112	[b]	22	259	Tr [e]	5	945	---	1
1980	3,333	100 [b]	8	657	---	12	842	---	---
1981	1,898	[c]	---	2,370	---	---	1,235	---	1
1982	2,725	9 [c]	---	3,500	---	3	1,746	---	---

Sources: Foreign catch 1977-79 are foreign reports from data on file, Northwest and Alaska Fisheries Center, Seattle; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 from ADF&G 1982a and 1982b; 1978-82 from ADF&G commercial fisheries catch-reporting system 1983.
Joint-venture catch 1979 from Rigby 1984; 1980-82 are best-blend reports from French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a --- indicates no catch.

b Catches for 1979 and 1980 combined to maintain confidentiality.

c Catches for 1981 and 1982 combined to maintain confidentiality.

d Catches for 1978 and 1979 combined to maintain confidentiality.

e Tr: Trace less than 0.5 metric tons.

Table 5. Pacific Ocean Perch Foreign (F), Domestic (D), and Joint-Venture (JV) Catch in the Bering Sea/Aleutian INPFC Areas in Metric Tons (Round Weight)

	Aleutians			Bering Sea I			Bering Sea II		
Year	F	D	JV	F	D	JV	F	D	JV
1977	5,900	--- [a]	---	6,600 [b]	---	---	[b]	---	---
1978	5,300	---	---	2,200 [b]	---	---	[b]	---	---
1979	5,487	---	---	950	---	---	768	---	---
1980	4,010	---	Tr [c]	441	---	52	466	---	Tr
1981	3,668	---	---	703	---	1	481	---	---
1982	1,739	---	2	314	9	27	305	---	---

Sources: Foreign catch 1977-78 are foreign reports from Ito 1983; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 from ADF&G 1982b; 1978-82 from ADF&G commercial fisheries catch-reporting system 1983.
Joint-venture catch 1980-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a --- indicates no catch.

b Foreign catches from Bering Sea Areas I and II are combined for 1977 and 1978.

c Tr: Trace less than 0.5 metric tons.

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Sablefish Human Use

I. MANAGEMENT HISTORY

Sablefish in the Fishery Conservation Zone (3 to 200 nautical miles from shore) are managed as one of a number of groundfish species under the Gulf of Alaska and Bering Sea/Aleutians groundfish fishery management plans (Povolny 1983). A general history of groundfish management can be found in the Groundfish Human Use section of this report.

Evidence of declining sablefish stock abundance has led to significant fisheries restrictions since 1977 (Balsiger 1982). Regulations affecting Gulf of Alaska and Bering Sea/Aleutians sablefish fisheries consist of maximum catch quotas derived from estimates of equilibrium yield (Balsiger 1982, Narita 1983). More information on catch quotas can be found in the Abundance section of this account. The directed foreign fishery for sablefish in the Gulf of Alaska is limited by regulations to longline gear (Balsiger 1982).

A. Management Objectives

See Groundfish Human Use.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

Sablefish have been harvested by United States fisheries since the early part of this century. Catches in the early fishery, however, were relatively small, with peaks occurring during the war years (1917 and 1942) (Heiser 1967, Balsiger 1982, Bracken 1983). Early Fishing effort in Alaska was generally confined to the Southeast Region (Bracken 1983).

The foreign fishery for sablefish began with Japanese longliners in the eastern Bering Sea in 1958 (Narita 1983). The Japanese catch peaked at 28,521 metric tons in 1962 (ibid.). The USSR entered the fishery in 1967. As fishing grounds used by longliners in the eastern Bering Sea became preempted by expanding trawl fisheries, new longlining areas were established in the Aleutian region (ibid.). Catches in the Aleutians peaked at 3,576 metric tons in 1972 (ibid.).

Catches in the eastern Bering Sea have declined since 1962, with a low catch of 1,139 metric tons in 1978 (table 6). Catches in the Aleutian region have also declined; the 1981 catch of 377 metric tons was the lowest since 1966 (ibid.).

Japanese longliners began sablefish operations in the Gulf of Alaska in 1963, and catches rapidly increased until the record all-nation catch from the northeast Pacific reached 68,072 metric tons in 1972 (Balsiger 1982). The northeast Pacific total catch averaged about 50,800 metric tons from 1973 until catch quotas were imposed in 1977 (ibid.).

In 1982, domestic longline fishery for sablefish in the westward region was very small (table 7), with only one or two landings made (Blackburn, pers. comm.). This is, however, a developing fishery. In 1983, the domestic sablefish effort expanded to over a dozen vessels, landing about 227 metric tons (about 22 landings) of sablefish in the westward region (Blackburn, pers. comm.). Sablefish are also taken incidentally in the domestic trawl fishery for cod (Blackburn, pers. comm.).

Table 6. Sablefish Foreign (F), Domestic (D), and Joint-venture (JV) Catch in the Bering Sea/Aleutian INPFC Areas in Metric Tons (Round Weight)

	Aleutians			Bering Sea I			Bering Sea II		
Year	F	D	JV	F	D	JV	F	D	JV
1977	1,717	1	---	2,109 [b]	2	---	[b]	---	---
1978	821	[a]	---	1,139 [b]	---	---	[b]	---	---
1979	782	---	---	1,026	---	---	350	---	---
1980	267	---	4	1,600	[c]	35	571	---	---
1981	377	---	156	1,918	4 [c]	24	659	---	---
1982	809	[d]	118	1,748	177 [d]	6	1,282	---	---

Sources: Foreign catch 1977-78 are foreign reports from Narita 1983; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1978-1982 from ADF&G commercial fisheries catch-reporting system 1983, 1977 from Rigby 1984, ADF&G 1982b.
Joint-venture catch 1980-82 are best-blend reports from French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a --- indicates no catch.

b Foreign catches for Bering Sea Regions I and II are combined for 1977 and 1978.

c 1980 and 1981 catches combined to maintain confidentiality.

d 1982 domestic catch from Aleutians and Bering Sea Region I combined to maintain confidentiality.

Table 7. Sablefish Foreign (F), Domestic (D), and Joint-venture (JV) Catch in the Western Gulf of Alaska INPFC Areas in Metric Tons (Round Weight)

	Kodiak			Chirikof			Shumagin		
Year	F	D	JV	F	D	JV	F	D	JV
1977	3,588	--- [a]	---	1,548	---	---	1,864	Tr	---
1978	2,254	1	---	1,028	---	---	1,611	---	---
1979	2,051	54	18	1,109	---	---	999	---	Tr [c]
1980	1,641	25	13	1,355	[b]	7	1,450	1	---
1981	1,776	12	---	1,646	---	Tr [c]	1,567	---	---
1982	1,516	52	---	1,374	3 [b]	1	1,489	---	Tr [c]

Sources: Foreign catch 1977-79 are foreign reports from data on file, Northwest and Alaska Fisheries Center, Seattle; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 from ADF&G 1982a and 1982b; 1978-82 from ADF&G commercial fisheries catch-reporting system 1983.
Joint-venture catch 1979 from Rigby 1984; 1980-82 are best-blend reports from French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a Domestic catch for Kodiak INPFC area in 1977 does not include catches from outside the ADF&G Westward Region; however, catches of sablefish from Prince William Sound and Cook Inlet totaled 1.6 metric tons in that year.

b Catches for 1980 and 1982 combined to maintain confidentiality.

c Tr: trace less than 0.5 metric tons.

An important question to be answered for sablefish management concerns the degree of intermingling of stocks from different regions. Several studies have indicated that although some sablefish undergo extensive migrations the majority are localized and do not migrate great distances (Low et al. 1976, Wespestad 1981). This would indicate that regional stocks in the Gulf of Alaska can be successfully managed as separate units having little influence on each other. Recent studies by Bracken (1982), however, indicate that a significant number of fish do migrate long distances (over 185 km) and that extensive intermingling of stocks does occur. Bracken recommended that sablefish be managed as a single stock gulfwide and suggested that extensive fishing in the Charlotte and Vancouver INPFC areas in recent years, coupled with continued high harvest levels in the central and western gulf, is slowing the recovery of stocks that have been overharvested in the eastern gulf.

III. PERIOD OF USE

Domestic harvest of sablefish in the westward region in 1982 took place in the summer (Blackburn, pers. comm.).

A. Significance of Particular Harvest Areas

Foreign harvest of sablefish takes place along the edge of the continental shelf in the Bering Sea, south of the Alaska Peninsula, and in the Kodiak area. The 1982 domestic harvest was from the Portlock Bank area east of Kodiak (Morrison 1982).

Domestic fishing areas for sablefish are now developing all along the shelf edge south of Kodiak Island (Blackburn, pers. comm.).

B. Harvest Method

Sablefish in the Gulf of Alaska are generally fished with longline gear (Morris et al. in press). During 1960-1963, most sablefish caught in the Bering Sea were also taken with longline gear. Since 1966, however, longliners have been phased out of the Bering Sea fishery since extensive trawling activities for pollock have preempted the grounds (Morris 1981).

C. Projected Increase in Demand

It had been hoped that, with the establishment of the 200-mi Fishery Conservation Zone in 1977 and the designation in 1978 of the waters off Southeast Alaska as a domestic preserve in which foreign fishing for sablefish is prohibited, the domestic sablefish fishery would expand greatly (Natural Resources Consultants 1982). This expansion, however, has been less than expected; in fact, the domestic catch dropped from 1,590 metric tons in 1980 to 410 metric tons in 1981. This drop was apparently caused by a scarcity in 1981 of large sablefish (ibid.). Difficulties in gaining access to Japanese markets and a lack of United States demand for sablefish are also blamed for the slower than expected growth of the domestic fishery (Natural Resources Consultants 1982, Hughes 1980). Domestic sablefish catches are now increasing and are expected to be much larger in 1984 as a result of increased domestic allocations from the NPFMC.

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Walleye Pollock Human Use

I. MANAGEMENT HISTORY

Pollock in the Fishery Conservation Zone (3 to 200 nautical miles from shore) are managed as one of a number of groundfish species under the Gulf of Alaska and Bering Sea/Aleutians groundfish fishery management plans. The history of groundfish management in general can be found in the Groundfish Human Use section of this report.

Since the implementation of the Magnuson Fishery Conservation and Management Act in 1977, licensing, catch quotas and time-area closures, and gear restrictions have been placed on foreign vessels within the Fishery Conservation Zone (Alton and Deriso 1982). A summary of 1982 catch quotas can be found in the section on abundance in this account. In the Bering Sea/Aleutian Islands region, several areas are closed to foreign trawling to prevent gear conflicts and to reduce the incidental catch of prohibited species (NPFMC 1983).

A. Management Objectives

See Groundfish Human Use.

II. MANAGEMENT CONSIDERATIONS

With the decline in abundance of yellowfin sole due to overfishing in the early 1960's and the development in 1964 of techniques for processing minced fish on board motherships, the main Japanese fishing effort in the Bering Sea shifted from yellowfin sole to pollock (Bakkala et al. 1979). Pollock has dominated Japanese catches in the Bering Sea since 1963 (ibid.), and pollock catches increased more than tenfold between 1964 and 1972 (Bakkala and Wespestad 1983). Catches in the Bering Sea/Aleutian Islands area peaked at 1.9 million metric tons in 1972 (Morris 1981). Catches have since declined, due in part to catch restrictions placed on the fishery as a result of declining stock abundance (Bakkala and Wespestad 1983); pollock, however, still constitute the major portion of the foreign groundfish catch in the Bering Sea (Morris 1981).

Japanese fisheries have usually accounted for over 80% of pollock catches in the Bering Sea and Aleutian Islands since 1970 (Bakkala and Wespestad 1983). Until 1978, most of the remaining catch was taken by the USSR, but since 1978 catches of the Republic of Korea have exceeded those of the USSR (ibid.). New fisheries for pollock in the Bering Sea and Aleutian Islands area have recently been developed by Poland (1979) and West Germany (1980) and also by the joint ventures between United States "catcher boats" and foreign processors (1980) (table 8) (ibid.).

Foreign trawlers first began operations in the Gulf of Alaska in 1962, targeting on Pacific ocean perch. Perch stocks soon declined, however, and effort shifted to pollock. Pollock from 1962 to 1971 were taken either in a fishery intermittently conducted by Japan or as "by-catch" in the Japanese and USSR rockfish (perch) fisheries (Alton and Deriso 1982). In 1972, the foreign pollock catch rose to 34.1 thousand tons (30.9 thousand metric tons) and continued to rise, with an annual catch of 130.3 thousand tons (118.2 thousand metric tons) in the Gulf of Alaska in

1981 (ibid.). Boats from the Republic of Korea in 1974 and from Poland in 1975 joined the foreign effort for pollock in the gulf.

The catch of pollock in joint-venture fisheries in the Gulf of Alaska has increased dramatically since its beginning in 1978 (table 9) (Morris et al., in press; Alton and Deriso 1982). This catch is taken almost entirely in the Shelikof Strait pollock roe fishery (Morris et al., in press). It is possible that in the near future the entire optimum yield of pollock in the Central District of the Gulf of Alaska will be taken by an expanded joint-venture fishery (ibid.).

The abundance of walleye pollock in Alaskan waters is currently good. Management and research is directed at maintaining pollock abundance, evaluating the future status of pollock stocks, and improving the current information upon which management decisions are based (Alton and Deriso 1982).

III. PERIOD OF USE

Japanese factory fleets fish the Bering Sea nearly year-round. In 1977, the greatest number of Japanese trawlers was present from May to October (Morris 1981).

Foreign trawling in the Gulf of Alaska in recent years occurred mainly during June to November, probably because of time-area closures and gear restrictions during the early part of the year (Alton and Deriso 1982). Harvest by some nations in some years does take place earlier in the year (ibid.). The pollock joint-venture fishery in Shelikof Strait took place early in the year (Feb.-March).

A. Significance of Particular Fishing Areas

Pollock catches in the Bering Sea come mainly from along the outer shelf and continental slope, extending from Unimak Pass to Cape Navarin. The largest catches come just northwest of Unimak Pass and southwest of St. Matthew Island (Morris 1981). In the Gulf of Alaska, most foreign fishing effort takes place in the Shumagin and Chirikof-Kodiak INPFC areas (Alton and Deriso 1982, Smith and Hadley 1979). The major pollock joint-venture fishery takes place in the Shelikof Strait area.

B. Harvest Method

Pelagic and bottom trawls are used to harvest pollock. The Japanese use large trawlers and factory fleets, which process pollock into minced fish (surimi), and freezer trawlers, which freeze whole or dressed pollock and pollock fillets. The Japanese harvest fish mainly with bottom trawls (Alton and Deriso 1982, Bakkala et al. 1979).

C. Projected Increase in Demand

Pollock is the major groundfish species harvested by United States joint-venture fisheries. Information on the future prospects of this industry can be found in the general groundfish human use account.

Table 8. Walleye Pollock Foreign (F), Domestic (D), and Joint-Venture (JV) Catch in the Bering Sea/Aleutian INPFC Areas in Metric Tons (Round Weight)

	Aleutians			Bering Sea I			Bering Sea II		
Year	F	D	JV	F	D	JV	F	D	JV
1977	7,745	--- [a]	---	331,684	---	---	547,273	---	---
1978	6,274	---	---	359,320	23	---	578,002	---	---
1979	9,446	---	---	367,635	---	---	566,882	---	---
1980	58,157	---	---	426,912	133	10,341	520,888	---	138
1981	55,372	[b]	145	673,046	177	41,540	258,520	---	398
1982	55,771	105 [b]	1,983	661,365	88	52,547	241,977	---	75

Sources: Foreign catch 1977-78 are foreign reports from data on file, Northwest and Alaska Fisheries Center, Seattle; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 from Rigby 1984; 1978-82 from ADF&G commercial fisheries catch-reporting system 1983.
Joint-venture catch 1980-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a --- indicates no catch.

b Catches for 1981 and 1982 combined to maintain confidentiality.

Table 9. Walleye Pollock Foreign (F), Domestic (D), and Joint-Venture (JV) Catch in the Western Gulf of Alaska INPFC Areas in Metric Tons (Round Weight)

	Kodiak			Chirikof			Shumagin		
Year	F	D	JV	F	D	JV	F	D	JV
1977	28,157	44	---[a]	27,745	---	---	56,774	---	---
1978	17,524	490	---	43,020	19	---	32,365	---	---
1979	38,414	1,507	506	30,184	10	N.A.	30,218	---	22
1980	26,616	482	527	35,101	[b]	496	46,647	[b]	113
1981	9,095	544	---	65,094	19[b]	16,836	47,560	2[b]	21
1982	8,077	2,049	3,135	44,281	137	70,637	40,229	61	145

Sources: Foreign catch 1977-79 are foreign reports from data on file, Northwest and Alaska Fisheries Center, Seattle; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 from Rigby 1984; 1978-82 from ADF&G commercial fisheries catch-reporting system 1983.
Joint-venture catch 1979 from Rigby 1984; 1980-82 are best-blend reports from French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a --- indicates no catch.

b Catches for 1980 and 1981 combined to maintain confidentiality.

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Yellowfin Sole Human Use

I. MANAGEMENT HISTORY

Yellowfin sole in the Fishery Conservation Zone (3 to 200 nautical miles from shore) are managed as one of a number of groundfish species under the Gulf of Alaska and Bering Sea/Aleutians groundfish management plans. A general groundfish management history can be found in the Groundfish Human Use section of this report.

Foreign fishing for yellowfin sole in the Bering Sea is restricted by time-area closures designed to prevent gear conflicts, reduce the incidental catch of halibut, and protect winter concentrations of juvenile halibut and flounders (NPFMC 1983).

A. Management Objectives

See Groundfish Human Use.

II. MANAGEMENT CONSIDERATIONS

The postwar foreign fishery for yellowfin sole in the Bering Sea began in 1954, when the Japanese began fishing for flounders (primarily yellowfin sole) off Bristol Bay (Bakkala et al. 1976). Beginning in 1958, Japan intensified its fishery and used the catches for reduction into fishmeal as well as for freezing (Salveson and Alton 1976). The USSR entered the fishery in 1958. Catches increased substantially from 1958 to 1961 and then markedly declined in 1963; the main effort of foreign fleets in the Bering Sea switched to walleye pollock, though some directed effort for yellowfin sole continued (ibid.). The resource began to improve in the 1970's and was probably underfished from 1975 to 1977. The Soviets did not fish from 1973 to 1977, but catches increased in 1978 when they resumed fishing (Bakkala and Wespestad 1983). United States and foreign joint-venture fisheries for yellowfin sole began in the Bering Sea in 1980 (table 10). Catches from this fishery have increased rapidly to over 17,000 metric tons in 1982 (Blend Estimate from NMFS).

III. PERIOD OF USE

The Japanese commercial fishery for yellowfin sole mainly operated in the months of October-March from 1969 to 1976, but since then operations have shifted to summer and fall months (Bakkala and Wespestad 1983).

A. Significance of Particular Harvest Areas

Yellowfin sole are taken over a large area of the eastern Bering Sea, but the main area of fishing is east of the Pribilof Islands (Bakkala et al. 1979). Yellowfin sole abundance in the Gulf of Alaska is low, with no concentrations sufficient to warrant a commercial fishery (ibid.).

B. Harvest Method

The Japanese fish for yellowfin sole with mothership trawl fleets and medium-sized stern trawlers. The Soviets use large stern trawlers (Morris 1981).

C. Projected Increase in Demand

Yellowfin sole abundance is high and is estimated to remain good

Table 10. Yellowfin Sole Foreign (F), Domestic (D), and Joint-Venture (JV) Catch in the Bering Sea/Aleutian INPFC Areas in Metric Tons (Round Weight)

	Aleutians			Bering Sea I			Bering Sea II		
Year	F	D	JV	F	D	JV	F	D	JV
1977	100	--- [a]	---	51,210	---	---	7,218	---	---
1978	681	---	---	103,248	---	---	8,924	---	---
1979	1,206	---	---	93,327	---	---	6,575	---	---
1980	450	---	Tr [b]	74,954	---	9,623	2,364	---	---
1981	1,455	---	---	76,889	---	16,046	2,911	---	---
1982	138	---	33	74,407	---	17,381	1,427	---	---

Sources: Foreign catch 1977-78 are foreign reports from data on file, Northwest and Alaska Fisheries Center, Seattle; 1979-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.
Domestic catch 1977 from ADF&G 1982; 1978-82 from ADF&G Commercial Fisheries catch-reporting system 1983.
Joint-venture catch 1980-82 are best-blend reports from Nelson et al. 1980, French et al. 1981, Nelson et al. 1982, and Nelson et al. 1983.

a ---- indicates no catch.

b Tr: Trace less than 0.5 metric tons.

through 1985 (Bakkala and Wespestad 1983). Sole are an important component of the United States joint-venture fisheries in the Bering Sea. Comments on the projected increase in this industry can be found in the Groundfish Human Use account.

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Salmon Human Use: Commercial Harvest

I. MANAGEMENT HISTORY

The USFWS regulated Alaska's fisheries from the late 1800's through 1959. After statehood was granted in 1959, the ADF&G managed the salmon fishery. The Alaska salmon fishery became a limited entry fishery in 1974 after the Commercial Fisheries Entry Commission was established.

Management of fisheries in waters within three nautical miles from shore is the responsibility of the State of Alaska. The Magnuson Fishery Conservation and Management Act, implemented in 1977 and amended in 1980, provided for conservation and exclusive United States management of all fisheries within 200 nautical miles from shore, creating the Fishery Conservation Zone from 3 to 200 nautical miles from shore. The NPFMC is responsible for managing fisheries in the Fisheries Conservation Zone and prepares management plans, which become federal law. The INPFC, comprised of Canada, Japan, and the United States, recommends management procedures and prepares conservation measures outside the United States and Canadian 200-nautical-mile zones. The ADF&G manages the salmon fishery in the Southwest Region in five management areas: Kodiak, Chignik, Alaska Peninsula, Aleutian Islands, and Bristol Bay.

II. KODIAK MANAGEMENT AREA

A. Management Objectives

The goal of the Kodiak salmon fishery program is to achieve and continue to maintain a level of sustained yield. This goal can be achieved through long-term rebuilding of escapement quotas to optimal levels in the sockeye salmon systems where production is below optimum, and by maintaining escapement objectives in pink salmon systems where production is at optimum levels. A long-term need for the chum and coho salmon fishery is to improve surveys and escapement counts and to initiate chum salmon forecasts (ADF&G 1983b). The districts and statistical areas used in the Kodiak Management Area are listed in table 11.

B. Management Considerations

There are problems in assigning sockeye salmon catches to individual Kodiak systems, as tagging data have shown that there are very few, if any, pure stock fisheries. Although catches assigned to various systems through the years may not always have been accurate, the total sockeye production in the Kodiak area is on the upswing. Sockeye salmon runs have been steadily rebuilding (with the notable exception of the Karluk stocks), as measured by increased escapements and recent harvests that are more than double the 35-year average. Recent runs have approached or exceeded historic highs at Red River, Fraser, Upper Station, Afognak River, Paul's Bay, Uganik, Saltery Cove, and Kaflia (Manthey 1984).

Some management problems are related more to the allocation of the fish between competing user groups than to simply harvesting salmon surplus to escapement requirements. Good examples of these types of

Table 11. Districts and Statistical Areas Used for Reporting Commercial Salmon Harvest in the Kodiak Management Area

District	Statistical Areas
Afognak	251-10,20,30,40,50,60,70,81,82,83,90 252-10,20,30,31,32,33,34 252-35 (from 1982 to present)
Uganik	253-11,12,13,14,31,32,33,35 252-35 (through 1981)
Uyak Bay	254-20,30,40
Karluk	254-10 255-10,20
Red River	256-10,20,25
Sturgeon River	256-30,40
Alitak Bay	257-10,20,30,40,41,50,60,70
General	258-54,55,60,70,80,85,90,95 259-10,21,22,23,24,25,36,37,38, 39,40,41,42 252-36,37,38,39(through 1981); changed in 1982 to 259-36,37,38,39
Mainland	262-10,15,20,25,30,35,40,45,50, 55,60,65,70,75,80,85,90,95

management problems are associated with the Cape Igvak, Cape Alitak, and Olga/Moser Bay fisheries (ibid.). These fisheries are commonly called "cape fisheries" because catches are made at the ends of prominent capes, and the salmon stocks are mixed as schools head for many different rivers. The allocation of the salmon resource in these fisheries goes through the regulatory process almost annually, which leads to a "final" determination by the State Board of Fisheries (ibid.).

C. Period of Use

The 1983 salmon fishery in Kodiak opened in mid June or July, depending on the species and area, and ran through October (ADF&G 1983a). For many years the fishery on the west side of Kodiak was allowed to operate during June and early July with little regulation. A complete closure of the early fishery was initiated in 1971 to strengthen the Karluk run (ADF&G 1982b). Recently, as many as three days of fishing have been allowed during the month of June on the west side (Manthey, pers. comm.).

D. Harvest Method

Salmon may be taken commercially in Kodiak by purse seines and beach seines and set gill nets. Only set gill nets are permitted in Olga and Moser bays before September 5th. Set nets also fish on the west side of Kodiak Island and in Kizhuyak Bay and Kupreanof Strait on the north end of Kodiak Island (Manthey, pers. comm.). The commercial harvest for the Kodiak Management Area is summarized by species over 10 years in figure 1.

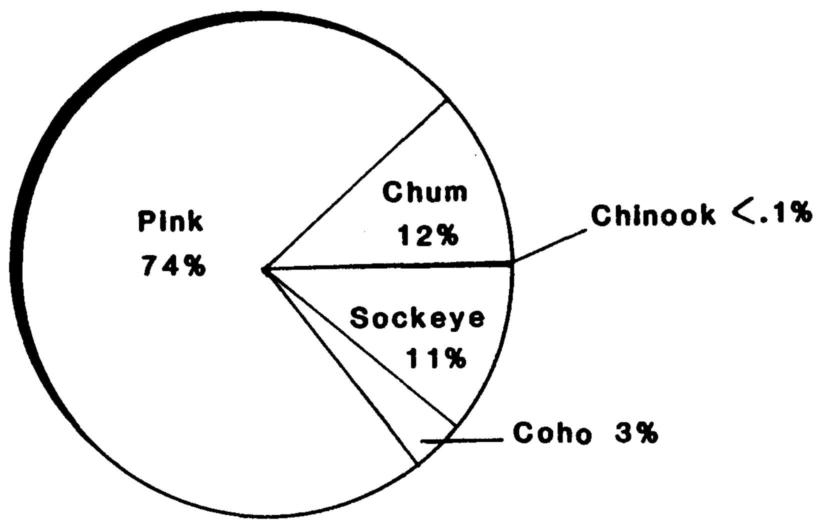

Figure 1. Commercial harvest in numbers of fish from 1973 through 1982 by species for the Kodiak Management Area.

E. Species Harvest

1. Sockeye salmon. In Kodiak, sockeye salmon were the principal species harvested in the early 1900's. The catch declined as stocks were depleted, and now it is the second or third most abundant species. Chum salmon have been nearly equal in abundance to sockeye salmon in recent years. The Karluk River was at one time one of the most productive sockeye salmon systems in the world. The reported catch of 1901 was almost 4 million. Historically, the Alitak District systems produced the second largest catches of sockeye salmon, and Upper Station was the main producer in this district. The Upper Station system is very difficult to manage because the timing of the late sockeye salmon run, the strongest portion of the return, occurs during the pink salmon season (ADF&G 1982b).
   The Red River is the only sockeye salmon system in the Red River District, and the fishery, which began in 1896, peaked with a reported high catch of over 400,000 in 1912. The Red River system was soon depleted, however, and after the low catch of 12,000 in 1922 the fishery was closed. A weir was built in 1929, and by 1935 the run had increased to the point where a fishery was again allowed (ibid.). The commercial catch data for 1973 through 1982 are presented in table 12.
2. Chum salmon. Chum salmon are usually second to pink salmon in the Kodiak catch. In Kodiak, chum salmon are becoming an increasingly more important species. Catches in 1971, 1981, and 1982 were the largest in the history of the Kodiak chum salmon fishery. The major chum salmon systems have mostly late runs, and it is therefore possible in most cases to manage these runs separately from the pink salmon (ibid.). The commercial catch data for 1973 through 1982 are presented in table 13.
3. Coho salmon. The Kodiak catches of coho salmon are incidental to other species; the catch fluctuates with the level of effort for other species, especially fall runs of sockeye and chum salmon (ADF&G 1977b). Many of the Kodiak systems support coho salmon returns, but because of the late fish and small runs there was little effort. Since 1978, the effort on coho salmon has increased dramatically, and the catch is three to seven times higher than the average (Manthey, pers. comm.). Because of the lateness of the runs, escapement figures are incomplete, but it appears that until recently coho salmon may have been underharvested in some areas. The 1982 catch of 343,000 was the highest coho salmon catch in Kodiak. For the nine years prior to 1982 the average annual catch was 53,600 (ADF&G 1982b). The commercial catch data for 1973 through 1982 are presented in table 14.
4. Chinook salmon. Few chinook salmon are harvested in the Kodiak area, and those caught are usually incidental to the early sockeye fisheries. The catch has averaged about 1,100 fish annually from 1973 to 1982 (ADF&G 1982b). The commercial catch data for 1973 through 1982 are presented in table 15.

Table 12. Commercial Harvest of Sockeye Salmon by Gear Type and District (in Thousands of Fish), Kodiak Management Area

Purse Seine										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	5.4	7.8	7.5	17.0	1.6	46.9	31.8	7.7	69.4	55.3
Uganik	4.7	10.1	15.3	27.5	24.8	30.6	23.2	6.1	23.4	26.5
Karluk	2.4	77.9	7.2	73.3	3.0	104.2	18.0	93.4	2.9	36.8
Uyak	0.05	0.02	1.2	3.8	1.8	4.0	3.7	0.4	5.8	0.3
Red River	38.1	47.5	---*	124.0	173.5	177.9	35.7	177.8	208.6	140.6
Sturgeon River	6.0	6.2	0.7	29.1	1.1	36.2	---	43.7	---	16.7
Alitak Bay	3.7	32.6	4.5	28.3	24.4	88.4	156.8	34.4	89.5	65.7
General	5.8	6.0	8.4	30.6	9.7	29.9	53.1	5.2	38.0	11.8
Mainland	72.8	158.1	33.1	151.2	161.3	285.6	32.4	17.6	409.6	233.5
Gear Total for Mgmt. Area ***	139.0	346.2	75.0	484.9	409.0	803.6	354.7	386.0	847.3	587.3

Beach Seine										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	---*	---	---	---	0.8	3.5	3.6	0.8	3.3	6.2
Uganik	0.2	0.2	0.1	0.2	0.1	0.2	0.2	0.01	0.3	0.6
Karluk	1.3(1)	1.3 (1)	0.4	1.4	0.1	2.0	0.7	0.4	0.03	0.09
Uyak	---	0.06(2)	---	---	0.06(2)	0.03	0.01	0.08	0.1	0.1
Red River	---	---	---	---	0.5 (3)	0.5 (3)	---	0.6(4)	0.6(4)	0.6(4)
Sturgeon River	---	---	---	0.02	---	---	---	1.0(5)	---	1.0(5)
Alitak Bay	0.2	0.8	0.2	0.1(6)	0.1(6)	0.5	1.6	1.9	2.0	1.4
General	0.0+**	0.0+	---	0.1	0.03	0.8	1.2	0.05	0.3	0.5
Mainland	---	---	---	---	---	---	---	---	0.3	---
Gear Total for Mgmt. Area ***	0.5	2.2	0.7	1.7	1.3	7.4	7.4	4.1	6.8	9.1

Set Gill Net										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	---	0.3(7)	---	0.3(7)	---	---	0.4	0.4	---	---
Uganik	14.2	19.4	27.3	38.2	74.1	75.9	48.7	51.6	91.7	113.9
Karluk	7.2	14.1	19.6	46.0	77.3	48.3	50.3	39.6	69.8	59.6
Uyak	2.2(8)	2.2(8)	1.8	0.9	5.7	4.4	8.2	2.5	13.7	18.5
Red River	---	---	---	---	---	---	---	---	---	---
Sturgeon River	---	---	---	---	---	---	---	---	---	---
Alitak Bay	6.4	34.4	11.8	68.7	54.3	129.4	158.9	161.7	254.6	409.7
General	0.06	0.02	0.2	1.1	1.7	2.7	2.3	5.6	5.2	5.7
Mainland	---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	27.8	70.3	60.6	154.9	213.2	260.8	268.6	261.3	434.9	607.3

Total Harvest for All Gear Combined										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	5.4	8.1	7.5	17.3	2.4	50.4	35.8	8.9	72.7	61.5
Uganik	19.1	29.7	42.7	65.9	99.0	106.7	72.1	57.7	115.4	141.0
Karluk	9.6	93.2	27.1	120.6	80.5	154.4	69.1	133.4	72.7	96.5
Uyak	0.06	2.2	3.0	4.7	7.6	8.5	11.9	3.0	19.6	18.9
Red River	38.1	47.5	---	124.0	173.5	178.3	35.7	177.9	209.0	140.8
Sturgeon River	6.0	6.2	0.7	29.2	1.1	36.2	---	44.5	---	16.9
Alitak Bay	10.3	67.7	16.5	97.0	78.8	218.3	317.3	197.9	346.1	476.9
General	5.9	6.0	8.6	31.8	11.4	33.4	56.6	10.9	43.5	18.0
Mainland	72.8	158.1	33.1	151.2	161.3	285.6	32.4	17.6	409.8	233.5
Gear Total for Mgmt. Area ***	167.3	418.8	136.4	641.5	623.5	1,071.8	630.8	651.4	1,289.0	1,203.8

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (8) Catch combined for respective years to ensure confidentiality requirements.

Table 13. Commercial Harvest of Chum Salmon by Gear Type and District (in Thousands of Fish), Kodiak Management Area

Purse Seine										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	6.4	3.9	4.5	19.5	11.5	26.0	8.8	32.2	52.2	44.5
Uganik	25.0	17.4	18.7	33.9	66.5	52.8	26.3	25.7	91.9	165.6
Karluk	0.4	1.7	4.2	10.2	5.6	16.9	4.5	42.4	9.4	17.0
Uyak	12.0	0.7	1.8	6.1	6.4	16.4	5.1	1.6	47.5	66.4
Red River	0.3	1.9	---	3.3	0.8	3.1	0.04	8.9	1.5	17.5
Sturgeon River	0.09	0.3	0.0+	4.9	---	5.5	---	9.3	---	6.2
Alitak Bay	19.3	21.6	1.7	58.9	62.2	60.1	15.0	54.4	37.6	76.8
General	149.5	130.4	32.8	355.3	444.6	421.6	188.8	405.0	538.8	366.6
Mainland	90.7	57.5	9.4	214.6	426.0	152.5	70.6	408.1	433.6	316.0
Gear Total for Mgmt. Area ***	303.7	235.2	73.1	706.8	1,023.5	754.9	319.0	987.7	1,212.5	1,076.6

Beach Seine										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	---*	---	---	---	0.1	0.1	0.1	0.5	0.3	0.5
Uganik	0.2	0.2	0.3	0.9	3.7	0.7	0.3	2.6	1.4	10.9
Karluk	---	0.03	---	0.0+**	0.2	0.3	0.02	0.05	0.05	0.0+
Uyak	---	---	---	0.0+	0.02	0.08	0.04	0.2	0.6	1.1
Red River	---	---	---	---	---	---	---	---	---	---
Sturgeon River	---	---	---	0.0+	---	0.0+	---	1.3	---	---
Alitak Bay	0.6	0.3	0.02(1)	0.02(1)	0.4	0.6	0.2	5.4	1.1	2.5
General	0.1	0.2	0.0+	2.6	5.2	7.7	1.0	7.8	3.6	2.6
Mainland	---	---	---	---	3.0(2)	---	3.0(2)	5.3	4.2	---
Gear Total for Mgmt. Area ***	0.9	0.6	0.3	3.5	10.0	9.5	4.2	23.7	11.1	17.7

Set Gill Net										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	---	0.04(3)	---	0.04(3)	---	---	0.0+	0.06	---	---
Uganik	5.5	5.9	5.3	12.5	15.7	16.7	13.4	27.7	55.9	64.8
Karluk	3.1	4.3	2.9	6.6	10.6	12.8	5.7	13.5	21.1	34.8
Uyak	1.0(4)	1.0(4)	1.5	0.8	2.2	7.1	5.6	3.1	14.7	41.0[a]
Red River	---	---	---	---	---	---	---	---	---	22.3[a]
Sturgeon River	---	---	---	---	---	---	---	---	---	---
Alitak Bay	4.5	2.1	1.1	9.2	8.3	11.5	7.2	7.8	22.8	22.3[a]
General	0.1	0.2	0.2	1.1	1.9	1.7	3.3	12.0	7.3	5.3
Mainland	---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	13.3	13.4	11.0	30.2	38.8	49.9	35.1	64.2	121.7	168.3

Total Harvest for All Gear Combined										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	6.4	4.3	4.5	19.5	11.6	26.1	8.9	32.8	52.5	45.0
Uganik	30.7	7.5	24.3	47.3	85.9	66.9	40.0	56.0	149.2	241.3
Karluk	3.5	6.0	7.0	16.7	16.4	30.0	10.1	55.9	30.5	51.8
Uyak	12.0	1.6	3.3	7.0	8.6	23.6	10.7	4.9	62.7	108.5
Red River	0.3	1.9	---	3.3	0.8	3.1	0.04	8.9	1.5	17.7
Sturgeon River	0.09	0.3	0.0+	4.9	---	5.5	---	10.6	---	6.2
Alitak Bay	24.4	23.9	2.9	68.1	71.0	72.2	22.5	67.7	61.5	101.5
General	149.7	130.8	33.0	359.0	451.7	431.0	193.1	424.8	549.7	374.5
Mainland	90.7	57.5	9.4	214.6	426.4	152.5	73.1	413.9	437.8	316.0
Gear Total for Mgmt. Area ***	317.9	249.3	84.4	740.5	1,072.3	814.3	358.3	1,075.6	1,345.3	1,262.6

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (4) Catch combined for respective years to ensure confidentiality requirements.

a District totals combined due to low effort in Red River District.

Table 14. Commercial Harvest of Coho Salmon by Gear Type and District (in Thousands of Fish), Kodiak Management Area

District	Purse Seine 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	Beach Seine 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	0.8	6.0	8.3	2.9	4.8	19.0	43.9	57.9	38.5	116.6	*---	---	---	---	0.6	2.6	7.7	8.4	10.2	12.0
Uganik	0.8	1.3	1.1	1.0	1.1	1.1	9.3	9.4	10.0	28.9	---	**0.0+	0.0+	0.0+	0.6	0.0+	0.3	0.3	0.07	2.8
Karluk	0.2	0.4	6.4	2.6	2.7	5.4	8.1	4.1	1.8	12.6	---	0.0+	4.3	3.8	4.1	6.5	4.1	0.5	0.2	0.2
Uyak	---*	---	0.07	0.04	0.1	0.04	1.6	2.6	4.8	2.2	---	---	---	0.0+	0.0+	0.0+	0.02	0.0+	0.6	0.2
Red River	0.0+**	0.06	---	0.5	---	0.7	0.2	5.6	5.4	35.3	---	---	---	---	---	---	---	0.03	---	---
Sturgeon River	---	0.05	---	0.7	1.1	1.5	5.2	2.8	3.6	5.0	---	---	---	0.0+	---	0.08	1.3(1)	1.3	1.3(1)	1.3(1)
Alitak Bay	0.03	0.7	1.6	1.7	0.6	1.3	6.8	7.3	7.3	17.3	0.0+	0.0+	0.02(2)	0.02(2)	0.0+	0.03	0.04	1.3	0.3	0.2
General	1.0	3.3	1.0	4.9	7.3	5.2	24.0	20.1	20.8	31.6	---	0.0+	---	0.01	0.6	0.3	0.2	1.2	0.6	2.5
Mainland	0.3	0.8	0.1	2.4	1.3	1.2	3.0	3.1	1.3	42.3	---	---	---	---	0.03	---	0.0+	---	0.0+	---
Gear Total for Mgmt. Area ***	3.2	12.7	18.5	16.7	19.1	35.4	102.2	113.0	93.5	291.9	0.0+	0.0+	4.3	3.9	6.0	9.5	12.8	13.1	12.7	18.7

District	Set Gill Net 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	Total Harvest for All Gear Combined 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	0.05	---	---	---	---	---	0.01	---	---	---	0.9	6.0	8.3	2.9	5.4	21.6	51.6	66.3	48.7	128.7
Uganik	0.06	0.2	0.5	1.0	1.6	0.9	8.1	4.9	3.2	11.5	0.9	1.5	1.6	2.5	3.3	2.0	17.7	14.6	13.3	43.2
Karluk	0.2	0.09	0.2	0.2	0.3	1.0	5.0	2.4	1.7	6.8	0.4	0.5	10.9	6.6	7.1	12.9	14.2	7.1	3.7	19.6
Uyak	---	0.02	0.04	0.0+	0.03	0.3	3.1	0.2	0.4	2.9	---	0.02	0.1	0.04	0.1	0.3	4.8	2.7	5.8	5.3
Red River	---	---	---	---	---	---	---	---	---	12.01[a]	0.0+	0.06	---	0.5	---	0.7	0.2	5.7	5.4	35.4
Sturgeon River	---	---	---	---	---	---	---	---	---	---	---	0.05	---	0.7	1.1	1.6	5.8	4.1	4.4	5.0
Alitak Bay	0.09	0.6	0.04	1.9	0.8	1.5	8.2	4.5	9.4	12.0[a]	0.1	1.3	1.6	3.5	1.3	2.8	15.0	13.1	17.0	29.4
General	---	0.01	0.03	0.08	0.1	0.2	1.2	1.1	0.6	1.1	1.0	3.3	1.0	4.9	8.0	5.7	25.4	21.3	22.0	35.2
Mainland	---	---	---	---	---	---	---	---	---	---	0.3	0.8	0.1	2.4	1.3	1.2	3.0	3.1	1.4	42.3
Gear Total for Mgmt. Area ***	0.4	1.0	0.8	3.1	2.8	3.8	25.6	13.1	15.3	34.3	3.6	13.6	23.7	23.7	27.9	48.8	140.6	139.2	121.5	344.8

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (2) Catch combined for respective years to ensure confidentiality requirements.

a District totals combined due to low effort in Red River District.

Table 15. Commercial Harvest of Chinook Salmon by Gear Type and District (in Thousands of Fish), Kodiak Management Area

District	Purse Seine									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	0.02	0.03	0.03	0.1	.03	0.2	0.1	0.02	0.1	0.06
Uganik	0.03	.03	.02	0.08	.03	0.2	0.2	0.04	0.1	0.1
Karluk	0.0+**	0.01	.01	0.02	0.0+	0.08	0.04	0.06	0.0	0.09
Uyak	0.0+	---*	0.0+	0.01	0.0+	0.01	0.1	0.01	0.03	0.0+
Red River	0.05	0.02	---	0.04	0.4	0.7	0.07	0.0+	0.5	0.2
Sturgeon River	0.03	---	0.0+	0.01	---	0.2	---	0.03	---	0.05
Alitak Bay	0.0+	0.02	---	0.01	0.01	0.3	0.08	0.03	0.04	0.03
General	0.5	0.3	0.02	0.3	0.06	0.5	1.0	0.09	0.2	0.2
Mainland	0.1	0.04	0.0+	0.1	0.3	0.5	0.04	0.0	0.2	0.1
Gear Total for Mgmt. Area ***	0.8	0.4	0.09	0.7	0.5	2.6	1.7	0.3	1.2	0.9

District	Beach Seine									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	---	---	---	---	---	---	**0.0+	---	0.0+	---
Uganik	---	---	---	0.0+	---	---	---	---	0.0+	---
Karluk	---	0.0+	0.0+	---	---	0.0+	---	0.0+	---	---
Uyak	---	---	---	0.0+	---	---	---	0.0+	0.0+	0.0+
Red River	---	---	---	---	---	0.0+(1)	---	---	0.0+(1)	---
Sturgeon River	---	---	---	---	---	---	---	0.0+	---	---
Alitak Bay	---	---	---	---	---	0.0+	0.0+	---	---	---
General	0.0+	---	0.0+	0.0+	0.0+	0.03	0.01	---	0.01	0.0+
Mainland	---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	0.0+	0.0+	0.0+	0.01	0.0+	0.04	0.1	0.0+	0.02	0.0+

District	Set Gill Net									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	---	---	---	---	---	---	0.0+	0.0+	---	---
Uganik	0.01	0.0+	0.0+	0.02	0.01	0.04	0.05	0.06	0.1	0.08
Karluk	0.0	0.1	0.0+	0.03	0.02	0.09	0.05	0.2	0.1	0.2
Uyak	0.03(1)	0.03(1)		0.0+	0.0+	0.04	0.05	0.0+	0.03	0.04
Red River	---	---	---	---	---	---	---	---	---	0.01(2)
Sturgeon River	---	---	---	---	---	---	---	---	---	---
Alitak Bay	0.0+	0.0+		0.0+	0.0+	0.4	0.03	0.0+	0.0+	0.01(2)
General	---	---	---	---	---	---	---	---	---	---
Mainland	---	---	---	0.0+	0.01	0.0+	0.0+	---	0.0+	---
Gear Total for Mgmt. Area ***	0.02	0.1	0.01	0.05	0.05	0.6	0.2	0.3	0.2	0.3

District	Total Harvest for All Gear Combined									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	0.02	0.03	0.03	0.1	0.03	0.2	0.2	0.01	0.1	0.06
Uganik	0.04	0.04	0.02	0.1	0.04	0.2	0.3	0.1	0.2	0.2
Karluk	0.0	0.1	0.02	0.05	0.02	0.2	0.09	0.2	0.1	0.3
Uyak	0.0	---	0.0	0.01	0.01	0.05	0.2	0.01	0.05	0.05
Red River	0.05	0.02	---	0.04	0.4	0.7	0.07	0.0	0.5	0.2
Sturgeon River	0.03	---	0.0	0.01	---	0.2	---	0.03		0.05
Alitak Bay	0.0	0.02	---	0.02	0.02	0.7	0.1	0.03	0.04	0.04
General	0.5	0.03	0.02	0.3	0.07	0.6	1.0	0.09	0.2	0.2
Mainland	0.1	0.04	0.0	0.1	0.03	0.5	0.04	0.0	0.2	0.1
Gear Total for Mgmt. Area ***	0.8	0.5	0.1	0.8	0.6	3.2	1.9	0.5	1.4	1.2

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (2) Catch combined for respective years to ensure confidentiality requirements.

5. Pink salmon. Pink salmon are the main salmon species harvested in Kodiak, and about 90% of these are taken by purse seine. Pink salmon were relatively unimportant in Kodiak until 1912. Catches from 1934 through 1947 averaged 8.5 million fish. After a decline, catches increased, and the average annual catch from 1973 to 1982 was about 8.5 million (ibid.).

   From 1934 to 1959 the odd-year cycle dominated the Kodiak pink fishery. In 1960, the even-year cycle began to improve, with a catch of 6.7 million pink salmon. In 1962, there was a record even-year catch of 14.2 million. The odd-year cycle declined slowly until strict harvest regulations resulted in a rock-bottom catch of less than .2 million fish in 1967 (ADF&G 1982b).

   The lowest Kodiak pink salmon catch in four decades, with the exception of 1967, was recorded in 1973. Saltwater mortality during 1971 and 1972, previously suspected of remaining fairly constant from year to year, was apparently much higher than normal. Present forecasting techniques now include marine monitoring of abnormal or unusual changes in temperatures and salinities. The 1980 harvest of 17.3 million was the largest historical catch ever recorded (ibid.). The commercial catch data for 1973 through 1982 are presented in table 16.

III. CHIGNIK MANAGEMENT AREA

A. Management Objectives

The goal of the Chignik salmon fishery program is to provide regulatory management of the pink, chum, and sockeye salmon fisheries. This goal can be realized by ensuring that escapement objectives for both early and late-run Chignik sockeye salmon and for the area's pink and chum salmon stocks are obtained while allowing full harvest of surplus salmon (ADF&G 1983b). The districts and statistical areas used in the Chignik Management Area are listed in table 17.

B. Management Considerations

There are two runs of sockeye salmon in the Chignik River system; the first run is comprised of fish from Black Lake and the second of fish from Chignik Lake. The two runs are regulated by weir counts, catch analysis, and commercial salmon catches (ADF&G 1983a). Methods of more accurately separating the Black Lake and Chignik Lake sockeye runs during the period of overlap are currently being refined, but at this time there is no quantitative way of estimating the number of fish in the lagoon. The above information would help not only in managing the fishery at Chignik but also in implementing the management plans for the Cape Igvak and Southeast Mainland districts. These two fisheries, which are both outside the Chignik Management Area, intercept Chignik-bound sockeye (Manthey 1984).

C. Period of Use

The 1983 Chignik fishery was open from June through September and was regulated by emergency order (ibid.).

Table 16. Commercial Harvest of Pink Salmon by Gear Type and District (in Thousands of Fish), Kodiak Management Area

	Purse Seine										Beach Seine									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	53.4	72.0	90.7	260.4	94.7	663.6	676.8	1,452.8	1,439.3	832.9	---*	---	---	---	2.1(1)	2.1(1)	7.5	60.1	95.0	37.4
Uganik	159.7	325.8	919.3	1,053.6	870.3	793.3	1,712.0	1,441.6	1,070.5	740.6	4.2	4.0	27.6	60.6	44.0	22.6	44.6	82.8	38.5	8.1
Karluk	10.7	172.5	152.4	576.9	162.3	1,748.9	496.8	4,896.6	158.8	982.0	0.09	1.2	0.5	8.3	9.9	21.9	31.3	58.5	11.5	25.8(3)
Uyak	25.0	13.3	88.7	573.2	397.0	442.9	743.4	218.2	600.2	5.0	---	0.2(2)	0.2(2)	3.0	19.8	49.3	19.5	17.2	55.4	3.7
Red River	3.0	190.6	---*	1,050.2	5.6	1,136.9	4.9	1,634.8	6.3	2,077.7	---	---	---	---	0.6(4)	0.6(4)	---	8.2(5)	---	8.2(5)
Sturgeon R.	0.7	25.2	1.1	623.2	0.3	942.9	---	1,568.6	0.9	293.5	---	---	---	9.3	---	1.3	---	68.3	---	25.8(3)
Alitak Bay	29.9	308.8	208.8	1,359.9	734.1	3,628.3	1,478.1	1,651.8	1,686.3	345.1	2.6	12.7	3.2(6)	3.2(6)	4.7	62.9	72.3	161.3	121.3	35.1
General	125.1	1,262.8	931.7	4,164.5	2,638.1	3,665.8	4,261.7	2,140.2	3,097.7	743.1	0.3	14.4	5.0	66.5	47.3	64.3	101.5	66.5	62.3	51.9
Mainland	24.4	24.1	270.8	50.3	342.9	236.8	620.2	270.2	270.2	587.8	---	---	---	---	3.3(7)	---	3.3(7)	16.6	1.6	---
Gear Total for Mgmt. Area***	431.7	2,395.2	2,663.5	9,712.2	5,245.1	13,259.4	9,994.0	15,274.8	8,330.3	6,607.7	7.2	32.3	34.8	149.4	126.8	224.2	279.7	535.6	385.5	169.2

	Set Gill Net										Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Afognak	---	1.8(8)	---	1.8(8)	---	---	0.3	1.7	---	---	53.4	72.0	90.7	260.4	94.7	663.6	684.6	1,514.6	1,534.3	870.3
Uganik	33.6	131.5	124.0	456.2	348.8	436.3	502.0	657.2	823.1	686.3	197.5	461.3	1,070.9	1,570.4	1,263.1	1,252.2	2,258.6	2,181.6	1,932.1	1,435.0
Karluk	20.7	42.5	66.7	236.7	214.6	395.0	244.8	449.8	260.6	331.3	126.0	1,278.5	941.0	4,248.2	2,722.9	3,748.9	4,397.0	2,271.5	3,232.5	829.6
Uyak	9.4(9)	9.4(9)	24.1	41.4	56.7	169.7	117.3	69.9	198.8	120.1	25.4	22.3	113.0	617.7	473.6	662.0	880.2	302.2	854.4	128.8
Red River	---	---	---	---	---	---	---	---	---	140.7[a]	3.0	190.6	---	1,050.2	5.8	1,137.3	4.9	1,639.1	6.3	2,082.6
Sturgeon R.	---	---	---	---	---	---	---	---	---	---	0.7	25.2	1.1	632.4	0.3	944.1	---	1,636.9	0.9	314.6
Alitak Bay	17.4	33.6	25.3	465.0	222.8	500.5	114.0	239.9	266.1	140.7[a]	49.9	355.2	235.7	1,826.5	961.7	4,191.8	1,664.4	2,053.1	2,073.6	519.9
General	0.6	1.3	4.3	17.2	37.5	18.8	33.8	64.8	72.5	34.6	109.6	1,147.9	606.4	3,884.8	2,353.8	3,490.4	4,157.3	1,979.3	2,881.2	829.6
Mainland	---	---	---	---	---	---	---	---	---	---	24.4	24.1	270.8	50.3	343.3	236.8	623.1	286.8	271.8	587.8
Gear Total for Mgmt. Area***	72.8	219.7	244.4	1,216.4	880.4	1,520.4	1,012.2	1,480.2	1,621.0	1,312.9	511.7	2,647.2	2,904.8	11,078.0	6,252.4	15,004.1	11,285.8	17,290.6	10,336.8	8,089.8

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (9) Catch combined for respective years to ensure confidentiality requirements.

a District totals combined due to low effort in Red River District.

Table 17. Districts and Statistical Areas Used for Reporting Commercial Salmon Harvest in the Chignik Management Area

District	Statistical Area
Chignik Bay	271-10
Central	272-20,30,40,50,62,64
Eastern	272-60,70,72,80,90,92,96
Western	273-72,74,80,82,84,90,94
Perryville	275-40,50,60

D. Harvest Method

Salmon may be taken commercially in Chignik by purse seine or hand purse seine. The commercial harvest for the Chignik Management Area is summarized by species over 10 years in figure 2.

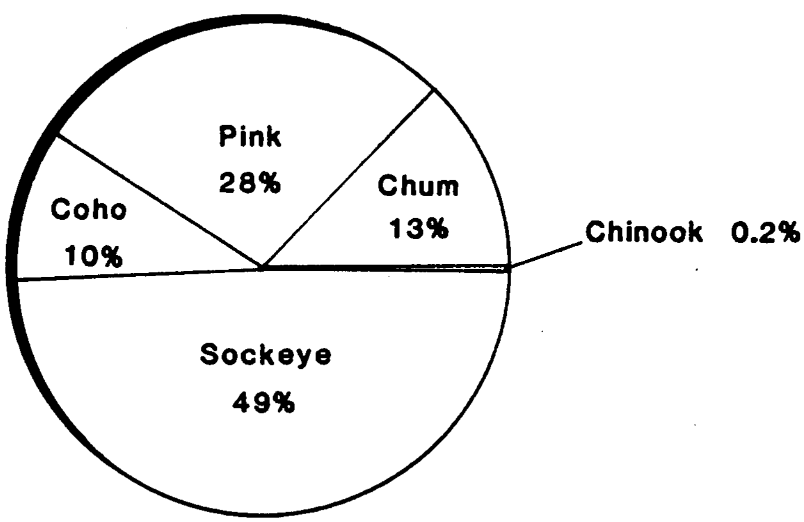

Figure 2. Commercial harvest in numbers of fish from 1973 through 1982 by species for the Chignik Management Area.

E. Species Harvest

1. Sockeye salmon. Sockeye salmon are the most important species in Chignik. Early-run sockeye spawn primarily in Black Lake tributaries, whereas late-run fish spawn for the most part in Chignik Lake and tributaries. A small portion of both early and late-run fish spawn in Black River tributaries (Manthey 1984). Chignik sockeye salmon are intercepted at Cape Igvak to the north and in Stepovak and Balboa bays to the south (ADF&G 1977a).

   The Chignik fishery began in 1888 with a catch of 13,000 fish. The runs are still strong, and the 1981 sockeye salmon commercial harvest, the highest return since 1888, was 1,839,469 salmon (ADF&G 1981b). The commercial catch data for 1973 through 1982 are presented in table 18.

2. Chum salmon. Chum salmon catches are incidental to the pink salmon harvest in Chignik, and it is usually impossible to manage chum salmon separately from the pink salmon runs. The harvests from 1972 through 1974 were low because of strict regulations aimed at protecting pink salmon (ADF&G 1977a). The 1981 harvest was 580,000, which is the highest recorded catch since 1888 (ADF&G 1981b). The commercial catch data for 1973 to 1982 are presented in table 19.

3. Coho salmon. The Chignik River system produces most of the coho salmon harvested by the commercial fishery. The 1981 commercial harvest was 78,800, the fifth highest recorded catch since 1888 (ibid.). In 1982, 303,000 coho salmon were caught; the average for the previous nine years was 46,000. The commercial catch data for 1973 through 1982 are presented in table 20.

4. Chinook salmon. Chinook salmon in the Chignik area are harvested incidentally to other species and are of minor commercial importance. The 1981 Chinook salmon harvest was 2,694, the third highest catch since 1888 (ibid.). The commercial catch data for 1973 through 1982 are presented in table 21.

5. Pink salmon. Pink salmon in the Chignik area show some local variation in the normal even-odd year cycle. The Eastern District has produced larger runs during even years, while the Chignik Bay, Western, and Perryville districts have produced large runs on both even and odd years (ADF&G 1977a). The total 1981 pink salmon harvest was 1,162,613 fish (ADF&G 1981b). Pink salmon are second to sockeye salmon in commercial importance in Chignik, and in 1979 and 1980 the pink catch was higher than that of sockeye. The major pink salmon systems are in the Western, Perryville, and Eastern districts (Probasco, pers. comm.). The commercial catch data for 1973 through 1982 are presented in table 22.

Table 18. Commercial Harvest of Sockeye Salmon by Gear Type and District (in Thousands of Fish), Chignik Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay	845.2	539.2	387.1	1,112.5	1,851.7	1,474.7	908.9	708.8	1,355.5	1,414.0										
Central	8.0	120.4	12.4*	48.3	119.5	89.9	103.2	64.0	426.2	66.3										
Eastern	17.2	0.2	---	1.3	---	7.2	12.6	71.6	36.6	10.2										
Western	---	3.1	0.02	0.4	1.0	4.5	20.3	9.2	14.8	30.2										
Perryville	---	---	---	1.2	0.08	0.1	2.9	6.3	6.4	1.1										
Gear Total for Mgmt. Area***	870.4	662.9	399.6	1,163.7	1,972.2	1,576.3	1,047.9	860.0	1,839.5	1,522.5										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay											845.2	539.2	387.1	1,112.5	1,851.7	1,474.7	908.9	708.8	1,355.5	1,414.0
Central											8.0	120.4	12.4	48.3	119.5	89.9	103.2	64.0	426.2	66.3
Eastern											17.2	0.2	---	1.3	---	7.2	12.6	71.6	36.6	10.2
Western											---	3.1	0.02	0.4	1.0	4.5	20.3	9.2	14.8	30.2
Perryville											---	---	---	1.2	0.08	0.1	2.9	6.3	6.4	1.1
Gear Total for Mgmt. Area***											870.4	662.9	399.6	1,163.7	1,972.2	1,576.3	1,047.9	860.0	1,839.5	1,522.5

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 19. Commercial Harvest of Chum Salmon by Gear Type and District (in Thousands of Fish), Chignik Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay	7.3	17.3	21.1	19.2	8.6	15.0	32.2	19.9	38.1	16.0										
Central	0.2	13.5	3.2*	3.4	8.9	10.3	10.4	31.0	160.7	33.7										
Eastern	1.2	0.3	---	11.5(1)	11.5(1)	17.5	36.1	64.7	108.7	64.5										
Western	---	3.2	0.8	33.1	88.0	46.0	82.3	91.9	221.6	253.3										
Perryville	---	---	---	15.7	3.4	32.1	26.9	45.0	51.3	22.6										
Gear Total for Mgmt. Area ***	8.7	34.3	25.2	81.4	110.5	120.9	187.9	252.5	580.3	390.1										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay											7.3	17.3	21.1	19.2	8.6	15.0	32.2	19.9	38.1	16.0
Central											0.2	13.5	3.2	3.4	8.9	10.3	10.4	31.0	160.7	33.7
Eastern											1.2	0.3	---	11.5(1)	11.5(1)	17.5	36.1	64.7	108.7	64.5
Western											---	3.2	0.8	33.1	88.0	46.0	82.3	91.9	221.6	253.3
Perryville											---	---	---	15.7	3.4	32.1	26.9	45.0	51.3	22.6
Gear Total for Mgmt. Area ***											8.7	34.3	25.2	81.4	110.5	120.9	187.9	252.5	580.3	390.1

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) Catch combined for respective years to ensure confidentiality requirements.

Table 20. Commercial Harvest of Coho Salmon by Gear Type and District (in Thousands of Fish), Chignik Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay	22.3	11.1	52.4	34.4	16.8	14.5	53.0	49.8	35.6	132.4										
Central	0.0+**	0.4	0.3	0.2	0.2	0.02	3.0	4.1	8.7	6.6										
Eastern	0.02	---*	---	0.1	0.03(1)	0.03(1)	3.9	17.0	6.2	31.5										
Western	---	0.8	---	0.03	0.4	3.8	31.3	34.6	22.0	122.7										
Perryville	---	---	1.0(2)	1.0(2)	0.05	1.9	7.4	14.1	6.3	7.3										
Gear Total for Mgmt. Area ***	22.3	12.2	53.3	35.2	17.4	20.2	98.5	119.6	78.8	303.4										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay											22.3	11.1	52.4	34.4	16.8	14.5	53.0	49.8	35.6	132.4
Central											0.0+	0.4	0.3	0.2	0.2	0.02	3.0	4.1	8.7	6.6
Eastern											0.02	---	---	0.1	0.03(1)	0.03(1)	3.9	17.0	6.2	31.5
Western											---	0.8	---	0.03	0.4	3.8	31.3	34.6	22.0	122.7
Perryville											---	---	1.0(2)	1.0(2)	0.05	1.9	7.4	14.1	6.3	7.3
Gear Total for Mgmt. Area ***											22.3	12.2	53.3	35.2	17.4	20.2	98.5	119.6	78.8	303.4

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (2) Catch combined for respective years to ensure confidentiality requirements.

Table 21. Commercial Harvest of Chinook Salmon by Gear Type and District (in Thousands of Fish), Chignik Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay	0.5*	0.2	0.5 **	2.1	0.7	1.4	0.9	0.9	2.0	3.3										
Central	---	0.03	0.0+	0.02	0.01	0.05	0.1	0.1	0.3	0.04										
Eastern	0.0+	---	---	0.0+	---	0.02	0.0+	0.2	0.2	0.04										
Western	---	0.03	---	0.06	0.0+	0.1	0.2	0.7	0.1	1.4										
Perryville	---	---	---	0.08	0.0+	0.02	0.1	0.4	0.1	0.5										
Gear Total for Mgmt. Area ***	0.5	0.3	0.5	2.3	0.7	1.6	1.3	2.3	2.7	5.2										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Chignik Bay											0.5	0.2	0.5	2.1	0.7	1.4	0.9	0.9	2.0	3.3
Central											---	0.03	0.0+	0.02	0.01	0.05	0.1	0.1	0.3	0.04
Eastern											0.0+	---	---	0.0+	---	0.02	0.0+	0.2	0.2	0.04
Western											---	0.03	---	0.06	0.0+	0.1	0.2	0.7	0.1	1.4
Perryville											---	---	---	0.08	0.0+	0.02	0.1	0.4	0.1	0.5
Gear Total for Mgmt. Area ***											0.5	0.3	0.5	2.3	0.7	1.6	1.3	2.3	2.7	5.2

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 22. Commercial Harvest of Pink Salmon by Gear Type and District (in Thousands of Fish), Chignik Management Area

District	Purse Seine 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****
Chignik Bay	22.7	33.5	27.5	108.8	60.9	137.1	312.4	180.9	121.4	83.0										
Central	0.3	22.1	31.3*	16.6	120.0	61.2	275.2	79.3	210.0	80.6										
Eastern	2.5	0.6	---	29.1(1)	29.1(1)	86.8	292.4	501.9	173.3	89.1										
Western	---	13.4	7.4	135.8	379.0	419.3	744.6	216.5	433.6	602.4										
Perryville	---	---	---	105.2	44.6	280.8	271.4	114.6	224.3	18.3										
Gear Total for Mgmt. Area ***	25.4	69.5	66.2	395.3	604.8	985.1	1,896.0	1,093.2	1,162.6	873.4										

District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****	Total Harvest for All Gear Combined 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****
Chignik Bay											22.7	33.5	27.4	108.8	60.9	137.1	312.4	180.9	121.4	83.0
Central											0.3	22.1	31.3	16.6	120.0	61.2	275.2	79.3	210.0	80.6
Eastern											2.5	0.6	---	29.1(1)	29.1(1)	86.8	292.4	501.9	173.3	89.1
Western											---	13.4	7.4	135.8	379.0	419.3	744.6	216.5	433.6	602.4
Perryville											---	---	---	105.2	44.6	280.8	271.4	114.6	224.3	18.3
Gear Total for Mgmt. Area ***											25.4	69.5	66.2	395.3	604.8	985.1	1,896.0	1,093.2	1,162.6	873.4

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) Catch combined for respective years to ensure confidentiality requirements.

IV. ALASKA PENINSULA MANAGEMENT AREA

A. Management Objectives

The goal of the North Peninsula salmon fishery program is to achieve desired salmon escapement of all five species in both numbers and distribution, targeting on increased coverage of coho salmon escapements. The goal of the South Peninsula salmon fishery program is to 1) improve forecasting and returns for pink and chum salmon and increase coverage of coho escapements; 2) to allow a fishery targeting on the annual surplus of local stocks of pink, chum, and coho salmon; and 3) to allow an interception, or cape, fishery targeting on nonlocal stocks, primarily sockeye and chum salmon, which is held to acceptable exploitation rates as determined by the Board of Fisheries (ADF&G 1983b). The districts and statistical areas used in the Alaska Peninsula Management Area are listed in table 23.

B. Management Considerations

The fisheries on the Alaska Peninsula are managed by aerial surveys, two counting towers, commercial catch reports, forecasts, and stock

Table 23. Districts and Statistical Areas Used for Reporting Commercial Salmon Harvest in the Alaska Peninsula Management Area

District	Statistical Areas
Southeastern	281-10,20,31,32,33,34,35 282-10,11,12,13,21,22,23,24,25,26, 283-80,90
Southwestern	283-11,12,20,23,30,31,32,33,34,35, 41,42,51,52 284-60
Southcentral	283-61,62,63,64,65,70
Unimak	283-10 284-10,20,30,40,50,71,72
Northwestern	311-32,52,60 312-20,40
Northern	313-10,20,30 314-11,12,20,30 315-10,11,12,20 316-10,20 317-10,20 318-10,20

analyses (ADF&G 1983b; Shaul, pers. comm.). Mixed stocks of salmon bound for other systems have historically been intercepted in significant numbers along the Alaska Peninsula. Sockeye salmon heading for Bristol Bay and the North Peninsula are intercepted in June fisheries in South Unimak and the Shumagin Islands. Chignik River system sockeye salmon are intercepted at Stepovak and Balboa bays. The Alaska Board of Fisheries has established sockeye salmon guideline harvest levels to restrain the interception and to distribute the catches over the June runs. Other salmon species are harvested incidentally to the sockeye salmon harvest and cannot be regulated without more knowledge of the fishery (ADF&G 1983a).

C. Period of Use

The Alaska Peninsula salmon fishery opened in May or June and remained open until September 1983, but in some districts fishery periods are opened only by emergency order (ibid.).

D. Harvest Method

On both the North and South Peninsula, salmon may be taken commercially by set gill nets, drift gill nets, purse seine, and hand purse seines. The commercial harvest for the Alaska Peninsula Management Area is summarized by species over ten years in figure 3.

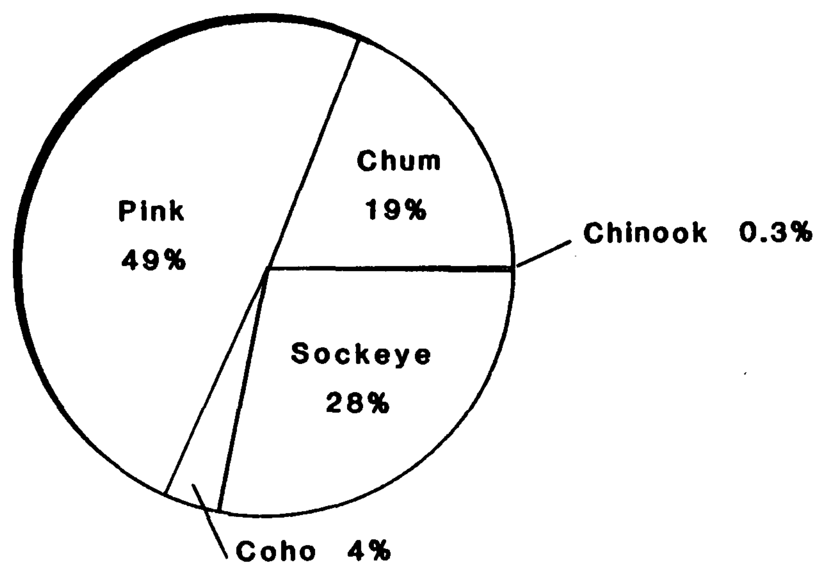

Figure 3. Commercial harvest in numbers of fish from 1973 through 1982 by species for the Alaska Peninsula Management Area.

E. Species Harvest

1. Sockeye salmon. Sockeye salmon are found in many drainages on the North Peninsula, and the fishery depends upon these local stocks. The South Peninsula sockeye salmon runs are small and the habitat, consisting of small lakes, is not adequate to produce large sockeye salmon runs (Shaul, pers. comm.). The harvest of sockeye salmon increased in 1978 for both the North and South Peninsula, and sockeye salmon is the main species harvested on the North Peninsula. On the South Peninsula, sockeye salmon are the second most abundant species in the catch. The value of the South Peninsula sockeye salmon catch during years when large numbers are taken is much more than any other species (Shaul, pers. comm.). The commercial catch data for 1973 through 1982 are presented in table 24.
2. Chum salmon. Chum salmon systems occur on both the North and South Peninsula. Large numbers of migrants are intercepted during June that are bound for Western Alaska (North Peninsula, Bristol Bay, Kuskokwim River, Yukon River, and Norton Sound) and probably for Asia (Shaul, pers. comm.). The 1981 North Peninsula chum salmon harvest was 331,000, and the runs were strong but down from the unusually large returns of 1980 and 1981 (ADF&G 1981b). The commercial catch data for 1973 through 1982 are presented in table 25.
3. Coho salmon. Coho salmon are harvested along the North Peninsula, mainly at Nelson Lagoon. Coho salmon runs on the South Peninsula are scattered and very small. Escapement data for coho salmon on the Alaska Peninsula are incomplete because of the late runs, their minor importance, and the lack of survey aircraft at that time of season. The 1982 North Peninsula coho salmon harvest was 238,000, the fourth consecutive record (ADF&G 1982c). The commercial catch data for 1973 through 1982 are presented in table 26.
4. Chinook salmon. Chinook salmon spawn along the North Peninsula; streams on the South Peninsula do not support chinook salmon. The fishery for chinook salmon on the Alaska Peninsula is minor. The commercial catch data for 1973 through 1982 are presented on table 27.
5. Pink salmon. Pink salmon are not abundant on the North Peninsula, and there is little fishing effort for pink salmon. On the South Peninsula, pink salmon are the major species harvested and since 1975 have contributed over half of the entire South Peninsula salmon harvest. The commercial catch data for 1973 through 1982 are presented in table 28.

V. ALEUTIAN ISLANDS MANAGEMENT AREA

A. Management Objectives

The goal of the Aleutians salmon fishery program is to continue to maintain the high Unalaska pink salmon production level, which sustains both a commercial and subsistence fishery, and to allow the development of salmon fisheries targeting on local stocks throughout the rest of the Aleutian Islands (ADF&G 1983b). The districts and

Table 24. Commercial Harvest of Sockeye Salmon by Gear Type and District (in Thousands of Fish), Alaska Peninsula Management Area

Purse Seine										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	35.9	63.0	49.4	74.5	56.6	116.8	335.7	688.3	469.6	510.9
Southcentral	0.06	0.06	0.05	4.4	6.5	2.5	2.2	2.8	9.4	2.8
Southwestern	38.2	7.3*	28.2	17.7	32.4	64.0	28.2	89.2	76.6	218.5
Unimak	18.2	---	15.8	25.4	9.8	17.2	467.5	2,024.2	694.1	704.8
Northwestern	---	---	3.0	20.1	33.8	39.9	63.0	41.2	40.7	28.2
Northern	---	---	---	---	---	---	0.1	45.0	1.1	1.1
Unknown	---	---	4.8	---	---	---	---	---	12.6	---
Gear Total for Mgmt. Area ***	56.7	70.4	101.2	142.0	139.1	240.4	896.8	2,890.7	1,304.1	1,466.3

Drift Gill Net										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	---	---	0.02	---	---	---	0.07	---	0.1(1)	0.1(1)
Southcentral	---	---	---	---	---	---	0.03	---	0.01	---
Southwestern	95.4	52.5	107.6	123.2	125.9	286.7	158.6	384.8	267.4	466.3
Unimak	121.1	---	39.3	69.7	38.3	52.6	38.9	247.5	427.2	292.8
Northwestern	---	---	---	0.7	0.9(2)	0.9(2)	8.8	0.2	0.1	0.8
Northern	---	---	192.2	556.9	374.2	716.9	1,633.7	1,094.7	1,522.8	1,220.7
Unknown	1.4	8.7	---	---	---	---	---	---	0.05	---
Gear Total for Mgmt. Area	217.9	61.2	339.2	750.5	540.2	1,056.3	1,840.4	1,727.2	2,217.7	1,980.5

Set Gill Net										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	54.5	69.7	3.0	57.5	37.8	37.1	114.9	152.6	258.5	127.9
Southcentral	0.5	4.4	---	1.7	3.4	0.1	2.5	0.6	2.7	0.3
Southwestern	5.1	---	0.9(2)	0.9(2)	0.9	2.4	1.4	22.8	32.0	23.7
Unimak	3.6	---	---	0.2	---	---	---	---	3.9	0.9
Northwestern	---	---	---	---	0.8(3)	0.8(3)	2.1	8.0	10.2	4.8
Northern	---	---	38.1	63.4	62.2	139.7	271.4	208.1	269.4	179.8
Unknown	5.4	0.6	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	69.1	74.7	41.3	123.6	104.5	179.3	392.2	392.2	576.7	337.5

Total Harvest for All Gear Combined										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	90.1	132.8	52.5	131.9	94.5	153.8	450.6	840.9	728.3	638.9
Southcentral	0.6	4.5	0.05	6.1	9.9	2.6	4.7	3.4	12.2	3.1
Southwestern	138.8	59.8	135.9	141.7	159.3	353.1	188.1	496.8	375.9	708.5
Unimak	142.8	---	55.1	95.3	48.1	69.8	506.5	2,271.8	1,125.2	998.5
Northwestern	---	---	3.0	20.7	34.6	40.1	73.9	49.4	51.0	33.7
Northern	---	---	230.3	620.4	437.4	856.6	1,905.3	1,347.8	1,793.3	1,401.5
Unknown	6.7	9.3	4.8	---	---	---	---	---	12.7	---
Gear Total for Mgmt. Area	343.6	206.3	481.7	1,016.2	783.7	1,476.0	3,129.4	5,010.1	4,098.5	3,712.3

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (3) Catch combined for respective years to ensure confidentiality requirements.

Table 25. Commercial Harvest of Chum Salmon by Gear Type and District (in Thousands of Fish), Alaska Peninsula Management Area

Purse Seine										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	68.3	49.3	34.8	103.6	36.6	230.8	189.9	469.8	708.1	755.7
Southcentral	24.8	0.8	28.6	73.6	81.5	107.1	97.8	165.6	229.6	235.9
Southwestern	65.2	1.3*	12.0	34.5	50.3	90.5	96.6	170.2	205.9	288.2
Unimak	10.9	---	7.3 **	26.7	3.6	3.0	17.4	348.5	338.2	355.0
Northwestern	---	---	0.0+	0.05	---	466.1	1.0	295.1	9.0	4.9
Northern	---	---	---	18.5(5)	18.5(5)	---	6.6	23.6	70.0	22.3
Unknown	---	---	0.4	---	---	---	---	---	1.8	---
Gear Total for Mgmt. Area***	106.1	51.4	87.0	282.1	232.1	561.9	437.4	1,533.9	1,900.3	1,750.2

Drift Gill Net										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	---	---	0.0+	---	---	---	0.0+	---	2.5(1)	2.5(1)
Southcentral	---	---	---	---	---	---	2.7	---	2.9(2)	2.9(2)
Southwestern	68.0	14.0	32.8	196.5	39.1	58.5	28.4	38.9	48.6	326.0
Unimak	108.3	---	13.7	93.2	44.9	34.6	15.8	56.0	137.8	190.4
Northwestern	---	---	---	0.04	---	0.1(3)	0.1(3)	---	---	0.1
Northern	---	---	4.3	17.6	5.3	22.6	21.0	263.5	230.4	187.3
Unknown	1.8	1.1	---	---	---	---	---	---	0.03	---
Gear Total for Mgmt. Area***	178.0	15.1	50.7	310.2	89.9	115.8	67.9	369.4	427.4	708.0

Set Gill Net										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	8.4	5.0	1.5	4.2	7.3	21.2	25.8	64.6	69.2	85.4
Southcentral	1.4	1.1	---	0.1	6.1	0.5	5.1	8.9	8.7	3.8
Southwestern	1.7	---	---	0.02	0.2	0.09	0.9	14.1	18.8	13.5
Unimak	2.2	---	---	0.2	---	---	---	---	0.6	0.1
Northwestern	---	---	---	---	---	4.0(4)	4.0(4)	2.8	0.06	0.05
Northern	---	---	0.6	9.2	16.2	6.2	7.8	45.6	50.9	26.4
Unknown	0.9	0.1	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area***	14.5	6.2	2.1	13.8	29.7	28.0	15.0	133.3	148.2	129.2

Total Harvest for All Gear Combined										
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	76.7	54.2	36.3	107.7	43.9	252.0	215.7	534.4	778.0	842.9
Southcentral	25.2	1.9	28.6	73.6	87.6	107.6	105.7	174.5	240.6	240.2
Southwestern	134.9	15.3	44.8	231.0	89.6	149.1	125.9	223.1	273.2	627.7
Unimak	121.3	---	21.0	120.1	48.6	37.6	33.1	404.5	476.6	545.5
Northwestern	---	---	3.9	46.0	42.9	130.7	30.3	367.5	355.5	95.1
Northern	---	---	4.9	27.6	39.2	28.8	35.4	332.7	351.3	236.0
Unknown	2.7	1.2	0.4	---	---	---	---	---	1.8	---
Gear Total for Mgmt. Area***	298.7	72.7	139.9	606.1	351.8	705.7	520.3	2,036.7	2,476.0	2,587.4

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (5) Catch combined for respective years to ensure confidentiality requirements.

Table 26. Commercial Harvest of Coho Salmon by Gear Type and District (in Thousands of Fish), Alaska Peninsula Management Area

District	Purse Seine										Drift Gill Net									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	6.2	8.1*	0.03**	0.04	1.0	44.3	328.2	237.9	135.7	210.0	---	---	---	---	---	---	---	---	---	---
Southcentral	0.08	---	0.0+	0.01	0.01	1.7	4.1	0.4	1.7	3.5	---	---	---	---	---	---	0.0+	---	0.01	---
Southwestern	5.9	0.0	---	---	0.02	11.9	14.0	11.4	17.8	6.0	0.05	1.1	---	0.0+	---	---	0.06	0.01	0.04	19.5
Unimak	0.06	---	---	---	---	---	0.0+	0.7	0.7	0.02	0.0+	---	0.0+	---	---	0.0+	---	---	0.0+	0.9
Northwestern	---	---	0.03	---	0.02	8.3	6.5	0.02	0.5	0.07	---	---	---	---	---	---	---	0.0+	---	---
Northern	---	---	---	---	---	---	---	---	---	---	---	---	17.1	12.4	21.7	41.6	64.8	77.9	65.2	125.0
Unknown	---	---	---	---	---	---	---	---	---	---	5.9	6.6	---	---	---	---	---	---	0.01	---
Gear Total for Mgmt. Area ***	12.3	8.1	0.06	0.05	1.1	66.1	352.8	250.3	156.4	219.6	6.0	7.7	17.1	12.4	21.7	41.6	64.8	78.1	65.3	145.4

District	Set Gill Net										Total Harvest for All Gear Combined									
	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	0.2	0.2	0.03	0.2	1.1	2.9	10.4	16.1	4.9	13.7	6.4	8.3	0.06	0.2	2.1	47.2	338.6	254.0	140.6	223.6
Southcentral	0.02	0.0+	---	---	0.0+	---	0.1	1.0	0.01	0.01	0.1	0.0+	0.0+	0.01	0.02	1.8	4.2	1.4	1.7	3.5
Southwestern	0.07	---	---	---	---	---	0.01	6.6	1.4	2.5	6.0	1.1	---	0.0+	0.02	11.9	14.0	18.1	19.2	28.0
Unimak	0.04	---	---	---	---	---	---	---	---	---	0.1	---	0.0+	---	---	0.0+	0.0+	0.7	0.7	0.9
Northwestern	---	---	---	---	---	---	0.01	0.1	---	0.0+	---	---	0.03	---	0.02	8.3	6.5	0.1	0.5	0.08
Northern	---	---	11.2	13.6	12.5	13.5	41.6	49.8	78.0	113.0	---	---	28.3	26.1	34.1	55.1	106.3	137.8	143.2	236.9
Unknown	1.1	0.1	0.8	---	---	---	---	---	---	---	7.1	7.4	---	---	---	---	---	---	0.01	---
Gear Total for Mgmt. Area ***	1.5	1.0	11.2	13.8	13.5	16.4	52.1	73.7	84.2	129.1	19.6	16.7	28.4	26.3	36.2	124.1	469.7	402.1	305.9	494.1

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 27. Commercial Harvest of Chinook Salmon by Gear Type and District (in Thousands of Fish), Alaska Peninsula Management Area

District	Purse Seine 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	0.3*	0.5	0.02	0.3	0.1	0.5	1.4	1.7	5.4	3.7
Southcentral	---	---	---	0.0+	0.0+	0.0+	0.0+	0.0+	0.01	0.03
Southwestern	0.3 **	0.0+	0.01	0.1	0.0+	0.06	0.04	0.03	0.1	0.7
Unimak	0.0+	---	0.0+	0.08	0.0+	0.02	0.2	2.4	2.8	2.3
Northwestern	---	---	---	---	0.0+	0.0+	0.0+	0.0+	0.0+	0.0+
Northern	---	---	---	---	---	---	0.0+	0.0+	0.0+	0.0+
Unknown	---	---	---	---	---	---	---	---	0.03	---
Gear Total for Mgmt. Area ***	0.5	0.5	0.03	0.5	0.2	0.5	1.6	4.2	8.4	6.8

District	Drift Gill Net 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	---	---	---	---	---	---	---	---	---	---
Southcentral	---	---	---	---	---	---	---	---	---	---
Southwestern	0.06	0.02	0.06	1.5	0.3	0.1	0.3	0.3	0.7	2.0
Unimak	0.07	---	0.02	0.1	0.09	0.06	0.08	0.1	0.6	0.7
Northwestern	---	---	---	0.0+	---	---	---	---	0.0+	---
Northern	---	---	1.0	2.6	2.9	9.6	9.2	10.5	11.4	17.8
Unknown	1.9	2.5	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	2.0	2.5	1.1	4.2	3.3	9.8	9.6	11.0	12.7	20.5

District	Set Gill Net 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	0.01	0.04	0.0+	0.06	0.02	0.04	0.1	0.1	1.2	0.4
Southcentral	---	0.0+	---	0.0+	0.0+	0.0+	0.0+	0.0+	0.0+	0.0+
Southwestern	0.0+	---	---	0.0+	---	---	---	0.03	0.3	0.1
Unimak	0.0+	---	---	---	---	---	---	---	0.0+	0.0+
Northwestern	---	---	---	---	---	---	---	---	0.0+	0.0+
Northern	---	---	1.1	2.4	2.6	4.6	7.9	6.2	7.4	12.2
Unknown	0.05	0.1	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	0.06	0.2	1.1	2.4	2.6	4.7	8.0	6.4	9.0	12.7

District	Total Harvest for All Gear Combined 1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	0.3	0.6	0.02	0.4	0.2	0.5	1.5	1.8	6.6	4.1
Southcentral	---	0.0+	---	0.0+	0.0+	0.01	0.0+	0.01	0.02	0.3
Southwestern	0.3	0.02	0.08	1.6	0.3	0.2	0.4	0.4	1.2	2.8
Unimak	0.09	---	0.03	0.2	0.09	0.08	0.2	2.6	3.4	3.0
Northwestern	---	---	---	0.0+	0.0+	0.0+	0.0+	0.0+	0.01	0.01
Northern	---	---	2.1	4.9	5.5	14.2	17.1	16.8	85.9	30.1
Unknown	1.9	2.6	---	---	---	---	---	---	0.03	---
Gear Total for Mgmt. Area ***	2.6	3.2	2.2	7.1	6.0	15.0	19.2	21.6	30.1	40.0

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 28. Commercial Harvest of Pink Salmon by Gear Type and District (in Thousands of Fish), Alaska Peninsula Management Area

Purse Seine

District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	34.7	76.1	4.1	579.3	166.6	1,926.2	3,270.4	2,364.4	2,300.1	3,130.1
Southcentral	6.4	10.1	27.0	1,456.9	982.8	2,254.8	1,579.8	457.6	1,911.7	1,542.9
Southwestern	26.7	3.0	27.3	310.9	281.2	1,363.7	1,564.7	3,812.7	393.2	1,106.3
Unimak	5.0	---*	1.1	7.1	0.4	8.6	34.3	1,091.1	300.6	614.9
Northwestern	---	---	0.0+**	0.05	---	466.1	1.0	295.1	9.0	4.9
Northern	---	---	---	---	---	---	0.0+	0.1	0.0+	---
Unknown	---	---	0.1	---	---	---	---	---	2.9	---
Gear Total for Mgmt. Area ***	72.6	89.1	59.7	2,354.2	1,431.1	6,019.3	6,450.1	8,021.1	4,917.5	6,399.2

Drift Gill Net

District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	---	---	---	---	---	---	4.3	---	1.0(1)	1.0(1)
Southcentral	---	---	---	---	---	---	5.9	---	19.1(2)	19.1(2)
Southwestern	4.1	1.6	0.09	5.5	0.6	5.5	16.2	3.6	5.1	45.2
Unimak	3.5	---	0.05	1.3	0.9	1.9	1.3	0.2	2.5	1.6
Northwestern	---	---	---	0.04	---	0.1(3)	0.1(3)	---	---	0.1
Northern	---	---	0.3	0.5	0.6	17.1	1.5	3.5	78.9	6.9
Unknown	---	0.0+	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area	7.6	1.6	0.4	7.4	2.2	24.5	29.3	7.3	92.6	67.8

Set Gill Net

District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	3.6	8.5	1.0	5.5	6.0	22.9	73.6	50.7	101.4	100.4
Southcentral	0.1	1.3	---	0.2	10.0	6.5	11.4	10.1	3.2	4.2
Southwestern	0.8	---	---	0.08	---	0.03	3.0	38.5	8.9	13.8
Unimak	0.7	---	---	---	---	---	---	---	0.2	---
Northwestern	---	---	---	---	---	4.5(4)	4.5(4)	2.8	0.06	0.05
Northern	---	---	0.01	0.1	0.2	0.3	0.1	0.1	0.3	0.3
Unknown	0.0+	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	5.2	9.9	1.0	5.9	16.3	31.5	90.5	102.3	114.0	118.8

Total Harvest for All Gear Combined

District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Southeastern	38.4	84.6	5.1	584.8	172.7	1,949.4	3,348.3	2,415.1	2,401.6	3,231.5
Southcentral	6.5	11.3	27.0	1,457.1	992.9	2,261.3	1,597.1	467.8	1,921.1	1,560.1
Southwestern	31.7	4.7	27.4	316.5	281.9	1,369.2	1,584.0	3,854.8	407.1	1,165.4
Unimak	9.1	---	1.1	8.5	1.3	9.9	35.6	1,091.4	303.2	616.5
Northwestern	---	---	0.0+	0.09	---	467.8	3.4	297.9	9.1	5.1
Northern	---	---	0.3	0.6	0.9	17.4	1.6	3.7	79.1	7.2
Unknown	0.0+	0.0+	0.1	---	---	---	---	---	2.9	---
Gear Total for Mgmt. Area	85.4	100.6	71.1	2,367.5	1,449.5	6,703.4	6,569.9	8,130.7	5,124.1	6,585.9

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

(1) to (4) Catch combined for respective years to ensure confidentiality requirements.

statistical areas used in the Aleutian Islands Management Area are listed in table 29.

B. Management Considerations

The salmon fisheries in the Aleutians have been managed with the aid of aerial surveys that are limited by funding and logistics. With only one year of escapement data (Holmes 1982), except for Unalaska Island, the stock status is difficult to assess. The management program for the Aleutian Islands has been hampered by inclement weather, great distances among potential fisheries, and limited accessibility.

C. Period of Use

The Aleutians fishery ran from June to July through September 1983 and was regulated by emergency order from mid July through September (ADF&G 1983a).

D. Method of Harvest

Salmon may be taken commercially in the Aleutians by purse seine, hand purse seine, and beach seine. Most of the catch is taken by hand purse seine, with some taken by beach seine (Shaul, pers. comm.). The commercial harvest for the Aleutian Islands Management Area is summarized by species over 10 years in figure 4.

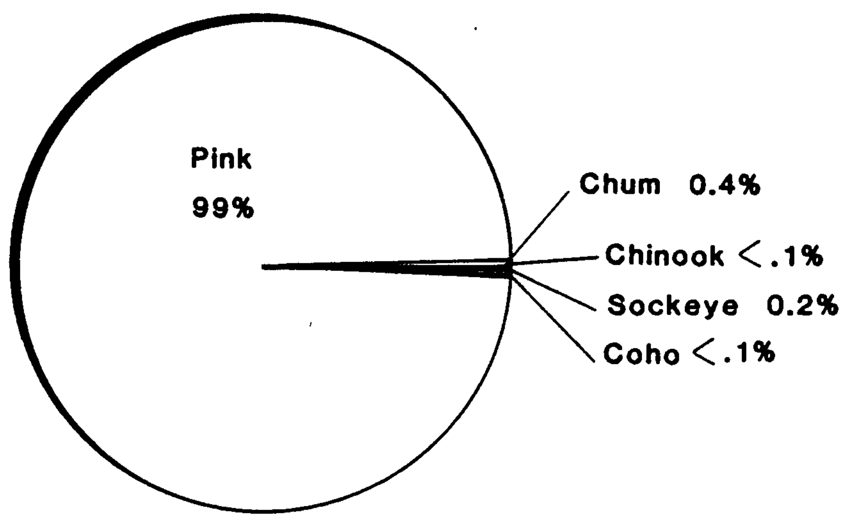

Figure 4. Commercial harvest in numbers of fish from 1973 through 1982 by species for the Aleutian Islands Management Area.

Table 29. Districts and Statistical Areas Used for Reporting Commercial Salmon Harvest in the Aleutian Islands Management Area

District	Statistical Areas
Akutan	302-15,16,17,18,19
Unalaska	302-21,22,23,24,25,30,31,50,51,60,70,80,90
Umnak	303-10,21,22,31,32,35 304-11,15,21,22 305-11,21,22,31,32,41,42,51,52,53
Adak	306-11,16,20,30,40,50,70 307-11,12,16,21,23,24,27 308-11,12,16,17,22,26,31,32,36,37,42,46 309-11,12,13,14,15,21,22,23,25,32,33,36,41,42

E. Species Harvest

1. Sockeye salmon. Sockeye salmon runs in the Aleutians are numerous but small. Sockeye salmon are the second in importanance to pink salmon in the commercial harvest, and all the catch comes from Unalaska. The pink fishery is separate from the sockeye salmon season. The harvests have ranged from 1,800 fish in 1978 to a high of 19,400 fish in 1975. The commercial catch data for 1973 through 1982 are presented in table 30.
2. Chum salmon. Chum salmon are the third most important commercial species in the Aleutians. Historical catch data indicate no potential for significant chum salmon runs in the Aleutians (ADF&G 1977a). The harvests have ranged from less than 10 fish in 1978 to a high of 6,600 fish in 1981. The commercial catch data for 1973 through 1982 are presented in table 31.
3. Coho salmon. Coho salmon utilize a few streams on Unalaska Island. Only a few coho salmon are caught commercially. The harvests have ranged from less than 10 fish in 1980 to 200 fish in 1981. The commercial catch data for 1973 through 1982 are presented on table 32.
4. Chinook salmon. The streams in the Aleutians do not support chinook salmon. Only a few chinook salmon appear in the commercial catch and are probably migrating to other areas. The commercial catch data for 1973 through 1982 are presented in table 33.
5. Pink salmon. Pink salmon are the most important species commercially in the Aleutians, and all are caught in the

Table 30. Commercial Harvest of Sockeye Salmon by Gear Type and District (in Thousands of Fish), Aleutian Islands Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****
Akutan	---*	---	---	---	---	---	---	---	---	---										
Unalaska	---	---	19.4	---	---	1.8	12.2	9.2	5.4	2.7										
Umnak	---	---	---	---	---	---	---	---	---	---										
Adak	---	---	---	---	---	---	---	---	---	---										
Gear Total for Mgmt. Area ***	---	---	19.4	---	---	1.8	12.2	9.2	5.4	2.7										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****
Akutan											---	---	---	---	---	---	---	---	---	---
Unalaska											---	---	19.4	---	---	1.8	12.2	9.2	5.4	2.7
Umnak											---	---	---	---	---	---	---	---	---	---
Adak											---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***													19.4			1.8	12.2	9.2	5.4	2.7

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 31. Commercial Harvest of Chum Salmon by Gear Type and District (in Thousands of Fish), Aleutian Islands Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Akutan	---*	---	---	---	---	---	---	---	---	---										
Unalaska	---	---	1.9	---	---	0.0+**	0.2	4.9	6.6	6.1										
Umnak	---	---	---	---	---	---	---	---	---	---										
Adak	---	---	---	---	---	---	---	---	---	---										
Gear Total for Mgmt. Area ***	---	---	1.9	---	---	0.0+**	0.2	4.9	6.6	6.1										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Akutan											---	---	---	---	---	---	---	---	---	---
Unalaska											---	---	1.9	---	---	0.0+	0.2	4.9	6.6	6.1
Umnak											---	---	---	---	---	---	---	---	---	---
Adak											---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***											---	---	1.9	---	---	0.0+	0.2	4.9	6.6	6.1

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 32. Commercial Harvest of Coho Salmon by Gear Type and District (in Thousands of Fish), Aleutian Islands Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Akutan	---*	---	---	---	---	---	---	---	---	---										
Unalaska	---	---	---	---	---	---	---	0.0+**	0.2	0.03										
Umnak	---	---	---	---	---	---	---	---	---	---										
Adak	---	---	---	---	---	---	---	---	---	---										
Gear Total for Mgmt. Area ***	---	---	---	---	---	---	---	0.0+	0.2	0.03										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Akutan											---	---	---	---	---	---	---	---	---	---
Unalaska											---	---	---	---	---	---	---	0.0+	0.2	0.03
Umnak											---	---	---	---	---	---	---	---	---	---
Adak											---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***											---	---	---	---	---	---	---	0.0+	0.2	0.03

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 33. Commercial Harvest of Chinook Salmon by Gear Type and District (in Thousands of Fish), Aleutian Islands Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Akutan	---*	---	---	---	---	---	---	---	---	---										
Unalaska	---	---	---	---	---	---	---	0.0+**	0.02	---										
Umnak	---	---	---	---	---	---	---	---	---	---										
Adak	---	---	---	---	---	---	---	---	---	---										
Gear Total for Mgmt. Area ***	---	---	---	---	---	---	---	0.0+**	0.02	---										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Akutan											---	---	---	---	---	---	---	---	---	---
Unalaska											---	---	---	---	---	---	---	0.0+	0.02	---
Umnak											---	---	---	---	---	---	---	---	---	---
Adak											---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***											---	---	---	---	---	---	---	0.0+	0.02	---

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Unalaska Bay, Makuskin Bay, and Kashega Bay sections of the Unalaska District. There was essentially no fishery from 1973 through 1978 either because fishing was more attractive elsewhere or no markets were available for salmon in the Aleutians. In even years, when a strong pink salmon return is expected at Unalaska, part of the South Peninsula purse seine fleet may move to Unalaska about July 20 and stay there until the end of the season in mid August. Even-year pink salmon runs dominate at Unalaska, where 2.6 million were harvested in 1980 and 1.4 million in 1982 (ADF&G 1982c). The commercial catch data for 1973 through 1982 are presented in table 34.

VI. BRISTOL BAY MANAGEMENT AREA

A. Management Objectives

The goal of the Bristol Bay salmon fishery is to achieve and maintain that level of sustained production the fishery has demonstrated it is capable of attaining. This goal can be achieved through 1) perpetuation of the Kvichak River system's five-year sockeye cycle by a managerial strategy that adjusts escapement goals to the varying magnitude of the runs; 2) stock-specific management capability for chinook, coho, pink, and sockeye salmon runs; 3) achieving escapement objectives; 4) in-season run strength assessment; and 5) accurate long-range forecasts (ADF&G 1983b). The districts and statistical areas used in the Bristol Bay Management Area are listed in table 35.

B. Management Considerations

Management of the Bristol Bay stocks has been complicated by the Japanese high seas fishery. Several species of salmon were impacted, and chinook and sockeye salmon harvests from the inshore run began a downward trend in 1972, just as the Japanese harvest in the Bering Sea increased (ADF&G 1977a). More recently, the drastic increase in the interception of chinook salmon in 1980 by the high seas mothership fleet was of particular concern. Japan voluntarily agreed to limit chinook salmon harvests for a three-year period from 1981 through 1983 (ADF&G 1982a). The impact of this foreign fishery has been greatly reduced in recent years as a result of the 1976 Magnuson Fishery Conservation and Management Act (MFCMA), which established a Fisheries Conservation Zone from 3 to 200 mi offshore from the United States coastline. This act has enabled the United States to exercise area and time prohibitions against foreign fishing fleets to minimize the interception of Bristol Bay salmon. The real significance of this act can be appreciated by noting that during four "sets" of years (1956-1957, 1960-1961, 1965-1966, 1970-1971) prior to its introduction, when sockeye salmon were most abundant, the high seas catch averaged 4.1 million Bristol Bay sockeye salmon; whereas in the 1978-1980 period of record runs the high seas interception averaged only 521,000 sockeyes for each of the five years (Middleton 1983).

Table 34. Commercial Harvest of Pink Salmon by Gear Type and District (in Thousands of Fish), Aleutian Islands Management Area

	Purse Seine																			
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****
Akutan	---*	---	---	---	---	---	---	---	---	---										
Unalaska	---	---	0.7	---	---	38.1	539.4	2,597.5	3.0	1,447.8										
Umnak	---	---	---	---	---	---	---	---	---	---										
Adak	---	---	---	---	---	---	---	---	---	---										
Gear Total for Mgmt. Area ***	---	---	0.7	---	---	38.1	539.4	2,597.5	3.0	1,447.8										

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****
Akutan											---	---	---	---	---	---	---	---	---	---
Unalaska											---	---	0.7	---	---	38.1	539.4	2,597.5	3.0	1,447.8
Umnak											---	---	---	---	---	---	---	---	---	---
Adak											---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***											---	---	0.7	---	---	38.1	539.4	2,597.5	3.0	1,447.8

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 35. Districts and Statistical Areas Used for Reporting Commercial Salmon Harvest in the Bristol Bay Management Area

District	Statistical Areas
Ugashik	321-00
Egegik	322-00
Naknek-Kvichak	324-10,20
Nushagak	325-10,20,30
Togiak	326-10,20,30,40,70
General*	320

* General district was used only in 1970 & 1980.

C. Period of Use
The 1983 salmon fishery in Bristol Bay was open from May through September. From mid June to mid July, fishing periods are managed on an emergency order basis to achieve escapement objectives in eight river systems (ADF&G 1983a).

D. Harvest Method
Salmon may be taken commercially in Bristol Bay by drift gill nets and set gill nets. The commercial harvest for the Bristol Bay Management Area is summarized by species over a 10-year period in figure 5.

E. Species Harvest

1. Sockeye salmon. Bristol Bay is world-renowned for sockeye salmon production, with the Kvichak River system the largest producer. From 1921 to 1939 the production average was 17.5 million sockeye salmon. The production pattern from 1940 to 1960 changed dramatically. Not only did the overall production decrease 54% during this 20-year period, but the production sequence changed from a five-year cycle to a four-year cycle. The 1960 parent year, with a Kvichak River escapement of 14.6 million fish reestablished the historic five-year peak cycle pattern, and sockeye salmon increased after 1960. The 1980 sockeye salmon catch could easily have broken the record year of 1938 had there not been a price dispute. Escapement totals in 1980 were the highest on record. The strong sockeye salmon run in 1981, which was not burdened by a price dispute, saw a record harvest of 25.7 million sockeye salmon, which broke the prior record set in 1938 (Middleton 1983). In 1983, an early price settlement and extremely strong sockeye salmon returns resulted in another record harvest of 37.3 million sockeye salmon (ADF&G 1984).

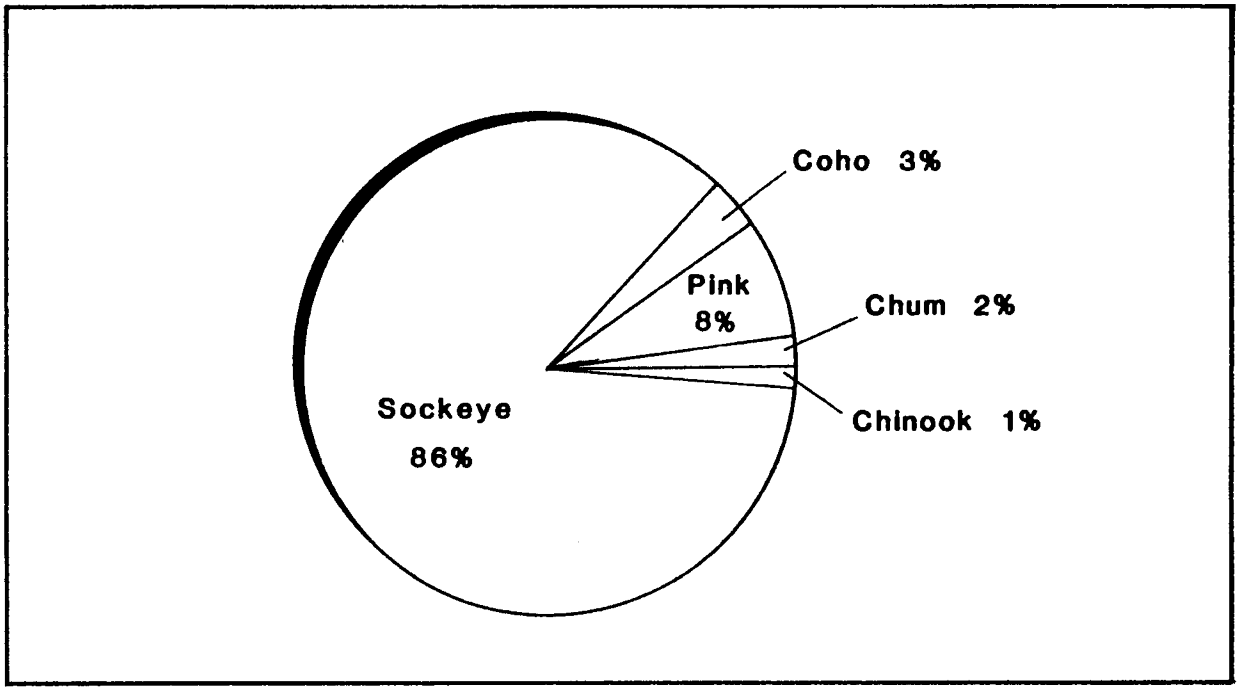

Figure 5. Commercial harvest in numbers of fish from 1973 through 1982 by species for the Bristol Bay Management Area.

Historically, the Nushagak District was the second most productive system in Bristol Bay, averaging a 5 million sockeye salmon catch for 20 years (1899 to 1918), nearly 2.8 million for the following 30 years, and finally dropping to an 882,000 average in the 29 years from 1949 to 1977. Only in the past five years during recent times has the Nushagak District catch reached the historical sustained level (Middleton 1983).

The Egegik District has demonstrated relatively stable production throughout its history, except during World War II, when fishing effort was down. The drastic decline of 1973 and 1974 was reflected throughout Bristol Bay. Historical high catches for Egegik are relatively recent, occurring in 1965 and 1981, with 3.2 and 4.5 million fish, respectively (ibid.).

The Ugashik District represents a different pattern, one more difficult to characterize or explain. Even from 1946 to 1954, with fairly high sustained levels of escapement, catches in subsequent years were quite low. This erratic behavior for the Ugashik District also poses particular difficulties in forecasting runs based on parent-year escapements. Production was depressed from 1972 through 1978, and it rebounded significantly during the period from 1979 through 1982 (ibid.).

The Togiak District fishery is the most recent in Bristol Bay, dating from 1954. Based on the average total run of 402,000 sockeye salmon, this system is producing at a sustained high rate, with no indications of problems. Production has exceeded the average for the last seven consecutive years (ibid.). The 1973 through 1982 commercial catch data for Bristol Bay sockeye salmon are presented in table 36.

2. Chum salmon. The chum salmon is the third most abundant in Bristol Bay. Harvest is incidental to the sockeye salmon fishery. Overall production, catch plus escapement, for 1976 to 1982 has averaged 1.7 million fish annually, compared to the previous nine-year average of 742,000 fish. The Nushagak District of Bristol Bay has accounted for 52% of the chum salmon production since 1960. The Togiak and Naknek-Kvichak districts rank second in harvest levels, with the remainder evenly divided between the Egegik and Ugashik districts. Catches have increased significantly since 1976, averaging 1.2 million fish annually, or nearly three times the historical average (ibid.). The commercial catch data for 1973 through 1982 are presented in table 37.

3. Coho salmon. Fewer coho salmon are caught in Bristol Bay than any other species of salmon. Low numbers and their lateness in the season have kept canneries from operating for coho salmon after the sockeye salmon season. Historically, most of the catch has come from the Nushagak District. In recent years, catches in the Togiak District have increased to match Nushagak production. Although catches for the two districts have been similar since 1966, the Nushagak District watershed supports the larger coho salmon population. It is believed that the Nushagak District stocks have the potential for a high sustained production comparable to 1980-1981 levels and that the recent high catches in the Togiak District cannot be sustained (ibid.). The commercial catch data for 1973 through 1982 are presented in table 38.

4. Chinook salmon. The chinook salmon is the fourth most abundant in Bristol Bay. After 1969, when salmon in Bristol Bay were bought by the pound rather than by the fish, chinook salmon have ranked close to sockeye and coho salmon in value. Chinook salmon are less abundant than pink or chum salmon, but their size makes them more valuable to the fishery (ibid.).

   Conflicts between user groups have begun to develop in recent years, and they can be expected to continue and probably increase as the sport fishery continues to grow in use of Nushagak District chinook salmon stocks. Very little effort has been directed toward sport fishing harvest trends and related use patterns (ADF&G 1977a). The commercial catch data for 1973 through 1982 are presented in table 39.

5. Pink salmon. The pink salmon is the second most abundant in Bristol Bay in even years, but odd-year production is very low. No significant odd-year run has occurred since 1918, and the

Table 36. Commercial Harvest of Sockeye Salmon by Gear Type and District (in Thousands of Fish), Bristol Bay Management Area

	Drift Gill Net										Set Gill Net									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Ugashik	3.0	0.8	11.7	158.3	83.5	7.3	328.2	708.8	1,884.1	1,013.6	0.9	1.3	2.9	16.7	9.1	0.7	61.5	107.6	231.9	148.4
Egegik	199.0	134.4	866.7	1,204.0	1,563.9	1,008.6	1,755.7	1,680.2	3,349.5	2,074.7	22.4	37.9	97.3	125.8	216.7	196.7	501.1	748.4	1,011.9	436.4
Naknek-Kvichak	148.5	439.1	2,888.8	2,363.0	1,955.9	4,651.0	13,548.1	12,329.7	9,732.0	4,503.9	19.7	99.0	197.8	184.3	711.3	472.7	1,443.5	1,666.0	1,260.8	659.1
Nushagak	252.2	371.2	518.2	1,070.7	529.4	2,666.0	2,712.9	3,801.8	6,098.7	5,619.3	19.9	139.4	127.8	194.7	89.6	471.1	614.2	696.0	1,393.3	611.7
Togiak	95.0	127.3	174.1	276.8	195.5	377.9	375.7	527.8	504.3	498.3	0.7	12.1	14.8	25.1	22.9	74.1	85.3	114.0	136.4	95.9
General	---*	---	---	---	---	---	---	1,380.4	---	---	---	---	---	---	---	---	---	8.2	---	---
Gear Total for Mgmt. Area ***	697.7	1,072.8	4,459.4	5,072.8	4,328.2	8,710.8	18,720.5	20,428.7	21,568.6	13,709.8	63.6	289.7	440.7	546.5	549.6	1,217.3	2,705.6	3,340.3	4,034.4	1,951.6

									Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Ugashik									3.9	2.2	14.6	174.9	92.6	8.0	389.7	816.4	2,116.1	1,162.0
Egegik									221.4	172.3	964.0	1,329.8	1,780.6	1,207.3	2,256.7	2,428.7	4,361.4	2,511.0
Naknek-Kvichak									168.2	538.2	3,086.7	2,547.3	2,167.2	5,123.7	14,991.5	13,995.7	10,992.8	5,163.0
Nushagak									272.1	510.6	645.9	1,265.4	619.0	3,137.2	3,327.1	4,497.8	7,492.0	6,231.0
Togiak									95.7	139.4	188.9	301.9	21.85	452.0	461.0	641.8	640.7	594.2
General									---	---	---	---	---	---	---	1,388.6	---	---
Gear Total for Mgmt. Area ***									761.3	1,362.5	4,900.1	5,619.3	4,877.9	9,928.1	21,426.1	23,769.0	25,603.0	15,661.3

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 37. Commercial Harvest of Chum Salmon by Gear Type and District (in Thousands of Fish), Bristol Bay Management Area

District	Drift Gill Net 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****	Set Gill Net 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****
Ugashik	5.8	1.7	1.5	9.0	4.2	1.4	10.6	29.8	32.2	17.3	0.3	0.6	0.1	0.9	0.3	0.08	1.5	4.6	4.1	1.7
Egegik	19.7	2.9	3.3	41.2	71.7	36.6	27.7	46.4	64.6	12.7	3.3	1.1	0.8	5.7	11.4	7.9	10.3	28.0	23.0	6.3
Naknek-Kvichak	112.3	33.3	69.9	294.8	307.8	160.3	167.2	158.0	298.1	27.7	11.2	8.1	8.6	22.7	32.4	25.1	29.2	35.6	57.8	7.5
Nushagak	326.2	155.3	145.4	789.8	883.9	639.8	424.7	661.6	779.5	99.3	10.1	2.6	7.4	11.3	15.8	11.9	15.6	20.3	15.7	14.7
Togiak	194.6	78.7	84.0	146.7	259.3	258.9	204.3	269.7	209.2	135.1	0.8	2.0	3.1	6.8	11.3	16.1	15.6	30.0	20.6	15.8
General	---*	---	---	---	---	---	---	17.0	---	---	---	---	---	---	---	---	---	0.1	---	---
Gear Total for Mgmt. Area ***	658.7	272.0	304.1	1,281.6	1,526.9	1,097.0	834.5	1,182.4	1,383.7	292.1	25.8	14.4	20.0	47.5	71.3	61.1	72.3	118.6	121.1	45.9

District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****	Total Harvest for All Gear Combined 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982****
Ugashik											6.1	2.3	1.6	9.9	4.5	1.4	12.2	34.4	36.3	19.0
Egegik											23.1	4.0	4.1	47.0	83.1	44.5	38.0	74.4	87.6	18.9
Naknek-Kvichak											123.6	41.3	78.5	317.6	340.2	185.5	196.4	193.6	355.9	35.2
Nushagak											336.3	157.9	152.7	801.1	899.7	651.7	440.3	681.9	795.1	113.9
Togiak											195.4	80.7	87.1	153.6	270.6	275.0	219.9	299.7	229.8	150.8
General											---	---	---	---	---	---	---	17.1	---	---
Gear Total for Mgmt. Area ***											684.5	286.4	324.1	1,329.1	1,598.2	1,158.1	906.8	1,301.0	1,504.8	338.1

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 38. Commercial Harvest of Coho Salmon by Gear Type and District (in Thousands of Fish), Bristol Bay Management Area

	Drift Gill Net										Set Gill Net									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Ugashik	1.7	1.5	4.5	0.5	0.4	0.2	9.3	14.1	15.4	5.8	0.6	2.5	0.1	3.1	3.5	0.04	8.5	5.3	14.9	22.5
Egegik	1.8	0.5	0.7	0.6	2.7	1.2	6.8	3.5	5.8	30.1	0.8	0.6	0.3	1.8	---*	1.1	8.3	19.0	26.9	45.2
Naknek-Kvichak	0.2	0.5	0.02	0.9	2.5	0.8	7.2	3.4	0.5	2.0	0.02	0.4	0.03	0.3	0.4	0.1	5.1	4.4	0.7	8.7
Nushagak	16.8	6.4	2.6	3.1	42.9	31.8	102.7	119.7	245.3	297.5	12.0	6.2	4.8	3.7	9.6	12.9	26.9	28.0	37.6	53.6
Togiak	22.5	23.8	29.4	11.6	41.0	36.0	107.0	130.6	23.1	121.6	0.7	1.2	3.9	1.2	4.3	8.4	12.4	20.4	6.1	12.2
General	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	42.9	32.8	37.1	16.7	89.4	71.7	233.1	271.4	290.1	457.0	14.1	10.9	9.1	10.0	17.8	22.5	61.3	77.1	86.2	142.3

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Ugashik											2.3	4.1	4.6	3.6	3.9	2.0	17.9	19.4	30.2	28.3
Egegik											2.6	1.2	1.0	2.3	2.7	2.3	15.1	22.5	32.8	75.3
Naknek-kvichak											0.3	0.9	0.04	1.2	2.9	0.9	12.4	7.8	1.2	10.7
Nushgak											28.7	2.6	7.4	6.8	52.6	44.7	129.6	147.7	282.9	351.1
Togiak											23.1	25.0	33.3	12.8	45.2	44.3	119.4	151.0	29.2	133.8
General											---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***										57.0	43.7	46.3	26.6	107.2	94.3	294.4	348.5	376.3	599.3	

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 39. Commercial Harvest of Chinook Salmon by Gear Type and District (in Thousands of Fish), Bristol Bay Management Area

District	Drift Gill Net 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****	Set Gill Net 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****
Ugashik	0.1	1.1	0.1	0.2	2.1	5.9	8.9	4.5	3.2	6.3	0.2	0.1	0.0+**	0.1	0.05	0.3	0.6	0.1	0.3	0.9
Egegik	1.2	0.7	0.2	0.9	3.2	2.2	3.9	1.6	2.8	3.0	0.2	0.4	0.08	0.3	0.05	1.0	1.6	3.8	2.7	2.4
Naknek-Kvichak	0.6	0.4	0.7	2.9	2.4	5.0	8.5	4.0	7.3	9.6	0.4	0.1	0.3	1.2	1.9	1.9	1.9	3.2	3.8	4.7
Nushagak	29.8	31.7	21.0	57.6	84.3	117.3	151.5	63.3	183.3	188.4	0.7	0.3	0.5	3.1	0.8	4.3	5.8	1.7	10.2	10.7
Togiak	10.8	10.4	7.0	28.4	33.9	54.5	27.9	10.7	20.8	31.2	0.02	0.4	0.3	1.4	1.3	2.5	2.1	1.8	3.1	2.6
General	---*	---	---	---	---	---	---	0.7	---	---	---	---	---	---	---	---	---	0.08	---	---
Gear Total for Mgmt. Area ***	42.5	44.3	28.9	90.0	125.9	184.9	200.8	84.8	217.3	238.5	1.5	1.4	1.1	6.0	4.7	6.7	12.1	10.7	20.0	21.2

District	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****	Total Harvest for All All Gear Combined 1973	1974	1975	1976	1977	1978	1979	1980	1981	1982 ****
Ugashik											0.3	1.2	0.1	0.3	2.2	5.9	9.6	4.7	3.4	7.3
Egegik											1.5	1.1	0.2	1.1	3.7	3.1	5.5	5.4	5.5	5.4
Naknek-Kvichak											1.0	0.5	1.0	4.1	4.4	6.9	10.4	7.2	11.0	14.2
Nushagak											30.5	32.1	21.5	60.7	85.1	118.5	157.3	65.0	193.4	199.0
Togiak											10.9	10.8	7.2	29.7	35.2	57.0	30.0	12.5	23.9	33.8
General											---	---	---	---	---	---	---	0.8	---	---
Gear Total for Mgmt. Area ***											44.0	45.7	30.0	96.0	130.5	191.5	212.9	95.5	237.3	259.7

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

Table 40. Commercial Harvest of Pink Salmon by Gear Type and District (in Thousands of Fish), Bristol Bay Management Area

	Drift Gill Net										Set Gill Net									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Ugashik	---*	0.2	0.0+**	0.05	---	0.3	---	---	0.0+	0.2	0.0+	0.2	---	0.07	0.0+	0.3	0.0+	0.05	0.02	0.03
Egegik	0.06	1.8	0.0+	2.4	---	7.2	---	1.2	0.04	0.9	---	2.6	0.0+	1.7	---	4.2	0.0+	1.3	0.2	1.1
Naknek-Kvichak	0.04	446.3	---	234.4	0.0+	633.3	0.05	229.3	0.04	80.0	0.0+	62.2	0.0+	30.2	0.01	101.6	0.09	59.0	0.2	48.3
Nushagak	0.01	374.5	0.02	664.6	2.7	3,896.8	1.3	1,975.6	0.06	980.1	0.05	39.1	0.1	75.0	0.3	451.5	0.4	226.9	0.3	319.6
Togiak	0.2	12.5	0.2	25.3	1.2	46.1	1.4	59.8	4.7	21.4	0.0+	0.6	0.05	2.7	0.2	11.4	0.5	10.2	1.8	2.6
General	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Gear Total for Mgmt. Area ***	0.3	835.3	0.3	926.8	4.0	4,583.7	2.8	2,266.0	4.9	1,082.6	0.06	104.6	0.2	109.8	0.6	569.0	1.0	297.4	2.4	371.6

											Total Harvest for All Gear Combined									
District	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982	1973	1974	1975	1976	1977	1978	1979	1980	1981	**** 1982
Ugashik											0.0+	0.3	0.0+	0.1	0.0+	0.5	0.0+	0.05	0.03	0.2
Egegik											0.06	4.4	0.0+	4.1	---	11.4	0.0+	2.5	0.2	1.0
Naknek-Kvichak											0.05	508.5	0.0+	264.6	0.02	734.9	0.1	288.4	0.2	128.3
Nushagak											0.06	413.6	0.1	739.6	3.0	4,348.3	1.8	2,202.5	0.3	1,299.8
Togiak											0.2	13.1	0.3	28.1	1.5	57.5	1.9	70.0	6.5	24.0
General																				
Gear Total for Mgmt. Area ***											0.4	940.0	0.4	1,036.5	4.5	5,152.7	3.8	2,563.5	7.3	1,454.3

Source: ADF&G Commercial Fisheries Catch-Reporting System (printout dated 9/29/83 and 9/30/83).

* A dashed line indicates that no fish were harvested.

** 0.0+ indicates that less than 10 fish were harvested.

*** Individual district catch may not add to the management area total because of rounding.

**** 1982 data are preliminary information.

cause of the decline is unknown (ibid.). The current status of pink salmon in Bristol Bay is at an all time high; however, their abundance has characteristically been erratic historically and any long-term projections would be speculative (Middleton 1983). Pink salmon are mainly harvested in the Nushagak District, and the Nushagak pink run fluctuates considerably. The annual even-year average pink salmon catch for Bristol Bay from 1974 through 1982 was 2.2 million fish (ibid.). The commercial catch data for 1973 through 1982 are presented in table 40.

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Pacific Herring Human Use

I. INTRODUCTION

The Southwest Region has supported herring fisheries since the early 1900's. The first reported harvest was from the Kodiak area in 1912. Another domestic fishery developed off Unalaska Island in 1928. Foreign fleets harvested herring in the Southeastern Bering Sea beginning in the late 1950's. Though effort and interest had declined in most of these fisheries by the mid 1960's, new herring markets caused a resurgence of activity in the mid 1970's. Early efforts were primarily directed toward packed or salted food or reduction (fertilizer) products. Currently, herring are sold for food and bait, but the Japanese interest in sac roe dominates the herring market.

Herring harvested for sac roe are taken during spring months as they move from the open areas inshore to bays and estuaries to spawn. Fisheries on herring in nonspawning condition usually occur in the fall or winter months and are sold for food or bait. Frequently, some herring harvested during the sac roe herring fishery that are "green," or not ripe, are marketed as bait or food. A third fishery occurring in the Southwest Region is the harvest of spawn-on-kelp. Aquatic vegetation on which herring eggs have been deposited is hand picked and marketed.

Within the Southwest Region, herring harvest is managed through the use of five herring statistical areas. These include the Kodiak, Chignik, North Peninsula, South Peninsula-Aleutian Islands, and Bristol Bay areas (map 3). Fisheries for sac roe herring occur in Bristol Bay, Kodiak, Chignik, and South Peninsula-Aleutian Islands statistical areas. Directed bait fisheries occur in the Kodiak, Chignik, South Peninsula-Aleutian Islands (eastern portion of Aleutian Islands chain) area. The only spawn-on-kelp fishery in the Southwest Region is located in the Bristol Bay Statistical Area.

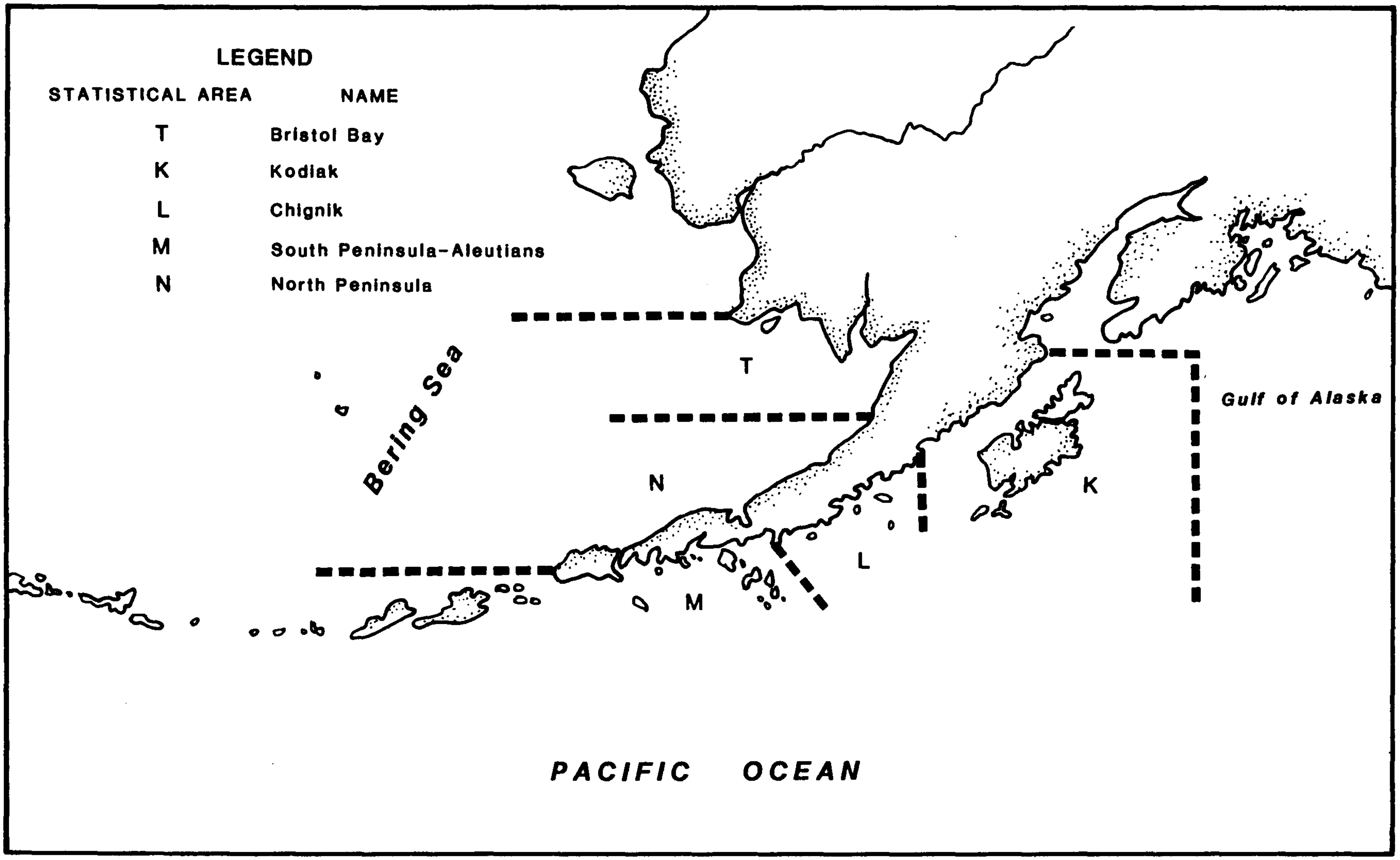
The Southwest herring harvest has averaged about 7,900 metric tons per year between 1972 and 1982. Catches have steadily increased during this time period, ranging from 63 metric tons in 1975 to 25,672 metric tons in 1982 (table 41). Bristol Bay herring catches dominate herring production in the Southwest Region, commonly averaging about 79% of the total harvest.

The narratives that follow in sections II. through VI. describe in more detail the commercial herring harvest. The text is arranged by herring statistical area.

II. KODIAK AREA

A. Boundaries

The Kodiak Area, or Herring Statistical Area K, includes all waters of Alaska south of a line extending east from Cape Douglas (lat 58°52'N), west of 150° west longitude, north of 55°30' north latitude, and east of a line extending south from the southern entrance of Imuya Bay near Kilokak Rocks (long 156°20'13"W). The



Map 3. Herring statistical areas

Table 41. Commercial Harvest of Pacific Herring in Metric Tons by Herring Statistical Area for the Southwest Region, 1972-82

	Fishing Season										
Management Area	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Bristol Bay[b]	73	46	112	51	a	2,534	7,030	10,115	17,774	11,372	19,556
Kodiak[b]	240	915	824	12	12[c]	12[c]	1,182	1,688	2,508	1,889	1,620
Chignik	a	a	a	a	a	a	a	a	630	406	127
South Pen.	a	a	a	a	a	a	a	9.1	420	714	672
North Pen.	a	a	a	a	a	a	a	a	a	a	463
Eastern Aleutian	a	a	a	a	a	a	a	a	a	655	3,234
Total	313	961	936	63	-	2,546	8,212	11,812	21,328	15,020	25,672

Sources: ADF&G 1982a, 1982b, 1982c; Manthey et al. 1982.

a No fishery conducted.

b Sac roe and bait harvest combined.

c Harvest for 1976 combined to protect confidentiality, data incomplete.

Kodiak Area has been divided into the Afognak, Alitak, General, Mainland Sturgeon-Halibut Bay, Uganik Bay, and Uyak districts (ADF&G 1983a).

B. Management History

Commercial exploitation of herring in the Kodiak area began in 1912. Through 1954, the fishery averaged 36,287.4 metric tons annually. The fishery peaked in 1934, when 109,585 metric tons were processed. During the height of the fishery, herring were utilized for meal, oil, pickling, dry salting, and halibut bait. Market conditions for meal and oil became unprofitable, and herring were not harvested from 1960 through 1963. The Japanese market for roe herring sparked interest in development of the sac roe fishery. Though the bait fishery was also reinstated, the sac roe fishery has dominated the Kodiak herring harvest since 1964 (ADF&G 1977).

The food and bait fishery exploits herring on the overwintering grounds in the Kodiak Area. The product from the food/bait fishery has primarily been fresh herring for local use as halibut and crab bait. The small bait catch has been from several small bays on the west side and north end of Kodiak Island. Bait herring are also caught by many small-boat commercial halibut fishermen who participate in the spring gill net fishery and also capture herring for halibut bait in the spring just prior to the opening of the halibut fishery. Interest in food herring has been minimal since 1980, when a small amount was salted and successfully marketed. Since 1964, the food/bait catch has not exceeded 10% of the total area herring catch.

The Kodiak herring harvest has ranged from about 4.2 metric tons in 1976 to 2,692 metric tons taken during 1966. About 1,620 metric tons were taken during the 1982 season (table 41). The production area during the early exploitation for sac roe herring was the Uyak District. In recent years, however, this fishery has expanded so that significant percentages of the catch have also come from the Afognak, Alitak, General, Uganik, and Mainland districts (ADF&G 1980b, 1981b; Manthey 1982).

C. Management Objectives and Considerations

The management objective of the herring fishery is to maintain the resource at levels that will sustain maximum sustainable yield harvest with an exploitation rate of 10 to 20% (Manthey et al. 1981). Guideline harvest levels by which the fishery is regulated are based on recent average annual catch levels and have been established by district, and in some cases, by fishing section. These harvest levels are flexible and can be adjusted in-season should less or additional abundance of herring appear on the grounds (ibid.). A major management problem has been defining the relationship of spawning stocks to overwintering populations so that exploitation of the same stock at different times of year, with subsequent overharvest, will not occur. Since 1969, inshore spawning populations in traditional fishing areas have generally been depressed, resulting in establishment of a 726 metric tons guideline harvest level in 1977 for the west side of Kodiak Island. A guideline harvest level of 3,084 metric tons was implemented for the entire Kodiak Statistical Area during the 1978 season (ibid.), of which the guideline harvest level for the food/bait fishery was 907.2 metric tons.

From 1964 through 1977, sac roe herring were taken primarily by purse seines. Gill nets were introduced into the fishery in 1978. Trawl effort has been minimal. Trawls were used in the 1978 and 1980 fisheries but were outlawed for the sac roe fishery in 1981. The number of vessels participating in the sac roe fishery ranged from 1 to 42 between 1964 and 1978. Approximately 1,605 metric tons and 14.5 metric tons were taken in the sac roe and bait fisheries, respectively, during 1982. The number of vessels participating in the fishery increased to 173 and 236 in 1979 and 1980, respectively. Because of the increasing effort and limited resource, the sac roe fishery became limited to entry after 1980 (Manthey et al. 1982).

D. Period of Use and Harvest Methods

Herring are taken for sac roe as the fish move into numerous bays to spawn during spring months. The fishery targets on relatively small stocks in up to 35 bays (Malloy, pers. comm.). By regulation, the sac roe season extends from April 15 through June 30, with portions of the area subject to in-season closure and reopenings by emergency order. Though herring with low roe recovery are sold during the sac roe fishery as food or bait, a directed food/bait season occurs in offshore areas and exploits herring in nonspawning condition. The food/bait season occurs from August 15 through February 28 and is subject to change by emergency order (ADF&G 1983a).

Legal gear for the food/bait fishery are purse seines, gill nets, and trawls, with no size or aggregate limits. Limitations on the food/bait fishery have been imposed to prevent exploitation of the same stocks that support the sac roe fishery.

III. CHIGNIK AREA

A. Boundaries

The Chignik Area, or Herring Statistical Area L, lies on the southside of the Alaska Peninsula and includes all waters enclosed by 156°20'13" west longitude and a line extending southeast (135°) from the southernmost tip of Kupreanof point (ADF&G 1983a). The area is divided into the Eastern, Central, Chignik Bay, Western, and Perryville districts.

B. Management History

Earliest recorded commercial fishing in the Chignik Area occurred in 1906. These early Chignik catches are not easily retrievable because data have been merged with data regarding fisheries on the North and South Peninsula and called the Southwestern Alaska herring fishery. Total annual catches in the southwestern fishery did not exceed 454 metric tons. The fishery ended in the 1930's, as did other herring fisheries around the state. Herring in these early years were sold primarily for food/bait and fish meal.

With increased interest in the Japanese market for sac roe, interest also developed in exploitation of herring in the Chignik Area. The first and largest harvest taken in the Chignik Area occurred in 1980 at 630 metric tons and was taken by 24 vessels. Catches have since decreased to 406 metric tons taken by 33 vessels in 1981, and 127 metric tons harvested by 8 vessels during the 1982 season (table 41). Herring have been fished in small bays as they move inshore to spawn. Amber Bay and Aniakchak Bay have consistently been the major production portions of the Chignik Area. In 1982, these two bays provided over 90% of the area's harvest (ADF&G 1982c).

C. Management Objectives and Considerations

The Chignik herring fishery is managed by the State of Alaska. Guideline harvest levels have been established based on fishery performance from 1980 through 1981. During the 1982 season, guideline harvest levels were established for those bays most frequented by herring for spawning and were as follows: Big River section (Amber and Aniakchak bays) - 181 metric tons; Ivanof and Humpback bays - 45.4 metric tons. The Alaska Board of Fisheries has determined an exploitation rate not to exceed 10 to 20% of the standing stock or biomass estimate (ADF&G 1981a).

D. Period of Use and Harvest Methods

The sac roe season opens by regulation April 15 and extends through June 30. Only a very minor unsuccessful effort for food/bait has occurred in the Chignik Area since statehood (ADF&G 1982c). A season has been established by regulation from August 15 through February 28. Both fishing seasons may be altered by emergency order. Herring may be taken only by purse seine in the Chignik Area (ADF&G 1983a).

IV. NORTH PENINSULA AREA

A. Boundaries

The North Peninsula Area, or Herring Statistical Area N, encompasses waters north of 54°36' north latitude. and south of a line extending westward from the tip of Cape Menshikof to the International Dateline in the Bering Sea. The area also includes all waters of Bechevin Bay and Isanotski Strait north of a line from the False Pass cannery dock to the tip of Nichols Point. The North Peninsula area is further divided into the Amak, Port Moller, Port Heiden, and General districts (ADF&G 1983a). During the December 1984 meeting of the Alaska Board Fisheries, Herring Statistical Area N was incorporated into and became a portion of Herring Statistical Area M (see V. below) (Malloy, pers. comm.).

B. Management History

Herring were first commercially harvested in the North Peninsula Area during the 1982 season. During the spring, fishing vessels destined for the Togiak herring fishery in Bristol Bay have explored for herring in the Port Moller area. Prior to the 1982 season, however, no harvestable amount of herring and fishing effort had occurred simultaneously. During the 1982 season, 463 metric tons of herring were harvested by purse seine. About 57% of the North Peninsula catch was from Herendeen Bay and 36% from Port Moller Bay. The remainder of the harvest was taken along the Bering Sea coast (ADF&G 1982a).

C. Management Objectives and Considerations

Because of the paucity of historical data, guideline harvest levels for the North Peninsula Area have not been established. However, the Alaska Board of Fisheries policy states that no more than 10 to 20% of the biomass will be harvested (ibid.). The ADF&G is currently monitoring the fishery to determine the long-term potential of the fisheries for food, bait, and sac roe (ADF&G 1983b).

D. Period of Use and Harvest Methods

The season for the sac roe fishery extends from May 1 through July 15 and for the food/bait fishery from August 15 through February 28. Both fisheries are regulated by emergency order. In the Port Heiden, Amak, and Port Moller districts, legal gear are purse seine and gill nets. Trawls may also be used in the Amak District from July 16 through April 30. Only trawls may be used for harvesting herring in Bering Sea waters north of 55°47' north latitude. The General District is closed to herring fishing, except by emergency order, to prevent incidental harvest of salmon (ADF&G 1983a).

V. SOUTH PENINSULA-ALEUTIAN ISLANDS AREA

A. Boundaries

The South Peninsula-Aleutian Islands Area, or Herring Statistical Area M, has as its eastern Pacific Ocean boundary a line extending southeast (135°) from the southernmost tip of Kupreanof Point; as its western boundary, 172° east longitude; and as its northern boundary in the Bering Sea, 54°36' north latitude. The Unimak, Southwestern, Southcentral, Southeastern, Akutan, Unalaska, Umnak, and Adak districts are contained within area M (ADF&G 1983a). During the December 1984 meeting of the Alaska Board of Fisheries, the North Peninsula Area (see I.V. above) became a portion of Herring Statistical Area M (Malloy, pers. comm.).

B. Management History

Three distinct fisheries occur in the South Peninsula-Aleutian Island Area. They include the South Peninsula food/bait fishery, the South Peninsula sac roe fishery, and the eastern Aleutians food/bait fishery.

South Peninsula districts that extend from Kupreanof Point west to Cape Sarichef are the location of the region's newest food/bait fishery. The first year in which exploitation occurred was 1982. Most of the harvest was taken in the Stepovak Bay area in January and February and was caught exclusively by purse seine. Efficiency was hampered by unfamiliar grounds, unproven stock abundance, poor weather conditions, conflicts with a concurrent crab fishery whose gear prevented extensive exploration, and miscellaneous tender and processor problems. Most of the harvest was frozen and packaged as food herring, with the remainder marketed as crab bait (Manthey et al. 1982).

Fishing for sac roe herring in the South Peninsula area began in 1979. The fishery harvests herring in spawning condition as they move into small bays to spawn. Catches peaked in 1981, when 655 metric tons of herring were taken from 14 bays. The smallest harvest occurred in 1979, when 9.1 metric tons were caught (table 41). Areas that produced largest catches for the three-year period were Stepovak, Canoe, and Pavlof bays (Manthey et al. 1982; Manthey, pers. comm.).

The Eastern Aleutians herring food/bait fishery is in its second consecutive year of successful redevelopment. Essentially, the fishery occurs inshore during August and September in the Unalaska area and targets upon feeding herring as they migrate from suspected western Alaska spawning areas. Historically, the Unalaska area was the scene of a significant fishery in which herring were harvested for food, beginning in 1928. Between 1928 and 1938 catches averaged 1,337.4 metric tons. The fishery ceased in 1945 because of changing market conditions. In both 1981 and 1982, most of the harvest came from Unalaska Bay. During the 1982 season, a total of 3,234 metric tons were taken (Manthey et al. 1982; Malloy, pers. comm.).

C. Management Objectives and Considerations

Guideline harvest levels have not been developed for the South Peninsula food bait and sac roe fishery because its development is so recent. The bait fishery occurs on stocks of unknown abundance and origin in an area of close proximity to the sac roe fishery. There is concern that the same stocks may be harvested twice (Manthey et al. 1982). A quota level for the Eastern Aleutian food/bait fishery was established at 2,903.0 metric tons by the Board of Fisheries (ADF&G 1983b). Currently, the origin of the herring exploited in the Eastern Aleutians is unknown. It is probable that these offshore concentrations are migrating populations that spawn elsewhere on the western Alaskan coast, where fishing has occurred earlier in the year. Therefore, until additional information is obtained so that sac roe and food and bait harvests may be maintained to permit long-term optimal use and reproduction of the resource, harvest levels will probably remain at current levels.

D. Period of Use and Harvest Methods

During periods opened by emergency order, herring may be taken in the Southwestern, Southcentral, and Southeastern districts from July 15 through February 28. In the Unimak, Akutan, Unalaska, Umnak, and Adak districts, herring may be harvested from April 15 through February 28. Legal gear in all areas are gill nets, seines, and trawls (ADF&G 1983a).

VI. BRISTOL BAY AREA

A. Boundaries

The Bristol Bay Area, or Herring Statistical Area T, has as its southern boundary a line extending west from Cape Menshikof and as its northern boundary a line extending west from Cape Newenham. The area is bordered by the International Dateline on the west. Though the area is divided into the Bay, General, and Togiak herring districts, to date all effort has occurred within the Togiak District (ADF&G 1983a).

B. Management History

The first large-scale commercial herring fishery in the southeastern Bering Sea began in 1928. This domestic fishery occurred in the Unalaska area and ceased in 1946 because of poor market conditions for herring. Exploitation of herring did not resume until Soviet exploratory trawlers discovered overwintering concentrations of herring along the continental slope northwest of the Pribilof Islands during the winter of 1959-1960. Japanese vessels also began to fish the area in 1960, establishing a trawl fishery on the overwintering grounds from November to April and a gill net fishery near the spawning grounds in Bristol Bay and Norton Sound from April through June (Westpestad and Barton 1981). Catch and effort for herring by the Soviet and Japanese fishermen peaked in the late 1960's and early 1970's, with the largest harvest of 145,579 metric tons taken during 1970. Development of the eastern Bering Sea fishery by these nations was partially due to reduced abundance of herring in the heavily fished western Bering Sea (ibid.). In 1977, with the establishment of the Fishery Conservation and Management Act of 1976 and the 200-mi fishery conservation zone, the foreign herring harvest was limited to 21,000 metric tons and the area east of 168° west longitude and north of 58° north latitude was closed to foreign fishing. The 168°W closure line was extended to the Alaska Peninsula in 1978 (ibid.). In 1980, herring was declared a prohibited species, and herring taken by foreign nations during fishing operations had to be returned to the sea (Middleton 1983). Currently, the fishery management plan still allows an incidental catch of 2,000 metric tons.

Domestic herring fisheries resumed in other western Alaskan coastal areas and in Bristol Bay during the late 1960's to obtain herring sac roe and herring spawn-on-kelp products (Westpestad and Barton 1981). Effort in Bristol Bay was low, and harvests were usually under 100 metric tons until 1977, when in response to the increased demand of the Japanese market for sac roe, the harvest increased to more than 2,534 metric tons.

Herring are currently harvested in the Togiak District as the fish school and move inshore from the Bering Sea to spawn. Bristol Bay herring sac roe harvests for the Togiak Management District averaged 11,397 metric tons during the period 1977-1982. The major harvest area extends from Kululak Bay to the west end of Hagemeister Straight (Asigyukpak Spit), generally within a mile of the shoreline. Currently, the Bristol Bay Area supports the largest herring fishery in the state and contributed about 43% of the statewide harvest during the 1982 season (ADF&G 1983b). Herring have been caught by purse seine and gill net since 1977. The purse seine harvest has consistently exceeded the gill net catch. The fishery, however, has supported a greater number of gill net vessels than purse seine vessels. A maximum of 525 vessels participated in the fishery during the 1980 season. The record harvest in 1982 of 19,556 metric tons (see table 41) was taken by 200 gill net and 135 purse seine vessels (Middleton 1983).

Bristol Bay also supports a herring spawn-on-kelp fishery, which began in 1968. Interest and harvest in the fishery gradually increased in response to the increasing Japanese market for roe products. Aquatic vegetation with herring spawn is hand-picked or harvested with rakes. The primary species of vegetation harvested in the Bristol Bay region is rockweed (_Fucus_ sp.). Peak harvest in the fishery occurred in 1979, when 188 metric tons were harvested by 100 kelpers (table 42). The season for roe-on-kelp coincides with that of the commercial fishery for herring (ibid.).

C. Management Objectives and Problems

The commercial fishery is managed under the joint policy of the North Pacific Management Council and Alaska Board of Fisheries. Harvest levels are maintained at 10 to 20% exploitation of the total

Table 42. Commercial Harvest of Herring Spawn-on-kelp in Metric Tons for Bristol Bay Management Area of the Southwest Region, 1972-82

	Fishing Seasons										
Management Area	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Bristol Bay	29	5	57	50	134	125	150	188	86	172	107

Source: ADF&G 1982b.

in-season estimated biomass. To protect younger age classes entering the fishery, exploitation is adjusted on a sliding scale dependent upon in-season abundance and upon the age-class composition of the run (Middleton 1983). Provision for harvest of herring by gear types with varying efficiency is also provided in the Bristol Bay Herring Management Plan (ADF&G 1983a).

Fluctuations in herring abundance are not well understood. This makes preseason forecast and estimates of harvest levels difficult for a given year. The relationship of Bristol Bay spawning stocks and their migrational patterns to those of other spawning and overwintering concentrations of herring in the Bering Sea has not been fully defined. This causes difficulty in determining the maximum yield of the resource on the spawning grounds in Bristol Bay.

The intensity and efficiency exhibited in the spawn-on-kelp fishery has resulted in specific and localized harvest quotas being imposed in-season after biomass estimates have been conducted and spawning success has been evaluated by density and egg deposition each season. A spawn-on-kelp harvest of 350,000 lb is equivalent to production from 1,353 metric tons of herring. The ADF&G has recommended that the spawn-on-kelp removal be included in the calculation of the percent of herring biomass harvested (ADF&G 1984).

D. Period of Use and Harvest Methods

The herring season is open by regulation April 25 and closes June 30. In-season openings and closures are adjusted by emergency order. Legal gear are purse seines and gill nets. Trawls, however, may be utilized during seasons established by emergency order but have yet to make their appearance in the Bristol Bay area (ADF&G 1983b). The spawn-on-kelp harvest occurs concurrently with the herring fishery. Legal methods of taking kelp are hand picking and hand-operated rakes (ADF&G 1983b).

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Dungeness Crab Human Use

I. INTRODUCTION

Analysis of the commercial harvest of Dungeness crab is presented in the following narrative. A regional summary of pertinent information is provided first. More detailed district-specific data is contained in sections II., III., and IV. of this account.

A. Boundaries

Within the Southwest Region is found ADF&G Dungeness crab Statistical Area J. Statistical Area J, or the Westward Registration Area, includes all Pacific Ocean waters south of the latitude of Cape Douglas (lat 58°52'N), west of the longitude of Cape Fairfield (long 148°50'W), east of 172° east longitude and shoreward of the 200 fathom (366 m) depth contour and all Bering Sea waters east of 172° east longitude.

For purposes of Dungeness crab management, area J is divided into four districts: Kodiak, Alaska Peninsula, Aleutian, and North Peninsula. Dungeness crab are currently harvested in all but the North Peninsula District. A map of the districts at 1:1,000,000-scale may be found in the Southwest Region Atlas.

B. Management History

First catches in the region occurred in the Kodiak area in 1962. The fishery has gradually developed since then throughout the region. Interest in Dungeness crab, however, has not been as intense as that directed toward other shellfish species. The harvest of Dungeness crab is more dependent on market demand and the status of other shellfish fisheries than on the abundance of the species.

C. Management Objectives and Considerations

There is currently no stock assessment on Dungeness crab independent of the performance of the commercial fishery. Assessments of the condition of the fishery, and its management, are based on past and current harvest levels and the number of recruit crabs caught the previous year (ADF&G 1983b).

The males-only fishery and size limits for males are designed to protect males for at least two reproductive years after reaching sexual maturity. This strategy has historically been used to manage Dungeness crab along the entire United States Pacific Coast. Fishing seasons attempt to protect crabs from being harvested during molting and softshell periods (McCrary, pers. comm.).

D. Harvest Methods and Period of Use

Throughout the Southwest Region, legal gear for harvesting Dungeness crab are pots or ring nets. The season for Dungeness crab is different for each district but usually occurs from May through February (ADF&G 1983a).

II. KODIAK DISTRICT

A. Boundaries

The Kodiak District includes all Pacific Ocean waters south of the latitude of Cape Douglas (lat 58°52'N), west of the longitude of Cape Fairfield (long 148°50'W), and east of the longitude of Cape Kumlik (long 157°27'W). Fishing sections within the Kodiak District are the South Mainland, North Mainland, Westside, Semidi Island, Southwest, Eastside, Northeast, and Southeast sections.

B. Management History and Reported Use

As mentioned above, Dungeness crab was first harvested in the Kodiak District in 1962. Harvest levels increased steadily and peaked in 1968 with a catch of 6.8 million pounds. During the early 1970's, the fishery declined because of biological factors and, at times, adverse marketing conditions. The catch dropped to an all-time low of 87,110 lb in 1976 because the market for Dungeness crab was poor and fishing effort was directed toward other more lucrative shellfish fisheries. In recent years, a better market for Dungeness crab has stimulated interest in the fishery, with the 1981-1982 harvest reaching 5.6 million pounds (see table 43).

Effort has fluctuated throughout the history of the fishery. In the early 1970's, most harvest occurred in the Eastside, South Mainland, and Westside sections of the Kodiak area. Effort has since shifted, and about 63% of the catch has been taken in the Southeast, North Mainland, South Mainland, and Westside sections of the Kodiak area (ADF&G 1982). The 1982 harvest was taken by 50 vessels, the largest number ever registered.

C. Management Objectives and Considerations

The Dungeness crab fishery is expanding. It is, however, dependent upon recruitment of young crab. Dungeness crabs are short-lived (one to two years) after reaching legal size. Most of the crabs harvested are recruits. Postrecruit crabs, or those crabs available to the commercial fishery the previous season, account for less than 20% of the commercial harvest (Nippes, pers. comm.). Because no resource assessment occurs for this fishery independent of estimates based on harvest levels in the commercial fishery, no realistic figures exist for calculating the harvestable stock size. Therefore, it is difficult to establish harvest levels that would prevent overharvest while avoiding loss of crabs to natural mortality (old age) (ibid.).

D. Period of Use

Dungeness crab in the Kodiak District may be harvested from May 1 through February 1 by pots, except that in the area from the latitude of the southernmost tip of Boot point and South of the latitude of the southernmost tip of Cape Ikolik Dungeness crab may be taken from June 15 through February 1 (ADF&G 1983b). Most of the harvest is taken during July and August (Nippes, pers. comm.). Harvest diminishes late in the season as crabs move into deeper water. Because of declining stocks and market conditions in other commercial fisheries, the Dungeness fishery in Kodiak is rapidly expanding and is expected to continue to do so (ADF&G 1983b).

Table 43. Commercial Harvest of Dungeness Crab in Thousands of Pounds by Management District for the Southwest Region, 1972-82[a]

Management District	Fishing Season 1972	1973	1974	1975	1976	1977	1978	1979	1980	1981-82
Kodiak	2,060	2,001	750	650	200[b]	b	1,362	1,313	2,011	5,566
Alaska Peninsula	65	195	c	c	c	c	c	102	c	42
Aleutians	c	c	c	c	c	c	18	1	c	36
Region total	2,125	2,196	750	650	200	-	1,380	1,415	2,011	5,644

Source: ADF&G 1983a.

a Includes dead loss.

b Harvest for 1977 combined wtih 1976 to protect confidentiality.

c No fishery.

III. ALASKA PENINSULA DISTRICT

A. Boundaries

The Alaska Peninsula District contains the South Peninsula and Chignik subdistricts. This area includes all waters of Statistical Area J west of the longitude of Cape Kumlik (long 157°27'W) and east of the longitude of Scotch Cap Light (long 164°44'W).

B. Management History and Reported Use

Dungeness crab were first harvested from this area in 1968. Over one million pounds of crabs were taken in each of the first two years of the fishery. Harvest effort depends upon market demand, which has been low. Since 1970, therefore, harvest has been sporadic.

During the past 10 years, catches have been reported for only five years (see table 43). Most of the harvest has been from the South Peninsula area. The Chignik area contributed only 30% of the total harvest in 1982. Fishing effort has occurred primarily in the Unimak Bight area and the bays from Belkofski north to Chignik (Hilsinger, pers. comm.).

Between 1972 and 1982, for years in which harvest occurred, catches ranged from a low of 42,296 lb in 1981-1982 to a high of 779,600 lb in 1982-1983 (ADF&G 1983b). A total of 20 vessels fished for Dungeness crab in 1982. This was the largest number of boats ever to participate in the fishery (ADF&G 1982).

C. Management Objectives and Considerations
Objectives and problems associated with the Dungeness fishery in the Alaska Peninsula District are similar to those described for the Kodiak District and in the introductory section.

D. Period of Use
Fishing occurs by regulation from May 1 through February 1 (ADF&G 1983a).

IV. ALEUTIAN DISTRICT

A. Boundaries
The Aleutian District includes all waters of Statistical Area J west of the longitude of Scotch Cap Light and south of Cape Sarichef and encompasses the Aleutian Islands (ADF&G 1983a).

B. Management History and Reported Use
Harvest has occurred during only three years since the inception of the fishery in 1978 (see table 43), and maximum participation has been by only two vessels. Most of the fishing occurred in Unalaska Bay, Makushin Bay, and the Rootok Island area. Numerous fishable areas have yet to be explored, however. It is possible that small scattered Dungeness crab stocks may be found in such areas; and the poor king crab production of recent years may provide the incentive for seeking them out, with a consequent expansion of the fishery (ADF&G 1983b).

C. Management Objectives and Considerations
This fishery is very new and remote. Management objectives are similar to those described in the introduction and in the Kodiak District section of this narrative.

D. Period of Use
The fishery for Dungeness crab opens June 15 by regulation and extends through February 1 in the Aleutian District (ADF&G 1983a). Most fishing activity occurs during the summer months.

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King Crab Human Use

I. INTRODUCTION

Commercial harvest of king crab is presented in the following narrative. A regional summary of pertinent information is provided first. More detailed data specific to statistical areas are contained in sections II. through VII. of the account.

A. Background

King crab are harvested throughout the Southwest Region. Within the region are found all or a part of six ADF&G king crab statistical areas. Included are the Kodiak, Alaska Peninsula, Dutch Harbor, Adak, and Bristol Bay areas, and the Pribilof District of the Bering Sea Area. These areas are used for fishery management purposes such as regulating seasons.

B. Management History and Reported Use

First exploitation of Alaska's king crab stocks in the Southwest Region was by a Japanese mothership fleet in the Bering Sea in 1930. Fishing ended in 1942 but began again in 1952, continuing through 1974 (Otto, pers. comm.). The first domestic effort occurred in the Kodiak Area in the mid 1930's. Prior to statehood, Alaskan king crab fisheries were managed by the United States Bureau of Fisheries. In 1959, management was transferred to the State of Alaska. By 1960, the king crab fleet had expanded into offshore areas beyond the state's 3-mi jurisdictional boundary. With enactment of the Magnuson Fisheries Conservation Management Act (MFCMA) in 1976, establishment of the Fishery Conservation Zone (FCZ - from 3 to 200 mi), and by memorandum of agreement between the State of Alaska and the federal government, management of the Bristol Bay, Adak, Dutch Harbor, Bering Sea, and Aleutian Islands areas is by a joint statement of principles between the Alaska Board of Fisheries and the National Marine Fisheries Service. The South Peninsula, Chignik, and Kodiak fisheries are regulated by the ADF&G. Currently, three species of king crab are of commercial interest. Historically, red king crab (Paralithodes camtshatica) has been the more abundant and most widely distributed species. It therefore has been targeted by the commercial fishery. With declines in red king crab populations, interest and harvest effort for blue king crab (Paralithodes platypus) and brown king crab (Lithodes aequispina) have intensified.

C. Management Objectives and Considerations

The resource is managed to achieve optimum yield of king crab stocks in the FCZ and to promote full utilization of the resource by the domestic fishery (NPFMC 1980). The current management framework has evolved through a complex system of regulatory measures involving size, sex, season, area, gear restriction, area registration, and a flexible quota system. These regulatory measures 1) relate to maximizing the reproductive potential of the resource, 2) consider the competitive advantages among vessels of different sizes,

3) attempt to prevent conflicts with other fisheries, 4) promote even distribution of the fishing fleet, and 5) monitor catch and catch rate in particular areas (NPFMC 1980). Management objectives are similar in all Southwest areas, and guideline harvest levels are set at a specified percentage dependent upon the estimated abundance of recruit and postrecruit overall population levels (ADF&G 1983a; Otto, pers. comm.). Regulations used to address these objectives in state waters differ by area (NPFMC 1980).

To prevent overexploitation of given king crab populations, superexclusive, exclusive, and nonexclusive registration areas have been established. A vessel or gear registered for an exclusive registration area may not be used to take king crab in any superexclusive registration area or any other exclusive registration area during that registration year. A vessel or gear registered for one or both of the nonexclusive areas may also be registered for one exclusive registration area but may not be used to take king crab in more than one exclusive registration area or in any superexclusive registration area during that registration year (ADF&G 1983).

D. Harvest Methods and Period of Use

Harvest seasons for king crab have historically been used in the king crab fishery to protect crabs during the mating, molting, and growing period of their life cycle, which usually occurs from mid January through mid July in most areas of the State of Alaska. By law, the fishing season may therefore occur from August through mid January. Seasons differ by management area as environmental and biological concerns may be considered (recovery rate, migrational patterns, weather conditions, etc.).

To maximize the reproductive potential of the crab resource, harvest is restricted to male crabs. Size limits are established to ensure that sufficient numbers of male crabs are available to meet reproductive needs and to maximize total yield from each year class. Gear are restricted to pots and ring nets to prevent high mortality rates of nonlegal crabs, which can occur with other gear types (e.g., tangle nets, trawls).

II. KODIAK STATISTICAL AREA

A. Boundaries

The Kodiak Statistical Area for king crab (Statistical Area K) has as its northern boundary the latitude of Cape Douglas (lat 58°52'N), as its western boundary the longitude of Cape Kumlik (long 157°27'W), and as its seaward boundary the 300 fathom (549 m) depth contour. The area is divided into the Northeast, Southeast, Southwest, Semidi Island, and Shelikof districts.

B. Management History and Reported Use

The Kodiak king crab fishery began as an exploratory effort by salmon fishermen in 1936. Harvest levels were not officially recorded until 1950; however, catches were small during the early years of the fishery. Once the resource was determined to be abundant enough to support fishermen, markets had to be developed to sell the product (ADF&G 1982).

In 1950, a significant 60,000 lb of king crab were harvested. By 1959, the fishery was a major economic force, and 21 million pounds were taken by 106 vessels. The early sixties saw continued growth of the fishery until 1964, when the earthquake halted production (ibid.).

The development period, which began in 1950, peaked in 1966, when 177 vessels delivered 90 million pounds to 32 processors in a 10-month fishing season. Catches in January and February accounted for 40% of the harvest. Increased vessel length, fishing effort, and processing capacity combined to produce the peak harvest. In 1966, the department issued the first emergency order to protect new shell and breeding crab. After the 1965-1966 season's harvest of 90 million pounds, the ADF&G estimated the sustained production for the area to be 40 to 70 million pounds, with an average harvest level of 50 million pounds.

From 1967 to 1970, the king crab fishery expanded to offshore areas, trying to maintain the catch levels of 1965-1966. In 1967, the department began a test-fishing program to locate concentrations of prerecruit crabs and to forecast production in future years. Results from the first test fishery indicated that future king crab catches would depend on the strength of the incoming recruit classes. The first catch projections predicted a continuing decline. The 1967-1968 catch dropped to 43 million pounds, 30 million pounds less than the 1966-1967 season. Also in 1968, examination of females from eight different areas showed that 15.7% were not carrying eggs.

The 1968-1969 season's catch dropped to 18 million pounds, and the fishery was closed by emergency order on February 28. Catches remained below 16 million pounds until the 1974-1975 and 1975-1976 seasons, when harvest levels jumped to 23.6 and 25.2 million pounds, respectively (table 44). During the next four seasons, fishing effort continued to increase, but the catches dropped again. During the 1980-1981 season, the harvest rose to 20.5 million pounds. As in past years, southwest and southeast districts were major producers. The 1981-1982 season produced a harvest of 24.2 million pounds taken by 246 vessels and a peak effort of 388,751 pot lifts (ADF&G 1982).

C. Management Objectives and Considerations

King crab stocks have been delineated within the Kodiak area. Essentially, stocks fall within the boundaries of each district: the Northeast District (Stock I), the Southeast District (Stock II), and the Southwest District (Stock III). Annual pot surveys and tag-and-recapture studies of legal-size male red king crabs provide population estimates of legal male crabs and information on crab growth and migrations. Exploitation rates are determined, and guideline harvest levels by stock are developed for the following season.

A major problem in determining harvestable population levels of king crab is the length of time (7-9 years) between egg hatching and recruitment of crabs on the fishing grounds. This problem, coupled

Table 44. Commercial Harvest of Red King Crab in Thousands of Pounds and Effort in Number of Vessels: Kodiak Statistical Area (Area J) 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Northeast	9	960.2	1,619.7	4,559.9	7,982.0	6,680.3	2,978.6	1,745.3	2,273.5	4,589.7	9,378.3
Southeast		6,601.0	7,896.5	8,069.8	5,018.9	4,516.6	3,445.2	1,978.4	1,680.0	3,703.3	6,681.0
Southwest		6,827.7	4,050.7	9,080.8	9,407.1	5,328.0	6,511.4	7,385.5	9,486.3	9,921.2	6,295.1
Shelikof		51.5	171.4	740.5	1,108.4	610.2	193.0	137.0	316.5	900.3	1,049.8
Semidi Islands		---	---	---	---	---	---	134.5	92.3	26.6	10.0
Undefined[a]		1,039.5	647.9	1,131.7	1,653.6	831.7	375.4	641.0	760.4	1,307.6	823.4
Area total		15,480.0	14,386.2	23,582.7	25,170.0	17,966.8	13,503.6	12,021.7	14,609.0	20,448.7	34,225.8
No. of vessels	89	88	129	158	169	195	179	194	247	164	246

Source: ADF&G 1983c.

a Catches not assigned to district.

with the inability to age crabs, has resulted in poor understanding of the causes and rates of mortality during this period. Therefore long-term projections of stock status based on fishery performance are impossible.

The abundance of Kodiak king crab stocks has radically declined. Although the specific reasons for the decline are unknown, ADF&G's surveys have documented the low abundance and poor survival of both prerecruit male and female crabs from three to six years of age (McCrary, pers. comm.).

D. Period of Use and Harvest Methods

The Kodiak area is an exclusive registration area. Legal gear for king crabs are pots or ring nets, and only male king crabs may be harvested. From 1960 through 1965, the king crab season was open year-round. During subsequent years, the seasons became progressively shorter.

Two seasons for separate size limits were first imposed during the 1974-1975 fishery and have since been in existence. The current 1983 regulations for red and blue king crab specify a legal size of seven inches (178 mm) or greater in carapace width during the season from September 25 until closed by emergency order. Red and blue king crabs larger than 7.5 (191 mm) inches in carapace width could be taken during periods established by emergency order. Brown king crabs seven inches (178 mm) or greater in carapace width could be caught from January 1 through December 1 under conditions of a permit issued by the commissioner (ADF&G 1983a).

III. ALASKA PENINSULA STATISTICAL AREA

A. Boundaries

The Alaska Peninsula Statistical Area for king crab (Statistical Area M) has as its eastern boundary the longitude of Cape Kumlik (long 157°27'W), and as the western boundary a line extending from Scotch Cape Light. The seaward boundary is at the 800 fathom depth contour. The statistical area also includes all waters of Bechevin Bay and Izanotski Strait south of a line from the easternmost tip of Chunak Point to the westernmost tip of Cape Krenitzen. The districts used for king crab management are Unimak Bight, Central, and West Chignik (see the Southwest Region Map Atlas) (ADF&G 1983a).

B. Management History and Reported Use

King crab fishing in the Alaska Peninsula area began in 1947, when 141,000 lb of crabs were landed. Trawl gear was used extensively between 1947 and 1961. Trawls were finally prohibited in the fishery in 1961. The area harvest peaked in 1966 at 22.5 million pounds. Over 50% of this record harvest, taken by 37 vessels, came from the Unimak Bight and Davidson Bank area. Before 1966, most of the harvest was taken in Pavlof, Stepovak, and Balboa bays (ADF&G 1983c).

During the 1970's, 60 to 90% of the South Peninsula king crab harvest was from the Central District. The West Chignik District has been characterized by small catches of postrecruit crabs.

During the past 10 years, the area harvest has ranged from a low of 726,500 lb, taken by 73 vessels during the 1977-1978 season, to a high of 5.1 million pounds, taken by 51 vessels during the 1980-1981 season. The peak number of vessels in the fishery was 68 during the 1979-80 season (table 45). The 1981-1982 fishery produced 3.2 million pounds, taken by 56 vessels (ADF&G 1982).

C. Management Objectives and Considerations

As with other areas, harvest levels are based on population estimates and age-composition data obtained during annual pot and trawl surveys. Harvest levels may be adjusted in-season, based on fishery performance data.

Recent management policy has been based on the multi-age class-management concept. This concept carries over a percentage of the stock from each year to the next to provide a more stable fishery and to maintain legal-size male breeding stock even during periods of low male-recruit abundance.

Interest in the king crab fishery has increased throughout the area over the past 10 years. Keeping pace with the expansion of fishing effort and processor participation has been difficult. Harvest monitoring has become increasingly difficult (Hilsinger 1983).

The abundance of Alaska Peninsula red king crab stocks has radically declined. Although the specific reasons for the decline are unknown, ADF&G's surveys have documented the low abundance and poor survival of both prerecruit male and female crabs from three to six years of age (McCrary, pers. comm.).

D. Period of Use and Harvest Methods

The Alaska Peninsula Statistical Area is a superexclusive registration area. The season for male king crabs 6.5 inches (165 mm) or greater carapace width opens October 1 and is closed by emergency order. The season for crab 7.5 inches (191 mm) or greater in carapace width opens by emergency order and extends through January 15. Pots are the only legal gear in the Alaska Peninsula Statistical Area (ADF&G 1983a).

IV. DUTCH HARBOR STATISTICAL AREA

A. Boundaries

The Dutch Harbor Statistical Area O has as its eastern boundary the longitude of Scotch Cap Light, extending west to 172° west longitude and seaward to the 800 fathom (1,463 m) depth contour, excluding waters of the Bering Sea Statistical Area (Statistical Area Q). Within the Dutch Harbor Statistical Area are the Akun, Akutan, Egg Island, Unalaska, and Western districts (see the Southwest Region Map Atlas) (ADF&G 1983).

B. Management History and Reported Use

The Dutch Harbor area king crab fishery began in 1961. Harvest began to reach significant proportions during the 1964-1965 season and peaked during the 1966-1967 season at 32.9 million pounds. The fishing fleet shifted from the Akun and Akutan districts to the Egg Island and Western districts by the 1975-1976 season. A sharp decline followed several years of increasing harvests, and the

Table 45. Commercial Harvest of Red King Crab in Thousands of Pounds of Effort in Number of Vessels: Alaska Peninsula Statistical Area (Area M), 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Central	2,812.2	3,194.2	2,882.4	2,935.7	1,715.5	597.9	512.5	2,757.1	2,604.3	3,030.8	2,486.3
Unimak Bight	1,310.9	741.9	1,280.4	1,538.6	758.0	173.1	13.3	198.7	1,700.0	1,849.6	650.3
Chignik District	0	133.3	385.3	97.8	131.8	187.0	200.7	138.1	168.4	213.4	32.0
Area total	4,123.1	1,613.8	4,548.1	4,572.1	2,605.3	958.0	726.5	3,093.9	4,472.7	5,093.8	3,168.6
No. of vessels	26	29	36	36	37	26	15	33	68	51	56

Source: ADF&G 1983c, 1981, 1977.

a Harvest includes 6½, 7½ seasons.

1977-1978 season marked a low in the fishery, with 3.7 million pounds taken by 60 vessels (table 46). Catches subsequently increased as a result of increasing effort to 18.9 million pounds harvested by peak effort of 121 vessels during the 1980-1981 season. Increased harvest levels were due to exploitation of previously fished populations. The 1981-1982 harvest dropped to one-third the previous year's catch, with 5.1 million pounds harvested by 92 boats (table 46).

Throughout the history of the fishery, most of the harvest has been from the Egg Island District. The Unalaska and Western districts have proved to be significant since the mid 1970's. The 1980-1981 season produced the lowest catches in these three districts since the 1971-1972 season (ADF&G 1982).

Brown king crabs have been taken incidentally to red king crabs for several years. However, the decreasing red king crab abundance and high market value of all king crabs resulted in fishermen directing their efforts toward brown king crabs for the first time during the 1981-1982 season. Harvest has occurred primarily in the Western District. The areawide harvest for 1981-1982 totaled 115,715 lb (table 47) (ADF&G 1983).

C. Management Objectives and Considerations

Red king crab stocks are managed by establishing district harvest quotas. Quotas are developed for the area based on past harvest levels and abundance of prerecruit and recruit crab. In past years, when a quota was close to being filled in a district, the district was closed. With stock decline, however, fewer districts have produced catches, resulting in the effort concentrating in the smaller producing areas. The result has been a decline in the crab population. Additional problems are associated with the large size of the fishing grounds and subsequent survey and monitoring difficulties (Griffin 1983).

Eastern Aleutian red king crab stocks have declined radically since the 1981-1982 season. Recruitment failures are the cause, but the reasons for the failures are unknown (McCrary, pers. comm.).

Guideline harvest levels have yet to be established for brown king crab. The deep-water habitat of brown king crab may require development of new survey techniques to perform stock assessment (ADF&G 1983c).

D. Period of Use and Harvest Methods

Dutch Harbor is a nonexclusive registration area. The season for king crabs 6.5 inches (165 mm) or greater in carapace width is from November 10 until closed by emergency order. Crabs 7.5 inches (191 mm) or greater in carapace width may be taken in periods opened and closed by emergency order. Legal gear in this area are pots. Unlike other management areas, regulation includes restrictions on vessel length. King crab may not be taken from waters of Unalaska Bay enclosed by a line from Cape Cheerful (lat 54°N, long 166°40'20"W) to Priest Rock (lat 54°N, long 166°22'30"W) by vessels over 50 ft, U.S. Coast Guard registered length, or 58 ft overall (ADF&G 1983a).

Table 46. Commercial Harvest of Red King crab in Thousands of Pounds and Effort in Numbers of Vessels: Dutch Harbor Statistical Area (Area 0), 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Egg Island	2,723.3	5,376.5	5,465.7	5,753.4	7,285.6	8,127.7	2,335.2	4,817.2	8,746.9	3,781.8	1,303.1
Akun	1,390.6	607.3	1,615.1	2,199.8	7,576.4	1,161.5	693.6	512.0	481.7	257.5	81.7
Akutan	5,277.7	4,431.3	3,930.3	2,717.3	1,988.0	761.7	416.8	289.3	707.4	711.2	170.9
Unalaska	0	0	1,711.7	993.4	440.3	118.3	96.6	177.7	2,432.9	4,350.3	1,351.9
Western	0	0	0	2,327.3	3,616.3	529.4	143.3	1,028.0	2,611.1	9,800.9	2,202.8
Area total	9,391.6	10,450.4	12,722.7	13,991.1	15,906.7	10,198.4	3,684.4	6,824.1	14,979.9	1,892.5	5,115.3
No. of vessels	32	51	56	87	79	72	33	60	104	121	92

Source: ADF&G 1983c.

Table 47. Commercial Harvest of Brown King crab in Thousands of Pounds and Effort in Numbers of Vessels: Dutch Harbor Statistical Area (Area 0), 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
All districts combined	0	0	0	0	0	0	0	0	0	0	115.7[b]
No. of vessels	0	0	0	0	0	0	0	0	0	0	6

Source: ADF&G 1983.

a Breakdown between red and brown king crab not available prior to 1981.

b Harvest primarily in Unalaska and Western districts.

V. ADAK STATISTICAL AREA

A. Boundaries

The Adak Statistical Area (Statistical Area R) for king crab has as its eastern boundary 172° west longitude, extending westward to a line from 52° north latitude, 168°35' east longitude, to 54°36' north latitude, 171°23' east longitude, and seaward to the 800 fathom contour. The area is divided into six districts: North Amlia, South Amlia, North Atka, Adak, Petrel Bank, and Western Aleutians (see the Southwest Region Map Atlas) (ADF&G 1983).

B. Management History and Reported Use

The Adak king crab fishery began in 1961, when four vessels harvested two million pounds. The fishery rapidly expanded to a peak catch of 21 million pounds for the 1964-1965 season. After a two-year decline, catches stabilized around 15 million pounds during a six-year period. Beginning in the 1973-1974 season, catches rapidly declined to such low levels that the 1976-1977 season for red king crab was not opened. The fishery reopened the following year, but catches since then have been very depressed (ADF&G 1983c). With an increase in vessels participating in the fishery, declining commercial catches in other areas, and the time lag between Bering Sea king crab fisheries and the opening of the Tanner crab seasons, new areas of red king crab populations have been discovered and utilized by the fleet, producing a slow and steady increase in the commercial catch (Griffin 1983). Through 1976, the North Amlia District produced the largest percentage of the catch. Emphasis has since been directed to the North Atka, Petrel Bank, Adak, and Western Aleutian districts. The 1981-1982 harvest totaled 1.6 million pounds and was taken by a historically high peak effort of 46 vessels (table 48). The red king crab stock appears to be at a very low but stable population level.

The brown king crab fishery in the Adak area is a recent development, with first deliveries totaling 25,000 lb recorded during the 1975-1976 fishery. Catches have been incidental to the red king crab fishery and have fluctuated from zero to 59,000 lb. The fishery peaked in the 1981-1982 season with a harvest of 1.2 million pounds taken by 14 vessels (table 49) (ADF&G 1983c). Major areas producing brown king crab have been North Amlia District and Petrel Bank (ibid.).

C. Management Objectives and Considerations

The red king crab fishery is managed by guideline harvest levels. For years where stock assessment surveys have not been performed, harvest levels have been based on fishery performance data from past years (ADF&G 1983). Problems exist in performing stock assessment programs (i.e., tagging studies, abundance surveys, etc.) covering a large marine area (Griffin 1983).

Management of brown king crab is accomplished in-season, based on effort and past harvest levels. Guideline harvest levels have yet to be developed.

D. Harvest Methods and Period of Use

The Adak Statistical Area is a nonexclusive registration area. Pots

Table 48. Commercial Harvest of Red King Crab in Thousands of Pounds and Effort in Numbers of Vessels: Adak Statistical Area (Area R), 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
North Amlia	15,164.6	14,786.4	8,218.6	1,173.0	139.8	2.3	239.7	125.0	27.2	310.8	47,682
North Atka	242.1	1,934.1	113.6	748.7	73.0	0	40.0	70.1	47.6	535.8	593.4
South Amlia	26.6	270.9	688.5	113.3	15.1	0	0	.1	34.2	268.6	19.3
Adak	24.9	0	0	487.4	95.2	0	673.2	312.5	158.8	227.0	551.2
Petrel Bank	17.7	732.8	720.8	254.6	114.0	0	0	299.5	174.5	77.4	447.0
Western Aleutians	0	0	0	0	0	0	0	0	0	0	0
Area total	15,475.9	18,724.1	9,741.5	2,777.0	437.1	2.3	953.0	807.2	467.3	1,419.5	1,638.8
No. of vessels	40	43	41	36	9	0	12	13	18	17	46

Source: ADF&G 1983.

a Petrel Bank and Western Aleutian districts formed Area S prior to 1978. Catches before 1982-83 were from Petrel Bank section.

Table 49. Commercial Harvest of Brown King Crab in Thousands of Pounds and Effort in Number of Vessels: Adak Statistical Area (Area R), 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
All districts combined	0	0	0	0	[a]	[a]	75.2	0	[b]	82.4	1,194.0
No. of vessels	0	0	0	0	[a]	[a]	[a]	0	[b]	5	15

Source: ADF&G 1983.

a Harvest and effort combined for seasons 1975 through 1978 to protect confidentiality.

b Harvest and effort combined for seasons 1979-80 and 1980-81 to protect confidentiality.

are the only gear by which king crab in the Adak area may be harvested. Male red king crabs 6.5 inches (165 mm) or greater in carapace width may be harvested from November 10 through February 15. The season for male brown king crabs extends from November 10 through April 15 (ADF&G 1983a).

VI. BERING SEA STATISTICAL AREA

A. Background

The Bering Sea Statistical Area (Statistical Area Q) for king crab includes waters of the Bering and Chukchi seas north of Cape Sarichef (lat 54°36'N) and east of the United States-Russian convention line of 1867. Its northern boundary is the latitude of Cape Hope (68°21'N). The area is separated into two fishing districts: the Pribilof and Northern districts. Only the Pribilof District falls within the Southwest Region.

B. Bering Sea Area Summary

The Bering Sea fishery has traditionally taken red king crab from Bering Sea and Bristol Bay waters north of Unimak Island and along the Alaska Peninsula from Cape Sarichef to Port Heiden. In 1973, however, a fishery began for blue king crab in the Pribilof District, and in 1977 fisheries began in the Northern District for red king crab in Norton Sound and for blue king crab near St. Matthew and St. Lawrence Islands (ADF&G 1980). Because only the Pribilof District falls within the boundaries of the Southwest Region, it alone will be discussed in this narrative.

1. Pribilof District:

a. Boundaries. The Pribilof District includes all waters of the Bering Sea Statistical Area (Statistical Area Q) west of 168° longitude and south of the latitude of Cape Newenham (lat 58°39'N) (ADF&G 1983a).

b. Management history and reported use. Historically, the Pribilof District of the Bering Sea Statistical Area received heaviest exploitation after closure of the old Southeastern District, currently known as the Bristol Bay Registration Area. With the low Bristol Bay harvest during the 1980-1981 season, effort shifted. Vessels registered for the nonexclusive Pribilof District when the season first opened and then registered for the exclusive Southeastern District area after the Pribilof District closed.

The blue king crab fishery in the vicinity of the Pribilof Islands started in 1973, when vessels targeted on stocks between St. George and St. Paul islands. The fishery occurred during summer months when the red king crab fishing was closed. Catches fluctuated throughout the history of the fishery, ranging between 1.3 million pounds the first season and a high of 11.0 million pounds during the 1980-1981 season. Effort has also increased in recent years. A peak number of 110 vessels participated in the fishery in the 1980-1981 season. Ninety-nine boats harvested 9.1 million pounds of blue king crab in 1981-1982 (table 50) (ADF&G 1982).

Red king crabs have been taken incidentally to the blue king crab harvest. About 920 and 1.3 million pounds were taken in the 1980-1981 and 1981-1982 fisheries, respectively. Effort increased during the 1981-1982 season. The harvest was taken by 65 vessels, compared to the 15 boats that registered the year before (table 51). Red king crabs were taken throughout the Pribilof District during the 1981-1982 fishery. The large concentrations prevalent during the previous years' fishery were not apparent in the 1981-1982 season (ADF&G 1982).

c. Management objectives and considerations. King crab harvest levels have been determined by exploitation rates of legal crabs based on relative population size, recruitment, and postrecruitment abundance levels. This information is obtained from stock assessment trawl surveys by the NMFS (ADF&G 1983). As with other areas, stock abundance has declined, and the need to understand the causes of the population decline is a major concern.

d. Periods of use and harvest methods. The Pribilof District is a nonexclusive registration area. All species of king crab in the Pribilof District may be harvested only with pot gear. By regulation in 1983, the season for male red and blue king crabs 6.5 inches (165 mm) or greater in carapace width is from October 1 through April 15. Fishing in the past 10 years has primarily occurred from mid September to mid October. Male red and blue king crabs 7.5 inches (191 mm) or greater in carapace width and brown king crabs 6.5 inches (165 mm) or greater in width may be taken or possessed during seasons established by emergency order (ADF&G 1983a).

VII. BRISTOL BAY STATISTICAL AREA

A. Boundaries

The Bristol Bay Statistical Area (or, currently, Statistical Area T) was formerly the Southeastern District of the Bering Sea Statistical Area. In 1980, it became a separate registration area. It is bordered to the north by the latitude of Cape Newenham (lat 58°39'N), to the south by the latitude of Cape Sarichef (lat 54°36'N), to the west by 168° west longitude, and includes all waters of Bristol Bay (ADF&G 1983).

B. Management History and Reported Use

The commercial harvest of king crab in the eastern Bering Sea was initiated by the Japanese in 1930. During the first year, approximately one million red king crabs were caught with tangle nets in the area north of the Alaska Peninsula by a fleet of 12 small catcher boats (Bakkala et al. 1976). Fishing did not occur in 1931, but each year from 1932 through 1939 one or two Japanese

Table 50. Commercial Harvest of Blue King Crab in Thousands of Pounds: Southern Bering Sea Statistical Area (Area Q), 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Southeast	0	0	0	0	0	0	0	0	0	0	0
Pribilof	0	0	1,300	7,100	2,400	6,600	6,456	6,395	5,995	10,970	9,080
Area total	0	0	1,300	7,100	2,400	6,600	6,456	6,395	5,995	10,970	9,080
No. of vessels	---	---	---	---	---	46	34	58	46	110	99

Sources: ADF&G 1983c, 1982, 1977.

Table 51. Domestic Commercial Harvest of Red King Crab in Thousands of Pounds and Effort in Number of Vessels: Bristol Bay Statistical Area (Area T) and the Pribilof District of the Bering Sea Statistical Area (Area Q), 1971-72 through 1981-82

	Fishing Seasons										
District	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Bristol Bay Area (formerly Southeast District)	12,900	21,700	28,200	41,900	51,300	63,900	70,000[b]	87,600[b]	107,800[b]	129,900	33,500
No. of vessels	52	64	67	108	102	141	130	162	236	236	177
Pribilof District	0	0	0	0	0	0	[b]	[b]	[b]	921.02	1,274.2
No. of vessels	---	---	---	---	---	---	---	---	---	15	65
Area harvest total	12,900	21,700	28,200	41,400	51,300	63,900	70,000	87,600	107,800		

Source: ADF&G 1983.

a Primarily Bristol Bay harvest.

b Southeast and Pribilof districts combined.

factory ships operated in the area. During this eight-year period, some 7.6 million crab were taken from the Bering Sea (Miyahara 1954). The Japanese discontinued fishing after the 1939 season.

The United States conducted exploratory fishing and processing studies on the king crab resource in 1940 and 1941. Ignorance of Japanese canning techniques, an import-dominated market, and a healthy salmon fishery that left little incentive for winter fishing (Gray et al. 1965) were factors partly responsible for the late entry of American fishermen and processors into the king crab fishery. The United States king crab fishery was renewed in 1947, having been interrupted by World War II.

In March of 1948, the factory ship Pacific Explorer left Seattle with a fleet of 10 fishing vessels to fish for both groundfish and king crab; king crab was the target species. This fleet used otter trawls and tangle nets to catch a total of 387,250 crabs. The success of these exploratory fishing ventures resulted in development of a small United States trawl fishery for king crab in the Bering Sea (NPFMC 1980).

Between 1949 and 1952, commercial operations by United States fishermen in the eastern Bering Sea yielded 4,250 metric tons of crab (Otto 1981). Domestic trawlers continued to fish for crabs until after the 1957 season, when development of a successful pot fishery for king crab south of the Alaska Peninsula attracted domestic crab fishermen from the eastern Bering Sea. In 1959, no domestic catch was reported from the Bering Sea (NPFMC 1980).

Japan reentered the eastern Bering Sea king crab fishery in 1953 with a catch of 1.3 million crab weighing approximately 5,100 metric tons. Japanese landings, however, were less than 4,500 metric tons through the remainder of the 1950's (Otto 1981).

The USSR entered the fishery in 1959 with a catch of 620,000 crabs weighing about 1,000 metric tons (ibid.). The combined catch of these two countries peaked in 1964 when about 9 million crabs were harvested (Bakkala et al. 1976).

Domestic fishermen increased their effort for king crab in the Bering Sea in 1970 as stocks in the Gulf of Alaska became heavily exploited. In the late 1960's and early 1970's, the domestic harvest of red king crab increased, but the total catch by all countries declined to less than one-half the peak years of 1962-1964. The reduced foreign catch was partly a result of declining stocks and partly a result of agreements that limited harvest size and fishing gear (ibid.). In 1971, the Soviets ceased fishing for king crab in the area, and by 1975, after four years of very low catches, the Japanese ceased operation. The king crab fishery of the eastern Bering Sea has been a domestic effort since the mid 1970's (table 52).

Domestic interest in the Bristol Bay area king crab fishery (Statistical Area T) increased gradually, peaking at 129.9 million pounds taken by 236 vessels during the 1980-1981 season. The

Table 52. Estimated Annual King Crab Catches in the Eastern Bering Sea by the United States, Japan, and USSR, 1953-82[a]

Year	United States[d]	Japan	USSR	Total[d]
1972-73	21,744	4,721	0	26,466
1973-74[b]	28,190	1,279	0	29,469
1974-75[b]	49,373	2,618	0	51,991
1975-76[b]	53,300,067	0	0	53,300,067
1976-77[c]	69,655,485	0	0	69,655,485
1977-78[c]	78,010,444	0	0	78,010,444
1978-79[c]	98,104,376	0	0	98,104,376
1979-80[c]	117,324,890	0	0	117,342,890
1980-81[c]	143,154,503	0	0	143,154,502
1981-82[c]	48,625,984	0	0	48,625,984
1982-83[c]	16,722,375	0	0	16,722,375

Source: ADF&G 1983.

a Weights in thousands of pounds (1,000 lb = 0.489 metric tons); all estimates were made by multiplying reported catch in numbers times an estimate of average weight. Average weights are live crab as reported by ADF&G.

b Includes Pribilof and Southeastern districts king crab catches.

c Includes Pribilof, Bristol Bay, and Northern districts king crab catches.

d 1975-83 deadloss included.

fishery crashed the following year, when only 33.6 million pounds were harvested by 177 vessels (table 50) (ADF&G 1982).

C. Management Objectives and Considerations

Trawl surveys are performed by the NMFS to obtain population estimates and other biological data for king crab stocks in the Bering Sea. Guideline harvest levels are developed from this data, and the ADF&G recommends regulatory changes, monitors the fishery, and issues closure announcements commensurate with the overall objectives for king crab management. The problem in recent years has been the increased effort directed at the fishery and declining stocks. A problem that occurs with declining populations is that as more areas are closed to fishing, greater effort is directed toward fewer populations, potentially causing a faster decline.

Bristol Bay red king crab stocks have declined radically since the 1981-1982 season. Poor recruitment and low survival of prerecruit crabs has been documented by the NMFS surveys as the cause. Specific reasons for the poor recruitment and low survival are unknown, but predation, disease, handling of sublegal crabs are among the suspected possibilities (McCrary, pers. comm.).

D. Period of Use and Harvest Methods

The Bristol Bay Statistical Area is an exclusive registration area. Pots are legal gear for harvesting crab. By regulation, the red king crab fishery opens October 1 and closes by emergency order. During the 1983 season, male red, and blue king crabs 6.5 inches (165 mm) or greater in carapace width could be harvested. Crabs of all three species (red, blue, brown) seven inches (178 mm) or greater in carapace width can be harvested only during periods opened and closed by emergency order (ADF&G 1983c).

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Tanner Crab Human Use

I. INTRODUCTION

Commercial harvest of Tanner crab is presented in the following narrative. A regional summary of pertinent information is provided first. More detailed district-specific data are contained in sections II. through VII. of this account.

A. Boundaries

Within the Southwest Region is found most of ADF&G Tanner crab Statistical Area J. Statistical Area J, or the Westward Registration Area, includes all Pacific Ocean waters south of the latitude of Cape Douglas (lat 58°52'N), west of the longitude of Cape Fairfield (long 148°50'W), east of 172° east longitude and shoreward of the 400 fathom (732 m) depth contour, and all Bering Sea waters east of 172° east longitude.

Area J is divided into six districts: Kodiak, South Peninsula, Eastern Aleutians, Western Aleutians, Bering Sea, and Chignik (ADF&G 1983a). With the exception of the Northern Subdistrict of the Bering Sea District, all of area J is located in the Southwest Region. A map of the districts at 1:1,000,000-scale may be found in the Southwest Region Atlas.

B. Management History and Reported Use

In most areas, the first commercial exploitation of Tanner crab was incidental to harvest of king crab. A fishery directed at Tanner crab by foreign fleets began in the Bering Sea in 1964. The first domestic harvest of Tanner crab occurred in the Kodiak area in 1967. Interest in Tanner crab has since increased as a consequence of better market conditions and the declining availability of the king crab resource. Over 80% of the statewide Tanner crab harvest has occurred in the Southwest Region.

Two species of Tanner crab are harvested commercially. Most effort has been directed toward the larger species, _Chionoecetes bairdi_. The harvest of _Chionoecetes opilio_, which primarily occurs in the Bering Sea, where _C. opilio_ is the more abundant species, has become significant since 1978 (NPFMC 1981).

C. Management Objectives and Considerations

The Tanner crab fishery within 3 mi of the shoreline is managed by the State of Alaska and the 3 to 200 mi area by the NMFS. Management is directed by a policy jointly developed by the Alaska Board of Fisheries and the North Pacific Management Council. Because Tanner crab distribution is not restricted by state/federal jurisdictional boundaries, problems can arise when state and federal policies conflict. Regulations, though nonexistent during the first two years of the Tanner crab fishery, have since evolved to accomplish the following objectives:

1. _To maximize yield from harvestable surpluses._ This is to be accomplished by seasons and gear restrictions to increase meat yield per individual crab and reduce mortality on sublegal crabs.

2. To maximize the reproductive potential of the Tanner crab stocks. This is to be accomplished by a) imposing seasons, gear restriction, size, and sex limits, and harvest levels to protect crabs during the reproductive period; b) minimizing mortality on female crabs due to handling or harvest; and c) assuring full female fertilization by providing adequate numbers of mature males for breeding.
3. To seek economic stability in the Tanner crab industry. This is to be accomplished by avoiding overcapitalization based on levels of population abundance that may not be sustained over time by a) regulating annual harvest to discourage too rapid expansion of harvesting and processing capability until resource potential can be better evaluated and b) by stabilizing harvest levels within the range of natural recruitment fluctuation if not precluded by excessive natural mortality beyond the first year of maturity (NPFMC 1981).

Currently, forcasting long-term abundance and harvest levels for different fisheries is difficult. Better knowledge of the biology, age classification, and refinement of population assessment are needed to forecast abundance and harvest levels for the fishery and to ensure compatible management policies.

To prevent overexploitation of given Tanner crab populations, superexclusive and nonexclusive registration areas have been established. Vessels or gear registered for fishing in a superexclusive area may not be used to take Tanner crab in any other registration area during that registration year. A vessel or gear may register for one or more of the nonexclusive registration area, however, a vessel or gear so registered may not be used to take Tanner crab in a superexclusive registration area during that registration year. The registration year extends from August 1 through July 31. Superexclusive areas within the Southwest Region include South Peninsula and Chignik districts (ADF&G 1983a).

D. Period of Use and Harvest Methods

Harvest seasons for Tanner crab have been designed to prevent fishing during the soft-shelled and reproductive stages of the species' life cycle. In the Southwest Region, the fishing season differs by management area but usually occurs sometime from late fall through the late spring months.

Regulations stipulate that only male crabs may be possessed to ensure that male Tanner crabs remain in the breeding population at least one season before they are harvested. A minimum size limit as measured by shell width has been established. For *C. bairdi*, the minimum size limit is 5.5 inches (140 mm). For *C. opilio*, the minimum size limit is 3.1 inches (78 mm). Pots are the only legal gear that may be used.

II. KODIAK DISTRICT

A. Boundaries

The Kodiak District consists of all waters south of the latitude of Cape Douglas (lat 58°52'N), west of the longitude of Cape Fairfield (long 148°50'W), and east of the longitude of Cape Kumlik (long 157°27'W). The Kodiak District contains eight fishing sections (ADF&G 1983a).

B. Management History and Reported Use

From the initial harvest in 1967, the Tanner crab fishery slowly expanded through 1972, with harvest levels increasing to 110,961 lb during the 1971-1972 season (ADF&G 1982). Harvest occurred in nearshore waters and inshore bays of the east and west sides of Kodiak Island. Catches prior to 1970 were usually incidental to the king crab fishery or provided a supplemental income source during the winter and spring months (NPFMC 1981).

By the 1972-1973 season, exploitation of Tanner crab was established as the dominate winter and spring shellfish fishery (ADF&G 1983c). During this period, short king crab seasons, favorable Tanner crab marketing conditions, and increased ex-vessel prices also resulted in major expansion of the fishery, with catches reaching 30.7 million pounds (NPFMC 1981). This harvest and the discovery of large untapped offshore stocks established Tanner crab as a principal winter-spring fishery providing fishermen with an earning potential similar to the king crab fishery. By 1975, the offshore area of Cape Ikolik to Chirikof Island, Portlock Banks, Shelikof Strait, Chiniak Gully, and Albatross Bank produced a large yield of crabs (NPFMC 1981).

Peak harvest was taken in the 1977-1978 season, when 33.3 million pounds were caught by 148 vessels (table 53). Catches declined in following years, with the 1980-1981 seasons harvest of 11.7 million pounds being the lowest catch since the early 1970's. The 1981-1982 catch totaled 13.8 million pounds and was landed by a record-high effort of 221 vessels (table 53) (ADF&G 1982). Most participants in the Kodiak fishery have been Alaskan residents (NPFMC 1981).

C. Management Objectives and Considerations

There were no restrictions on the Tanner crab fishery during the first two years of its existence. However, as the fishery developed and effort increased, seasons, size limits, and guideline harvest levels were established. Currently, guideline harvest levels are based on population indices obtained from pot surveys. Management is commensurate with the objectives outlined in the introductory section of this narrative.

D. Period of Use and Harvest Methods

Beginning in 1969, the Kodiak Tanner crab season was set from January 1 through July 31 and from August 15 through December 31. The two-week closure was to provide for an orderly transition into the upcoming king crab season. With time, the fishing season was gradually shortened. With increased effort, the season was adjusted to provide better quality and quantity of meat recovery (NPFMC 1981, ADF&G 1982). The 1983 season for Tanner crab lasted from February 10 through April 30 in the Kodiak District except in that portion of the district extending from the longitude of Kilokak Rocks (long 156°20'13" W) to the longitude of the Cape Kumlik (long 156°27'W), where crab fishing was allowed from February 10 through May 15.

Table 53. Commercial Tanner Crab Harvest in Thousands of Pounds and Effort in Number of Vessels for the Kodiak District, 1972-73 through 1981-82

Fishing Section	Fishing Seasons									
	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Northeast	4,539.4	6,152.0	2,764.1	4,054.1	2,871.2	3,881.8	6,359.8	4,986.1	2,389.5	1,160.9
Eastside	5,370.5	5,619.3	2,423.2	5,032.8	3,071.9	3,910.1	3,032.1	2,119.2	1,310.0	1,362.3
Southeast	1,655.0	1,883.9	624.0	5,859.8	5,908.7	5,222.6	2,529.3	974.9	496.3	549.5
Southwest	9,243.9	7,383.7	3,938.9	3,455.1	1,793.6	8,831.1	5,185.7	2,647.3	2,544.5	5,118.3
Semidi Island	0	0	0	0	0	0	722.6	1,292.3	1,075.5	1,210.7
North Mainland	6,877.0	7,009.1	3,536.9	4,568.8	3,433.1	6,791.3	7,111.5	4,677.7	2,088.9	2,205.3
South Mainland	120.1	50.4	292.6	23.6	20.7	59.3	277.9	500.2	396.2	260.6
Westside	2,893.9	1,722.4	171.3	4,342.7	3,620.8	4,585.4	3,954.9	1,426.0	1,447.8	1,818.5
District Total	30,699.8	29,820.8	13,751.0	27,336.9	20,720.0	28,581.6	29,173.8	18,623.7	11,748.7	13,686.1
No. of vessels	105	123	74	104	1028	2281	188	221		

Source: ADF&G 1982.

Only male crab may be harvested. Legal gear is pots. Effort is limited by allowing no more than 200 pots per vessel (ADF&G 1983a). In 1976, a 5.5 inch minimum limit was established (Colgate, pers. comm.).

III. CHIGNIK DISTRICT

A. Boundaries

The Chignik District encompasses all Pacific Ocean waters of ADF&G Tanner crab Statistical Area J east of a line from the southernmost tip of Kupreanof Point to the easternmost point of Castle Rock and east of a line extending southeast (135°) from the easternmost point of Castle Rock and west of the longitude of the easternmost tip of Cape Kumlik. The Chignik District is divided into four sections: Ivanof, Mitrofania, Chignik, and Kuiulik (ADF&G 1983b).

B. Management History and Reported Use

The Tanner crab fishery began in the Chignik District in 1973. Fifteen vessels entered the fishery and caught 4.2 million pounds (ADF&G 1983b). Catches have remained relatively stable, ranging from 2.5 million pounds taken during the 1978-1979 season to peak harvests of 6.9 million pounds in the 1975-1976 season. Kodiak-based fishermen took most of the catch during this period (NPFMC 1981). Most of the harvest has occurred between January and May. During the 1981-1982 season, 3.2 million pounds of crab were taken by a record high effort of 45 vessels (table 53) participating in the fishery (ADF&G 1983b).

C. Management Objectives and Considerations

In keeping with the general management goals and objectives previously outlined in section I. above, a guideline harvest level is established each season for the Chignik area. The survey is based on population indices derived from trawl surveys completed annually (ADF&G 1983b).

D. Period of Use and Harvest Methods

The Chignik District is a superexclusive registration area. Male Tanner may be taken by pots from February 10 through May 15. Legal gear is pots.

IV. SOUTH PENINSULA DISTRICT

A. Boundaries

The South Peninsula District consists of all Pacific Ocean waters of ADF&G Tanner crab Statistical Area J west of a line from the southernmost tip of Kupreanof Point to the easternmost tip of Castle Rock, west of a line extending southeast (135°) from the easternmost tip of Castle Rock, and east of a line extending south from Scotch Cap Light (ADF&G 1983a).

B. Management History and Reported Use

The Tanner crab fishery in the South Peninsula District began in 1967 with a catch of 5,000 lb. As in other areas of the Westward Region, the early catch was incidental to the king crab harvest. The fishery directed at Tanner crab developed during closed king crab periods. Favorable market conditions, increased processing capacity, and extensive stock exploration helped establish Tanner crab fishing in the South Peninsula District. Catches increased gradually, reaching a record harvest of 11.2 million pounds in 1975-1976 by 36 vessels (table 53). March, April, May, and June have historically provided the best production (ADF&G 1983). In the 1981-1982 season, about 4.6 million pounds were taken by a record-high effort of 72 vessels (table 54)(ADF&G 1983b).

C. Management Objectives and Considerations

Prior to the 1976-1977 season, the South Peninsula fishery was managed without guideline harvest levels (NPFMC 1981). Guideline harvest levels have since been developed each spring based on population estimates from annual pot surveys. The harvest level may be adjusted in-season, based on fishery performance data. The large area in which the fishery occurs has caused difficulty in monitoring it and implementing in-season management decisions. This is of particular concern because stocks have declined, and both fishing effort and processing capacity have increased (Hilsinger 1983).

D. Period of Use and Harvest Methods

Male Tanner crabs may be taken in the South Peninsula District from February 10 through May 15. The South Peninsula District is a superexclusive registration area (ADF&G 1983a).

V. EASTERN ALEUTIANS DISTRICT

A. Boundaries

The Eastern Aleutians District consists of all waters of ADF&G Tanner crab Statistical Area J between the longitude of Scotch Cap Light and 172° west longitude and south of 54°36' north latitude (ADF&G 1983a).

B. Management History and Reported Use

Both _Chionoecetes opilio_ and _Chionoecetes bairdi_ are harvested in the Eastern Aleutians District. This area, however, appears to have marginal habitat for _C. bairdi_ as this species is found in commercial quantities in only a few bays and inlets (ADF&G 1983b). The fishery for Tanner crab began in 1964 (NPFMC 1981). Peak harvest occurred in 1978 at slightly more than 2.4 million pounds (table 54). In the years since 1978, the fishing effort (number of vessels registered) has annually been greater than in 1978, but the harvest has been well below the 1978 total. The fishery is small and seasonal catches have usually been less then 1.0 million pounds. About .74 million pounds were taken in the 1981-1982 fishery.

In the early years of the fishery, effort was concentrated in the Akutan and Dutch Harbor areas but has since expanded to include nearly all areas known to support Tanner crab populations. From 1979 to 1982, most of the harvest was taken in the month of March. Decline of _C. bairdi_ stocks in the Bering Sea has resulted in a shift of effort into the Aleutian Islands area (ADF&G 1983b). Disposal of poor quality or dead-loss _C. opilio_ caught in the Bering Sea and delivered to processors in the Eastern Aleutians has resulted in establishment of very small populations of this species in Akutan Bay, Unalaska Bay, and Beaver Inlet. These populations

Table 54. Commercial Harvest in Thousands of Pounds and Effort in Number of Vessels for Tanner Crab from the Chignik and South Peninsula Districts, Eastern and Western Aleutian Districts, 1973-74 through 1981-82

	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Chignik	4,202.7	3,649.4	11,201.9	5,672.9	4,693.8	2,536.1	3,517.9	3,684.6	3,240.6
No. of vessels	15	25	35	21	32	39	42	24	45
South Peninsula	9,482.8	5,195.8	6,926.2	6,773.9	7,282.8	8,637.6	6,961.3	3,294.1	4,589.0
No. of vessels	36	44	36	28	36	48	61	43	72
Eastern Aleutians[a]	570.7	b	534.3	1,301.7	2,429.5	1,280.1	886.5	654.5	739.7[a]
No. of vessels	10	b	8	12	14	20	18	29	31
Western Aleutians	98.1	c	c	0	237.5	197.2	337.4	220.7	838.7
No. of vessels	10	c	c	0	6	6	10	9	17

Source: ADF&G 1983.

a Does not include 2,598 lb of C. opilio landed during the 1981-82 season.

b Noted seasons 1973-74 and 1974-75 combined to protect confidentialiy.

c Noted 1974-76 seasons combined to protect confidentiality.

usually produce poor quality crab unacceptable to processing plants. During the 1982 season, five vessels delivered 2,598 lb of *C. opilio*, of which 2,000 lb were from Unalaska Bay and the remainder from Akutan Bay (ADF&G 1983b).

C. Management Objectives and Considerations

Harvest levels of *C. bairdi* are usually determined from surveys conducted in the area or by past harvest levels in keeping with the objectives listed in the introductory section of this narrative.

D. Period of Use and Harvest Methods

In the Eastern Aleutians District, the 1983 season lasted from February 15 to June 15. Tanner crab may not be taken from waters of Unalaska Bay enclosed by a line from Cape Cheerful (lat 54° N, long 166°40'22" W) to Priest Rock (lat 54°N, long 166°22'30"W) by vessels over 50 ft, USCG registered length, or 58 ft length overall (ADF&G 1983a). Legal gear is pots.

VI. WESTERN ALEUTIANS DISTRICT

A. Boundaries

The Western Aleutians District is comprised of all waters of ADF&G Tanner crab Statistical Area J west of 172° west longitude, south of 54°36' north latitude and east of the United States-USSR Convention Line (ADF&G 1983a).

B. Management History

The Western Aleutians Tanner crab fishery has always been conducted in conjunction with the harvest of red king crab. Catches have increased steadily since 1975. The record catch of 838,697 lb was taken during the 1982 season by 17 vessels (table 55). Best catches were taken in the Nazon Bay, Korovin Bay, and Adak Island areas. Vessels exploring for brown king crab have recently found concentrations of Tanner crab near Attu Island (ADF&G 1983b).

C. Management Objectives and Considerations

Management considerations are similar to those in the introductory and Eastern Aleutians District portions of this narrative.

D. Period of Use and Harvest Methods

The Tanner and king crab seasons have usually occurred at the same time. In the past, the Tanner crab season began in January (ADF&G 1983c). In 1983, however, the season changed to correspond with the previous year's king crab season. The Tanner crab season now extends from November 10 through June 15 (ADF&G 1983a).

VII. BERING SEA DISTRICT

A. Boundaries

The Bering Sea District includes all Bering Sea waters of ADF&G Tanner crab Statistical Area J north of 54°36' north latitude. This district contains three subdistricts. The Pribilof and Southeastern subdistricts fall within the boundaries of the Southwest Region (ADF&G 1983a).

B. Management History and Reported Use

Foreign and domestic crab fleets were originally attracted to the eastern Bering Sea by the availability of the larger and more

Table 55. Commercial Harvest in Thousands of Pounds and Effort for Tanner Crab, by Species for the Southeastern and Pribilof Subdistricts of the Bering Sea District, 1972-82[a]

Subdistrict	Species	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82
Southeastern	*C. bairdi*	---	---	---	---	---	---	---	---	26,685.0	8,812.3
	C. opilio[b]	---	---	---	---	---	---	---	---	36,391.3	13,079.9
Pribilof	*C. bairdi*	---	---	---	---	---	---	---	---	2,945.5	2,196.5
	C. opilio	---	---	---	---	---	---	---	---	14,091.8	16,271.6
Total	*C. bairdi*	3,019.0	50,442.0	70,284.0	22,341.5	51,454.1	66,227.9	42,547.2	36,557.9	34,630.5	11,008.8
	No. of Vessels	---	---	---	---	---	281	144	286	165	125
	C. opilio	---	---	---	---	---	1,716.1	3,427.9	39,572.7	50,483.1	29,351.5
	No. of Vessels	---	---	---	---	---	15	102	134	153	122

Source: ADF&G 1981, 1982, 1983.

a Data by district available from 1980-81 through 1981-82.

b Harvest data for *C. opilio* available only from 1978 as a total.

valuable king crab (Paralithodes camtschatica). With development of markets and processing techniques, Tanner crab became a targeted species (Somerton 1981).

Between 1953 and 1964, Japanese and Soviet fleets caught Tanner crab usually as an incidental catch of the king crab and groundfish trawl fisheries. Available data, though limited, indicate that annual production, at least by the Japanese mothership fleet, during this time was probably fewer than 1,000,000 Tanner crabs per year (Otto 1981).

In 1964, when the Soviet and Japanese king crab fisheries were at their peak, negotiations began between the United States, Japan, and the USSR. These negotiations restricted foreign harvest quotas of king crab and encouraged exploitation of Tanner crab as a substitute. The initial fishery targeted exclusively on C. bairdi because of its larger size.

In 1965, approximately 1.7 million Tanner crabs were taken by Soviet and Japanese fleets. The fishery expanded rapidly during the following years, and in 1968 the United States entered the Tanner crab fishery, although fishing remained incidental to king crabbing until 1974 (Otto 1981).

By 1969, the direct harvest of C. bairdi had increased to the level where foreign fishing quotas appeared necessary. As a result of restrictions imposed by the United States, foreign vessels began directing their effort toward C. opilio (Armstrong et al. n.d.).

As total landings of Tanner crab from the eastern Bering Sea increased (from 12 to 24 million crabs from 1967 to 1970), so did American interest in the fishery. Consequently, through a series of bilateral agreements and United States harvest quotas, foreign participation in the eastern Bering Sea Tanner crab fishery was gradually reduced and forced to fish areas to the north and west (ibid.). Foreign catches declined in 1971 and again in 1972, when the USSR left the fishery (Otto 1981).

In 1974, a directed United States Tanner crab fishery began, with the target species C. bairdi (ADF&G 1982). The fishery was, and continues to be, conducted north of the Alaska Peninsula and near the Pribilof Islands (Otto 1981). After the directed United States fishery began, C. bairdi catches grew from 2,300 metric tons in 1974, to 10,100 metric tons in 1976, and peaked at 30,030 mt (table 54) in 1978 (Otto 1981). With a decline in C. bairdi abundance, United States vessels moved north and began catching C. opilio (Somerton 1981). Landings of C. opilio exceeded those of C. bairdi by almost three million pounds during the period 1980 through 1982, though C. opilio continues to command a considerably lower ex-vessel price (Armstrong et al. n.d.). In 1981, because of increased United States participation in the C. opilio fishery, foreign fishing was eliminated (Somerton 1981). Today, all Tanner crab fishing in the southeastern Bering Sea (except for incidental catch) is conducted aboard American vessels and is directed at both C. bairdi and C. opilio (Armstrong et al. n.d.).

C. bairdi stocks are showing a sharp decline, producing a 1980-1981 harvest of only 29.7 million pounds and a 1981-1982 catch of 10.9 million pounds. As catches of C. bairdi decrease, the commercial fleet is shifting its effort to C. opilio (ADF&G 1983c).

C. Management Objectives and Considerations

Bering Sea Tanner crab stocks are managed by two agencies. The domestic fishery is managed by the State of Alaska. The NMFS is responsible for regulating the foreign fishery (NPFMC 1981). Management is under the joint policy established by the Alaska Board of Fisheries and the NPFMC. As with other Tanner crab fisheries, regulations governing the fishery involve sex, gear type, season, and size. Guideline harvest levels are determined annually by the state. The harvest levels are based on population estimates and biological data provided from trawl surveys performed by the NMFS (ADF&G 1983c). Identification of hybrid C. opilio and C. bairdi crab is difficult, which may provide loopholes in closure dates of the season on C. opilio. The large area and remoteness of the fishery and movement of processing facilities to offshore/on-the-grounds locations makes acquiring in-season biological and harvest data difficult for in-season management decisions.

D. Period of Use and Harvest Methods

The 1983 season by regulation extended from February 15 through August 1 (ADF&G 1983b). Legal gear is pots.

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Razor Clam Human Use

I. MANAGEMENT HISTORY

A. State or Other Agency Jurisdiction

Razor clam harvest in Alaska is managed by the ADF&G. Sanitary control of the commercial shellfish industry is regulated jointly by the State of Alaska Department of Environmental Conservation, the Department of Public Safety, and the ADF&G (Orth et al. 1975).

B. Management Objectives

Though no specific management objectives for razor clams in Alaska have been published by the ADF&G, research and management activities have been directed towards maintaining good recreational and commercial harvests.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

A commercial razor clam fishery in Alaska began in 1916 on razor clam beds near Cordova. Razor clams have been harvested in the Kodiak Management Area since the early 1920's (ADF&G 1983). Digging in the Kodiak area continued sporadically until the 1960's, with a peak at 461,000 lb in 1932 and another at 486,000 lb in 1958 (ADF&G 1975). The U.S. Food and Drug Administration (FDA) withdrew its endorsement of Alaska's membership in the National Shellfish Sanitation Program (NSSP) in 1954 as a result of paralytic shellfish poisoning (PSP) problems with hardshell clam stocks (Schink et al. 1983). Expulsion from the NSSP meant that clams harvested for human consumption could not be shipped out of state. In 1963, the Alaska Department of Health and Welfare closed all beaches to commercial shellfish harvest unless specific areas were certified by that department (Nickerson 1975). This, combined with poor market conditions and the destruction of commercially important beaches by the 1964 earthquake, helped bring about a decline in the fishery (ADF&G 1983a).

In 1975, Alaska regained its membership in NSSP, and commercial harvest of razor clams for human consumption resumed (Schink et al. 1983). Swikshak Beach, located 18 mi southwest of Cape Douglas within Katmai National Monument, is the only beach approved for commercial harvest of razor clams for human consumption in the Southwest Region. Clams are also harvested at several unapproved beaches, to be used as bait in the Dungeness crab fishery (table 55a). Crab fishermen prefer razor clams as bait and have been willing to pay high prices for this use (Orth et al. 1975). Clams are also harvested by sport fishermen (table 95).

A. Significance of Particular Harvest Areas

1. Kodiak area. Though many Kodiak Island beaches were explored during the early fishery, the principal commercial harvest occurred in the Kukak Bay, Hallo Bay, Big River, and Swikshak Beach regions on the Alaska Peninsula (ADF&G 1983a). In recent years, the substrate of Swikshak beach has changed dramatically, and it no longer supports a substantial razor clam harvest (Nippes, pers. comm.).

Table 55a. Kodiak District Razor Clam Commercial Harvest in Pounds (Round Weight)

Year	Harvest
1973	165,282
1974	198,382
1975	6,188
1976	--- [a]
1977	[b]
1978	1,752 [b]
1979	---
1980	8,006
1981	[c]
1982	19,794 [c]

Sources: ADF&G 1983a and ADF&G 1983b.

a --- indicates no catch.

b 1977 and 1978 catches combined to maintain confidentiality.

c 1981 and 1982 catches combined to maintain confidentiality.

2. Alaska Peninsula and Aleutian Islands area. Few beaches southwest of Shelikof Strait on the Alaska Peninsula have been used commercially. A catch of nearly 45,000 lb of razor clams was taken from the Kalekta Bay area on Unalaska Island in 1969, but that is the last commercial catch reported southwest of Shelikof Strait (ADF&G 1983b).

B. Harvest Method

At this time, almost all razor clams are harvested by hand-digging with shovels. Efforts are underway, however, to perfect a hydraulic dredge harvester that would be a more effective and less labor-intensive method of harvest (ADF&G 1982b, 1983c). The design and use of a dredge must be approved by the ADF&G. Permits must specify the location of the intended operation, the proposed duration of the operation, and detailed gear specifications. Less than 10% of the harvest may be lost from breakage (ADF&G 1983c).

C. Projected Increase in Demand

Currently, though the razor clam harvest in Alaska has increased in recent years, it remains very labor-intensive. Historically, Alaska clams marketed for food have been unsuccessfully competing against cheaper Atlantic Coast clams, which are mechanically harvested (Orth et al. 1975). If a dredge is perfected for Alaska, however, the commercial harvest of razor clams may greatly increase, and the cost of harvesting the clams may no longer be prohibitive. Further development of the fishery is contingent upon certification of new beach areas for the harvest of clams for human consumption (ADF&G 1983c, Smelcer and Orth 1974).

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Shrimp Human Use

I. INTRODUCTION

Commercial harvest of shrimp is presented in the following narrative. A regional summary of pertinent information is provided first. More detailed district-specific data are contained in sections II. through VI. of this account.

A. Boundaries

Within the Southwest Region is found ADF&G shrimp Statistical Area J. Statistical Area J, or the Westward Registration Area, includes all Pacific Ocean waters south of the latitude of Cape Douglas (lat 58°52' N), west of the longitude of Cape Fairfield (long 148°50' W), east of 172° east longitude, and seaward to the 300 fathom (549 m) depth contour, and all Bering Sea waters east of 172° east longitude (ADF&G 1983a). Area J is divided into five districts. These include the Kodiak, Chignik, South Peninsula, North Peninsula, and Aleutian districts. A map of the districts at 1:1,000,000-scale may be found in the Southwest Region Atlas.

B. Management History

The shrimp fishery in the Southwest Region is a multispecies fishery. Though pink shrimp (Pandalus borealis) dominate the harvest, humpy (Pandalus goniurus) and coonstripe shrimp (Pandalus hypsmotus) are also caught.

Commercial exploitation of shrimp in the Southwest Region began in the Kodiak District in 1959. Fisheries also developed in the Chignik, South Peninsula, and Aleutian Islands areas. The combined harvest for these areas increased steadily, peaking at over 112.76 million pounds in 1976, diminishing to a harvest of 10.73 million pounds during the 1982-1983 season and averaging 69.1 million pounds annually since the 1973-1974 season. About 77% of the statewide shrimp harvest is from Statistical Area J (ADF&G 1982).

Foreign fleets also harvested shrimp in the Southwest Region. Effort exerted in the Gulf of Alaska was primarily by the Soviet fleet, fishing near the Kodiak and Shumagin islands during the 1960's. Japanese participation in the Gulf of Alaska fishery was less intense and was primarily concentrated in the Kodiak area (McCrary 1984). Directed fishing pressure upon both pink and humpy shrimp in the eastern Bering Sea or North Peninsula District was by foreign fleets and was short-lived. The Japanese began harvesting shrimp in 1960, ceasing by 1967 (Balsiger 1979). Soviet fishermen arrived after the Japanese in the Bering Sea, but participation was minor because shrimp stocks were already depressed by the time the Soviet fleet arrived on the fishing grounds (McCrary 1984).

C. Management Objectives and Considerations

Shrimp fisheries are managed by the Alaska Department of Fish and Game (ADF&G), directed by the policy of the Alaska Board of

Fisheries. The management objective is to obtain optimum yield from each defined stock by harvesting healthy stocks at a higher rate than those in need of rebuilding. Currently, most stocks in the Southwest Region are in depressed condition and need protection from overexploitation. The overall management goal is to achieve maximum harvest without affecting reproductive potential. Guideline harvest levels are determined each season, based on abundance indices and stock-condition data obtained from trawl surveys (Jackson 1983).

D. Harvest Methods and Period of Use

Shrimp may be harvested by pots and trawls, and most harvest is taken by trawl. Though there is no closed season on shrimp fishing with pots, seasons for trawl fishing are regulated by district, so that closures would correspond to egg-hatching periods in the spring months (ADF&G 1982, 1983a).

II. KODIAK DISTRICT

A. Boundaries

The Kodiak District encompasses all Pacific Ocean waters south of the latitude of Cape Douglas (lat 58°52' N), west of the longitude of Cape Fairfield (long 148°50' W), east of a line extending south from Kilokak rocks. The Kodiak District is divided into 16 sections (map 4).

B. Management History

Pandalid shrimp were first harvested in the Kodiak District in 1959. The fishery developed rapidly with introduction of mechanical peelers for processing the catch. This early effort concentrated in the area of Chiniak Bay and Marmot Bay (ADF&G 1982). Catches increased through the 1960's, due to good market conditions and implementation of double-sized trawler vessels. The fishing peaked in 1971, with a catch of 82.2 million pounds. The Kodiak harvest declined steadily thereafter because of low stock abundance. Much of the effort, therefore, moved to fisheries in the Chignik and South Peninsula areas (ibid.). Participation has ranged from a low of six boats in 1964 to a high of 75 vessels during the 1973-74 harvest season (ibid.). Fleet size prior to 1982 averaged about 60 vessels per season. Participation, however, began to drop in 1982 because of low stock abundance (ADF&G 1982; Jackson, pers. comm.). Most of the Kodiak harvest is taken by trawl gear. Pots are also used in the Chiniak Bay section and account for less than 0.01% of the total Kodiak District shrimp harvest (ADF&G 1982).

During the 1982-1983 season, 10.4 million pounds were harvested (ibid.). Most of the harvest was taken from Kalsin and Chiniak bays, Alitak Bay, North Afognak Bay, and Kukak Bay (table 56).

Though the Kodiak District shrimp fishery began in Marmot and Chiniak bays, major production has historically been from the Ugak Bay, Kiliuda Bay, and Two Headed Island fishing sections (Jackson 1981). Stock levels have recently declined to a level warranting closed seasons in Kiliuda Bay and limited fishing in the Two Headed Island area.

Table 56. Westward Region Seasonal Trawl-Caught Shrimp Harvests in Millions of Pounds by Fishing Section, 1973-74 Through 1982-83 Seasons

Fishing District/ Section or Area	Fishing Season 1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
Kodiak District										
Inner Marmot Bay	3.36	2.84	3.05	2.71	1.48	.47	0	0	1.96	b
Marmot Island	15.86	20.21	16.05	14.15	3.30	0	0	0	.09	b
Chiniak Bay	1.40	2.89	.76	1.01	.03	c	c	c	c	c
Kalsin Bay	---[a]	---[a]	1.28	1.51	1.81	1.16[c]	.92[c]	.14[c]	2.60[c]	1.38[c]
Kiliuda Bay	5.93	8.75	6.61	6.69	6.06	0	0	0	0	b
Twoheaded Island	12.74	12.73	12.81	11.89	4.04	.002	0.14	3.04	b	
Alitak Bay	8.99	4.19	4.25	4.90	4.42	3.49	3.54	4.742	4.14	3.58
Alitak Flats	---[a]	---[a]	---[a]	---[a]	---[a]	---[a]	---[a]	---[a,e]	1.73	.05
Olga Bay	---[a]	---[a]	---[a]	---[a]	---[a]	1.79	2.26	1.16	.76	.94
Ugak Bay	.02	.06	0	0	0	0	.53	1.05	.10	b
Uyak Bay	1.48	.72	.33	.48	1.31	1.00	0	.43	0	b
Uganik Bay	1.94	1.60	.84	.91	1.48	.37	0	0	0	b
West Afognak	.84	.66	.83	.99	.26	.88	.48	1.18	.23	.001
North Afognak	1.42	3.09	1.03	1.07	.05	1.15	1.43	2.20	.75	1.21
S. Mainland	.07	0.12	.21	.27	---[a]	---[a]	---[a]	---[a]	---[a]	---[a]
Kukak Bay	2.15	.48	1.02	.22	.78	.59	.53	1.17	.55	1.71
Wide Bay	---[a]	---[a]	---[a]	---[a]	---[a]	---[a,d]	1.18	.98	.93	.85
Puale Bay	---[a]	---[a]	---[a]	---[a]	---[a]	---[a,d]	1.84	.66[e]	1.60	.66
Non-section	0	0	0	0	0	9.60[d]	.14	11.28[e]	.64	.01
Subtotal	56.20	58.22	49.08	46.74	25.29	20.50	12.85	27.11	19.12	10.391
Chignik District										
Kujulik Bay	2.80	1.70	3.50	6.64	5.79	6.03	11.05	3.37	b	b
Chignik Bay	4.90	2.70	7.00	4.81	5.45	8.83	5.83	5.37	b	b
Kuiukta Bay	.60	2.60	3.00	1.84	1.23	1.74	.09	.01	b	b
Mitrofania Island	9.80	19.30	6.00	9.69	8.22	4.05	2.69	b	b	b
Ivanof Bay	.40	.30	.20	1.75	3.31	2.17	b	b	b	b
Sutwik Island	1.00	.90	.50	.31	1.40	.31	4.06	4.07	.07	b
Seal Cape	2.20	.50	4.10	2.10	1.10	.13	0	b	b	b
Subtotal	21.70	28.00	24.30	27.14	26.50	23.26	23.72	12.82	.07	b
South Peninsula										
Stepovak Bay	4.00	6.40	7.30	11.99	10.35	.09	b	b	b	b
Unga Strait	2.10	3.70	4.30	3.69	0	0	b	b	b	b
West Nagai	8.20	7.80	4.60	1.64	.46	1.01	.30	b	b	b
Beaver Bay	1.80	2.00	.30	.59	0	0	b	b	b	b
Kennoys Island	---[a]	---[a]	---[a]	---[a]	---[a]	---[a]	0	b	b	b
Pavlof Bay	2.80	4.90	3.40	17.29	25.68	8.25	2.82	b	b	b
Belkofski Bay	---[a]	---[a]	---[a]	---[a]	1.46	.005	.003	b	b	b
Subtotal	18.90	24.80	19.90	35.20	44.87	9.43	3.13	b	b	b

(continued)

Table 56 (continued).

Fishing District/ Section or Area	Fishing Season 1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
Aleutian District										
Unalaska Bay	---[a]	---[a]	.37	1.00	.93	1.23	.24	0	0	0
Makushin Bay	---[a]	---[a]	.52	2.26	3.16	1.53[f]	1.67[f]	1.54[f]	1.95[f]	.34[f]
Beaver Inlet	---[a]	---[a]	0	.11	.16	1.38	.71	.54	.19	0
Skan Bay	---[a]	---[a]	0	.31	.20	f	f	f	f	f
Usof Bay	---[a]	---[a]	---[a]	---[a]	.15	.76	.67	.38	.05	0
Subtotal	---[a]	---[a]	.89	3.68	4.60	4.90	3.29	2.46	2.19	.34
Grand total	96.80	111.02	94.17	112.76	101.26	58.09	42.99	42.39	21.38	10.73

Source: Jackson 1983.

a Sections with no catch indicated by zero. Dashes indicate no section existed that year.

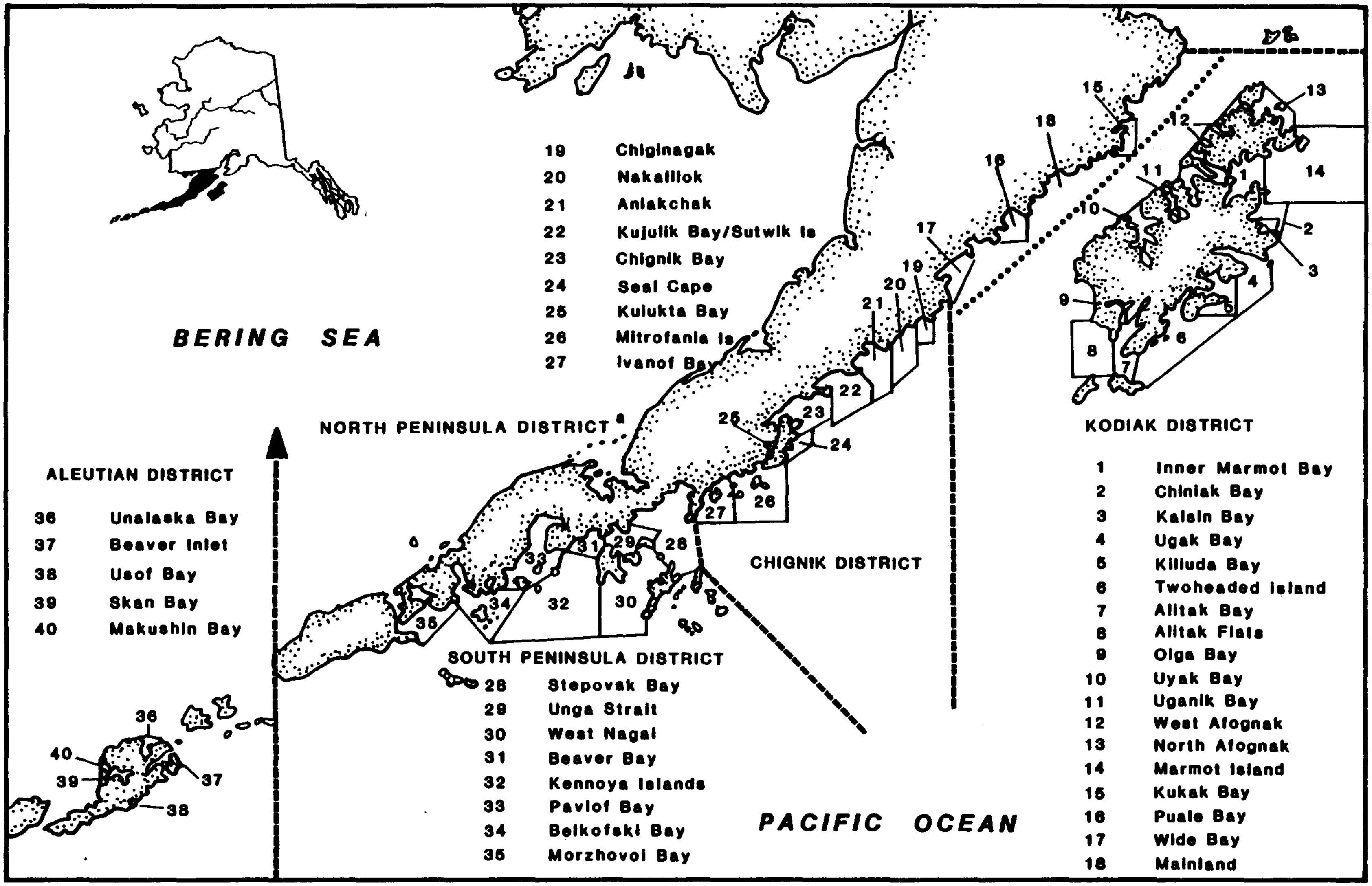
b Closed to commercial trawling.

c Catches from Kalson and Chiniak bays combined under Kalsin Bay.

d Catch made from Wide and Puale bays.

e Catch made from Alitak Flats.

f Skan Bay catch incorporated with the Makushin Bay catch since 1978.



Map 4. Shrimp fishing districts and sections of the Southwest Region (Statistical Area J) (ADF&G 1983, Jackson 1983)

a The North Peninsula District is not subdivided into sections.

C. Management Objectives and Considerations

The Kodiak shrimp fishery through 1969 was free of any regulatory measures. The Board of Fisheries then imposed the first time-area closure. The closure was established to protect stocks during the egg-hatching period of the reproductive cycle. Regulations have since been adopted to include total egg hatch closures for the entire Kodiak Island District during the months of March and April. Single harvest periods with staggered opening dates for some sections were adopted, and the Department of Fish and Game began utilizing abundance indices from trawl surveys to establish harvest levels (ADF&G 1983c).

In most cases, the shrimp fishery is managed by stock. During the 1982 season, however, the Board of Fisheries consented to industry's request for an experimental fishery along a specified portion of the Alaska Peninsula mainland section. This particular area is open 10 months of the year regardless of the harvest levels attained during the season (ADF&G 1983).

The management goal is to allow recovery of the Kodiak shrimp fisheries to again support significant commercial harvest (ADF&G 1983b). The decline in abundance of most shrimp populations has yet to be completely understood. Evidence, however, points to nonselective predation by groundfish species (Jackson 1983). Projections for the fishery's recovery have yet to be defined.

D. Period of Use and Harvest Methods

Shrimp may be taken by both pot and trawl gear in the Kodiak District. There is no closed season on shrimp fishing with pots (ADF&G 1983a). In 1971, the Alaska Board of Fisheries adopted a quarterly quota system, dividing the catch into four harvest periods for different fishing sections on the island. During the late 1970's, the quarterly quota system was reduced to a single harvest period, with staggered opening dates for many fishing sections. Since 1979, the opening date for most fishing sections has been June (ADF&G 1983e). With the exception of the Kiliuda Bay and Marmot Bay sections, which are regulated by emergency order, shrimp may be taken by trawl from June 15 through February 28 (ADF&G 1983a).

III. CHIGNIK DISTRICT

A. Boundaries

The Chignik District is comprised of all waters west of a line extending south from Kilokak Rocks and east of a line from Kupreanof Point to the easternmost point of Castle Rock and east of a line extending 135° southeast from the easternmost point of Castle Rock (ADF&G 1983a). The Chignik District is divided into nine sections (map 2). Of these, the most important are Chignik Bay, Kujulik Bay, Ivanof Bay, and Mitrofania Island.

B. Management History and Reported Use

The fishery for shrimp in the Chignik District began in 1968, concentrating in the Mitrofania Island area. This districtwide fishery was developed initially by the Alaska Peninsula fleet. Minor seasonal catches averaged less than one million pounds, prior to the 1973-1974 season. Harvest levels increased to 21.7 million pounds during the 1973-1974 season, due to the availability of a floating processor near the fishing grounds. The peak harvest of 28.0 million pounds occurred during the 1974-1975 season. Catches later declined to a low of 0.07 million pounds in 1981-1982 (table 56). The fishery has remained closed since then because of low abundance indices (ADF&G 1982). Catches in the Mitrofania Island fishery were minor prior to the 1973-1974 season, averaging less than one million pounds annually (ibid.). The record harvest for this area occurred in the 1973-1974 season at about 19.3 million pounds. The increased harvest was a result of an increased effort and the availability of a localized floating processor. Catches in subsequent years declined to a low of 2.69 million pounds in 1979-1980. The fishery in this area was closed from 1980 to 1982 in response to continued low abundance indices (ibid.).

The Ivanof Bay fishery developed incidentally to the Alaska Peninsula and the Mitrofania Island shrimp fisheries during exploratory fishing operations on the Mitrofania Island grounds. Catches from Ivanof Bay did not exceed one million pounds until the 1976-1977 season (table 56). A peak harvest of 3.31 million pounds occurred during the 1977-1978 season. Harvest declined the following year, and the Ivanof Bay fishery closed during the 1979-1980 season because of low abundance (ibid.).

The combined production of shrimp stocks in Chignik and Kujulik bays historically is second only to Two Headed Island and Kiliuda stocks in the Kodiak District. The Chignik Bay and Kujulik Bay fisheries were developed in 1973-1974 by double-rig, gulf-style trawlers. These vessels entered the fishery with increased efficiency during the early 1970's. A peak harvest from these two areas of 16.9 million pounds occurred in the 1979-1980 season but decreased to 8.7 million pounds in 1980-1981 (ibid.). The fisheries were closed after the 1980-1981 season because of low abundance.

C. Management Objectives and Considerations

As with other Southwest Region shrimp fisheries, abundance of shrimp stocks is very low. Recovery of the fisheries and projected use at this time cannot be predicted. The decrease in abundance indices has been attributed to increased predation by cod and pollock (ibid.).

D. Period of Use and Harvest Methods

In the Chignik District, all commercial shrimp harvest is taken by trawl. The season opens by regulation May 15 and extends through February 14. Exceptions to the districtwide opening occur in the Mitrofania Island, Ivanof Bay, Kuiukta Bay, Kujulik Bay, and Chignik Bay sections, which are opened and closed by emergency order, and in the Chiginagak Bay, Nakalilok Bay, and Aniakchak Bay sections, where the season extends from June 15 through February 28 (ADF&G 1983a).

IV. SOUTH PENINSULA DISTRICT

A. Boundaries

The South Peninsula District consists of all waters west of a line from Kupreanof Point to the easternmost point of Castle Rock and west of a line extending 135° southeast from the easternmost point of Castle Rock and Pacific Ocean waters east of the longitude of Cape Sarichef (ADF&G 1983). The district is divided into eight sections (map 4), of which Stepovak Bay, Unga Straits, West Nagai, and Pavlof bay have historically provided most of the shrimp harvest (ADF&G 1982).

B. Management History

Fisheries in the South Peninsula District began in the area of Pavlof Bay and Stepovak Bay during the 1967-1968 season. Seasonal catches for the period 1973-1974 through 1982-1983 peaked with a districtwide catch of 44.87 million pounds during the 1977-1978 season. During the same period, Stepovak Bay Section catches peaked with a harvest of 17.29 million pounds during the 1976-1977 season. The Pavlof Bay Section harvest increased to 25.68 million pounds during the 1977-1978 season. Both populations have since declined. Shrimp abundance in other South Peninsula District fishing sections followed a similar trend, and the entire district has been closed to commercial shrimp trawling beginning with the 1980-1981 season.

The local fleet based in Sand Point was the primary harvester of shrimp in the South Peninsula District through the mid 1970's. The intense effort directed at Stepovak and Pavlof bays from 1976 through 1978 was from the Kodiak-based fleet. The Kodiak fleet moved to the peninsula area because of declining shrimp populations in the Kodiak District. The decline of shrimp stocks in the South Peninsula District has been attributed to overharvest (ADF&G 1982).

C. Management Objectives and Considerations

Management in the South Peninsula District is on a stock-by-stock basis. The goal is to manage the commercial shrimp fisheries to protect the presently depressed stocks from exploitation and to allow recovery to again support significant commercial fisheries (ADF&G 1983c).

D. Period of Use and Harvest Methods

Trawls are the only legal gear in the South Peninsula District. Districtwide, the fishing season extends from May 15 through February 14, except that Stepovak Bay, Unga Straits, Beaver Bay, Pavlof Bay, Belkofski Bay, and Morzhovai Bay seasons are opened and closed by emergency order (ADF&G 1983a).

V. NORTH PENINSULA DISTRICT

A. Boundaries

The North Peninsula District includes all Bering Sea waters east of the longitude of Cape Sarichef. The district has not been divided into sections.

B. Management History and Reported Use

Pink shrimp have been documented northwest of the Pribilof Islands and in Bristol Bay. The Bering Sea supports good shrimp habitat, shallow waters, and substrate conducive to trawling. In the early 1960's, the Japanese and Soviet fleets fished for shrimp in the Bering Sea. Japan concentrated its efforts in the Central Bering

Sea north of the Pribilof Islands and achieved a peak catch of 27,000 metric tons in 1963. However, Japanese effort then declined rapidly, ceasing by 1967. Shrimp stocks have remained depressed, and the shrimp fishery has not returned in recent years (Morris 1981, Balsiger 1979).

C. Management Objectives and Considerations

A directed fishery in shrimp in the Bering Sea has not occurred since 1966. During the late 1960's and early 1970's, some shrimp stocks were exploited in the Gulf of Anadyr off the Soviet coast and in the northcentral area of the Bering Sea. The shrimp fisheries in the eastern Bering Sea had not been managed until 1977, when prohibitions were placed on retention of shrimp by any nation other than the United States within United States jurisdictional waters in the Bering Sea.

Currently, shrimp populations in the Bering Sea are severely depressed. There is no commercial foreign or domestic exploitation upon these populations at this time (Morris 1981).

D. Period of Use and Harvest Methods

A directed fishery for shrimp in the North Peninsula District has not occurred since the 1960's.

VI. ALEUTIAN DISTRICT

A. Boundaries

The Aleutian District is defined as all waters west of the longitude of Cape Sarichef. The district contains four sections that are located toward the eastern end of the Aleutian chain. They are Unalaska Bay, Makushin Bay, Beaver Inlet, and Usof Bay (map 4) (ADF&G 1983).

B. Management History

Shrimp catches were first reported from the Aleutian District in 1975. Though most of the harvest is by trawl, a very small pot fishery also operates in this area. Catches and effort increased gradually and peaked at 4.9 million pounds during the 1978-1979 season, declining steadily thereafter. The Unalaska Bay section was closed during the 1980-1981 and 1981-1982 seasons because of low stock abundance (ADF&G 1982). The 1982-1983 season provided a catch of about 340,000 lb. The 1982-1983 harvest was from Makushin Bay, as commercial quantities of shrimp were not located in the other sections (ADF&G 1983c).

C. Management Objectives and Considerations

Past harvest levels provide the basis for determining present harvest levels, the objective being to rebuild populations to optimum harvestable levels.

D. Period of Use and Harvest Methods

Shrimp in the Aleutian District have been primarily harvested by trawl, although both pots and trawls are legal. Fishing seasons have been variable since 1976. Although the trawl fishery was open for 11 months in 1978 and 1979, fishing time in subsequent seasons has become gradually restricted. The fishery was open only during the months of May and June in 1982. Within the Aleutian District, there is no regulated season for pots other than for the Unalaska Bay, Makushin Bay, Beaver Inlet, and Usof Bay sections, which open and close by emergency order (ADF&G 1983a).

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Commercial Fur Seal Harvest

Northern Fur Seal Human Use

I. MANAGEMENT HISTORY

Since the Russians began commercially harvesting fur seals in 1786, the northern fur seal has been one of the most intensively managed marine mammal species in North America. Excellent discussions of the history of fur seal management between 1786 and 1959 are available in NMFS (1975, 1977), Lander (1980) and Ronald et al. (1982). The discussion below will summarize major management milestones for the period 1786-1956 and more intensively discuss recent management history (1957 to present).

A. Prior to 1956

Prior to the sale of Alaska to the United States in 1867, management of the land harvest of seals was controlled by the Russian-American Company. Because the population had been harvested to dangerously low levels by 1834, in 1835 the Russian-American Company restricted the harvest to males. By the time that Alaska was sold to the United States in 1867, the herd had likely recovered to near pre-exploitation levels. Following the sale of Alaska to the United States, fur seals, including females, were harvested indiscriminately until, in 1869, an exclusive 20-year lease was issued to the Alaskan Commercial Company, and the harvest of females was forbidden. However, pelagic sealing by other nations, as well as by the United States, began in earnest in 1869, and as a result the population plummeted to less than 300,000 by 1909. In 1910, Great Britain, Japan, Russia, and the United States signed the North Pacific Fur Seal Convention, which, among others, had two important terms: a) the abolition of pelagic sealing and b) the management of the herd for maximum sustained yield (MSY). Japan abrogated the treaty in 1941 because she claimed that the increased fur seal population was starting to adversely affect her North Pacific fishery. Between 1942 and 1956, the harvest on the Pribilof Islands was managed by an agreement between the United States and Canada.

B. From 1957 to Present

In 1957, an Interim Convention on Conservation of North Pacific Fur Seals was signed by the United States, Canada, Japan, and the USSR. Provisions of this treaty were similar to those of the 1911 treaty. Additionally, the North Pacific Fur Seal Commission was established to coordinate research and management of the herd. Following the 1957 convention, the fur seal population has been intensively managed and manipulated in what has been described as a massive experiment to determine the maximum sustained yield (NMFS 1975). In response to data that indicated that the fur seal population was too high, the harvest of females was initiated (NMFS 1977). Between 1957 and 1963, in addition to the annual harvest of 29,000 to 82,000 males, 25,000 to 40,000 females were harvested annually (Lander 1980). During this period, the total annual harvest on the Pribilofs averaged 88,000 seals (NMFS 1975). Between 1964 and 1968, the management objective was to stabilize the population at the 1963 level by harvesting those females in excess of the number needed for recruitment. In addition to the harvest of males, usually between 9,000 and 18,000 females annually were harvested (Lander 1980). In 1969, harvest of females was discontinued to allow the Pribilof herd to increase to a level that would produce the maximum sustained yield of 280,000 pups annually on St.Paul Island and 70,000 annually on St. George Island (NMFS 1975). However, the anticipated increase in herd productivity did not occur; therefore, in 1973 the commercial harvest was suspended on St. George Island in order to investigate the reasons for the lack of increased productivity (Lander 1980).

II. CURRENT HARVEST CHARACTERISTICS

A. Harvest Levels

Harvest data for the period 1971-1981 are summarized in table 57. The average harvest over the past 11 years has been 28,148 seals. In 1981, the most recent year for which published data are available, the Pribilof harvest was 23,892 seals (Kozloff 1982).

Table 57. Numbers of Northern Fur Seals Taken During the Commercial Harvest on the Pribilof Islands, 1971-81

Year	Number Harvested[a]
1971	31,795
1972	37,314
1973	28,482
1974	33,027
1975	29,148
1976	23,096
1977	28,444
1978	24,885
1979	25,762
1980[b]	24,327
1981[c]	23,892
Total	309,813

Source: Lander 1980.

a Commercial harvest terminated on St. George Island in 1973.

b Data from Kozloff 1981.

c Data from Kozloff 1982.

B. Season, Effort, Size, Limits

Since 1971, sealing drives have begun in the third and fourth weeks of June and lasted until the end of July. There have been 29 to 30 drives annually since 1973 (Lander 1980). In 1972, when sealing was still allowed on St. George Island, 50 drives on St. Paul Island and 37 drives on St. George Island were held annually (ibid.).

Size limits have varied between 46 inches total length (tip of nose to tip of tail) and 49 inches total length. There is no minimum size limit (ibid.)

C. Qualifications on Harvest Data

Because of the intensive management of the harvest, harvest figures are accurate.

D. Population Recovery from Female Harvest

Following the harvest of females between 1956 and 1968, the anticipated increase in pup production did not occur (ibid.). This was due primarily to the excessive harvest of females (ibid.); however, several other factors also contributed to the decline, either directly or indirectly. A major indirect factor was that there was a systematic sampling bias that caused repeated overestimates of pup numbers, which in turn overestimated the harvest quota for females (ibid.). Other factors such as competition with commercial fisheries (Gentry 1981), entanglement in net debris (Lander 1980), and contact with contaminants such as oil (Anonymous 1980) have been reported as possible causes; however, Lander (1980) believes that the overharvest of females and the systematic sampling bias could have alone accounted for the lack of increase.

E. Change of Managerial Authority

Following the passage of the Alaska Native Claims Settlement Act, the Aleut Corporation selected the Pribilof Islands. Federal land was transferred to the Natives, with the exception of marine bird areas and the fur seal rookeries, which remained under the jurisdiction of the USFWS as part of the Alaska Maritime NWR. Management of the fur seal harvest was transferred to the Natives with oversight by the NMFS. The infrastructure associated with the harvest and a cash settlement to aid in maintenance was made in fall 1983. The United States is still required to manage fur seals for maximum sustained yield under the 1957 Interim Convention; however, the future of the harvest without substantial government subsidy is unknown.

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Sportfishing

Pacific Halibut Human Use

I. SPORTFISHING

Sportfishing for halibut is permitted from March 1 to October 31. In the Kodiak area, the sport fishery for halibut takes place primarily off the northeast section of Kodiak Island, with most effort concentrated in Chiniak Bay, but extending to Ugak Bay (Murray, pers. comm.). A small amount of sport harvest also takes place in the Alaska Peninsula area (table 58). Sportfishing for halibut is permitted with no more than two hooks attached to a handline or rod or by spear (IPHC 1983). (See map 5.)

Table 58. Alaska Sport Halibut Catch by Numbers of Fish from Kodiak and the Alaska Peninsula (ADF&G Sport Harvest Survey Areas Q & R, Illustrated in map 3)

	Kodiak		Ak. Peninsula		SW Total	
Year	No.	%	No.	%	No.	%
1977	995	4.3	0	0	994	4.3
1978	1,721	4.6	0	0	1,721	4.6
1979	3,013	6.3	0	0	3,013	6.3
1980	3,651	5.6	0	0	3,651	5.6
1981	6,858	9.2	853	1.1	7,711	10.4

Source: Mills 1983.
Note: Catches are also shown as percent of total Alaska sport halibut catch for each year.

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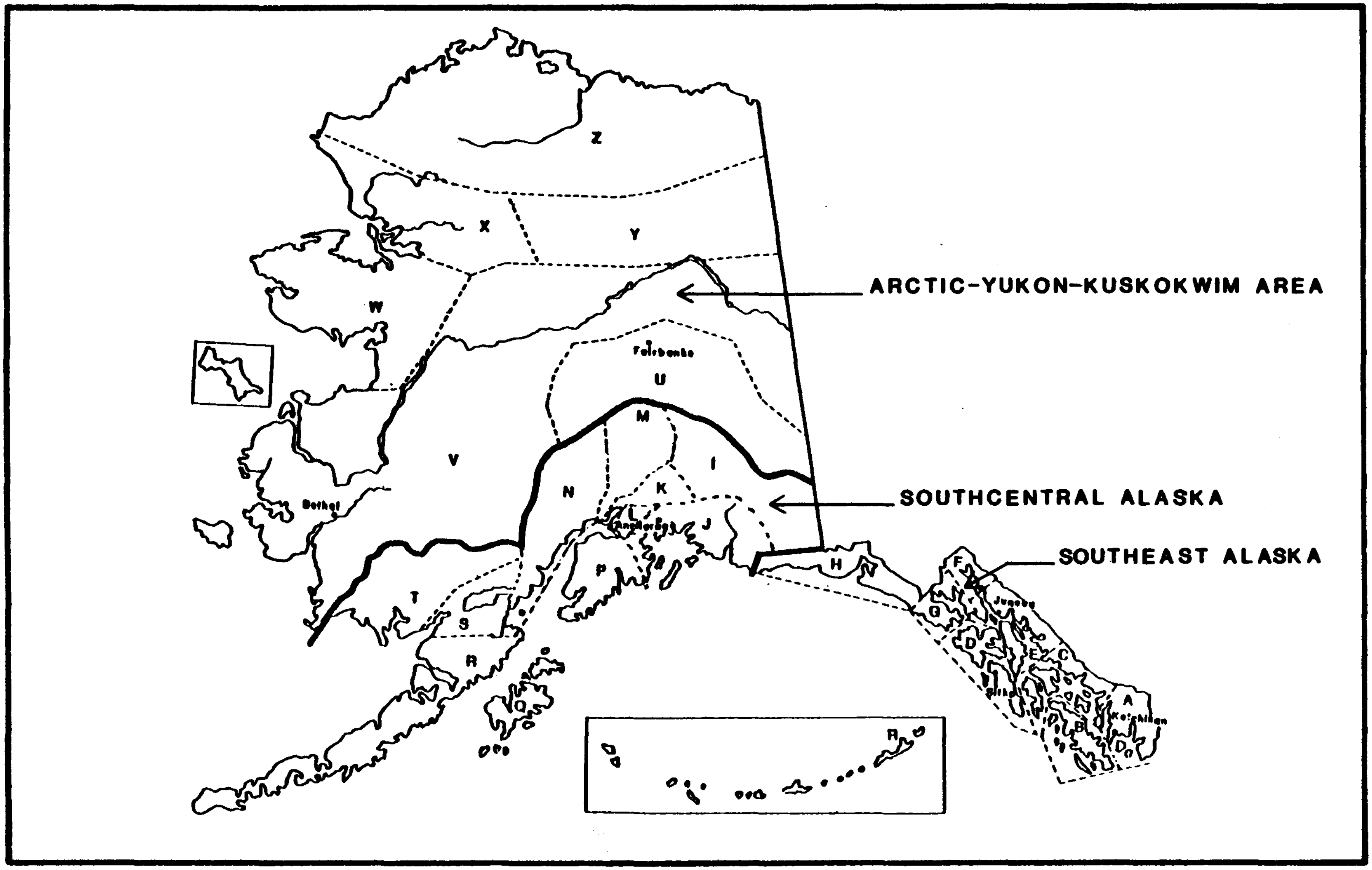


Map 5. ADF&G sport fish harvest study postal survey areas, 1977-1982.

Human Use
Selected Freshwater Resident Anadromous Fish Species

I. SPORT FISHERIES MANAGEMENT HISTORY

A. Selected Species

This narrative and the accompanying maps present available information on the recreational (sport) fisheries' utilization of a selected group of anadromous and freshwater resident fish species found in the Southwest Region. This group of fish includes all five species of North American Pacific salmon (chinook, coho, sockeye, pink, and chum), char (Dolly Varden/arctic char), steelhead trout, rainbow trout, and arctic grayling. These species were selected because of their representative life history and habitat requirements and their relative importance in the Southwest Region's recreational fisheries.

The sport fishery harvest of char is typically the largest in the Southwest Region, with pink salmon second and coho salmon third.

B. Management History

1. Management agency jurisdiction. During the late 1800's, all fisheries were under the jurisdiction of the Treasury Department. Later, the Commerce Department took over until 1940, when the Bureau of Fisheries was consolidated with the Biological Survey into the USFWS under the Department of the Interior. In 1949, the Territorial Legislature created the Alaska Department of Fisheries and its regulatory body, the Alaska Fisheries Board, to assist the USFWS (Alaska Department of Fisheries 1949).

Most emphasis in the early 1900's was on management of the salmon industry. The territory embarked on its own sport fish program in 1951. Program activities were concentrated on inventory studies, lake rehabilitation, and trout stocking on lakes and streams near population centers and bordering the highway systems (ADF&G 1957). In 1957, the Alaska Department of Fisheries was transferred to the newly formed Alaska Department of Fish and Game (ADF&G); all regulatory powers of the Alaska Fisheries Board were relegated to an Alaska Fish and Game Commission. The Division of Sport Fish continued its program of lake inventories, lake rehabilitation, and trout stocking (ibid.).

With the granting of statehood in 1959, the ADF&G, Division of Sport Fish, assumed full control of the sport fish resources. Primary regulatory authority is vested in the Alaska Board of Fisheries. Following statehood, the Sport Fish Division began receiving from the Dingell-Johnson (D-J) Bill federal funds to aid in fish restoration and was able to initiate several research projects in addition to expanding its management program (ADF&G 1959).

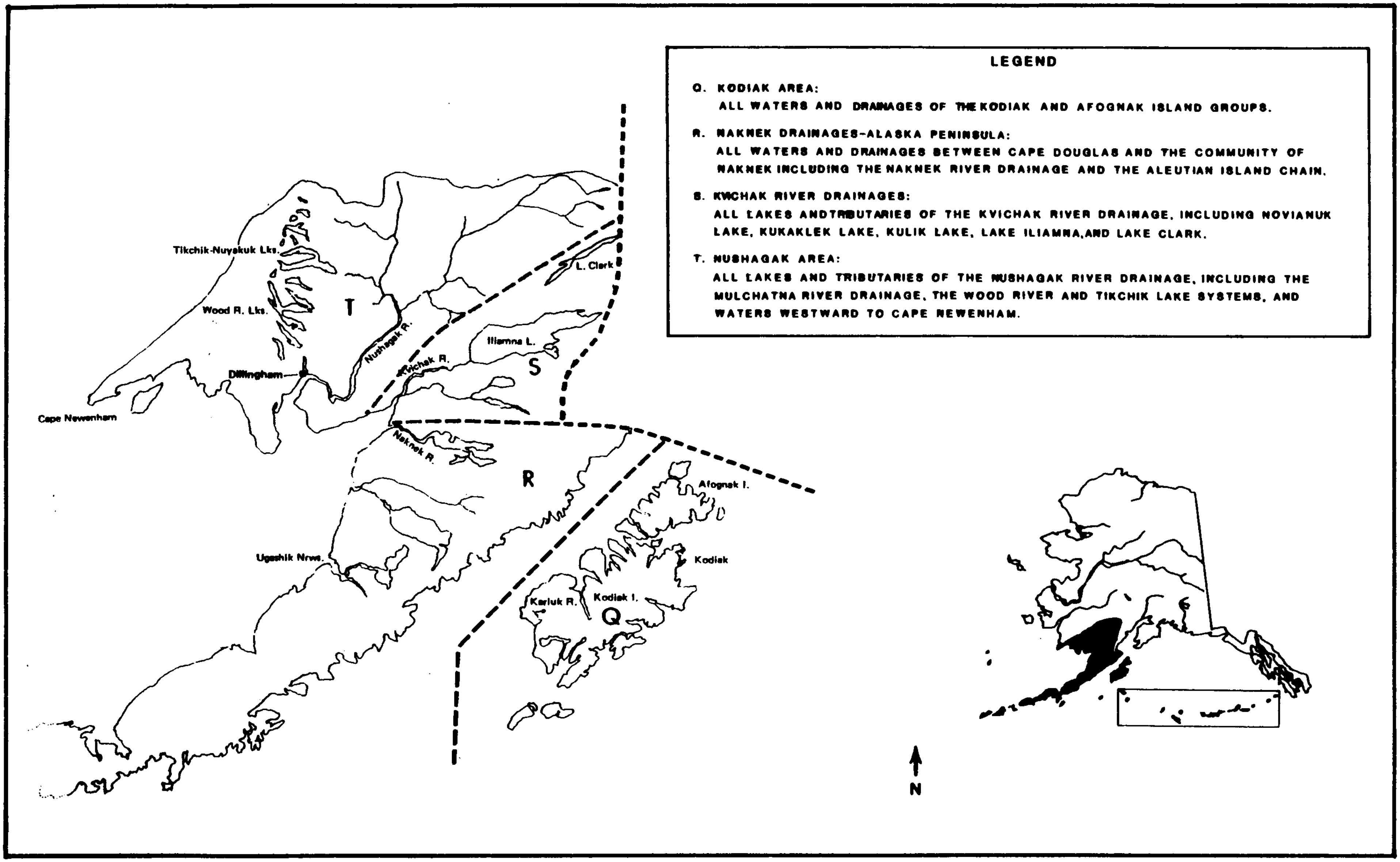
2. Management objectives. During the early years of resource management, sportfishing was viewed as a minor factor in context of the management of commercially harvested species. The sport fisheries of the state were not intense enough to damage stocks. The management objective was simply to accumulate basic survey information on the fishery resources. With rapid population expansion and industrial development came many more user groups, including an ever-increasing recreationally oriented population. Gradually, managerial objectives began to focus on stocks and areas having potential for overharvest. As natural fish stocks around cities and towns began to decrease and easily accessible sport fisheries became crowded, new fisheries were developed. In response to public demand for quality recreational fishing opportunities, standard fishery management practices that had been aimed primarily at maximizing numbers of fish available for harvest (yield) were refined to meet the aesthetic, social, and psychological needs of people. A multi-user group philosophy and a quality fishing concept were incorporated into Alaska's sport fish management in the 1960's. Since 1966, the ADF&G has been managing selected streams and drainages in Bristol Bay for "trophy" rainbow trout. This program emphasizes quality fishing for a unique species of native rainbow trout.

Recreational fisheries have grown tremendously since statehood and now play a significant role in total fisheries management (Mills 1983). Alaska statewide sportfishing regulations now address access to and development near recreational fisheries. Bag limits and/or gear have become restrictive to prevent overharvest and spread out the available larger fish among more anglers, thus affording the optimum possible opportunity per angler for taking large or trophy-size fish (Andrew n.d.). Artificial (stocked) urban fisheries have also been created adjacent to population centers and are enthusiastically used.

C. Alaska Statewide Sport Fish Harvest Program

1. Program history. In the early years of statehood, when quality, uncrowded sport fishing was readily available, large sport fisheries were few and easily monitored. On-site creel census surveys of the more intensively fished waters, rather than the compulsory statewide reporting as required of the commercial fishing industry, provided the information needed for proper management of the sport fish populations.

Detailed statistics were not kept on the sport harvest of fish in Alaska prior to 1977, except where a knowledge of the effort and catch was required for protective in-season management or to ensure compliance with regulatory and managerial policies, quotas, and guidelines (Mills 1983). Annual sport harvest estimates for ADF&G management areas were based on area sport fish biologists' own knowledge and observations, in addition to creel census data. These "historical" annual management area harvest estimates are therefore subjective, limited in total



Map 7. Southwest Region sport fish harvest study postal survey areas, 1977-1982.

over half of the region's total combined species harvest (ibid.).

The freshwater salmon and trout fisheries that have historically been the primary sport fisheries in the Kodiak area are now equalled in effort by the saltwater fisheries. Of the 81,238 angler-days fished in 1982, 41,113 (51%) were expended in salt water. This is a record high for both estimates and represents an increase over 1981, in which 66,439 total angler-days were estimated and 29,857 (45%) were expended in salt water (table 60).

The beach fisheries for salmon and char and the saltwater boat fishery for halibut, salmon, and rockfish are nearly equal in effort (table 60). The beaches with heaviest angler use are Pasagshak, Woman's, Middle, Kalsin, Monashka, and Anton Larsen bays (ADF&G 1976; Murray, pers. comm).

Most of the sportfishing effort centers in the northeast part of Kodiak Island around the town of Kodiak and the Kodiak road system. To reach any other system requires either aircraft or boat transportation (ADF&G 1977).

The Buskin River is the major freshwater fishing system in the area. It is the most accessible system; it has all species of salmon except chinook; it has a very large overwintering char population and has the longest fishing season (ADF&G 1976). Over a quarter of the Kodiak area salmon catches and nearly half of the char caught in 1982 were taken in the Buskin system (Mills 1983).

It was reported that the stocked systems around Kodiak were probably producing up to their full potential for sport fishery utilization and that most major systems outside this area, however, were underutilized and could receive more angler use (ADF&G 1976).

Mills (1979-1983) presents the total Kodiak area catch by species. Annual harvest estimates of selected fish species are summarized in tables 65 and 70. Char, pink salmon, and coho salmon, in that order, represent the majority of the harvest.

2. <u>Naknek River drainage - Alaska Peninsula area</u>. Most of Bristol Bay, the lower Alaska Peninsula, and the Aleutian chain receive little sportfishing effort because of their inaccessibility. In Southwest Alaska, only short localized roads exist, usually linking airports with residential areas. The majority of sportfishing areas are reached by a combination of aircraft and boat transportation. Commercial sportfishing lodges offering boats, accommodations, and guiding services are present on all Bristol Bay drainages (Gwartney, pers. comm.). Appendix I is a directory of most sportfishing guides, lodges, and air taxis serving Bristol Bay (ibid.). Typically, fisherpersons are flown to locations where boats are available or to streams where fishing is done from shore. Fly-in river float trips are a popular means of reaching more inaccessible systems.

scope, and should be considered minimum harvest estimates. Annual sport harvest estimates of salmon caught in Alaska, as reported to the Technical Committee of the INPFC and published in their annual statistical yearbook, is an example of such historical data (Mills, pers. comm.). Essential for regulation and management of Alaska's sport fisheries and for total regulation, management, and allocation of multiple-use fisheries is a statewide data base of information on where sportfishing occurs, the extent of participation, the preferences of participants, and the species and numbers of major game fishes being harvested. Statewide on-site creel censuses were considered prohibitively costly. To meet this data need in 1977, the ADF&G's Division of Sport Fish combined a postal survey with creel censuses to obtain annual estimates of effort and harvest for major Alaskan sport-caught species by area and fishery (see map 6.) (Mills 1983). Southwest Region sportfishing harvest survey areas and boundaries are delineated on map 7. This program is in its eighth year of operation.

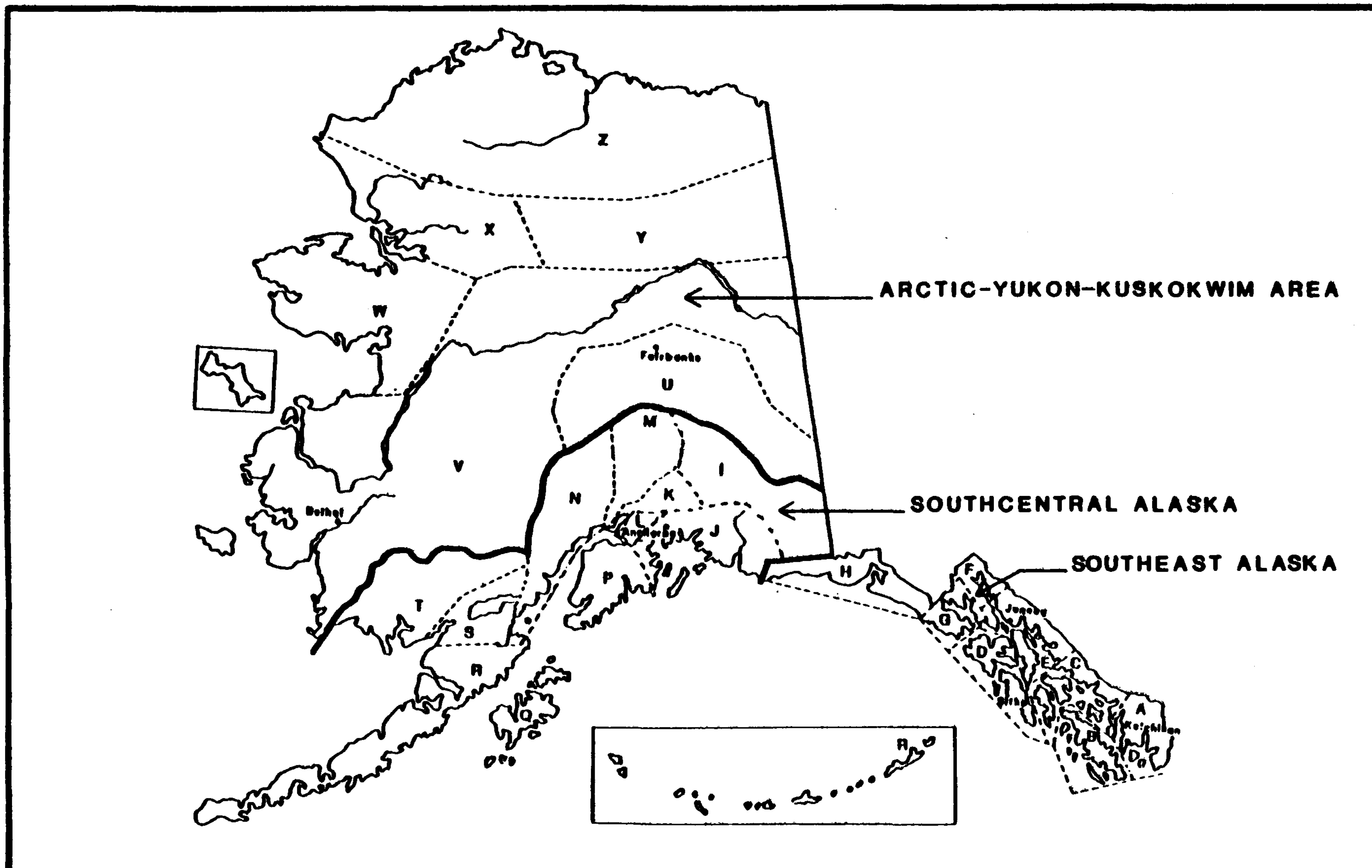
2. Application of program data. Detailed tabulations of annual effort and harvest by region, area, fishery, and species for 1977 through 1982 may be found in Mills (1979, 1980, 1981a, 1981b, 1982, and 1983). Summary tables of annual (1977-1982) Southwest Region effort and harvest data have been prepared and are included in this narrative for easy reference.

D. Regional Harvest Summary

1. Harvest methods. Sportfishing for salmon, char, steelhead trout, rainbow trout, and arctic grayling in the Southwest Region is by hook and line only.
2. Southwest Region effort data. Southwest Region effort data is presented in table 59. Though effort is steadily increasing, only about 10% of the total number of angler-days fished in Alaska in 1982 were in the Southwest Region (Mills 1983). Freshwater areas account for a majority of the effort; however, saltwater area effort is rapidly increasing (table 59).
3. Southwest Region harvest data. Southwest Region sport harvest totals of selected species are shown in tables 64 and 69. Though the region's total sport harvest has increased over twofold since 1977, the 1982 harvest of selected fish species comprised less than 5% of the total statewide sport fish harvest (ibid.). Typically, more char are harvested than any other species, and in 1982 the Southwest Regional harvest (table 64) accounted for 24% of the statewide char harvest (ibid.). The majority of the region's sport harvest occurs in freshwater areas; however, more effort and, as a result, larger catches are occurring in the saltwater fisheries (tables 59 and 69).

E. Southwest Region Harvest Survey Areas

1. Kodiak area. Kodiak area sport fisheries have annually accounted for over half of the regional effort (table 59) and



Map 6. ADF&G sport fish harvest study postal survey areas, 1977-1982.

Limited fiscal support has prevented the ADF&G's Sport Fish Division from conducting extensive monitoring and investigative programs; therefore, gaps exist in our knowledge of sport fish distribution (ibid.). When assessing the sport fish resources of these areas, one should be careful not to conclude, because of data gaps and minimal sport effort, that the resource itself is unimportant.

The Naknek River drainage and the Alaska Peninsula sport fisheries accounted for a quarter of the Southwest Regional effort in 1982 (table 59) and nearly a third of the region's total harvest of all species combined (Mills 1983). Pink salmon and char were the major species harvested (table 66); however, rainbow trout may be caught and released in larger numbers (Gwartney, pers. comm.).

Saltwater fisheries occur mostly in the Cold Bay and Adak area. Salmon, char, and halibut are the target species. Saltwater fisheries represented a quarter of the effort (table 61) and approximately 40% of the 1982 areawide harvest (table 71). Pink salmon and char were the major species harvested (table 71).

Freshwater fisheries - primarily the Naknek Lake, the Naknek River and its tributaries, the Brooks River, and the Ugashik and Becharof systems - represented the remaining three-quarters of fishing effort in the area in 1982 (table 61). Major fisheries include the Naknek River's chinook salmon and rainbow trout fisheries and the Ugashik system's arctic grayling fishery. Char, however, are the major species harvested in the area (table 71).

3. Kvichak River drainages. The Kvichak River drainages, including Lake Clark, constitute the second largest drainage system in Bristol Bay; however, effort and harvest are low when compared to the rest of the region (tables 59 and 72). Sockeye salmon, rainbow trout, and arctic grayling are, respectively, the major species harvested (table 67). It should be noted that within the Kvichak watershed is a designated Wild Trout Area managed to preserve the integrity of the unique native rainbow trout population. No saltwater sport fisheries are known to exist (table 62).
4. Nushagak area. The Nushagak River and its tributaries, the Mulchatna, Nuyakuk, and Kokwok, constitute the largest drainage system in Southwest Alaska (ADF&G 1978), yet they receive the least effort when compared to the rest of the region (table 59). Total area harvest is comparable to the Kvichak River drainage at less than 10% of the region's total 1982 harvest for all species combined (Mills 1983). Arctic grayling, char, and chinook salmon account for the largest harvests in the area, and, in 1982, the harvest for each was comparable at around 2,500 (tables 68 and 73). The Nushagak River chinook salmon harvest figures are believed to be low and should be considered minimal harvest estimates (Mills, pers.

comm.) Major fisheries include the Nushagak River system salmon (all five species) fishery, the Wood River Lakes system char fishery, and the arctic grayling fishery on the Mulchatna River. No marine fishery is known to exist (table 63).

F. Projected Increase in Demand or Harvest

1. Kodiak. Kodiak area sport fishery effort as determined by the statewide postal survey is increasing approximately 5-10% annually (Murray, pers. comm.). No information on projected harvest levels was found in the literature.

2. Bristol Bay-Alaska Peninsula. Increases in the form of more anglers will result in a greater pressure on all sport fish but may not increase the harvest significantly. With each passing year, the catch and release philosophy gains support, resulting in more quality fishing in Bristol Bay. In addition, the Board of Fisheries, NPS, and USFWS all support conservative limits in Bristol Bay. Any increase in efforts will no doubt result in reduced seasons, bag limits, and/or gear types. Since no fishery is without limits, there will be conflicts between user groups at some time in the future. Obvious fisheries in which this will occur are the chinook salmon fishery in the Naknek and Nushagak rivers, the coho salmon fishery in the Togiak River, and the rainbow trout fishery in the Iliamna Lake/Kvichak River system (Gwartney, pers. comm.).

II. SALMON

A. Regional Overview

The Alaska Sport Fish Harvest Survey (Mills 1983) indicated there were 72,802 salmon harvested in the Southwest Region in 1982 (table 64). This represents a 46% increase over the 1981 harvest of 49,716 (table 64). This increase was due primarily to the even-year predominance of pink salmon and a strong return of the other salmon species. The region's 1982 salmon harvest represents 57% of the harvest of all selected species combined (table 69). The 1982 salmon harvest was comprised of 31,604 (43%) pinks, 18,180 (25%) coho, and 10,959 (15%) sockeye, with smaller numbers of chinook and chum salmon (table 64). On a regional basis, 61% of the salmon harvested in 1982 were taken in freshwater fisheries (table 69). Southwest Region salmon sport harvest data by species and percent contribution by area for 1977-1982 are presented in tables 74-79. Southwest Region salmon sport harvest data by species, by area, and by fishery are presented in tables 84-89.

B. Harvest Survey Area: Kodiak

1. Management objectives. A primary goal of the ADF&G's Division of Sport Fish in the Kodiak area is to maintain the natural runs of all salmon (Van Hulle and Murray 1981).

2. Management considerations. The abundance of salmon in the Kodiak area sport fisheries is primarily dependent on the size of the runs and the exploitation rate of the commercial and subsistence fisheries.

3. Period of use. The main salmon fishing season begins at the Buskin and Pasagshak rivers on the road system, Afognak River

(Afognak Island), and Karluk and Ayakulik (Red) rivers for early sockeye salmon in May and June. The sockeye fisheries usually peak in late June. Chinook salmon run concurrent with sockeye salmon; however, fishable populations are found only in the Karluk and Ayakulik rivers (Murray, pers. comm.). Pink salmon fishing begins in mid July, and coho fishing extends from August to freeze-up (McLean et al. 1976). Generalized run-timing information is presented by species for the entire Kodiak area in the Salmon Distribution and Abundance narrative of this publication.

4. Fishery summary:
   a. Effort. Salmon species as a group support the most popular sport fisheries in the Kodiak area (table 65). All species except chinook salmon are present in the northeast Kodiak streams. Sportfishing pressure is concentrated on the northeast corner of Kodiak Island, where a road system traverses the area, providing easy access to many streams, lakes, and beaches.
   b. Harvest. Of the 72,802 salmon harvested in the Southwest Region in 1982, 37,678, or 52%, were harvested in the Kodiak area (tables 64 and 65). This is a record high and represents a 45% increase over 1981, in which 25,889 salmon were harvested. Coho salmon are the most preferred, but pinks are the most numerous salmon in the anglers' harvest. The pink salmon harvest in 1982 of 18,850 was second in number to the char harvest of 23,771, and coho salmon were next, with a harvest of 13,329. Smaller numbers of sockeye and chum salmon are also taken (tables 65 and 70).

      Saltwater fisheries accounted for 16,650 (44%) salmon, with the remaining majority of 21,028 (56%) being taken in fresh water (table 70).

      The Buskin, Pasagshak, American, and Saltery rivers are the largest producers of pink salmon (ADF&G 1976, Mills 1983). The Buskin system also produces the largest annual sockeye and chum salmon catches (ADF&G 1976). Coho salmon fisheries are quite intensive in the Kodiak area, with Buskin Lake, Pasagshak River (Lake Rose Tead), and the Saltery River systems being the largest producers (ADF&G 1976, Mills 1983). The Karluk and Ayakulik (Red) rivers on Kodiak's south end support the largest chinook fisheries (ibid.).
5. Projected increase in demand or harvest. See section I. F.1. of this narrative.

C. Harvest Survey Areas: Naknek River Drainages-Alaska Peninsula; Kvichak River Drainage; and Nushagak Area

1. Management objectives. The Bristol Bay region of Alaska is famous for its large salmon stocks and high commercial harvests. In comparison to the commercial and subsistence use of the area's salmon resource, the sport salmon fishery is

negligible. The majority of salmon harvested by rod and reel in the Southwest Region are caught by anglers fishing specifically for salmon; they are not taken incidentally to fishing for trophy rainbow and other nonsalmon species. Popular salmon fisheries, especially for chinook, coho, and sockeye, occur in the Naknek, Kvichak, and Mulchatna river drainages (Russell, pers. comm.).

The Bristol Bay salmon sport fishery is considered quite stable, and it is the goal of the ADF&G's Division of Sport Fish to maintain these natural runs of salmon.

2. Management considerations. The abundance of salmon in the Bristol Bay area sport fisheries is primarily dependent on the size of the runs and the exploitation rate of the commercial and subsistence fisheries. Though some of the stocks are too low to provide desired commercial harvests, they appear sufficient to provide acceptable recreational harvests.
3. Period of use. In the Bristol Bay, Alaska Peninsula, and Aleutian Islands area, chinook salmon usually arrive first, around the first of June. Chum and sockeye follow by July 1, pinks by July 15, and coho by August 15 (Gwartney, pers. comm; ADF&G 1978).
4. Fishery summary:
   a. Naknek River drainage-Alaska Peninsula. All five species of salmon are present in the area. Sportfishing for salmon in salt water is concentrated in the Adak area; the freshwater salmon fisheries are centered around the Naknek River and its tributaries.

      The 24,062 salmon harvested in 1982 represent 33% of the regional harvest (see tables 64 and 66). This is a record high and represents a 35% increase over the 1981 harvest of 17,798. Pink salmon are the main species harvested, and the 1982 harvest of 12,471 accounted for 52% of the area's salmon harvest total. Of these, 8,583 (69%) were harvested in salt water, primarily near Adak (Mills 1983). Freshwater streams in the Adak area also account for the majority of the freshwater pink salmon harvest. The largest freshwater fishery is the Naknek River and its tributaries and accounts for nearly the entire freshwater harvest of chinook and chum and most of the coho. Nearly 38% of the Southwest Region's chinook salmon harvest in 1982 came from the Naknek River (ibid.).
   b. Kvichak River drainage. The annual harvest of salmon has remained fairly stable at around 3,500 a year (table 67). The record high of 4,860 in 1982 included 3,872 (80%) sockeye. The Copper River and Newhalen River fisheries in 1982 were the largest sockeye producers, while the Kvichak and Alagnak (Branch) rivers accounted for all of the chinook and coho salmon. There were no reported pink salmon harvested in 1982 and only a few chum salmon.

c. Nushagak area. The Nushagak annual harvest of salmon was stable at around 2,800 a year but increased to 6,202 in 1982 (table 68). This is attributed to a substantial increase in effort on the Nushagak River system and the Wood River Lakes system (ibid.). The Nushgak River system chinook fishery is typically the largest. The major harvests of sockeye and chum in 1982 were also produced by the Nushagak. Both the Nushagak and the Togiak river systems are major producers of coho.

5. Projected increase in demand or harvest. The Bristol Bay salmon fishery is considered quite stable. It is anticipated that gradual growth will occur during the next five years primarily in the immediate vicinity of the Naknek and Mulchatna drainages. Stocks in these systems are considered capable of accommodating a modest increase in fishing pressure. A gradual increase in subsistence fishing effort is expected as the resident population of people grows. This could result in allocation problems between user groups. No published information on projected harvest levels was found in the literature. (See also section I. F.2. of this narrative.)

III. CHAR (DOLLY VARDEN/ARCTIC CHAR)

A. Regional Overview

An estimated 40,098 char were harvested in the Southwest Region in 1982 (table 64). This represents an 11% increase over the 1981 harvest of 35,963 (table 64) and accounts for 24% of the 1982 statewide char sport harvest. Typically, more char are harvested in the Southwest Region than any other individual species and in 1982 accounted for 31% of the total select species harvest (table 69). Three-quarters of the 1982 regional char harvest was taken in freshwater fisheries (table 69).

B. Harvest Survey Area: Kodiak

1. Management objectives. Protection of the overwintering Buskin River Dolly Varden stocks from overharvest is a primary management objective. Management of Dolly Varden overwintering stocks may be critical where these fish are subject to heavy angling pressure. Restrictive regulations have been adopted to reduce the Buskin River harvest of Dolly Varden.

2. Management considerations. Increasing fishing pressure and the resultant higher exploitation rate, coupled with a reduction in the Dolly Varden's mean size and catch per hour and a lack of population data, are the major management concerns, especially on the Buskin River (Murray 1982).

3. Period of use. In beach areas, lagoons, and general saltwater areas, char are plentiful from about June through July. They are abundant in freshwater streams throughout the Kodiak area in May and again in August through November.

4. Fishing summary. The majority of sportfishing effort directed specifically toward char, and approximately 50% of the total sport harvest of char, occurs during the spring out-migration

in the Buskin River and the Pasagshak River (Murray, pers. comm.). A limited amount of sportfishing effort for char is expended away from the vicinity of the road system, with most of the harvest incidental to fishing for salmon species or rainbow or steelhead trout (ADF&G 1978).

The annual harvest of char in the Kodiak area has been fairly stable at around 20,000 and is the largest in the region. The 1982 harvest of 23,771 represents 60% of the regional harvest (table 80). Most of the harvest occurs in fresh water, with the Buskin River supporting the largest fishery (table 90).

5. Projected increase in demand or harvest. See section I. F.1. of this narrative.

C. Harvest Survey Areas: Naknek River Drainage-Alaska Peninsula; Kvichak River Drainage; and Nushagak Area.

1. Management objectives. A primary goal of the ADF&G Division of Sport Fish in the Bristol Bay area is to optimize the survival and growth of resident char and to maintain the natural runs of anadromous char.
2. Management considerations. Recreational angling effort for char as a target species and as incidental harvest to other species is increasing in the Bristol Bay area. It is important to note that harvest figures represent the number of char retained from the total catch. Additional biological data are needed to better define population parameters necessary for the maintenance of the char population at a high level.
3. Period of use. Char are found areawide and are most available either in spring, when some migrate to sea, or in mid summer, when large schools concentrate at river mouths to feed on outmigrating salmon fry and smolt (Gwartney, pers. comm.).
4. Fishery summary:
   a. Naknek River drainage-Alaska Peninsula. The interest in char as a sport fish resource increased significantly in 1979, and annual harvests have since averaged 11,200 (table 66). The 1982 harvest of 12,073 represents 30% of the regional harvest (table 80) and is equalled in numbers only by the pink salmon harvest (table 71). The majority of the harvest occurs in fresh water (table 71), with Cold Bay and Adak area streams supporting the largest fisheries (table 90). Surveys conducted in the Naknek drainage area suggest that a majority of char captured by anglers are subsequently released (ADF&G 1977, Gwartney 1983b).
   b. Kvichak River drainage. This area typically accounts for the lowest annual harvest of char in the region, averaging less than 800 fish a year for 1977-1981 (tables 67 and 80). The 1982 harvest, however, rose sharply to 1,666 and is attributed to increased harvests in the Newhalen River and Lake Clark area waters (table 90).
   c. Nushagak area. The Nushagak area is nearly twice as large as that of the Kvichak River drainage (Selkregg 1976). From 1978 to 1981 the annual char harvest has been fairly

stable at an average of 1,700 fish (tables 68 and 80). Interest in char increased greatly in 1982, with a harvest of 2,588 (table 68). This increased harvest is attributed to the Wood River Lakes system harvest of 1,048, a 98% increase over the 1981 harvest of 529 (table 90). A large char sport fishery occurs in the Lake Aleknagik area: the Agulowak River outlet, the Wood River origin, and the lake proper. Only arctic grayling were harvested in greater numbers in the Nushgak area in 1982 (table 73).

5. Projected increase in demand or harvest. Sportfishing effort for char in the Bristol Bay-Alaska Peninsula area is expected to increase gradually. No published information on projected harvest levels was found in the literature. (See also section I.F.2. of this narrative.)

IV. RAINBOW TROUT/STEELHEAD

A. Regional Overview

1. Rainbow trout. Prior to 1980, the average annual rainbow trout harvest in the Southwest Region was less than 4,500 fish (table 64). A high of 8,768 rainbow trout were harvested in the Southwest Region in 1982 (table 64). This is slightly above the 7,618 average annual harvest for 1980 and 1981 and represents 5% of the 1982 statewide rainbow trout harvest. The largest harvest in the region in 1982 occurred in the Kodiak area (3,380).

2. Steelhead. The 1982 harvest of 258 steelhead is slightly under the 340 average annual harvest for 1977-1981 (table 64). This harvest accounts for 7% of the steelhead sport harvest statewide. The entire harvest occurred in the Kodiak area (tables 81 and 91).

B. Harvest Survey Area: Kodiak

1. Management objectives. Present managerial goals are to continue the rainbow trout stocking program, intensify studies to determine native rainbow trout population parameters, and maintain steelhead population levels in the Kodiak-Afognak islands area streams. The Buskin River is the exception, however; it has been closed to steelhead fishing since 1970, with the objective of increasing the population level.

2. Management considerations. Most stocked lakes require occasional restocking or rehabilitation to eliminate competitors (primarily stickleback). Oxygen depletion during severe winters has also influenced populations of stocked rainbows. Native rainbow trout population parameters other than general characteristics are largely unknown. The changing status of land ownership is the greatest management concern for steelhead populations today. The most important steelhead system in the Kodiak-Afognak islands area, Karluk River, has been conveyed to the Koniag Native Region Corporation. The future of the Karluk River steelhead population and traditional uses and access will depend upon the development of a cooperative management plan

between state and federal agencies and the Native corporations (Murray, pers. comm.).

3. Period of use. Small populations of native rainbow trout inhabit most sockeye salmon systems. Sportfishing is best during May and June, and again in the fall. Sport effort on stocked rainbow in the Kodiak area takes place throughout the year, with the major emphasis occurring during summer months. Sport fisheries for steelhead occur in mid September in salt water (Karluk Lagoon) and from early October to freeze-up in fresh water (ADF&G 1978).
4. Fishery summary:
   a. Rainbow trout. Most native rainbow trout populations in the Kodiak area are somewhat remote and isolated and receive only limited sportfishing. Most of the native rainbow trout harvested are taken incidentally to some other activity, such as bear hunting (ibid.). Fishing effort compared to that of the salmon and char fisheries is relatively minor. The 1982 rainbow harvest of 3,380 is substantially higher than that of any previous year and represents 39% of the Southwest Region's rainbow harvest (table 82). Most of the harvest occurred in lakes adjacent to the road system (table 92).
   b. Steelhead. The Karluk River and lagoon receive the most angler effort for steelhead in the Kodiak area. Smaller sport fisheries occur on other Kodiak area streams, including Ayakulik (Red) River, Akalura River, Olga Creek, Dog Salmon Creek, Uganik River, Afognak River, and Portage River. The 1982 steelhead harvest of 258 fish accounts for the entire region's estimated harvest of steelhead (table 81). The Karluk River and lagoon fishery alone accounted for 35% (90) of the 1982 Kodiak area steelhead harvested.
5. Projected increase in demand or harvest. See section I. F.1. of this narrative.

C. Harvest Study Areas: Naknek River Drainage-Alaska Peninsula, Kvichak River Drainage, and Nushgak Area

1. Managerial objectives. Bristol Bay rainbow trout attract sport fishermen from around the world to fish the Iliamna Lake tributaries, the Brooks, Kvichak, Newhalen, Naknek, Alagnak (Branch), and Wood rivers and the many tributaries of the Nushagak drainage (ibid.).

   The present-day sport fishery had its beginning during WW II with the construction of King Salmon Air Force Base. Sportfishing was the primary legal recreational activity for the service personnel. To accommodate King Salmon personnel and visitors from other bases, fishing camps were established in the mid 50's along the Naknek (Lake and Rapids camps) and Kvichak rivers and at Six-Mile Lake, north of Iliamna (ADF&G 1977). The angling pressure from the three military fishing camps, along with that of the established fishing lodges, marked the first significant sportfishing pressure placed on rainbows in Bristol Bay. By 1974, all three military fishing camps were permanently closed, thus reducing the effort on rainbow and other species as well. Since then, there has been a relatively constant annual effort from the local King Salmon Air Force Base, with a gradual increase in civilian angling pressure. Bristol Bay rainbows have also become one of the target species of over sixty commercial sport fishing lodges (see appendix I).

With interest in the large rainbow trout of Bristol Bay growing rapidly, the Alaska Board of Fisheries designated the entire Kvichak-Iliamna watershed, except for Lake Clark and its tributaries above Six-Mile Lake, a Wild Trout Area (formally the Bristol Bay Trophy Area). The management policies of the ADF&G and federal agencies are designed to perpetuate the original wild rainbow trout stocks while providing anglers a variety of fishing experiences or optimum quality of yield (Gwartney, pers. comm). Regulations within this area limit anglers to unbaited, single-hook artificial lures and prohibit angling during the spring to protect spawning rainbow trout. The philosophy of catch and release is encouraged, and it is important to recognize that all harvest figures are estimates of the number of fish retained from the total reported catch.

Steelhead trout are rare in the Bristol Bay area of Southwest Alaska, being present in only a small number of Alaska Peninsula systems south of Port Heiden. No effort or harvest data are available for those few streams; however, they are presumed to be relatively insignificant at this time.

2. Management considerations. The rainbow trout of Bristol Bay are unique in Alaska. They are also one of the largest resident rainbow trout in North America. Relatively large numbers are available only because they are not overexploited, owing to the remoteness and inaccessibility of most of the habitat. To a certain extent, the designation in Bristol Bay of a Wild Trout Area (Trophy Fish Area) has simply focused angler attention on a more limited number of locations than necessary. Trophy-size fish exist throughout most of the lake-river systems. It appears that the rainbow trout populations are holding up well under the present sportfishing effort and will be affected very little by sportfishing as long as effort remains low and widely distributed (ADF&G 1978). It should also be noted that there is a second user group of rainbow trout within the Wild Trout Area. A Native subsistence fishery is in existence and does harvest rainbow trout, particularly during the winter months (Gwartney, pers. comm.).

   A major long-term management concern in Bristol Bay is changing land ownership. Increased private control of access could cause major changes in utilization and harvest of the Bristol Bay rainbow trout populations.

3. Period of use. Rainbow trout fishing is at its best in early spring (February and March) and late summer/early fall (August), when they leave their lake environment and enter streams.
4. Fishery summary:
   a. Naknek River drainage-Alaska Peninsula. The 1982 harvest of 1,624 rainbow trout is a 58% decrease from the 1981 high of 2,819 (table 66) and accounts for 19% of the Southwest Region rainbow trout harvest in 1982 (table 82). The Naknek River drainage system accounted for 97% of the 1982 area harvest (table 92). The philosophy of catch and release that is encouraged in Bristol Bay is well documented in the Naknek River drainage, where the majority of rainbow trout caught are released. Creek census programs conducted on the Naknek River during 1981, 1982, and 1983 indicated that the total number of rainbow retained was only 24, 31, and 35%, respectively, of those reportedly caught (Gwartney 1982, 1983a, 1983b). Creek census programs conducted on Brooks River and Brooks Lake in 1982 and 1983 indicate even lower retention rates of 1 and 2.5%, respectively (Gwartney 1983a, 1983b).
   b. Kvichak River drainage. The annual harvest of rainbow trout has increased steadily from 1,092 in 1977 to 2,076 in 1982 (table 67), representing 24% of the Southwest Region rainbow trout harvest (table 82). Reported harvest is well distributed among the Kvichak River drainages (tables 92). Harvest estimates represent only a small percentage of the actual catch (Gwartney, pers. comm.).
   c. Nushagak area. The annual harvest of rainbow trout increased slightly in 1981 and 1982 up to 1,772 and 1,688, respectively (table 68). The 1982 harvest accounts for 19% of the Southwest Region's rainbow trout harvest (table 82). The harvest is well distributed among the Nushagak, Wood River Lakes, Tikchik-Nuyakuk, and Togiak River systems, and the Mulchatna River (table 92). Harvest figures represent the number of rainbow retained from the total catch.
5. Projected increase in demand or harvest. Sportfishing effort in Bristol Bay-Alaska Peninsula areas for rainbow trout and steelhead is expected to gradually increase; however, no published information on projected harvest levels was found in the literature. (See also section I. F.2. of this narrative.)

V. ARCTIC GRAYLING

A. Regional Overview

The annual harvest of arctic grayling in the Southwest Region has increased from a low of 2,844 in 1977 to a high of 5,777 in 1982 (tables 64 and 69). The 1982 harvest accounted for less than 4% of the total statewide grayling harvest. The arctic grayling sport harvest in the Southwest Region by area and fishery are presented in tables 83 and 93.

B. Harvest Survey Area: Kodiak

1. Management objectives. Arctic grayling are not native to the Kodiak area, and all populations are the result of stocking programs initiated by the ADF&G. Some natural reproduction has been established in Cascade Lake, but most systems require supplemental stocking (ADF&G 1977; Murray, pers. comm.). These artificial fisheries have been created to provide unique and additional recreational angling accessible from the population center, Kodiak. The lakes are managed to optimize the survival and growth of stocked grayling, to provide a quality recreational fishery (Murray, pers. comm.). Five lakes near the city of Kodiak and accessible by road or trail were stocked with a total of 106,000 grayling fry in 1983 (Murray, pers. comm.). (The Distribution and Abundance narrative found in the Life History portion of this publication contains the stocking records.)
2. Management considerations. Artificial stock management need not consider the natural harvest limitations important in the management of wildstock fisheries, and the economics of such artificial fisheries are very different from those of a wildstock fishery. Maintenance of artificial fisheries results in high production costs and must be economically justified. That is, once fish are produced there must be a justifiable catch per unit of effort, plus angler acceptance and use levels (Andrews n.d.). Survival of stocked grayling has been poor and in at least one lake (Long Lake) is attributed to predation on sac fry by threespine stickleback (Van Hulle and Murray 1980, 1981).
3. Period of use. Kodiak area arctic grayling populations receive moderate sportfishing effort, with the highest angler use occurring during the summer months (ADF&G 1977).
4. Fishery summary. All fishing occurs in the stocked lakes along the road system, with the lakes providing a unique fishery desired by anglers (Murray, pers. comm.). Estimates of effort, or the number of days spent angling specifically for grayling in the Kodiak area, are not readily available. Annual Kodiak area sport harvest estimates during the 1977-1982 base period are presented in tables 65, 83, and 93. Harvests have ranged from a low of 54 in 1977 to a high of 465 in 1980. The 1982 harvest of 225 represents approximately 4% of the total Southwest Region's grayling harvest (table 83).
5. Projected increase in harvest or demand. See section I. F.1. of this narrative.

C. Harvest Survey Areas: Naknek River Drainage-Alaska Peninsula, Kvichak River Drainage, and Nushagak Area

1. Management objectives. The arctic grayling is an important sport species in the Bristol Bay area and is abundant and widely distributed. Some systems draw effort directed

specifically for arctic grayling and afford anglers the opportunity to take trophy-sized fish. Since statehood, the ADF&G has collected general characteristics of spawning grayling populations and catch/effort data incidental to rainbow trout and char studies. With the exception of the Ugashik Lake drainage system, few management and research activities have been directed specifically at grayling. A primary management objective is to optimize the survival and growth of the Bristol Bay area's arctic grayling populations. All appear to be healthy and stable.

2. Management considerations. Few arctic grayling population estimates are available in the Bristol Bay area. Should effort patterns or the attitude of catch an release change, population parameters of the arctic grayling stocks would need to be better defined. At the present time, through restrictive seasons and bag limits, effort is low and maintenance of the population is assured.

   An important management consideration is that all life-phases of the arctic grayling usually take place within the semi-confined environment of one drainage or watershed system. Grayling therefore often exhibit complex migrational patterns and require unrestricted movement within a system.

3. Period of use. Grayling may be taken readily from May through October; however, sportfishing effort is heaviest during the summer months of July and August. A slight fishing pressure by hunters in the surrounding area exists through October (ADF&G 1977).

4. Fishery summary. Current sportfishing pressure on grayling in the Bristol Bay, Alaska Peninsula, and Aleutian Islands area is widespread and low.

   a. Naknek River drainage-Alaska Peninsula. Annual harvest estimates for 1977-1982 are presented in tables 66, 83, and 93. Harvests have ranged from 614 grayling in 1978 to 1,620 in 1981. The 1982 harvest of 1,158 accounts for 20% of the Southwest Region's grayling harvest (table 83). The combined fisheries of Naknek Lake and the Naknek River, with its tributaries, had a 1982 estimated harvest of 901 grayling, while the popular Ugashik Lake drainage trophy fishery had an estimated harvest of 142 grayling (table 93). The majority of grayling caught by anglers in the Naknek and Ugashik river drainages are subsequently released (Gwartney 1983b; Gwartney, pers. comm.).

   b. Kvichak River drainage. Annual harvest estimates for 1977-1982 are presented in tables 67, 83, and 93. Sport harvests have ranged from 826 in 1977 to 1,749 in 1982. The 1982 harvest accounts for slightly over 30% of the total Southwest Region's grayling harvest (table 83). In 1982, the Newhalen River had the largest grayling harvest, followed by the "Other" category, then the Lake Clark area fisheries and the Kvichak River (table 93).

c. Nushagak area. Annual harvest estimates for 1977-1982 are presented in tables 68, 83, and 93. Sport arctic grayling harvests have increased dramatically from 496 in 1977 to 2,645 in 1982. The 1982 harvest accounts for nearly 46% of the total Southwest Region's arctic grayling harvest (table 83). It is noteworthy that this high 1982 harvest was due largely to a newly developed fishery on the Mulchatna River (Gwartney, pers. comm.) (table 93). It is also significant that within the Nushagak area in 1979, 1980, and again in 1982 the total harvest of arctic grayling exceeds the harvest of any other selected sport fish species (table 73).

5. Projected increase in demand or harvest. Sportfishing effort in the Bristol Bay-Alaska Peninsula area for arctic grayling is expected to gradually increase; however, no published information on projected demand or harvest levels was found in the literature. (See also section I.F.2. of this narrative.)

Table 59. Southwest Region Sport Fish Effort[a] and Percentage by Area,[b] 1977-82

	Angler-Days[c]											
	1977		1978		1979		1980		1981		1982	
Area Fished	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Kodiak (Area Q)												
Saltwater total	14,957	18.9	19,063	23.6	23,124	23.1	27,646	22.7	29,857	23.4	41,113	27.8
Freshwater total	26,606	33.7	25,439	31.5	35,921	35.9	37,261	30.7	36,582	28.6	40,125	27.1
Subtotal	41,563	52.6	44,502	55.1	59,045	59.0	64,907	53.4	66,439	52.0	81,238	54.9
Naknek Drainages - Alaska Peninsula (Area R)												
Saltwater total	*[d]	0	*		*		*		11,828	9.3	9,075	6.1
Freshwater total	17,007	21.5	18,824	23.3	19,115	19.1	30,257	24.9	27,403	21.5	29,070	19.7
Subtotal	17,007	21.5	18,824	23.3	19,115	19.1	30,257	24.9	39,231	30.7	38,145	25.8
Kvichak River Drainages (Area S)												
Saltwater total	0		0		0		0		0		0	
Freshwater total	12,227	15.5	8,854	10.9	13,031	13.0	14,451	11.9	12,939	10.1	16,754	11.3
Subtotal	12,227	15.5	8,854	10.9	13,031	13.0	14,451	11.9	12,939	10.1	16,754	11.3
Nushagak (Area T)												
Saltwater total	0		0		0		0		0		0	
Freshwater total	8,244	10.4	8,659	10.7	8,835	8.9	11,867	9.8	9,045	7.1	11,839	8.0
Subtotal	8,244	10.4	8,659	10.7	8,835	8.9	11,867	9.8	9,045	7.1	11,839	8.0
Saltwater total	14,957	18.9	19,063	23.6	23,124	23.1	27,646	22.7	41,685	32.7	50,188	33.9
Freshwater total	64,084	81.1	61,776	76.4	76,902	76.9	93,836	77.3	85,969	67.3	97,788	66.1
Grand total	79,041	100.0	80,839	100.0	100,026	100.0	121,482	100.0	127,654	100.0	147,976	100.0

Sources: Mills 1979-83.

a Effort is simply the number of days spent sportfishing, where any portion of a day fished is counted as one whole day, or angler-day.

b ADF&G sport fish harvest study postal survey areas.

c The number of angler-days represents the effort by both residents and nonresidents for all species combined (not just selected species).

d Asterisk (*) indicates data unavailable.

Table 60. Kodiak Area Sport Fish Effort[a] and Percentage by Area,[b] 1977-82

Area Fished	1977 No.	1977 %	1978 No.	1978 %	1979 No.	1979 %	1980 No.	1980 %	1981 No.	1981 %	1982 No.	1982 %
	Angler-Days[c]											
Salt water:												
Boat	6,144	14.8	6,850	15.4	7,750	13.1	9,796	15.1	17,391	26.2	21,086	26.0
Shoreline	8,813	21.2	12,213	27.4	15,374	26.1	17,850	27.5	12,466	18.7	20.027	24.6
Saltwater total	14,957	36.0	19,063	42.8	23,124	39.2	27,646	42.6	29,857	44.9	41,113	50.6
Fresh water:												
Buskin River	12,681	30.5	11,072	24.9	19,336	32.7	20,149	31.1	19,403	29.2	20,404	25.1
Pasagshak River	4,712	11.4	3,403	7.7	5,785	9.8	6,754	10.4	4,434	6.7	3,344	4.1
Karluk River, lagoon					*[e]		*		*		1,552	1.9
Other Streams	(9,213)[d]	22.1	(10,964)[d]	24.6	8,017	13.6	8,197	12.6	10,487	15.8	8,359	10.3
Karluk Lake					*		*		*		1,962	2.4
Roadside lakes					1,258	2.1	1,257	1.9	982	1.5	2,474	3.1
Other lakes					1,525	2.6	904	1.4	1,276	1.9	2,030	2.5
Freshwater total	26,606	64.0	25,439	57.2	35,921	60.8	37,261	57.4	36,582	55.1	40,125	49.4
Grand total	41,563	100.0	44,502	100.0	59,045	100.0	64,907	100.0	66,439	100.0	81,238	100.0

Sources: Mills 1979-83.

a Kodiak area (SWHS Area Q): All waters and drainages of the Kodiak and Afognak islands groups.

b Effort is simply the number of days spent sportfishing, where any portion of a day fished is counted as one whole day, or angler-day.

c The number of angler-days represents the effort by both residents and nonresidents for all species combined (not just selected species).

d In 1977 and 1978, Karluk River and lagoon, Other streams, Karluk Lake, Roadside lakes, and Other lakes were all combined under the category of "Other waters."

e Asterisk (*) indicates data unavailable.

Table 61. Naknek Drainages - Alaska Peninsula[a] Sport Fish Effort[b] and Percentage by Fishery and Year, 1977-82

	Angler-Days[c]											
	1977		1978		1979		1980		1981		1982	
Area Fished	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Salt water:												
Cold Bay area	*[d]		*		*		*		*		1,211	3.2
Adak area	*		*		*		*		*		4,896	12.8
Boat-other areas	*		*		*		*		3,926[e]	10.0	392	1.0
Shoreline-other areas	*		*		*		*		7,902[f]	20.2	2,576	6.8
Saltwater total	*		*		*		*		11,828	30.2	9,075	23.8
Fresh water:												
Cold Bay area	*		*		*		*		*		5,271	13.8
Naknek River & tributaries	4,675	27.5	5,600	29.7	5,691	29.8	9,967	32.9	10,863	27.7	11,393	29.9
Adak area	*		*		*		*		*		4,026	10.6
Naknek Lake	872	5.1	646	3.4	770	4.0	1,542	5.1	1,472	3.8	1,777	4.7
Brooks River	1,195	7.0	1,464	7.8	1,163	6.1	1,971	6.5	1,391	3.5	2,423	6.3
Ugashik system	707	4.2	2,477	13.2	1,399	7.3	472	1.6	671	1.7	870	2.3
Becharof system	403	2.4	883	4.7	314	1.6	386	1.3	360	0.9	239	0.6
Others	9,155	53.8	7,754	41.2	9,778	51.2	15,919	52.6	12,646	32.2	3,071	8.0
Freshwater total	17,007	100.0	18,824	100.0	19,115	100.0	30,257	100.0	27,403	69.8	29,070	76.2
Grand total	17,007	100.0	18,824	100.0	19,115	100.0	30,257	100.0	39,231	100.0	38,145	100.0

Sources: Mills 1979-83.

a Naknek drainages - Alaska Peninsula (SWHS Area R): All waters and drainages between Cape Douglas and the community of Naknek, including the Naknek River drainage and the Aleutian Islands chain.

b Effort is simply the number of days spent sportfishing, where any portion of a day fished is counted as one whole day, or angler-day.

c The number of angler-days represents the effort by both residents and nonresidents for all species combined (not just selected species).

d Asterisk (*) indicates data unavailable.

e Boats - all areas.

f Shoreline - all areas.

Table 62. Kvichak River Drainages Sport Fish Effort[b] and Percentage by Fishery and Year, 1977-82

	Angler-Days[c]											
	1977		1978		1979		1980		1981		1982	
Area Fished	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Saltwater total	No Known Sportfishing Effort in Salt Water											
Fresh water:												
Kvichak River	1,509	12.3	948	10.7	2,044	15.7	2,056	14.2	1,865	14.4	1,877	11.2
Lower Talarik Cr.	749	6.1	646	7.3	927	7.1	585	4.0	458	3.5	972	5.8
Copper River	1,686	13.8	1,120	12.6	723	5.5	1,200	8.3	916	7.1	2,491	14.9
Gibralter River	423	3.5	646	7.3	346	2.7	414	2.9	670	5.2	751	4.5
Newhalen River	1,686	13.8	1,572	17.8	2,672	20.5	4,013	27.8	1,832	14.2	3,054	18.2
Alagnak (Branch) R.	*[d]		*		*		*		1,947	15.0	2,252	13.4
Lake Clark Area	3,748	30.7	2,910	32.9	3,128	24.0	2,342	16.2	2,519	19.5	2,286	13.7
Others	2,426	19.8	1,012	11.4	3,191	24.5	3,841	26.6	2,732	21.1	3,071	18.3
Freshwater total	12,227	100.0	8,854	100.0	13,031	100.0	14,451	100.0	12,939	100.0	16,754	100.0
Grand total	12,227	100.0	8,854	100.0	13,031	100.0	14.451	100.0	12,939	100.0	16,754	100.0

Sources: Mills 1979-83.

a Kvichak River drainages (SWHS Area S): All lakes and tributaries of the Kvichak River drainage, including Nonvianuk Lake, Kukaklek Lake, Kulik Lake, Lake Illiamna, and Lake Clark.

b Effort is simply the number of days spent sportfishing, where any portion of a day fished is counted as one whole day, or angler-day.

c The number of angler-days represents the effort by both residents and nonresidents for all species combined (not just selected species).

d Asterisk (*) indicates data unavailable.

Table 63. Nushagak Area[a] Sport Fish Effort[b] and Percentage by Fishery and Year, 1977-82

	Angler-Days[c]											
	1977		1978		1979		1980		1981		1982	
Area Fished	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Saltwater total	No Known Sportfishing Effort in Salt Water											
Fresh water:												
Nushagak River system	1,380	16.7	1,206	13.9	2,421	27.4	1,885	15.9	2,732	30.2	3,992	33.7
Wood River Lakes system	3,549	43.1	2,843	32.8	1,745	19.8	3,884	32.7	1,701	18.8	3,139	26.5
Tikchik-Nuyakuk lakes system	959	11.6	1,465	16.9	582	6.6	2,071	17.5	2,241	24.8	1,058	9.0
Togiak River system	675	8.2	539	6.2	1,666	18.8	1,513	12.7	932	10.3	1,160	9.8
Mulchatna River	1,296	15.7	1,486	17.2	1,431	16.2	1,057	8.9	1,145	12.7	1,228	10.4
Chilikadrotna River	*[d]		*		*		*		*		324	2.7
Others	385	4.7	1,120	13.0	990	11.2	1,457	12.3	294	3.2	938	7.9
Freshwater total	8,244	100.0	8,659	100.0	8,835	100.0	11,867	100.0	9,045	100.0	11,839	100.0
Grand total	8,244	100.0	8,659	100.0	8,835	100.0	11,867	100.0	9,045	100.0	11,839	100.0

Sources: Mills 1979-1983.

a Nushagak area (SWHS Area T): All lakes and tributaries of the Nushagak River drainage, including the Mulchatna River drainage, the Wood River and Tikchik lakes systems and waters westward to Cape Newenham.

b Effort is simply the number of days spent sportfishing, where any portion of a day fished is counted as one whole day, or angler-day.

c The number of angler-days represents the effort by both residents and nonresidents for all species combined (not just selected species).

d Asterisk (*) indicates data unavailable.

Table 64. Southwest Region Sport Fish Harvest Totals[a] by Species,[b] 1971-82

Species	1977	1978	1979	1980	1981	1982
Chinook salmon[c]	3,216	4,282	4,250	4,501	5,226	8,681
Coho salmon	6,861	7,509	13,683	16,453	14,042	18,180
Sockeye salmon	5,092	6,656	8,553	7,283	8,253	10,959
Pink salmon	14,634	21,737	19,698	31,392	20,650	31,604
Chum salmon	2,017	2,351	773	1,481	1,545	3,378
Sea-run salmon total	31,820	42,535	46,957	61,110	49,716	72,802
Dolly Varden/ arctic char	17,344	19,747	36,058	34,662	35,963	40,098
Steelhead	232	162	318	671	313	258
Rainbow trout	4,064	4,546	4,618	8,082	7,153	8,768
Arctic grayling	2,184	3,353	3,599	5,433	4,201	5,777
Total	55,644	70,343	91,550	109,958	97,346	127,703

Sources: Mills 1979-83.

a Freshwater and saltwater sport fish harvest combined.

b Select sport fish species only.

c Includes harvest of "small" chinook salmon (less than 20 inches in Area Q, less than 28 inches in Areas R, S, and T).

Table 65. Kodiak Area[a] Sport Fish Harvest Totals[b] by Species,[c] 1977-82

Species	1977	1978	1979	1980	1981	1982
Chinook salmon[d]	483	350	752	327	789	1,120
Coho salmon	4,716	4,92	11,522	12,692	10,584	13,329
Sockeye salmon	1,255	1,776	2,436	2,178	1,620	3,055
Pink salmon	14,519	17,739	15,871	18,969	12,259	18,850
Chum salmon	1,645	1,287	500	525	637	1,324
Sea-run salmon total	22,618	26,079	31,081	34,691	25,889	37,678
Dolly Varden/ arctic char	14,536	15,805	25,421	20,663	19,516	23,771
Steelhead	232	162	318	671	313	258
Rainbow trout	1,472	994	972	2,523	886	3,380
Arctic grayling	54	325	127	465	119	225
Total	38,912	43,365	57,919	59,013	46,723	65,312

Sources: Mills 1979-83.

a Kodiak area (SWHS Area Q): All waters and drainages of the Kodiak and Afognak islands groups.

b Freshwater and saltwater sport fish harvest combined.

c Select sport fish species only.

d Includes harvest of "small" chinook salmon (less than 20 inches in Area Q).

Table 66. Naknek Drainages - Alaska Peninsula[a] Sport Fish Harvest Totals[b] by Species,[c] 1977-82

Species	1977	1978	1979	1980	1981	1982
Chinook salmon[d]	1,405	2,849	2,610	3,073	3,056	4,720
Coho salmon	1,368	1,877	1,324	2,161	2,420	3,277
Sockeye salmon	998	894	1,856	3,064	3,348	2,220
Pink salmon	115	2,791	3,827	11,993	8,391	12,471
Chum salmon	226	693	109	878	583	1,374
Sea-run salmon total	4,112	9,104	9,726	21,169	17,798	24,062
Dolly Varden/ arctic char	1,542	2,070	8,244	10,901	13,715	12,073
Steelhead	Ø	Ø	Ø	Ø	Ø	Ø
Rainbow trout	906	1,103	1,408	2,781	2,819	1,624
Arctic grayling	808	614	609	1,550	1,620	1,158
Total	7,368	12,891	19,987	36,401	35,952	38,917

Sources: Mills 1979-83.

a Naknek drainages, Alaska Peninsula (SWHS Area R): All waters and drainages between Cape Douglas and the community of Naknek, including the Naknek River drainage and the Aleutian Islands chain.

b Freshwater and saltwater sport fish harvest combined.

c Select sport fish species only.

d Includes harvest of "small" chinook salmon (less than 28 inches in Area R).

Table 67. Kvichak River Drainages[a] Sport Fish Harvest Totals[b] by Species,[c] 1977-82

Species	1977	1978	1979	1980	1981	1982
Chinook salmon[d]	243	222	88	181	161	472
Coho salmon	190	76	225	714	465	485
Sockeye salmon	2,266	3,057	3,443	1,706	2,626	3,872
Pink salmon	Ø	31	Ø	Ø	Ø	Ø
Chum salmon	76	156	9	35	108	31
Sea-run salmon total	2,775	3,542	3,765	2,636	3,360	4,860
Dolly Varden/ arctic char	516	362	809	1,299	875	1,666
Steelhead	Ø	Ø	Ø	Ø	Ø	Ø
Rainbow trout	1,092	1,057	1,093	1,420	1,676	2,076
Arctic grayling	826	1,438	873	1,421	1,112	1,749
Total	5,209	6,399	6,540	6,776	7,023	10,351

Sources: Mills 1979-83.

a Kvichak River drainages (SWHS Area S): All lakes and tributaries of the Kvichak River drainage, including Nonvianuk Lake, Kukaklek Lake, Kulik Lake, Lake Iliamna, and Lake Clark.

b Freshwater and saltwater sport fish harvest combined.

c Select sport fish species only.

d Includes harvest of "small" chinook salmon (less than 28 inches in Area S).

Table 68. Nushagak Area[a] Sport Fish Harvest Totals[b] by Species,[c] 1977-82

Species	1977	1978	1979	1980	1981	1982
Chinook salmon[d]	1,085	861	800	920	1,220	2,369
Coho salmon	587	629	612	886	573	1,089
Sockeye salmon	573	929	818	335	659	1,812
Pink salmon	Ø	1,176	Ø	430	Ø	283
Chum salmon	70	215	155	43	217	649
Sea-run salmon total	2,315	3,810	2,385	2,614	2,669	6,202
Dolly Varden/ arctic char	750	1,510	1,584	1,799	1,857	2,588
Steelhead	Ø	Ø	Ø	Ø	Ø	Ø
Rainbow trout	594	1,392	1,145	1,358	1,772	1,688
Arctic grayling	496	976	1,990	1,997	1,350	2,645
Total	4,155	7,688	7,104	7,768	7,648	13,123

Sources: Mills 1979-83.

a Nushagak area (SWHS Area T): All lakes and tributaries of the Nushagak River drainage, including the Mulchatna River drainage, the Wood River and Tikchik lakes systems, and waters westward to Cape Newenham.

b Freshwater and saltwater sport fish harvest combined.

c Select sport fish species only.

d Includes harvest of "small" chinook salmon (less than 28" in Area T).

Table 69. Southwest Region Sport Fish Harvest and Percentage by Species,[a] 1977-82

	Harvest											
	1977		1978		1979		1980		1981		1982	
Species	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chinook salmon[b]												
Salt water	34	0.1	12	trace	98	0.1	60	.1	323	0.3	1,518	1.2
Fresh water	3,182	5.7	4,270	6.1	4,152	4.6	4,441	4.0	4,903	5.1	7,163	5.6
Total	3,216	5.8	4,282	6.1	4,250	4.7	4,501	4.1	5,226	5.4	8,681	6.8
Coho salmon												
Salt water	1,172	2.1	1,433	2.1	3,606	3.9	5,442	4.9	4,924	5.1	7,103	5.6
Fresh water	5,689	10.2	6,076	8.6	10,077	11.0	11,011	10.0	9,118	9.3	11,077	8.6
Total	6,861	12.3	7,509	10.7	13,683	14.9	16,453	14.9	14,042	14.4	18,180	14.2
Sockeye salmon												
Salt water	102	0.2	479	0.7	330	0.4	809	0.7	1,663	1.7	2,137	1.7
Fresh water	4,990	9.0	6,177	8.8	8,223	8.9	6,474	5.9	6,590	6.8	8,822	6.9
Total	5,092	9.2	6,656	9.5	8,553	9.3	7,283	6.6	8,253	8.5	10,959	8.6
Pink salmon												
Salt water	5,074	9.1	7,693	10.9	8,853	9.7	8,223	7.5	11,232	11.5	16,736	13.1
Fresh water	9,560	17.2	14,044	20.0	10,845	11.8	23,169	21.1	9,418	9.7	14,868	11.7
Total	14,634	26.3	21,737	30.9	19,698	21.5	31,392	28.6	20,650	21.2	31,604	24.8
Chum salmon												
Salt water	633	1.1	624	0.9	382	0.4	405	0.4	486	0.5	1,111	0.8
Fresh water	1,384	2.5	1,727	2.4	391	0.4	1,076	1.0	1,059	1.1	2,267	1.8
Total	2,017	3.6	2,351	3.3	773	0.8	1,481	1.4	1,545	1.6	3,378	2.6
Char												
Salt water	1,084	2.0	2,830	4.0	5,281	5.8	2,979	2.7	5,843	6.0	10,626	8.3
Fresh water	16,260	29.2	16,917	24.1	30,777	33.6	31,683	28.8	30,120	30.9	29,472	23.1
Total	17,344	31.2	19,747	28.1	36,058	39.4	34,662	31.5	35,963	36.9	40,098	31.4
Steelhead												
Salt water	3	trace	0	0.0	9	trace	17	trace	0	0.0	0	0.0
Fresh water	229	0.4	162	0.2	309	0.4	654	0.6	313	0.3	258	0.2
Total	232	0.4	162	0.2	318	0.4	671	0.6	313	0.3	258	0.2
Rainbow trout	4,064	7.3	4,546	6.4	4,618	5.1	8,082	7.4	7,153	7.4	8,768	6.9
Arctic grayling	2,184	3.9	3,353	4.8	3,599	3.9	5,433	4.9	4,201	4.3	5,777	4.5
Saltwater total	8,102	14.6	13,071	18.6	18,559	20.3	17,935	16.3	24,471	25.1	39,231	30.7
Freshwater total	47,542	85.4	57,272	81.4	72,991	79.7	92,023	83.7	72,875	74.9	88,472	69.3
Grand total	55,644	100.0	70,343	100.0	91,550	100.0	109,958	100.0	97,346	100.0	127,703	100.0

Sources: Mills 1979-83.

a Select sport fish species only.

b Chinook salmon harvest data includes harvest of "small" chinook salmon (less than 20 inches in Area Q, less than 28 inches in Areas R,S,T).

Table 70. Kodiak Area[a] Sport Fish Harvest and Percentage by Species,[b] 1977-82

	Harvest											
	1977		1978		1979		1980		1981		1982	
Species	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chinook salmon[c]												
Salt water	34	0.1	12	trace	98	0.2	60	0.1	194	0.4	167	0.2
Fresh water	449	1.2	338	0.8	654	1.1	267	0.4	595	1.3	953	1.5
Total	483	1.3	350	0.8	752	1.3	327	0.5	789	1.7	1,120	1.7
Coho salmon												
Salt water	1,172	3.0	1,433	3.3	3,606	6.2	5,442	9.2	4,449	9.6	6,612	10.1
Fresh water	3,544	9.1	3,494	8.1	7,916	13.7	7,250	12.3	6,135	13.1	6,717	10.3
Total	4,716	12.1	4,927	11.4	11,522	19.9	12,692	21.5	10,584	22.7	13,329	20.4
Sockeye salmon												
Salt water	102	0.3	479	1.1	330	0.5	809	1.4	669	1.4	1,079	1.7
Fresh water	1,153	2.9	1,297	3.0	2,106	3.7	1,369	2.3	951	2.0	1,976	3.0
Total	1,255	3.2	1,776	4.1	2,436	4.2	2,178	3.7	1,620	3.4	3,055	4.7
Pink salmon												
Salt water	5,074	13.0	7,693	17.8	8,853	15.3	8,223	13.9	4,677	10.0	8,153	12.5
Fresh water	9,445	24.3	10,046	23.1	7,018	12.1	10,746	18.2	7,582	16.2	10,697	16.4
Total	14,519	37.3	17,739	40.9	15,871	27.4	18,969	32.1	12,259	26.2	18,850	28.9
Chum salmon												
Salt water	633	1.6	624	1.4	382	0.7	405	0.7	151	0.3	639	1.0
Fresh water	1,012	2.6	663	1.5	118	0.2	120	0.2	486	1.1	685	1.0
Total	1,645	4.2	1,287	2.9	500	0.9	525	0.9	637	1.4	1,324	2.0
Char												
Salt water	1,084	2.8	2,830	6.5	5,281	9.1	2,979	5.1	2,441	5.2	5,931	9.1
Fresh water	13,425	34.6	12,975	29.9	20,140	34.8	17,684	30.0	17,075	36.5	17,840	27.3
Total	14,536	37.4	15,805	36.4	25,421	43.9	20,663	35.1	19,516	41.7	23,771	36.4
Steelhead												
Salt water	3	trace	0	0.0	9	trace	17	trace	0	0.0	0	0.0
Fresh water	229	0.6	162	0.4	309	0.5	654	1.1	313	0.7	258	0.4
Total	232	0.6	162	0.4	318	0.5	671	1.1	313	0.7	258	0.4
Rainbow trout	1,472	3.8	994	2.3	972	1.7	2,523	4.3	886	1.9	3,380	5.2
Arctic grayling	54	0.1	325	0.8	127	0.2	465	0.8	119	0.3	225	0.3
Saltwater total	8,102	20.8	13,071	30.1	18,559	32.0	17,935	30.4	12,581	26.9	22,581	34.6
Freshwater total	30,810	79.2	30,294	69.9	39,360	68.0	41,078	69.6	34,142	73.1	42,731	65.4
Grand total	38,912	100.0	43,365	100.0	57,919	100.0	59,013	100.0	46,723	100.0	65,312	100.0

Sources: Mills 1979-83.

a Kodiak area (SWHS Area Q): All waters and drainages of the Kodiak and Afognak islands groups.

b Select sport fish species only.

c Chinook salmon harvest data includes harvest of "small" chinook salmon (less than 20 inches in Area Q).

Table 71. Naknek Drainages - Alaska Peninsula[a] Sport Fish Harvest and Percentage by Species,[b] 1977-82

Species	Harvest 1977 No.	1977 %	1978 No.	1978 %	1979 No.	1979 %	1980 No.	1980 %	1981 No.	1981 %	1982 No.	1982 %
Chinook salmon[c]												
Salt water	*[d]		*		*		*		129	0.4	1,351	3.5
Fresh water	1,405		2,849		2,610		3,073		2,927	8.1	3,369	8.7
Total	1,405	19.1	2,849	22.1	2,610	13.1	3,073	8.5	3,056	8.5	4,720	12.2
Coho salmon												
Salt water	*		*		*		*		475	1.3	491	1.3
Fresh water	1,368		1,877		1,324		2,161		1,945	5.4	2,786	7.1
Total	1,368	18.6	1,877	14.6	1,324	6.6	2,161	5.9	2,420	6.7	3,277	8.4
Sockeye salmon												
Salt water	*		*		*		*		994	2.8	1,058	2.7
Fresh water	998		894		1,856		3,064		2,354	6.5	1,162	3.0
Total	998	13.5	894	6.9	1,856	9.3	3,064	8.4	3,348	9.3	2,220	5.7
Pink salmon												
Salt water	*		*		*		*		6,555	18.2	8,583	22.0
Fresh water	115		2,791		3,827		11,993		1,836	5.1	3,888	10.0
Total	115	1.5	2,791	21.7	3,827	19.2	11,993	33.0	8,391	23.3	12,471	32.0
Chum salmon												
Salt water	*		*		*		*		335	0.9	472	1.2
Fresh water	226		693		109		878		248	0.7	902	2.3
Total	226	3.1	693	5.4	109	0.5	878	2.4	583	1.6	1,374	3.5
Char												
Salt water	*		*		*		*		3,402	9.5	4,695	12.1
Fresh water	1,542		2,070		8,244		10,901		10,313	28.7	7,378	18.9
Total	1,542	20.9	2,070	16.0	8,244	41.3	10,901	29.9	13,715	38.2	12,073	31.0
Steelhead[e]	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Rainbow trout	906	12.3	1,103	8.5	1,408	7.0	2,781	7.6	2,819	7.9	1,624	4.2
Arctic grayling	808	11.0	614	4.8	609	3.0	1,550	4.3	1,620	4.5	1,158	3.0
Saltwater total	*		*		*		*		11,890	33.1	16,650	42.8
Freshwater total	7,368	100.0	12,891	100.0	19,987	100.0	36,401	100.0	24,062	66.9	22,267	57.2
Grand total	7,368	100.0	12,891	100.0	19,987	100.0	36,401	100.0	35,952	100.0	38,917	100.0

Sources: Mills 1979-83.

a Naknek drainages - Alaska Peninsula (SWHS Area R): All waters and drainages between Cape Douglas and the community of Naknek, including the Naknek River drainage and the Aleutian Islands chain.

b Select sport fish species only.

c Chinook salmon harvest data includes harvest of "small" chinook salmon (less than 28 inches in Areaa R).

d A isk (*) indicates data unavailable.

e St. ead harvest in this area is relatively insignificant; no ef has been reported.

Table 72. Kvichak River Drainages[a] Sport Fish Harvest[b] and Percentage by Species,[c] 1977-82

	Harvest											
	1977		1978		1979		1980		1981		1982	
Species	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chinook salmon[d]	243	4.7	222	3.5	88	1.4	181	2.7	161	2.3	472	4.6
Coho salmon	190	3.6	76	1.2	225	3.4	714	10.5	465	6.6	485	4.7
Sockeye salmon	2,266	43.5	3,057	47.8	3,443	52.6	1,706	25.2	2,626	37.4	3,872	37.4
Pink salmon	0	0.0	31	0.5	0	0.0	0	0.0	0	0.0	0	0.0
Chum salmon	76	1.4	156	2.4	9	0.1	35	0.5	108	1.5	31	0.3
Char	516	9.9	362	5.6	809	12.4	1,299	19.1	875	12.5	1,666	16.1
Steelhead[e]	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Rainbow trout	1,092	21.0	1,057	16.5	1,093	16.7	1,420	21.0	1,676	23.9	2,076	20.0
Arctic grayling	826	15.9	1,438	22.5	873	13.4	1,421	21.0	1,112	15.8	1,749	16.9
Total	5,209	100.0	6,399	100.0	6,540	100.0	6,776	100.0	7,023	100.0	10,351	100.0

Sources: Mills 1979-83.

a Kvichak River drainages (SWHS Area S): All lakes and tributaries of the Kvichak River drainage, including Nonvianuk Lake, Kukaklek Lake, Kulik Lake, Lake Iliamna, and Lake Clark.

b Harvest data is for freshwater fisheries only; no saltwater effort (or harvest) has been reported.

c Select sport fish only.

d Chinook salmon harvest data include harvest of "small" chinook salmon (less than 28 inches in Area S).

e Steelhead are not present in this area.

Table 73. Nushagak Area[a] Sport Fish Harvest[b] and Percentage by Species,[c] 1977-82

	Harvest											
	1977		1978		1979		1980		1981		1982	
Species	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chinook salmon[d]	1,085	26.1	861	11.2	800	11.3	920	11.8	1,220	15.9	2,369	18.1
Coho salmon	587	14.1	629	8.2	612	8.6	886	11.4	573	7.5	1,089	8.3
Sockeye salmon	573	13.8	929	12.1	818	11.5	335	4.3	659	8.6	1,812	13.8
Pink salmon	0	0.0	1,176	15.3	0	0.0	430	5.5	0	0.0	283	2.1
Chum salmon	70	1.7	215	2.8	155	2.2	43	0.6	217	2.8	649	4.9
Char	750	18.1	1,510	19.6	1,584	22.3	1,799	23.2	1,857	24.3	2,588	19.7
Steelhead[e]	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Rainbow trout	594	14.3	1,392	18.1	1,145	16.1	1,358	17.5	1,772	23.2	1,688	12.9
Arctic grayling	496	11.9	976	12.7	1,990	28.0	1,997	25.7	1,350	17.7	2,645	20.2
Total	4,155	100.0	7,688	100.0	7,104	100.0	7,768	100.0	7,648	100.0	13,123	100.0

Sources: Mills 1979-83.

a Nushagak area (SWHS Area T): All lakes and tributaries of the Nushagak River drainage, including the Mulchatna River drainage, the Wood River and Tikchik lakes systems, and waters westward to Cape Newenham.

b Harvest data is for freshwater fisheries only; no saltwater effort (or harvest) has been reported.

c Select sport fish only.

d Chinook salmon harvest include harvest of "small" chinook salmon (less than 28 inches in Areas T).

e Steelhead are not present in this area.

Table 74. Southwest Region Sport Chinook Salmon Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977[b]	1978[b]	1979[b]	1980[b]	1981	1982
Kodiak	483	350	752	327	724	1,047
(Q)	15.0[c]	8.2	17.7	7.3	23.3	20.5
Naknek drainages -	1,405	2,849	2,610	3,073	1,653	2,211
Ak. Pen.	43.7	66.5	61.4	68.3	53.1	43.3
(R)						
Kvichak R.	243	222	88	181	97	283
drainages	7.6	5.2	2.1	4.0	3.1	5.6
(S)						
Nushagak	1,085	861	800	920	637	1,562
(T)	33.7	20.1	18.8	20.4	20.5	30.6
Total	3,216	4,282	4,250	4,501	3,111	5,103

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Harvest data for 1977-80 include harvest of "small" chinook salmon (less than 20 inches in Area Q, less than 28 inches in Areas R, S, and T). For 1981 and 1982 "small" chinook salmon harvest see table 75.

c Percentage contribution to annual harvest total.

Table 75. Southwest Region Sport "Small" Chinook Salmon[a] Harvest and Percentage Contribution by Area,[b] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	*[c]	*	*	*	65	73
(Q)					3.1[d]	2.0
Naknek drainages -	*	*	*	*	1,403	2,509
Ak. Pen.					66.3	70.1
(R)						
Kvichak R.	*	*	*	*	64	189
drainages					3.0	5.3
(S)						
Nushagak	*	*	*	*	583	807
(T)					27.6	22.6
Total	*	*	*	*	2,115	3,578

Sources: Mills 1979-83.

a King salmon less than 20 inches in Area Q; less than 28 inches in Areas R, S, T.

b ADF&G sport fish harvest study postal survey areas.

c Asterisk (*) indicates data not available ("small" chinook salmon harvest prior to to 1981 was not estimated). See table 74 for chinook salmon harvest prior to 1981.

d Percentage contribution to annual harvest total.

Table 76. Southwest Region Sport Coho Salmon Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	4,716	4,927	11,522	12,692	10,584	13,329
(Q)	68.7[b]	65.6	84.2	77.2	75.4	73.3
Naknek drainages -	1,368	1,877	1,324	2,161	2,420	3,277
Ak. Pen.	19.9	25.0	9.7	13.1	17.2	18.0
(R)						
Kvichak R.	190	76	225	714	465	485
drainages	2.8	1.0	1.6	4.3	3.3	2.7
(S)						
Nushagak	587	629	612	886	573	1,089
(T)	8.6	8.4	4.5	5.4	4.1	6.0
Total	6,861	7,509	13,683	16,453	14,042	18,180

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Percentage contribution to annual harvest total.

Table 77. Southwest Region Sport Sockeye Salmon Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	1,255	1,776	2,436	2,178	1,620	3,055
(Q)	24.6[b]	26.7	28.5	29.9	19.6	27.9
Naknek drainages -	998	894	1,856	3,064	3,348	2,220
Ak. Pen.	19.6	13.4	21.7	42.1	40.6	20.3
(R)						
Kvichak R.	2,266	3,057	3,443	1,706	2,626	3,872
drainages	44.5	45.9	40.3	23.4	31.8	35.3
(S)						
Nushagak	573	929	818	335	659	1,812
(T)	11.3	14.0	9.5	4.6	8.0	16.5
Total	5,092	6,656	8,553	7,283	8,253	10,959

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Percentage contribution to annual harvest total.

Table 78. Southwest Region Sport Pink Salmon Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	14,519	17,739	15,871	18,969	12,259	18,850
(Q)	99.2[b]	81.6	80.6	60.4	59.4	59.6
Naknek drainages -	115	2,791	3,827	11,993	8,391	12,471
Ak. Pen. (R)	7.8	12.8	19.4	38.2	40.6	39.5
Kvichak R.	Ø	31	Ø	Ø	Ø	Ø
drainages (S)		0.2				
Nushagak	Ø	1,176	Ø	430	Ø	283
(T)		5.4		1.4		0.9
Total	14,634	21,737	19,698	31,392	20,650	31,604

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Percentage contribution to annual harvest total.

Table 79. Southwest Region Sport Chum Salmon Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	1,645	1,287	500	525	637	1,324
(Q)	81.5[b]	54.7	64.7	35.4	41.2	39.2
Naknek drainages -	226	693	109	878	583	1,374
Ak. Pen. (R)	11.2	29.5	14.1	59.3	37.7	40.7
Kvichak R.	76	156	9	35	108	31
drainages (S)	3.8	6.6	1.2	2.4	7.0	0.9
Nushagak	70	215	155	43	217	649
(T)	3.5	9.2	20.0	2.9	14.1	19.2
Total	2,017	2,351	773	1,481	1,545	3,378

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Percentage contribution to annual harvest total.

Table 80. Southwest Region Sport Dolly Varden/Arctic Char Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	14,536	15,805	25,421	20,663	19,516	23,771
(Q)	83.8[b]	80.0	70.5	59.6	54.3	59.3
Naknek drainages -	1,542	2,070	8,244	10,901	13,715	12,073
Ak. Pen.	8.9	10.5	22.9	31.4	38.1	30.1
(R)						
Kvichak R.	516	362	809	1,299	875	1,666
drainages	3.0	1.8	2.2	3.8	2.4	4.2
(S)						
Nushagak	750	1,510	1,584	1,799	1,857	2,588
(T)	4.3	7.7	4.4	5.2	5.2	6.4
Total	17,344	19,747	36,058	34,662	35,963	40,098

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Percentage contribution to annual harvest total.

Table 81. Southwest Region Sport Steelhead Trout Harvest by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Q)	232	162	318	671	313	258
Naknek drainages - Ak. Pen. (R)	Steelhead trout are rare in the Bristol Bay portion of Southwest Alaska, being present in only a small number of Alaska Peninsula systems south of Port Heiden. No effort or harvest data are available for those few streams; however, harvest is presumed to be relatively insignificant.					
Kvichak R. drainages (S)						
Nushagak (T)						
Total	232	162	318	671	313	258

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

Table 82. Southwest Region Sport Rainbow Trout Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	1,472	994	972	2,523	886	3,380
(Q)	36.2[b]	21.9	21.0	31.2	12.4	38.5
Naknek drainages -	906	1,103	1,408	2,781	2,819	1,624
Ak. Pen.	22.3	24.3	30.5	34.4	39.4	18.5
(R)						
Kvichak R.	1,092	1,057	1,093	1,420	1,676	2,076
drainages	26.9	23.2	23.7	17.6	23.4	23.7
(S)						
Nushagak	594	1,392	1,145	1,358	1,772	1,688
(T)	14.6	30.6	24.8	16.8	24.8	19.3
Total	4,064	4,546	4,618	8,082	7,153	8,768

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Percentage contribution to annual harvest total.

Table 83. Southwest Region Sport Arctic Grayling Harvest and Percentage Contribution by Area,[a] 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak	54	325	127	465	119	225
(Q)	2.5[b]	9.7	3.5	8.6	2.8	3.9
Naknek drainages -	808	614	609	1,550	1,620	1,158
Ak. Pen.	37.0	18.3	16.9	28.5	38.6	20.0
(R)						
Kvichak R.	826	1,438	873	1,421	1,112	1,749
drainages	37.8	42.9	24.3	26.1	26.5	30.3
(S)						
Nushagak	496	976	1,990	1,997	1,350	2,645
(T)	22.7	29.1	55.3	36.8	32.1	45.8
Total	2,184	3,353	3,599	5,433	4,201	5,777

Sources: Mills 1979-80.

a ADF&G sport fish harvest study postal survey areas.

b Percentage contribution to annual harvest total.

Table 84. Southwest Region Sport Chinook Salmon Harvest by Area[a] and Fishery, 1977-82

Area	1977[b]	1978[b]	1979[b]	1980[b]	1981	1982
Kodiak (Area Q)						
Salt water:						
Boat	9	0	10	60	86	73
Shoreline	25	12	88	0	108	52
Saltwater total	34	12	98	60	194	125
Fresh water:						
Buskin River	0	0	0	0	0	0
Pasagshak River	0	0	0	0	22	63
Karluk River, @	@ All Other @	@ @	*[c]	*	*	377
lagoon @		@				
Other streams @	449	338 @	654	267	508	63
Karluk lake @		@	*	*	*	419
Roadside lakes @		@	0	0	0	0
Other lakes @	@Waters Combined@	@	0	0	0	0
Freshwater total	449	338	654	267	530	922
Subtotal	483	350	752	327	724	1,047
Naknek drainages - AK. Peninsula (Area R)						
Salt water:						
Cold Bay area	*	*	*	*	*	42
Adak area	*	*	*	*	*	272
Boat - other areas	*	*	*	*	11[d]	0
Shoreline - other areas	*	*	*	*	0[e]	0
Saltwater total	*	*	*	*	11	314
Fresh water:						
Cold Bay area	*	*	*	*	*	0
Naknek River & tributaries	1,005	2,628	2,264	2,729	1,361	1,813
Adak area	*	*	*	*	*	0
Naknek Lake	0	0	0	0	0	0
Brooks River	0	0	0	0	0	0
Ugashik system	0	0	0	0	0	0
Becharof system	4	0	0	0	0	0
Others	396	221	346	344	281	84
Freshwater total	1,405	2,849	2,610	3,073	1,642	1,897
Subtotal	1,405	2,849	2,610	3,073	1,653	2,211

(continued)

Table 84 (continued).

Area	1977[b]	1978[b]	1979[b]	1980[b]	1981	1982
Kvichak River						
Drainages (Area S)						
Kvichak River	9	210	10	129	32	168
Lower Talarik Cr.	0	0	0	0	0	0
Copper River	0	0	0	0	0	0
Gibralter River	0	0	0	0	0	0
Newhalen River	0	0	0	0	0	0
Alagnak (Branch) R.	*	*	*	*	65	115
Lake Clark area	0	0	0	0	0	0
Others	234	12	78	52	0	0
Subtotal	243	222	88	181	97	283
Nushagak (Area T)						
Nushagak River system	402	151	312	611	540	870
Wood River Lakes system	0	0	0	0	0	0
Tikchik-Nuyakuk lakes system	0	0	0	0	0	0
Togiak River system	62	35	78	34	0	126
Mulchatna River	521	291	342	146	97	231
Chilikadrotna R.	*	*	*	*	*	21
Others	100	384	68	129	0	314
Subtotal	1,085	861	800	920	637	1,562
Grand total	3,216	4,282	4,250	4,501	3,111	5,103

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Harvest data for 1977-1980 include "small" chinook salmon (less than 20" in Area Q; less than 28" in Areas R,S,T). For 1981 and 1982 "small" chinook salmon harvest see table 85.

c Asterik (*) indicates data not available.

d Boat - all areas.

e Shoreline - all areas.

Table 85. Southwest Region Sport "Small" Chinook Salmon[a] Harvest by Area[b] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)	*[c]	*	*	*		
Salt water:						
Boat					0	0
Shoreline					0	42
Saltwater total					0	42
Fresh water:						
Buskin River					0	0
Pasagshak River					22	31
Karluk River, lagoon					*	0
Other streams					43	0
Karluk Lake					*	0
Roadside lakes					0	0
Other lakes					0	0
Freshwater total					65	31
Subtotal	*	*	*	*	65	73
Naknek Drainages - AK. Peninsula (Area R)	*	*	*	*		
Salt water:						
Cold Bay area					*	42
Adak area					*	859
Boat - other areas					32[d]	31
Shoreline - other areas					86[e]	105
Saltwater total					118	1,037
Fresh water:						
Cold Bay area					*	0
Naknek River & tributaries					1,220	1,451
Adak area					*	0
Naknek Lake					0	0
Brooks River					0	0
Ugashik system					0	0
Becharof system					0	0
Others					65	21
Freshwater total					1,285	1,472
Subtotal	*	*	*	*	1,403	2,509

(continued)

Table 85 (continued).

Area	1977	1978	1979	1980	1981	1982
Kvichak River Drainages (Area S)	*[c]	*	*	*		
Kvichak River					32	84
Lower Talarik Cr.					0	0
Copper River					0	0
Gibralter River					0	0
Newhalen River					0	0
Alagnak (Branch) R.					32	105
Lake Clark area					0	0
Others					0	0
Subtotal	*	*	*	*	64	189
Nushagak (Area T)	*	*	*	*		
Nushagak River system					389	566
Wood River Lakes system					0	0
Tichik-Nuyakuk lakes system					0	0
Togiak River system					0	105
Mulchatna River					194	136
Chilikadrotna R.					*	0
Others					0	0
Subtotal					583	807
Grand total	*	*	*	*	2,115	3,578

Sources: Mills 1977-82.

a King salmon less than 20" in Area Q; less than 28" in Areas R,S,T.

b ADF&G sport fish harvest study postal survey areas.

c Asterik (*) indicates data not available ("small" chinook salmon harvest prior to 1981 was not estimated). See table 84 for chinook salmon harvest prior to 1981.

d Boat - all areas.

e Shoreline - all areas.

Table 86. Southwest Region Sport Coho Salmon Harvest by Area[a] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)						
Salt water:						
Boat	440	541	1,335	1,774	2,873	3,982
Shoreline	732	892	2,271	3,668	1,576	2,630
Saltwater total	1,172	1,433	3,606	5,442	4,449	6,612
Fresh water:						
Buskin River	890	1,018	2,870	2,643	2,269	2,431
Pasagshak River	1,169	1,043	2,409	2,480	1,015	1,100
Karluk River, @	@ All	Other @ @	@ *[b]	*	*	451
lagoon @			@			
Other streams @	1,485	1,433	@ 2,346	2,075	2,592	2,557
Karluk lake @			@ *	*	*	0
Roadside lakes @			@ 136	52	108	42
Other lakes @	@Waters	Combined@	@ 155	0	151	136
Freshwater total	3,544	3,494	7,916	7,250	6,135	6,717
Subtotal	4,716	4,927	11,522	12,692	10,584	13,329
Naknek Drainages - AK. Peninsula (Area R)						
Salt water:						
Cold Bay area	*	*	*	*	*	31
Adak area	*	*	*	*	*	272
Boat - other areas	*	*	*	*	205[c]	10
Shoreline - other areas	*	*	*	*	270[d]	178
Saltwater total	*	*	*	*	475	491
Fresh water:						
Cold Bay area	*	*	*	*	*	398
Naknek River & tributaries	297	646	300	818	1,156	1,676
Adak area	*	*	*	*	*	21
Naknek Lake	0	0	0	0	0	0
Brooks River	0	0	0	0	0	0
Ugashik system	26	163	125	17	87	314
Becharof system	138	0	0	155	65	10
Others	907	1,068	899	1,171	637	367
Freshwater total	1,368	1,877	1,324	2,161	1,945	2,786
Subtotal	1,368	1,877	1,324	2,161	2,420	3,277

(continued)

Table 86 (continued).

Area	1977	1978	1979	1980	1981	1982
Kvichak River Drainage (Area S)						
Kvichak River	86	38	150	258	65	42
Lower Talarik Cr.	5	0	0	0	0	0
Copper River	0	0	0	0	0	0
Gibralter River	0	0	0	0	0	0
Newhalen River	0	0	0	0	0	0
Alagnak (Branch) R.	*	*	*	*	400	422
Lake Clark area	0	0	0	0	0	0
Others	90	38	75	456	0	21
Subtotal	190	76	225	714	465	485
Nushagak (Area T)						
Nushagak River	65	126	212	379	216	451
Wood River Lakes system	61	25	25	43	22	52
Tikchik-Nuyakuk lakes system	93	151	0	43	0	0
Togiak River system	114	214	300	258	119	524
Mulchatna River	90	113	0	129	173	52
Chilikadrotna R.	*	*	*	*	*	0
Others	164	0	75	34	43	10
Subtotal	587	629	612	886	573	1,089
Grand total	6,861	7,509	13,683	16,453	14,042	18,180

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Asterik (*) indicates data not available.

c Boat - all areas.

d Shoreline - all areas.

Table 87. Southwest Region Sport Sockeye Salmon Harvest by Area[a] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)						
Salt water:						
Boat	20	338	63	241	140	220
Shoreline	82	141	267	568	529	859
Saltwater total	102	479	330	809	669	1,079
Fresh water:						
Buskin River	228	493	424	388	173	304
Pasagshak River	176	85	236	284	205	199
Karluk River, lagoon @	@ All Other @	@	@ *[b]	*	*	178
Other streams @	749	719	@ 1,289	654	443	586
Karluk Lake @			@ *	*	*	126
Roadside lakes @			@ 31	0	0	26
Other lakes @	@Waters	Combined@	@ 126	43	130	557
Freshwater total	1,153	1,297	2,106	1,369	951	1,976
Subtotal	1,255	1,776	2,436	2,178	1,620	3,055
Naknek Drainages - Ak. Peninsula (Area R)						
Salt water:						
Cold Bay area	*	*	*	*	*	0
Adak area	*	*	*	*	*	650
Boat - other areas	*	*	*	*	281[c]	42
Shoreline - other areas	*	*	*	*	713[d]	366
Saltwater total	*	*	*	*	994	1,058
Fresh water:						
Cold Bay area	*	*	*	*	*	126
Naknek River & tributaries	78	345	236	542	184	534
Adak area	*	*	*	*	*	94
Naknek Lake	165	42	299	112	140	73
Brooks River	135	113	79	121	43	157
Ugashik system	213	127	189	379	11	126
Becharof system	144	56	31	34	0	42
Others	263	211	1,022	1,876	1,976	10
Freshwater total	998	894	1,856	3,064	2,354	1,162
Subtotal	998	894	1,856	3,064	3,348	2,220

(continued)

Table 87 (continued).

Area	1977	1978	1979	1980	1981	1982
Kvichak River Drainages (Area S)						
Kvichak River	583	380	283	654	400	639
Lower Talarik Cr.	58	0	47	0	22	0
Copper River	62	183	252	122	281	1,038
Gibralter River	8	113	0	0	22	0
Newhalen River	805	1,479	1,163	715	1,490	1,786
Alagnak (Branch) R.	*	*	*	*	11	0
Lake Clark area	420	648	1,022	155	292	220
Others	330	254	676	60	108	189
Subtotal	2,266	3,057	3,443	1,706	2,626	3,872
Nushagak (Area T)						
Nushagak River system	94	310	204	60	140	796
Wood River Lakes system	129	211	110	112	270	461
Tikchik-Nuyakuk lakes system	16	99	16	34	65	105
Togiak River system	14	183	393	69	108	241
Mulchatna River	280	56	79	17	0	199
Chilikadrotna R.	*	*	*	*	*	0
Others	40	70	16	43	76	10
Subtotal	573	929	818	335	659	1,812
Grand total	5,092	6,656	8,553	7,283	8,253	10,959

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Asterik (*) indicates data not available.

c Boat - all areas.

d Shoreline - all areas.

Table 88. Southwest Region Sport Pink Salmon Harvest by Area[a] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)						
Salt water:						
Boat	510	1,269	1,345	1,533	562	2,179
Shoreline	4,564	6,424	7,508	6,690	4,115	5,974
Saltwater total	5,074	7,693	8,853	8,223	4,677	8,153
Fresh water:						
Buskin River	3,868	4,752	4,036	6,122	3,856	7,357
Pasagshak River	1,423	1,006	1,173	1,731	713	94
Karluk River, @	@ All Other @	@	@ *[b]	*	*	38
lagoon @			@			
Other streams @	4,154	4,288	@ 1,809	2,893	3,013	3,030
Karluk Lake @			@ *	*	*	0
Roadside lakes @			@ 0	0	0	178
Other lakes @	@Waters	Combined@	@ 0	0	0	0
Freshwater total	9,445	10,046	7,018	10,746	7,582	10,697
Subtotal	14,519	17,739	15,871	18,969	12,259	18,850
Naknek Drainages - Ak. Peninsula (Area R)						
Salt water:						
Cold Bay area	*	*	*	*	*	105
Adak area	*	*	*	*	*	6,571
Boat - other areas	*	*	*	*	367[c]	10
Shoreline - other areas	*	*	*	*	6,188[d]	1,897
Saltwater total	*	*	*	*	6,555	8,583
Fresh water:						
Cold Bay area	*	*	*	*	*	702
Naknek River & tributaries	0	1,723	0	818	0	859
Adak area	*	*	*	*	*	2,170
Naknek Lake	0	0	0	0	0	0
Brooks River	0	0	0	0	0	0
Ugashik system	0	356	0	34	0	0
Becharof system	0	77	0	17	0	0
Others	115	635	3,827	11,124	1,836	157
Freshwater total	115	2,791	3,827	11,993	1,836	3,888
Subtotal	115	2,791	3,827	11,993	8,391	12,471

(continued)

Table 88 (continued).

Area	1977	1978	1979	1980	1981	1982
Kvichak River Drainages (Area S)						
Kvichak River	0	0	0	0	0	0
Lower Talarik Cr.	0	0	0	0	0	0
Copper River	0	31	0	0	0	0
Gibralter River	0	0	0	0	0	0
Newhalen River	0	0	0	0	0	0
Alagnak (Branch) R.	*	*	*	*	0	0
Lake Clark area	0	0	0	0	0	0
Others	0	0	0	0	0	0
Subtotal	0	31	0	0	0	0
Nushagak (Area T)						
Nushagak River system	0	836	0	258	0	73
Wood River Lakes system	0	31	0	0	0	0
Tikchik-Nuyakuk lakes system	0	232	0	60	0	0
Togiak River system	0	0	0	112	0	210
Mulchatna River	0	0	0	0	0	0
Chilikadrotna R.	*	*	*	*	*	0
Others	0	77	0	0	0	0
Subtotal	0	1,176	0	430	0	283
Grand total	14,634	21,737	19,698	31,392	20,650	31,604

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Asterik (*) indicates data not available.

c Boat - all areas.

d Shoreline - all areas.

Table 89. Southwest Region Sport Chum Salmon Harvest by Area[a] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)						
<u>Salt water</u>:						
Boat	158	39	0	26	43	63
Shoreline	475	585	382	379	108	576
Saltwater total	633	624	382	405	151	639
<u>Fresh water</u>:						
Buskin River	0	0	0	0	0	0
Pasagshak River	42	0	9	17	0	63
Karluk River, lagoon @ @	@ All Other @	@ @ @	*[b]	*	*	0
Other streams @	970	663 @	109	103	486	622
Karluk Lake @		@	*	*	*	0
Roadside lakes @		@	0	0	0	0
Other lakes @	@Waters Combined@	@	0	0	0	0
Freshwater total	1,012	663	118	120	486	685
Subtotal	1,645	1,287	500	525	637	1,324
Naknek Drainages - Ak. Peninsula (Area R)						
<u>Salt water</u>:						
Cold Bay area	*	*	*	*	*	0
Adak Area	*	*	*	*	*	0
Boat - other areas	*	*	*	*	11[c]	0
Shoreline - other areas	*	*	*	*	324[d]	472
Saltwater total	*	*	*	*	335	472
<u>Fresh water</u>:						
Cold Bay area	*	*	*	*	*	776
Naknek River & tributaries	78	302	18	86	54	126
Adak area	*	*	*	*	*	0
Naknek Lake	0	0	0	0	0	0
Brooks River	0	0	0	0	0	0
Ugashik system	0	20	0	0	0	0
Becharof system	0	78	0	0	0	0
Others	148	293	91	792	194	0
Freshwater total	226	693	109	878	248	902
Subtotal	226	693	109	878	583	1,374

(continued)

Table 89 (continued).

Area	1977	1978	1979	1980	1981	1982
Kvichak River Drainages (Area S)						
Kvichak River	0	0	9	9	0	0
Lower Talarik Cr.	0	0	0	0	0	0
Copper River	0	0	0	0	0	0
Gibralter River	0	0	0	0	0	0
Newhalen River	0	0	0	0	0	0
Alagnak (Branch) R.	*	*	*	*	108	0
Lake Clark area	0	117	0	9	0	0
Others	76	39	0	17	0	31
Subtotal	76	156	9	35	108	31
Nushagak (Area T)						
Nushagak River system	24	117	64	17	130	293
Wood River Lakes system	0	0	0	0	0	0
Tikchik-Nuyakuk lakes system	0	39	0	0	11	10
Togiak River system	0	59	36	17	22	168
Mulchatna River	46	0	55	9	54	178
Chilikadrotna R.	*	*	*	*	*	0
Others	0	0	0	0	0	0
Subtotal	70	215	155	43	217	649
Grand total	2,017	2,351	773	1,481	1,545	3,378

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Asterik (*) indicates data not available.

c Boat - all areas.

d Shoreline - all areas.

Table 90. Southwest Region Sport Dolly Varden/Arctic Char Harvest by Area[a] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)						
Salt water:						
Boat	371	127	800	353	313	681
Shoreline	713	2,703	4,481	2,626	2,128	5,250
Saltwater total	1,084	2,830	5,281	2,979	2,441	5,931
Fresh water:						
Buskin River	10,353	8,003	15,150	9,376	9,159	10,167
Pasagshak River	617	443	982	1,162	475	692
Karluk River, @	@ All	Other @ @	@ *[b]	*	*	147
lagoon @			@			
Other streams @	2,482	4,529	@ 2,172	4,770	6,178	4,684
Karluk Lake @			@ *	*	*	105
Roadside lakes @			@ 173	1,300	205	738
Other lakes @	@Waters	Combined@	@ 1,663	1,076	1,058	1,307
Freshwater total	13,452	12,975	20,140	17,684	17,075	17,840
Subtotal	14,536	15,805	25,421	20,663	19,516	23,771
Naknek Drainages - Ak. Peninsula (Area R)						
Salt water:						
Cold Bay area	*	*	*	*	*	545
Adak area	*	*	*	*	*	891
Boat - other areas	*	*	*	*	475[c]	52
Shoreline - Other areas	*	*	*	*	2,927[d]	3,207
Saltwater total	*	*	*	*	3,402	4,695
Fresh water:						
Cold Bay area	*	*	*	*	*	2,243
Naknek River & tributaries	195	127	527	1,679	1,609	786
Adak area	*	*	*	*	*	2,474
Naknek Lake	9	36	18	43	140	94
Brooks River	71	90	0	9	0	0
Ugashik system	51	389	200	164	270	304
Becharof system	76	289	18	129	162	31
Others	1,140	1,139	7,481	8,877	8,132	1,446
Freshwater total	1,542	2,070	8,244	10,901	10,313	7,378
Subtotal	1,542	2,070	8,244	10,901	13,715	12,073

(continued)

Table 90 (continued).

Area	1977	1978	1979	1980	1981	1982
Kvichik River Drainages (Area S)						
Kvichak River	165	154	55	60	43	42
Lower Talarik Cr.	6	9	9	69	65	0
Copper River	6	9	18	43	22	10
Gibralter River	5	0	0	0	0	0
Newhalen River	85	163	182	405	54	241
Alagnak (Branch) R.	*	*	*	*	86	0
Lake Clark area	25	9	136	77	173	859
Others	224	18	409	645	432	514
Subtotal	516	362	809	1,299	875	1,666
Nushagak (Area T)						
Nushagak River system	23	45	136	206	151	231
Wood River Lakes system	435	905	685	646	529	1,048
Tikchik-Nuyakuk lakes system	34	217	145	232	713	272
Togiak River system	133	72	236	560	345	671
Mulchatna River	102	217	100	52	119	52
Chilikadrotna R.	*	*	*	*	*	52
Others	23	54	282	103	0	262
Subtotal	750	1,510	1,584	1,799	1,857	2,588
Grand total	17,344	19,747	36,058	34,662	35,963	40,098

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Asterik (*) indicates data not available.

c Boat - all areas.

d Shoreline - all areas.

Table 91. Southwest Region Sport Steelhead Trout Harvest by Area[a] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)						
Salt water:						
Boat	0	0	0	0	0	0
Shoreline	3	0	9	17	0	0
Saltwater total	3	0	9	17	0	0
Fresh water:						
Buskin River	0	0	0	0	0	0
Pasagshak River	0	0	0	0	0	0
Karluk River,	@ @ All Other	@ @ @	*[b]	*	*	90
lagoon	@	@				
Other streams	@ 229	162 @	309	654	302	142
Karluk Lake	@	@	*	*	*	0
Roadside lakes	@	@	0	0	0	0
Other lakes	@ @Waters	Combined@ @	0	0	11	26
Freshwater total	229	162	309	654	313	258
Grand total	232	162	318	671	313	258

Sources: Mills 1977-83.

a ADF&G sport fish harvest study postal survey area. Steelhead do not occur in the Naknek, Kvichak, or Nushagak river drainages. No effort or harvest data is available for the few Alaska Peninsula streams known to contain steelhead; however, harvest is presumed to be relatively insignificant.

b Asterik (*) indicates data not available.

Table 92. Southwest Region Sport Rainbow Trout Harvest by Area[a] and Fishery, 1977-82

Area	1977	1978	1979	1980	1981	1982
Kodiak (Area Q)						
Buskin River	0	0	0	0	0	0
Pasagshak River	0	0	0	0	0	0
Karluk River, lagoon	@ @ All Other	@ @ @	*[b]	*	*	0
Other streams	@	@	136	1,317	227	298
Karluk Lake	@	@	*	*	*	0
Roadside lakes	@ 1,472	994 @	300	431	270	1,775
Other lakes	@ @Waters	Combined@ @	536	775	389	1,307
Subtotal	1,472	994	972	2,523	886	3,380
Naknek Drainages - Ak. Peninsula (Area R)						
Cold Bay area	*	*	*	*	*	42
Naknek River & tributaries	586	371	954	1,705	2,138	975
Adak area	*	*	*	*	*	0
Naknek Lake	37	63	109	198	216	555
Brooks River	173	181	227	224	227	42
Ugashik system	0	0	0	0	0	0
Becharof system	0	0	0	0	0	0
Others	110	488	118	654	238	10
Subtotal	906	1,103	1,408	2,781	2,819	1,624
Kvichak River Drainages (Area S)						
Kvichak River	672	226	355	637	421	398
Lower Talarik Cr.	57	81	91	69	97	84
Copper River	14	325	55	34	119	514
Gibralter River	62	127	82	17	184	210
Newhalen River	122	190	255	629	250	430
Alagnak (Branch) R.	*	*	*	*	76	157
Lake Clark area	0	0	0	0	0	0
Others	165	108	255	34	529	283
Subtotal	1,092	1,057	1,093	1,420	1,676	2,076

(continued)

Table 92 (continued).

Area	1977	1978	1979	1980	1981	1982
Nushagak (Area T)						
Nushagak River system	31	108	191	387	670	252
Wood River Lakes system	252	217	409	258	475	461
Tikchik-Nuyakuk lake system	62	145	136	232	216	220
Togiak River system	102	54	82	215	130	168
Mulchatna River	116	497	236	189	281	409
Chilikadrotna R.	*	*	*	*	*	105
Others	31	371	91	77	0	73
Subtotal	594	1,392	1,145	1,358	1,772	1,688
Grand total	4,064	4,546	4,618	8,082	7,153	8,768

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Asterik (*) indicates data not available.

Table 93. Southwest Region Sport Arctic Grayling Harvest by Area[a] and Fishery, 1977-82

Area		1977	1978		1979	1980	1981	1982
Kodiak (Area Q)								
Buskin River		0	0		0	0	0	0
Pasagshak River		0	0		0	0	0	0
Karluk River, lagoon	@ @	@ All Other @	@	@ @	*[b]	*	*	0
Other streams	@			@	0	0	0	31
Karluk Lake	@			@	*	*	*	0
Roadside lakes	@	54	325	@	127	465	119	194
Other lakes	@	Waters	Combined@	@	0	0	0	0
Subtotal		54	325		127	465	119	225
Naknek Drainages - Ak. Peninsula (Area R)								
Cold Bay area		*	*		*	*	*	0
Naknek River & tributaries		484	398		300	1,128	799	796
Adak area		*	*		*	*	*	0
Naknek Lake		17	0		18	0	0	105
Brooks River		50	63		73	26	43	0
Ugashik system		141	72		145	215	195	142
Becharof system		59	81		55	43	140	105
Others		57	0		18	138	443	10
Subtotal		808	614		609	1,550	1,620	1,158
Kvichak River Drainages (Area S)								
Kvichak River		361	579		136	207	162	136
Lower Talarik Cr.		60	36		18	86	65	63
Copper River		0	0		0	0	0	73
Gibralter River		0	0		118	0	0	0
Newhalen River		88	172		164	207	54	576
Alagnak (Branch) R.		*	*		*	*	119	52
Lake Clark area		275	606		373	301	626	377
Others		42	45		64	620	86	472
Subtotal		826	1,438		873	1,421	1,112	1,749

(continued)

Table 93 (continued).

Area	1977	1978	1979	1980	1981	1982
Nushagak (Area T)						
Nushagak River system	34	72	345	95	238	283
Wood River Lakes system	201	199	527	525	259	587
Tikchik-Nuyakuk lakes system	108	199	318	775	400	84
Togiak River system	26	18	200	241	43	31
Mulchatna River	59	443	227	103	324	1,373
Chilikadrotna R.	*	*	*	*	*	130
Others	68	45	373	258	86	157
Subtotal	496	976	1,990	1,997	1,350	2,645
Grand total	2,184	3,353	3,599	5,433	4,201	5,777

Sources: Mills 1979-83.

a ADF&G sport fish harvest study postal survey areas.

b Asterik (*) indicates data not available.

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Appendix I. Bristol Bay Sportfishing Guides, Lodges, and Air Charter Services

This directory is a list of most sportfishing guides, lodges, and air taxis serving Bristol Bay. It does not constitute endorsement by the Division of Sport Fish or the State of Alaska. Additional information and prices may be obtained by writing directly to these operators. Area code (907) for Alaska phone numbers.

Lodge and Address	Location	Services
ALAGNAK LODGE Vin Roccanova 4117 Hillcrest Way Sacramento, California 95821 (906) 487-6198	Branch River	Private lodge with guided fishing river boats on Branch River; 21 guests; fly fishing and drift fishing with common gear
ALASKA FISHING ADVENTURES Barry Johnson 1334 Bannister Drive Anchorage, Alaska 99504	Tikchik, Nuyakuk, and Nushagak rivers	Private tent camp providing float trips on indicated rivers
ALASKA FLOAT TRIP ADVENTURES P.O. Box 104309 Anchorage, Alaska 99510 276-3081	Anchorage	Float trips in Bristol Bay, including air fare and rafts, direct to several rivers
ALASKA NORTH GUIDING Dennis Reiner P.O. Box 55454 North Pole, Alaska 99705 Between 12/10 - 2/5 (717) 453-9794	Mulchatna River, Lake Iliamna Area	Tent camps and rafting in Lake Iliamna - Mulchatna area
ALASKA OUTDOOR SERVICES Chick Kishbaugh P.O. Box 1066 Soldotna, Alaska 99669 262-4589	Bristol Bay	Guided or unguided fishing trips
ALASKA PENINSULA LODGE Bob Cusack P.O. Box 331 King Salmon, Alaska 99613	Branch River	Private lodge with guided fly-out fishing in Bristol Bay area
ALASKA RAFT ADVENTURES Gary Kroll 9301 Strathmore Anchorage, Alaska 99502 248-2489	Anchorage	Floats various rivers in Bristol Bay; hook and release encouraged

Lodge and Address	Location	Services
ALASKA RAINBOW LODGE Ron Hayes P.O. Box 101711 Anchorage, Alaska 99510 338-6606	Kvichak River	Private lodge offering fly-out fishing in the entire Bristol Bay area
ALASKA RIVER AND SKI TOURS 1831 Kuskokwim Street Anchorage, Alaska 99508	Anchorage	Float trips on rivers in Western Alaska
ALASKA RIVER SAFARIS Ron Hyde 4909 Rollins Anchorage, Alaska 99504 333-2860	Goodnews River	Private lodge with deluxe tent accommodations, meals, fly-out fishing, and float trips
ALASKA SAFARI, INC. Valhalla Lodge P.O. Box 6583 Anchorage, Alaska 99502 276-3569	Between Lake Iliamna and Lake Clark	Private lodge offering guide service for up to eight guests; river boats, aircraft, and float boats available for guests; fishing in Iliamna, Tikchik, and Lake Clark drainages
ALASKA TROPHY SAFARIS Dennis Harms P.O. Box 71 Chugiak, Alaska 99567	Mulchatna River	Private fishing camp with river boat, motors, and tent camp offering guided service on Mulchatna River
ALASKA WEST SPORTFISHING 2291 E. Old Day Creek Road Sedro Woolley, Washington 98284 (206) 856-1667	Kanektok River	Exclusive guided angling on Kanektok River
ALASKA WILDERNESS ADVENTURES Hugh Glass Backpacking Company P.O. Box 10-796		Float trips throughout Bristol Bay; complete outfitting; catch and release emphasized
ALASKA WILDERNESS LODGE Mark and Sandy Lang 7320 6th Avenue, Suite #5 98406 (206) 564-6682	¼ mi north of Port Alsworth on Lake Clark also operating guided float trips	Private sportfishing lodge fishing the Iliamna, Lake Clark, Wood River, and Tikchik area; Tacoma, Washington
ALASKA WILDERNESS RIVER TRIPS John Ginsburg P.O. Box 1143 Eagle River, Alaska 99577 694-2194	Chilikadrotna-Mulchatna rivers	Float trips in Mulchatna and Chilikadrotna rivers

Lodge and Address	Location	Services
BEAR LAKE LODGE Don Johnson P.O. Box 152 Kenai, Alaska 99611	15 mi N.E. of Port Moller	Private lodge offering fishing, beach combing, photography, and sightseeing on lower Alaska Peninsula
BECHEROF LODGE Lorrie Bartlett P.O. Box 104 Egegik, Alaska 99579	Egegik River	Private lodge fishing the Becharof drainage exclusively, also fly-out fishing, capacity of 12 people; moose and caribou hunting in the fall
BRISTOL BAY LODGE Ron McMillan P.O. Box 6349AM Anchorage, Alaska 99502 248-1714	Lake Aleknagik (Wood River)	Private lodge offering daily fly-outs, guides, boats, float trips, and wilderness overnight camping in the Wood River-Tikchik Lakes area
CHULITNA LODGE Dan Rodey P.O. Box 6325 Anchorage, Alaska 99502 243-1595	Lake Clark	Fully equipped fishing camps, lodging, and facilities for fly-out fishing, photography, float trips, and scenic tours
COPPER RIVER FLY FISHING LODGE Bob and Doris Walker Star Route 1, Box 260	South side of Lake Iliamna	Private lodge with guided fishing trips on Copper River and surrounding area
CREATIVE ANGLER INTERNATIONAL TRAVEL P.O. Box 545 Kirkland, Washington 98033 (206) 822-1282	Branch River	Fishing on Branch River
CRY OF THE LOON LODGE Bill Wright Alaska Campout Adventures 938 P Street Anchorage, Alaska 99501 279-0919, 333-7838 595-1350 (summer)	Nonvianuk Lake	Private lodge offering fishing and float trips on Branch River and in Lake Clark area; jet boat and plane available
EKWOK LODGE Jeff O. McIver P.O. Box 196 Dillingham, Alaska 99576 842-5218	Ekwok, Alaska	Private lodge with guided boat boat service on the Nushagak River and local tributaries; lodge capacity 10 people

Lodge and Address	Location	Services
FISHING UNLIMITED Ken Owsichek P.O. Box 6301 Anchorage, Alaska 99502 243-5899	Lake Clark	Private, deluxe lodge with daily fly-out fishing trips in Bristol Bay area, plus float trips and use of river boats
GOLDEN HORN LODGE Bud Hodson P.O. Box 6748G Anchorage, Alaska 99502 243-1455	Wood River system (50 mi north of Dillingham)	Private lodge with daily fly-out fishing to remote waters in the Wood River-Tikchik Lakes region
ILIAMNA LAKE LODGE Gregory J. Galik 921 W. 6th Avenue, Suite 235 Anchorage, Alaska 99501 274-1541	Lake Iliamna	Private lodge offering daily fly-out fishing in Bristol Bay
ILIAMNA RIVER OUTFITTERS Don Knighton P.O. Box 1711 Anchorage, Alaska 99510 272-0051	Iliamna River	Private lodge with daily fly-out fishing trips in Lake Iliamna area, plus river boats on Iliamna River
ILIAMNA SAFARIS P.O. Box 6366 Anchorage, Alaska 99502 or P.O. Box 43 Iliamna, Alaska 99606	Iliamna, Alaska	Private lodge with fly-out fishing in Lake Iliamna and Tikchik Lakes areas
ILIASKA LODGE Ted Gerken P.O. Box 28 Iliamna, Alaska 99606 571-1221	Iliamna, Alaska	Private lodge, fishing Katmai and Iliamna area, specializing in fly fishing
ISLAND LODGE Glen VanValin Lake Clark Port Alsworth, Alaska 99654 345-1160	Lake Clark	Private lodge with daily fly-out fishing and float trips in Bristol Bay area
JAKES' ALASKA WILDERNESS OUTFITTERS John Gaudet P.O. Box 104179 Anchorage, Alaska 99510 277-6297	Anchorage	Tent camp offering custom fishing float trips throughout Bristol Bay

Lodge and Address	Location	Services
KATMAI GUIDE SERVICE Joseph R. Klutsch P.O. Box 313 King Salmon, Alaska 99613 246-3030	King Salmon	Fishing on Naknek River and Lake
KATMAI FISH CAMP Jim Maxwell P.O. Box 1340 Vancouver, Washington 98666 (206) 256-2483	Alagnak River	Fishing on the Alagnak River
KATMAILAND, INC. Ray Petersen 455 H. Street Anchorage, Alaska 99501 277-4314 or 277-5149		
1) Kulik Lodge	Nonvianuk Lake	Private lodge, fly-out fishing, with meals, guides, and boats
2) Grosvenor Lake Camp	Coville Lake	Same as above; maximum eight persons
3) Brooks Lodge	Naknek Lake	Same as above; in addition to fishing, canoes, and daily bus travel to the Valley of 10,000 Smokes available; lodge capacity is 45 people
KING SALMON LODGE Mike Cusack, M.D. King Salmon, Alaska 99613 246-3452	King Salmon	Private lodge with fishing on Naknek River
KOKHANOK LODGE Mike and Bud Branham Box 6-128 Annex Anchorage, Alaska 99502 344-7022	East shore of Lake Iliamna	Private lodge with a maximum of eight guests, personal service only
KVICHAK CLUB Glen Collins Global Travel 825 W. Northern Lights Anchorage, Alaska 99503 274-8591	Igiugig and Copper River on Lake Iliamna	Private lodge with fly-out fishing; fly fishing only; catch and release encouraged

Lodge and Address	Location	Services
KVICHAK LODGE Mike or Claude McDowell 403 East 24th Street Anchorage, Alaska 99503 272-9925	Igiugig (outlet of Lake Iliamna)	Private lodge provides meals, guides, boats, fishing tackle
LAKE CLARK LODGE Daniel J. Rodey 7320 6th Avenue Suite #5 Tacoma, Washington 98406 (206) 564-6682	¼ mi north of Port Alsworth on Lake Clark	Private lodge with fishing in the the Iliamna, Lake Clark, Wood River, and Tikchik Lakes area
KOKSETNA LODGE P.O. Box 69 Iliamna, Alaska 99606 Radio-phone contact through TRIDENT in Anchorage. 345-1160, ask for Hornbergers, WHJ-67-Chulitna. If no answer leave your name, phone number, and the Alaska time to return your call.	Lake Clark and Chulitna River	Private lodge providing wilderness experiences that include sport fishing, Lake Clark scenic sport fishing trips, fly-out fishing, and wilderness photography workshops
LAKESIDE LODGE Bill Johnson Port Alsworth, Alaska 99653	Lake Clark	Private lodge offering fishing in Lake Clark/Iliamna area
LAKE VIEW LODGE Tim and Nancy LaPorte P.O. Box 109 Iliamna, Alaska 99606 571-1248	Iliamna	Private lodge offering fly-out fishing in Bristol Bay
KING KO INN P.O. Box 346 King Salmon, Alaska 99613 246-3377	King Salmon	Hotel accommodations with fishing locally on the Naknek River system, Bay of Islands, Branch River, and Featherly Creek
MT. PEULIK LODGE Gerald Yeiter P.O. Box 157 Naknek, Alaska 99633	Ugashik Narrows	Private lodge offering fishing at Ugashik Narrows and outlet, Ruth Lake, King Salmon River, and Katmai National Park
MORRISON'S GUIDE SERVICE Mike Morrison P.O. Box 161 King Salmon, Alaska 99613 246-3066	King Salmon	Fishing on Naknek Lake and River; boats and gear furnished

Lodge and Address	Location	Services
NAKNEK MARINA Carl Fundeen P.O. Box 167 King Salmon, Alaska 99613 246-3491	King Salmon	Boat rentals and guiding services on Naknek River
NEWHALEN LODGE Denny Thompson and Bill Slims P.O. Box 2521 Anchorage, Alaska 99510 279-4236	Nondalton, Alaska	Private lodge with float and wheel planes, boats, and fishing guides operating in the Lake Iliamna and Katmai National Park areas
NO-SEE-UM LODGE John Holman P.O. Box 934 Palmer, Alaska 99645 745-5347	Kvichak River between Levelock, Alaska, and Igiugig, Alaska	Private lodge with guided fishing trips in Bristol Bay area
NOVA RIVER RUNNERS OF ALASKA P.O. Box 444 Eagle River, Alaska 99577 694-2750	Matanuska, Alaska	Guided float trips in Alagnak, Togiak, and Wood rivers; arrangement for other rivers can be can be made
OLE CREEK LODGE Don and Marge Haugen 506 Ketchikan Street Fairbanks, Alaska 99701 452-2421	Igiugig, Alaska	Private lodge with guided fishing trips on Kvichak River
PACIFIC COAST CHARTERS Robert Haglund P.O. Box 210337 Seattle, Washington 98102		Float trips and fishing on Branch River
PAINTER CREEK LODGE J. W. Smith SRA Box 27E Anchorage, Alaska 99507 338-2888	Painter Creek (30 mi south of Pilot Point)	Private lodge offering fishing in the Mother Goose area from June 1 - October 7
PRESTAGE SPORT FISHING LODGE John Prestage P.O. Box 213 King Salmon, Alaska 99613 246-3320	King Salmon	Private lodge providing quarters, guides, boats, and fishing tackle on Naknek River

Lodge and Address	Location	Services
RAINBOW KING LODGE Ray Loesche P.O. Box 106 Iliamna, Alaska 99606 571-1277 (summer) (509) 924-8077 (winter)	Iliamna, Alaska	Private lodge with daily fly-out fishing for all guests within a 200-mi radius
RAINBOW RIVER LODGE (Northwest Outfitters, Inc.) Chris F. Coll 5801 Arctic Blvd. Anchorage, Alaska 99502 561-8726 or 333-8654	17 mi southeast of Iliamna	Private lodge with guided fishing trips in the entire Bristol Bay area
RED QUILL LODGE Larry Brant P.O. Box 49 Iliamna, Alaska 99606 571-1215	Iliamna, Alaska	Private lodge with a capacity of 10 guests; fly-out fishing; jet boats on Branch and Newhalen Rivers
ROYAL COACHMAN LODGE Bill Martin (Summer) P.O. Box 10068 Dillingham, Alaska 99576 344-9811 (Winter) (206) 821-1435	Nuyakuk River near outlet of Tikchik Lake	Private lodge with guided fly-out fishing in Bristol Bay area
RUST'S FLYING SERVICE P.O. Box 6325 Anchorage, Alaska 99502 243-1595 or 349-1151	Iliamna area	River float trips in Bristol Bay
SEVY GUIDE SERVICE P.O. Box 1527 Sun Valley, Idaho 83353 (208) 788-3440	Alagnak River (Branch)	Float trips on Branch River; catch and release and fly fishing
TALARIK CREEK LODGE Floyd Polmateer P.O. Box 68 Iliamna, Alaska 99606 571-1214	Iliamna, Alaska	Private lodge with guided fly-out fishing in Bristol Bay area; certified air taxi also
THE FARM LODGE Glen and Patty Alsworth Port Alsworth, Alaska 99653 781-8001	Port Alsworth	Private lodge offering fly-out fishing throughout Bristol Bay

Lodge and Address	Location	Services
TIKCHIK NARROWS LODGE Bob Curtis P.O. Box 1631 Anchorage, Alaska 99510 277-8426	Tikchik Lake (75 mi north of Dillingham)	Private lodge with daily fly-out fishing in Bristol Bay and Kuskokwim drainages
TODD'S IGIUGIG LODGE Larry and Elizabeth Todd P.O. Box 87-1395 Wasilla, Alaska 99687 376-2859	Igiugig, Alaska	Private lodge at outlet of Lake Iliamna, offering guided fishing trips throughout Bristol Bay
WESTERN ALASKA SPORT FISHING, INC. Dave Egdorf P.O. Box 10142 Dillingham, Alaska 99576 842-5480	Nushagak, Mulchatna, Togiak rivers	Private tent camp providing boat fishing on indicated rivers
WILDALASKA GUIDING AND OUTFITTING 8536 Hartzell Road #32 Anchorage, Alaska 99507 349-9111/349-3988	Iliamna River	Private lodge offering fly fishing in Lake Iliamna, Lake Clark, and Katmai areas
WILD COUNTRY RIVER GUIDES, INC. Chip Marinella SRA 180-F, 12020 Timberlane Dr. Anchorage, Alaska 99502 349-9173	Iliamna area	Wilderness float fishing in the Iliamna watershed
WOOD'S ALASKA SPORT FISHING Jack Wood P.O. Box 112 King Salmon, Alaska 99613	King Salmon	Fishing on Naknek River and Lake
WOOD'S ALASKAN WILDERNESS SPORT FISHING Charles Wood P.O. Box 363 King Salmon, Alaska 99613	King Salmon	Fishing on Naknek River and Lake
WOOD RIVER LODGE 4437 Stanford Drive Fairbanks, Alaska 99701 479-0308	Agulowak River (north of Dillingham)	Private lodge offering daily fly-out fishing in the Wood-Tikchik region

Lodge and Address	Location	Services
WOOD-Z LODGE Chuck Woody P.O. Box 196 King Salmon, Alaska 99613 246-3449	King Salmon	Private lodge providing quarters, guides, meals, and boats on Naknek River

BRISTOL BAY BASED AIR TAXIS

ARMSTRONG AIR SERVICE
Richard Armstrong
P.O. Box 204, Dillingham, Alaska 99576

GREICHEN AIR SERVICE
Monty Handy
P.O. Box 61, Naknek, Alaska 99633

ILIAMNA AIR TAXI
Tim La Porte
Iliamna, Alaska 99606
571-1248

KATMAI AIR SERVICE
Sonny Petersen
King Salmon, Alaska 99613
246-3079

KING AIR SERVICE
Ed King
P.O. Box 26, Naknek, Alaska 99633
246-4414

PENINSULA AIRWAYS
Oren Seybert and George Tibbetts
King Salmon, Alaska 99613
246-3372 or 246-3373

ROY SMITH'S FLYING SERVICE
South Naknek, Alaska 99670
246-4467

SOUTHWEST AIRWAYS INC.
Joe Chuckwok
Dillingham, Alaska 99576
842-5464

YUTE AIR ALASKA, INC.
P.O. Box 180
Dillingham, Alaska 99576
842-5333

ANCHORAGE, HOMER, FAIRBANKS, AND KENAI AIR TAXIS SERVING BRISTOL BAY

LEE'S AIR SERVICE
Thomas G. Classen
P.O. Box 80507, Fairbanks, Alaska 99708

ALASKA AIR GUIDES
Don Cogger
327 E. Fireweed Lane
Anchorage, Alaska 99502
243-2680

ALASKA BUSH CARRIER, INC.
4801 Aircraft Drive, Anchorage, Alaska 99502
243-3127

ALASKA NORTH FLYING SERVICE
Bill Aregood
P.O. Box 6323, Anchorage, Alaska 99502
243-2686

ALASKA TRAVEL AIR
Dean Carrell
P.O. Box 6012, Anchorage, Alaska 99502
243-6012

BIG RED'S FLYING SERVICE, INC.
P.O. Box 6281, Anchorage, Alaska 99502
243-4376

CHARLIE ALLEN'S FLYING SERVICE
Lake Hood, Anchorage, Alaska 99502

COOK INLET AVIATION, INC.
P.O. Box 175, Homer, Alaska 99603

HOMER AIR SERVICE
P.O. Box 302, Homer, Alaska 99603

HUDSON AIR TAXI
Oren Hudson
2300 E. 5th Ave., Anchorage, Alaska 99501
272-6000

KACHEMAK AIR SERVICE
Bill DeCreft
P.O. Box 1769, Homer, Alaska 99603

KENAI AIR ALASKA, INC.
Bud Lofstedt
P.O. Box 3921, Kenai, Alaska 99611
283-7561

KETCHUM'S AIR SERVICE
2708 Aspen Drive, Anchorage, Alaska 99503
243-5525 ALASKA AIR CHARTER

P.O. Box 4-2495
Anchorage, Alaska 99509
243-6500

RUST'S FLYING SERVICE
P.O. Box 6325, Anchorage, Alaska 99502
243-1595

Razor Clam Human Use

I. SPORTFISHING

A minor razor clam sport fishery takes place on Kodiak Island (table 94). This harvest occurs primarily at Middle Bay and Buskin Beach, which are accessible on the road system (Nippes, pers. comm.; Murray, pers. comm.). Some sport clam harvest, incidental to sport hunting activities, also takes place at Driver Bay on Raspberry Island (Murray, pers. comm.). Sport clam harvest also occurs in the Tanner Head area (Murray, pers. comm.; Nippes, pers. comm.).

No sport harvest of razor clams from the Alaska Peninsula has been reported since the sport fish postal survey program began in 1977 (Mills 1979-1983). Some recreational harvest of razor clams probably does take place, however, on beaches close to villages.

Table 94. Kodiak Area Razor Clam Sport Harvest (in Numbers)

Year	Catch
1977	7,474
1978	3,028
1979	8,363
1980	11,826
1981	3,425
1982	1,944

Source: Mills 1983.

II. REFERENCES

Murray, J.B. 1983. Personal communication. Area Mgt. Biologist, ADF&G, Div. Sport Fish., Kodiak.

Nippes, W. 1983. Personal communication. Fishery Biologist, ADF&G, Div. Commer. Fish., Kodiak.

Sport Hunting

Brown Bear Human Use

I. MANAGEMENT HISTORY

Wildlife management in Alaska was formally established in 1925 when Congress created the Alaska Game Commission. Prior to 1925, protection of wildlife had been undertaken by the Departments of Treasury, Commerce, and Agriculture, and by the territorial governor. After statehood in 1959, the Alaska legislature established by statute the Department of Fish and Game.

A. Management Objectives

Currently there are 11 brown bear strategic management plans pertaining to discrete areas within the Southwest Region. Most of the region is managed for sustained opportunities to hunt brown bear under aesthetically pleasing conditions and/or to be selective in hunting brown bears. In some areas, such as in the vicinity of Cold Bay, where bear/human conflicts are a concern, one of the department's management objectives is to protect human life and property. In the vicinity of McNeil River, the primary management objective is to provide opportunities to view and photograph bears and secondarily to provide for scientific and educational study. Detailed guidelines for management areas are supplied in each strategic management plan.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

A. Southwest Region

Management problems identified for brown bear throughout the Southwest Region are as follows:

1. Well-intentioned concern of a national public may hamper effective management of the species and threatens future use by recreational hunters. One misconception is that because brown bears are threatened in one portion of their range, they are threatened in all areas. Also, some people believe that distinct, and therefore unique, subpopulations of brown bears exist that need absolute protection.
2. The eventual survival of the brown bear does not depend on the designation of vast tracts of "unspoiled wilderness." Conflicts with bears in large national parks indicate that beyond merely providing space for bears, man must come to understand bears, their requirements, behavior, and their place in ecosystems, and then apply this knowledge to land use decisions.

B. Management Plans

Management problems that have been identified in individual brown bear management plans in the Southwest Region are as follows:

1. Kvichak-Nushagak-Togiak Brown Bear Management Plan. This plan pertains to all of GMU 17 and that portion of GMU 9 lying north of Katmai National Park and north of the drainage of the Naknek River but excluding McNeil River State Game Sanctuary.

a. Oil and mineral exploratory work or development may seriously alter the wilderness nature of the area, increase access, or prove detrimental to brown bear habitat.
b. Land in private ownership or controlled by the NPS, the USFWS, or the state park system may be closed to hunting, thereby concentrating hunting on remaining public land. Concentrations of hunters would adversely affect hunting aesthetics or cause local overharvest of bear populations.
c. Segments of the hunting public may willfully ignore hunting regulations to ensure high hunter success. Overharvest of bears may result, and management objectives may become difficult to maintain.
d. Restrictions on the use of aircraft for transportation may result in a proliferation of all-terrain vehicles that would adversely affect hunting aesthetics.
e. Hunting for other game species may not be compatible with proposed management.
f. The reindeer industry, if reestablished, may lose livestock to brown bear predation. Control of brown bears may be requested by the herders, and losses of "nuisance" bears not associated with herding could endanger management objectives.
g. The area may be connected to the main state road system by road construction and/or marine highway system additions. The influx of hunters resulting from improved access would drastically alter the present hunting patterns.

2. Naknek/King Salmon Brown Bear Management Plan. This plan pertains to all drainages into the Naknek River in GMU 9 west of the Katmai National Park boundary.
   a. With additional urbanization resulting from oil development and gradual community growth due to an expanding economy, the potential for adverse bear/human interactions will increase.
   b. Additions to Katmai National Park and Preserve and land transferred to private ownership may be closed to public hunting. Increased protection would allow bear numbers to increase, with concomittent increases in problems within the communities.
   c. Harvest levels of brown bears may reduce bear populations within a portion of Katmai National Monument.
   d. The illegal harvest of bears may exceed the maximum desired harvest.
3. Central Alaska Peninsula Brown Bear Management Plan. This plan applies to that portion of the Alaska Peninsula draining into the Bering Sea southwest of the Naknek River drainage and Katmai National Park and Preserve and those drainages into the Pacific Ocean from Katmai National Park and Preserve on the north to a line drawn between the heads of Port Moller Bay and American Bay and to the south and west of, but not including,

the drainages of the Meshik and Aniakchak rivers and Kujulik Bay.

a. Oil and mineral exploration or development may seriously alter the wilderness nature of the area, improve access, and prove detrimental to brown bear habitat.
b. Land in private ownership or controlled by the NPS may be closed to hunting, thereby concentrating hunting on remaining public land. Concentrations of hunters would adversely affect hunting aesthetics or cause local overharvest of bear populations.
c. Segments of the hunting public may willfully ignore hunting regulations to ensure high hunter success. Overharvest may occur as a result, and management would be impossible to maintain.
d. Restrictions on the use of aircraft for transportation may result in a proliferation of all-terrain vehicles, which would adversely affect hunting aesthetics.
e. Hunting for other game species may not be compatible with proposed brown bear management.
f. Increased hunting pressure may reduce the numbers of large bears available to hunters or result in skewed sex ratios or excessive harvests.

4. Southwestern Alaska Peninsula Brown Bear Management Plan. This plan applies to that portion of the Alaska Peninsula south and west of a line drawn from the head of Port Moller Bay to the head of American Bay except that area included in the Cold Bay Brown Bear Managment Plan.
   a. Oil and mineral exploratory work or development may seriously alter the wilderness nature of the area, improve access, and prove detrimental to brown bear habitat.
   b. Land in private ownership or controlled by the National Refuge system may be closed to hunting, thereby concentrating hunting on remaining public land. Concentrations of hunters would adversely affect hunting aesthetics or cause local overharvest of bear populations.
   c. Increased hunting pressure may result in younger animals, skewed sex ratios, and excessive harvest levels.
   d. Restrictions on the use of aircraft for transportation may result in a proliferation of all-terrain vehicles, which would adversely affect hunting aesthetics.
   e. Hunting for other game species may not be compatible with proposed management.
   f. Segments of the hunting public will willfully ignore hunting regulations to ensure high hunter success. Overharvest of bears may result and management objectives would become impossible to maintain.
5. Cold Bay Brown Bear Management Plan. This plan applies to that portion of GMU 9 bounded by a line starting at Blaine Point in Izembek Lagoon, then due south of Kinzarof Lagoon, then along the mean high-tide line north and east to the point of origin.

   a. The village of Cold Bay has been plagued with "nuisance" brown bears because of its proximity to brown bear habitat and, in particular, the presence of several salmon-spawning streams. A photographer was killed by a brown bear near Cold Bay in 1974.
   b. With increased urbanization, the potential for adverse bear/human interactions will increase.

6. Unimak Island Brown Bear Management Plan. This plan applies to Unimak Island in GMU 10.
   a. Oil and mineral exploration and development may seriously alter the island's wilderness nature, improve access, and prove detrimental to brown bear habitat.
   b. The existing permit system regulating brown bear hunting may be discarded by the USFWS, possibly resulting in excessive harvests or in crowding of hunters.
   c. Segments of the hunting public may willfully ignore hunting regulations to ensure high hunter success. Overharvest may result and management objectives become impossible to maintain.

7. McNeil River Brown Bear Management Plan. This plan pertains to that portion of GMU 9 described as the McNeil River State Game Sanctuary (see State of Alaska Game Refuges, Critical Habitat Areas, and Game Sanctuaries, 1983).
   a. Visitor use may prove incompatible with maintaining a high concentration of bears, or human activities may harass bears from the area.
   b. Bears may be killed by visitors in "defense of life," but such actions should not be common. Injury or loss of human life may occur because of the close proximity of bears to humans within the sanctuary.
   c. Because McNeil River brown bears are dependent upon habitat outside the boundaries of the sanctuary, incompatible land use in these areas may reduce the numbers of bears present.
   d. Sport hunting outside the sanctuary or loss of bears to "defense of life" may significantly reduce the McNeil River bear population. Little illegal hunting is expected within the sanctuary, as few bears are in the area during the time when hides are of good quality.

8. Afognak-Shuyak Brown Bear Management Plan. This plan applies to that portion of GMU 8 including Shuyak, Ban, Marmot, and Afognak islands and adjacent small islands except Whale Island.
   a. The eastern portion of the management area, including parts of the Seal Bay and Izhut Bay drainages, have been and are scheduled for logging. Portions of the northwestern part of Afognak Island are being logged. The impact of logging operations will detract from the aesthetics of bear hunting. "Defense of life and property" kills can be expected to increase, and the quality of bear habitat may be initially reduced by clearcut logging.

b. Much of the management area has been selected by Native village corporations. Should the corporations close their lands to the public, a serious loss of hunting opportunity would occur.
c. A relatively limited number of access points serve to concentrate hunters and reduce aesthetic hunting opportunities. The even distribution of hunting pressure will be difficult to achieve.
d. There are many potential competing uses of the management area, both commercial and recreational, that may affect the quality of hunting. Commercial fishing, sportfishing, and hunting for other game species may conflict with the aesthetics of bear hunting.
e. Access created by the logging road will increase sport fishing activity and other recreational use in bear-feeding areas, and such use will conflict with bear observation and photography.
f. Bear/human encounters will become more frequent as more recreational use occurs. "Defense of life and property" kills will occur more often, and opportunity for viewing will be diminished.
g. Development of on-site wood processing facilities for processing Afognak Island timber and associated sewage and wood fiber could be detrimental to salmon populations, upon which brown bear feed. Increasing bear/human encounters will result in added mortality to brown bears near the community.

9. Northeastern Kodiak Island Brown Bear Management Plan. This plan applies to that portion of GMU 8 on Kodiak Island east of Rough Creek in Ugak Bay and east of the divide between Kizhuyak Bay and Sharatin Bay, including all drainages into Chiniak Bay.
   a. Increasing development and human occupancy will result in some unavoidable attrition of the quality of bear habitat.
   b. Most of the management area has been selected by Native village corporations under terms of the Alaska Native Claims Settlement Act. This is the road-connected portion of the island, and should the corporate landowners close their lands to the public, a serious loss of hunting opportunity would occur.
   c. Sport hunting opportunity will be diminished by the continuing kill of bears in "defense of life and property."
10. Southwestern Kodiak Island Brown Bear Management Plan. This plan pertains to that portion of GMU 8 including all drainages into the eastern side of Kizhuyak Bay and all of Kodiak Island south and west of the Rough Creek drainages, including Uganik, Whale, Amook, and Sitkalidak islands, excluding drainages to Karluk Lake.
    a. Much of the coastal land and land surrounding lakes and rivers has been selected by Native village corporations under terms of the Alaska Native Claims Settlement Act.

Should corporate landowners close their lands to the public, a serious loss of hunting opportunity would occur. Such action would also restrict access to public lands in the interior of the island. Currently, fees are being charged to guides and a use fee has recently been announced for hunting and fishing on the Karluk River (Smith, pers. comm.).

b. Land use activities competitive with bear habitat maintenance are likely. On private lands, livestock and reindeer herding industries may be introduced, in which case brown bears would be systematically eliminated as predators. Development of fishing lodges, recreational cabins, industrial facilities, and permanent human settlements will result in gradual attrition of bear habitat. A hydroelectric dam is nearly completed in the Terror Lake area, and construction of a generating plant is scheduled for Kizhuyak Bay, both of which would permanently alter the quality of bear habitat. The State Highway Department has long-range plans for a road around the island to link remote villages. All these activities will alter habitat quality and increase the frequency of bear/human encounters. Expansion of the petroleum industry to the Kodiak area, including offshore exploration and development, construction of onshore support facilities, and attendant growth of the human population, appears imminent. Oil spills could damage salmon-rearing areas and induce direct mortality to salmon. Increasing development of onshore facilities and increasing human populations would encroach on bear habitat.

c. There are many potential competing uses of the management area, both commercial and recreational, that may affect the quality of bear observation and hunting. Commercial fishing, sportfishing, hunting for other game species, recreational boating, cannery operations, and commercial and sport flying may conflict with the aesthetics of bear-related recreational activities.

d. Federal management objectives for the Kodiak National Wildlife Refuge may conflict with the department's management objectives.

e. Enforcement of hunting regulations is difficult at present levels of manpower and budgets.

11. Karluk Lake Brown Bear Management Plan. This plan applies to all drainages to Karluk Lake above the lake outlet, including Morian Creek.

a. Lands bordering approximately the northern one-half of the management area have been selected by Native village corporations. Should these corporations decide to close their lands to the public, proportionately more intensive use of the remaining available public land areas would be made.

b. Development of corporation lands could conflict with maintenance of bear habitat. Construction and occupancy of permanent facilities would increase conflicts with brown bears and reduce the opportunity for observing brown bears in a wilderness environment.
c. Construction and manning of additional research facilities for salmon rehabilitation projects by the department may decrease the opportunity for bear observation if additional disturbance occurs.
d. Frequency of bear/human encounters will increase with increasing use of the area by photographers and naturalists.
e. Other recreational uses, including fishing and camping, may be competitive with bear observation and could reduce the quality of bear-viewing opportunities.

III. REPORTED ANNUAL USE AND HARVEST DATA

Tables 95 through 107 present harvest figures for brown bears in GMUs 8, 9, and 10 from 1972 to 1982. These figures are derived from sealing certificates and represent only successful hunters. Game Management Units 8 and 9 harvest figures are presented by GMU and data analysis subunit (see maps 8 and 9) where available. Table 108 presents the nonsport (e.g., defense of life and property) brown bear kill in GMUs 8, 9, 10, and 17 from 1972 to 1982. The interpretation of harvest data is complicated by the lack of reliable data on the actual size of the subregional bear population and their sex and age structure. Fluctuations in harvest levels are dependent on a number of variables ranging from weather conditions during the hunting season to the popularity of hunts for other big game such as deer and elk. In 1981, for example, hunters killed 148 brown bears in GMU 8, the highest harvest since 1974. Much of this harvest was attributed to the spring hunt, during which there was exceptionally good hunting weather. Brown bear harvest has increased in harvest Subunit 1 in GMU 8, possibly because hunting pressure on deer and elk has rapidly increased and many of those hunters are also obtaining bear permits.

Table 95. GMU 8: Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	132	71	54	303 days
1973	155	91	59	308 days
1974	165	113	68	308 days
1975	119	83	70	308 days
1976	117	67	57	308 days
1977	124	74	60	308 days
1978	124	70	56	278 days
1979	139	84	60	122 days
1980	127	76	60	122 days
1981	148	84	57	122 days
1982	149	77	52	122 days

Table 96. GMU 8, Subunit 1 (See Map 8): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	10	2	20	165 days
1973	08	0	0	168 days
1974	14	5	36	173 days
1975	10	4	40	173 days
1976	17	6	35	173 days
1977	17	6	35	173 days
1978	10	3	30	138 days
1979	15	3	20	138 days
1980	13	3	23	82 days
1981	14	2	14	82 days
1982	17	0	0	82 days

Table 97. GMU 8, Subunit 2 (See Map 8): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	19	13	68	303 days
1973	16	12	75	308 days
1974	13	5	38	308 days
1975	23	13	57	308 days
1976	10	4	40	308 days
1977	13	7	54	308 days
1978	7	4	57	278 days
1979	18	10	56	278 days
1980	16	11	69	92 days
1981	18	13	72	92 days
1982	17	8	47	92 days

Table 98. GMU 8, Subunit 3 (See Map 8): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	23	9	39	144 days
1973	31	16	52	149 days
1974	31	24	77	144 days
1975	19	13	68	144 days
1976	18	12	67	144 days
1977	16	8	50	144 days
1978	16	12	75	114 days
1979	25	16	64	114 days
1980	18	10	56	82 days
1981	21	11	52	82 days
1982	21	12	57	82 days

Table 99. GMU 8, Subunit 4 (See Map 8): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	58	35	60	144 days
1973	78	53	68	149 days
1974	72	58	81	144 days
1975	43	34	79	144 days
1976	50	31	62	144 days
1977	46	32	70	144 days
1978	68	34	50	113 days
1979	52	34	65	82 days
1980	55	37	67	82 days
1981	61	39	64	82 days
1982	57	33	58	82 days

Table 100. GMU 8, Subunit 5 (See Map 8): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	19	11	58	144 days
1973	20	10	50	149 days
1974	35	21	60	144 days
1975	22	19	86	144 days
1976	22	14	64	144 days
1977	32	21	66	144 days
1978	23	17	74	114 days
1979	29	21	72	114 days
1980	25	15	60	82 days
1981	33	19	58	82 days
1982	32	24	75	82 days

Table 101. GMU 9, Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	279	203	73	47 days
1973	242	183	76	31 days
1974	141	114	81	15 days
1975	224	141	63	31 days
1976	154	087	56	16 days
1977	189	129	68	15 days
1978	183	124	68	16 days
1979	167	126	75	15 days
1980	203	148	73	16 days
1981	192	134	70	15 days
1982	210	160	76	16 days

Table 102. GMU 9, Subunit 1 (See Map 9): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	53	27	51	47 days
1973	50	27	54	31 days
1974	22	12	55	15 days
1975	40	21	53	31 days
1976	23	9	39	16 days
1977	30	12	40	15 days
1978	25	15	60	16 days
1979	25	17	68	15 days
1980	28	15	54	16 days
1981	30	10	33	15 days
1982	26	22	85	16 days

Table 103. GMU 9, Subunit 2 (See Map 9): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	86	71	83	47 days
1973	56	46	82	31 days
1974	44	33	75	15 days
1975	46	34	74	15 days
1976	40	23	58	16 days
1977	71	52	73	15 days
1978	64	39	61	16 days
1979	67	52	78	15 days
1980	64	50	78	16 days
1981	66	53	80	15 days
1982	62	50	81	16 days

Table 104. GMU 9, Subunit 3 (See Map 9): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	75	64	85	47 days
1973	46	38	83	31 days
1974	25	22	88	15 days
1975	25	22	88	15 days
1976	30	20	67	16 days
1977	35	28	80	15 days
1978	49	40	82	16 days
1979	30	24	80	15 days
1980	36	29	81	16 days
1981	46	32	70	15 days
1982	41	29	71	16 days

Table 105. GMU 9, Subunit 4 (See Map 9): Yearly Brown Bear Sport Harvest, 1972-82

Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	65	41	63	47 days
1973	90	72	80	47 days
1974	50	47	94	31 days
1975	113	64	57	37 days
1976	60	35	58	16 days
1977	53	37	70	15 days
1978	42	28	67	16 days
1979	45	33	73	15 days
1980	75	54	72	16 days
1981	50	39	78	15 days
1982	75	58	77	16 days

Table 106. GMU 10, Yearly Brown Bear Sport Harvest, 1972-82

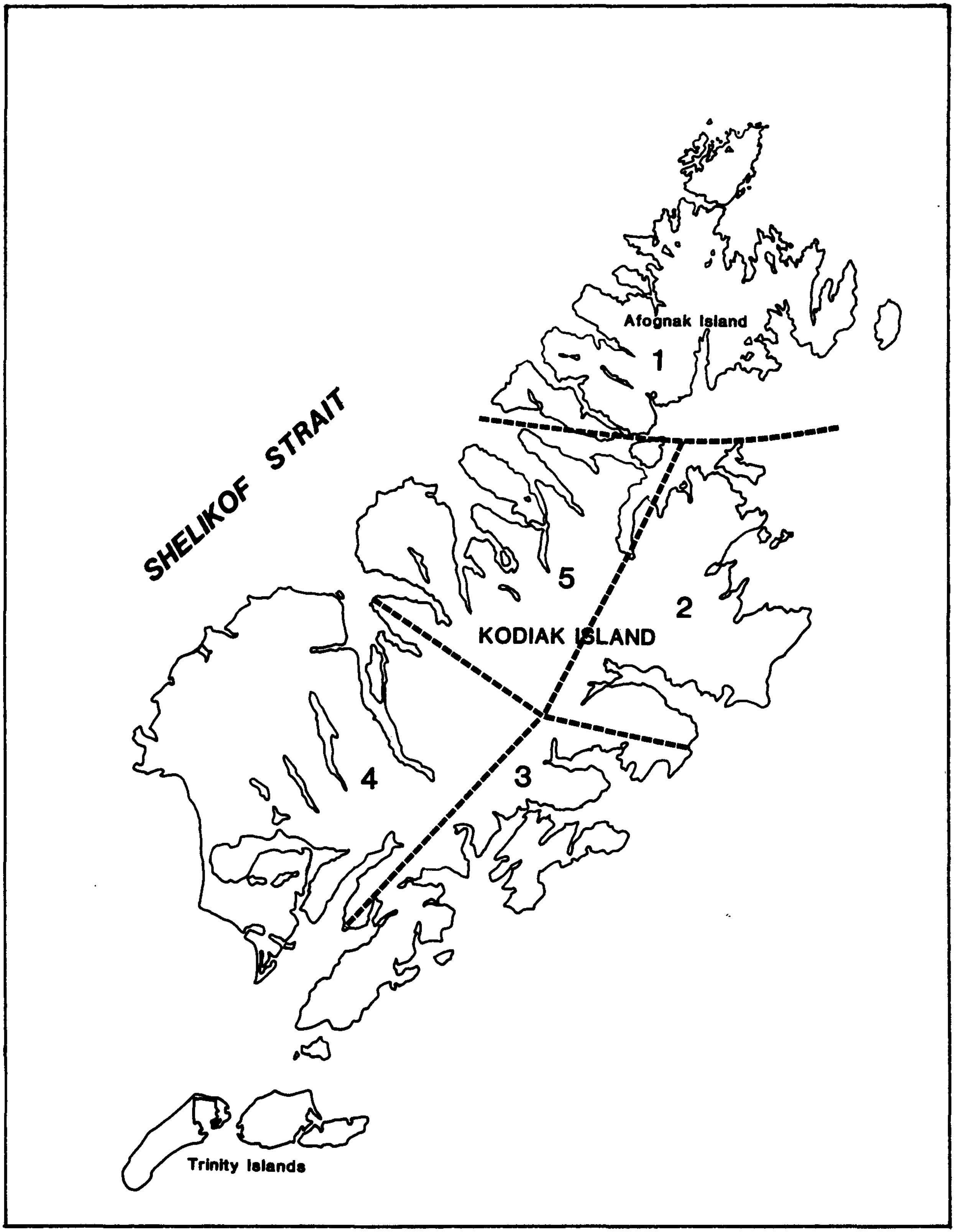
Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	5	0	0	47 days
1973	3	0	0	47 days
1974	5	0	0	47 days
1975	6	0	0	37 days
1976	4	0	0	37 days
1977	6	0	0	37 days
1978	1	0	0	37 days
1979	8	0	0	37 days
1980	4	1	25	37 days
1981	3	2	67	37 days
1982	4	0	0	37 days

Table 107. GMU 17: Yearly Brown Bear Sport Harvest, 1972-82

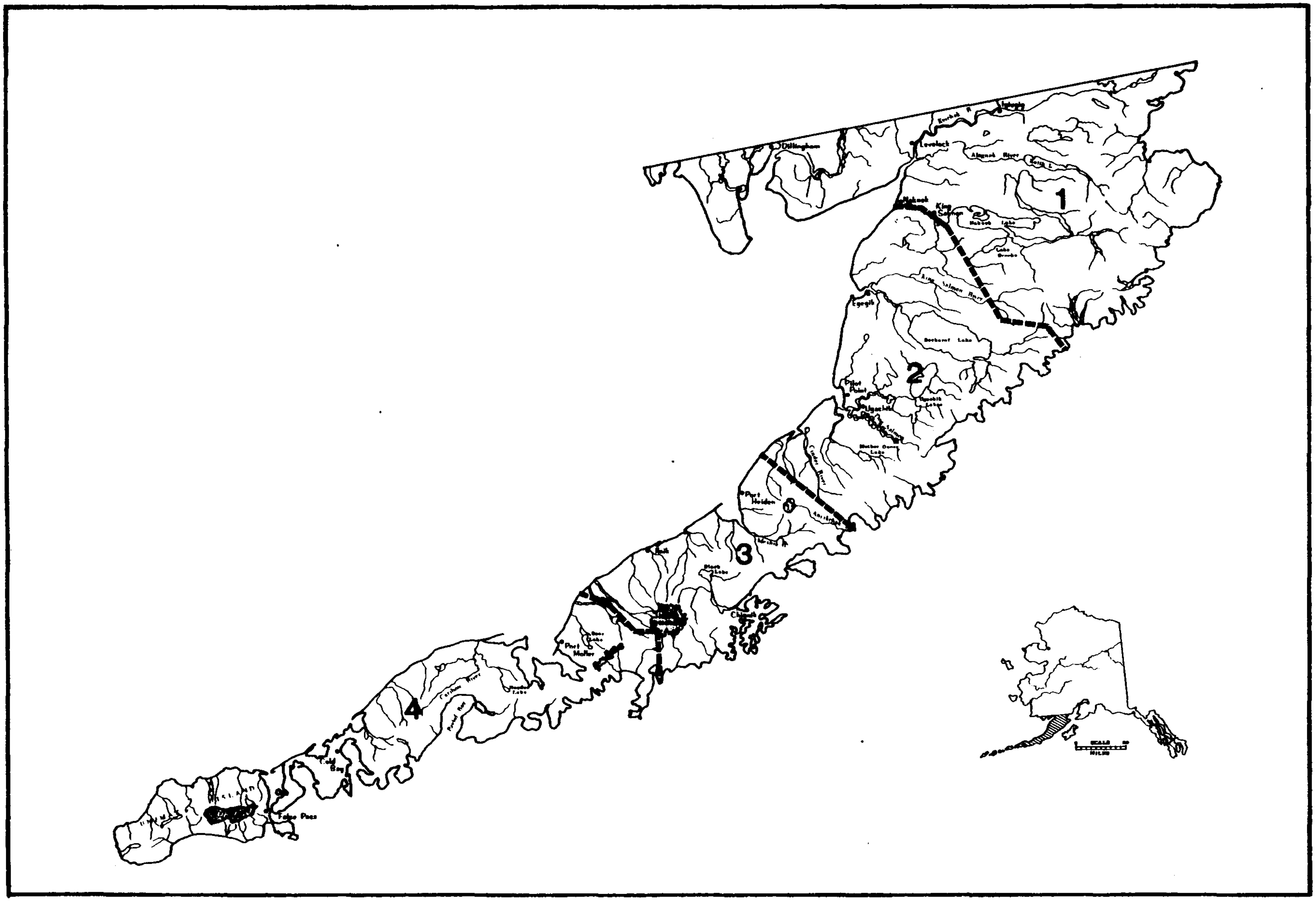
Calendar Year	Total Kill	No. By Nonresident	% By Nonresident	Season Length
1972	37	28	76	72 days
1973	41	33	80	42 days
1974	29	22	76	42 days
1975	24	25	86	31 days
1976	37	33	89	31 days
1977	42	30	71	31 days
1978	25	21	84	31 days
1979	46	34	74	31 days
1980	25	21	84	31 days
1981	27	22	81	31 days
1982	8	4	50	31 days

Table 108. GMUs 8, 9, 10, and 17 Nonsport Brown Bear Kill, 1972-82

Calendar Year	GMU 8	GMU 9	GMU 10	GMU 17
1972	4	4	2	1
1973	7	2	0	1
1974	5	16	0	1
1975	9	5	0	0
1976	2	7	0	0
1977	4	11	0	1
1978	7	5	1	1
1979	6	5	0	1
1980	11	8	0	0
1981	8	5	0	0
1982	16	3	0	0



Map 8. GMU subunits used for data analysis.



Map 9. GMU 9 subunits used for data analysis.

IV. REFERENCES

Harvest information presented has been derived from big game data index files maintained in the Division of Game's regional offices. Management objectives and problems have been derived from individual species strategic management plans.

Smith, R.B. 1984. Personal communication. Area Game Biologist, ADF&G, Div. Game, Kodiak.

Caribou Human Use

I. MANAGEMENT HISTORY

Wildlife management in Alaska was formally established in 1925 when Congress created the Alaska Game Commission. Prior to 1925, protection of wildlife had been undertaken by the Departments of Treasury, Commerce, and Agriculture, and by the territorial govenor. After statehood in 1959, the State of Alaska assumed administration of its wildlife and established the Department of Fish and Game.

A. Management Objectives

Currently, there are five strategic caribou management plans that apply to discrete areas within the Southwest Region. Generally, the management objectives for caribou in this region are to provide for the greatest sustained opportunity to hunt caribou under aesthetically pleasing conditions and to provide for subsistence use of caribou. In addition to these objectives, the Southwestern Alaska Peninsula Management Plan also has the management objective to be selective in hunting caribou.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

A. Reindeer Herding

A revival of interest in semidomestic reindeer herding in Southwest Alaska has the potential for serious conflicts with caribou in the region. Because reindeer are less nomadic than caribou, reindeer ranges can become severely overutilized, reducing the carrying capacity of the area for both reindeer and caribou. In addition, unless closely herded, reindeer herds suffer attrition from animals that join passing groups of caribou, necessitating construction of fences or elimination of caribou to maintain intact reindeer herds. Contact between caribou and reindeer can result in transmission of diseases to reindeer. Feral reindeer that join caribou populations also may serve as vectors of disease and may introduce undesirable genetic characteristics into the wild caribou stocks. Experience of large-scale and largely unsuccessful reindeer herding attempts along much of northwestern, western, and southwestern Alaska during the early-to-mid 1900's suggests that reindeer herding should be limited to areas where caribou and reindeer will not come into contact, and where caribou will not need to forage in the forseeable future.

B. Oil Exploration and Development

Accelerated exploration and development of offshore, nearshore, and onshore oil resources in Alaska affects the welfare of caribou on the Alaska Peninsula where oil deposits are known to exist. Construction of roads and pipelines and attendant increases in human activity and disturbance in the area may impede caribou movements and adversely affect critical calving areas.

C. Individual Caribou Management Plans

Management problems identified in individual caribou management plans for the Southwest Region are discussed below.

1. The Mulchatna Caribou Management Plan. This plan pertains to Game Management Unit (GMU) 17; all drainages of the Kvichak River watershed above the Alagnak River in GMU 9; and that portion of GMU 19 lying south of the Chukowan River, Holitna River, Kuskokwim River, and the Swift River, except for the area in the Farewell Caribou Management Plan.
   a. Development of hard mineral or oil resources within the range of the Mulchatna herd may prove detrimental to caribou habitat or block traditional migration routes. The size of the population that would be compatible with the remaining habitat could be lessened by adverse effects of development. The numbers of caribou then available for use by various segments of the public would be reduced.
   b. Harvest pressure can be expected to increase and may reach a level detrimental to the caribou population. Restrictive big game seasons and bag limits in other areas of the state will encourage increased sport hunting of this herd. Continued human population growth, particularly if a large number of people enter the area as a result of mineral development, will also place a larger demand on the resource.
   c. Continued growth of this caribou population may eventually exceed the carrying capacity of the range. Emigration to other areas or actual loss of animals to disease or starvation may occur.
   d. A proposal to establish reindeer grazing in portions of this area might remove critical habitat from use by the Mulchatna caribou herd, depending on where the reindeer were grazed. Free-ranging caribou may encounter reindeer, causing losses to the reindeer herd. Such action would also potentially cause dilution of the caribou gene pool. Past incompatibility of caribou with reindeer grazing has been documented in other areas of the state. Depending upon the areas utilized for reindeer herding, the carrying capacity of the Mulchatna herd may be reduced, resulting in a smaller caribou population. In addition, hunting of caribou in areas of reindeer grazing may be prevented, resulting in lower harvest and/or congestion of hunters in the remaining areas.
   e. The transfer of lands to private ownership as a result of the Native Claims Settlement Act may seriously affect access or reduce the areas available for the public to hunt. As a result, hunting may be concentrated on remaining public lands. Concentration of hunters may result in local overharvest of some segments of the caribou herd.
   f. The recreational harvest may reach a level incompatible with the needs of local residents to take caribou for domestic use.
2. The Central Alaska Peninsula Caribou Management Plan. This plan pertains to that portion of GMU 9 on the Alaska Peninsula

south of the Kvichak and Alagnak rivers, Kukalek Lake, Battle Lake, McNeil Lake and River, to a line drawn between the head of Port Moller Bay on the Bering Sea side and American Bay on the Pacific side, except for Katmai National Park.

a. Continued caribou population growth may exceed the area's carrying capacity and result in range deterioration.
b. Weather or disease may substantially reduce the caribou population. Emigration to other areas, harvest, or poor reproductive success may also result in low numbers.
c. Loss of public hunting access to lands transferred to private ownership or incorporated into national parks or refuges may concentrate hunting on remaining public lands. The resulting concentration of hunters may result in overharvest of segments of the population.
d. The reestablishment of a reindeer grazing industry would create a situation where reindeer would occupy range utilized by caribou or block migration paths. Free-ranging caribou could encounter reindeer, causing losses of reindeer to the herds and, at the same time, potentially causing dilution of the gene pool of the caribou population.
e. Recreational harvesting of caribou may lower the success rate of local residents trying to obtain sufficient caribou to fill legitimate domestic needs. Local residents may insist that the caribou resource be managed exclusively for domestic use.
f. Harvest levels are not adequately documented. With increased pressure, it will be necessary to accurately identify the level and distribution of caribou harvest.

3. The Southwest Alaska Peninsula Caribou Management Plan. This plan pertains to that portion of GMU 9 on the Alaska Peninsula south and west of a line drawn from the head of Moller Bay on the Bering Sea side to the head of American Bay on the Pacific side and, in GMU 10, Unimak Island.
   a. Large losses of caribou may occur from disease or from freezing rain conditions that coat the tundra with ice and limit availability of winter forage.
   b. The continued growth of the caribou population on both the mainland and Unimak Island may exceed the carrying capacity of the range. Emigration to other areas and/or actual loss of animals through mortality may occur.
   c. Development of oil and mineral resources may have impacts incompatible with the maintenance of a productive, free-ranging caribou population. Pipeline roads may block traditional migration routes. Associated development may increase hunter access and/or hunter numbers to the point that harvest may be excessive.
4. The Aleutian Islands Caribou Management Plan. This plan pertains to Umnak, Atka, and Attu islands in GMU 10. Feral reindeer occur on Umnak, Atka, and Attu islands. Data are

lacking for present population sizes or trends on any of these islands.

a. Unregulated population growth of reindeer will damage the limited range of these island populations, and a drastic reduction in reindeer numbers can be expected.

b. Access to the area is costly and difficult. The availability of the reindeer resource is almost unknown to the public.

c. Reindeer populations on Umnak Island may conflict with range use by domestic sheep.

5. The Adak Caribou Management Plan. This plan pertains to Adak Island.

a. Inadequate harvest may result in an increasing caribou population. Unchecked growth would ultimately result in range deterioration and a subsequent significant decline in caribou numbers.

III. Reported Annual Use and Harvest

The following harvest data (tables 109-143) are from 1977-1982 hunting season harvest statistics. Harvest statistics were not kept between 1972 and 1977 for caribou in the Southwest Region. Where available, estimated harvest figures are presented in order to indicate the magnitude of the unreported harvest. Because unreported harvest may account for over half of the total caribou harvest in the region, reported harvest figures must be interpreted with caution. Much of the unreported harvest may be attributed to local residents of the region who may use significantly different means of transport than are indicated by the reported harvest figures.

IV. REFERENCES

Harvest information presented has been derived from big game data index files maintained in the Division of Game's regional offices. Management objectives and problems have been derived from individual species strategic management plans.

Table 109. Harvest Statistics for the Alaska Peninsula Caribou Herd, GMU 9, 1977-78

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	32 (6)	6 (3)	1 (4)	39 (5)	20 (15)	0 (0)	0 (0)	20 (13)	59 (7)
1	362 (69)	151 (84)	20 (77)	533 (73)	59 (43)	11 (92)	5 (56)	75 (48)	608 (69)
2	1 (4)	0 (0)	0 (0)	1 (0)*	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)*
3	60 (12)	11 (6)	3 (12)	74 (10)	34 (25)	1 (8)	2 (22)	37 (24)	111 (13)
4	6 (1)	1 (1)	0 (0)	7 (1)	2 (1)	0 (0)	0 (0)	2 (1)	9 (1)
5	11 (2)	0 (0)	1 (4)	12 (2)	2 (1)	0 (0)	0 (0)	2 (1)	14 (2)
6	21 (4)	11 (6)	1 (4)	33 (5)	6 (4)	0 (0)	1 (11)	7 (4)	40 (5)
7	28 (5)	0 (0)	0 (0)	28 (4)	13 (10)	0 (0)	1 (11)	14 (9)	42 (5)
Totals	521 (99)	180 (100)	26 (101)	727 (100)	136 (99)	12 (100)	9 (100)	157 (100)	884 (102)

Total Harvest 970 (Estimated harvest 1,500-2,000)

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

*Percentages of less than 0.5% denoted as 0%.

Table 110. Harvest Statistics for the Alaska Peninsula Caribou Herd, GMU 9, 1978-79

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	6 (2)	3 (2)	0 (0)	9 (2)	8 (10)	1 (10)	0 (0)	9 (9)	18 (3)
1	263 (77)	140 (88)	18 (90)	421 (81)	53 (65)	8 (80)	4 (80)	65 (68)	486 (79)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	34 (10)	3 (2)	1 (5)	38 (7)	8 (10)	1 (10)	1 (20)	10 (10)	48 (8)
4	2 (1)	0 (0)	0 (0)	2 (0)*	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)*
5	1 (0)*	0 (0)	0 (0)	1 (0)*	1 (1)	0 (0)	0 (0)	1 (1)	2 (0)*
6	12 (4)	11 (7)	1 (5)	24 (5)	6 (7)	0 (0)	0 (0)	6 (6)	30 (5)
7	24 (7)	3 (2)	0 (0)	27 (5)	5 (6)	0 (0)	0 (0)	5 (5)	32 (4)
Totals	342 (101)	160 (101)	20 (100)	522 (101)	81 (99)	10 (100)	5 (100)	96 (99)	618 (99)

Total harvest 663 (Estimated harvest 1,200-1,500)

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

*Percentages of less than 0.5% are denoted as 0%.

Table 111. Harvest Statistics for the Alaska Peninsula Caribou Herd, GMU 9, 1980-81

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	22 (6)	3 (2)	0 (0)	25 (4)	11 (11)	1 (10)	4 (67)	16 (14)	41 (6)
1	252 (65)	168 (85)	13 (59)	433 (71)	54 (55)	8 (80)	0 (0)	62 (54)	495 (68)
2	1 (0)*	0 (0)	0 (0)	1 (0)*	1 (1)	0 (0)	0 (0)	1 (1)	2 (0)*
3	28 (7)	5 (3)	5 (23)	38 (6)	12 (12)	1 (10)	1 (17)	14 (12)	52 (7)
4	7 (2)	3 (2)	0 (0)	10 (2)	4 (4)	0 (0)	0 (0)	4 (4)	14 (2)
5	3 (1)	0 (0)	0 (0)	3 (0)*	2 (2)	0 (0)	0 (0)	2 (2)	5 (1)
6	17 (4)	15 (8)	0 (0)	32 (5)	2 (2)	0 (0)	0 (0)	2 (2)	34 (5)
7	60 (15)	4 (2)	4 (18)	68 (11)	12 (12)	0 (0)	1 (17)	13 (11)	81 (11)
Totals	390 (100)	198 (102)	22 (100)	610 (99)	98 (101)	10 (100)	6 (101)	114 (100)	724 (100)

Total harvest 900 (Estimated harvest 1,500-2,000)

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

*Percentages of less than 0.5% are denoted as 0%.

Table 112. Harvest Statistics for the Alaska Peninsula Caribou Herd, GMU 9, 1981-82

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	21 (4)	7 (3)	1 (3)	29 (4)	11 (13)	0 (0)	0 (0)	11 (11)	40 (5)
1	302 (64)	218 (84)	24 (83)	544 (71)	52 (62)	5 (50)	4 (80)	61 (62)	605 (79)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	35 (7)	13 (5)	0 (0)	48 (6)	12 (14)	5 (50)	1 (20)	18 (18)	66 (8)
4	3 (1)	4 (2)	0 (0)	7 (1)	2 (2)	0 (0)	0 (0)	2 (2)	9 (1)
5	5 (1)	0 (0)	0 (0)	5 (1)	0 (0)	0 (0)	0 (0)	0 (0)	5 (1)
6	27 (6)	4 (2)	1 (3)	32 (4)	2 (2)	0 (0)	0 (0)	2 (2)	34 (4)
7	82 (17)	12 (5)	3 (10)	97 (13)	5 (6)	0 (0)	0 (0)	5 (5)	102 (12)
Totals	475 (100)	258 (101)	29 (99)	762 (100)	84 (99)	10 (100)	5 (100)	99 (100)	86 (101)

Total harvest 1,129 (Estimated harvest 1,500-2,000)

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 113. Harvest Statistics for the Alaska Peninsula Caribou Herd, GMU 9, 1982-83

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	17 (4)	1 (1)	1 (2)	19 (3)	9 (15)	3 (19)	0 (0)	12 (14)	31 (4)
1	225 (54)	134 (93)	42 (70)	401 (65)	36 (58)	13 (81)	4 (80)	53 (64)	454 (65)
2	1 (0)*	0 (0)	0 (0)	1 (0)*	1 (2)	0 (0)	0 (0)	1 (1)	2 (0)*
3	26 (6)	5 (3)	0 (0)	31 (5)	4 (6)	0 (0)	0 (0)	4 (5)	35 (5)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	2 (0)*	0 (0)	0 (0)	2 (0)*	1 (2)	0 (0)	0 (0)	1 (1)	3 (0)*
6	44 (11)	0 (0)	7 (12)	51 (8)	2 (3)	0 (0)	0 (0)	2 (2)	53 (8)
7	101 (24)	4 (3)	10 (17)	115 (19)	9 (15)	0 (0)	1 (20)	10 (12)	125 (18)
Totals	416 (99)	144 (100)	60 (101)	620 (100)	62 (101)	16 (100)	5 (100)	83 (99)	703 (100)

Total harvest 1,038 (Estimated harvest 2,000)

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

*Percentage of less than 0.5% are denoted as 0%.

Table 114. Harvest Statistics for the Mulchatna Caribou Herd, GMUs 9, 16, 17, 19, 1977-78

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	14 (5)	4 (4)	1 (10)	19 (5)	7 (6)	3 (10)	1 (25)	11 (7)	30 (5)
1	225 (82)	104 (93)	10 (90)	339 (86)	95 (81)	28 (90)	3 (75)	126 (83)	465 (85)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	4 (1)	1 (1)	0 (0)	5 (1)	4 (3)	0 (0)	0 (0)	4 (3)	9 (2)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	29 (11)	1 (1)	0 (0)	30 (8)	6 (5)	0 (0)	0 (0)	6 (4)	36 (7)
6	1 (0)*	0 (0)	0 (0)	1 (0)*	3 (3)	0 (0)	0 (0)	3 (2)	4 (1)
7	0 (0)	2 (2)	0 (0)	2 (1)	2 (2)	0 (0)	0 (0)	2 (1)	4 (1)
Totals	273 (94)	112 (101)	11 (100)	396 (101)	117 (100)	31 (100)	4 (100)	152 (100)	548 (101)

Total harvest 473 (Estimated harvest 500-800)

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

*Percentages of less than 0.5% are denoted as 0%.

Table 115. Harvest Statistics for the Mulchatna Caribou Herd, GMU 9, 1977-78

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unkown	0(0)	0(0)	0 (0)	0 (0)	2 (10)	0 (0)	0 (0)	2 (9)	2 (3)
1	26 (81)	15 (94)	2 (100)	43 (86)	15 (75)	1 (100)	1 (100)	17 (77)	60 (83)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	1 (3)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	5 (16)	1 (6)	0 (0)	6 (12)	1 (5)	0 (0)	0 (0)	1 (5)	7 (10)
6	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (5)	1 (1)
7	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (5)	1 (1)
Totals	32 (100)	16 (100)	2 (100)	50 (100)	20 (100)	1 (100)	1 (100)	22 (101)	72 (99)

Total harvest 61

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 116. Harvest Statistics for the Mulchatna Caribou Herd, GMU 16, 1977-78

Transport Means	# % Successful Hunters Resident	Nonresident	Unknown	Total Successful Hunter	# % Unsuccessful Hunters Resident	Nonresident	Unknown	Total Unsuccessful Hunters	Total Hunters
Unknown	1 (5)	0 (0)	0 (0)	1 (4)	1 (8)	2 (67)	0 (0)	3 (19)	4 (9)
1	18 (86)	6 (100)	0 (0)	24 (84)	9 (69)	1 (33)	0 (0)	10 (62)	34 (79)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	1 (5)	0 (0)	0 (0)	1 (4)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)
6	1 (5)	0 (0)	0 (0)	1 (4)	2 (15)	0 (0)	0 (0)	2 (12)	3 (7)
7	0 (0)	0 (0)	0 (0)	0 (0)	1 (9)	0 (0)	0 (0)	1 (6)	1 (2)
Totals	21 (101)	6 (100)	0 (0)	27 (101)	13 (100)	3 (100)	0 (0)	16 (99)	43 (99)
Total harvest 31									

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 117. Harvest Statistics for the Mulchatna Caribou Herd, GMU 17, 1977-78

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	9 (4)	1 (2)	1 (25)	11 (4)	2 (3)	1 (5)	0 (0)	3 (3)	14 (4)
1	167 (83)	60 (94)	3 (75)	230 (85)	56 (84)	19 (95)	0 (0)	75 (86)	305 (85)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	3 (1)	1 (2)	0 (0)	4 (1)	4 (6)	0 (0)	0 (0)	4 (5)	8 (2)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	23 (11)	0 (0)	0 (0)	23 (4)	5 (7)	0 (0)	0 (0)	5 (6)	28 (8)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	2 (3)	0 (0)	2 (1)	0 (0)	0 (0)	0 (0)	0 (0)	2 (1)
Totals	202 (99)	64 (101)	4 (100)	270 (100)	67 (100)	20(100)	0 (0)	87 (100)	357 (100)
Total harvest 331									

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 118. Harvest Statistics for the Mulchatna Caribou Herd, GMU 19, 1977-78

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	4 (22)	3 (12)	0 (0)	7 (14)	2 (12)	0 (0)	1 (33)	3 (11)	10 (13)
1	14 (78)	23 (88)	5 (100)	42 (86)	15 (88)	7 (100)	2 (67)	24 (84)	66 (87)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	18 (100)	26 (100)	5 (100)	49 (100)	17 (100)	7 (100)	3 (100)	27 (100)	76 (100)

Total harvest 50

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 119. Harvest Statistics for the Mulchatna Caribou Herd, GMUs 9, 16, 17, 19, 1978-79

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	6 (6)	6 (7)	0 (0)	12 (6)	1 (1)	0 (0)	0 (0)	1 (1)	13 (4)
1	98 (90)	76 (90)	13 (81)	187 (89)	41 (59)	10 (83)	3 (100)	54 (64)	241 (82)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (8)	0 (0)	1 (1)	1 (0)*
3	3 (3)	1 (1)	2 (13)	6 (3)	3 (4)	0 (0)	0 (0)	3 (4)	9 (3)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	1 (1)	0 (0)	1 (6)	2 (1)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0)*
6	0 (0)	0 (0)	0 (0)	0 (0)	7 (10)	0 (0)	0 (0)	7 (8)	7 (2)
7	1 (1)	1 (1)	0 (0)	2 (1)	17 (25)	1 (8)	0 (0)	18 (21)	20 (7)
Totals	109 (101)	84 (99)	16 (100)	209 (100)	69 (99)	12 (99)	3 (100)	84 (99)	243 (99)

Total harvest 223 (Estimated harvest 500-800)

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

*Percentage of less than 0.5% are denoted as 0%.

Table 120. Harvest Statistics for the Mulchatna Caribou Herd, GMU 9, 1978-79

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	0 (0)	0 (0)	0 (0)	0 (0)	1 (20)	0 (0)	0 (0)	1 (20)	1 (5)
1	8 (80)	6 (100)	0 (0)	14 (82)	4 (80)	0 (0)	0 (0)	4 (80)	18 (82)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	1 (10)	0 (0)	0 (0)	1 (6)	0 (0)	0 (0)	0 (0)	0 ( )	1 (5)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	1 (10)	0 (0)	1 (100)	2 (12)	0 (0)	0 (0)	0 (0)	0 (0)	2 (9)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	10 (100)	6 (100)	1 (100)	17 (100)	5 (100)	0 (0)	0 (0)	5 (100)	22 (101)

Total harvest 17

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 121. Harvest Statistics for the Mulchatna Caribou Herd, GMU 16, 1978-79

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	0 (0)	4 (44)	0 (0)	4 (29)	0 (0)	0 (0)	0 (0)	0 (0)	4 (8)
1	4 (100)	5 (56)	1 (100)	10 (71)	6 (18)	3 (100)	0 (0)	9 (0)	19 (38)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	0 (0)	3 (9)	0 (0)	0 (0)	3 (0)	3 (6)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	7 (21)	0 (0)	0 (0)	7 (0)	7 (14)
7	0 (0)	0 (0)	0 (0)	0 (0)	17 (52)	0 (0)	0 (0)	17 (0)	17 (34)
Totals	4 (100)	9 (100)	1 (100)	14 (100)	33 (100)	3 (100)	0 (0)	36 (99)	50 (100)

Total harvest 14

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 122. Harvest Statistics for the Mulchatna Caribou Herd, GMU 17, 1977-78

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	3 (4)	2 (5)	0 (0)	5 (4)	0 (0)	0 (0)	0 (0)	0 (0)	5 (4)
1	65 (93)	36 (92)	9 (100)	110 (93)	16 (100)	4 (80)	3 (100)	23 (96)	133 (94)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	2 (3)	1 (3)	0 (0)	3 (3)	0 (0)	0 (0)	0 (0)	0 (0)	3 (2)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (20)	0 (0)	1 (4)	1 (1)
Totals	70 (100)	39 (100)	9 (100)	118 (100)	16 (100)	5 (100)	3 (100)	24 (100)	142 (101)

Total harvest 132

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 123. Harvest Statistics for the Mulchatna Caribou Herd, GMU 19, 1978-79

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	3 (12)	1 (3)	0 (0)	4 (7)	0 (0)	0 (0)	0 (0)	0 (0)	4 (5)
1	21 (84)	29 (97)	3 (60)	53 (88)	15 (100)	3 (75)	0 (0)	18 (95)	71 (90)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (25)	0 (0)	1 (5)	1 (1)
3	0 (0)	0 (0)	2 (40)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	2 (3)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	1 (4)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
Totals	25 (100)	30 (100)	5 (100)	60 (100)	15 (100)	4 (100)	0 (0)	19 (100)	79 (100)

Total harvest 60

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 124. Harvest Statistics for the Mulchatna Caribou Herd, GMUs 9, 16, 17, 19, 1979-80

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	4 (4)	0 (0)	0 (0)	4 (2)	5 (10)	1 (6)	2 (12)	8 (10)	12 (4)
1	80 (86)	91 (95)	34 (100)	205 (92)	24 (50)	15 (94)	10 (59)	49 (60)	254 (84)
2	0 (0)	5 (5)	0 (0)	5 (2)	0 (0)	0 (0)	0 (0)	0 (0)	5 (2)
3	4 (4)	0 (0)	0 (0)	4 (2)	3 (6)	0 (0)	0 (0)	3 (4)	7 (2)
4	2 (2)	0 (0)	0 (0)	2 (1)	0 (0)	0 (0)	0 (0)	0 (0)	2 (1)
5	2 (2)	0 (0)	0 (0)	2 (1)	5 (10)	0 (0)	0 (0)	5 (6)	7 (2)
6	0 (0)	0 (0)	0 (0)	0 (0)	5 (10)	0 (0)	0 (0)	5 (6)	5 (2)
7	1 (1)	0 (0)	0 (0)	1 (0)*	6 (13)	0 (0)	5 (29)	11 (14)	12 (4)
Totals	93 (99)	96 (100)	34 (100)	223 (100)	48 (99)	16 (100)	17 (100)	81 (100)	304 (101)

Total harvest 236 (Estimated harvest 500-800)

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

*Percentages of less than 0.5% are denoted as 0%.

Table 125. Harvest Statistics for the Mulchatna Caribou Herd, GMU 9, 1979-80

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	0 (0)	0 (0)	0 (0)	0 (0)	1 (12)	0 (0)	0 (0)	1 (10)	1 (2)
1	13 (93)	12 (100)	5 (100)	30 (97)	3 (37)	1 (100)	1 (100)	5 (50)	35 (85)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	1 (7)	0 (0)	0 (0)	1 (3)	4 (50)	0 (0)	0 (0)	4 (40)	5 (12)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	14 (100)	12 (100)	5 (100)	31 (100)	8 (99)	1 (100)	1 (100)	10 (100)	41 (99)

Total harvest 34

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 126. Harvest Statistics for the Mulchatna Caribou Herd, GMU 16, 1979-80

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	1 (25)	0 (0)	0 (0)	1 (5)	1 (7)	0 (0)	1 (14)	2 (8)	3 (7)
1	3 (75)	12 (72)	0 (0)	16 (73)	2 (13)	2 (100)	1 (14)	5 (21)	21 (46)
2	0 (0)	5 (28)	0 (0)	5 (23)	0 (0)	0 (0)	0 (0)	0 (0)	5 (11)
3	0 (0)	0 (0)	0 (0)	0 (0)	2 (13)	0 (0)	0 (0)	2 (8)	2 (4)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	4 (27)	0 (0)	0 (0)	4 (17)	4 (9)
7	0 (0)	0 (0)	0 (0)	0 (0)	6 (40)	0 (0)	5 (71)	11 (46)	11 (24)
Totals	4 (100)	18 (100)	0 (0)	22 (101)	15 (100)	2 (100)	7 (99)	24 (100)	46 (101)

Total harvest 22

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 127. Harvest Statistics for the Mulchatna Caribou Herd, GMU 17, 1979-80

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	2 (4)	0 (0)	0 (0)	2 (2)	1 (6)	0 (0)	1 (14)	2 (8)	4 (3)
1	41 (91)	31 (100)	17 (100)	89 (96)	13 (81)	3 (100)	6 (86)	22 (85)	111 (93)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	1 (2)	0 (0)	0 (0)	1 (1)	1 (6)	0 (0)	0 (0)	1 (4)	2 (2)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	7 (2)	0 (0)	0 ( )	1 (1)	1 (6)	0 (0)	0 (0)	1 (4)	2 (2)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	45 (99)	31 (100)	17 (100)	93 (100)	16 (99)	3 (100)	7 (100)	26 (101)	119 (100)

Total harvest 101

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 128. Harvest Statistics for the Mulchatna Caribou Herd, GMU 19, 1979-80

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	1 (3)	0 (0)	0 (0)	1 (1)	2 (22)	1 (10)	0 (0)	3 (4)	4 (4)
1	23 (77)	35 (100)	12 (100)	70 (91)	6 (67)	9 (90)	2 (100)	17 (81)	87 (89)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	3 (10)	0 (0)	0 (0)	3 (4)	0 (0)	0 (0)	0 (0)	0 (0)	3 (3)
4	2 (7)	0 (0)	0 (0)	2 (3)	0 (0)	0 (0)	0 (0)	0 (0)	2 (2)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	1 (11)	0 (0)	0 (0)	1 (5)	1 (1)
7	1 (3)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	98 (100)
Totals	30 (100)	35 (100)	12 (100)	77 (100)	9 (100)	10 (100)	2 (100)	2 (100)	98 (100)

Total harvest 79

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 129. Harvest Statistics for the Mulchatna Caribou Herd, GMUs 9, 16, 17, 19, 1980-81

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	5 (4)	3 (3)	0 (0)	8 (3)	4 (8)	2 (10)	1 (20)	7 (9)	15 (5)
1	110 (87)	100 (94)	4 (80)	214 (90)	30 (61)	17 (81)	1 (20)	48 (64)	262 (82)
2	1 (1)	0 (0)	0 (0)	1 (0)*	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)*
3	6 (5)	2 (2)	0 (0)	8 (3)	2 (4)	2 (10)	0 (0)	4 (5)	12 (4)
4	1 (1)	0 (0)	0 (0)	1 (0)*	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)*
5	1 (1)	0 (0)	0 (0)	1 (0)*	1 (2)	0 (0)	0 (0)	1 (1)	2 (1)
6	1 (1)	0 (0)	1 (20)	2 (1)	3 (6)	0 (0)	0 (0)	3 (4)	5 (2)
7	1 (1)	1 (1)	0 (0)	2 (1)	9 (18)	0 (0)	3 (60)	12 (16)	14 (4)
Totals	126 (101)	106 (100)	5 (100)	237 (98)	49 (99)	21 (101)	5 (100)	75 (99)	312 (100)

Total harvest 245 (Estimated harvest 500-800)

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 130. Harvest Statistics for the Mulchatna Caribou Herd, GMU 9, 1980-81

Transport Means	# % Successful Hunters Resident	Nonresident	Unknown	Total Successful Hunter	# % Unsuccessful Hunters Resident	Nonresident	Unknown	Total Unsuccessful Hunters	Total Hunters
Unknown	1 (8)	1 (7)	0 (0)	2 (7)	1 (14)	0 (0)	0 (0)	1 (11)	3 (8)
1	12 (92)	13 (93)	0 (0)	25 (93)	5 (71)	2 (100)	0 (0)	7 (78)	32 (89)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	1 (14)	0 (0)	0 (0)	1 (11)	1 (3)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	13 (100)	14 (100)	0 (0)	27 (100)	7 (99)	2 (100)	0 (0)	9 (100)	36 (100)
Total harvest 27									

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 131. Harvest Statistics for the Mulchatna Caribou Herd, GMU 16, 1980-81

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	1 (25)	2 (7)	2 (5)
1	9 (90)	1 (100)	0 (0)	10 (83)	6 (30)	3 (100)	0 (0)	9 (33)	19 (49)
2	1 (10)	0 (0)	0 (0)	1 (8)	0 (0)	0 (0)	0 (0)	0 (0)	1 (3)
3	0 (0)	0 (0)	0 (0)	0 (0)	1 (5)	0 (0)	0 (0)	1 (4)	1 (3)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	1 (100)	1 (8)	3 (15)	0 (0)	0 (0)	3 (11)	4 (10)
7	0 (0)	0 (0)	0 (0)	0 (0)	9 (45)	0 (0)	3 (75)	12 (44)	12 (31)
Totals	10 (100)	1 (100)	1 (100)	12 (99)	20 (100)	3 (100)	4 (100)	27 (99)	39 (101)

Total harvest 12

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 132. Harvest Statistics for the Mulchatna Caribou Herd, GMU 17, 1980-81

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	1 (2)	1 (3)	0 (0)	2 (2)	1 (11)	1 (14)	0 (0)	2 (12)	4 (4)
1	43 (90)	35 (97)	2 (100)	80 (93)	7 (78)	4 (57)	0 (0)	11 (69)	91 (89)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	4 (8)	0 (0)	0 (0)	4 (5)	1 (11)	2 (29)	0 (0)	3 (19)	7 (7)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	48 (100)	36 (100)	2 (100)	86 (100)	9 (100)	7 (100)	0 (0)	16 (100)	102 (100)

Total harvest 89

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 133. Harvest Statistics for the Mulchatna Caribou Herd, GMU 19, 1980-81

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	3 (5)	1 (2)	0 (0)	4 (4)	1 (8)	1 (11)	0 (0)	2 (9)	6 (4)
1	46 (82)	51 (93)	2 (100)	99 (88)	12 (92)	8 (89)	1 (100)	21 (91)	120 (89)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	2 (4)	2 (4)	0 (0)	4 (4)	0 (0)	0 (0)	0 (0)	0 (0)	4 (3)
4	1 (2)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
5	1 (2)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
6	1 (2)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
7	1 (2)	1 (2)	0 (0)	2 (2)	0 (0)	0 (0)	0 (0)	0 (0)	2 (1)
Totals	55 (99)	55 (101)	2 (100)	112 (101)	13 (100)	9 (100)	1 (100)	23 (100)	135 (100)

Total harvest 117

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 134. Harvest Statistics for the Mulchatna Caribou Herd, GMUs 9, 16, 17, 19, 1981-82

Transport Means	# % Successful Hunters			Total Successful Resident	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	11 (9)	10 (8)	1 (9)	22 (8)	7 (10)	1 (6)	2 (29)	10 (11)	32 (9)
1	102 (82)	110 (88)	8 (73)	220 (84)	41 (58)	15 (94)	3 (43)	59 (63)	279 (79)
2	1 (1)	4 (3)	0 (0)	5 (2)	1 (1)	0 (0)	0 (0)	1 (1)	6 (2)
3	8 (6)	1 (1)	1 (9)	10 (4)	4 (6)	0 (0)	1 (14)	5 (5)	15 (4)
4	1 (1)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
5	2 (2)	0 (0)	1 (9)	3 (1)	2 (3)	0 (0)	1 (14)	3 (3)	6 (2)
6	0 (0)	0 (0)	0 (0)	0 (0)	3 (4)	0 (0)	0 (0)	3 (3)	3 (1)
7	0 (0)	0 (0)	0 (0)	0 (0)	13 (18)	0 (0)	0 (0)	13 (14)	13 (4)
Totals	125 (101)	125 (100)	11 (100)	261 (99)	71 (100)	16 (100)	7 (100)	94 (100)	355 (101)

Total harvest 277 (Estimated harvest 800-1,000)

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

* Percentages of less than 0.5% are denoted as 0%.

Table 135. Harvest Statistics for the Mulchatna Caribou Herd, GMU 9, 1981-82

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	2 (7)	0 (0)	0 (0)	2 (5)	1 (11)	0 (0)	2 (67)	3 (23)	5 (9)
1	22 (79)	12 (100)	3 (75)	37 (84)	7 (78)	1 (100)	0 (0)	8 (62)	45 (79)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	3 (11)	0 (0)	0 (0)	3 (7)	0 (0)	0 (0)	0 (0)	0 (0)	3 (5)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	1 (4)	0 (0)	1 (25)	2 (5)	1 (11)	0 (0)	1 (33)	2 (15)	4 (7)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	28 (101)	12 (100)	4 (100)	44 (101)	9 (100)	1 (100)	3 (100)	13 (100)	57 (100)

Total harvest 46

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 136. Harvest Statistics for the Mulchatna Caribou Herd, GMU 16, 1981-82

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	0 (0)	0 (0)	0 (0)	0 (0)	4 (14)	0 (0)	0 (0)	4 (13)	4 (8)
1	8 (89)	6 (60)	0 (0)	14 (74)	6 (21)	2 (100)	1 (100)	9 (29)	23 (46)
2	1 (11)	4 (40)	0 (0)	5 (26)	1 (4)	0 (0)	0 (0)	1 (3)	6 (12)
3	0 (0)	0 (0)	0 (0)	0 (0)	1 (4)	0 (0)	0 (0)	1 (3)	1 (2)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	3 (11)	0 (0)	0 (0)	3 (10)	3 (6)
7	0 (0)	0 (0)	0 (0)	0 (0)	13 (46)	0 (0)	0 (0)	13 (42)	13 (26)
Totals	9 (100)	10 (100)	0 (0)	19 (100)	28 (100)	2 (100)	1 (100)	31 (100)	50 (100)

Total harvest 19

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 137. Harvest Statistics for the Mulchatna Caribou Herd, GMU 17, 1981-82

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	2 (4)	2 (8)	1 (33)	5 (7)	2 (11)	0 (0)	2 (67)	4 (15)	9 (9)
1	41 (87)	24 (92)	1 (33)	66 (87)	15 (79)	4 (100)	0 (0)	19 (73)	85 (83)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	3 (6)	0 (0)	1 (33)	4 (5)	1 (5)	0 (0)	1 (33)	2 (8)	6 (6)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	1 (2)	0 (0)	0 (0)	1 (1)	1 (5)	0 (0)	0 (0)	1 (4)	2 (2)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	47 (99)	26 (100)	3 (99)	76 (100)	19 (100)	4 (100)	3 (100)	26 (99)	102 (100)

Total harvest 83

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 138. Harvest Statistics for the Mulchatna Caribou Herd, GMU 19, 1981-82

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	7 (17)	8 (10)	0 (0)	15 (12)	0 (0)	1 (11)	0 (0)	1 (4)	16 (11)
1	31 (76)	68 (88)	4 (100)	103 (84)	14 (99)	8 (89)	0 (0)	22 (88)	125 (85)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	2 (5)	1 (1)	0 (0)	3 (2)	2 (12)	0 (0)	0 (0)	2 (8)	5 (3)
4	1 (2)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	41 (100)	77 (99)	4 (100)	122 (99)	16 (100)	9 (100)	0 (0)	25 (100)	147 (100)

Total harvest 129

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 139. Harvest Statistics for the Mulchatna Caribou Herd, GMUs 9, 16, 17, 19, 1982-83

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	5 (3)	2 (3)	0 (0)	7 (3)	11 (23)	3 (21)	1 (11)	15 (21)	22 (7)
1	126 (87)	69 (90)	25 (78)	220 (87)	30 (64)	10 (71)	5 (56)	45 (64)	265 (82)
2	1 (1)	0 (0)	3 (9)	4 (2)	0 (0)	0 (0)	0 (0)	0 (0)	4 (1)
3	3 (2)	6 (8)	1 (3)	10 (4)	1 (2)	1 (7)	0 (0)	2 (3)	12 (4)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	10 (7)	0 (0)	2 (6)	12 (5)	2 (4)	0 (0)	0 (0)	2 (3)	14 (4)
6	0 (0)	0 (0)	1 (3)	1 (0)*	3 (6)	0 (0)	0 (0)	3 (4)	4 (1)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (33)	3 (4)	3 (1)
Totals	145 (100)	77 (101)	32 (99)	254 (101)	47 (99)	14 (99)	9 (100)	70 (99)	324 (100)

Total harvest 313 (Estimated harvest 1,300)

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

* Percentage of less than 0.5% are denoted as 0%.

Table 140. Harvest Statistics for the Mulchatna Caribou Herd, GMU 9, 1982-83

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	0 (0)	0 (0)	0 (0)	0 (0)	3 (43)	0 (0)	0 (0)	3 (43)	3 (6)
1	26 (90)	11 (92)	1 (100)	38 (90)	4 (57)	0 (0)	0 (0)	4 (57)	42 (86)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	2 (7)	1 (8)	0 (0)	3 (7)	0 (0)	0 (0)	0 (0)	0 (0)	3 (6)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	1 (3)	0 (0)	0 (0)	1 (2)	0 (0)	0 (0)	0 (0)	0 (0)	1 (2)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	29 (100)	12 (100)	1 (100)	42 (99)	7 (100)	0 (0)	0 (0)	7 (100)	49 (100)
Total harvest 44									

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 141. Harvest Statistics for the Mulchatna Caribou Herd, GMU 16, 1982-83

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	1 (20)	0 (0)	0 (0)	1 (6)	3 (25)	0 (0)	0 (0)	3 (17)	4 (12)
1	4 (80)	5 (100)	3 (50)	12 (75)	5 (42)	2 (100)	1 (25)	8 (44)	20 (59)
2	0 (0)	0 (0)	3 (50)	3 (19)	0 (0)	0 (0)	0 (0)	0 (0)	3 (9)
3	0 (0)	0 (0)	0 (0)	0 (0)	1 (8)	0 (0)	0 (0)	1 (6)	1 (3)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	0 (0)	0 (0)	3 (25)	0 (0)	0 (0)	3 (17)	3 (9)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	3 (75)	3 (17)	3 (9)
Totals	5 (100)	5 (100)	6 (100)	16 (100)	12 (100)	2 (100)	4 (100)	18 (101)	34 (101)

Total harvest 16

Transport means:

1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 142. Harvest Statistics for the Mulchatna Caribou Herd, GMU 17, 1982-83

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	2 (3)	1 (8)	0 (0)	3 (3)	1 (7)	1 (25)	1 (50)	3 (14)	6 (5)
1	58 (83)	9 (69)	11 (85)	78 (81)	12 (80)	2 (50)	1 (50)	15 (71)	93 (79)
2	1 (1)	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
3	0 (1)	3 (23)	0 (0)	3 (3)	0 (0)	1 (25)	0 (0)	1 (5)	4 (3)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	9 (13)	0 (0)	2 (15)	11 (11)	2 (13)	0 (0)	0 (0)	2 (10)	13 (11)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	70 (100)	13 (100)	13 (100)	96 (99)	15 (100)	4 (100)	2 (100)	21 (100)	117 (99)

Total harvest 146

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Table 143. Harvest Statistics for the Mulchatna Caribou Herd, GMU 19, 1982-83

Transport Means	# % Successful Hunters			Total Successful Hunter	# % Unsuccessful Hunters			Total Unsuccessful Hunters	Total Hunters
	Resident	Nonresident	Unknown		Resident	Nonresident	Unknown		
Unknown	2 (5)	1 (2)	0 (0)	3 (3)	4 (31)	2 (25)	0 (0)	6 (25)	9 (7)
1	38 (93)	44 (94)	20 (83)	92 (92)	9 (69)	6 (75)	3 (100)	18 (75)	110 (89)
2	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
3	1 (2)	2 (4)	1 (8)	4 (4)	0 (0)	0 (0)	0 (0)	0 (0)	4 (3)
4	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
5	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
6	0 (0)	0 (0)	1 (8)	1 (1)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)
7	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Totals	41 (100)	47 (100)	12 (99)	100 (100)	13 (100)	8 (100)	3 (100)	24 (100)	124 (100)

Total harvest 107

Transport means:
1. Airplane
2. Horse
3. Boat
4. Motorcycle
5. Snowmachine
6. Offroad vehicle
7. Highway vehicle

Black-tailed Deer Human Use

I. MANAGEMENT HISTORY

Wildlife management in Alaska was formally established in 1925 when Congress created the Alaska Game Commission. Prior to 1925, protection of wildlife had been undertaken by the Departments of Treasury, Commerce, and Agriculture, and by the territorial governor. After statehood in 1959, the State of Alaska assumed administration of its wildlife and established the Department of Fish and Game.

A. Management Objectives

Currently, there are four strategic deer management plans that apply to discrete areas in the Southwest Region. Because deer are distributed only in the Kodiak/Afognak islands area, these plans are restricted to GMU 8. The primary management objective for deer in GMU 8 is to provide the greatest sustained opportunity to participate in hunting deer.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

A. Kodiak/Afognak Islands Area

Management problems that have been identified for deer in the Kodiak/Afognak islands area (GMU 8) in general include the following:

1. Distribution of hunting pressure, which has increased substantially in recent years, proportional to deer population density cannot presently be achieved. Rapidly expanding deer herds in remote areas are not being harvested in sufficient numbers to prevent range deterioration and subsequent population declines. Because of limited access sites and continued increases in hunting pressure, littering and trash accumulations are becoming a problem in remote areas.
2. Competition for habitat in areas with high human populations limits deer populations in the most accessible hunting areas. Competition for forage with cattle, usurpation of winter range by housing and industrial development, increasing harassment and predation by free-roaming dogs, and illegal harvest of deer reduce hunting opportunity in readily accessible areas.
3. Development of the logging industry may have a negative impact on deer range in forested areas on Afognak, Shuyak, and Raspberry islands, and on northern Kodiak Island. Experience with logging in other areas of Alaska indicates that large clearcuts in deer winter range may be detrimental.

B. Southwest Region

Within all but the Tonki Management Area, most of the management areas have been selected by Native village corporations under provisions of the Alaska Native Claims Settlement Act. Public access for hunting may require cooperative agreements or negotiations with corporate landowners in the future.

Managerial problems in the specific deer management plans for the Southwest Region are identified below.

1. Northeastern Kodiak Island Deer Management Plan. This plan pertains to that portion of Kodiak Island draining eastward into Anton Bay, including all drainages into Narrow Strait and Chiniak Bay, and then into Ugak Bay east of the Rough Creek drainage.
    a. Much of the deer winter range is deteriorating as a consequence of residential and industrial development associated with human population growth and poor land use practices. Overbrowsing of winter ranges by cattle precludes any improvement in the quality of these areas for deer.
    b. Noncompliance with bag limits and out-of-season kills restrict the effectiveness of management.
2. Tonki Deer Management Plan. This plan pertains to that portion of Afognak Island east of a straight line from the mouth of Seal Bay Creek to the mouth of Sepora Creek.
    a. The limited availability of access points and trails may cause excessive hunter crowding in localized areas.
    b. Severe weather conditions and lack of adequate shelter discourage hunting and other recreational use.
    c. Low-flying aircraft, which are used to locate elk herds, disturb deer and diminish the quality of recreational experience for hunters and other recreationists.
    d. Deer winter range in the Seal Bay and Ishut Bay drainages will be impacted by road construction and clearcut logging within 10 years.
3. Southern Kodiak Island Deer Management Plan. This plan pertains to that portion of Kodiak Island west and south of the Horton Larsen Bay drainage, including Whale, Uganik, and Amook islands, and that part of Kodiak Island west and south of Saltery Creek drainage including Sitkalidak Island.
    a. Areas with high deer densities are relatively inaccessible, and the deer population is underharvested.
    b. Lack of adequate shelter discourages hunting in more remote areas.
4. Afognak Island Deer Management Plan. This plan pertains to that portion of Afognak Island west of a straight line from the mouth of Seal Bay Creek to the mouth of Saposa Creek, including Raspberry, Shuyak, Mormot, and adjacent islands, except Whale Island.
    a. The logging industry has only recently been introduced into Afognak Island. Experience in Southeast Alaska suggests that logging can be detrimental to deer winter range without proper design and layout of cuts. Deer are dependent on cover and food provided by mature timber during severe winters. Examination of previously logged areas on Afognak Island indicates that heavy growth of grass, fireweed, and salmonberry dominates clearcuts and that little forage is available under heavy snows except

on the fringes near spruce timber. Small well-spaced clearcuts could benefit deer populations by increasing preferred forage and improving habitat diversity.

b. Difficult access, severe fall weather, and lack of shelter restrict hunting effort.

III. PERIOD OF USE

Deer harvest in GMU 8 has steadily increased in recent years as the result of increasing deer populations, lengthy seasons, and increased bag limits (table 144).

Major access for deer hunting is by boat or float plane. Many local residents also use the road system extensively.

Harvest is expected to increase until such time as the deer population stabilizes or decreases.

A. Reported Annual Use and Harvest Data

The following harvest statistics are based on telephone surveys of 6 to 12% of Kodiak license buyers, except where noted. Generally, these figures underestimate the total harvest and the number of hunters afield because they do not take into account other Alaskan residents and nonresidents. The increased hunting pressure and harvest generally are indicative of the overall increase in the deer population and liberalization of season and bag limits.

IV. REFERENCES

Harvest information presented has been derived from big game data index files maintained in the Division of Game's regional offices. Management objectives and problems have been derived from individual species strategic management plans.

Smith, R.B. 1984. Personal communication. Area Game Biologist, ADF&G, Div. Game, Kodiak.

Table 144. GMU 8 Sitka Black-Tailed Deer Harvest, 1972-82

	1972	1973	1974	1975	1976	1977	1978*	1979	1980**	1981	1982***
No. hunters (Estimated no. hunters)	689	1,127	1,141	1,068	1,088	957	582	1,333 (1,096)*	1,783 (2,738)	1,541	1,648
No. deer harvested (Estimated harvest)	587	1,166	1,754	1,057	1,111	1,857	991	2,732 (2,365)	3,294 (5,347)	3,190	4,000 (6,000)
% hunter success	46%	47%	61%	47%	51%	81%	70%	75% (80%)*	70%	74%	71%
Mean no. deer per hunter	0.9	1.0	1.5	1.0	1.5	1.9	1.7	2.1 (2.1)*	1.8	2.1	2.4
Mean no. hunting days per deer	5.2	5.0	3.7	4.8	3.8	2.3	---	3.1 (1.8)*	2.7	---	2.7

* Based on incompleted returns of hunter harvest reports.
** Based on 1969 hunters responding to mail questionnaire.
*** Based on extrapolation of 148 questionnaires representing 7% sample of Kodiak hunting license buyers.

Elk Human Use

I. MANAGEMENT HISTORY

Wildlife management in Alaska was formally established in 1925 when Congress created the Alaska Game Commission. Prior to 1925, protection of wildlife had been undertaken by the Departments of Treasury, Commerce, and Agriculture, and by the territorial governor. After statehood in 1959, the State of Alaska assumed administration of its wildlife and established the Department of Fish and Game.

A. Management Objectives

Management objectives have been outlined in the Afognak Elk Management Plan. This plan pertains to all of Afognak, Raspberry, and Little Raspberry islands in GMU 8.

In the Afognak Elk Management Plan, the primary management objective is to provide the greatest sustained opportunity to participate in hunting elk.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

The following management problems have been identified for elk on Afognak and Raspberry islands:

A. Potential losses of elk winter habitat to logging are an important consideration in the management of sustained elk populations. The most valuable stands of commercial timber grow along the coast, and many are critical winter habitat for elk. The depletion of willow and elderberry stands, the invasion of spruce into grass-shrubland communities, and the growing competition for forage from an increasing deer population make maintenance and enhancement of existing elk winter ranges increasingly important. Although clearcut logging results in temporary increases in growth of seral forbs and browse species, much of this vegetation is unavailable under winter snows. In addition, elk generally utilize the edges of clearcuts most heavily; therefore, large clearcuts are of less benefit than are small, well-spaced clearcuts with more edge area.

B. Illegal kills of elk were suspected to have retarded desirable growth in the accessible Raspberry Island elk herd in the early 1970's. However, the herd is currently back up to an acceptable level. Although development of an extensive logging road system on Afognak Island will improve the distribution of hunters, increased hunting pressure will result in shortened hunting seasons and reduced hunter opportunity. Additionally, increased poaching can be expected.

C. Much of the coastal land has been selected by Native village corporations under terms of the Alaska Native Claims Settlement Act. Should the corporate landowners close their lands to public access, a serious loss of hunting opportunity could occur.

D. Logging in the Perenosa Bay drainage may have negative impacts on elk winter range. In addition to the possible loss of available forage, disturbance by logging activity and truck traffic and increased use of all-terrain vehicles may temporarily reduce elk use of some areas.

E. The limited availability of access points and trails may cause excessive hunter crowding in localized areas.

Table 145 presents figures for reported elk harvest in GMU 8 from 1970 through 1982. Transportation means were primarily aircraft or boat, and most hunters were Alaskan residents. The increasing harvest of recent years in part reflects the increasing population of elk in the area. Because of severe winters, which occurred in the late 1960's and early 1970's, the elk population had declined from a previous estimated high of approximately 1,300 animals to about 500 animals by 1975. Since then, the elk population has increased and is near or above the previous high population estimates.

Table 145. GMU 8 Reported Elk Harvest in 1970-82

Year	No. Hunters	Reported Harvest	Hunter Success	Length (Days)
1970	184	62	34%	153
1971	190	27	14%	153
1972	112	18	16%	153
1973	116	18	16%	153
1974	118	30	25%	153
1975	123	23	19%	153
1976	239	26	11%	153
1977	200	24	12%	153
1978	242	45	19%	153
1979	375	68	18%	153
1980	538	101	19%	153
1981	619	112	18%	153
1982	705	151	21%	153

III. REFERENCES

Harvest information presented has been derived from big game data index files maintained in the Division of Game's regional offices. Management objectives and problems have been derived from individual species strategic management plans.

Moose Human Use

I. MANAGEMENT HISTORY

Wildlife management in Alaska was formally established in 1925, when Congress created the Alaska Game Commission. Prior to 1925, protection of wildlife had been undertaken by the Departments of Treasury, Commerce, and Agriculture, and by the territorial governor. After statehood in 1959, the State of Alaska assumed administration of its wildlife and established the Department of Fish and Game.

A. Management Objectives

Currently there are six strategic moose management plans, which pertain to discrete areas within the Southwest Region. Generally, the management objectives for the region are to provide the greatest sustained opportunity to hunt moose under aesthetically pleasing conditions and to be selective in hunting moose. In areas where the moose resource is limited, such as in the Lower Nushagak-Wood River-Togiak area, one of the objectives is to provide sustained opportunities for subsistence use of wildlife.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

A. Southwest Region In General

Management problems identified for moose in the Southwest Region are as follows:

1. An influx of people associated with Outer Continental Shelf oil development or nearshore or onshore oil and mineral development will contribute significantly to the hunting pressure on local game populations. Subsequent major developments in transportation would substantially alter the access patterns and greatly increase pressure on populations adjacent to transportation corridors. As pressures increase on the moose resources of this region it will be necessary to further restrict hunters and hunting seasons in the area.
2. Hunting may be excluded by statute from several large areas in Southwestern Alaska. Extentions of Katmai National Park and the lands included within Lake Clark National Park and Wood River-Tikchik State Park constitute potential areas for exclusion of moose hunting. Transfer of title for several hundred thousand acres of land to village and regional corporations under terms of the Alaska Native Claims Settlement Act may significantly reduce public hunting opportunity in much of this region because the majority of hunters come from outside the region.
3. Populations of moose may decline in many areas to the level where they can no longer support established consumptive use. As the resource declines, various segments of the public can be expected to demand management of the resource for their exclusive benefit. In some instances, the level of demanded

use may exceed the capability of the population to support the harvest.

B. Individual Stategic Moose Management Plans

Management problems identified in individual moose management plans in the Southwest Region are as follows:

1. The Kvichak-Mulchatna Moose Management Plan. This plan pertains to that portion of GMU 9 north of the Egegik Bay drainage, except Katmai National Park, and to all of GMU 17, except the Lower Nushagak-Wood River-Togiak Moose Management Plan area.
   a. Oil and mineral exploration and development may increase access and prove detrimental to moose habitat.
   b. Large acreages of land along river systems containing prime moose habitat will be transferred to private ownership under terms of the Alaska Native Claims Settlement Act. Use of these lands by the public may be prohibited by private landowners, thereby concentrating public use on lands remaining open and creating potential overharvest conditions. Additional lands may be lost to moose hunting if a proposed state park is established in the Wood River Lakes area or on lands controlled by the USFWS.
   c. Methods used for moose hunting may be incompatible with management of brown bears.
   d. The area may be joined with the main state road system by additional road construction and/or marine highway system additions. An influx of people into the area and increased recreational use would probably alter the existing life style.
   e. The illegal winter-spring harvest by local residents will lower the moose population to a level that can no longer support any form of harvest.
2. The Lower Nushagak-Wood River-Togiak Moose Management Plan. This plan pertains to all drainages of the Togiak, Wood, and Nushagak rivers in GMU 17.
   a. Oil and mineral exploration or development may increase access and prove detrimental to moose habitat.
   b. Large acreages of land along river systems containing prime moose habitat will be transferred to private ownership under terms of the Alaska Native Claims Settlement Act. Use of these lands by the public may be prohibited by private landowners, thereby concentrating public use on lands remaining open and creating potential overharvest conditions. Additional lands may be lost for moose hunting if a proposed state park is established in the Wood River Lakes area or on lands controlled by the USFWS.
   c. Methods used for moose hunting may be incompatible with management of brown bears.
   d. The area may be joined with the main state road system by additional road construction and/or marine highway system

additions. An influx of people into the area and increased recreational use would probably alter the existing life style.

e. The illegal winter-spring harvest by local residents will lower the moose population to a level that can no longer support any form of harvest.

3. The Ivanof-Perryville Moose Management Plan. This plan pertains to that area in GMU 9 including all Alaska Peninsula drainages into the Pacific Ocean between American Bay and Castle Cape.
   a. Mineral development could have serious local impacts on the limited moose habitat or create additional hunting pressure through improved access or increased human population.
   b. As the human population of the Alaska Peninsula increases with the development of oil and mineral resources, local residents may not be able to compete with other segments of the public to obtain moose for domestic use.
4. The Becharof Lake-Cinder River Moose Management Plan. This plan pertains to that portion of GMU 9 including all drainages into Bristol Bay south of and including the King Salmon River that flow into Egegik Bay, including drainages of Port Heiden, the Bering Sea drainages north and east of Port Moller, to and including all drainages into Ilaik Lagoon, and all Pacific Ocean drainages into Chignik Bay.
   a. Oil and mineral exploration and development may alter the wilderness nature of the area, increase access, and prove detrimental to moose habitat.
   b. Land in private ownership or controlled by the National Park Service (Katmai National Park or Aniakchak National Park) may be closed to hunting or block access to other lands, thereby concentrating hunting pressures on remaining areas open to hunting. Concentration of hunters could result in excessive harvests of moose.
   c. Segments of the public may willfully ignore hunting regulations to ensure hunter success.
   d. Continued decline of the moose population may result in insufficient animals to maintain harvests or necessitate reduced harvest levels.
   e. Methods used for moose hunting may be incompatible with management for brown bears.
5. The Chiginagak Moose Management Plan. This plan pertains to all drainages into the Pacific Ocean from Katmai National Park on the northeast to Cape Kumliam on the southwest in GMU 9.
   a. Oil and mineral exploration and development may seriously alter the wilderness nature of the area, increase access, and prove detrimental to moose habitat.
   b. Portions of the area may be included in the proposed Aniakchak Caldera National Monument. Restrictions by National Park Service management could eliminate hunting on a significant portion of the moose population. Also,

lands within the area may be transferred to private ownership as a result of the Alaska Native Claims Settlement Act. Sport hunting by the public may be restricted by the land owners, or access across private land to public land could be blocked. These actions would serve to concentrate hunting pressure on remaining lands available to recreational hunters.

   c. Methods used in hunting moose may be incompatible with management for brown bears.
   d. Aircraft restrictions may encourage an increase in the use of all-terrain vehicles for hunting. Additional vehicles could result in an excessive harvest or in a significant deterioration of hunting aesthetics.
   e. A segment of the public may willfully ignore hunting regulations to ensure hunter success.
   f. The continued decline of the moose population through continued poor reproductive success may result in insufficient animals to support hunting.

6. The Southwestern Alaska Peninsula Moose Management Plan. This plan pertains to that area of GMU 9 on the Alaska Peninsula south and west of a line drawn between the heads of Moller Bay and American Bay.
   a. The area presently lacks a viable moose population.
   b. Oil and mineral exploration and development may seriously alter the wilderness nature of the area and prove detrimental to potential moose habitat.
   c. Hunting may be restricted on private lands acquired by Natives under terms of the Alaska Native Claims Settlement Act, or public access to adjoining lands may be blocked, forcing concentration of hunters elsewhere.
   d. Segments of the public may ignore regulations and harvest moose at a level that prevents a viable herd from becoming established.

III. REPORTED ANNUAL USE AND HARVEST DATA

Tables 146 and 147 present figures for reported moose harvest in GMUs 17 and 9 from the 1973-1974 hunting season through the 1982-1983 season. There are probably substantial numbers of moose killed each year in both GMUs that are not reported. Many of these moose are probably taken by local residents.

Reported moose harvest in GMU 17 has remained relatively static over the past 10 years. Harvest in GMU 9 has declined dramatically since the early 1970's. The moose population over much of GMU 9 has declined, apparently as a result of historic overuse of range (although current studies indicate that moose range is presently not a limiting factor). Brown bear predation upon moose calves now appears to be a significant factor holding the existing moose population at a low to moderate level. Because of the declining moose population since the early 1970's, hunting seasons have been much more restrictive.

Table 146. GMU 17 Reported Moose Harvest, 1973-74 Through 1982-83

	Successful Hunters				Unsuccessful Hunters					
Year	Res.	Non-res.	Unk.	Total	Res.	Non-res.	Unk.	Total	Total Hunter	Total Harvest
1973-74	26	15	1	42	47	5	0	52	94	42
1974-75	40	28	1	69	41	6	3	50	119	69
1975-76	52	56	7	115	77	12	3	92	207	115
1976-77	33	12	4	49	95	16	8	119	168	49
1977-78	39	13	2	54	47	10	2	59	113	54
1978-79	41	23	1	65	82	9	4	95	160	65
1979-80	23	8	2	33	28	7	0	35	68	33
1980-81	63	25	1	89	104	15	4	123	212	89
1981-82	54	17	5	76	118	7	8	133	209	76
1982-83	34	5	5	49	82	11	7	100	149	49

Table 147. GMU 9 Reported Moose Harvest, 1973-74 Through 1982-83

	Successful Hunters				Unsuccessful Hunters					
Year	Res.	Non-Res.	Unk.	Total	Res.	Non-Res.	Unk.	Total	Total Hunter	Total Harvest
73-74	415	313	51	779	274	52	10	336	1115	839
74-75	352	327	26	705	284	75	8	367	1072	705
75-76	124	103	5	232	166	28	10	204	435	232
76-77	137	108	3	248	268	44	3	285	533	248
77-78	100	63	22	185	157	26	18	201	386	185
78-79	127	85	12	224	220	32	10	262	486	224
79-80	85	116	18	219	91	19	6	116	335	219
80-81	116	86	4	206	204	52	7	263	469	206
81-82	104	62	6	172	188	41	14	243	415	172
82-83	58	35	25	118	737	31	18	186	304	118

IV. REFERENCES

Harvest information presented has been derived from big game data index files maintained in the Division of Game's regional offices. Management objectives and problems have been derived from individual species strategic management plans.

Waterfowl Human Use

I. MANAGEMENT HISTORY

With the exception of the tundra swan, which is a protected species, hunting in the State of Alaska is permitted for all species of waterfowl discussed in the waterfowl life history narratives. Waterfowl seasons in Alaska are set on an annual basis by both the state and federal governments. Usually during April, the commissioner of the ADF&G requests, in writing, regulations for the forthcoming season. This request, along with justifications, is sent to the director, Fish and Wildlife Service, Washington, D.C. During late June, the director's Advisory Committee on Waterfowl Regulations meets and recommends to the director and ultimately to the secretary of the interior what the season regulations will be. Alaska is a member of the Pacific Flyway Council, one of four such councils created to act in an advisory capacity to the federal government.

After the interior secretary approves the regulations, they are published in the Federal Register and become federal law. The ADF&G issues an emergency regulation setting the seasons, and thus the regulations become state law. States then have the option to be more restrictive than federal regulations permit but not more liberal (ADF&G 1976). Statewide, waterfowl seasons open during September or October and close in December or January.

II. PERIOD OF USE

Harvest data have been obtained through the ADF&G waterfowl hunter surveys (1974-1976) and USFWS parts collection surveys (1977-1981). These data have been summarized in the ADF&G's annual reports of survey and inventory activities for waterfowl. The authors of these reports state that sample sizes for the USFWS surveys are small and may not accurately represent harvest levels throughout the state. In most cases, ADF&G data from 1974 through 1976 are thought to be more accurate estimates of harvests in recent years. The ADF&G reinstated its own mail waterfowl survey after the 1982 season for the purpose of collecting data that would provide a more realistic assessment of waterfowl harvests.

A. Reported Annual Use and Harvest Data

Waterfowl hunters in Alaska declined annually from 13,811 hunters during the 1978-1979 season to 10,862 during the 1981-1982 season. Annual harvests of ducks declined statewide during this period from 122,431 to 78,209 birds. Mallards, pintails, green-winged teal, and wigeons were the species most frequently taken. Annual harvests of geese in Alaska generally declined during this period as well. The largest harvest was 17,433 geese (1977-1978), whereas the smallest harvest numbered 10,203 birds (1981-1982). Canada geese were the most frequently harvested species, comprising more than 60% of the statewide harvest during each year from 1977 through 1981.

The State of Alaska is divided into 11 waterfowl regions. The Southwest Region contains three: Kodiak is Region 9; the Alaska Peninsula is Region 10; and the Aleutian chain is Region 11. In Region 10, the waterfowl hunting season extends from 1 September to 16 December, whereas in Regions 9 and 11 it is from 8 October to 22 January.

1. Ducks. Survey information obtained by the ADF&G (1974-1976) and the USFWS (1978-1981) indicates that approximately 5 to 6% of the statewide duck harvest is derived from Region 10, 2 to 4% from Region 9, and about 0.5% from Region 11 (table 148). Areas in and around Cold Bay and Pilot Point are major hunting areas in the Southwest Region, with each contributing 1 to 2% of the statewide harvest. Table 149 illustrates the number and types of ducks harvested within Regions 9 and 10 from the 1977-1978 season through the 1981-1982 season.
2. Geese. The annual goose harvest in Region 10 represents an average of 47% of the total annual statewide harvest, according to USFWS survey data (1978-1981). This figure, ADF&G personnel believe, is high, and the actual percentage should be closer to the 38% projected by the ADF&G during the 1974-1976 period (table 150).

   Areas in and around Izembek Lagoon have produced the largest goose harvests within the Southwest Region. Data from the ADF&G (1974-1976) and the USFWS (1978-1980) indicate that production in this area represents 21 and 30% of the annual statewide harvest, respectively. The Pilot Point area is the only other area where the percentage of the annual statewide harvest exceeds 1%. Pilot Point contributes 11% of the statewide goose harvest annually, according to ADF&G figures (1974-1976), whereas USFWS data (1978-1980) indicate a 10% annual contribution. Unfortunately, the harvest of cacklers and snow geese at Pilot Point has dropped drastically, especially for cacklers during the past two years (Sellers, pers. comm.)

   In Region 10, as in other regions of the state, Canada geese are harvested in far greater numbers than the other species of geese. Estimates of the USFWS (1978-1981) show that Canada geese comprise 56%, emperor geese 33%, and black brant 12% of the Alaska Peninsula region's goose harvest. Limited numbers of white-fronted and snow geese were reported harvested in the USFWS surveys during this period (tables 151 and 152).

Table 148. A Comparison of Reported Duck Harvest from the 1978-79 Season through the 1981-82 Season USFWS Parts Collection Surveys with ADF&G Mail Survey, 1974-76 Three-Year Average

Harvest Area	Percentage Statewide Harvest					
	1974-76	1978-79	1979-80	1980-81	1981-82	1978-81 Average
North Slope	0.2	0	0	0	0.1	0
Seward Peninsula	1.4	0	0	0.8	0	0.2
Yukon valley	2.5	0	0	0	0.1	0
Central	18.0	14.6	25.0	15.3	18.0	18.2
Y-K delta	1.4	1.5	1.2	0.6	0.6	1.0
Cook Inlet	39.2	50.1	49.4	46.1	62.6	52.0
Gulf Coast	8.4	6.6	2.9	2.5	0.4	3.1
Southeast	20.6	14.6	11.5	25.1	8.8	15.0
Kodiak	2.7	3.6	7.3	4.7	1.3	4.2
Alaska Peninsula	5.1	9.0	2.7	4.9	8.2	6.2
Aleutian chain	0.5	0	0	0	0	0
Totals	100.0	100.0	100.0	100.0	100.1	99.9

Source: Campbell and Timm 1983.

Table 149. Species Composition (%) of the Duck Harvest Within Regions 9 (Kodiak) and 10 (Alaska Peninsula) As Compared to the Statewide Composition, 1977-82

	1977-78			1978-79			1979-80			1980-81			1981-82		
	Regions		State-	Regions		State-	Regions		State-	Regions		State-	Regions		State-
Species	9	10	wide	9	10	wide	9	10	wide	9	10	wide	9	10	wide
Mallard	28.0	25.2	29.7	32.4	15.9	34.3	50.0	57.6	36.6	26.0	18.5	28.1	50.0	13.9	28.0
Pintail	10.5	46.2	26.5	2.7	45.5	17.6	5.6	21.2	14.1	2.6	23.5	21.3	---	33.9	25.7
G-W teal	31.5	10.5	14.9	32.4	25.0	13.7	18.9	9.1	15.9	7.8	25.9	12.5	7.1	20.9	15.0
Wigeon	5.3	3.5	10.4	---	8.0	12.4	3.3	6.1	15.8	3.9	6.2	14.7	---	10.4	14.0
Shoveler	1.8	2.1	5.3	---	---	3.8	1.1	---	3.8	---	6.2	6.4	---	2.6	3.5
Gadwall	7.0	2.8	0.8	2.9	2.3	0.6	4.4	---	0.8	6.5	6.2	0.9	---	13.0	1.5
B.W. teal	---	---	0.6	---	---	0.1	---	---	0.5	---	---	1.1	---	---	Tr
Total dabblers	84.1	90.3	88.2	70.6	96.7	82.4	83.3	93.9	87.5	46.8	86.5	85.0	57.1	93.8	87.7
Barrows goldeneye	---	---	1.7	5.9	---	2.5	---	3.0	1.3	1.3	---	1.0	28.5	---	1.2
Common goldeneye	1.8	---	2.4	---	---	1.7	2.2	---	1.5	1.3	---	1.2	7.1	0.9	1.9
Bufflehead	3.5	---	1.8	11.8	---	3.2	6.7	---	1.1	10.4	---	2.0	7.1	---	1.5
Greater scaup	1.8	2.8	1.7	---	3.4	1.5	2.2	---	1.4	13.0	11.1	2.6	---	4.3	1.4
Lesser scaup	1.8	---	1.9	---	---	1.5	---	---	1.9	2.6	1.2	3.7	---	---	2.5
Canvasback	---	---	0.3	2.9	---	0.3	---	---	0.2	---	---	0.5	---	---	0.4
Ring-necked duck	---	---	0.3	---	---	0.3	---	---	0.2	---	---	0.8	---	---	0.3
Redhead	---	---	0.2	---	---	0.1	---	---	0.5	---	---	0.2	---	---	0.7
Total divers	8.9	2.8	10.3			11.1	11.1	3.0	8.2	28.6	12.3	12.5	42.7	5.2	9.9
Surf scoter	---	---	---	---	---	2.2	---	---	1.5	---	---	0.5	---	0.9	0.2
Common scoter	---	---		---	---	---	1.1	---	0.1	5.2	---	0.2	---	---	---
Mergansers	---	---	0.1	---	---	0.3	1.1	---	0.5	2.6	1.2	0.2*	---	---	0.4
Oldsquaw	---	1.4	0.4	---	---	0.8	---	---	0.1	1.3	---	0.1	---	---	0.5
Harlequin	3.5	2.8	0.4	8.8	---	1.5	3.3	---	0.4	6.5	---	0.5	---	---	---
W.W. scoter	1.8	1.4	0.4	---	---	1.7	---	---	1.5	1.3	---	0.6	---	---	1.2
Steller's eider	---	1.4	0.1	---	---	---	---	3.0	0.1	7.8	---	0.4	---	---	---
Common eider	1.8	---	1.0	---	---	---	---	---	---	---	---	---	---	---	---
Total sea ducks and mergansers	7.1	7.0	1.5	8.8	0.0	6.5	5.5	3.0	4.2	24.7	1.2	2.5	---	0.9	2.3
Sample size	57	143	1,647*	34	88	1565	90	33	1,321	77	81	1,688	14	115	1,483

* Includes birds harvested in unknown locations.

Table 150. Comparison of Reported Geese Harvest from the 1978-79 Season to the 1981-82 Season USFWS Parts Collection Surveys with ADF&G Mail Survey, 1974-76 Three-Year Average

	Percentage Statewide Harvest			
Harvest Area	1974-76	1979-80	1980-81	1981-82
North Slope	0.4	0.0	0.0	0.0
Seward Peninsula	4.4	0.0	2.4	0.0
Yukon valley	4.4	0.0	0.0	0.0
Central	8.1	7.7	1.4	1.0
Y-K delta	7.3	1.9	2.9	0.0
Cook Inlet	10.1	35.6	22.5	26.1
Gulf Coast	13.6	0.0	0.5	2.5
Southeast	13.1	23.1	22.0	11.1
Kodiak	0.2	0.0	0.0	0.0
Alaska Peninsula	38.2	31.7	48.3	59.8
Aleutian chain	0.1	0.0	0.0	0.0
Totals	99.0	100.0	100.0	100.5

Source: Campbell and Timm 1983.

Table 151. Calculated Statewide Harvest of Geese, 1977-81

	1977-78	1978-79	1979-80	1980-81	1981-82
Canada	11,309	8,986	11,742	9,477	8,846
Emperor	2,198	2,968	2,055	2,306	700
Black brant	2,041	738	733	87	505
White-fronted	1,257	1,156	586	249	152
Snow	628	84	---	125	---
Total	17,433	13,932	15,116	13,030	10,203

Sources: Campbell and Timm 1983; Timm 1978; Timm and Sellers 1979, 1980, 1982.

Table 152. Species Composition (%) of Goose Harvest within Region 10 as Compared to the Statewide Composition, 1978-81

	1978-79		1979-80		1980-81		1981-82	
	R-10	State	R-10	State	R-10	State	R-10	State
Canada	47.7	64.5	45.5	77.9	45.5	72.7	86.3	86.6
Emperor	41.9	21.3	39.4	13.5	39.4	17.7	12.7	6.8
Black brant	10.4	5.3	15.1	4.8	15.1	6.7	9.0	5.0
White-fronted	---	8.3	---	3.9	---	1.9	---	1.5
Snow	---	0.6	---	---	---	1.0	---	---
Sample size	86	163	33	104	101	209	119	199

Sources: Campbell and Timm 1983; Timm 1978, 1980, 1982; Timm and Sellers 1979.

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Trapping

Beaver Human Use

I. MANAGEMENT HISTORY

In 1925, the Alaska Game Commission was created by Congress "to protect game animals, land furbearing animals, and birds in Alaska, and for other purposes." Prior to that time, protection of wildlife had been under the jurisdiction of the Departments of Treasury, Commerce, and Agriculture, and of the territorial governor (ADF&G 1976). Since 1923, beaver pelts have been sealed. Since 1955, beaver pelts have been measured to determine the harvest and to separate the entire catch into age classes (Burris, pers. comm.). In 1959, the Department of Fish and Game was established and took over the jurisdiction of furbearers in the State of Alaska (Courtright 1968).

A. Management Objectives

The ADF&G's primary management objective for the Southwest Region is to provide for an optimum harvest of furbearers (including beaver). The secondary management goal is to provide the greatest opportunity to participate in hunting and trapping furbearers.

In areas of overharvest, it may be necessary to close the beaver trapping season entirely or enforce a very restricted season. In urban areas, to prevent property damage, beaver populations will be reduced below the carrying capacity of the habitat.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

Beavers chronically cause problems by blocking road culverts with dams, flooding private property, or cutting down trees on private property, and by blocking streams, which prevents movements of anadromous fish.

Most beavers are trapped near human settlements by local residents. Because beavers are easily overtrapped, intense trapping near villages and along road systems results in overharvests and the depletion of local populations. In Southwest Alaska, this is especially evident in the Nushagak, Togiak, and Kuskokwim drainages, where beavers are five times as abundant in remote locations as compared to areas near villages (ADF&G 1976, ADNR/USFWS 1983). Up to 40% of the harvest is kits near some villages, while 10% or less are kits in remote areas. Restrictive regulations have been in effect in most of northern Bristol Bay to allow beaver populations to recover from past overharvesting (ADNR/USFWS 1983).

On Kodiak Island (GMU 8), beavers have been overtrapped along the road system. Trapping pressure is mostly recreational (Palmer 1976). Beaver populations increased throughout Unit 17 during the late 1970's and early 1980's. Presently, they are at high levels throughout Unit 17 but have decreased slightly over the past two years (Taylor, pers. comm.).

III. PERIOD OF USE

A. Historical Background

Historically, beginning with the nineteenth century Russian fur trade, beavers have been one of Alaska's most important furbearers. In territorial days, heavy utilization of beavers caused a period of scarcity in the early 1900's, but populations have recovered and are now at moderate-to-high levels in many areas. Although beaver pelt prices have not risen dramatically, beavers remain an economically important furbearer in Alaska (ADF&G 1978). In GMU 17, beaver carcasses are an important food item to humans and a rich source of food for dogs (Ernest, pers. comm.).

B. Reported Annual Use and Harvest Data

Trapping pressure varies considerably from area to area. On Kodiak Island, trappers annually take about 200 beavers, but the prevailingly low prices offered for coastal beaver pelts discourage further effort there. Approximately 300 beavers are taken on the Alaska Peninsula (GMU 9). More than 1,600 beavers are taken in the Bristol Bay drainages (GMU 17), with the greatest harvest coming from the Togiak and Nushagak bay areas (ADNR/USFWS 1983). Frequently, the magnitude of beaver harvests in the Bristol Bay drainages has been associated with the relative success of the commercial salmon fishery. In years of poor salmon catches, larger beaver harvests occur. In recent years, however, the inverse relationship between salmon catches and beaver harvests has weakened with the advent of more stable salmon runs and changing village lifestyles (ibid.). Trapping pressure has increased annually from 1976 to 1981 and is expected to increase during the 1981-1982 season because of the increased season length in Subunit 17B (Taylor 1983).

For detailed harvest and use information, including number of users, harvest in numbers of animals, etc., see tables 153, 154, and 155. Herb Melchior, statewide furbearer biologist, ADF&G, has analyzed beaver harvest data for the past five years. That data have shown that the largest numbers of beavers sealed and harvested have generally come from GMUs 17 and 18. One year (1982-1983) is depicted on map 10, which gives the percentage of the total number of beavers sealed in Alaska by game management unit. In the year 1979-1980, a large percentage of sealed beavers also came from GMU 20, as well as from GMU 18 (Melchior, pers. comm.).

Table 153. GMU 8 Beaver Harvests, 1973-82

Year	Limit	Size Composition of Harvest (%)			Total Beavers Taken	No. Trappers	Avg. No. Beaver/Trapper	% of State Harvest
		Kits (Under 54")	Yearlings (Under 59")	Adults (Over 59")				
1973	No Limit	24.3	43.4	56.6	115	9	12.8	1.06
1974	No Limit	18.6	37.2	62.8	220	16	13.8	2.62
1975	No Limit	13.2	39.6	60.4	129	13	9.9	1.72
1976	No Limit	24.0	48.0	52.0	30	10	3.0	0.53
1977	No Limit	33.0	52.7	47.3	131	29	4.5	1.19
1978	No Limit	28.1	24.4	46.5	142	18	7.9	1.77
1979	No Limit	23.8	17.8	58.4	101	21	4.8	1.86
1980	No Limit	19.2	19.2	61.6	99	24	4.1	0.8
1981	No Limit	24.0	24.0	52.0	154	30	5.0	0.1-5.0
1982	No Limit	24.5	19.9	55.6	151	22	6.9	0.1-5.0

Sources: Ernest 1978 and 1980.

Table 154. GMU 9 Limited Beaver Harvests, 1973-82

Year	Limit	Size Composition of Harvest (%) Kits (Under 54")	Yearlings (Under 59")	Adults (Over 59")	Total Beavers Taken	No. Trappers	Avg. No. Beaver/Trapper	% of State Harvest
1973	40 & 20*	19.7	35.4	64.6	726	57	12.7	6.68
1974	40 & 20*	18.8	37.6	62.4	212	28	7.6	2.53
1975	40 & 20*	23.8	43.0	77.0	439	35	12.5	5.84
1976	40 & 20*	22.2	33.6	66.4	451	43	10.5	8.0
1977	40 & 20*	23.9	54.3	45.7	686	65	10.6	6.22
1978	40 & 20*	23.1	14.6	62.3	721	65	11.1	9.02
1979	40 & 20*	17.6	18.5	63.9	325	39	8.3	5.97
1980	40 & 20*	21.9	14.1	64.0	660	66	9.8	5.1
1981	40 & 20*	29.0	14.1	56.9	508	53	9.5	0.1-5.0
1982	40 & 20*	23.4	11.5	65.1	295	37	7.7	0.1-5.0

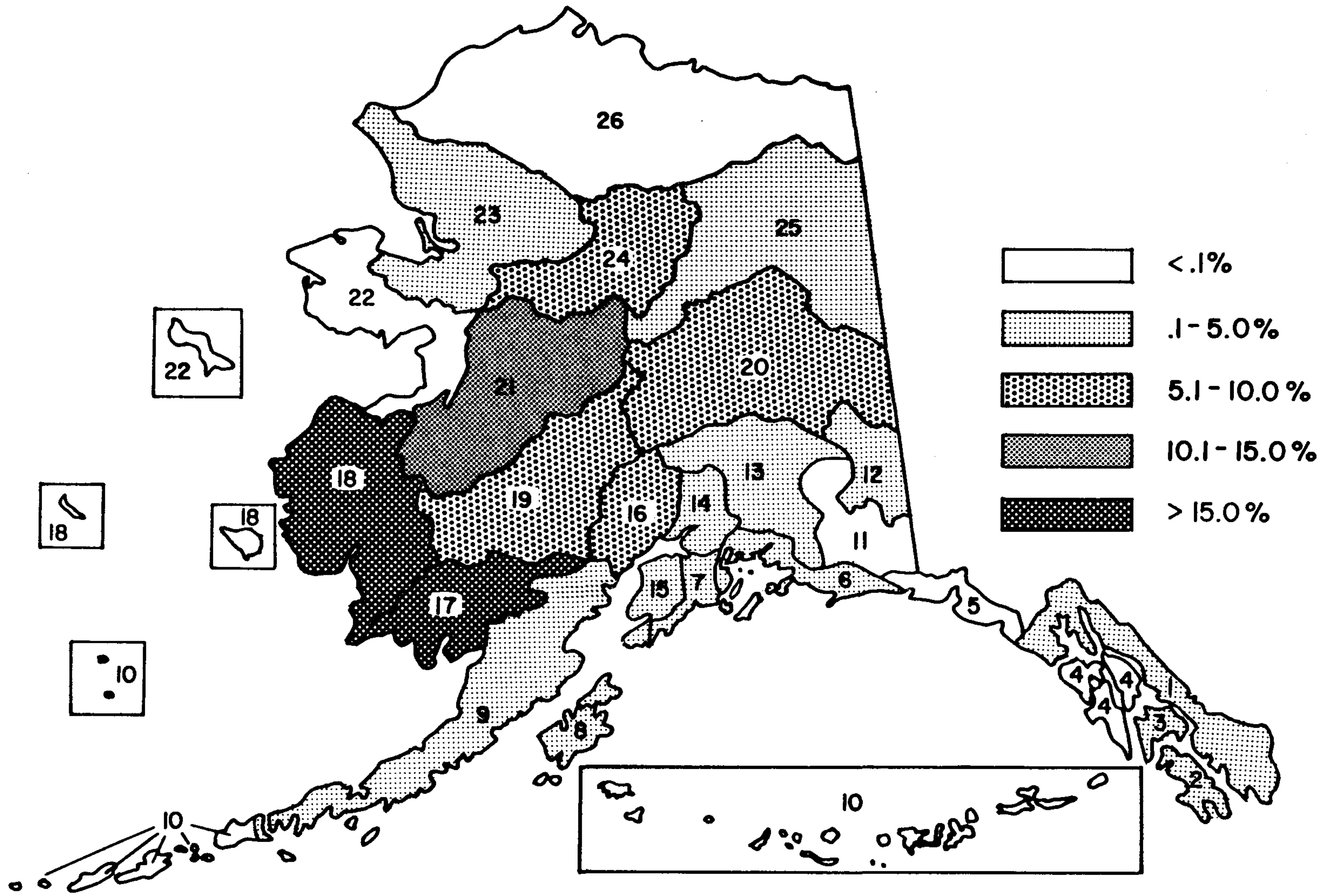
Sources: Ernest 1978 and 1980.

* Unit had different bag limits for subunits or portions of subunits.

Table 155. GMU 17 Limited Beaver Harvests, 1973-82

Year	Limit	Size Composition of Harvest (%) Kits (Under 54")	Yearlings (Under 59")	Adults (Over 59")	Total Beavers Taken	No. Trappers	Avg. No. Beaver/Trapper	% of State Harvest
1973	15	23.9	35.8	64.2	1,849	163	11.3	17.02
1974	15	23.9	36.6	63.4	1,681	169	9.9	20.02
1975	15	15.8	27.1	72.8	929	85	10.9	12.36
1976	15	22.2	32.7	66.4	637	66	9.7	11.29
1977	15	17.7	32.1	67.2	766	73	10.5	6.94
1978	10	23.5	35.5	64.2	802	75	10.7	10.0
1979	10	20.5	37.7	62.2	959	125	7.7	17.68
1980	10	27.7	40.4	59.6	1,478	190	7.8	11.6
1981	10	20.0	34.0	66.0	1,673	207	8.1	10.1-15.0
1982	10	20.9	33.2	66.8	1,693	201	8.4	15.0

Sources: Ernest 1978 and 1980.



Map 10. Percentage of total number of beavers sealed in Alaska in 1982-1983 by GMU (ADF&G furbearer files, Fairbanks).

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Furbearers Human Use

I. MANAGEMENT HISTORY

Prior to the establishment in 1925 by Congress of the Alaska Game Commission, protection of wildlife was under the Departments of Treasury, Commerce, or Agriculture and under the territorial governor (ADF&G 1976). Reporting of export of furs has been required since 1910 and dealer reporting since 1943 (Courtright 1968). Since statehood in 1959, fur dealers and individuals have reported the out-of-state export of raw pelts to the ADF&G as required by 5 AAC 84.120. The required data included the shipper's name, address, license number, and status as either a trapper or a fur dealer, along with the species, number of pelts, and destination of the shipment. Statewide furbearer harvest estimates prior to 1977 were computed by inflating the number of exported pelts of each species by a correction factor. For unsealed species, this is still being done (ADF&G 1979; Melchior, pers. comm.).

In 1971, the ADF&G started sealing wolf and wolverine to gather better harvest data. Prior to 1971, bounty records existed. In 1977, the federal government required that all lynx and otter pelts be sealed in compliance with terms of the Convention for International Trade in Endangered Species (CITES), an international agreement to which the United States is a signator (Bishop, pers. comm.).

Sealing is not required for coyote, marten, mink, muskrat, or red fox, nor for red squirrel, weasel (ermine), and white (arctic) fox, which are not discussed in this narrative. Statewide harvest information for these species is obtained from fur acquisition forms and fur export reports. This information is broken down by game management unit. The basis for the breakdown, however, is the residence of the seller or exporter, which may or may not properly reflect the area of harvest (Melchior, pers. comm.).

A. Management Objectives

The department is maintaining an active furbearer program to increase its knowledge of the population status and biological and ecological requirements of furbearers. Maintenance of suitable habitat is of foremost importance in furbearer management.

The department is managing furbearers for optimum sustained yield in most areas of Alaska. In many areas of the state, recreational activities constitute an important use of furbearers, and management will seek to provide maximum opportunities for all recreational uses.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

A. Harvest data are incomplete for all but sealed species (Melchior, pers. comm.). (See MANAGEMENT HISTORY and tables 156 and 157.)

B. Some species are subject to overexploitation (ADF&G 1976). Furbearer population levels and trends depend primarily on the abundance of food and weather. Most species, such as the river

Table 156. Comparison of the Estimated Statewide Furbearer Harvests and Estimated Average Price Per Pelt for the Last Three Seasons

	Estimated Harvests			Estimated Average Pelt Price		
	1980-81	1981-82	1982-83	1980-81	1981-82	1982-83
Coyote	150	150	150	99.00	61.87	27.46
Lynx	3,170	5,204	5,652	235.00	275.86	263.07
Marten	36,053	33,705	30,481	38.00	42.34	56.61
Mink	22,120	25,028	14,350	49.00	46.43	31.19
Muskrat	85,220	23,918	11,525	4.00	3.05	2.80
Otter	2,346	1,896	1,591	44.00	41.43	39.10
Red fox	11,850	13,587	6,026	90.00	88.86	51.66
Wolf	708	690	818	255.00	227.50	180.38
Wolverine	534	610	767	171.00	232.24	203.00

Source: Melchior 1984.

otter, that rely on a variety of prey species are less subject to fluctuations than are those, such as lynx, that are dependent on a single or only a few prey species. At times, disease (e.g., rabies and distemper) cause significant reductions in furbearer populations (ADF&G 1976).

C. Pelt prices often determine trapping intensity (and harvests) rather than harvests reflecting population density (ibid.).

D. Furbearers are very difficult to census; few data exist on population densities for most furbearer species (ibid.).

E. At times, substantial conflicts arise between humans and wolves over the use of prey. When those occur, wolf populations may have to be managed more intensively and human use of prey further regulated to minimize such conflicts.

Table 157. Reported Fur Exports, Estimated Harvest, and Estimated Raw Pelt Value, 1982-83

Species	Reported Exports	Estimated Harvet	Average Pelt Price[e]	Estimated Value ($)
Coyote	---	150[c]	27.46	4,119
Lynx	3,222	5,652[b]	263.07	1,486,871
Marten	16,379	30,481[d]	56.61	1,725,529
Mink	7,711	14,350[d]	31.19	447,577
Muskrat	6,193	11,525[d]	2.80	32,270
Otter (land)	869	1,591[b]	39.10	62,208
Red fox	3,238	6,026[d]	51.66	311,303
Wolf	---	818[b]	180.38	147,551
Wolverine	---	767[b]	203.00	155,701
Totals	37,612+	71,360		4,373,129

Source: Melchior 1984.

a Includes blacks, cross, and silvers.

b Number sealed.

c Lacking export data for coyotes, this is an educated guess.

d Estimates = 1.861 x reported exports (1.861 = mean of number of lynx and otter pelts sealed divided by number exported for lynx and otter).

e Most pelt prices from midwinter average prices paid for Alaskan goods at Seattle Fur Exchange. The exception is muskrat (May sale), which are from Ontario Trappers Association sales.

III. PERIOD OF USE

A. Historical Background

Known historical information has been included under each species account in III. B. below.

B. Reported Annual Use and Harvest Data

1. Most furbearer species are represented to some extent in many areas of Southwest Alaska. On a number of islands (primarily the Aleutians), furbearers are present as a result of past introductions from fur farming or from transplants to establish harvestable populations. Each individual species may vary in abundance according to habitat preferences and availability of food. There is little information available on numbers or utilization of the various species (ADF&G 1978).
2. Commercial trapping and domestic utilization are the most important uses of furbearers in much of Alaska, and some recreational trapping and nonconsumptive use occurs near urban centers. Most furs are sold, but some are retained for domestic use in parkas, mukluks, or as trim for garments; but almost all species are utilized to some extent, particularly when the furs are not in prime marketable condition. Lynx and muskrats are commonly utilized for both human and dog food, as well as for fur (Melchior, pers. comm.).
3. Trapping seasons have generally been timed to coincide with periods of pelt primeness. Harvests have had little effect on populations of most species of furbearers except for localized, easily accessible areas. In some areas, the income from trapped fur is the only source of cash in winter. In the Southwest Region, many residents combine fishing in summer with trapping in winter to provide for their needs.
4. Snowmachines and dog teams are the standard means of transport for trappers in bush communities. Aircraft are also used for trapping in remote areas, and boats are used for trapping along the beach fringes on Kodiak (GMU 8) and on the south side of the Alaska Peninsula (part of GMU 9) (ADF&G 1978; McCall, pers. comm.).
5. In the Southwest Region, river otter is important in GMU 8, slightly less important in GMUs 9 and 17, and of no importance in GMU 10. Lynx is the most important furbearer in GMU 9, of little importance in GMU 17 (less that 45/yr are harvested), and does not exist in GMUs 8 and 10. Wolves are moderately important in GMU 17 (range of annual harvest is 1 to 111 between 1962 and 1983) and GMU 9 (range of annual harvest is 4 to 52 from the period 1962-1983). Wolves do not exist in GMU 8, and only 12 wolves have been sealed from GMU 10 since statehood (1959). Wolverines are very important in GMU 9, moderately important in GMU 17, of little importance in GMU 10, and there are no wolverines found in GMU 8 (Melchior, pers. comm.).
6. Data on the harvest of unsealed species are obtained from fur dealer purchase reports and export reports. However, these data underestimate the harvest because some dealers and residents do not fully comply with the regulations, and there is no regulation requiring individuals to report the harvest of pelts kept for personal use. The degree to which data from

dealer and export reports underestimate harvest is not known, but comparison of data from these two sources with sealing data for beaver, lynx, and land otter indicates the actural harvest may be as much as 25 to 80% greater than reported (Melchior 1982).

7. Specific details relating to furbearer harvests are covered in the following species accounts.
   a. Coyote. Coyotes are believed to have first arrived in Alaska in 1915. There was a rapid population expansion in the 1930's. Prior to 1969 there was a statewide bounty of $30 for coyotes; however, no bounties have been paid since 1969 (ADF&G 1976). At the present time, coyotes occur as far west as the Alaska Peninsula and the north side of Bristol Bay. As a whole, coyotes are not especially abundant, although periodically populations become so locally, perhaps in response to fluctuations in snowshoe hare populations (ibid.). The coyote population seems to be fairly stable, and hunting does not appear to affect their abundance from year to year (Palmer 1976).

      Relatively few coyotes are trapped, and those are usually caught incidentally to trapping for fox, lynx, and wolf. A few coyotes are harvested by sport hunters using predator calls (McCall, pers. comm.). Most coyotes are sold commercially, although a few are used for parka ruffs and mittens (ADF&G 1976).

      In the Southwest Region, coyotes do not occur in the Kodiak Island area (GMU 8) nor in the Aleutian Islands (GMU 10). Coyotes occur both in the upper part of the Alaska Peninsula (GMU 9) and in the Bristol Bay area (GMU 17) (Palmer 1976). There are no harvest data available at this time (Melchior, pers. comm.).

      For the 1982-1983 season, the estimated harvest of coyotes statewide was guessed to be 150 (export data are lacking), and the 1982-1983 average price per pelt was $27.46, down from $99 in the 1980-1981 season (table 156).
   b. Land otter. Land otters are found throughout Southwest Alaska. Land otters are utilized most in coastal areas, and populations in these areas are relatively stable where they have access to the marine environment and a variety and abundance of food (Palmer 1976). Overtrapping is usually not a factor affecting population, but temporary reductions in a local population can be effected by an efficient trapper. Most otter hides are sold commercially, but in the Southwest Region they are often used domestically for trim on garments and slippers (ADF&G 1976).

      During the 1982-1983 season, 869 land otters were exported statewide. Trapping effort for land otters is low because they are diffcult to catch and skin and because their pelt prices are depressed (Melchior 1984). During 1982-1983, the average price for otter pelt was estimated to be $39.10, down from $44.00 in the 1980-1981 season (see table 156). The current estimated statewide value of otter pelts was $62,208 (table 157).

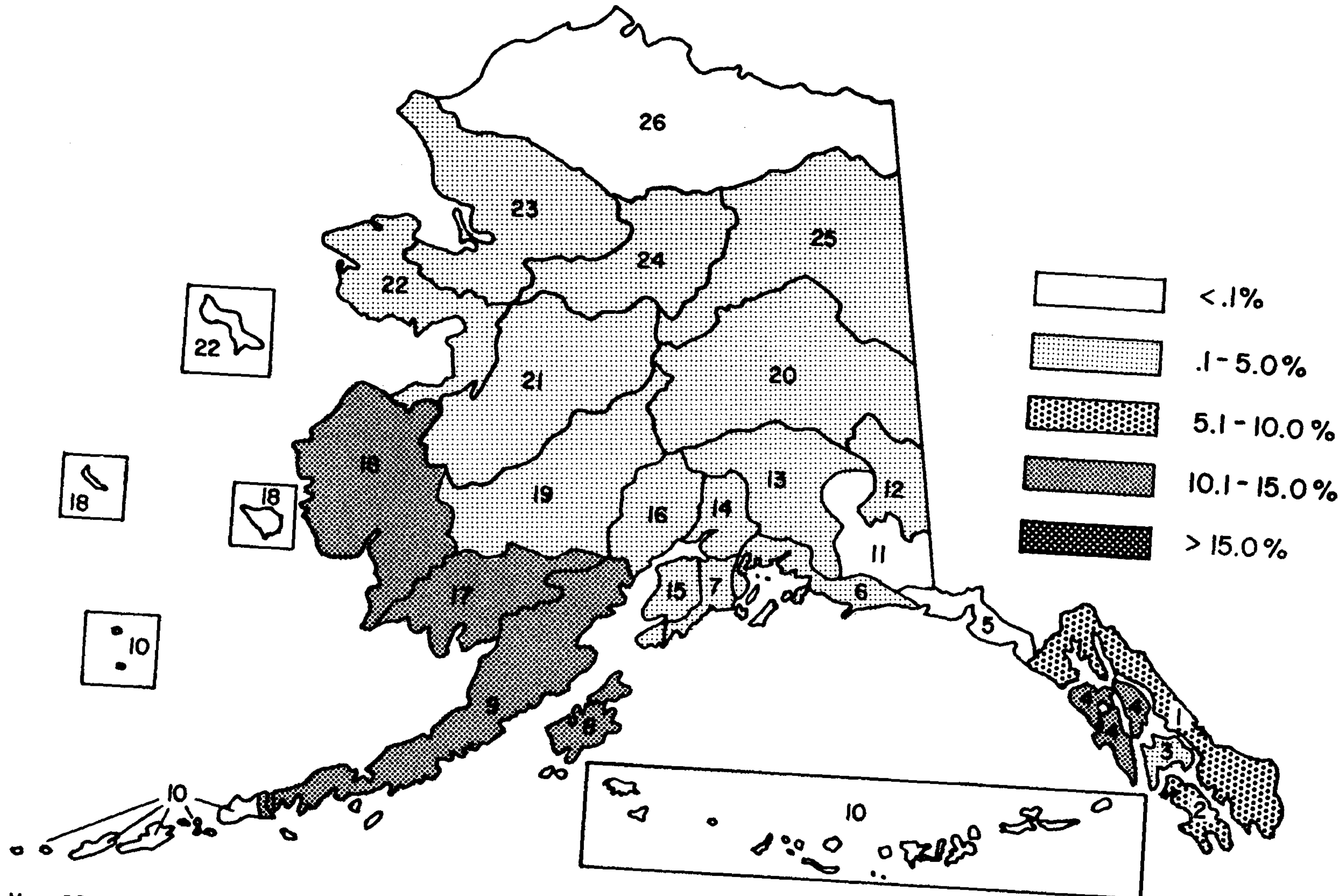
In the Southwest Region, the Kodiak Island area is considered prime otter habitat, and otters are an important furbearer. The harvest of land otters from Kodiak is relatively low because the number of commercial trappers is few. There is little domestic use of otter fur in the Kodiak area. Some barter between local and out-of-state fishermen takes place here (Palmer 1976).

Land otters are common throughout the Bristol Bay area (GMUs 9 and 17) and are abundant in the Kodiak Island area (GMU 8). They occur as far west as Akutan Island (ADF&G 1978) in the Aleutian chain (GMU 10), but have not been reported further west.

The average annual harvest of land otters from 1977 through 1983 for GMU 8 was 296, for GMU 9 144, for GMU 10 2, and for GMU 17 155 (for detailed harvest data see table 158 and map 11). The combined harvests from units 8, 9, and 17 make this region one of the most productive areas for land otters in the entire state. This is clearly reflected in the percentage that each unit represents of the total statewide harvest of land otter (see map 12).

c. Lynx. The number of lynx present in Alaska varies considerably in space and time. Statewide, lynx numbers have "peaked" seven times since 1910, when regular reporting of fur pelt exports became a requirement. The period between peaks has ranged from 8 to 16 years, with a mean of 10.8 years. However, sealing data, which provide information on the specific location of the harvest and has been gathered since 1977, show that fluctuations in the numbers of lynx harvests are asynchronous among game management units and perhaps even within game management units. For example, while statewide harvests were generally rising between 1977 and 1982, the harvest in GMU 9 declined form 195 to 61, but the harvest in GMU 17 during this same period remained relatively stable, ranging between 16 and 41 per year (Melchior, pers. comm.).

Courtright (1968), ADF&G survey and inventory data, and sealing data show that the minimum number of lynx harvested statewide in "peak" years has ranged from a low (exports) of 2,705 in 1939 to a high (exports) of 21,210 in 1917. Lynx has become popular for hats, coats, and trim. High pelt prices in recent years have resulted in increased trapping effort (Melchior, pers. comm.) (see table 159 for furbearer harvests and the approximate values for the period 1972-1977).



Map 11. Percentage of total number of otters sealed in Alaska in 1982-1983 by GMU (ADF&G furbearer files, Fairbanks).

Table 158. Alaska Land Otter Harvest, 1977-83

Unit	Year					
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
8	313	197	349	409	281	207
9	120	103	156	149	129	205
10	10	--	3	--	--	--
17	109	133	140	169	173	204
Statewide total	2,265	2,199	2,243	2,382	1,834	1,573

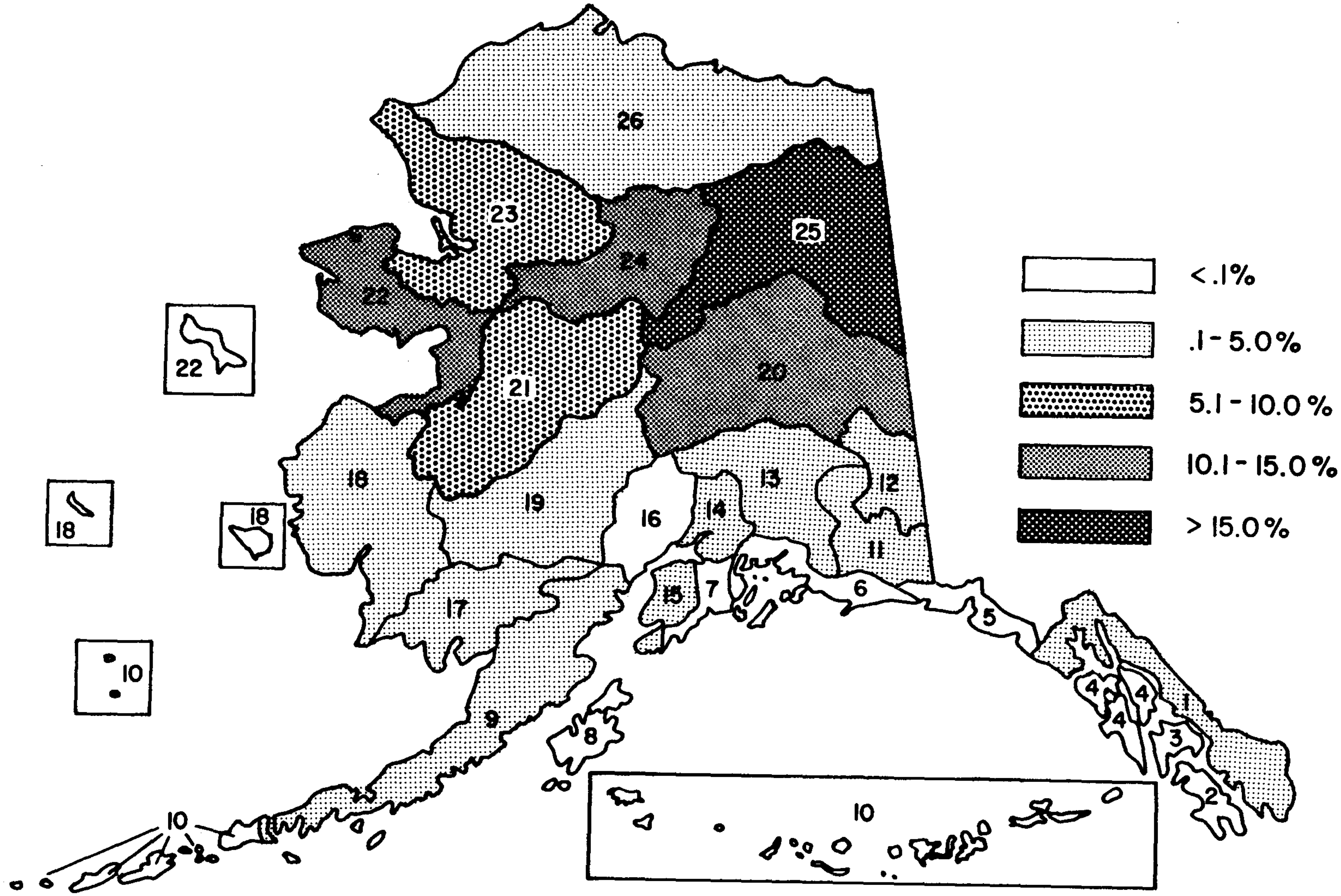
Percentage of Statewide Harvest by Game Management Unit

Unit	Year						Average
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	
8	13.8	9.0	15.6	17.2	15.3	13.2	14.0%
9	5.3	4.7	7.0	6.3	7.0	13.0	7.2%
10	0.4	--	0.1	--	--	--	0.1%
17	4.8	6.1	6.2	7.1	9.4	13.0	7.8%

Source: ADF&G furbearer files, Fairbanks.

Population estimates are not available for lynx, but they were very abundant over much of their range from about 1971 to 1974 and again from 1981 to the present (ibid.). From 1977-1983 an average of 3,555 lynx were harvested per year in Alaska (table 160). The current estimated statewide value of lynx pelts is $1,486,871, and the average price per pelt is $263.07.

In the Southwest Region, lynx occur in low numbers in GMUs 9 and 17, which are not prime habitat. They are not present in GMUs 8 or 10 (Palmer 1976). From 1977 to 1983 in GMUs 9 and 17, an average of 126 and 29 lynx, respectively, were caught annually (for detailed harvest data from 1977-1983 see table 160 and map 12).



Map 12. Percentage of total number of lynx sealed in Alaska in 1982-1983 by GMU (ADF&G furbearer files, Fairbanks).

Table 159. Furbearer Harvest and Approximate Value

	1972-73		1973-74		1974-75		1975-76		1976-77	
	Number	Approx. Value $	Number	Approx. Value $	Number	Approx. Value $	Number	Approx. Value $	Number	Approx. Value $
Muskrat	31,900	79,750	40,278	100,695	34,920	104,760	41,310	165,240	59,065	265,800
Mink	7,680	268,800	10,700	321,000	6,540	261,600	9,135	365,400	14,704	735,200
Marten	8,710	217,750	17,970	539,100	11,350	397,250	11,620	464,800	22,711	1,022,000
Land otter	2,570	141,350	2,540	114,300	2,010	120,600	2,100	105,000	3,355	218,080
Red fox	5,310	185,850	14,580	583,200	5,680	340,800	10,570	528,500	11,007	990,630
Lynx	5,130	589,950	8,970	1,121,250	5,100	765,000	3,040	532,000	2,252	450,400

Source: ADF&G furbearer files, Fairbanks.

Table 160. Alaska Lynx Harvest, 1977-83

Unit	Year					
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
9	195	129	143	127	61	98
17	36	30	25	41	16	25
Statewide total	2,014	2,416	2,743	3,285	5,221	5,652

Percentage of Statewide Harvest by Game Management Unit

Unit	Year						Average
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	
9	9.7	5.3	5.2	3.9	1.2	1.7	4.5%
17	1.8	1.2	0.9	1.3	0.3	0.4	0.9%

Source: ADF&G furbearer files, Fairbanks.

Sealing data obtained by the ADF&G from 1977-1983 indicate that an average of 4.5% of the statewide lynx harvest is derived from GMU 9 and 0.9% from GMU 17 (see table 160 and map 13).

Most of the lynx harvest is by local residents, and most trapping is centered around villages (ADF&G 1976).

d. Marten. Marten are one of the five most important furbearers in Alaska. Marten are one of the species most affected by trapping because they are easily trapped (McCall, pers. comm.). When the value of marten pelts increases, there is concomitant increase in trapping effort. Most marten trapped are sold commercially, and a few are kept for domestic use as garment trim and hats (Palmer 1976).

In the Southwest Region, marten are not abundant because prime martin habitat is absent. Marten were transplanted to Afognak Island in 1952 and continue to exist there (Burris and McKnight 1973). Marten are not present in the

Aleutian Islands or on most of the Alaska Peninsula (GMU 9), but they occur in the more northern part of GMU 9B). Marten are present in suitable habitat throughout Bristol Bay (GMU 17) (Palmer 1976).

For the 1982-1983 season, 16,379 marten were reported exported statewide, and the harvest was estimated to be 30,481 (table 157). For the period 1978-1980, the total number of marten reported exported in GMUs 9 and 17 represented 0.1% to 5.0% of the statewide reported exports. The 1982-83 estimated value of marten pelts statewide was $1,725,529, and the average price per pelt was $56.61, up from $38.00 in the 1980-1981 season (see tables 156 and 157 for more information).

e. Mink. Traditionally, mink have been one of the most important commercially trapped species of furbearers in the state. Reduced trapping effort in the past decade has been caused by reduced pelt prices, which are caused by the increased supply of ranch-raised mink and increased levels of employment (McCall, pers. comm.; ADF&G 1976). Harvest of mink is often variable, depending as much on the abundance of mink as on current market values. Most mink trapped are sold to outside buyers, although a few are kept for use as garment trim on slippers, gloves, hats, and parkas (ADF&G 1976).

In the Southwest Region, mink were transplanted in 1952 on Kodiak Island (GMU 8), but it appears the attempt failed (Burris and McKnight 1973). Mink do not occur in the Aleutian Islands (GMU 10). For the period 1978-1980, the total number of mink reported exported in GMUs 9 and 17 represented 5.0% or less of the total number of mink exported statewide. In the 1982-1983 season, 7,711 mink were reported exported statewide, and the harvest was estimated to be 14,350 (see table 157 for more information).

The 1982-1983 estimated pelt price was $31.19, off from $49.00 in the 1980-1981 season (see table 156).

f. Muskrat. Muskrats occur and are harvested to some degree throughout the Alaska mainland south of the Brooks Range except the Alaska Peninsula west of the Ugashik Lakes. Muskrats were introduced to Kodiak Island in 1929 and later to Afognak and Raspberry islands but are absent from most other Alaska islands. In the Southwest Region, muskrat abundance varies, depending on localized wetland habitat conditions (ADF&G 1976).

Muskrats are vulnerable to unfavorable weather conditions affecting their wetland habitat. Hunting and trapping have relatively little effect on muskrat populations, and a relatively small proportion of the total good muskrat habitat is hunted or trapped. Most of the muskrats harvested are taken by shooting with small-caliber rifles because trapping is considered too time-consuming (ibid.). In Alaska in the 1920's, 1930's, and early 1940's, muskrats represented a large proportion of the pelts exported from Alaska (Courtright 1968). Low prices combined with increased employment and availability of welfare are responsible for reduced harvest efforts, and consequently when pelt prices increase so may harvest (ADF&G 1976). Reported statewide muskrat exports during the 1982-1983 season was 6,193, and the extrapolated harvest was estimated to be 11,525 (table 157). This is a record low number since export-reporting was required in 1910 (e.g., reported exports in the previous three years were 1981-1982, 18,147; 1980-1981, 57,546; 1979-1980, 43,121) (Melchior, pers. comm.). The 1982-1983 price of a muskrat pelt averaged $2.80, off from $4.00 in the 1980-1981 season (table 156).

In the Southwest Region on Kodiak and Afognak islands, muskrat population densities are so low that they are rarely harvested. A few people do trap them recreationally, however. Muskrats are not present in the Aleutian Islands (GMU 10). Muskrats are present in the Alaska Peninsula area (GMU 9) and the Bristol Bay area (GMU 17); however, they are only moderately important as a furbearer in GMU 17. Most trapping is for commercial use, and the meat may be used domestically for human or dog food (Palmer 1976).

g. Red fox. Red fox populations fluctuate in response to the availability of food. This response seems to be caused by fluctuations of snowshoe hare and rodent populations. The best habitat for red foxes in the Southwest Region seems to be in the coastal areas of Units 8, 9, and 17. In coastal areas such as Kodiak Island (GMU 8) and the Alaska Peninsula/Bristol Bay areas (GMUs 9 and 17), red foxes feed on carrion on the beaches and are not so dependent on small mammal populations (ADF&G 1976).

In the Southwest Region, red foxes are native to Kodiak but were introduced to some of the other islands for the purpose of fox farming. Because of fox farming releases and escapees, there is a high incidence of silver and cross phases in these populations. Kodiak Island is prime red fox habitat because of the variety of food available as well as the beach carrion. On Kodiak, red fox populations are rarely low, as they do not have drastic population fluctuations there. Overtrapping is not a problem on Kodiak. Most foxes are taken for commercial use, although most trapping is considered recreational (ibid.).

On the Alaska Peninsula (GMU 9), Aleutian Islands (GMU 10), and Bristol Bay (GMU 17), red foxes are harvested primarily by trappers for domestic use or sale, although some sport hunting occurs. As a result of rabies epidemics, red fox populations fluctuate widely. Harvesting of red fox may be beneficial in lowering the magnitude of the epidemics, particularly around villages and towns (Palmer 1976).

The 1982-1983 average price per pelt of red fox was $51.66, off from $90.00 in the 1980-1981 season (table 106). For the period 1978-1980, the total number of red fox reported exported from GMUs 9 and 17 represented 5 to 10% of the statewide reported exports, and from GMUs 8 and 10 it was 0.1 to 5%. In the 1982-1983 season, 3,238 foxes were reported exported statewide, and the harvest was estimated to be 6,026 (see table 157 for more information).

h. Wolf. Wolves are an important and highly valued furbearer (ibid.). Because wolves are highly mobile predators, capable of obtaining a variety of prey sources, they are not usually subject to drastic fluctuations in population levels. The biggest population fluctuations observed in Alaska resulted from the predator-control programs of the 1950's, which included the use of poisons to reduce numbers. In 1915, Alaska's first territorial legislature established a bounty on wolves, and prior to 1960 there were no restrictions on the taking of wolves. From 1948 until 1959, the federal government conducted intensive wolf control operations in many parts of Alaska, using poisons, aerial shooting, and trapping. In 1959, the State of Alaska assumed managerial authority for wolves, and in 1960 the use of poisons was discontinued. The Board of Game in 1963 classified wolves as both furbearers and big game animals and promulgated regulations governing methods of harvest, seasons, and bag limits, thus providing additional protection for wolves. In 1968, the legislature authorized the Board of Game to abolish bounties in all but three game management units in Southeast Alaska (ADF&G 1976). Today, management of wolves in Alaska continues to be a controversial issue.

Generally, wolf abundance most likely varies in response to numerical changes in big game prey species. Aerial hunting has never had a sustained impact on Alaska Peninsula wolves because winter snow conditions seldom favor extensive use of this technique. It has, however, been both popular and effective in the upper Nushagak and Mulchatna river drainages. In Southwest Alaska, wolves are commonly observed, but estimates of wolf densities are lacking in specific areas (ibid.).

Although abundant in some areas of the state, wolves are generally less abundant on the coastal plain in the Southwest Region. The nature of human use of wolves in

Southwest Alaska has changed during this century. Early harvests were primarily by trapping or occasional ground shooting, and harvest levels were low. This pattern gradually shifted to aerial hunting, with somewhat increased harvest until this practice was discontinued in the early 1970's. Presently, most wolves are taken by ground shooting, either by sport hunters or trappers. The harvest in the Southwest Region is almost entirely by residents. The bulk of the harvest is for commercial purposes, but sport or subsistence use is also common. For village residents, wolf fur is valuable as a form of cash income and in the manufacture of various clothing, most notably parka ruffs (Palmer 1976). The current estimated statewide value of raw wolf pelts for the 1982-1983 season was $147,551, and the average, price per pelt was $180.38, off from $255.00 in the 1980-1981 season (tables 156 and 157).

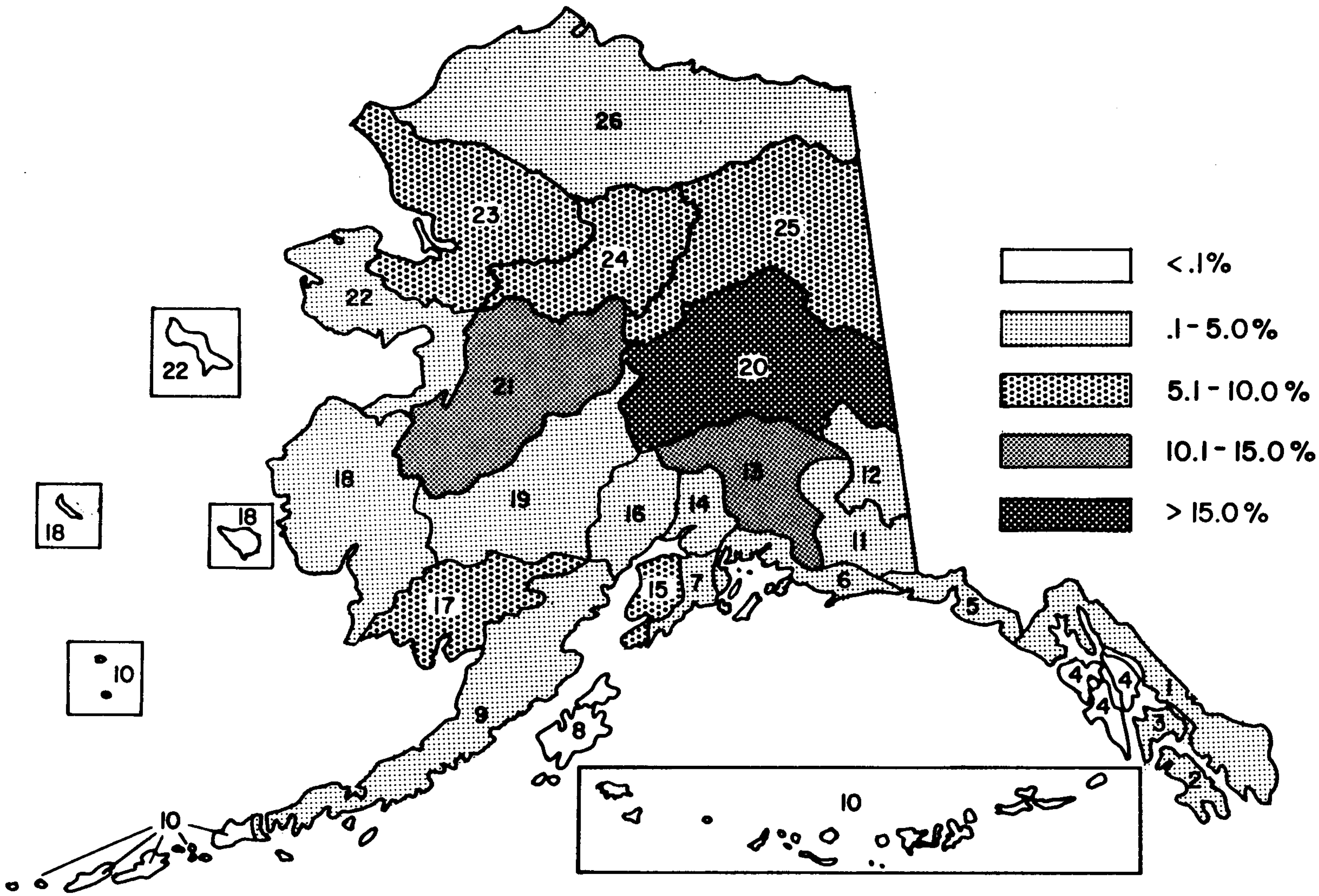
In the Southwest Region, wolves are not present in the Kodiak Island area (GMU 8). Wolves do occur throughout the Alaska Peninsula (GMU 9) and Bristol Bay region (GMU 17). In GMU 10 (the Aleutian Islands), wolves are restricted to Unimak Island (ibid.).

From 1977 to 1983 an average of 20 wolves (2.4% of the total statewide harvest) were harvested in Unit 9, and in Unit 17 the average was about 22 (2.8% of the total statewide harvest) (see table 161 for additional information). Only an occasional wolf was harvested on Unimak Island. For the 1982-1983 season 1.6% of the total number of wolves sealed statewide came from Unit 9 and 5.5% from Unit 17 (see map 13).

i. <u>Wolverine</u>. Wolverines are trapped throughout mainland Alaska. Population densities are variable, depending on suitable habitat and, in some western areas, on the degree of harvest (ADF&G 1976).

During the period 1977-1983, an average of 733 wolverines were harvested per year by hunters and trappers. Although some sealing (tagging) of wolverine skins is required, some skins are used locally for parkas, ruffs, and garment trim and are not always reported. Consequently, reported harvests are often minimum numbers. Trapping is the most common method of taking wolverine in forested areas, whereas in open country ground-shooting from snowmachines or with the aid of aircraft predominates (ibid.).

Use of wolverine varies among areas. In Southwest Alaska, most wolverines are in high demand for domestic use in garments, and few are sold commercially; most skins never leave the villages. Coastal villagers also acquire pelts by bartering with interior residents or purchasing from commercial furriers (Palmer 1976). The 1982-1983



Map 13. Percentage of total number of wolves sealed in Alaska in 1982-1983 by GMU (ADF&G furbearer files, Fairbanks).

Table 161. Alaska Wolf Harvest, 1977-83

Unit	Year					
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
9	26	17	21	22	18	13
17	17	20	25	8	17	45
Statewide total	916	906	679	740	603	819

Percentage of Statewide Harvest by Game Management Unit

Unit	Year						Average
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	
9	2.8	1.9	3.1	3.0	2.6	1.6	2.5%
17	1.9	2.2	3.7	1.1	2.5	5.5	2.8%

Source: ADF&G furbearer files, Fairbanks.

estimated value of raw wolverine pelts statewide was $155,701 (see table 157).

High prices for wolverine pelts and the continuing demand for local use of skins for garments provides continuous incentive to trappers and hunters (ADF&G 1976). In the Southwest Region, wolverines are not present in the Kodiak Island area (GMU 8). Wolverines occur throughout the Alaska Peninsula and Bristol Bay areas (GMUs 9 and 17). In the Aleutian Islands (GMU 10), they are restricted to Unimak Island. Existing harvest pressure in these units is low in spite of a high stable fur price (Palmer 1976). Harvest has averaged about 44 animals annually from Unit 17 and about 69 from Unit 9. This level of harvest is not considered to have a significant nonexistent because of a lack of hunting and trapping pressure (ibid.); harvests from the past six years average less than one wolverine taken.

During the 1982-1983 season, 9.3% of the statewide harvest of wolverines came from Unit 9 and 6.1% from Unit 17 (see map 14). See table 162 for the wolverine harvest from Units 9, 10, and 17 for the 1977-1983 seasons.
The 1982-83 price per pelt was $203.00, up from $171.00 in the 1980-81 season (see tables 156 and 157).

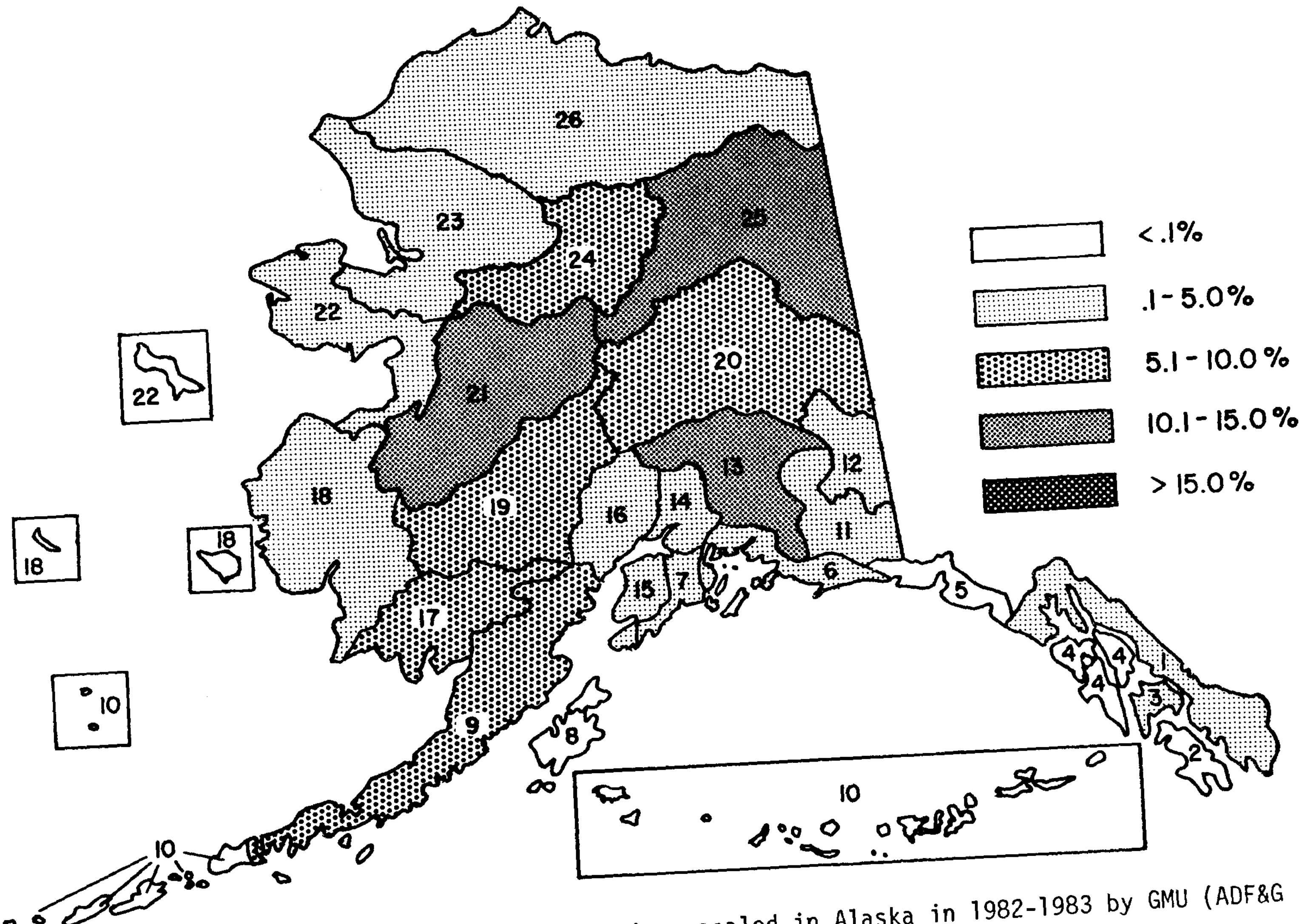
Table 162. Alaska Wolverine Harvest, 1977-83

Unit	Year					
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
9	86	80	64	42	72	68
17	49	43	46	40	39	47
Statewide total	909	807	716	567	631	768

Percentage of Statewide Harvest by Game Management Unit

Unit	Year						Average
	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	
9	9.5	9.9	9.0	7.4	11.4	8.9	9.4%
17	5.4	5.3	6.5	7.1	6.2	6.2	6.2%

Source: ADF&G furbearer files, Fairbanks.



Map 14. Percentage of total number of wolverines sealed in Alaska in 1982-1983 by GMU (ADF&G furbearer files, Fairbanks).

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Nonconsumptive Use

Pacific Walrus Human Use

I. MANAGEMENT HISTORY

The only significant documented nonconsumptive use of walrus in the Southwest Region is viewing and photography at the Walrus Islands State Game Sanctuary. Up to 15,000 walrus haul out annually in the sanctuary, mostly on Round, High, and Twin islands (see Distribution/Abundance section). The sanctuary was established in 1960 to protect the walrus and other game on the Walrus Islands (A.S.16.20.00). Regulations were promulgated to prohibit hunting and trapping in the sanctuary and to restrict access to Round Island (the major haulout) and the waters within .5 mi (5 AAC 81.300).

Because of the steady increase in visitor use in the past 10 years, and because it became necessary to distinguish nonconsumptive users from unauthorized users, a permit system (5 AAC 81.300) for access to Round Island was adopted by the Board of Game in the 1974-1975 season (Alaska Hunting Regulations 1974-1975). The permit was modified in 1982 to require that visitors notify department personnel on Round Island just prior to the visitors' arrival.

Although the Marine Mammal Protection Act of 1972 removed walrus management from the state, the department has continued to protect the sanctuary because of its authority to regulate access (5 AAC 81.300).

A. Current Use

Known visitor use of the sanctuary over the past six years is summarized in table 163. The mode of access to the island has been predominantly by boat. In spite of the unpredictable and often severe weather, lack of good boat or aircraft landing sites, and lack of visitor facilities, there has been an increase in visitor use (Taggert and Zabel 1982, ADF&G files). Several cruise ships, including the "Lindblad Explorer" (ADF&G files), have visited the sanctuary (Burns, pers. comm.). In addition to those mentioned above, the following factors affect visitor use of the sanctuary:

1. Timing and movements of the pack ice in Bristol Bay. Most walrus do not use the sanctuary until early summer when the Bering Sea ice moves out of the region. In years in which pack ice leaves later than usual or extends further south than usual, the walrus remain with the ice and are not common in the Walrus Islands until later in summer and are therefore not as available for viewing (ADF&G files).
2. Timing of the commercial fish seasons. Considerable visitor use is by commercial fishermen who are in the area and visit Round Island to view walrus (ibid.). The amount of such use is directly related to the timing of commercial fish seasons in the area (ibid.). In 1982, for example, because of the poor Bristol Bay sockeye salmon run, more boats remained in Bristol Bay to fish for silver salmon and visitor use of Round Island increased correspondingly (Taggert and Zabel 1982). In 1983, 139 fishermen came ashore during a two-day period of good weather that coincided with a closure in the herring season (Taggert and Zabel 1983).

Table 163. Visitor Use of Round Island[a]

Year	No. of Visitors[a]	No. of Visitor-Days	Transport Mode (No. of Visitor-Days)
1977	25[b]	102	Air (10); boat (15)
1978	305[c]	---	Air (---); boat (min. 216[c])
1979[d]	---	---	---
1980	58	136	Air (16); boat (42)
1981	---	---	---
1982	96	---	Air (---); boat (19 parties)
1983	253	46	Air (27); boat 226

Source: ADF&G files.

a Does not include casual observers (e.g., fishing boats) that do not land on the island.

b The cruise ship "Lindblad Explorer" landed on two occasions with approximately 100 passengers each, but the passengers did not camp on the island.

c Visitors (216) were members of three parties from the cruise ship "Lindblad Explorer."

d Because of the return of marine mammal management to the federal government, no visitors were allowed on Round Island until July 1, 1982.

II. MANAGEMENT PROBLEMS AND CONSIDERATIONS

The department recognizes that the "highest and best use of the Walrus Islands is as a hauling grounds for Bristol Bay walrus" (Hinman 1980). The attraction of thousands of walrus hauled out at a location relatively much more accessible to visitors that other walrus haulouts has resulted in increased visitor use of the sanctuary and an increased incidence of disturbance to the walrus (ADF&G files). Regulations and permit stipulations have necessarily become more restrictive in order to prevent a serious conflict between the necessity to protect the walrus from disturbance and the desire to provide the opportunity for people to view and photograph them. As the sanctuary receives more publicity, visitor use can be expected to increase, and the potential for conflict can also be expected to increase.

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Subsistence

Introduction
Subregional Assessments

ASSESSMENTS OF SUBSISTENCE USE OF FISH AND GAME

Purpose

The subregional assessments that follow in this section were written primarily to compile and summarize the best available data on subsistence use of fish and game in the Southwest Region and, secondarily, to provide relevant background data on the communities of the region. These assessments complement subsistence use area data documented in the 1:1,000,000 series of maps presented in the Atlas to this guide and in the reference series of the 1:250,000 maps on file in ADF&G offices and with the Divisions of Habitat and Subsistence in Anchorage. The assessments should be used in conjunction with these maps. No attempt has been made to present all available data in the following subregional assessments. The reader is encouraged to consult listed references for more complete information and to consult with Division of Subsistence staff and others for studies completed after the date of this publication.

Sources of Information

Data on contemporary subsistence use are drawn largely from community studies that have been completed as part of the Division of Subsistence research program that has been underway since 1978. Other studies completed by researchers and organizations as part of the Offshore Continental Shelf program, Coastal Zone Management Program, Cooperative Parks Study Unit research, individual city plans, and other data-gathering efforts have contributed useful information. In our review of this literature, we found that the most useful data came from studies where researchers spent significant amounts of time in communities and where community members were involved in the research undertaken. Because adequate baseline studies of subsistence use of fish and game have not been completed in all communities of the Southwest Region, some subregional assessments are able to present more complete depictions of subsistence resource use than others. We hope that this guide has helped identify areas where further research is needed.

Data on historic use of fish and game within the Southwest Region are drawn from systematic social science studies of the Native people of the region. Interviews with elders and searches through historical documents have been the basis of these studies.

Relevant background data are drawn from planning documents and studies - the Community Profile Series of the Department of Community and Regional Affairs, census documents, and statistical summaries put out by the Department of Labor, for example. These sources have been used to provide basic information on the geography of the region, major historical events, community population and population change, land status, transportation, and economy.

Limitations of Data

As was mentioned, the best sources of subsistence data are in-depth community studies. Major subsistence studies of this type in the Southwest Region have been completed only in the communities of Atka, New Stuyahok, Nondalton, St. George, St. Paul, and Unalaska and are underway in a number of other communities. In addition, recent survey and mapped land use data are available for Kodiak Island communities. We have best data for these communities.

For communities where thorough studies have not been completed we have relied on field staff for data on species harvested and the seasonal round of harvest activities. Often harvest level data have been limited in these cases.

Even where good data are available, they are usually for one year only. From the historical record and from contemporary studies that provide dischronic data, we know that subsistence harvest and use of fish and game vary significantly from year to year. Changes in the distribution and abundance of species used, varying weather and other conditions that may limit or facilitate harvest, changing community needs for harvest, hunting and fishing competition, fish and game regulations and enforcement, and other factors are known to influence the quantity, species composition, and seasonality of subsistence harvest and use. Longitudinal research and yearly monitoring of subsistence harvest and use are needed.

CONTENTS

For the purposes of these assessments, the Southwest Region is divided into nine subregions. This division is based on community level research in the Southwest Region that has found there are clusterings of communities where similar patterns of subsistence harvest and use of fish and game are followed. In most cases, subregional boundaries reflect the territories inhabited by different groups of Yupik Eskimos, Aleuts, Koniag Eskimos, and Athapascan Indians.

Togiak Subregion

The Togiak subregion includes the communities of Manokotak, Togiak, and Twin Hills, with an area population of about 915. The area extends from Cape

Newenham on the west to the Snake and Weary rivers on the east and inland to the headwaters of the Kisaralik River.

Nushagak River Subregion

The Nushagak River subregion includes the communities of Ekwok, Koliganek, New Stuyahok, and Portage Creek, with an area population of about 670. The area includes the drainages of the Nushagak River and its tributaries above the confluence of the Nushagak and Wood rivers at the head of Nushagak Bay.

Nushagak Bay Subregion

The Nushagak Bay subregion includes the communities of Aleknagik, Ekuk, Clarks Point, and Dillingham, with an area population of about 1,803 in 1980. The area includes the lower portions of the Nushagak River and the Wood River lakes system and the flat alluvial plain surrounding Nushagak Bay.

Iliamna Lake Subregion

Iliamna Lake subregion includes the communities of Igiugig, Iliamna, Kakhonak, Levelock, Newhahen, Nondalton, Pedro Bay, and Port Alsworth, with an area population of 582, according to the 1980 census. Intensive use is made of the drainage areas of the Kvichak River, Iliamna Lake, and Lake Clark.

Upper Alaska Peninsula Subregion

The Upper Alaska Peninsula subregion includes the communities of Egegik, King Salmon, Naknek, Port Heiden, South Naknek, Pilot Point, and Ugashik, with an area civilian population of about 1,125, according to the 1980 census. This subregion includes that portion of the Alaska Peninsula between the Kvichak River on the north and Port Moller on the south.

Chignik Subregion

The Chignik subregion includes the communities of Chignik, Chignik Lagoon, Chignik Lake, Perryville, and Ivanof Bay, with a census population of 515 in 1980. These communities are located on the eastern side of the Alaska Peninsula and make intensive use of the area from Stepovak Bay on the west to Wide Bay on the east.

Lower Peninsula Subregion

The Lower Peninsula subregion includes the communities of Cold Bay, False Pass, King Cove, Nelson Lagoon, and Sand Point, with a census population of

1,442 in 1980. The subregion includes the Alaska Peninsula south of Port Moller to the north tip of Unimak Island.

Kodiak Island Subregion

The Kodiak Island subregion includes the city of Kodiak, the settlements connected by road to the city, and the six remote communities of Akhiok, Karluk, Larson Bay, Old Harbor, Ouzinkie, and Port Lions. The total island population was estimated to be 12,714 in 1982. The subregion includes Kodiak and Afognak islands as well as other islands in the archipelago.

Aleutian/Pribilof Subregion

The Aleutian/Pribilof subregion includes the communities of Akutan, Atka, Nikolski, St. George, St. Paul, and Unalaska, with an estimated civilian population of 2,411. Military bases at Adak Station and Shemya Station also fall within this subregion, which includes the islands of the Aleutian Chain and the Pribilof Islands.

MAPPED DATA AND OTHER SOURCES OF INFORMATION

A series of 1:1,000,000-scale maps can be found in the Map Atlas and depicts areas used by residents of the Southwest Region communities for subsistence harvest of fish and game. These maps show 1) composite subsistence use areas that outline the area used by each community where mapping took place and 2) composite subsistence use areas that outline subsistence harvest areas for each species or resource category. These maps were drawn from a more detailed series of 1:250,000 reference maps that document subsistence use by species and by community. The 1:250,000 reference maps are on file with the Divisions of Habitat and Subsistence in Anchorage and are available for use at ADF&G offices in the Southwest Region. These maps provide the best available documentation of the geographical extent of areas used for subsistence harvest subject to qualification statements printed on each map. The intensity of subsistence harvest has not been mapped.

Other sections of the human use volume of this guide contain useful data on area harvest levels and may supplement community harvest level data presented in subregional assessments.

The Southwest Region Subsistence Economies section of this guide provides analysis of the interaction between subsistence harvest of fish and game and cash economy activities. This section also includes a careful summary of state and federal laws that define, mandate, and regulate subsistence.

The Division of Subsistence should be consulted for recent studies not listed in the reference section that follows the subregional assessments as well as for unpublished information. Communities potentially affected by land use decisions, permitting, resource development, or other government or private activity should be consulted to update information presented in this guide and to determine actual or potential impact. Working through local Indian Reorganization Act councils, city councils, regional nonprofit corporations, and other representative organizations will ensure that this public input will take place as productively as possible.

Togiak Subregional Assessment

I. LOCATION AND ENVIRONMENT

Three communities are included within this subregion: Togiak, Twin Hills, and Manokotak. The subregion is bounded on the west by Cape Newenham, on the east by the Snake and Weary rivers draining into Nushagak Bay, and to the north in the high country near the headwaters of the Kisaralik River. The coastal area from Cape Newenham to Protection Point is bounded by the clear marine waters of Bristol Bay. Much of the mainland coast and the shores of the offshore islands are rocky, and sea cliffs are common. Marine mammals, seabirds, marine fish, and invertebrates are abundant near shore. Mountain ranges extend to the coast at Cape Newenham and around Kulukak Bay. The terrain surrounding the lower Togiak drainage and on the Nushagak Peninsula is mostly flat or gently rolling, and there are many ponds and small lakes.

The coastline and nearshore waters from Cape Newenham east to the mouth of the Igushik River are the source of the marine resources important to the subregion. Tundra is the dominant vegetation in this region. Willows and scattered clumps of cottonwoods grow along rivers. Small patches of spruce are found in the east and northeast edges of the subregion. All five species of salmon run in local rivers, but sockeye and coho salmon are most abundant. Brown bears are the only common large mammal in the subregion. Ptarmigan are numerous, particularly in late winter, when large flocks form.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITIES

When the Russians entered northern Bristol Bay in the early 1800's, their trading and missionary efforts were concentrated in Nushagak Bay and, to a lesser degree, the Nushagak River subregions. The Togiak subregion was relatively isolated from these early developments, although some commercial trapping and trade for local resources occurred. Development of commercial salmon fisheries in Bristol Bay in the late 1800's and early 1900's centered on the Kvichak and Nushagak bays, where huge salmon runs occur. Again, Togiak was relatively unaffected. In the early years of the fishery, few people from the Togiak subregion participated. During World War II, when imported labor was no longer available, many local people were hired to work in the canneries. In the 1950's, a cannery was built across the river mouth from Togiak, creating a demand for commercial fishing of local salmon runs and providing employment in processing the fish. An additional salmon processing plant was built in the 1970's.

The development of a commercial market for local salmon provided the impetus for growth of a local fleet of fish boats adapted to conditions in Togiak Bay. Until just recently, the Togiak District salmon has been isolated, and few fishermen from other parts of the Bristol Bay limited entry region have attempted to fish there.

Manokotak fishermen have participated in the Nushagak District commercial salmon fishery since their village was settled in the late 1940's. Most fishermen from the village fished for the cannery at Ekuk, across the bay from the mouth of the Igushik. For many years the Manokotak fishermen were recognized on Nushagak Bay as the "mosquito fleet," because they fished plywood skiffs similar to Togiak skiffs. In recent years, nearly all Manokotak fishermen have purchased 32-ft-long boats, the largest legally used in the Bristol Bay salmon fishery.

A commercial herring fishery has developed in the subregion between Togiak and Kulukak bays in the past 20 years. The fishery has increased in size dramatically since 1977 and attracts large numbers of seiners from all parts of the state. Manokotak residents participate actively with their modern 32-ft-long gillnetters, but relatively few Togiak fishermen take part. People from all three communities in the subregion are the dominant participants in the commercial spawn-on-kelp fishery.

Reindeer were herded in the subregion in the 1920's and 1930's, but the industry diminished by the early 1940's. At present, there is a herd, owned by a resident on Hagemeister Island in Togiak Bay.

The annual pattern of activities by residents of the Togiak subregion prior to historic contact is poorly documented. According to local residents, members of coastal settlements concentrated on marine mammals, especially seals and walruses and on waterfowl in spring. During summer, salmon were trapped or speared in rivers. In fall, trips were probably taken inland to hunt caribou, with hunters returning to permanent settlements to pass the remainder of winter. Freshwater fish were an important winter food also. Residents of communities inland along the Togiak River relied more upon terrestrial mammals, such as brown bear and caribou, in spring and winter.

The three communities rely on the services provided by Dillingham, the regional center. Several flights are made to each community daily by single-engined planes from two or three flight service companies based in Dillingham. Each community has an airport and lies on the bank of a navigable waterway. In Dillingham, connections are available on scheduled airlines to Anchorage and points beyond. Seat fare rates from Dillingham to villages in the Togiak subregion own private aircraft, but fish boats, skiffs, snowmachines, three wheelers, and automobiles are far more common types of private transportation. Skiffs and fish boats are used for both commercial and subsistence activities. Snowmachines are primarily used in subsistence pursuits, but they are also used for travelling within and between communities. Manokotak residents frequently use snowmachines to haul stove oil home from Dillingham. Pickup trucks and automobiles are used by some residents on the short roads within the communities, mostly to haul people and freight, although travel between Togiak and Twin Hills is possible by auto when ice conditions are right.

The Yup'ik language is dominant over English in all three communities within the subregion. In the schools in the three communities, Yup'ik is the primary language of more than three-quarters of the students attending schools in the three communities (pers. comm., Southwest Region School District, Dillingham).

III. POPULATION

Today, approximately 915 people reside in the subregion. Village censuses conducted in 1983 for revenue-sharing purposes enumerated 545 residents in Togiak and 299 in Manokotak (ADCRA, pers. comm.). The 1980 U.S Census provides the most recent count, 70, for Twin Hills. From 93 to 97% of the residents of the three communities are Alaska Natives (Nebesky et al. 1983).

In 1880, Petroff (1884) counted approximately 2,100 residents in the Togiak subregion, although Oswalt (1967) considered this figure highly suspect, especially the 1,826 counted in communities along the Togiak River. He thought a population half the size of that enumerated by Petroff was more reasonable in consideration of results of other censuses and relative to population densities in neighboring parts of the state. Petroff (1884) found communities at Igushek (Igushik), Kulluk (Kulukak), Ooalikh (Ungalikthuk), Togiagamute (Old Togiak), six sites up the Togiak River, and at Aziagvigamute (Osviak). The population history of the subregion is depicted in table 1. The following account is based on information provided by local informants. The present site of Togiak became the principal community of the subregion in the 1940's, and it drew residents from the surrounding bay and upriver settlements, as well as from communities in the Kuskokwim area. Several factors caused the consolidation of the local population and attraction of immigrants, including the development of a Moravian Church and school, the BIA school, and the birth of a local commercial salmon fishery. Manokotak was settled in the 1940's by previous residents of the Kulukak, Nushagak Peninsula, and Togiak areas. Twin Hills is a very recent settlement. In the mid 1960's, a few families moved the short distance from Togiak following a flood. Most residents of Twin Hills are originally from the Kuskokwim Bay area.

Although much of the population history of this subregion is sketchy, the coverage since 1950 appears to be fairly complete. Togiak and Manokotak have grown rapidly and consistently over the past 30 years. Twin Hills' population has remained stable since its settlement in the 1960's.

Table 1. Census Population of Togiak Subregion, 1880-1980

Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Anoogamok	214										
Aziagvigamute	130										
(Aziavigamiut)		90									
Igusnik						28	16				
(Igusnek)	74										
Ikaliuka											
(Ikaliukamiut)	192	60									
Kassianmute	615										
(Kassiachamiut)		50									
(Kashiagamut)							33				
Kissaiakh	181										
Kulukak					83	28	55				
(Kulluk)	65										
Ooallikh	68										
Manokotak								120	149	214	294
Nulahtuk	211										
Togiak					91	71	10	108	220	383	470
(Togiak Bay)							46				
(Togiagamute)											276
(Togiagamiut)		94									
Tuklung								30			
(Tokelung)						39					
Tunniakhpuk	137										
Twin Hills										67	70
Subregion total								258	369	664	834

Sources: ADL 1981, Rollins 1978, Petroff 1884.

IV. MONETARY ECONOMY

As in the rest of Bristol Bay, commercial salmon fishing is the primary source of cash for local residents in the Togiak subregion. Gross income from commercial fishing accounted for 78% of the earned income in 1982 in Togiak (Wolfe et al. 1984). In the three communities, there are approximately 137 drift permits and 73 set net permits (table 2). For each community there is approximately one permit per five residents, or from 0.8 to 1.2 permits per household in the three communities (permit data from Langdon 1981, Wolfe et al.1984). In Manokotak and Togiak, it is not uncommon for one household to hold both a drift and a set net permit. Togiak and Twin Hills fishermen use small (26-ft) plywood, shallow-draft skiffs suited for Togiak Bay; thus they have less capital invested in their vessels than drift fishermen in other districts of Bristol Bay. The mean earnings reported by Togiak drift fishermen in 1982 was $11,920 after expenses, and $27,945 gross. Togiak set net fishermen reported similar net incomes, $11,093, but lower gross incomes, $18,300 (Wolfe et al. 1984). Manokotak fishermen primarily use fiberglass, 32-ft boats in the Nushagak Bay District salmon fishery. They also use their salmon gillnetters in the spring herring sac-roe fishery in the Togiak District. Since markets were developed for gillnetcaught herring in 1980, significant incomes have been earned in some years by some Manokotak fishermen. Togiak fishermen, however, have not earned significant amounts in the herring fishery. Total gross income from herring in 1982, including sac-roe and spawn-on-kelp fisheries, equalled only 4.4% of the gross salmon earnings for the same year (ibid.). In 1982, the total gross income from the sac-roe fishery for all 19 fishermen from Togiak was only $29,407 (ibid.). Residents from all three communities participate in the herring roe-on-kelp harvest in the Togiak fishery. Skiffs are used in this fishery, sometimes in conjunction with larger fish boats, and relatively small incomes are earned. The mean gross income from spawn-on-kelp for 53 Togiak participants was $1,921 (ibid.). The capital investment is small, however, and the cash comes in at a time when most households are at the lowest point in the annual cash-flow cycle.

Another type of self-employment is trapping. Income from trapping is not as important as it was in the past. Wolfe et al. (1984) estimate that it accounted for only 0.2% of the earned income of Togiak in 1982. Trapping does provide employment in the winter, when other employment is hard to find, and provides cash in the spring, when it is most needed.

Wage employment opportunities are provided primarily by government-funded sources. Federal and state funding employ health aides, school workers (teachers, teachers' aides, secretaries, librarians, village custodians, cooks), postal employees, airport maintenance personnel, police officers, utilities maintenance positions, and others. Local government jobs include city administrators, secretaries, police officers, garbage collectors, and temporary construction work. Village Native corporations may employ secretaries, and in Togiak a few businesses are operated by the local corporation. Estimates of the number of wage positions regularly available in each community are presented in table 3. In Togiak, wages provided approximately 20% of the total earned income in 1982 (ibid.).

Many of the wage-labor positions are seasonal, permitting employees to take part in summer commercial and subsistence fishing activities. A large proportion of the jobs are part-time, which allows workers to integrate subsistence pursuits with cash employment. Even workers with full-time jobs often have the opportunity to go hunting, fishing, or trapping. Most jobs have flexible schedules designed to accomodate subsistence activities. A thorough description of the cash economy in Togiak is presented in Wolfe et al. (1984).

V. USE OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Used and Seasonal Round of Harvest

Residents of the Togiak subregion draw on resources from marine and shoreline habitats, and from rivers, tundra, and forest. From the ocean and seashore they harvest seals, walruses, sea lion, several types of fish, herring spawn-on-kelp, waterfowl, seabird eggs, clams and other invertebrates, and basket grass. From rivers, several types of salmon and other fish, furbearers, and waterfowl are taken. Tundra in the subregion provides brown bear, tundra hare, ptarmigan, furbearers, and berries. People often travel to other subregions to harvest moose and caribou, though a few are taken within the western and northern portions of the Togiak subregion.

The seasonal round of subsistence activities for the Togiak subregion is portrayed in figure 1. Spring harvests begin with the arrival of eiders and emperor geese and the emergence of brown bears and "parky" squirrels. Hunters travel to coastal sites primarily to catch waterfowl and marine mammals (see figure 1 for listing of specific species). A few brown bears are also harvested for food at this time. Some hunters head inland to shoot or trap "parky" squirrels and catch the last ptarmigan of the spring. A little later, usually around the first week of May, herring begin to spawn, and the fish are netted to dry or salt for home consumption. Herring spawn-on-kelp is also picked to eat fresh or is preserved by salting, freezing, or drying. Clams are dug at this time, and some hunting of marine mammals and waterfowl occurs while people are camped during herring season. Later in May or in June, eggs of gulls and seabirds are collected.

The first chinook mark the start of the salmon season. Chinook salmon and other species are caught in subsistence nets or are kept

Table 2. Limited Entry Permits[a] Held by Residents of the Togiak Subregion

Community	Population	Set Net Permits	Drift Net Permits	Total Permits	Persons/ Permit
Manokotak	299[b]	27	37	64	4.7
Togiak	545[b]	46	86	132	4.1
Twin Hills	70[c]	0	14	14	5.0
Total	914	73	137	210	4.3

a Langdon 1981, Wolfe et al. 1984.

b Recent census data (ADCRA, pers. comm.).

c 1980 U.S. Census.

Table 3. Local Wage Employment,[a] Togiak Subregion

Community	Population[b]	Full-Time Positions	Part-Time or Seasonal Positions	Total No. Positions
Manokotak	299	--	--	41
Togiak	545	36	19[c]	55
Twin Hills	70	--	--	11

Sources: Information on Manokotak and Twin Hills: ADCRA 1982 (includes teaching positions held by nonpermanent residents). Information on Togiak: Wolfe et al. 1984 (figures do not include nonpermanent teachers).

a Includes only those jobs that are regularly available each year. These figures do not include work on construction projects or similar unpredictable positions. A single individual may hold more than one job.

b Recent census data (ADCRA, pers. comm.).

c Figures do not include 50 or more positions in local salmon-processing facilities held by local residents for one to two months in the summer (Wolfe et al. 1984).

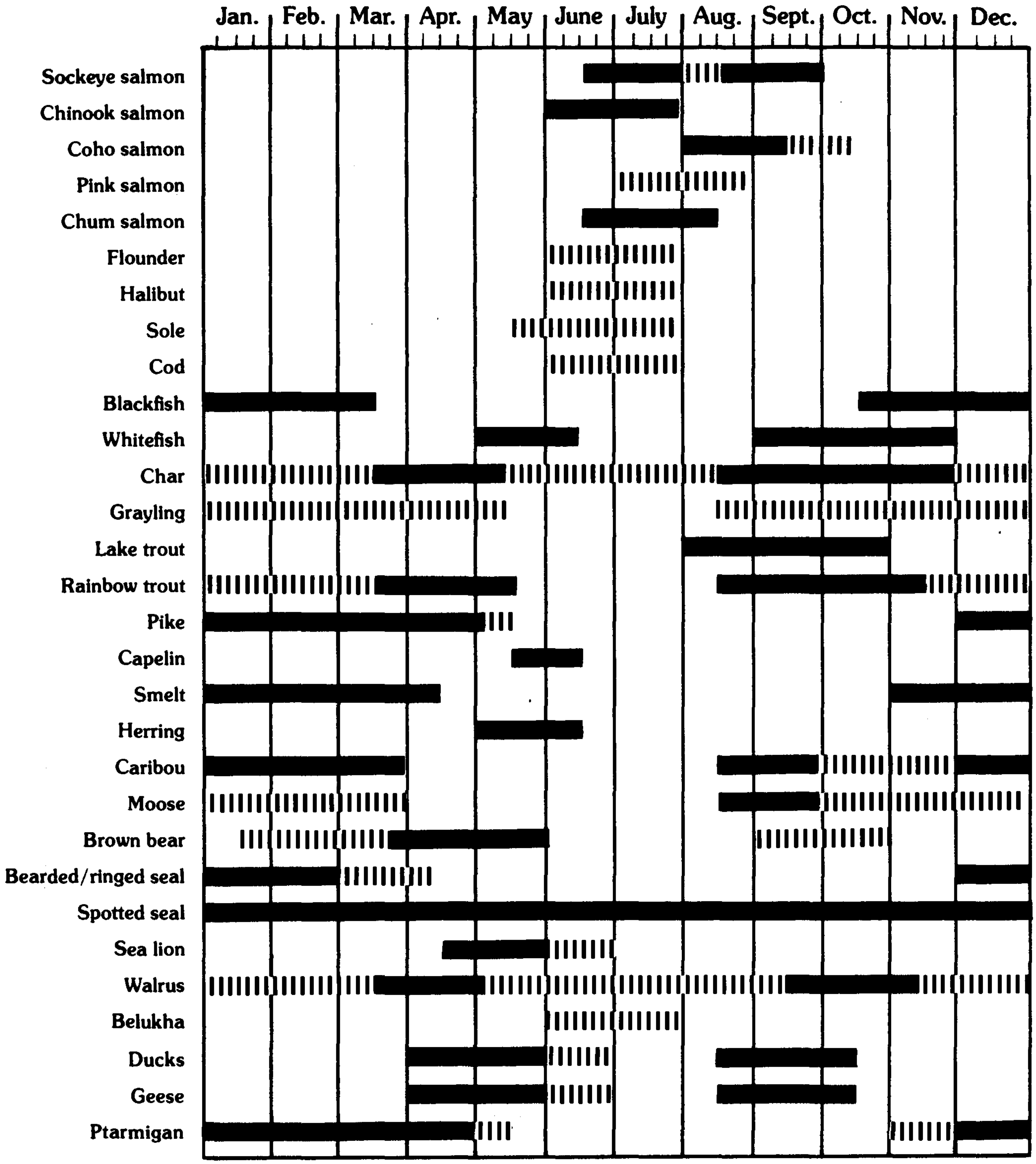


Figure 1. Seasonal round of resource harvests, Togiak subregion. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (1982-1983 field interviews, ADF&G, Div. Subsistence; Wolfe et al. 1984).

(continued)

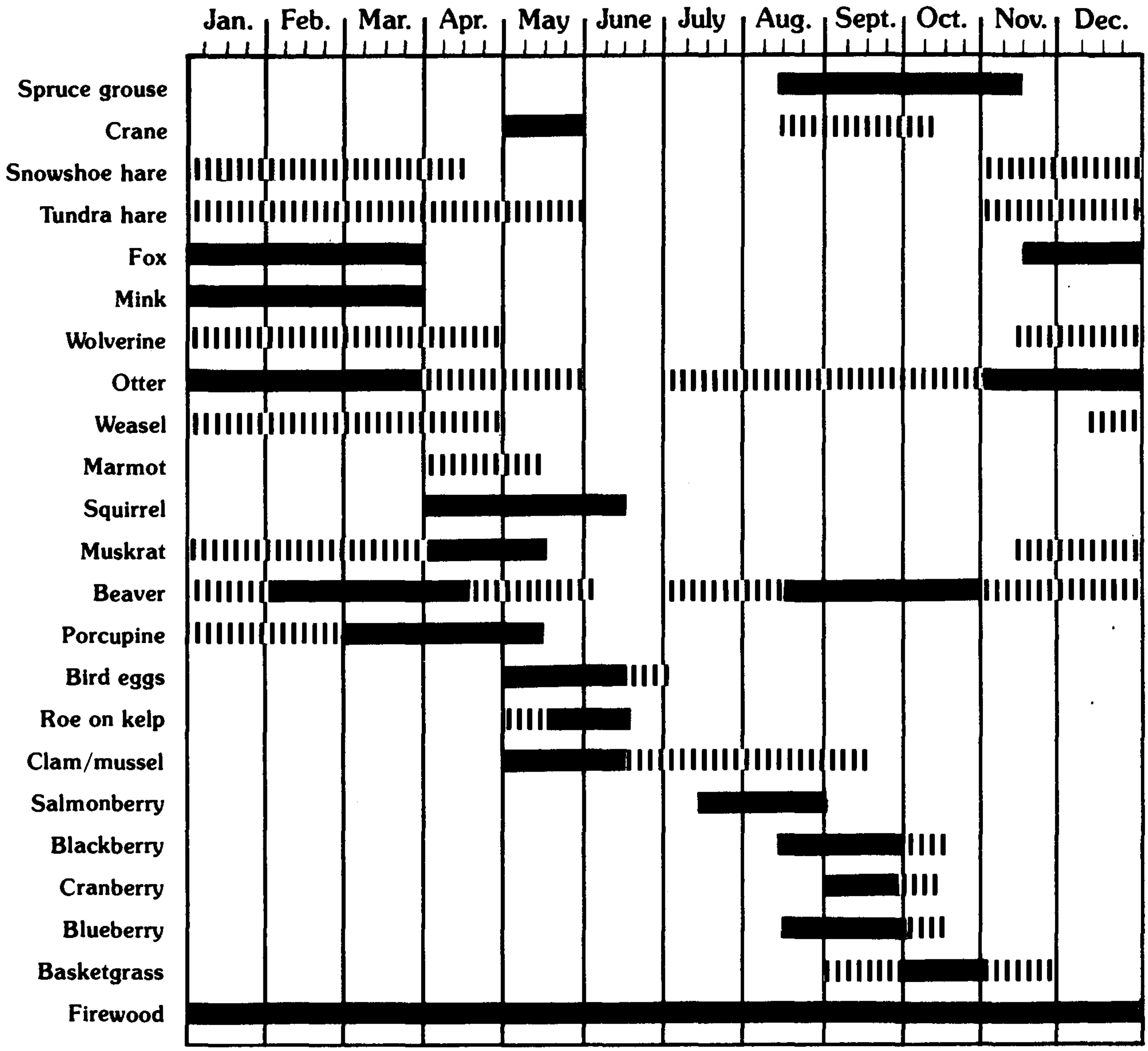


Figure 1 (continued).

out of the commercial catch for home use. Coho salmon are eaten fresh, frozen, or made into strips. Sockeye salmon are mostly split and dried. Chums are preferred by some older people because they have less fat and are easier to dry. Coho are the last to run up the rivers. They are mostly eaten fresh or frozen, although some are salted or dried. Fall red fish (spawned-out sockeye salmon) are a preferred fish, taken upriver or in the lakes that feed the Togiak and Igushik rivers. Char are taken throughout the year but in largest quantities in fall and spring. Smelt, whitefish, pike, and other fish are taken by jigging or in nets from late fall through spring. In Togiak Bay, incidental catches of halibut, and sometimes flounder, are saved for consumption at home or to be shared in the village. Berry picking begins in mid July, with salmonberries, and continues until late fall, with blackberries and some blueberries, huckleberries, and lowbush cranberries being gathered as the season progresses. Late fall is the season for gathering beach grass for basket making.

In August and September, many hunters travel to Nushagak River villages or to Aleknagik to hunt moose or caribou, usually with a relative living in that area. Some moose hunting is done on local rivers and lakes, but few moose are available in these areas. Spotted seals, waterfowl, small mammals, and a few brown bears are taken within the subregion. Later in the fall and in winter, hunters may travel to neighboring subregions by airplane or snowmachine to hunt caribou.

During the winter, trapping and shooting of furbearers occurs. Beaver, red fox, and land otter are the most common species taken. Beavers are important as a source of food as well as fur. When ice is in Togiak Bay in late winter, bearded seals and ringed seals are available to hunters, in addition to spotted seals, walruses, and sea lions, which are present year-round. As the ice moves out of the bay, the spring migration of eiders and emperors begins, and the seasonal cycle starts over again.

B. Harvest Levels and Intercommunity Differences in Resource Use

Little information has been gathered on the quantities of specific types of fish and game harvested in the subregion. Manokotak was included in a 1973 survey of subsistence harvests by Gasbarro and Utermohle (1974) (table 4). This survey consisted of an interview in which household members recalled their harvests over the past year. Just over half of the households in Manokotak were covered. Subsistence salmon harvests for all three communities in 1982 (table 4) were gathered through individual reports using the permit system of the ADF&G's Division of Commercial Fisheries. Harvest reports for 1982 are based on a 70% return of permits from Togiak (includes Twin Hills) and a 90% return from Manokotak. Not all households

Table 4. Average Subsistence Harvest of Selected Fish and Game, Pounds Dressed Weight per Household, Togiak Subregion

	1973a	1982b	
	Manokotak	Manokotak	Subregion
No. households surveyed	19	18	53
Mean household size	5.9	--	--
Fish			
Sockeye salmon		375	234
Chinook salmon		48	85
Chum salmon		19	22
Pink salmon		14	17
Coho salmon		187	150
Total salmon	790	643	508
Pike	264		
Whitefish	41		
Grayling	19		
Char	38		
Smelt	36		
Herring	16		
Other spp.	42		
Total fish	1,106		
Mammals			
Moose	483		
Caribou	158		
Seal	41		
Walrus	21		
Belukha	147		
Beaver	78		
Other spp.	26		
Total mammals	954		
Birds			
Geese	49		
Ducks	33		
Ptarmigan and grouse	57		
Total birds	139		
Total harvest per household	2,199		
Total harvest per capita	373		

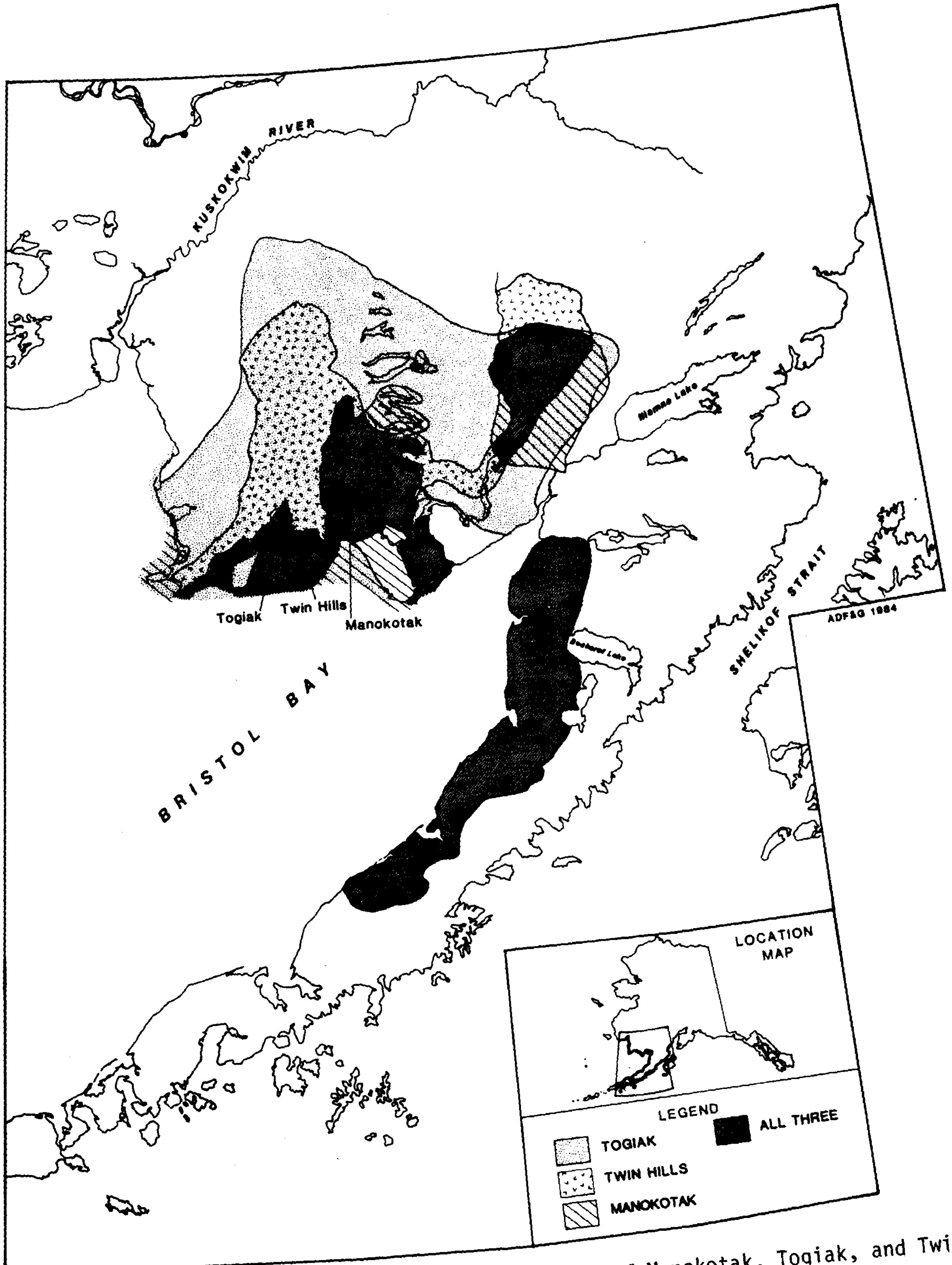
a Calculated from Gasbarro and Utermohle 1974.

b Calculated from ADF&G subsistence salmon permit returns, Dillingham; subregional harvests for Togiak, Manokotak, and Twin Hills.

harvesting salmon obtained a permit, so the actual percentage of households reporting is lower than that implied in the above percentages, and the extrapolated total harvests are conservative estimates. Harvest reports from Manokotak should not be used to estimate resource use in Togiak and Twin Hills because the three communities are not located in identical environments, and the history of each community is unique. The total harvest of char by Manokotak residents in 1973 was estimated at just over 1,000 fish (Gasbarro and Utermohle 1974), whereas in the 1970's ADF&G commercial fish biologists estimated that 105,000 char were taken each year by residents of Togiak and Twin Hills (files of ADF&G, Div. Commer. Fish., Dillingham). Togiak and Twin Hills are just a few miles apart, but there are differences between these two communities in harvests related to the historical residence of their populations. Twin Hills residents moved recently from Kuskokwim Bay and have retained preferences for resources from their previous home. Some residents have not yet acquired a taste for certain resources in the Togiak area, such as herring. Many Manokotak families originated in the Kulukak and Togiak areas and used similar resources to present-day and historical Togiak people, but today they are situated inland between Nushagak Bay and Kulukak Bay. Therefore, they do not have as ready access to marine resources as Togiak and Twin Hills residents do. Manokotak is closer to spruce forests and other interior vegetation types, and its residents have a greater opportunity to harvest resources from those environs than do Togiak and Twin Hills residents.

C. The Geography of Harvest Activities

Subsistence harvests are generally focused on the river drainage each community is located along and on traditionally used coastal sites (see map 1). Although subsistence activities commonly involve short excursions from the home community, many longer-term, seasonal camps continue to be used as they were in the past. Many people travel to coastal sites in the spring to harvest marine mammals, waterfowl, and herring. In summer, many families move to camps at commercial salmon set net sites. All but a couple of families in Manokotak move to Igushik at the mouth of the Igushik River. In fall, families from Togiak, Twin Hills, and Manokotak head upriver to lakes primarily to harvest fish. Extremely large areas are covered by hunters and trappers of this subregion because many terrestrial resources are not abundant. Snowmachines are used to travel within the subregion and occasionally to reach hunting areas in adjacent subregions. Some hunters fly to the Nushagak River and Upper Alaska Peninsula subregions to hunt caribou and, less frequently, moose. Some people fly to communities to the north in the Kuskokwim Bay and River areas to combine visiting with harvesting berries and basket grass.



Map 1. Togiak subregion: areas used by residents of Manokotak, Togiak, and Twin Hills for subsistence use of fish and game, 1982 (ADF&G, Div. Habitat).

Nushagak River Subregional Assessment

I. LOCATION AND ENVIRONMENT

The Nushagak River subregion includes the drainages of the Nushagak River and its tributaries above the confluence of the Nushagak and Wood rivers at the head of Nushagak Bay. Four communities are located in the subregion: Portage Creek, Ekwok, New Stuyahok, and Koliganek. All four villages are situated on the banks of the Nushagak River in the low, flat basin of the river system. The Nushagak River drains the Nushagak Hills bordering the basin to the north. Its tributaries, the Nuyakuk and Mulchatna rivers, are fed by runoff from the hills and mountains to the west and northwest, and east and northeast, respectively. The Nuyakuk River drains the Tikchik Lakes system. The Wood River lakes, on the west border of the subregion, feed into the Wood River. Forests of spruce and deciduous trees, and tundra are the dominant vegetation types in the subregion. Forests are best developed on bottom lands along rivers. Tundra covers most of the rolling upland areas in the basin.

All five species of salmon and several other anadromous and freshwater fish species are abundant in the Nushagak River system. Moose are common in forest and shrub habitats. Caribou of the Mulchatna herd are abundant in the upper reaches of the Mulchatna drainage and range over much of the tundra in the subregion.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITIES

The Nushagak River is inhabited by Yup'ik Eskimos. The prehistory of the area is not well known, but VanStone (1971) suggests that the Eskimos entering the Nushagak River already possessed salmon-fishing technology and easily adapted to the inland environment in the Nushagak drainage where salmon are abundant. At the time of Russian exploration in the region, during the early 1800's, separate subgroupings of Yup'ik Eskimos were noted (historical information in this section comes from VanStone 1967 and 1971). Residents of the inland area were called the Kiatagmiut; inhabitants of Nushagak Bay belonged to the group named Aglegmiut. The Kiatagmiut occupied the Nushagak River, the lower Mulchatna River, and possibly the Wood and Tikchik lakes systems, the upper Kvichak River, and western end of Iliamna Lake. There were approximately 400 Kiatagmiut in the early 1800's. Most present-day residents of the Nushagak River subregion are descendants of the Kiatagmiut; other residents are descendents of Eskimos originally from Nushagak Bay, Togiak, the Kuskokwim region, and other areas.

The Russian-American Company sent employees to Bristol Bay from Kodiak in 1818 to explore the northern portion of the bay. A trading post, Aleksandrovski Redoubt, was established near the head of Nushagak Bay, across the bay from the current location of Dillingham. Russian traders set out from this post to explore the Nushagak drainage and the Kuskokwim to the north. A trade route was established up the Nushagak River to the Kuskokwim River. Although a Russian Orthodox Church was established at Aleksandrovski Redoubt in 1841 and the trading post was active, it is unlikely that residents of the Nushagak River had contact with the Russians more than a few times each year. Little changed with the sale of Alaska to the United States in 1867. The Russian Orthodox church remained active and today is the dominant religion on the Nushagak River.

Commercial salmon fishing began in Nushagak Bay in the 1870's, and by 1903 10 canneries had been constructed. Only a small number of local residents were employed by the canneries; both fishermen and cannery workers were imported by the cannery management. It was not until World War II that Yup'iks participated fully in the canning industry and only after 1960 that many Nushagak River men had the chance to become fishermen. From its inception, the commerical salmon fishery has been the major external influence on traditional economic patterns in Bristol Bay.

Reindeer herding was introduced in the subregion around 1905 but was most active from 1918 to 1940. Local informants report that many men were involved as herders in the 1920's and 1930's; the herds disappeared in the early 1940's. Several reasons are given for the loss of the reindeer, including predation by wolves and absorption by larger caribou or reindeer herds passing through the area.

Today, the four Nushagak River communities share a common reliance upon the commercial salmon fishery for employment. Nushagak River residents participate as fishermen; only a few are employed in canneries or processing plants. This seasonal pattern of employment fits easily into the traditional subsistence pattern. In most cases, while men are away commercial fishing, the rest of the family is busy catching and processing salmon for home use.

The seasonal pattern of activities of the Kiatagmiut in the 1800's is described by VanStone (1967). During winter, people settled in permanent villages on the rivers and trapped and hunted near the village with small teams of dogs or on foot. Intervillage visiting was common in winter, and this was the season for intervillage feasting and dancing. In spring, people moved by dog team to temporary camps further in the interior to trap and hunt caribou. Following breakup, they moved downstream to their permanent villages to catch and preserve salmon. Trips to Nushagak Bay for trading and salmon fishing were made in the summer. After the peak of the salmon run in July, men headed back upriver to hunt caribou, while the women and children remained in the village to care for the processed salmon. The men hunted and trapped until snowfall in October, when they returned to the permanent village for the winter.

Today, the pattern of resource harvest and use is essentially the same, though most activities are based from the permanant village. Intervillage visiting is common in winter, especially during Russian Orthodox Christmas (Slavi) in January and winter carnivals in March.

III. POPULATION

Approximately 670 people live in the four Nushagak River subregional communities. Recent censuses conducted by the communities for revenue-sharing purposes enumerated 173 in Koliganek and 337 in New Stuyahok in 1983, and 78 in Ekwok in 1982 (pers. comm. 1984, ADCRA, Dillingham). Portage Creek's population is estimated to be 80 (pers. comm. 1983, Bristol Bay Native Association, Dillingham). Residents are predominantly of Yup'ik descent; from 91 to 96% of the residents in each community are Alaska Natives (Nebesky et al. 1983).

Historically, the subregional population was estimated to be 400 at the time of exploration by Russian fur traders in the early 1800's (VanStone 1971). In his analysis of the settlement patterns in the Nushagak River area, VanStone (1971) notes that river villages were probably seasonally inhabited prior to the arrival of the Russians. From contact with fur traders until about 1880, there were well-established communities. From 1880 to 1900, VanStone suggests that the population spread out into a larger number of settlements along the river. The years from 1900 to 1920 saw a reduction in population and the abandonment of settlements due primarily to disease, especially the 1918-1919 influenza epidemic. After 1940, the locations of Russian Orthodox churches and, later, schools became important factors in the siting and number of communities along the river. VanStone (1971) notes a basic continuity in population patterns: present-day Koliganek represents the Tikchik, Nuyakuk, and the far upriver populations; New Stuyahok is representative of the Mulchatna River and upper-middle Nushagak; and Ekwok represents the middle-Nushagak River populations.

The population history of the subregion is presented in table 5. Portage Creek became a permanent community in the early 1960's, and no trend in population growth is evident. Ekwok has the longest history of continuous settlement of the Nushagak River communities. It has been a year-round community for about 100 years. United States Census figures (table 5) show a gradual decline in population over the past 30 years. New Stuyahok is currently the largest community in the subregion and has grown steadily since the present village site was settled in the 1940's. Local informants recall that through the 1960's it attracted residents from Old Stuyahok and neighboring sites on the Mulchatna and Nushagak rivers. The continued growth of New Stuyahok in the 1970's is primarily due to births and immigration of spouses. The people of Koliganek settled at the current village site in 1964. The village had been relocated from Old Koliganek in 1940 to a site 3 km from the present location. The population of Koliganek has remained fairly stable over the past 100 years, but local residents report that it has grown in recent years.

Table 5. Census Population of the Nushagak River Subregion, 1880-1980

	Year										
Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Agivivak	52	30									
Akakhpuk	9										
Akulwikchuk	72	61									
Ekwok			79					131	106	103	77
(Ekwak)						40	68				
Kokwok		45	106								
(Kakuak)	104										
Koliganek			114					90	100	142	117
(Kalignak)			91								
Moltchatna			180								
New Stuyahok								88	145	216	331
Nunachuak							50	32			
Portage Creek										60	48
Tikchik	38										
Total								309	351	521	573

Sources: ADL 1981, Rollins 1978, VanStone 1971, Petroff 1884.

The four communities of the subregion are linked to Dillingham by transportation services. Scheduled Wien Air Alaska jet service connects Dillingham to Anchorage on a daily basis. Two other carriers fly between Anchorage and Dillingham on a less regular basis. Transportation within northern Bristol Bay is generally by small, single-engine aircraft available for charter or seat fare (standardized charges for shared charters) rates in Dillingham, King Salmon/Naknek, and Iliamna. Currently, three charter companies operate from Dillingham, with most upriver travel handled by two of these companies. On most days there are four to six flights upriver, with the number of stops in villages proportionate with their population. Seat fares from Dillingham to Nushagak River communities ranged from $20 to $40 in 1983-1984; charters generally cost $100 to $200. During summer, some people travel by boat between their home community and Dillingham. Commercial salmon fish boats are usually used to move to and from fish camps and to haul the winter's supply of fuel oil and gas and other bulky and heavy items upriver. Skiffs are also used for spring, summer, and fall transportation between fish camps, Dillingham, and upriver communities. A barge service based in Aleknagik serves upriver communities, primarily hauling fuel oil and construction materials in spring and fall. In winter, snowmachine travel is common between upriver communities, with occasional trips as far as Dillingham. Dog teams are also used once in a while for visiting between villages.

People travel to Dillingham to participate in the commerical salmon fishery, shop, receive medical care (the Bristol Bay Area Hospital is located in Kanakanak, 6 mi by road from Dillingham), visit relatives, and participate in festivals. Most adult residents of Nushagak River communities travel to Dillingham at least five times per year, and it is probably not uncommon for an upriver resident to come into Dillingham 10 times during the year. Travel between the upriver villages occurs primarily in the fall and winter. Most trips are made to visit, participate in subsistence activities with relatives and friends, and take part in festivities during Russian Orthodox Christmas (Slavi), when it is customary to travel to neighboring communities for visiting and feasting. Nushagak River people commonly go to communities in the Iliamna and Nushagak Bay subregions in addition to their own. People also travel within the same three subregions to attend winter and spring carnivals.

IV. MONETARY ECONOMY

Commercial salmon fishing is the primary source of cash income to residents of the Nushagak River subregion. Approximately 73 Bristol Bay drift permits and six set net permits are held by residents of the four upriver communities (Langdon 1981, Wolfe et al. 1984). The distribution of permits among the four villages is presented in table 6. There is one permit per 4 to 11 people, or .56 to 1.0 permit per household (Langdon 1981, Wolfe et al. 1984). Median gross income from commercial salmon fishing by residents of New Stuyahok was $14,500 in 1976, $34,000 in 1979, and $15,500 in 1982 (Wolfe et al. 1984). Most permit holders fish with a crew of one to three close relatives from their community. Very few upriver residents participate in the Togiak commercial herring fishery. Only two residents of New Stuyahok have sold fish on a herring permit in the past few years (ibid.).

Trapping is another form of cash-generating self employment based on the harvest of renewable wild resources. The importance of trapping in relation to other sources of cash has decreased markedly in the past 30 years or so, as local people have become fishermen in the commerical fishery, and income from trapping has remained static or declined. Production of crafts for sale, another type of self-employment, is not an important source of cash in the subregion, except for a few households.

Table 6. Limited Entry Permits Held by Residents of the Nushagak River Subregion

Community	Population[a]	Set Net Permits[b]	Drift Net Permits[b]	Total Permits	Persons/ Permit
Ekwok	78	1	16	17	4.6
Koliganek	173	3	15	18	9.6
New Stuyahok	337	0	32	32	10.6
Portage Creek	80	2	10	12	6.7
Total	668	6	73	79	8.4

a Recent, local census data (pers. comm., ADCRA, and Bristol Bay Native Association).

b Langdon 1981, Wolfe et al. 1984.

Estimates of the number of wage positions in the four communities are presented in table 7. Government-funded jobs are the primary type of wage labor available in the subregion. The regional school district employs teachers, teachers' aids, cooks, custodians, secretaries, librarians, and activity coordinators (the number of positions varies with the schools' enrollment). All four villages have grade schools, and all but Portage Creek have high schools. Often, state and federally funded positions include Public Health Service health aids and water and sewer maintenance personnel, postal employees, village police officers, and airport maintenance personnel positions. Local community-funded jobs include electrical maintenance workers, garbage collectors, administrators, secretaries, and temporary construction workers. Village corporations may also employ a few individuals. Many of the wage-labor positions are seasonal, and a large portion, perhaps half, of the jobs are part-time positions (see Wolfe et al. 1984 for a more detailed description of employment in New Stuyahok).

Table 7. Local Wage Employment,[a] Nushagak River Subregion

Community	Population[b]	Full-Time Positions	Part-Time or Seasonal Positions	Total No. Positions
Ekwok	78	--	--	11
Koliganek	173	11	11	22
New Stuyahok	337	15	18	33
Portage Creek	80	--	--	7

Sources: For Ekwok and Portage Creek: ADCRA 1982 (includes teaching positions held by nonpermanent residents); for Koliganek: ADF&G, Div. Subsistence files, Dillingham; for New Stuyahok: Wolfe et al. 1984 (Koliganek and New Stuyahok data do not include nonpermanent teachers).

a Includes only those jobs that are regularly available each year. Does not include work on construction projects or similar unpredictable positions. A single individual may hold more than one job.

b Recent, local census data (pers. comm. ADCRA and Bristol Bay Native Association).

In recent years, income from commercial fisheries has probably generated 40 to 75% of the cash entering village economies. Federal, state, and local government wage employment likely produces 20 to 35%, trapping 1 to 5%, and cannery work less than 2%. Transfer payments may amount to 10 to 20% or more in poor fishing seasons. Commercial salmon fishing has been very good in Nushagak Bay the past six seasons. In 1982, a strike year, in New Stuyahok commercial fishing accounted for 54%, wages 31%, trapping 2%, and transfer payments 13% of gross income (not including state dividend payments; Wolfe et al. 1984). In 1973, one of the poorest fishing years on record, Gasbarro and Utermohle (1975) estimated that 56% of the cash in upriver communities came from transfer payments, 29% came from wages and salaries, 8% came from trapping, and only 7% of the incoming cash was generated by commercial salmon fishing. Factors other than cash income are important in considering the various types of cash-producing activities. Commercial fishing in Bristol Bay is a condensed, intensive venture that lasts only 6 to 10 weeks, with most fish being caught during 3 weeks around the start of July. Residents of upriver communities traditionally harvested salmon for subsistence use. Since they entered the commercial fishery, they have found it relatively easy to participate in both commercial and subsistence fisheries through a division of labor. Men fish commercially in the drift net fishery, while women work at home or at fish camps putting up subsistence salmon.

The fishery in the Nushagak District of Bristol Bay, where nearly all upriver residents fish commercially, is fairly stable; runs generally do not fluctuate wildly, as they do in the Kvichak District. Another factor making the Nushagak more dependable than the Kvichak is that all five species of salmon run up the Nushagak in substantial numbers, whereas red salmon overshadow the relatively insignificant runs of other salmon species on the Kvichak. On the Nushagak, if sockeye salmon are not abundant in a given year, alternative species are available to harvest.

Trapping is an economic pursuit that also fits in well with the traditional seasonal activity pattern of the area. Like commercial fishing, trapping is a form of self-employment that allows individuals to work when they want to and with whom they want. As in commercial fishing, partnerships are almost all composed of residents of the same community, and in most cases partners are closely related (Wright, pers. comm.). Trapping provides employment in mid and late winter, when few other cash-producing activities are available, and the income enters the village at the low point in the annual cash-flow cycle.

The majority of permanent wage-labor jobs allow workers to take time off for other activities. In most communities, fewer than five positions are filled during the summer salmon-fishing season. Usually, half or more of the permanent positions are not full eight-hour-a-day jobs, and the shorter working hours are often flexible, so that other activities can be fitted in. Some of the full-day jobs permit the same flexibility. One-third to a half of the permanent positions are held by women. The children of working mothers are cared for by the father or nearby relatives, thereby freeing the father to hunt, trap, or fish. Frequently, construction projects in the communities provide short-term employment in the late summer and fall. These jobs usually last for one to six weeks and often fill in the time between commercial fishing and fall hunting. In almost all cases, wage employment positions provide sufficient flexibility so that workers can readily participate in subsistence pursuits and cash-producing self employment opportunities (Wright, unpubl. data).

V. USE OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Used and Seasonal Round of Harvest

Residents of the four communities of the subregion appear to use a similar variety and amount of wild resources. They have access to resources in mixed spruce-deciduous forest, tundra, riverine, and lake environments. From the forests they commonly take moose, porcupines, showshoe hares, furbearers, spruce grouse, berries, firewood, and some wild vegetables and herbs. On the tundra, they harvest caribou, arctic hares, furbearers, ptarmigan, berries, and some herbs and vegetables. From the waters of the subregion come furbearers, waterfowl, salmon, and many other types of freshwater and anadromous fish.

Today, most harvest activities occur on short-term trips from the permanent community, but many Nushagak River families move to summer fish camps for the months of June and July, and a few residents stay for extended periods at remote cabins during late winter to trap, hunt, and fish. In summer, half of New Stuyahok's residents move donwriver to camps on the lower Nushagak River at Lewis Point. Several families from the other upriver communities move to camp sites around Nushagak Bay during the salmon season.

The present-day seasonal round of activities is similar to the historic pattern described previously. Figure 2 portrays the general pattern of wild resource harvest activities for the subregion. In the spring, following breakup of the river ice, gill nets are set in sloughs for whitefish and pike. Most of the catch is split and dried for use during the summer, when many village residents are without refrigeration. Following traditional practice, meat from caribou and moose is dried about this time and stored for summertime use. Waterfowl are caught as they return from their wintering grounds in the south. Spring is the only time geese are readily available on the river, and they are eagerly sought. The first king salmon are caught in gill nets near the village, usually at the end of May, and are widely shared to be eaten fresh. As people prepare for salmon fishing, some also make use of fresh spring growth of wild celery and fiddleneck ferns. Wild spinach (sour dock) is also picked for a few meals during summer. Chinook are the first salmon to run. They are caught at sites near the villages or at fish camps in set gill nets and split, dried, and smoked to make strips, the favorite form of preserved salmon. Some are also eaten fresh or frozen whole to be cooked later. Heads and bellies may be salted or dried for dogfood. Sockeye salmon run next (mid June to mid July). They are split, scored, and dried to make dry fish, the staple form of preserved salmon. They are also eaten fresh and a few may be frozen. Heads are fermented as they were traditionally to make "stinky heads." Some heads and backbones are also dried for dog food. Chum salmon are also caught in nets, especially by owners of dog teams, who dry them for dog food. Pink salmon are caught in set gill nets or on rod and reel and consumed fresh or frozen. A few pinks may be smoked. Coho are the last salmon to head upriver to spawn (in August and early September). They are caught in set gill nets near the villages and also with rod and reel. Coho salmon are eaten fresh; many are frozen to be cooked later; and some are smoked or salted.

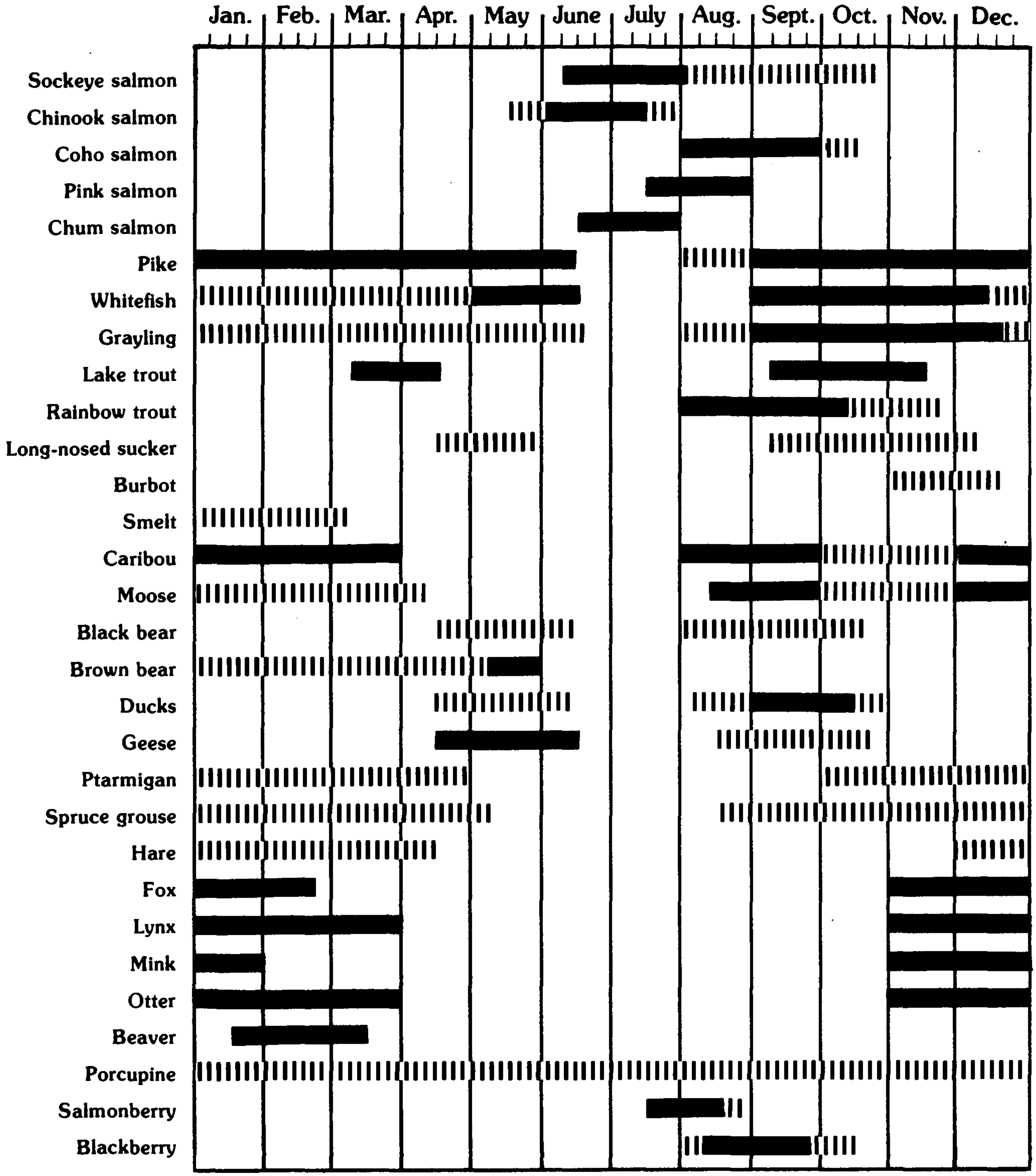


Figure 2. Seasonal round of resource harvests, Nushagak River subregion. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (1982-1983 field interviews, ADF&G, Div. Subsistence).

(continued)

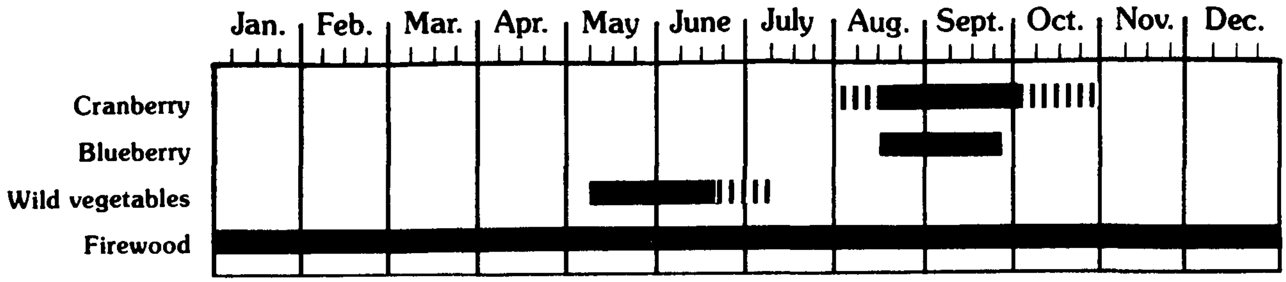


Figure 2 (continued).

In mid July, salmonberries ripen on the tundra. These are the preferred berry for use in akutaq (Eskimo icecream). Blackberries and blueberries are picked a little later, and low-bush cranberries are gathered up until snow falls. The berries are frozen as picked or made into akutaq and frozen.

Some grayling, pike, and rainbow trout are caught with rod and reel in August and September and eaten fresh, but the bulk of freshwater fish, whitefish, pike, suckers, and grayling, are caught later in the fall. Gill nets are set in late September and October for whitefish, with substantial incidental catches of pike and suckers. Most of these netted fish are frozen for later consumption. Suckers are primarily used for dog food, but heads and soft-dry fish are eaten by some people.

Spawned-out sockeye salmon are also netted in the fall for drying or freezing. These spawned-out fish are easily dried and are preferred dried fish when eaten with seal oil. Long-distance trips are often taken in fall to net whitefish and sometimes lake trout. As ice begins to run in the river a few people traditionally put out baited set lines for burbot. Just following freeze-up, people jig with hook and line for grayling, freezing the catch. Through the winter, some jigging and under-ice netting of freshwater fish takes place.

Caribou and moose are hunted by skiff in the fall. Much of the fall-caught meat is distributed within the community and eaten fresh. Ducks and a few geese are also taken in the fall. Once the river is frozen and snow cover is adequate, hunters travel by snowmachine to catch big game. Moose are especially sought for use during the celebration of Russian Orthodox Christmas (Slavi) in mid January. Caribou are hunted as long as snow and ice conditions permit travel by snowmachine. Most meat is eaten fresh or frozen. In late winter, some meat is dried for use during the summer.

Trapping is another winter activity. Some sets are made for land otter, mink, red fox, lynx, and a few other species in November, but most trapping activity occurs later in winter during beaver season.

Beaver is the primary furbearer sought for commercial sale, and almost all of the meat is eaten, either fresh, frozen, or partially dried and smoked. Partially dried beaver meat is frequently eaten during late spring or summer when other sources of red meat are not available. Some beaver skins are used locally in the manufacture of hats and mitts.

Small game is taken year-round. Porcupines are taken whenever they are encountered. A few showshoe hares are snared by young boys. Tundra hares are occasionally hunted near the village or taken incidentally while out after other game. Spruce grouse are hunted in the woods near the village, and ptarmigan are hunted on the tundra in winter or in the brush along river channels in late winter.

Firewood is collected year-round also. Dry, standing dead spruce is the preferred wood for steambath stoves. Some homes and most cabins at fish camps are heated by firewood. Wood cutting, hauling, and splitting is primarily done by young men and boys. Wood is constantly in demand, for steambaths are used almost daily.

B. Harvest Levels of Fish and Game

The quantities of fish and game harvested by upriver residents are presented in table 8. Data for 1973 harvests were collected in three communities: Ekwok, New Stuyahok, and Koliganek (Gasbarro and Utermohle 1974). Comparable information was collected in New Stuyahok for 1982. Salmon harvests for both years are derived from ADF&G subsistence salmon permit returns. The average reported harvest of fish and game for the three communities in 1973 was 1,034 lb dressed weight per capita. In New Stuyahok, harvests of 843 lb per capita were reported in 1973, and 939 lb per capita were reported in 1982. The per capita harvests reported in the subregion are among the highest reported in the state (compare with data in Wolfe and Ellanna 1983) and lend quantitative backing to the local declaration that 90 to 100% of protein in diets is derived from wild resources.

There were some shifts in the proportion contributed by key species between 1973 and 1982 in New Stuyahok (table 9). Moose and caribou combined accounted for 37% of all fish and game harvested in 1973 in New Stuyahok. In 1982, moose and caribou contributed 25% of the total harvest. This was closer to the 1973 subregional proportion of moose and caribou, 27%.

For the subregion as a whole and for the two years surveyed in New Stuyahok, four key species, sockeye salmon, chinook salmon, moose, and caribou, consistently provided around 75% of the fish and game harvested. Other resources are important during specific seasons as

Table 8. Average Subsistence Harvest of Selected Fish and Game, Pounds Dressed Weight per Household, Nushagak River Subregion

	1973a		1982b	
	Subregion	New Stuyahok	Subregion	New Stuyahok
No. households Surveyed	58	26	45	19
Mean Household Size	5.7	6.3	--	5.9
Fish				
Sockeye salmon	1,610	1,000	1,485	1,000
Chinook salmon	1,250	1,050	630	1,680
Chum salmon	700	396	79	440
Pink salmon	40	35	220	88
Coho salmon	70	50		175
Pike	168	249		218
Whitefish	86	49		104
Grayling	69	100		44
Other spp.	53	38		21
Total fish	4,046	3,020		3,770
Mammals				
Moose	886	1,183		680
Caribou	693	796		718
Beaver	170	188		192
Porcupine	32	46		85
Other spp.	5	7		5
Total game	1,786	2,220		1,680
Birds				
Geese	24	32		36
Ducks	23	26		45
Ptarmigan and spruce grouse	13	13		7
Total birds	60	71		88
Total harvest per household	5,892	5,311		5,538
Total harvest per capita	1,034	843		939

a Gasbarro and Utermohle 1974, except for salmon data, which are from ADF&G subsistence salmon permit returns, Dillingham. Subregional data from the communities of Ekwok, New Stuyahok, and Koliganek.

b Wolfe et al. 1984, except for salmon data, which are from ADF&G subsistence permit returns, Dillingham.

sources of fresh food, or they may become emergency alternatives, if key species are unavailable. Coho salmon, pike, whitefish, grayling, beaver, porcupine, and waterfowl are some of the important alternative foods. Many other foods are present in the subregion and may become important if the availability of key species decreases.

Table 9. Proportions of Key Species in Resource Harvests, Nushagak River Subregion

	1973a		1982b
	Subregion	New Stuyahok	New Stuyahok
Sockeye salmon	27%	19%	18%
Chinook salmon	21%	20%	30%
Moose	15%	22%	12%
Caribou	12%	15%	13%
Total	75%	76%	74%

a Gasbarro and Utermohle 1974, except for salmon data, which are from ADF&G subsistence permit returns, Dillingham.

b Wolfe et al. 1984, except for salmon data, which are from ADF&G subsistence permit returns, Dillingham.

C. Cultural Values of Resource Harvesting

Wild resources and their harvesting and processing play an important role in the lives of subregional residents (information in this section comes from Wolfe et al. 1984 and Wright, pers. comm.). As stated previously, the most important holiday of the year, Russian Orthodox Christmas (Slavi), occurs in mid winter, at the same time that traditional intervillage feasting and dancing took place. Intervillage visiting and feasting with traditional goods are basic to the celebration of Slavi today. Every effort is made to provide guests with ample portions of moose, smoked chinook salmon strips, akutaq and other traditional foods. During Slavi, people visit villages within the subregion and in the Nushagak Bay and Iliamna Lake/Kvichak River areas. Feasting on traditional foods is also an important part of birthday and name day or saint day celebrations, which are attended by a large proportion of the village.

The harvesting of wild foods is nearly always done by several individuals working together. These groups are composed primarily of close relatives. Hunting parties are often based on brother/brother, brother/brother-in-law, father/son, or similar close relationships with additional relatives and friends. Freshwater fishing with nets is often done by older men and their grandsons. Subsistence salmon fishing is mostly done by groups of closely related women. Berry picking is also done primarily by women, in groups composed of mothers, daughters, and daughters-in-law and their offspring. Processing of resources gathered in large quantities, such as salmon and other fish, is done by groups of closely related women with the assistance of male relations if they are available. The tasks of catching and processing draw relations and friends together in a satisfying enterprise that ties people to their past as well as to one another.

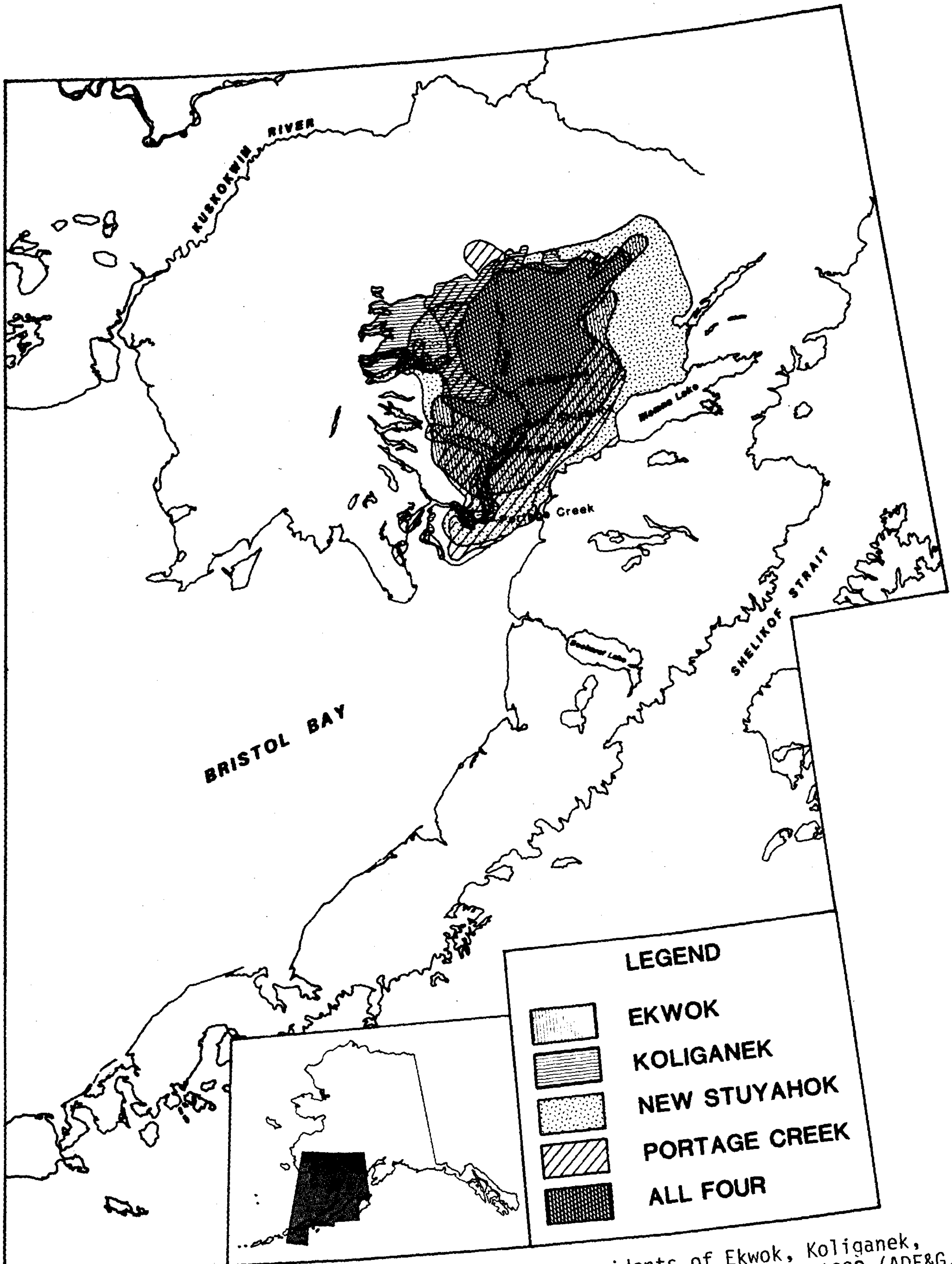
Once foods are harvested and processed, they are commonly shared and distributed through extended kin networks. Members of a kin group frequently share in use of a cache belonging to the household of the eldest member of the kin group. Distribution of foods ensures that all households have access to desired traditional foods, even elderly couples who are no longer able to hunt or fish.

Some foods are shared between subregions. Upriver residents commonly receive marine products from relatives and friends in the Nushagak Bay and Togiak areas. Seal oil and meat, smelt, herring eggs, walrus, and other products may come into the subregion. Coastal residents often bring marine products when they come upriver to hunt moose or caribou. Upriver residents sometimes travel to coastal areas during commercial fishing for berry picking in the fall or for school or adult sports activities.

A lot of visiting and exchange occurs during the late winter festival season. Dog racing is a very popular activity among upriver people; there are several teams in each community. People commonly travel to surrounding areas to participate or watch the races and other activities.

D. Geography of Harvest Activities

The geographic areas used in the recent past (roughly 20 years) by residents of Portage Creek, Ekwok, New Stuyahok, and Koliganek are shown in map 2. The map shows that extensive areas are covered in



Map 2. Nushagak River subregion: areas used by residents of Ekwok, Koliganek, New Stuyahok, and Portage Creek for subsistence use of fish and game, 1982 (ADF&G, Div. Habitat and Div. Subsistence).

search of moose, caribou, furbearers, waterfowl, fish, and berries. A great amount of overlapping use occurs, although this varies by activity. Salmon fishing generally takes place close to the community or at traditionally used fish camp sites. Most freshwater fishing is done within a short skiff ride of the village, but longer trips are regularly taken in fall and spring. Large areas are covered by hunters and trappers. In fall, most traffic is confined to rivers and lakes. Koliganek hunters make greater use of the upper Nushagak and Nuyakuk drainages, whereas New Stuyahok hunters are more likely to head up the Mulchatna. These affinities are reflections of long-term traditional ties to the respective areas. Hunters from Ekwok and Portage Creek also use the upper reaches of the Nushagak and Mulchatna rivers, sometimes travelling with kin from Koliganek or New Stuyahok. In winter, a wider area is covered, as snowmachines permit travel overland. Berries are generally harvested near home but may be gathered on long hunting trips or on special trips to other villages.

Though certain areas are traditionally used and preferred, they may not be used every year. Changing weather conditions may affect travel by influencing water levels, ice conditions, or snow cover. The distribution of the prey may change, which is particularly true of caribou, or the population size may fluctuate, influencing hunting, fishing, or trapping patterns.

Nushagak Bay Subregional Assessment

I. LOCATION AND ENVIRONMENT

The Nushagak Bay subregion includes four communities: Aleknagik, Clarks Point, Dillingham, and Ekuk. The land surrounding the bay is predominantly flat alluvial plain, with mountains of the Wood River range lying to the northwest. Tundra is the dominant vegetative community of these flat, poorly drained areas. Spruce-deciduous forests are limited to the better-drained river margins, rolling hills, and lower slopes of the mountains. The Wood River drains the Wood River lakes system and joins the Nushagak River at the head of Nushagak Bay. The Snake River flows into the bay southwest of the Wood River. Numerous tidal sloughs penetrate the flats on the east side of Nushagak Bay.

Millions of salmon pass through Nushagak Bay each summer enroute to spawning grounds up the Wood and Nushagak drainages. All five salmon species are present in abundance. Smelt are also plentiful, as are belukha and spotted seals. Freshwater fish are abundant in the Wood River system. Only a few moose are found near the bay, but they are more common around the Wood River lakes. Small groups of caribou are occasionally seen east of the bay, but they are not common in the bay area. Brown bears are the most abundant large land mammal in the area.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITIES

When the Russians first entered the area in the early 1800's, the bay area was inhabited by Yup'ik Eskimos belonging to the Aglegmiut subgrouping (historical information in this section is from VanStone 1967 and 1971). At the time of Russian contact, it is estimated that there were probably no more than 500 Aglegmiut living around Nushagak Bay. The Russians established a fur trading post, Aleksandrovski Redoubt, at Nushagak, across the bay from present-day Dillingham, in 1818. A Russian Orthodox church was added in 1841. The Russian Orthodox church remained active after purchase of Alaska by the United States, when operation of the trading post was taken over by the Alaska Commercial Company. A mission and school were established by the Moravians in 1886 adjacent to Nushagak, but they were abandoned in 1905.

Commercial fishing began in the 1870's and quickly grew to be the most important outside influence in the region. By 1903, 10 canneries were built on Nushagak Bay. Increasing numbers of local residents were attracted to the bay during the commercial fishing season, and eventually they gained opportunities to work in the canneries because of labor shortages during WW II and, since the 1960's, to become independent fishermen. Some local men herded reindeer near the bay between 1910 and

1940, but it was never as important to the regional economy as was commercial salmon fishing.

In 1908, a Bureau of Education school was constructed at Kanakanak, six miles south of present-day Dillingham. In 1918, the building was enlarged and converted into a hospital to treat victims of the influenza epidemic; the following year an orphanage was constructed. The 1918-19 epidemic had a terrible impact upon local communities; many villages were abandoned, and large numbers of residents died. Through the years, the hospital at Kanakanak increased its facilities and the area it served; today it is the regional hospital and dental and health center.

Situated on the bay near the canneries and the hospital, Dillingham has emerged as the economic and trading center for northwestern Bristol Bay. Roads connect Dillingham to the Kanakanak Hospital and stretch more than 20 mi north to the village of Aleknagik. The Dillingham airport, with a flight service station, is large enough to accomodate passenger jet aircraft and large cargo planes. Most federal and state agency offices for the Bristol Bay region are located in Dillingham.

VanStone (1971) suggests that the Aglegmiut were strongly oriented to inland resources. Apparently, lengthy spring and fall hunting and trapping trips were made into the interior. The Aglegmiut exploited marine resources about the bay, but they were not as heavily reliant upon them as were their northern neighbors.

The historical pattern of seasonal activities in the late 1800's is described by VanStone (1967). In fall, men made long trips upriver to hunt caribou. Later, following freeze-up, ice fishing produced blackfish, ling cod, and, at Lake Aleknagik, char and trout. By December, people had settled in their permanent winter communities. Some trapping continued through the dead of winter, but this was the primary season for intervillage visiting for feasting and dancing. In spring, men travelled upriver to hunt and trap or down the bay to hunt marine mammals. Smelt were caught through the ice and by dipnetting in open water. Waterfowl hunting commenced as birds returned north on their spring migrations. The main summer activity was salmon fishing. Belukha whales were also harvested in summer. By August, the cycle would begin again, with men heading upriver to hunt and trap.

III. POPULATION

Currently, around 2,000 people live in the Nushagak Bay subregion. Nearly 90% of the population is concentrated in the city of Dillingham. In the 1800's, there were numerous village sites on both the west and east shores of Nushagak Bay, but several factors -- primarily the development of salmon canneries and the 1918-19 flu epidemic -- led to a consolidation of the population at Dillingham, which emerged as the regional center. Dillingham is growing rapidly (see table 10). A 1983 census conducted by the city enumerated 1,896 residents (pers. comm. ADCRA, Dillingham). Most of the growth is due to immigration of non-Natives. The percentage of Natives in the local population dropped from 64% in 1970 to 58% in 1980 (Nebesky et al. 1983). Immigrants are supported primarily by the growth of wage employment in government and service industries.

The permanent population of Clarks Point in the 1930's was around 25 but grew abruptly to 128 by 1950. The presence of the cannery attracted residents from the Bristol Bay region and some from the Kuskokwim. Over the past 20 years the population of Clarks Point has steadily declined. The decrease in population is likely due to movement of residents to Dillingham further up Nushagak Bay.

Ekuk was the site of an old Yup'ik settlement, and a cannery was also built there. The community was a large and important village at the time of Russian contact. In the 1960's, the population was 40 to 50 people, but only a few families resided there year-round. Today, only a watchman lives there permanently. In the summer, many commercial set net fishermen live in cabins along the beach. The majority of the population emigrated from Ekuk to Dillingham in the 1970's.

The traditional village of Aleknagik was abandoned in 1919 after most of its inhabitants died in the 1918-1919 flu epidemic. Starting in the late 1920's, families from Togiak and Kulukak moved to the lake and reestablished a community. A few years later, a group of Seventh-Day Adventists started a colony on the lake. By 1940, the colony grew to include 60 people but has declined since the 1960's. The Yup'ik population of Aleknagik has steadily increased. The percentage of Alaskan Natives residing in Aleknagik increased from 76% in 1970 to 90% in 1980 (Nebesky et al. 1983).

Dillingham appears to be drawing inhabitants away from other bayshore communities, leading to a decline in population in Clarks Point and the virtual demise of Ekuk as a year-round community. Dillingham also grows as it solidifies its position as regional center, as increasing numbers of government agencies open offices, and as private industry develops to provide services to the region. Aleknagik is becoming a predominantly Native community and is growing (table 10).

During the commercial fishing season, Dillingham, Clarks Point, Ekuk, and other locations on the bay are flooded with fishermen, cannery workers, and other seasonal workers. Many sports fishermen and tourists also pass through Dillingham and Aleknagik in the summer months.

Table 10. Census Population of Nushagak Bay Subregion, 1880-1980

	Year										
Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Akooyukhpak	83										
(Agulukpukmiut)		22									
Aleknagik							78	153	231	128	154
(Alaknak)			114								
Clark's Point						25	22	128	138	95	79
(Stugarok)	7										
Dillingham						85	278	577	424	914	1,563
(Kanakanak)	53	145									
(Bradford)	167										
(Choglung)				165	182						
Ekuk	112					37			40	51	7
(Yekuk)		65									
Kanulik	142	54									
(Carmel)		187	151								
Nushagak	178	268	324	74	16	43					
Wood River Village			196			55					
(Anagnak)	87										
Subregion total							378	858	833	1,188	1,803

Sources: ADL 1981, Rollins 1978, VanStone 1971, Petroff 1884.

With Dillingham serving as the region's center, there are ties within and outside the region. Dillingham is connected to Anchorage by scheduled daily jet service and, less frequently, by two other carriers. Additional cargo flights are made regularly. Three air charter companies are based in Dillingham, and they serve surrounding villages with many flights each day in single-engine aircraft. Charter flights frequently are made to the Bethel area. Barge services link Dillingham with Seattle during the ice-free period from May to October. Local residents commonly order grubstakes, vehicles, and other large, bulky items for delivery by barge. Two local barge services are based in Aleknagik. Individuals travel in personal aircraft, boats, automobiles, and snowmachines. Dillingham and Aleknagik are linked by a gravel road that is serviceable year-round except for a short period in spring.

Auto traffic is the primary means of transportation used by the residents of Aleknagik to reach Dillingham. Clarks Point residents generally fly to Dillingham. People travel to Dillingham to shop, to receive medical and dental care, to visit, to participate in festivals and religious celebrations, to conduct business, and to make connections to fly to Anchorage. Most residents of Clarks Point belong to the Russian Orthodox church, as do a large number of Dillingham residents. During church holidays, there is a lot of travel between these two communities and Nushagak River and Iliamna Lake communities. Many Aleknagik residents travel to the Togiak subregion and Kuskokwim area to participate in Moravian church festivities. Winter and spring carnivals also attract visitors to several communities in the region.

IV. MONETARY ECONOMY

Commercial salmon fishing remains the primary source of cash income in the subregion, but as Dillingham grows an increasingly larger proportion of income is derived from government and private support and service industries (Nebesky et al. 1983). The commercial herring fishery near Togiak has recently attracted fishermen from the Nushagak Bay area and provides local fishermen an opportunity to use their salmon boats in a second fishery with little investment in additional gear.

The cash economies of Aleknagik and Clarks Point are similar to those of other small communities in the Bristol Bay region. Most cash income is derived from commercial salmon fishing during the short summer season. There are approximately 40 Bristol Bay salmon limited entry drift permits and 28 set net permits held by residents of the two communities (Langdon 1981; table 11). That equals one permit per four or five people, or 0.9 to 1.3 permits per household.

These values may be inflated, since there has been much movement by residents of the communities, and some fishermen may return to the area only during fishing season. Some fishermen participate in the Togiak herring fishery in May, and most of these are members of the Bristol Bay Herring Marketing Co-op based in Dillingham.

Trapping and the production of traditional crafts are two additional types of self employment based on local harvests of renewable resources. Relatively small incomes are derived from either activity, but the cash usually is important to the households because it comes in winter or spring, when money commonly is running low.

Table 11. Limited Entry Permits[a] Held by Residents of the Nushagak Bay Subregion

Community	Population[b]	Set Net Permits	Drift Net Permits	Total Permits	Persons/ Permit
Aleknigik	232	19	30	49	4.7
Clarks Point	80	9	10	19	4.2
Dillingham	1,896	93	136	229	8.3
Ekuk	7	2	0	2	3.5
Total	2,215	123	176	299	7.4

a ADCRA.

b Langdon 1981, ADCRA 1982.

Wage employment is predominantly through government-funded sources. The schools, electrical and water and sewer utilities, local government, and Native corporations are the source of most positions. Most of the permanent jobs are 9 or 10-month positions that permit employees to participate in summer commercial and subsistence fishing activities. In addition, many of the positions are part-time or flexible in timing so that people do not forfeit the opportunity to participate in subsistence activities by taking wage employment. An estimate of the number of wage positions available in the two communities is presented in table 12.

Dillingham is unique among the communities in Bristol Bay. Its population is large relative to other communities, and, as the regional center, it is home base for government agencies, private industry support services, and Native corporation activities. Dillingham has offices of a wide variety of government branches, including USFWS, FAA, Corps of Engineers, U.S. Public Health Service, State Court System, Department of Fish and Game, Departments of Health and Social Services and Public Assistance, Job Service Employment Center, Legislative Affairs, State Troopers, and Fish and Wildlife Protection. The Southwest Regional School District's administrative offices are based there and serve northwestern Bristol Bay. In the private sector, there are two hotels, several restaurants, a bank, three large grocery and general merchandise stores, two lumber yards, several snowmachine and outboard motor dealers, and numerous other businesses. The Bristol Bay Native Association, the nonprofit branch of the regional Native corporation, has its headquarters in Dillingham. Choggiung Ltd, the local village Native corporation, has offices there, and its staff assists the corporations of several neighboring villages.

Table 12. Local Wage Employment,[a] Nushagak Bay Subregion

Community	Population	Full-time Positions	Part-Time or Seasonal Positions	Total No. Positions
Aleknagik	232	13	5	18
Clark's Point	80	--	--	10
Dillingham	1,896	828	--	828
Ekuk	7	1	0	1

Source: ADCRA 1982.

a Includes only those jobs that are regularly available each year. Teaching positions, commonly held by nonlocal residents, are included. The Dillingham data are calculated from both full-time and part-time seasonal positions.

These offices and businesses provide stable, year-round employment to a large number of people. In 1980, Alaska Consultants, Inc., estimated that the equivalent of 828 full-time jobs were held by Dillingham residents. Government provided 180 jobs, manufacturing 155, the service industry 144, trade 101, and transportation, communications, and public utilities 96. More than 40% of these jobs were considered related to commercial fishing (ADCRA 1982).

Commercial salmon fishing is still an important part of the cash economy in Dillingham. In 1980, approximately 136 drift net permits and 93 set net permits were held by Dillingham residents (Langdon 1981). One cannery and several shore-based processing plants are located in the city. Support services are provided to resident and non-resident fishermen. The local small boat harbor is used by more than 500 fishing vessels each year. Many Dillingham salmon fishermen also take part in the Togiak herring fishery; some have rigged their 32-ft salmon gill net boats to seine for herring, but most use gill net gear.

V. USE OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Used and Seasonal Round of Activities

Residents of the subregion rely on marine and terrestrial resources. They harvest marine mammals, waterfowl, clams, salmon, and a variety of other fish from Nushagak Bay. Salmon, a number of other types of fish, furbearers, and waterfowl are harvested in rivers and lakes. They harvest moose, porcupine, spruce grouse, furbearers, berries, and firewood from the forests. Caribou, ptarmigan, furbearers, and berries are taken from tundra habitat.

Although many Dillingham residents are new to the region and a relatively large proportion are committed to full-time jobs, there is a traditional and common pattern to resource harvest activities conducted by many residents within the subregion. This pattern is depicted in figure 3. Beginning with break-up in spring, the annual cycle starts with waterfowl hunting around Nushagak Bay and along the rivers. Many hunters travel down the bay to intercept flights of eiders and emperor geese. Seals are hunted at the same time. In late April, parky squirrels and a few brown bears are harvested in the vicinity of the Wood River lakes soon after they emerge from hibernation. Some families travel to the Togiak and Kulukak coastal areas to harvest herring and herring eggs on kelp, clams, and sea mammals.

The first chinook salmon are usually caught in set nets along Nushagak Bay in late May. The chinook run stretches through June and July, and these fish are the most eagerly sought salmon for eating fresh, freezing, and smoking and salting. Sockeye salmon run from late June through late July and are the next most popular salmon. They are primarily dried and smoked or frozen. Chum salmon and pinks also run in summer. Coho pass through the bay in August and September, and most are caught in set nets and frozen. Trout, char, and grayling are caught in lakes and rivers with rod and reel during summer months.

Salmonberries are the first to ripen in summer. Large quantities of this favorite berry are picked in the Nushagak Bay area in July and early August. Blueberries, huckleberries, blackberries, and lowbush cranberries are also sought as they ripen later in the summer and fall. Berries are traditionally served in agutaq.

Caribou and moose hunting begins in late summer and early fall. Most caribou hunters travel inland, up the Nushagak and Mulchatna rivers. Moose hunters also head upriver or to the Wood River lakes. Most hunters use skiffs or fish boats for transportation, although increasing numbers of Dillingham residents fly. In winter, snowmachines or airplanes are used. Some hunters travel to the

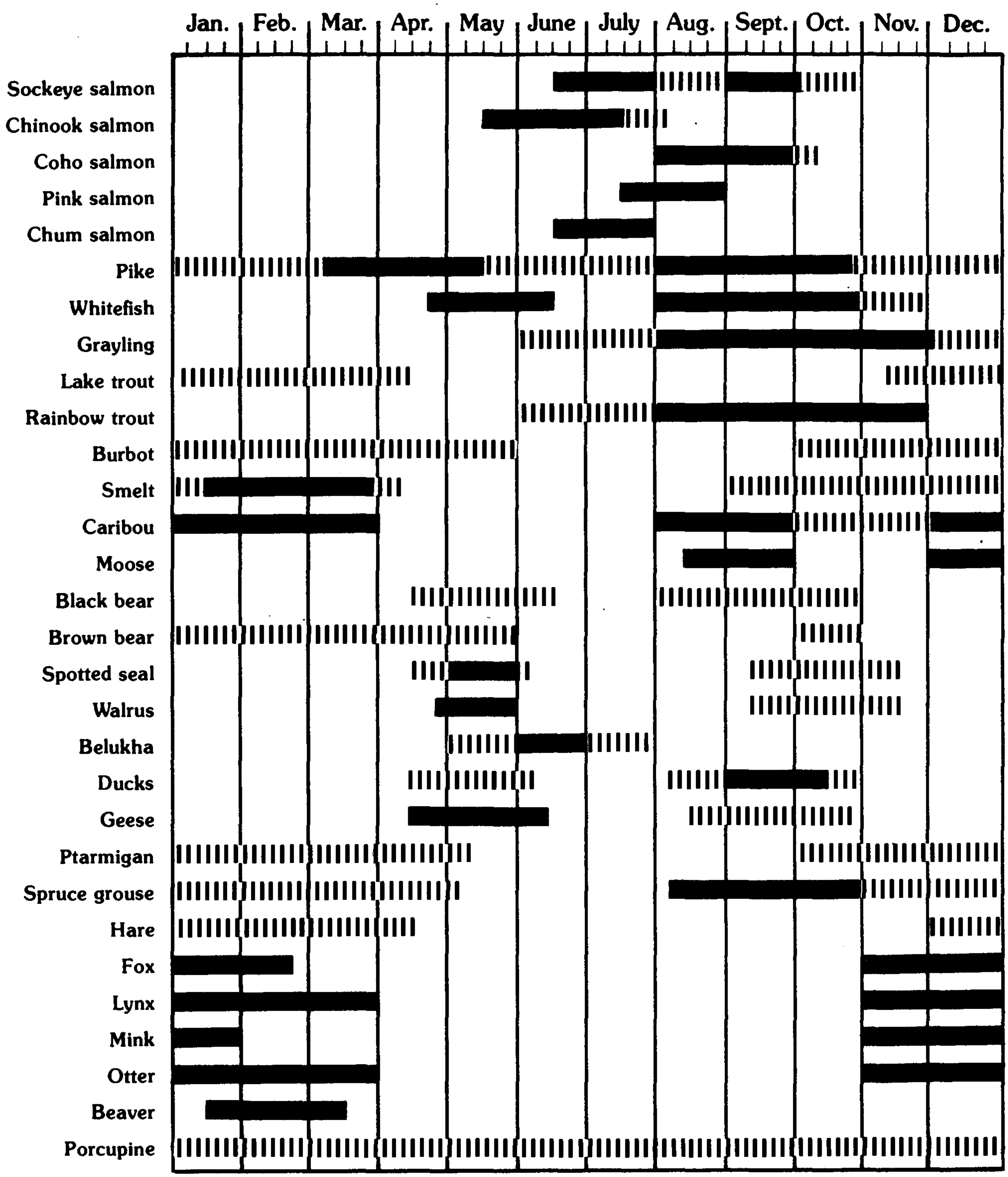


Figure 3. Seasonal round of resource harvests, Nushagak Bay subregion. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (1982-1983 field interviews, ADF&G, Div. Subsistence).

(continued)

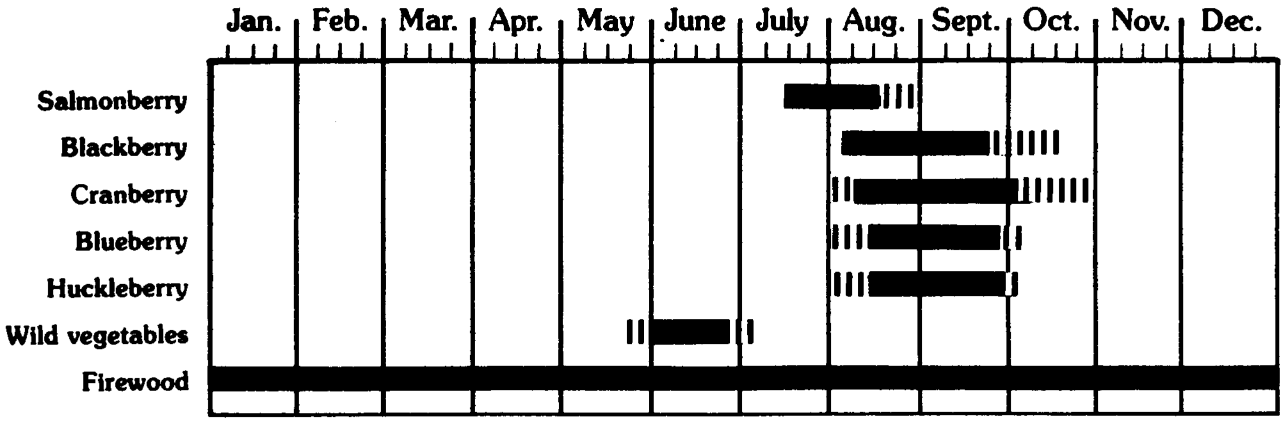


Figure 3 (continued).

Alaska Peninsula by air. Some fall waterfowl hunting takes place around Nushagak Bay, but many Dillingham residents prefer to fly down the Alaska Peninsula for goose hunting. Seals are also taken in the fall when hunters are travelling about the bay by boat.

As ice begins to form in rivers and lakes, nets are set for whitefish and smelt. Smelt are also dip netted around the bay. Following freeze-up, people jig for char, lake trout, and pike up in the Wood River lakes area. Nets are set throughout the winter near Aleknagik for whitefish, char, and burbot. In late winter, smelt are caught by jigging in lower river areas near Nushagak Bay. A few people still set traps for blackfish.

Many Nushagak Bay residents trap. Beaver, land otter, and red fox are caught in greatest numbers. Beaver meat is an important late winter food in the smaller communities. Small mammals and birds are taken at various times throughout the year. Porcupines are taken whenever they are encountered but are most desired in late fall. Spruce grouse are primarily hunted in September and October. Ptarmigan are hunted when they form large flocks in late winter. Firewood is gathered year-round. Wood-heated steam baths are a common feature throughout the subregion and many are used daily.

B. Harvest Levels and Intercommunity Variation in Harvest

A 1973 survey of subsistence harvests in Bristol Bay (Gasbarro and Utermohle 1974) included Aleknagik, Clarks Point, and Dillingham, although only a small sample of Dillingham households was surveyed. Results from that survey are summarized in table 13. These data indicate that salmon and large mammals provide the bulk of subsistence foods in the subregion. Some variation among communities is hidden in the subregional averages. Clarks Point

Table 13. Average Harvest of Selected Fish and Game, Pounds Dressed Weight per Household, Nushagak Bay Subregion

	1973a		1975b	1982c	
	Subregion	Aleknagik	Aleknagik	Subregion	Aleknagik
No. households surveyed	59	16	15	245	12
Mean household size	4.7	5.0	6.7	--	--
Fish					
Sockeye salmon	315			154	533
Chinook salmon	410			225	118
Chum salmon	88			30	56
Pink salmon	2			32	1
Coho salmon	57			87	45
Total salmon	872		923	528	753
Pike	19	42	128		
Whitefish	8	27	47		
Char	19	19			
Smelt	23	1			
Other spp.	23	45			
Total fish	964				
Mammals					
Moose	190	232	718		
Caribou	170	57	80		
Seal	19	20			
Beaver	18	78	158		
Porcupine	17	5	13		
Other spp.	10	5			
Total mammals	424	397			
Birds					
Geese and ducks	26	17	31		
Ptarmigan and grouse	43	12	57		
Total birds	69	39	88		
Total harvest per household	1,557				
Total harvest per capita	354				

a Calculated from Gasbarro and Utermohle 1974; salmon data from ADF&G subsistence salmon returns, Dillingham. Subregional data from Aleknagik, Clark's Point, and Dillingham household.

b Calculated from Nicholson 1976.

c ADF&G subsistence salmon permit returns, Dillingham.

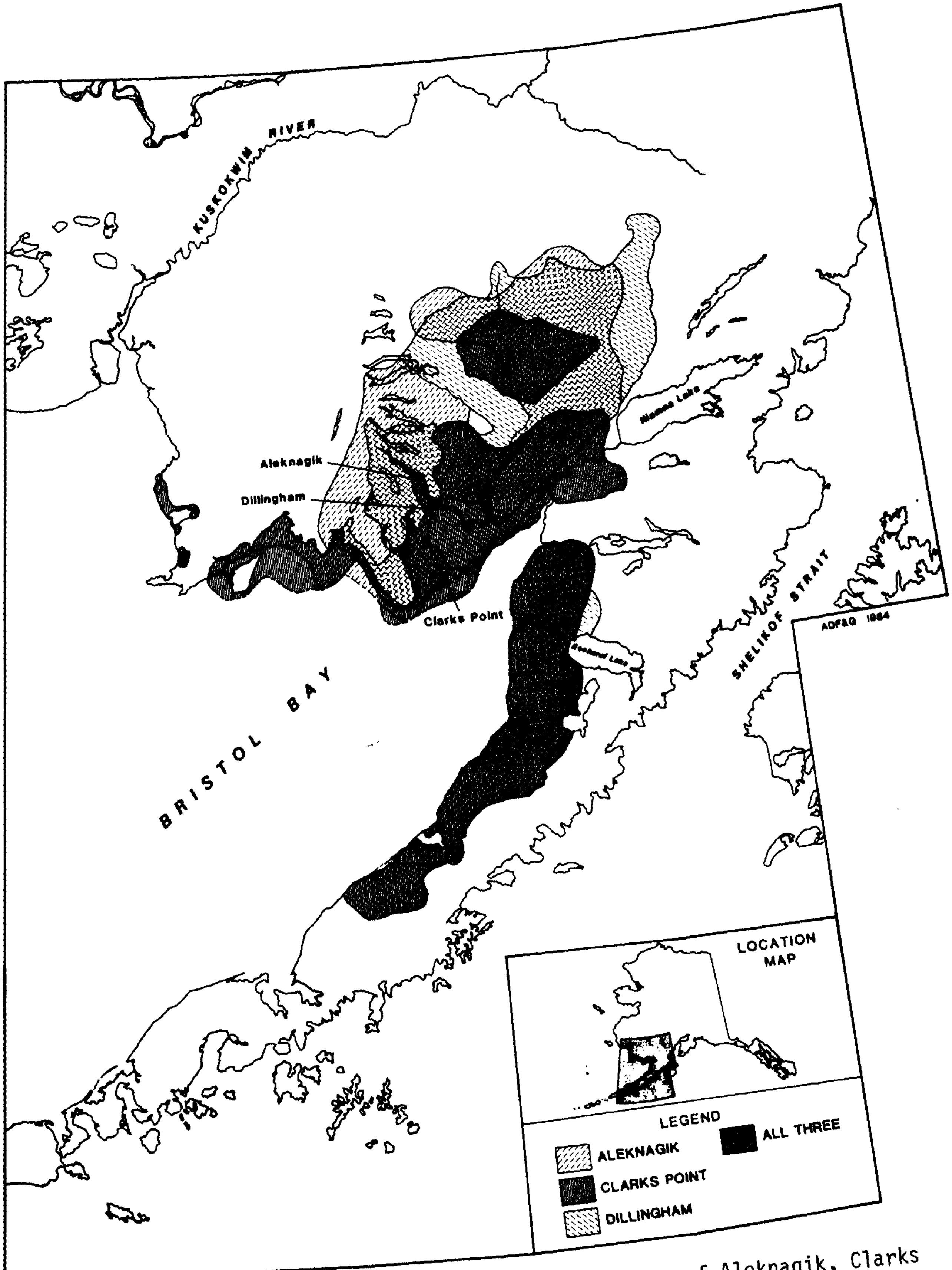
residents rely more heavily on marine mammals than do residents of Aleknagik and, especially, Dillingham. On the other hand, Clarks Point residents have less access to several types of freshwater fish and use fewer of them in their diet. A second survey was conducted in Aleknagik in 1975. Data from this survey indicated that considerably more fish and wildlife were harvested than were reported in the 1973 survey. The 1982 subsistence salmon permit returns show that residents of the subregion continue to use large numbers of chinook and sockeye salmon.

In small communities, the harvest, preparation, and distribution of subsistence products is a group endeavor, usually conducted by persons related by kinship. In a large, diverse community such as Dillingham, subsistence activities are conducted by groups of varying composition in addition to the traditional kin-based groups. Friends and work associates commonly share in the use of a subsistence set net and the work of splitting and drying or freezing fish. The largest proportion of salmon are preserved by freezing in Dillingham. Hunting partners are also frequently drawn from pools of friends and work aquaintances rather than from close kin groups.

Many residents of Dillingham, Clarks Point, and Aleknagik travel to neighboring communities to hunt or pick berries with kin. Men commonly travel upriver to hunt caribou or moose with relatives, who share equipment with them. Likewise, men go to the Togiak area to hunt marine mammals or waterfowl. Relatives may come into the Nushagak Bay subregion to pick salmonberries or huckleberries, to hunt moose or waterfowl, or to attend festivals and shop.

C. Geography of Harvest Activities

Map 3 portrays the areas used by Aleknagik, Clarks Point, and Dillingham for resource harvesting in the past 20 years or so. Extensive areas are covered in the harvest of subsistence resources. Access to these areas is by boat, snowmachine, aircraft, and, in the Dillingham/Aleknagik area, by automobile. Caribou are generally sought up the Nushagak River and its main tributary, the Mulchatna. Moose are hunted in the same area and also around the Wood River lakes. A few hunters, mostly from Dillingham, fly across to the Alaska Peninsula to hunt caribou and perhaps moose. A number of Dillingham hunters fly down the peninsula to hunt waterfowl in the fall. Most marine mammal hunting occurs near Protection Point, down Nushagak Bay, but some hunters also travel to the Kulukak and Togiak areas, particularly if these areas were traditionally used by their families.



Map 3. Nushagak Bay subregion: areas used by residents of Aleknagik, Clarks Point, and Dillingham for subsistence use of fish and game, 1982. No data are presented for Ekuk (ADF&G, Div. Habitat).

Iliamna Lake Subregional Assessment

I. LOCATION AND ENVIRONMENT

The Lake Iliamna subregion includes the eight communities with year-round populations: Igiugig, Iliamna, Kakhonak, Levelock, Newhalen, Nondalton, Pedro Bay, and Port Alsworth. In addition to the population in these named settlements, about 20 to 30 people live at isolated locations around Iliamna Lake and Lake Clark. These communities make intensive use of the drainage areas of the Kvichak River, Iliamna Lake, and Lake Clark for harvesting a diversity of resources.

This area is ecologically diverse and encompasses very different types of terrain. The Chigmit Mountains of the Alaska Range in the northern and eastern parts of the subregion have permanent snowfields and support montain flora and fauna. The valleys of upper Lake Clark and the eastern shore of Lake Iliamna are heavily forested with spruce. Rolling open tundra, with many small tundra lakes, extends westward from the shores of Lake Iliamna and down the Kvichak River drainage to Kvichak Bay. The major lakes and rivers of the subregion support the largest sockeye salmon runs in the world. The subregion also has a large number of terrestrial mammals, birds, and freshwater fish species. All communities within the subregion are situated on waterways, and community sites appear to have been chosen to ensure good access to the fish and game resources found in the area.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITY

Although little is known about the prehistory of the Iliamna Lake subregion, it is likely that the rich natural resources of the area have supported human habitation for thousands of years. The distribution of ethnic groups and their populations in the prehistoric and early contact period is imperfectly understood because major population movements were underway when Russian fur traders entering the area in the late eighteenth century wrote the first accounts of the area's population (Oswalt 1965, Townsend 1965, 1970, 1973). At the turn of the century the Iliamna Lake area was a meeting place and cultural contact point between Dena'ina-speaking Athabaskan Indians and Yup'ik-speaking Eskimos (Townsend 1965, 1973). The Iliamna Dena'ina have cultural similarities with other Dena'ina Athabaskan groups of Cook Inlet and with Athabaskans of Interior Alaska. The Yup'ik Eskimos have cultural affinities with Eskimo groups present in coastal and tundra areas from the Alaska Peninsula to Norton Sound.

The Dena'ina population of the Iliamna Lake subregion is concentrated in the communities of Nondalton, Pedro Bay, and Iliamna. Kakhonak, Igiugig, Levelock, and Newhalen are primarily Yup'ik Eskimo communities. Non-Native prospectors, traders, and trappers began entering the subregion in increasing numbers in the present century. More recently, the establishment of hunting and fishing lodges has added to the non-Native population of the area. At the present time, Port Alsworth is predominantly non-Native, and there are significant numbers of non-Natives in Iliamna as well.

Despite what appears to be long periods of contact between Dena'ina and Yup'ik communities and a shorter period of contact between the Native villages and Euro-American society, both the Dena'ina and Yup'ik communities have maintained their cultural integrity and cultural heritage. Kinship ties of marriage and descent join the Dena'ina families of Nondalton, Pedro Bay, and Iliamna with one another and with other Dena'ina living in Lime Village and Stony River in the Kuskokwim River drainage. Similar kinship ties bond the Yup'ik Eskimos of Kakhonak, Iguigig, Levelock, and Newhalen with one another and with Yup'ik communities of the Bristol Bay area.

The area has been unified for some time by a common transportation and communication center used by all communities, a common economy based on harvest of selected natural resources, common festivals and cultural celebrations, and a common language. The communities of the area are currently linked by a growing dependence on Iliamna as a transportation hub and service center. Wien Air Alaska provides daily flights between Anchorage and Iliamna during the summer and three times a week during winter. Jet service was inaugerated in 1980. Subregional air services also operate out of Iliamna, which has become an important transhipment point for both air and barge freight. Before air transport became dominant, the waterways of the subregion provided for natural transportation corridors uniting the communities.

These communities share common systems of production, consumption, and exchange. Commercial salmon fishing in Bristol Bay, firefighting for the Bureau of Land Management, temporary work on construction both within and outside the subregion, and trapping have been the main sources of cash income for members of all ethnic groups over the last 20 years. All of these sources of employment are seasonal, and income from these occupations is subject to large year-to-year fluctuations. Members of all communities and ethnic groups in the subregion also share in making major use of fish, wildlife, and other locally available natural resources.

Major festivals are celebrated throughout the subregion. During Slavi, Russian Christmas, people travel from house to house within and between communities. According to custom, every home in a community is visited, and special foods are prepared for guests. In late winter, carnivals take place featuring dog-racing, visiting, and gambling.

Currently, English is the common language of the subregion. Older members of the Native population of the subregion continue to speak Deni'ina or Yup'ik. Before English became the common language of the area, Russian was widely spoken and many Dena'ina understood Yup'ik.

III. POPULATION

In the 1980 census, 582 people are recorded as living in the seven communities of the Iliamna Lake subregion enumerated. In addition to this permanent population, hunting and fishing lodges bring in seasonal help during summer months. The main movement of population in and out of the subregion in recent years has consisted of temporary migration of residents away from the subregion for employment and education, significant permanent migration of subregional residents to other areas of Bristol Bay or away from the region entirely, and a small immigration of non-Natives either attracted by the way of life possible in the subregion or engaged in guided hunting and fishing businesses. The cumulative effect of these movements of people has maintained the total population of the subregion at about 600 since the 1960 census (table 14). If we assume a rate of natural increase for the subregional population (births minus deaths / total population) as being between 1.5 and 2% per year, we would estimate that the subregion population would have increased from about 600 in 1960 to between 810 and 895 individuals by 1980. By this estimate between 210 and 295 persons have migrated away from the subregion in this 20-year period (Goldsmith et al. 1982). Limited employment opportunities in the subregion are likely to be related to this movement.

Although the early population history of the subregion is cloudy in the absence of good census accounts, it would appear that at least 339 people were living in the subregion in five communities at the time of the 1880 census (table 14). Ethnographic evidence indicates that settlement in permanent communities inhabited throughout all months of the year is a more recent phenomenon in the subregion. In precontact times and during the initial Russian period, households and family groupings moved throughout the subregion and maintained camps where seasonal resources could be most effectively harvested (Oswalt 1963, Winterhaler and Smith 1981). Some of this semi-nomadic pattern of resource harvesting and settlement continues at the present time. Households and extended families maintain fish camps for processing salmon during summer months. In other seasons, hunting and trapping camps may be maintained.

Population projections have been made for five of the eight communities of the subregion for the purpose of evaluating different economic scenarios and for estimating potential demand for noncommercial harvest of fish and game resources (table 15). The rate of change for the five communities over the period 1980 to 2002 is 34%. If this rate of growth is applied to the total subregion, population would increase from 582 in

Table 14. Census Population of Iliamna Lake Subregion, 1880-1980

Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Chikak	51										
Igiugig									36	36	33
Iliamna		76		121	66	100	30	44	47	58	94
(Ilyamna)	49										
Kakhonak	28							39	57	88	83
Kashinakh	119										
Kaskauak		66									
Kichik	91										
Koggiung	29		533								
Levelock								76	88	74	79
Newhalen						--	55	48	110	88	87
(Noghelingamiut)		16									
Niknak		42									
Nondalton					69	24	82	103	205	184	173
Pedro Bay								44	53	65	33
Port Alsworth[a]											(22)
Other population											(20)
Subregion total	339							354	596	593	582

Sources: ADL 1981, Rollins 1978.

a Not listed in census material.

b Researcher estimate, probably included in other named community population.

Table 15. Population Projections 1980-2002, Selected Iliamna Lake Subregion Communities

	1980	1987	1992	1997	2002	Percent Change 1980-2001
Igiugig	33	35	37	39	41	+24
Iliamna	94	111	126	142	160	+70
Newhalen	87	99	109	120	132	+52
Nondalton	173	179	184	188	193	+12
Levelock	79	85	89	94	98	+24
Total	466	509	545	583	624	+34

Source: Goldsmith et al. 1982.

1980 to 780 in 2002. This increase in population, coupled with a larger influx of hunters from outside the subregion, could result in increased competition for large ungulates in the subregion and diminish the hunting oportunities and likelihood of hunting success of local residents who rely on these species as major sources of food (Goldsmith et al. 1982, Nebesky et al. 1983).

IV. MONETARY ECONOMY

The harvest of fish and game and utilization of other natural resources present in the subregion forms the basis of the subregional economy. Virtually everyone in the subregion relies on noncommercial harvest and use of fish and game as a major food source, and the level of dependence on these natural resources is quite high. Commercial fishing and related employment in fish processing and service industries provide the residents of the subregion most of their cash income. Other regular sources of income include employment with state and local governments, with area schools, with hunting and fishing lodges, and with the limited marketing and service infrastructure present in the subregion. Trapping, construction work, and firefighting also add cash income to the area. In bad fishing years and for some impoverished families, transfer payments may be an important source of cash in the subregion.

Because of physical distance from the fishery, scheduling conflicts with subsistence harvesting, and possibly because of better sources of cash income from trapping, Iliamna Lake area residents were not involved in the Bristol Bay salmon fishery in any numbers before the 1920's. The first available jobs were for cannery workers and laborers. During the 1930's and 1940's many area residents began fishing commercially.

Participation in the fishery has varied with the expected return of sockeye salmon. Fewer Iliamna Lake subregional residents fish in years when the sockeye run is expected to be weak than in years when a strong run and good fishing proceeds are expected. Limited entry regulation of the Bristol Bay fishery has altered this variable participation pattern. From about 1950 through 1975, peak salmon runs tended to occur at five-year intervals, with poorer runs occuring in the off years. According to the participation strategy followed during this time period, Iliamna Lake residents attempted to minimize losses by not investing heavily in the fishery. In years of poor runs, fishermen found that their earnings barely covered expenses. The distance to the coast added to the transportation costs of getting to and from the fishery. Many fishermen would not find it worthwhile to fish in poor years.

After several years of very poor runs in the early 1970's, Bristol Bay was declared a disaster area by the state in 1974. These poor runs were predicted in advance by the ADF&G, and few Iliamna area residents fished from 1972 through 1974. In the late 1970's, as salmon runs improved, Iliamna Lake subregional fishermen increased their level of participation in the fishery. Limited entry regulation of the fishery, however, has had considerable effect on the area residents' access to the fishery. The Limited Entry Commission weighted 1971 and 1972 particularly heavily in awarding points for fishing participation needed to qualify for limited entry permits. Since these were years when many area residents did not fish, many people who consider themselves to be commercial fishermen did not get permits.

Average household size in the subregion was 4.07, according to the 1980 census. Comparison of the population data with data on the number of permits (see table 16) indicates that in most of the communities in the subregion there is about one limited entry permit for every six people, or less than one permit per household.

Table 16. Limited Entry Permits, Iliamna Lake Subregion Communities, 1982

	1980 Population	Set Net Permits	Drift Net Permits	Total Permits	Persons/ Permit
Iguigig	33	1	6	7	4.7
Iliamna/ Newhalen	181	18	15	33	5.5
Kokhanok	83	5	3	8	10.4
Levelock	79	10	6	16	4.9
Nondalton	173	12	13	25	6.9
Pedro Bay	33	5	3	8	4.1
Total	582	51	46	97	6.0

Source: Morris 1982. pers comm.

The majority of permits held in the Iliamna subregion are for set netting. Drift net fishing usually produces higher gross earnings than does set net fishing. Gross earnings in the Bristol Bay fishery have varied dramatically over recent years (table 17). Langdon (1981) has reported that gross earnings for fishermen from Newhalen/Iliamna are significantly low compared with other Bristol Bay communities surveyed in 1980. In the same survey, fishermen from Newhalen/Iliamna reported that 89.6% of their total yearly income was derived from commercial fishing. Overall, because of variability in return from salmon runs and restricted participation in the Bristol Bay fishery due to limited entry and other factors, income from commercial fishing is both extremely variable from year to year and unevenly distributed among the families of the subregion.

Table 17. Average Gross Earnings by Gear Type, Bristol Bay Salmon Fishing, Bristol Bay Residents Only, 1975-80

	Drift Gillnet	Set Net
1975	$5,401	$1,581
1976	$12,944	$2,764
1977	$15,378	$4,135
1978	--	--
1979	$50,378	$16,493a
1980	$28,146	$8,400

Source: Langdon 1981.

a Includes nonresident fishermen for this year and gear type only.

Job opportunities in occupations other than commercial fishing and fish processing are severely limited in the subregion. Jobs that are available may be part-time and are often seasonal. Iliamna, which functions as a subregional center, has a disproportionately large number of the few jobs available in the area (table 18). Trapping was once a major source of cash income for area residents. Because of the high cost of equipment and supplies and the relativly low prices for furs, trapping has declined in overall importance, although it continues to be one of the few sources of cash income during winter months. Seasonal jobs include firefighting on BLM crews and construction work. Construction work and many of the jobs available through local government are largely dependent on state funding and do not represent locally generated work.

Table 19 presents income, taxpayer, and household income data for communities of the Iliamna Lake subregion, indicating that Iliamna, Newhalen, and Pedro Bay reported higher incomes than Kokhanok, Levelock, and Nondalton. Income for 1978 was much lower than for the state as a whole; the much higher cost of living in the area compounds this disparity. For 1980, income was lower than for the larger Bristol Bay area. The income data also reveal major fluctuations in income from year to year; this is related to the dependence on earnings from commercial fishing. In poor fishing years, transfer payments may be important for some families.

Table 18. Local Wage Employment, Iliamna Lake Subregion, 1982[a]

	Full-Time and Part-Time/Seasonal Positions	Population (1980)
Igiugig	8	33
Iliamna	55	94
Kokhanok	22	83
Levelock	41	79
Newhalen	27	87
Nondalton	26	173
Pedro Bay	8	33

Source: ADCRA 1982.

a Data cover jobs typically available each year. Since many positions are part-time or seasonal, a single individual may hold more than one job.

Table 19. Income by Community, Iliamna Subregion

	No. Returns	Avg. Income	No. Returns	Avg. Income	No. Hslds.	Avg. Income Hsld.
Iliamna/Newhalen	92	$13,051	54	$20,065	35	$24,272
Kokhanok	24	8,645	15	3,291	--	--
Levelock	28	7,684	25	7,505	28	$6,155
Nondalton	46	7,711	48	14,270	42	$7,673
Pedro Bay	17	13,948	15	14,786	--	--
Total Alaska		16,943		--		--
Total Bristol Bay		--		--		$27,607

Source: ADR 1981, 1982; Goldsmith et al. 1982.

Note that income for 1978 and 1979 is by tax return; income for 1980 is for household. Data were available for listed communities only, based on federal adjusted gross income for 1978 and 1979 and on projection for 1980.

V. USE OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Used

The varied ecology of the subregion supports fish and game populations of species common to interior forested subarctic, subarctic open tundra, and riverine and lacustrian environments. Area residents have access to the range of available resources and make use of most of the species present. Table 20 indicates fish and game species known to be used locally within the subregion. Use of other species may occur but has yet to be documented.

Of the species used, sockeye salmon, moose, and caribou provide the bulk of the food harvested by residents of the Iliamna Lake area. In addition to these species, a large number of freshwater fish species, including lake trout, grayling, pike, rainbow trout, several species of whitefish and Dolly Varden, make major contributions to the diet of residents of most communities. Beaver, porcupine, and waterfowl are particularly important during spring and fall when other game may be scarce. Black bear and brown bear are also harveted and continue to be used as a traditional source of food by some area residents (Behnke 1982).

Large quantities of many species of berries are used by most residents throughout the area. Many residents make heavy use of local spruce and birch for heating their homes and ubiquitous steambaths. Some use of local timber also occurs in construction.

B. Seasonal Round of Harvest and Use

Subsistence use of fish and game takes place in a yearly cycle of activities. This seasonal round of activities may be influenced by factors affecting availability of resource and factors influencing residents' ability to find, harvest, process, and transport target fish and game species. For many species that are used, more time and effort may be spent transporting, preserving, and storing target fish and game species than in harvesting them. Moreover, the constraints affecting this part of the households' use of fish and game for food may be more significant than constraints that influence hunting or fishing success. With sockeye salmon, for example, much more time and work is usually spent cutting, drying, smoking, and storing fish than harvesting them. Excessively wet weather may ruin partially processed fish and result in a scarcity of stored fish even in years with record salmon runs.

Figure 4 illustrates a generalized seasonal round of harvest activity for households in the Iliamna Lake subregion (Nondalton). Late spring has traditionally been a time of resource scarcity in

Table 20. Fish, Game, and Plant Resource Known To Be Used in the Iliamna Subregion[a]

Fish	Game	Plants
Sockeye salmon	Moose	Salmonberries
Chinook salmon	Caribou	Blueberries
Coho salmon	Brown bear	Huckleberries
Pink salmon	Black bear	Blackberries
Chum salmon	Porcupine	Cranberries
Dolly Varden/char	Arctic hare	Strawberries
Steelhead (rainbow trout)	Snowshoe hare	Firewood
Lake trout	Ground squirrel	Vegtables
Grayling	Marmot	Herbs
Whitefish	Beaver	
Pike	Red fox	
Burbot	Wolverine	
Smelt	Wolf	
	Land otter	
	Mink	
	Marten	
	Muskrat	
	Lynx	
	Harbor seal	
	Belukha	
	Swans	
	Geese	
	Ducks	
	Ptarmigan	
	Spruce grouse	
	Bird eggs	

Source: Based on field research, Steve Behnke, ADF&G, Div. Subsistence, Juneau.

a Other species may be used; consult with local communities for definitive inventory. Geese includes Canada, brant, emperor, white-front, and snow. Ducks include mallards, pintails, qadwall, green-winged teal, shovelers, wigeon, scaup, goldeneye, bufflehead, oldsquaw, eiders, and scoters.

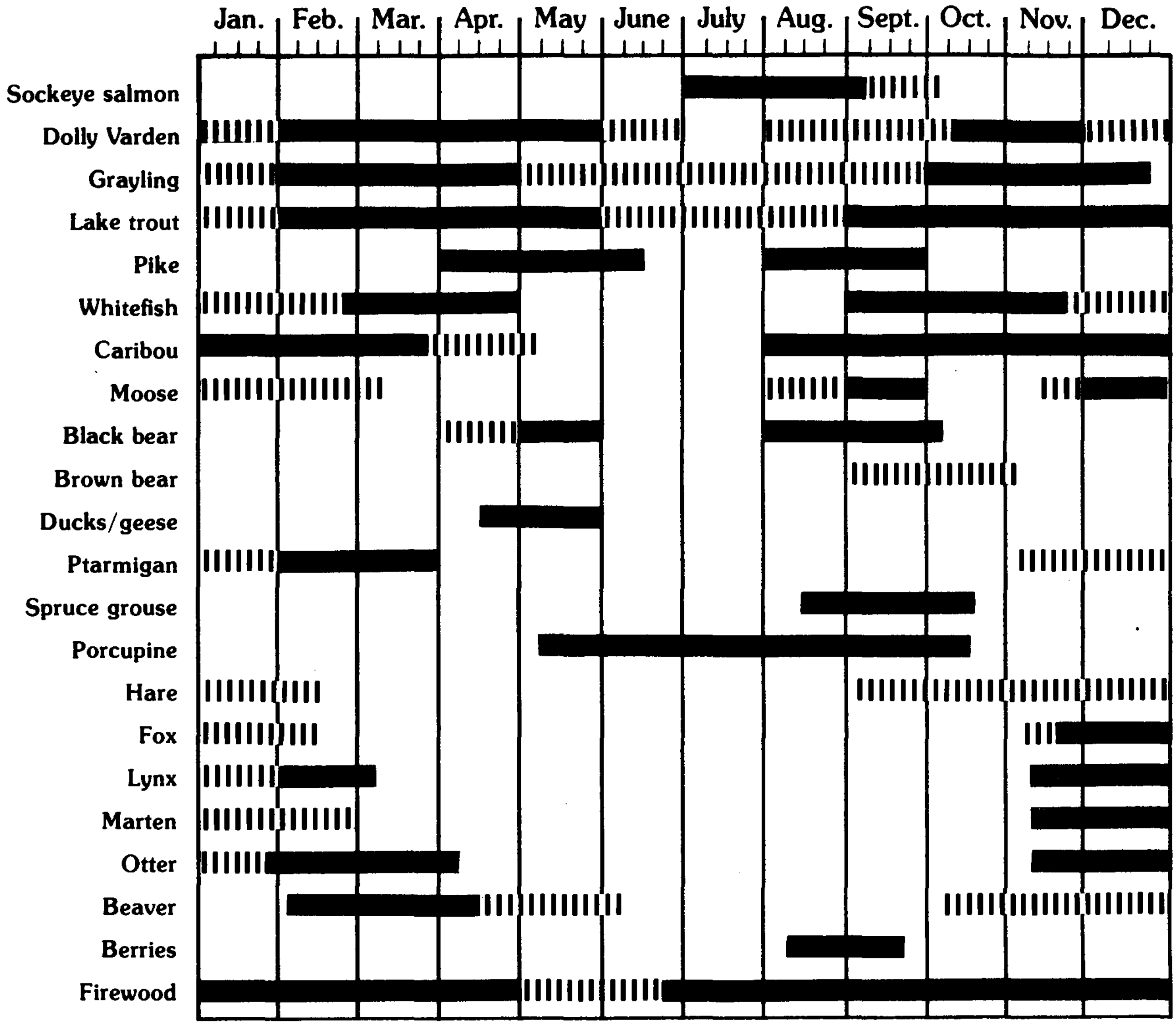


Figure 4. Seasonal round of resource harvests, Nondalton. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (1982-1983 field interviews, ADF&G, Div. Subsistence).

the Iliamna Lake area. Some salmon preserved by smoking and drying from the previous year's harvest may remain, but it is likely that this supply is limited and that quality is deteriorating. Some moose or caribou meat may remain from winter hunts. However, thaw snow conditions and distribution of these species contribute to make spring harvesting difficult. Snowmachines continue to be used as long as there is adaquate snow cover and lake and river ice is solid. Open skiffs are used to reach spring harvesting locations after break-up. Freshwater fish, waterfowl, beaver, and muskrat are the main target species during this season. Large numbers of whitefish can be harvested by intercepting the migration of these fish back to small tundra lakes. Spring bird hunting for migratory fowl may contribute fresh meat during this season, and beaver may be hunted as the spring thaw progresses. Traditionally, late spring was a time of population dispersion during which extended families would move from a winter community to a spring camp.

Salmon fishing is the main activity during early and mid summer. Members of most families travel to the Naknek area to participate in the short commercial sockeye fishing season, from late June through mid July. Belukha may be harvested while in the coastal areas. People begin to put up subsistence sockeye salmon during this time. Many people plan to put up fish throughout the season. An initial stock of dried fish may be stored, in case conditions for putting up fish are not good later in the season. Often families put up salmon at fish camps located near good fishing locations. Camps will at minimum have a good boat landing, a fish-cutting area, and a smokehouse. At more established camps, wall tents have often been replaced with semipermanent structures. A number of families may share a fish camp location. Set gill nets of about 20 fathoms length are the most common means of harvesting sockeye for subsistence uses. Occasionally, when fish are abundant, these same nets may be used to seine from beaches or from skiffs. Other resource use activities include limited fishing for trout, grayling, and other freshwater fish, porcupine hunting, and gathering of edible plants.

Late summer and fall are seasons of major resource harvest activity. Commercial fishing is over, and attention focuses on putting up a good supply of food for the winter months. Families continue to fish for salmon and to process fish into September. The major varieties of berries ripen during August and September, and families may travel to places known to be good for berries during these months. Hunters travel very extensively throughout the subregion, searching the lake shores and river banks for moose. The usual mode of travel is by an open 16 to 18 ft aluminum skiff powered by a 20 to 50 horsepower outboard engine. Over the last 10 years, these boats have replaced the locally made plank and plywood skiffs.

Winter is a period of intermittent resource harvest activity. Major fishing will not occur again until the coming spring. The main activities include hunting, trapping, and maintenance of hunting and fishing gear. Weather and travel conditions, fish and game regulations, resource distribution, adequacy of food preserved earlier in the year, holidays, and alternate employment have major effects on harvest effort and success.

Winter storms, periods of intense cold weather, and thaw periods all make movement out of Iliamna Lake communities difficult and dangerous, and all three of these conditions occur as part of a weather system dominated by cyclical storms coming in from the Bering Sea. When weather and ice and snow conditions allow, resident hunters travel long distances throughout the subregion and the Bristol Bay area seeking moose and caribou. Travel is by snowmachine. Although hunters may occasionally travel over 150 mi from their home communities in pursuit of game, most harvesting takes place within 30 mi of home communities. Hunters use existing trapping cabins and other shelters or bring camping equipment with them on long hunting trips. Moose season is open during the month of December, and either sex can be harvested in Game Management Unit 9(B). The caribou season is open throughout the winter. Small game, including ptarmigan, hares, spruce grouse, and porcupine are taken near the communities or when encountered while travelling. Freshwater fish are taken by jigging through the ice, particularly early and late in the winter. Some ice fishing with nets is done. Grayling, lake trout, pike, whitefish, and Dolly Varden are species commonly used.

As previously mentioned, trapping has declined in recent years, because of low fur prices and high fuel and equipment costs. Some members of all communities continue to maintain traplines, however. Beaver is the species most actively trapped, although fox, lynx, otter, wolf, and wolverine are also taken. Several residents of Iliamna and Port Alsworth use private aircraft to trap. The high value many families place on beaver meat adds impetus to trapping for this species, even in years when prices for beaver pelts are low (see Behnke 1982 for further discussion of seasonal rounds).

C. Intercommunity Differences in Resource Use

Although the communities of the subregion generally have access to similar fish and game resources, significant differences in resource availability influence use patterns and dependence on certain species. Kokhanok and Pedro Bay, for example, are located far from the usual range of caribou, and residents of these communities must either travel long distances or rely on relatives or friends to obtain caribou meat.

Communities around the eastern part of Iliamna Lake occasionally harvest seal from the small freshwater seal population that inhabits the lake, and meat and oil may be shared with relatives in other communities. Residents of Levelock and Igiugig also take seals in the Kvichak River and occasionally harvest belukha as well. These products are shared widely throughout the subregion. Levelock is the only community in the region that regularly harvests significant numbers of salmon species other than sockeye, though some residents of the lake area retain kings from commercial catches.

Igiugig residents harvest a major early winter run of whitefish in the Kvichak River and provide residents of other communities with these fish. Nondalton residents obtain caribou and moose meat from relatives in Lime Village, located 100 mi to the north in the Kuskokwim drainage.

D. Harvest Levels and Use of Fish and Game

Table 21 presents data on subsistence salmon harvests by communities in the Iliamna Lake subregion for 1955 to 1982. Data are based on subsistence calendars on which households recorded the number of sockeye salmon caught. Although underreporting may have occurred in some years and in some communities, data do indicate a minimum general level of use of sockeye salmon. In interpreting these data, we may conclude that at least an average of 73,000 sockeye salmon are used in a typical year by the approximately 600 permanent residents of the subregion. This works out to about 120 sockeye salmon per person. Using conversion factors of 5.7 lb per fish and a usable food weight of 70% of round weight, the subsistence harvest of this single species contributes at least 480 lb of food per capita in a typical year.

Table 22 presents the results of resource harvest and utilization surveys conducted in the Iliamna Lake subregion in 1973 and in Nondalton in 1980 and 1981. These surveys collected data on household harvest and use of the seven fish species, nine game species, and aggregated species of birds that are most often harvested by subregional residents. The total food weight for the species listed amounted to from 3,521 lb to 4,959 lb per household over this time period. Per capita food availability from these sources amounted to 736 lb to 1,033 lb per person. The higher harvest total for 1980 reflects the large number of salmon put up in that year. A portion of the total harvest is used for dog food.

These harvest totals and per capita food availability figures are roughly comparable to levels reported for other parts of Alaska where strong food dependence on fish and game is known to occur (Wolfe 1982). Harvest levels of this magnitude that provide for per capita consumption of over 2 lb of fish, game, or fowl from the wild per person per day, indicate that almost all or a large portion of

Table 21. Subsistence Sockeye Salmon Harvest by Village, Kvichak River Drainage, 1955-82

Year	Village								Total
	Levelock	Igiugig	Newhalen	Nondalton	Port Alsworth	Iliamna	Pedro Bay	Kokhanok	
1955	-	-	17,100	27,360	-	-	24,282[f]	12,768	81,510
56	-	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-
61	-	-	-	-	-	-	-	-	-
62	-	-	-	-	-	-	-	-	-
63[a]	600[e]	-	7,000	25,000	-	3,000	14,000	7,000	56,600
64[b]	1,000[e]	4,000	16,000	35,000	-	3,000	12,000	8,000	79,000
1965	1,000[e]	3,300	9,700[c]	35,500	-	d	9,800	10,200	69,500
66	600	1,200	6,600[c]	45,800	-	d	6,000	10,500	70,700
67	1,400	3,400	9,100[c]	29,600	-	d	9,900	10,200	63,600
68	1,400	4,800	8,700[c]	33,700	-	d	9,800[e]	10,200[e]	68,600
69	1,000[e]	5,100	4,900[c]	44,000	-	d	4,200	15,000	74,200
1970	1,600[e]	11,245	16,440[c]	42,880	-	d	11,916	22,290	105,651
71	1,600[e]	6,528	6,477	22,089	-	2,052	10,127	12,836	61,709
72	1,600[e]	2,168	6,598	24,057	-	3,394	3,999	8,340	50,156
73	4,836	2,217	6,950	8,545	1,299	3,187	2,916	9,177	39,127
74	8,586	6,210	9,286	29,509	1,465	7,052	14,398	21,509	98,015
1975	5,343	6,446	19,381	48,704	2,078	7,281	8,327	17,956	115,516
76	5,317	6,823	16,290[c]	20,490	5,532	d	4,424	17,060	75,936
77	2,555	6,012	1,581	27,175	4,897	9,824	5,638	14,258	71,940
78	8,866	8,790	6,105	17,289	3,020	4,889	11,174	23,726	83,859
79	4,406	6,552	4,160	14,749	4,224	11,686	3,520	16,223	65,520
1980	6,100	8,146	6,992	11,316	5,965	4,060	7,399	22,578	72,556
81	6,562	5,369	10,858	15,153	6,843	4,545	9,699	16,526	75,554
82	5,410	1,927	9,914	11,228	4,458	3,590	8,234	16,614	61,375
Total	69,781	100,233	200,132	569,144	39,781	67,560	191,033	302,960	1,540,624
Average	5,798[g]	5,275	9,172[h]	27,102	3,978	5,197	9,097	14,427	73,363

a Source: FRI circular #211.
b Source: FRI circular #238.
c Includes both Newhalen and Iliamna catches.
d See Newhalen catches.
d ADF&G interpolation.
e Includes Pile Bay also.
f 1973-82 only.
g Excluding years 1965-70 and 1976, as Iliamna catches are included with Newhalen totals in those years.

Table 22. Mean Food Weight of Fish and Game Harvest Per Household (Hsld.) and Per Capita Food Weight, Iliamna Lake Subregion, 1973-81

	1973 (All Communities)	1980 (Nondalton Only)	1981
No. hslds. surveyed	85	14	19
Mean hsld. size	4.8	4.8	5.7
Fish			
Burbot	---	1	1
Char/Dolly Varden	42	10	29
Grayling	25	23	65
Lake trout	45	64	39
Pike	36	5	14
Rainbow trout (steelhead)	50	9	21
Sockeye salmon	2,228	3,985	2,883
Whitefish	56	18	36
Total fish (lb)	2,482	4,115	3,088
Game			
Beaver	52	114	143
Black bear	--	--	47
Brown bear	22	--	26
Caribou	384	332	347
Moose	470	366	483
Porcupine	57	14	27
Snowshoe hare	---	4	8
Seals	3	---	---
Tundra hare	---	6	3
Total game (lb)	988	836	1,084
Birds			
Ducks	15	--	7
Geese	9	--	4
Ptarmigan/ spruce grouse	27	8	12
Total birds (lb)	51	8	23
Total subsistence food harvest per hsld.	3,521 lb	4,959 lb	4,195 lb
Total subsistence food harvest per capita	736 lb	1,033 lb	736 lb

Sources: Gasbarro and Utermohle 1974, Behnke 1982.

a Includes data for Igiugig, Iliamna, Kakhonak, Levelock, Newhalen, Nondalton, and Pedro Bay.

animal protein in the diet of subregional residents comes from these sources.

Subregional residents harvest almost all fish and game species found in the area (see table 20); this diet breadth is a common characteristic of customary and traditional use of subsistence resources. Species that account for only a small portion of total harvest under current harvesting conditions may become important components in diet should the availability of different harvested species change over time. Whitefish use, for example, is likely to increase if there is difficulty in putting up salmon in any given year, and other resources may be intensively utilized in times of scarcity. More hares are likely to be harvested during those cycle years when their population is up. Furbearers and other species may be harvested for craft or other special purposes, and some species may be harvested for preparation of desired seasonal foods.

Although diet breadth in the Iliamna Lake subregion includes many species, harvest of just three species comprises about 90% of meat, fish, and fowl available from subsistence use of resources. Table 23 indicates the relative importance of sockeye salmon, caribou, and moose in harvests in the 1973-1981 time period. In these years, sockeye salmon account for from 63 to 80% of total harvest.

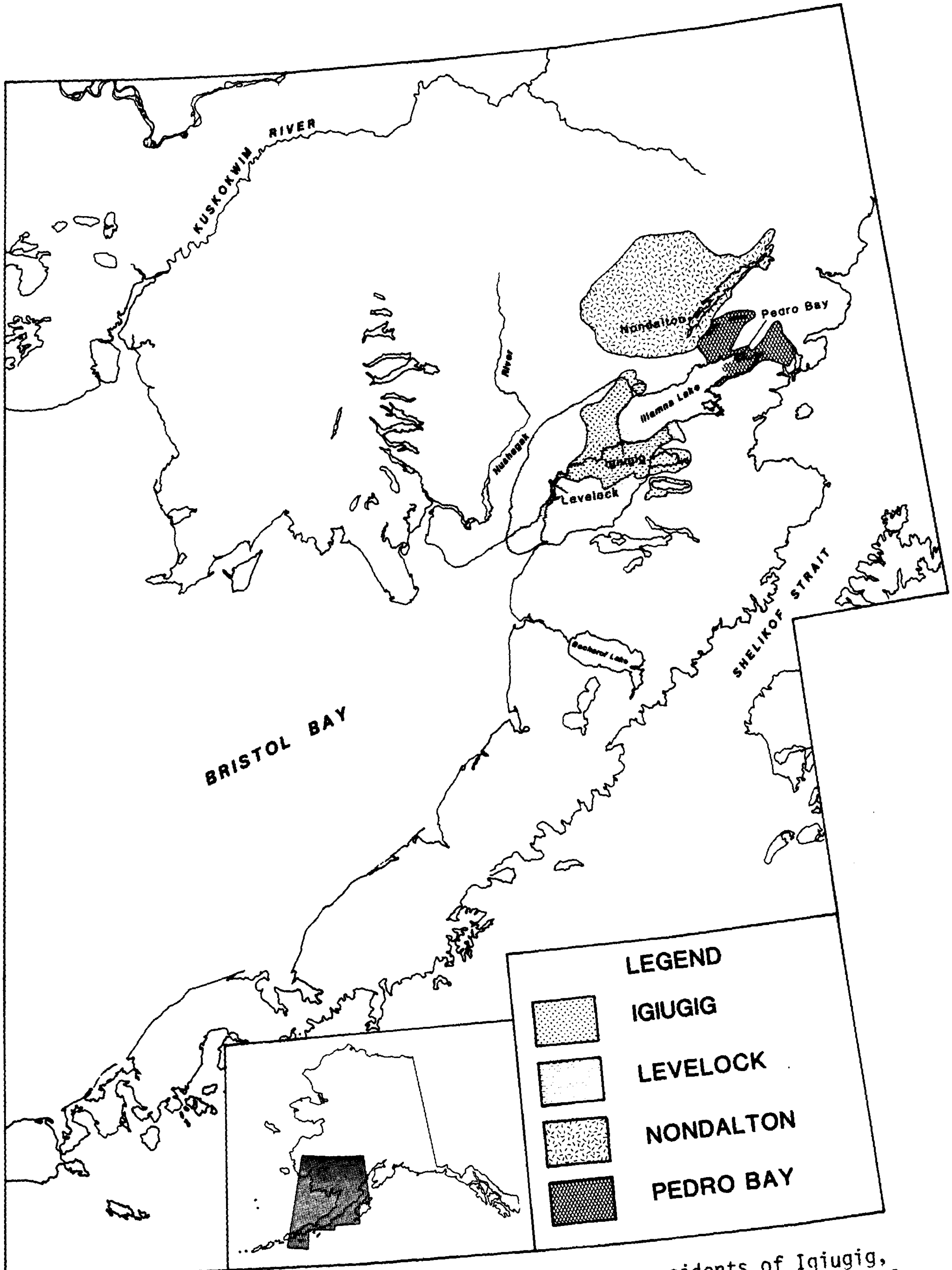
Table 23. Proportion of Subsistence Food Per Household Key Species, Iliamna Lake Subregion, 1973-81

	Pounds (Percent of Total Harvest)		
	1973 (All Communitites)	1980 (Nondalton Only)	1981
Food weight of sockeye	2,228 (63%)	3,985 (80%)	2,883 (69%)
Food weight of caribou	384 (11%)	332 (7%)	347 (8%)
Food weight of moose	470 (13%)	366 (7%)	483 (12%)
A. Total for these species	3,082	4,683	3,713
B. Total for all species	3,521	4,959	4,195
A/B x 100	88%	94%	89%

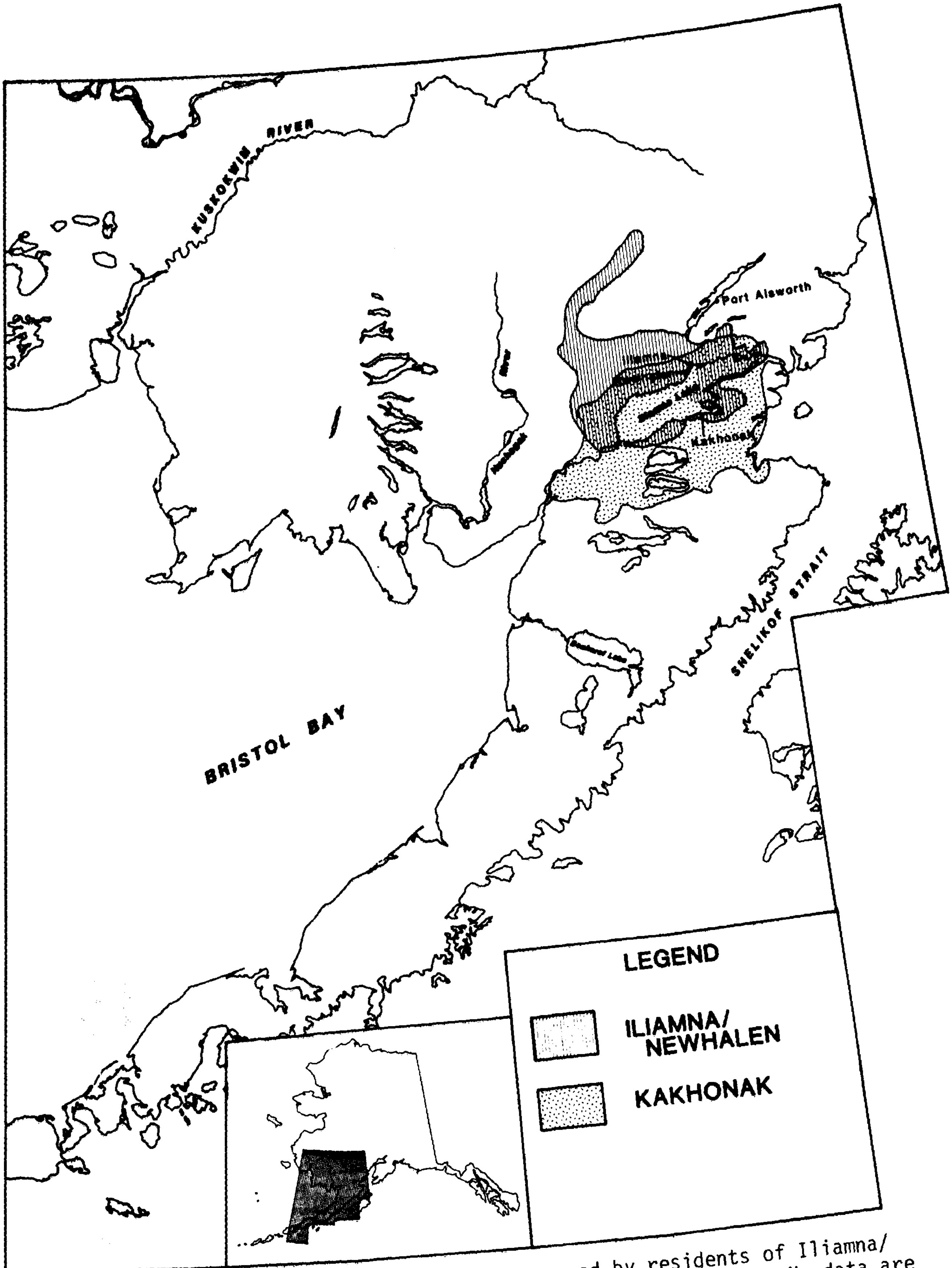
E. The Geography of Harvest Activities

Maps 4 and 5 depict the geographic area used by residents of each community in the Iliamna Lake area for subsistence fishing and hunting. As noted previously, local environmental conditions create some differences in resource use patterns among communities in the region. There are also major differences in patterns of use from year to year. Weather conditions affect travel, and resource distribution influences where people hunt, trap, or fish. In addition, there have been major shifts in patterns through time in response to larger-scale changes in human population distributions, economic patterns, and environmental conditions. The entire upper Mulchatna drainage, for example, at present only sporadically used by the people of Nondalton and other Iliamna Lake communities, was occupied and used heavily until about 50 years ago. For these reasons, these maps are abstractions of complex patterns of land and resource use by residents of the region.

The maps illustrate that communities have broadly overlapping areas of use. This is primarily because of wide-ranging hunting for highly valued species such as caribou, which is only infrequently and unpredictably available close to most villages. Moose are often hunted in the same areas and at the same times as caribou or are taken incidentally to caribou in winter hunting. Moose harvests tend to be concentrated along the major waterways, however, where moose tend to be more predictably and easily located, killed, and packed out, particularly in the open-water season. Fish, on the other hand, are generally taken quite close to the communities, whose sites were often chosen with these resources in mind. Certain species may be sought at more distant locations at particular times of the year. As noted above, in a few communities, notably Nondalton, and to a more limited extent, Kokhanok, camps are established in good fishing locations at certain times of the year. Berries, wood, and small game are generally harvested relatively close to the communities, although long trips may be taken to harvest a certain species or particularly abundant population.



Map 4. Iliamna Lake subregion, Part 1: areas used by residents of Igiugig, Levelock, Nondalton, and Pedro Bay for subsistence use of fish and game, 1982 (ADF&G, Div. Habitat and Div. Subsistence).



Map 5. Iliamna Lake subregion, Part 2: areas used by residents of Iliamna/ Newhalen and Kakhonak for subsistence use of fish and game, 1982. No data are presented for Port Alsworth (ADF&G, Div. Habitat and Div. Subsistence).

Upper Alaska Peninsula Subregional Assessment

I. LOCATION AND ENVIRONMENT

For the purposes of this assessment, the upper peninsula subregion refers to that portion of the Alaska Peninsula that lies between the Kvichak River on the north and Port Moller on the south. The north-south trending Aleutian range effectively divides the peninsula into two sections. The communities of the upper peninsula subregion are situated on the western, or Bristol Bay, side of the mountain range. All seven communities, King Salmon, Naknek, South Naknek, Egegik, Pilot Point, Ugashik, and Port Heiden, are located along major river drainages.

The area is physiographically quite homogeneous. The Alaska Peninsula is part of the tundra biome, characterized by absence of trees, spongy and/or hummocky ground, and dwarfed plants. The tundra of the peninsula differs from other arctic tundra by its lack of permafrost. The exception to the uniform absence of trees occurs in the immediate King Salmon area. Shrubs, alder, and willow are found along the protected banks of some of the larger drainages.

The subregion has a maritime climate, with cloudy skies, relatively mild temperatures, and moderate precipitation. Average summer maximum temperatures range from 50 to 60± F. Average winter minimum temperatures vary from 6 to 20± F. Sea and river ice are usually present from mid November to early April. Fog is frequently present in the summer, and strong winds are prevalent year-round. Average wind speed varies from 14 mph at Port Heiden to 9 mph at King Salmon.

The subregion is the home of one subherd of the Northern Alaska Peninsula caribou herd. The subherd, numbering approximately 18,000 animals, winters between the Naknek River and Becharof Lake. Calving occurs further south, between the Bear and Meshik rivers. The Alaska Peninsula caribou herd has increased in number over the last few years (ADFG files, Div. Game, King Salmon).

Moose are also found in the subregion. The population has been declining from a peak of approximately 6,000 animals in the late 1960's to a current level of around 2,000 (McNay, pers. comm.). Willow-shrub plant communities preferred by moose are frequently found along river and lake areas of the subregion. Key habitat areas include the upper Meshik and Naknek river areas, Mother Goose Lake, Cinder River, and King Salmon River (Evergreen State College 1977).

Brown bears, too, are resident in the upper peninsula subregion. The bears appear in the lowland areas in the spring and summer, foraging for carrion and invertebrates, grazing in the sedge meadows.

In the midsummer, they begin fishing for salmon in creeks and inland tributaries. They den in the Aleutian Range.

Additionally, a host of smaller mammals such as porcupine, red foxes, beavers, wolves, wolverines, lynx, hares, and land otters inhabit the upper peninsula subregion. Harbor seals, Steller sea lions, and sea otters are abundant along the coastline (USFWS 1981).

Migratory waterfowl and salmon are natural resources of particular significance. Several areas of the Upper Alaska Peninsula subregion afford suitable habitat for millions of migratory waterfowl. The peninsula estuaries are favored habitat for ducks, geese, swans, shorebirds, and Sandhill cranes. The estuaries are utilized by waterfowl primarily as staging grounds, for stopping both enroute north to breeding grounds and south to wintering areas. Salmon stocks, particularly sockeyes returning to Bristol Bay river systems, constitute some of the largest runs in Alaska. Several drainages within the Upper Alaska Peninsula serve as major spawning areas for the returning sockeye, as well as for the other four species of Pacific salmon. In addition to salmon, the subregion supports a variety of freshwater fish species in its rivers, lakes, and streams, including rainbow trout, Dolly Varden, grayling, and lake trout.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITIES

The first human settlement of the Upper Alaska Peninsula occurred over 6,000 years ago. The people of the subregion used a variety of resources, including salmon, caribou, seals, and whales. The general area of the Naknek drainage was the scene of movements of groups all over the peninsula. By the nineteenth century, Dummond (1981) states, peninsular Eskimos speaking the Sugpiaq language (also called Alutiiq) of the Eskimo-Aleut language family were living in the upper portions of the Naknek drainage, while people belonging to the Aglegmiut subgrouping of Yup'ik Eskimos lived along the lower drainage and the adjacent coastal area. At the time of contact, there was considerable movement occuring among the indigenous peoples living on the Alaska Peninsula, and the precise prehistory of the area is still unclear.

The earliest record of foreign contact occurred during the third voyage of Captain Cook in 1778. Sustained contact between Natives and non-Natives did not occur until the early-to-mid 1800's, when the Russians began promoting the Russian Orthodox religion and pursuing trapping interests in the Nushagak area, north of the Upper Alaska Peninsula subregion (Feldman 1979). The area was not considered of great importance to the Russian effort in Alaska and was similarly regarded when the American government purchased Alaska in 1867 (ibid.).

Trapping and commercial fishing constituted the primary focus of the early American interests in the area. The activity levels they generated, however, remained minimal until the late 1800's and early 1900's. At this time, cod and salmon salteries were established at scattered locations around the subregion. In 1890, the first salmon cannery opened on the Naknek River. By 1900, South Naknek and Egegik had local salmon canneries, and by the 1920's the remaining subregional villages had canneries established in proximity to the community (Nebesky et al. 1983). The canneries were established by individuals from outside the local area. Crews of fishermen and workers to operate the canneries were imported from outside Alaska. It was not until the labor shortage created by World War II that local residents became actively involved with the commerical fishing industry (Feldman 1979).

With few opportunities to participate in the early commercial fishery, local residents depended, as they had in the past, on the local area for food and raw materials. The general pattern for the indigenous peoples of the subregion revolved around a seasonal cycle of events conforming to the natural resource cycle. This included hunting, trapping, and fishing in the fall, winter, and early spring. In the summer, fish camps were established at sites for ease in processing salmon (ibid.). After the establishment of the canneries, cash income was occasionally earned at one of the processing sites.

Once commercial fishing had been established in the 1800's (even though initially local residents played a minor role in the industry), it became the dominant force in shaping the development of the subregion. The fate of subregional communities has, for the most part, gone hand in hand with the fate of the commercial fishing industry.

With the exception of King Salmon, the historical background of the villages at their present locations dates back at least to the turn of the century (table 24).

A. Port Heiden

Port Heiden, long known as Meshik Village, had been an aboriginal village site. During the latter part of the nineteenth century, it was recognized as an established community in the Alaskan cod fishery. A saltery was opened in the early 1900's, resulting in increased population growth. The flu epidemic in 1918-1919 virtually wiped out the Native population of the community and encouraged relocations throughout the Alaska Peninsula. During World War II, an Army and Air Force presence was established to the north of the community, but personnel did not remain after the war. The community experienced a period of emigration during the the 1960's and 1970's common to many smaller Alaskan villages of similar size (Langdon 1982). The village appears to have stemmed the emigration and has shown an increase of residents during the last few years. Natural increase is responsible for at least part of the community's recent growth (Nebesky et al. 1983).

Table 24. Population History, Upper Alaska Peninsula Subregion, 1880-1980

Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Koggiung	133										
King Salmon[a]									227	202	374[b]
Naknek[a]						173	152	174	249	178	369[b]
(Naknek Village)			431		111						
South Naknek[a]									142	154	136[b]
(Paugwik)	192										
Igagik	46										
Egegik[a]					83	---	125	119	150	148	75
Pilot Point[a]									61	68	66
Ugashik[a]		154	348	154		84	55	48	36	---	13
Oogashik	177										
Oonangashik	37										
(Unangashik)		190									
Meshik			74								
Port Heiden[a]									74	66	92
(Port Heiden Village)					30						
Subregion total									936	816	1,125

Source: Recent figures are from ADL 1981; other figures from U.S. Census reports compiled in Rollins 1978.

a Year-round contemporary communities.

b Figures based on Bristol Bay Population Census, December 12, 1981; they do not include 375 active-duty Armed Forces personnel stationed in King in 1980.

few years. Natural increase is responsible for at least part of the community's recent growth (Nebesky et al. 1983).

B. Ugashik and Pilot Point

The current population of 13 persons residing in Ugashik belies the size of the village in historic times. Known as "Oogashik" in 1880, it was one of the region's largest villages until the flu epidemic of 1918. A saltery had been built in the 1880's, insuring its involvement with the salmon fishery. The flu epidemic of 1918-1919 virtually wiped out the population; the few survivors relocated in Pilot Point. Pilot Point was originally the site of salmon salteries in the late 1800's that were established to take advantage of the resource-rich Ugashik River. The combined communities of Ugashik and Pilot Point were estimated to have a population of over 600 at the time of the 1918 epidemic. As a result of the decimation of the Native population by flu, the communities were left with a total of 60 survivors. During the 1940's and 1950's, cannery operations were once again in force at Ugashik, but this ended in 1957. The population of Ugashik continued to dwindle to the current level of 13 year-round residents. Pilot Point has a stablized year-round population base of approximately 70 people. This reduced population has lead to reduced services, and young families find the community less attractive for raising families (Langdon 1982).

C. Egegik

Egegik was first reported as an existing fish camp during the late 1800's. At that time it was called Igagik. Once commercial fishing became an integral part of the community, the population steadily grew, peaking in the late 1960's. The 47% population decline between 1970 and 1980, shown in table 24, was due to a lack of decent school facilities and economic opportunities in the community, according to local residents (Nebesky et. al. 1983).

D. Naknek and South Naknek

The communities of Naknek and South Naknek have a long history. Hunting camps along the Naknek River date back 3,000 to 4,000 years (Dummond 1981). Canneries were present in Naknek since 1890. Oral history sets the time of settlement by present ancestors of Naknek in 1840. It is believed that the arrivals were likely to have been Aglegmiut migrants from the north (Feldman 1979). The arrival of the canneries in the late 1800's spelled a change for the Native communities living along the banks of the Naknek. Though, as stated earlier, their direct involvement was miminal, the impact of the outside world could not be diminished. The area gained new residents just prior to the 1918-1919 flu epidemic when residents from the village of Savonoski relocated on the south side of the Naknek River approximately 6 mi from the present-day site of South Naknek. The Katmai eruption had forced them to leave their homes in Savonoski, located in what is now Katmai National Park. The two communities have continued as fishing villages, with Naknek also developing as a subregional commercial center.

E. King Salmon

King Salmon is the only community in the subregion whose development has not been tied directly to the commercial fishing industry. In the 1930's, a navigational silo was built. At the beginning of World War II an air force base was constructed and maintained through the war by the Federal Aviation Administration. The construction of good airport facilities, also used for civilian aircraft, secured King Salmon's role as the subregional transportation headquarters. Today, there are approximately 375 military personnel stationed at the King Salmon Air Base. Due to the continued importance of the commercial salmon fishery and the presence of the regional transportation center at King Salmon, the growth of the area has continued despite occasional fluctuations in the fishery industry.

III. TRANSPORTATION AND ACCESS

Formerly, access to and transportation within the subregion was confined to waterways and, on land, to pedestrian or dog-team modes. The first airplane arrived in 1929, and since then air travel has greatly altered traditional patterns of travel. King Salmon serves as the main access point for jet travel. The King Salmon airport and 8,515-ft paved and lighted runway is used by both the air force base and civilian air transport services. The runway can accommodate aircraft up to 136,000 lb. There is also a 5,000-ft crosswind runway. Additionally, close to the airport is the Naknek River, with a straight stretch of approximately 3,000 ft that is used by float planes during the summer months (Nebesky et al. 1983).

Wien Air Alaska provides year-round daily jet service to King Salmon. During the peak of the fishing season, in order to accomodate the increased number of persons entering and leaving the region, additional flights are provided by Wien and other carriers. Air freight is usually delivered initially to King Salmon and then taken by smaller planes to outlying communities.

King Salmon and Naknek serve as focal points for the regional air charter services. Transportation is generally provided by single or twin engine planes. A pilot and aircraft stationed in Pilot Point take care of the needs of that community and also of Ugashik a good portion of the time. Port Heiden, Egegik, and South Naknek use services that operate out of King Salmon or Naknek. Seat fares range from $100 one-way seat fare between King Salmon and Port Heiden to $50 between Egegik and King Salmon.

Skiffs are used for transportation on the local waterways. The Naknek River and its tributaries are used for hunting and fishing, berry gathering, and general recreational purposes. It is also used as a transportation corridor between the communities located on its banks. The same pattern is followed on the other major river systems. With the exception of those communities on the Naknek River, Ugashik, and Pilot

Point, the upper peninsula communities are situated on separate drainages, and skiffs are not commonly used for intercommunity transportation. They are used extensively in the commerical fishing industry, however, both in set and drift gillnet fishing in the Bristol Bay District. Occasionally, these boats are used to haul materials or people within the area or to nearby communities such as Iliamna Lake. Barges, hauling supplies from Seattle, directly serve all but King Salmon. The barges run from early spring until October, when weather and ice conditions prohibit further traffic.

Tidal action is a significant factor in terms of access and transportation in much of the region. The average range of tides in Bristol Bay is 14 ft. This affects not only the coastline but several miles of the river system. Water travel, float plane access, and the use of beaches for motorized transport are all methods of travel that must take the tide level into consideration.

Roads are very limited in the subregion. King Salmon and Naknek are connected by 15 mi of paved road. When the Naknek River is frozen solid, access to South Naknek is possible by automobile, and the road system is, in effect, increased to include the roads surrounding that village. When the Naknek River is not available as part of the transportation network, South Naknek can be reached only by air. School children in the upper grades are flown to and from school daily throughout the year. Packed trails, used by four-wheel drive trucks and three-wheelers are common around all the villages and are used to reach hunting and fishing areas. Unpaved roads are found within all communities. Snowmachines have not been much used in the subregion during the past few years because of insufficient snowfall. Dog teams, formerly used for transportation purposes in the region, are not found locally today.

IV. POPULATION

Table 24 presents the population history of the subregion. Approximately 1,200 persons reside in the Upper Alaska Peninsula subregion. The population center for this area is the Naknek drainage, where three communities are located. King Salmon, Naknek, and South Naknek account for 78% of the subregion's total population. Port Heiden, located in the southern portion of the subregion, is the next largest community. Egegik, Pilot Point, and Ugashik are smaller communities (Nebesky et al. 1983).

The two communities exhibiting the greatest degree of population growth, King Salmon and Naknek, form the subregional commerce and transportation hub. Growth in both locations is a result of immigration, along with natural increase (ibid.). Port Heiden, after experiencing a period of emigration, appears to have reversed the trend, and a growth period based on natural increase is underway (Langdon 1982). Pilot Point and Ugashik both have had basically stable populations for the past 10 years. Due to their low populations, they, like other small communities, have difficulty providing basic services that attract young people intent on raising families. Egegik is another example of a community unable to offer many services, such as a high school, that encourage persons to remain in the village.

The residents of the Upper Alaska Peninsula share certain characteristics. With the exception of those residing in King Salmon, all are predominately Alaskan Native. Though some refer to themselves as "Eskimo" or "Sugpiaq," which is the dialect spoken by peninsula Eskimos, the majority consider themselves Aleut (ibid.). Throughout the subregion are numerous Russian and Scandinavian surnames that recall the influence each of these groups has had in the area. The Russians made their presence felt in the 1800's, whereas men from Norway, Sweden, Denmark, and Finland were drawn to the area at the turn of the nineteenth century by the commercial fishing industry.

The Russian Orthodox church is established in each of the communities. Churches are located at Naknek, South Naknek, Pilot Point, and Egegik. However, there is no resident priest in any community. For special occasions such as weddings or funerals a visiting priest will perform the services. Certain holidays, such as Slavi, Russian Christmas, are celebrated by a number of people, with the traditional visiting that accompanies the holiday. Occasionally, residents from Pilot Point and Port Heiden will celebrate special holidays with the Orthodox community in Chignik Lake, which has both a church and priest. Naknek has two protestant churches, one Lutheran, and a community Bible chapel. There is also a Roman Catholic church. While the main focus of these religious communities is on the immediate area, there are instances of overlapping activities among the villages. The Bible camp held each summer draws children from Naknek, South Naknek, King Salmon, and Egegik. The Lutheran minister from Naknek holds services on a regular basis in South Naknek.

English is the common language throughout the subregion. Aleutiq, a member of the Eskimo-Aleut language family, is spoken by a few of the older residents of Port Heiden and Pilot Point. Yu'pik or Sugpiaq, separate dialects of Eskimoan, is spoken by residents of Naknek and South Naknek. A bilingual program is soon to be underway at Egegik.

There are kinship and marriage ties among the various communities of the Upper Alaska Peninsula. Port Heiden has linkages with Chignik Lake, on the Pacific side of the peninsula, and to Pilot Point, among other places. Pilot Point has ties with Port Heiden and South Naknek. Egegik has ties to South Naknek. The nontransient population of Naknek and South Naknek not only have ties to southern locations of the peninsula, they also have many ties with people living along the Kvichak River and Lake Iliamna. The number of networks threading through the subregional area tend to give the residents a sense of shared identity.

V. MONETARY ECONOMY

With the exception of King Salmon, commercial salmon fishing and processing constitute the economic backbone of the subregion. Other components of the subregional economy include government jobs, transportation-related employment and, to a limited extent, hunting and sport fish guiding and other tourist-related services. King Salmon is the site of most federal and state government jobs and much of the transportation employment. Table 25 gives a breakdown of the federal, state, and local government employment for the Bristol Bay Borough, in which King Salmon is located. The types and number of jobs potentially available to transient professional employees of the various agencies can be inferred. Table 26, which portrays the number of commercial salmon limited entry fishing permits by village for 1980, illustrates the lack of particpation by King Salmon residents in the industry. The table does not, however, show recent population shifts between Naknek, South Naknek, and King Salmon, in which a few permit holders have moved into King Salmon. A few Air Force enlisted personnel and children of government employess participate in the salmon processing in Naknek. Basically, King Salmon residents tend to have relatively stable, year-round jobs providing a constant source of cash income. Housing is often furnished by the employing agency.

Naknek is the hub of the commercial fishing industry, with four active canneries located along the river and a steadily increasing number of processors who freshfreeze fish operating in the immediate area each year. Many of the seasonal jobs associated with the fishing industry are held by residents from other parts of Alaska or other states. Most of the processors bring their crews up as a group during the first part of June. The crews work long hours during the sockeye season and begin departing the area around the middle to the last part of July. Floating processors bring crews up, process the fish, and leave the area with essentially no input into the local economy, although they do provide additional markets for fishermen.

The vast majority of local resident fishermen take their catches in the Bristol Bay Management Area. Drift and set gillnets are the only legal gear. Under limited entry guidelines, 2,640 permanent Bristol Bay permits were fished in 1982 (Alaska Commercial Fisheries Entry Commission 1982). A set gill net is allowed to fish 50 fathoms of gear, whereas a drift gillnetter is allowed 150 fathoms. In 1980, there were approximately 114 drift gill net and 148 set gill net permits held by the residents of the subregion (table 27). An average price for a drift permit for the Bristol Bay fishery in 1982 was estimated at $95,936 and a set net permit at $37,394 (ibid.). The maximum boat length is 32 ft. A new boat shipped up from Seattle is expected to cost over $100,000. Drifters tend to have both the highest expenses and the greatest potential for making money (see table 27). Crew members are often relatives of the permit holders, who do not possess a permit themselves. A Sea Grant study of gross and net incomes for Bristol Bay fishermen in

1979, which included all fishermen and not just residents of Bristol Bay, revealed an average of $71,968 for a drift gill net permit holder. The same study indicated an average gross of 25 to 37% less for Bristol Bay fishermen (Langdon 1981).

Table 25. Federal, State, and Local Government Estimated Employment for Bristol Bay Borough

Job Classification	Location and No. of Jobs		
	King Salmon	Naknek	South Naknek
Federal Government			
U.S. Air Force	340		
Federal Aviation Administration	33		
Fish and Wildlife Service	7[a]		
National Park Service	6[a]		
National Weather Service	3		
U.S. Post Office	2	2	1
State Government			
Department of Transportation	12		
Public Health Nurse		2	
Department of Fish and Game	7		
Fish and Wildlife Protection	2[a]		
State Trooper	1		
Lake and Peninsula School District	10+[a]		
Local Government			
Bristol Bay Borough		12	
Bristol Bay School District		39	
Police		3	
Martin Monsen Regional Library		1	
Village Councils		3	1

Source: Kramer et. al 1983.

a Updated information from field notes.

Table 26. Bristol Bay Limited Entry Permits by Community, Upper Alaska Peninsula, 1980

Community	Population 1980[a]	Approximate No. Limited Entry Permits: Drift	Set
Naknek	369b	47	66
King Salmon	374b	--	--
South Naknek	136b	15	34
Egegik	75	24	30
Pilot Point	72	19	15
Ugashik	13	--	--
Port Heiden	92	9	3

Source: Langdon 1981.

a U.S. Census.

b Figures based on Bristol Bay Population Census, December 12, 1981; they do not include 375 active-duty Armed Forces personnel stationed in King Salmon in 1980.

The summer of 1980 did not produce the earnings as did the previous year, and averages from a study done on earning levels of Bristol Bay residents indicate that drift gill net gross earnings averaged $28,287. A set gill net permit averaged $8,400, and a crew member of a drift boat averaged $11,200 (ibid.).

Though the majority of the commercial fishermen in the Upper Alaska Peninsula subregion fish within the Bristol Bay Management Area, there are a few Port Heiden residents who fish in the Alaska Peninsula Management Area. In 1981, there were a total of 10 set gill net permits and one drift gill net permit held by residents of this community (Langdon 1982).

The five villages of South Naknek, Egegik, Pilot Point, Ugashik, and Port Heiden are more similar in character to one another in economic terms than they are to Naknek and King Salmon. Cash income is more seasonal, and these communities are more dependent on the success of the commercial fishing season. There are few opportunities for earning a cash income outside the commercial salmon industry. All the communities have at least one processor that either cans or freezes salmon.

Table 27. Salmon Fishery Costs and Earnings for Bristol Bay Permit Holders, 1979

	Salmon Drift Gill Net (252 Respondents)	Salmon Set Net (120 Respondents)
Participation and investment		
Time spent fishing	29 days	29 days
Fuel consumption	866 gal	324 gal
Crew size	2.6	3.9
Investment		
Vessel	$ 38,569	$11,709
Entry permit	107,721	30,996
Fishing gear	9,775	3,553
Fishing site	0	8,567
Cost and returns		
Total fishery income	$ 71,968	$16,493
Operating expenses	30,289	5,243
Capital equipment expenses	11,329	4,416
Depreciation	11,079	1,585
Net Income		
Net cash available	$ 30,372	$ 6,833
Returns to labor and management	16,620	6,468
Range of gross income	$25,000- $125,000	

Source: Kramer et al. 1983. Reprinted from Alaska Fishermen's Journal, February 1981.

Kinship groups are significant in all communities, though less so in King Salmon, where many families have no extended ties in the subregion. Subsistence, cash production, and distribution networks are all organized along kinship lines. Kin groups share equipment and locally harvested resources, commercially fish together, and in some instances share child care even through the high school years. This becomes necessary because the only communities with a secondary school are Port Heiden and Naknek.

Table 28 provides household income information for each of the seven communities. The data show that the communities with the least reliable cash income base also have the lowest average household income levels.

Table 28. Average Household (Hsld.) Income, Upper Alaska Peninsula Subregion, 1980

Community	Personal Income ($ x 1,000)	No. of Hsld.	Avg. Hsld. Income
Naknek	$4,097.8	103	$39,784
King Salmon	$4,665.3	75 (+9 Igiugig)	55,540
South Naknek	570.7	43	13,272
Egegik	198.8	32	6,213
Pilot Point	180.5	16	11,283
Ugashik	--	8	--
Port Heiden	144.2	29	4,973
Total	$9,857.3	307	32,108

Source: Nebesky et al. 1983.

VI. USES OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Used

The Upper Alaska Peninsula provides a wide variety of natural resources, many of which are, or have been, used by local residents for domestic consumption. Salmon, caribou, and moose are the three staples most commonly mentioned when locally obtained food stuffs are discussed. In addition to these, a wide range of marine and land fauna and flora are available. Among the land mammals utilized are Arctic hare, snowshoe hare, beaver, and porcupine. Additionally, land otter, muskrat, squirrel, lynx, wolf, wolverine, red fox, and other furbearers are taken. Marine mammals include belukha whales and harbor seals.

Fish species provide a significant food source, in terms of both weight and variety. All five species of the Pacific salmon are used. Dolly Varden, grayling, blackfish, rainbow trout, pike, and smelt are among the freshwater fish harvested. Butter clams are dug when available. Waterfowl provide another major component to the diet derived from local resources. The rich estuaries of the upper peninsula provide large quantities of ducks and geese in the fall. Ptarmigan, grouse, sandhill cranes, and snipe are also harvested. Formerly, the list of fowl harvested also included swans, curlew and seagulls.

Finally, there are resources to be gathered. Various berries picked include blueberries, crowberries, salmonberries, and both low-bush and high-bush cranberries. Currents are also found in some areas. Formerly, greens were widely gathered; today, although the variety and amounts used are much less, the resource is still available, and some residents do make use of such items as grass roots, wild celery, onion-like greens (Putrokis), wild rhubarb, and wild corn (Feldman 1979). Bird eggs, mainly seagull, are gathered when available.

B. Seasonal Round

A similar pattern of resource harvest is followed throughout the region. This pattern is illustrated in figure 5. The resource harvest calendar might be said to begin when breakup occurs and waterfowl begin returning to the area. Though the exact time varies from year to year, by March or April the rivers, bays, and Bering Sea waters are usually ice-free. Belukhas and seagulls are two of the early arrivals. Formerly, groups of men would drive the whales onto sand bars in the river, where the animals would become stranded with the outgoing tide. Both meat and blubber were used. Today, there is very little active belukha hunting. Beached whales will occasionally be used if still in good condition when discovered. The flippers are considered a delicacy. As the waterfowl return, eggs are gathered. In the past, spring was also an active waterfowl hunting period as the birds stopped to regroup and feed in open waters. Spring waterfowl hunting is now illegal.

Springtime is also a favorite time for clam digging. Clams can be taken any time the waters are ice-free; however, tides are frequently very low in early spring, and clamming is particularly good. Although not a great deal of seal hunting is undertaken by residents of the upper peninsula subregion, early spring is a time when seal hunting takes place. Plant materials may also be gathered at this time. Fishing for Dolly Varden and trout occurs, and an occasional porcupine might be taken.

In May, the return of the salmon is anticipated, and gear is prepared. Subsistence salmon fishing gear consists of set gillnets. Ten fathoms are allowed within the Nakenk River and 25 fathoms elsewhere in the subregion where fishing is allowed. In the Naknek River system, those with king gear begin setting it out as soon as river conditions permit. Catching the first chinook is an event to be shared with friends and family. In 1982, the first chinook caught by one local resident was shared with a total of nine households, which included 25 people (field notes). When available, chinooks have traditionally been a highly valued resource in this subregion because of the amount of meat on the fish, the quality of smoked strips it produces, and the timing of the run, which allows

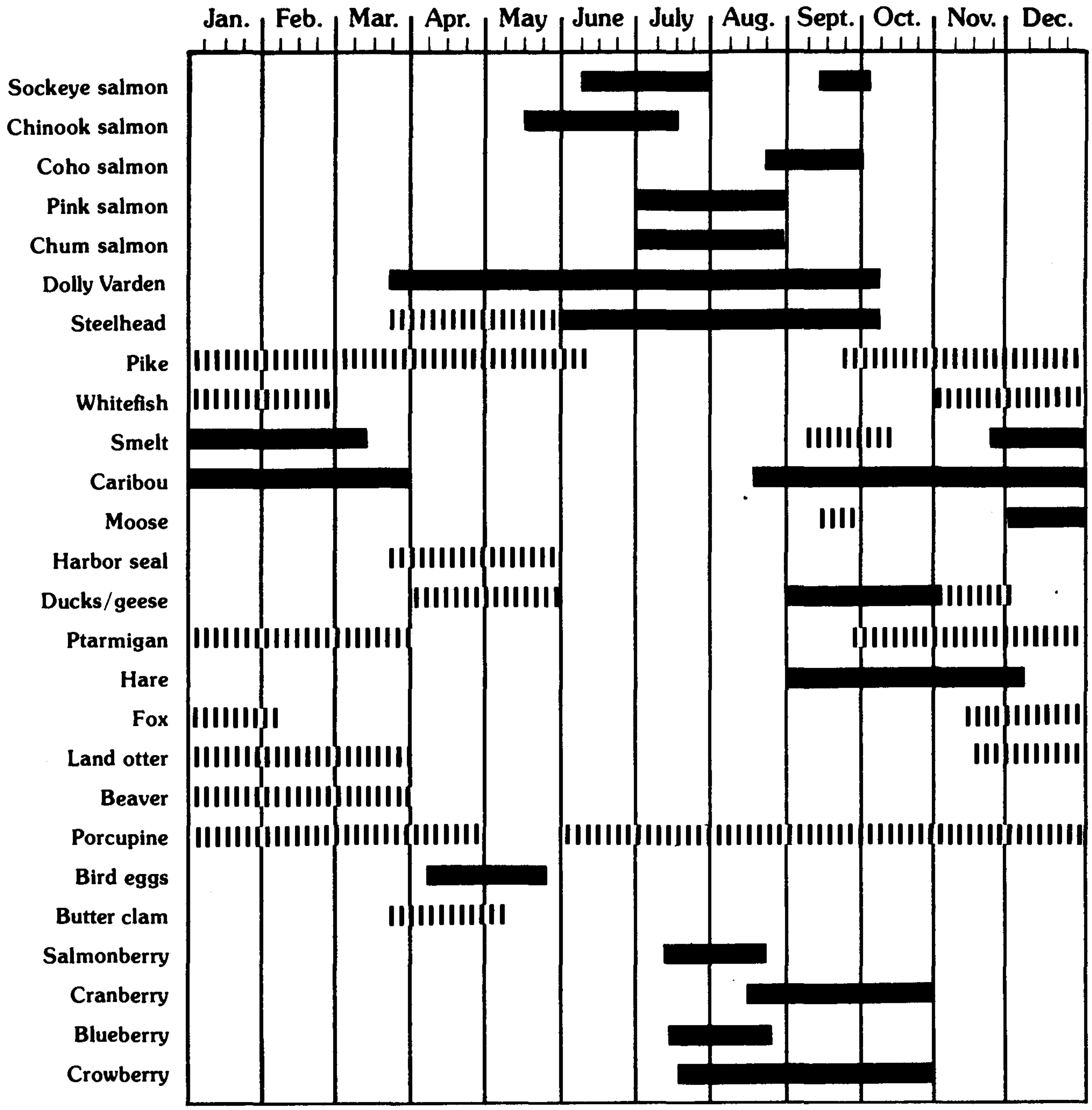


Figure 5. Seasonal round of resource harvests, upper Alaska Peninsula subregion. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (1982-1983 field interviews, ADF&G, Div. Subsistence).

families to put up locally used fish before the onset of the commmercial fishing season. Among the noncommercial fishing families, fewer chinook nets are set, but often increased effort is devoted to catching these fish with rod and reel.

The intensity of the subsistence fishing effort increases as the sockeye run nears. Commercial fishermen frequently elect to keep salmon harvested with commercial gear for family consumption. Keeping fish from a commercial catch is convenient in that it allows the family to keep only the amount and species desired, and the remainder can be sold. If a subsistence set net is used, all fish must be kept and utilized. One species often kept are kings. Many families prefer to keep rather than sell them as they feel the price being offered is too low. Also, people who use a lot of chinook do not always get sufficient numbers in their subsistence nets. And lastly, by taking from a commercial catch, the family may process the fish at a time convenient for them.

Sockeye subsistence fishing continues through July. Also around this time the first of the year's berries begin ripening. Salmonberries are the first picked, followed closely by blueberries and then crowberries (blackberries). Berries are picked by entire families or by groups of women or by individual women. Berries are gathered by the gallons, and long distances will be traversed to take advantage of known productive locations.

The month of August brings renewed interest in salmon fishing as the cohos begin appearing. Both with rod and reel and with gillnet, effort increases for this species (ADFG files). The run comes after the commercial sockeye run, when time is available for processing resources for home consumption. Cohos are a favored species for making salt fish. Individuals desiring pink or chum salmon also set their nets during the latter part of July or during the month of August.

Not only is August an important month for fish and berry harvesting, it also marks the beginning of the caribou hunting season. Caribou are desirable at this time of year because they provide a change from a fish diet, the bulls are not in rut, and it is feasible to use a skiff for transportation while hunting. The biggest disadvantage to the early hunting season is the difficulty of preserving the meat against spoilage. Families without refrigeration or freezers must utilize the meat immediately.

The moose and waterfowl hunting season begin in September. The fall moose season is generally no more than 20 days and is less in some parts of the subregion. Hunting of ducks and geese is generally good, and waterfowl is a resource used by many local residents. Hares, porcupine, and grouse are also hunted during this time.

A number of families fish into September and October for spawned-out salmon, locally referred to as fall or red fish. These fish are preserved by drying. For a short while during this time of year conditions may be right for dip-netting smelt. Only a few individuals participate, and the smelt are distributed throughout the village.

As the weather turns colder and water begins to freeze, attention turns again to caribou hunting. The frozen rivers provide increased access to hunting areas unavailable during the in-between season when neither skiffs nor vehicles are feasible. When a December moose season is allowed, residents from all the villages in the subregion take advantage of the opportunity and try to harvest one. Hares, porcupines, and ptarmigan are hunted throughout the winter months. When conditions are right, people catch large numbers of smelt jigging through the ice on rivers near the various settlements. Trapping of furbearers at this time is undertaken on a limited scale throughout most of the subregion. Local residents look to trapping as a means of obtaining a cash income when commerical fishing might be poor. Were the price of furs to rise, more effort would likely be put into trapping.

Winter activities continue until the lengthening days indicate that spring is approaching. And as the composition of the resource base changes with the new year, the cycle of human activities adapts also.

C. Harvest Levels and Use of Fish and Game

Harvest levels for all resources vary on a yearly basis. A number of factors may affect the harvest levels, such as the availablity of the resource, weather conditions, the amount of cash income available, and the health of the harvesters. Even if levels may vary somewhat, however, the uses of the resources remain fairly constant. Tables 29 and 30 display some basic harvest levels for resources commonly used in the subregion. In terms of poundage, caribou, salmon, and moose are the most important species.

Salmon, taken in all commmunities, are both eaten fresh and preserved for later use. Smoking, either by means of a smokehouse and firewood or an electrically run smoker, is an extremely popular method of preservation. Some households dry-smoke; others kipper their fish; and some put them up in jars or cans. Another popular method of processing, with origins in Scandinavia, is salting. Heads and/or bellies are most frequently preserved this way. Freezing is common among households with freezers and a reliable source of electricity. Salmon are used throughout the year as daily fare and on special occasions for the family or community. Pickled fish and smoked salmon are always served at weddings, funerals, and most large gatherings held in the communities.

Table 29. Mean Household (Hsld.) Harvest of Selected Resources, Upper Alaska Peninsula Subregion

	1973[a]	1981[b]	1982[b]
No. hslds. sampled	133	17	10
Mean size of sampled hslds.	4.5	3.82 winter 4.47 summer	3.00 winter 5.00 summer
Moose	.34	0.2	0.5
Caribou	2.63	3.35	4.6
Seals	.06	0.12	0.3
Ducks	9.7	13.8	3.2
Ptarmigan and spruce grouse	19.3	18.6	5.9
Beavers	0.65	0.53	4.6
Porcupines	0.5		1.3
Salmon	49.8	169.6	
Whitefish	2.6		2.8
Pike	2.7	3.2	
Char/Dolly Varden	4.5	3.0	
Grayling	6.7	7.1	
Rainbows	5.7	8.6	
Lake trout	.7		
Smelt	142.3		25.4
Berries			7.8 gal

a Gasbarro 1974 (includes households from all communities).

b ADF&G 1982 (includes only South Naknek households).

Table 30. Subsistence Salmon Catches by Village, Upper Alaska Peninsula, 1982

Community	Salmon Harvested					Total
	Sockeye	Chinook	Chum	Pink	Coho	
Salmon-Naknek[a]	10,072	933	317	791	862	12,975
Egegik[b]	2,377	30	--	--	34	2,441
Ugashik	368	33	16	16	300	733
Totals	12,817	996	333	807	1,196	16,482

Source: ADF&G 1982.

a Includes villages of King Salmon, Naknek, and South Naknek.

b These figures probably underestimate actual village catch.

Berries are used for a variety of foodstuffs. Salmonberries are a favorite for making akutaq, a dish made with shortening, sugar, and berries. It is often called Eskimo ice cream. Many families freeze their akutaq, ready to eat, in plastic bags. Cranberries are most frequently used in baked goods and for juice. Moose and caribou are eaten fresh or frozen for later use. They will be shared among family and friends, both at the time of harvest and later from supplies kept in the freezer. Some families preserve their meat by canning it in a pressure canner. When waterfowl hunting is at its prime, hunters often distribute fresh fowl through much of the community. What is not eaten fresh will be frozen for later use.

In general, any resource harvested will be utilized by the hunter and distributed among other households as well. A frequently heard comment is "when you have a lot to share, you share a lot" (field notes). Distribution of harvested resources, either fresh or preserved, follows regular, if informal, channels. After the successful hunter and his immediate party have taken what they want, older relatives of the hunter are next in line to receive the meat. Next are siblings of the hunter and his spouse, older community members, and any others who would like or need the meat (field notes).

Though income levels may indicate that many families have the option of obtaining much of their required nutritional needs from commercial sources, many persons cite both economic advantages and personal preferences as reasons for choosing to use local resources. This preference reflects not only the acquired taste for locally available foods but also the social values attendant upon the harvest, processing, and exchange of local wild resources.

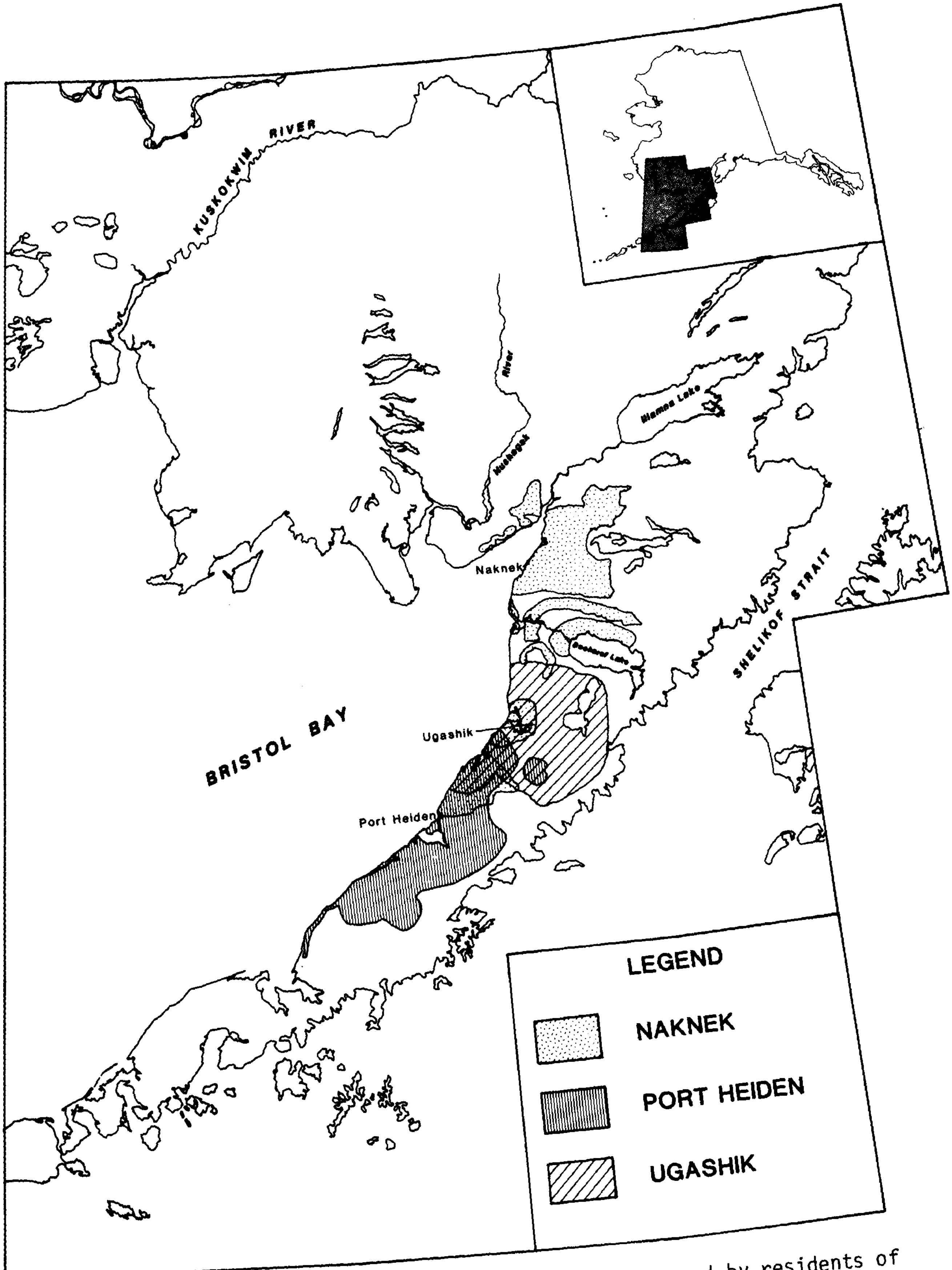
D. The Geography of Harvest Activities

The area immediately surrounding each village is the major resource harvest area for that village (maps 6 and 7). Rivers and their tributaries adjacent to the village provide for most of the fish harvested by the residents of that community. The river system often provides access to areas for big game hunting, either by means of a skiff in open water or by motor vehicle over the ice.

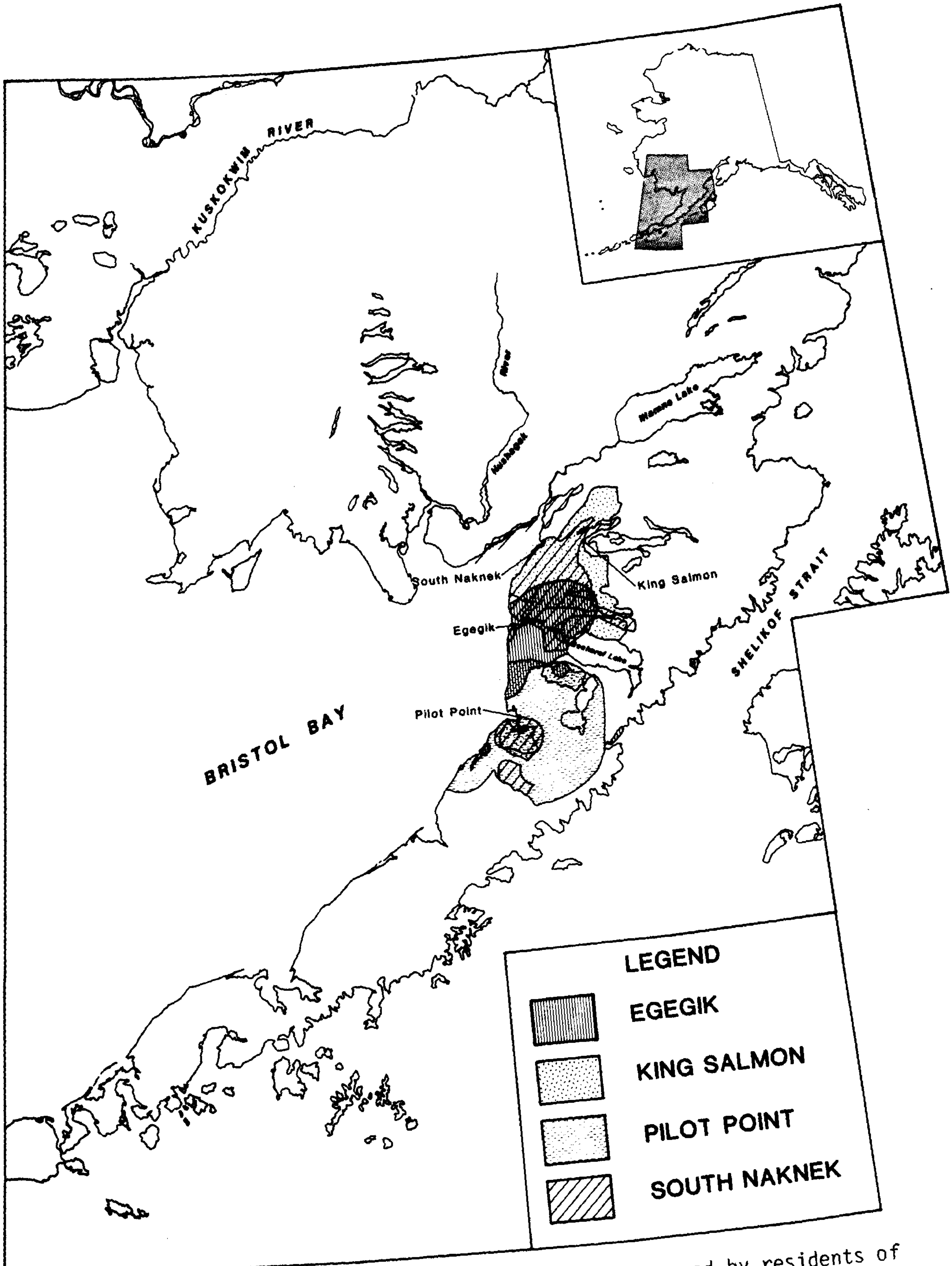
If caribou are not taken in the immediate vicinity of the community, the midsection of the Alaska Peninsula near the Becharof Wildlife Refuge is a commonly used hunting ground for those with air transportation. Specifically, the Shoskey-Dunes area, the Becharof Dunes at the mouth of the Egegik, Jensen's strip, and several large unnamed lakes on the peninsula are favored because of the good access they offer.

Waterfowl hunting areas are found near all communities. Residents from King Salmon hunt along the Naknek River. Those from South Naknek and Naknek either hunt near these communities or sometimes fly across Kvichak Bay and hunt at Halfmoon Bay. Pilot Point, Egegik, and Port Heiden are all prime waterfowl hunting areas. Individuals with relatives in one of these villages will make extended hunting trips during the waterfowl season. For those hunters without kinship ties, effort will be made to arrange a trip for a day or occasionally for an overnight trip.

Other resources, such as berries, hares, porcupines, or ptarmigan, are usually harvested in the vicinity of the home community. The major exception seems to be berry picking. It is not unusual for groups of women or a husband and wife to fly to known locations of productive berry picking. Resource harvesting usually requires specific knowlege of the geographical area to be used and extensive knowledge of the resource itself. The second method of selecting a harvesting area is to accompany someone who has the appropriate knowledge. The amount and sophistication of the hunter's knowledge of both the resource and the area often determine what areas will be used.



Map 6. Upper Alaska Peninsula subregion, Part 1: areas used by residents of Naknek, Port Heiden, and Ugashik for subsistence use of fish and game, 1982 (ADF&G, Div. Habitat).



Map 7. Upper Alaska Peninsula subregion, Part 2: areas used by residents of Egegik, King Salmon, Pilot Point, and South Naknek for subsistence use of fish and game, 1982 (ADF&G, Div. Habitat).

Chignik Subregional Assessment

I. LOCATION AND ENVIRONMENT

Located on the Pacific drainage side of the Alaska Peninsula, the Chignik subregion, as defined for these purposes, extends from Wide Bay on the east to Stepovak Bay on the west. The Aleutian Range, part of the chain of volcanoes known as the Ring of Fire that encircles the Pacific Ocean, dominates the landscape. On the Bering Sea side of the peninsula, the lands slope gradually toward the water. On the Pacific side, location of the Chignik communities, the mountain ranges drop suddenly into the sea, forming high rugged cliffs. Chignik River is the major drainage system in the subregion. Numerous bays, including Amber, Kujulik, Chignik, Castle, Anchor, Mitrofinia, and Ivanof, dot the coastline. The ocean is ice-free year-round. Settlements are located at Ivanof Bay, at the mouth of the Kametolook River, and at Chignik Lake, Chignik Lagoon, and Chignik Bay.

A moderate polar maritime climate is found throughout the subregion. High and frequent winds, mild temperatures, cloudy skies, and relatively high precipitation, averaging 160 inches of rain annually at Chignik, characterize weather conditions.

The isolated drainages on the Pacific side of the Alaska Peninsula provide the major exception to the tundra cover dominating the Alaska Peninsula. In the tundra are found areas of high bush adapted to persistent high winds, low temperatures, and acidic soils. Sedges, grasses, and dwarf shrubs are common along the protected draws of the rivers.

A variety of wildlife is found in the Chignik subregion. Brown bear, moose, and caribou are the most common large terrestrial mammals. The Northern Alaska Peninsula caribou herd is one of the major herds in Alaska. That herd, which ranges near the Chignik subregion, has an estimated population of 18,000. Census information from the Division of Game indicates that the herd has increased in the past few years (ADF&G files). However, moose numbers in the subregion have declined. Figures for 1983 estimate 2,500 moose in GMU 9E (McNay, pers. comm.). Brown bears are often seen in the Chignik subregion. The tributaries of Black Lake and Chignik Lake, the slopes of Aniakchak Caldera, and the slopes of Mt. Veniaminof are important bear habitat. Brown bears number at least 2,000 on the Alaska Peninsula south of the Naknek River (ibid.)

In addition to large mammals, hares, porcupines, beavers, wolves, mink, wolverines, land otters, red foxes, and arctic ground squirrels are found in the Chignik subregion. Marine mammals, such as Steller sea lions and sea otters, are abundant along the coastline (USFWS 1981). Although various species of ducks and geese are found on the Pacific side of the peninsula, the Bering Sea side has much larger waterfowl populations. A number of species of marine birds, such as cormorants, murres, gulls, and terns, nest on inaccessible cliffs along the coastline. Ptarmigan, sandhill cranes, Bald Eagles, and peregrine falcons are also found in the subregion (ibid.). All five species of North American Pacific salmon spawn in the streams of the Chignik area. Shellfish, including king, Tanner, and Dungeness crabs, and razor clams, are also found in the waters and shorelines of the subregion. Octopus, halibut, cod, and pollock, along with freshwater fish such as Dolly Varden, contribute to the abundant resources in the Chignik subregion.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITY

Human occupation and adaptation to a coastal economy had begun along the Pacific coast of the Alaska Peninsula by 4000 B.C. (Dummond 1977). Open-sea hunting techniques were employed by the indigenous peoples living in the ice-free conditions afforded by the maritime climate. The local inhabitants harvested sea otters, hair seals, and sea lions throughout the year. Occasionally, a walrus was seen. There were major populations of whales, both great and small, plus fur seals, from Unimak Island eastwards to Kodiak. The major human populations were also centered in this area. The peoples of the region shared a great many subsistence techniques and made use of equipment that classifies both the distinctive groups of Aleut and Eskimo as southern units.

Although the people of the region used a similar resource base, subsistence techniques, and equipment, two distinct linguistic classes were present: Aleut and Eskimo. The linguistic dividing line for these groups was somewhere near 159 degrees on the Alaska Peninsula by the nineteenth century (ibid.).

At the time of Russian contact, the Chignik area was populated by Kaniagmuit Eskimos. The village of Kaluak was located at the present-day site of Chignik. During the Russian period of obtaining the valuable sea otter fur, the Native people of the area were exploited. Groups of people were relocated; individuals or entire villages were severely punished; and new diseases devastated the Native population. At the same time, the resource base to which the Native peoples had become so well adapted was rapidly being depleted. Simultaneously, new foods and technologies were being introduced. This combination of events contributed to a period of great upheaval in the Chignik area.

The political change that transferred the ownership of Alaska from Russia to the United States had little immediate effect on the lives of the people living on the Pacific coastline. The major factor changing the patterns of life in the Chignik subregion was the introduction of commercial fishing. Chignik was established as a fishing village and cannery in the second half of the eighteenth century. From this point forward, commercial fishing has been the dominant influence on all the peoples of the Chignik subregion. Many of the values and the basis of the economic structure of the area developed as a result of the dominance of the commercial fisheries.

The history of Perryville is unique. Residents of this community and of Ivanof Bay are direct descendants of persons fleeing the 1912 Katmai eruption. These people had been living in the villages of Douglas and Katmai but had already made their annual move to a commercial salmon saltery located at Kaflia Bay when the eruption occurred on June 6, 1912. Making their way to Kodiak Island, the survivors were relocated aboard the Manning under the command of Captain Perry first to the present-day site of Ivanof Bay in July of that year. In August, they decided to relocate once more, this time to the present site of Perryville, as the village came to be known. Ivanof Bay continued as a fish camp over the years. It became more than a temporary settlement in 1965 when a number of families from Perryville seeking a change in lifestyle opted to move permanently to Ivanof Bay. These families were seeking religious freedom, a quieter pace of life, and closer access to what they considered better hunting grounds (Nebesky et al. 1983)

Chignik Lake had its earliest historic origins in the 1920's as the site of a trapping cabin (Petterson n.d.). Families from Chignik Lagoon moved up during the mid 1950's because they felt winters were more comfortable at the lake location and because a school had been established (Nebesky et al. 1983). There were also movements of families from Ilnik, on the Bering Sea side of the peninsula, and from the old village of Kanataq, located on the Pacific side near Becharof Lake. Today, inhabitants of the Chignik subregion consider themselves to be Aleut. The only distinctions they see between themselves and people further south are related to current fishery issues and geographical distance (Petterson n.d.). Even residents who were aware of the linguistic differences among themselves and other Aleut groups asserted that they were Aleut and not Eskimo.

III. POPULATION

The 1980 population in the Chignik subregion was 515 (table 31), which represents a 50% increase over 10 years. This increase has been concentrated in the three communities of Chignik, Chignik Lagoon, and Chignik Lake. Perryville and Ivanof Bay have remained relatively stable, with the former community increasing by 17 persons, while the latter decreased by 8.

Table 31. Population History, 1880-1980, Chignik Subregion

Community	1888	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Chignik								253	99	83	178
(Chignik Village)								224			
(Chignik Bay Village)		193		566							
Sutkoon	25										
Chignik Lagoon									58	--	48
Mitrofinia	22	49									
Chignik Lake									107	117	138
Katmai	218	132									
Kukak	37										
Perryville					85	93	92		93	94	111
Ivanof Bay									154	48	40
Totals									813	302	515

Source: ADL 1981, Rollins 1978.

The increases documented for Chignik and Chignik Lagoon, in part, reflect a decline in the dual-residency pattern many families had established. Briefly, the communities have had their structure dictated by the fortunes of the commercial fishing and seafood industries. Residents of the communities recall the years before 1960 as relatively stable. Wages were low, but the cannery provided many of the necessities of daily life (Petterson n.d.). Between 1960 and 1974, however, the fisheries were increasingly depressed, schooling needs could not be met locally, and fewer services were available to local residents. Many of these families began establishing homes in Kodiak, Anchorage, and, to a lesser extent, Seattle. As commercial salmon fishing improved in the late 1970's, a reversal of the dual-residency trend began and continues today. Approximately 40% of the residents of Chignik currently hold dual residency with Kodiak (ibid.). In terms of availability of services and economic potential, Chignik Bay is the most developed of the subregional communities. It has the only land-based seafood facility that processes both crabs and salmon and offers a sheltered year-round harbor. In 1983, Chignik Bay incorporated as a second-class city, and community services continue to be added. These now include electric utilities, individual phone service, and a fire department.

Chignik Lagoon, while not offering a level of amenities comparable to Chignik, has also experienced an increase in year-round residents. There has not been an increase of community services offered, however.

Chignik Lake's growth can be attributed mainly to natural increase (ibid.). Large families are common and are a source of pride among the residents. Other than teachers, who are present in the village only during the school year, most outsiders have married into local families.

Since its establishment in 1912, Perryville has maintained a relatively stable population, showing a slight increase over the years (table 31). Ivanof Bay, an offshoot of Perryville, is the smallest of the Chignik subregional communities, and the in-or-out migration of a single household can significantly alter the population of the village. As most of the movement is between closely related kin groups, however, the fluctations are more spurious than is apparent.

The residents of the subregion share social and economic characteristics that overlap through all the communities. The majority of each community is Alaskan Native (table 32). The predominant ethnicity is Aleut (Nebesky et al. 1983). Many of the residents have Russian ancestors from the period of Russian colonization and/or Scandinavian background. The variety of surnames attests to the mixing that occurred between the various groups of people living or passing through the subregion.

Table 32. Changes in Ethnic Composition From 1970 to 1980, Chignik Subregion

Community	Native-1970	Native-1980
Chignik	80.7	53.4
Chignik Lake	98.3	90.6
Chignik Lagoon	--	85.4
Perryville	95.7	92.8
Ivanof	95.8	92.5

Source: Nebesky et al. 1983

Russian Orthodoxy is a unifying element among the communities. All are nominally considered Orthodox, though Perryville and Chignik Lake are the only two that aggressively pursue religious activities. Both have active congregations, resident priests, and elaborate churches. Two major holidays associated with Russian Orthodoxy, Slavi (Russian Christmas) and Russian Easter, are times of great celebrations. The pre-Lenten celebrations attract visitors from nearby villages to Chignik Lake.

The communities of Chignik and Ivanof Bay have active Protestant religious groups. The residents participating in the non-denominational activities feel no conflict with the newer relgious activity. A number of families in Chignik do not appear interested in pursuing a more religious life (Petterson et al. 1982).

English is the common language in the subregion. Older residents speak Aleutiiq, a member of teh Eskimo-Aleut language family. Few of the younger people know more than isolated words and phrases. There is a bilingual/cultural program in Chignik Lake.

Kinship plays a major role in the social organization of the Chignik subregional communities. Individual households in each of the villages are usually connected with other households by a series of overlapping affinal and consanguineous links. The kinship ties developed through these networks are the basis of many of the groups formed to carray out a number of activities, including both subsistence and commercial fishing (ibid.). Within each of the subregional villages, one or two major lineages dominate many economic, political, and social positions (ibid.).

Among the communities are discrete networks of interaction. Chignik and Chignik Lagoon hae strong ties, and both have strong bonds to Kodiak. Perryville and Ivanof Bay, because of their shared origin, have very close kinship ties. Residents of Chignik and Perryville travel back and forth, participaing in hunting and religious activities with one another. Of all the communities, Chignik Lake possesses the greatest degree of contact with communities on the Bering Sea side of the peninsula. This is due to a number of factors: it is situated most inland of all the subregional communities, has a number of locally owned planes (eight in 1981) that provide access, and has affinely related households. Finally, there are historic ties to the Ilnik area, where a number of residents lived previously to moving to Chignik Lake (Nebesky et al. 1983).

IV. TRANSPORATION AND ACCESS

All the communities in the Chignik subregion are accessible only by air and sea. There are no roads connecting villages in the subregion with any other village. Winds and generally poor weather conditions tend to make travel into and around the subregion unpredicatable. It is not unusual for people to get weathered in or out of the area for several days.

Air travel is the primary means of transporation in the subregion. Each village has a gravel runway. Chignik Lake and Chignik have runways of 2,600 ft and 2,800 ft, respectively. The runways in the remaining three communities are no longer than 1,800 ft. In addition to the gravel runways, seaplane landings are feasible in all communities. During the winter, ski planes are occasionally used. Ivanof Bay has a stretch of beach that may be used for wheel landings at low tide (ibid.).

Many residents receive goods and travel in and out of the region through the King Salmon airport. Access to King Salmon is generally provided by Peninsula Airways, with headquarters in King Salmon. The company has a pilot stationed in Chignik Lake during the winter season and in Chignik during the summer. During the peak of the commercial fishing season, air service is available between Kodiak and Chignik with a Kodiak-based air service. When this service is available, it is somewhat cheaper to travel to Anchorage via Kodiak than through King Salmon. Private aircraft owners are located in Chignik Lake and Chignik Lagoon. In 1981, eight aircraft were owned by individuals in Chignik Lake and three in Chignik Lagoon. The planes are used for transporation around the peninsula, for hauling freight, and sometimes as a form of recreation (Petterson et al. 1982).

The second major form of transportation in the region is marine. Chignik has the most regular and frequent barge service. Western Pioneer, Inc., services the south Alaska Peninsula, with stops at least once a month in Chignik. This barge also brings in supplies for Chignik Lagoon and Chignik Lake. Chignik Lake's supplies are offloaded in Chignik Lagoon and transported by boats upriver to the village site. Perryville and Ivanof Bay are serviced once a year by North Star barge. There are no public docks or harbors in either community and cargo is lightered ashore. Oil is the principle cargo barged into these communities.

Within the communities, three-wheelers and pick-up trucks are the common forms of transporation. Chignik has approximately 3 mi of state-maintained roads, Perryville 2 mi, Chignik Lake and Chignik Lagoon .5 mi, and Ivanof Bay has no roads (Nebesky et al. 1983). In each community, small skiffs are a frequent form of transportation, providing access to local resource use areas. Skiffs also provide easy travel between some communities, such as between Chignik Lake and Chignik Lagoon or Perryville and Ivanof Bay.

Chignik, Chignik Lagoon, and Chignik Lake have phone service available to individual homes. The remaining three communities have one phone in the village, usually located in the council office or the health clinic. The Lake and Peninsula School District has radio contact between the central office in King Salmon and each individual school in the subregion. Mail, processed through King Salmon, is routed through Port Heiden before reaching the villages. The normal postal delivery schedule is two or three times weekly.

V. MONETARY ECONOMY

Salmon dominates the economy of the Chignik subregion. In 1981, approximately 85% of the local income was derived directly from the commercial salmon fishery (Petterson et al. 1983). All of the commercail salmon harvest takes place within the Chignik Management Area on the southside of the peninsula. Purse seine and hand seine are the only legal gear for salmon. There are 90 units of gear allowed under limited entry regulations. This is a relatively small fishery if compared to an area such as Bristol Bay, where 2,769 units of gear were fished in 1982 (Alaska Commercial Fisheries Entry Commission 1982). The market value of a Chignik permit in 1983 was estimated at $350,000. As no permits were transferred in 1982, the value cannot be substantiated. In 1980, 9 permits were held by Chignik residents, 9 also in Chignik Lake, and 11 in Chignik Lagoon. Seven persons in Perryville held permits and two in Ivanof Bay (Nebesky et al. 1983, Petterson et al. 1982). In 1980, an average crew for a commercial operation in the Chingik subregion consisted of 4.5 persons (Langdon 1982). Taking the numbers of locally held permits and expanding the crew, this translates into 171 resident jobs during the peak of the salmon fishing season. Table 33 shows average household income for the subregion, of which the major portion is derived from the commercial salmon fishery.

Table 33. Average Household (Hsld.) Income, Chignik Subregion, 1980

Community	Personal Income ($ x 1,000)	No. Hslds.	Average Hsld. Income
Chignik	$2,196.1	47	$46,726
Chignik Lake	557.8	38	14,678
Chignik Lagoon	173.3	14	12,379
Perryville	723.5	31	23,338
Ivanof Bay	190.0	9	21,116

Source: Nebesky et al. 1983.

The salmon season begins in early June with the first run of sockeyes, followed by successive runs of chum, pinks, and finally coho salmon. The fish are delivered to Chignik for canning or to Kodiak for freezing. In recent years, a number of floating processors and buyers have begun to work in the Chignik waters. This has presented the local fishermen with a market other than that of the land-based processor. Local Chignik fishermen consider their salmon the highest quality to be found worldwide. This is because the fish are seine caught, which does not damage the fish as can a gillnet. These fish have the highest oil content of any Alaskan salmon and are considered to have the firmest flesh, in part because they have the earliest major runs in the state (Petterson n.d.).

In addition to salmon, the Pacific waters offer several other types of marine resources that may be commercially harvested. Tanner crab harvesting began in 1967, and catches rose to as high as 11.2 million pounds in 1975-1976. The industry has been declining, however, and in 1979-1980 only 1.2 million pounds were harvested. Dungeness crabs are also taken commercially, but king crab has never been important in the subregion (Petterson n.d.). Currently, it is mainly fishermen from Chignik and Chignik Lagoon who have entered the crab fishery. The other three communities lack easy access to the crabbing grounds and to participate would mean either extended periods away from their homes or relocating to Chignik or Chignik Lagoon. The crab fishery is not controlled by limited entry at this point, and some fishermen participate in crabbing in order to qualify if the fishery were to become limited (ibid.). Although the fishery has been lucrative during the mid 1970's, the outlook for a return to the harvest levels of that period is not optimistic. The marginal forecast and the high cost of obtaining crab gear has kept some fishermen from participating in this fishery.

Other options for the local fishery include halibut, pollock, shrimp, and cod. Halibut is fished by some local fishermen although there are seasonal conflicts with salmon fishing in some years. Bottomfishing may become more important if crabbing continues to decline. In 1981, a total of 32 boats from the subregion participated in the herring fishery, receiving an average of $8,052 per boat (Nebesky et al. 1983).

Fishermen from Chignik Lake, Perryville, and Ivanof Bay generally set up summer living quarters at the fishing grounds located at Chignik Lagoon and Chignik. Some of the men bring wives and families along. The families stay in fishing camps or second homes located in these communities. The men will fish the sockeye runs in the lagoon, and as these runs diminish, the boats will venture east along the peninsula looking for pink, chum, and coho salmon. A small number of chinooks are also taken in the course of the season. When the coho run ends in September, fishermen will dock their boats and return to their respective villages. Their families have usually preceeded the men home, often leaving as soon as the sockeye run ends, around the first of August.

Residents of Chignik Lake run their boats upriver to Chignik Lake and pull them up along the lakeshore at the season's end.

Other than commercial fishing activities, there are few economic opportunities for residents of the Chignik subregion. Each village has a limited number of jobs associated with village council work, health care, support for the local school through the Lake and Peninsula School District, the U.S. Postal Service, and the state-maintained roads and runways. In Chignik, Perryville, and Ivanof Bay there are small, locally owned and operated stores that usually provide one to two individuals limited employment. Occasionally, seasonal jobs based on special projects, such as school construction, become available. Seasonal employment is intermeshed with commercial fishing activities and subsistence enterprises to provide for the families of the subregion.

VI. USE OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Used

Of the variety of species utilized by the residents of the Chignik Subregion, moose, caribou, and salmon provide the greatest amount of food in terms of weight (Evergreen State College 1977). Though these three species are the ones most frequently mentioned with reference to local domestic use, many other locally available natural resources add caloric and nutritional components to the diets of the residents. Brown bear is used by the residents of Chignik Lake and Perryville. All the communities harvest ducks, particularly pintails and green-winged teals, geese, mainly emperors, and ptarmigan (ibid.). Small mammals used include porcupines and hares. Sea mammals harvested are sea lion, walrus, and seals. Furbearers trapped include fox, lynx, mink, and wolverine. Marine resources such as clams, crabs, shrimp, octopuses, and mussels are used. Wild vegetables, berries, and seagull eggs are gathered at various times of the year and incorporated into the local diets.

B. Seasonal Round

Resource availability is the most important factor in determining the local seasonal round of resource utilization. Other variables to be considered in resource use in the Chignik subregion include weather conditions, winds, and commercial fishing activities. External factors such as fishing and hunting seasons and bag limits also affect the pattern of resource use. Weather conditions in the Chignik subregion tend to be extremely variable. Access to various resource harvest areas may be limited by the lack of snowfall, too much rain, ice, or no ice, on certain waterways used for transportation, and so forth. Strong winds, combined with cloudy or rainy conditions, make air and water transportation, the two main means of travel in the area, hazardous.

Figure 6 depicts a generalized seasonal round of resource harvest activities in the Chignik subregion. The end of May or beginning of June mark the first period of activity of each year's subsistence salmon fishing effort. People begin checking equipment and gear. Necessary items are ordered or repaired. Smokehouses are cleaned and made ready for the upcoming season. Seining is the common method of harvesting subsistence salmon. For the commercial fishing families that have moved to Chignik or Chignik Lagoon, salmon will be harvested initially at these locations. Many families concentrate on processing fish while simultaneously preparing for the commercial fishing season during the first half of June. Families remaining in Perryville and Ivanof Bay will fish streams near the village as the run appears. Once the commercial fishing season opens, men and older boys will leave for the fishing grounds while remaining family members continue to harvest and process subsistence catches.

Fresh wild vegetables are picked as they appear in the early spring and summer months. Wild celery and spinach are two varieties of greens noted for use in all the communities (Nebesky et al. 1983). Dolly Varden may be fished during this period. Catches of seal and halibut also occur. Cottonwood and alder are gathered for use in the smokehouses.

As summer continues, berries begin ripening. Groups of women, children, or entire families make trips out around the community to collect this resource. Mossberries, salmonberries, blueberries, and cranberries are all gathered (Tuten 1976). August marks the beginning of the regulatory year's caribou hunting year. The late summer caribou are often hunted in areas accessible by commercial fishing vessel. Three-wheelers, taken aboard the boats, are used for travelling inland from the bays where the boats are anchored. In some instances, hunting will take place in conjunction with commercial fishing activities. Other times, men will take younger boys and family members out on trips that are viewed specifically as hunting ventures.

Early fall is also a time for moose hunting. Moose hunting often occurs along waterways reached with skiffs or fish boats. The families that have moved back to Ivanof Bay, Perryville, and Chignik Lake make more use of skiffs and three-wheelers in moose and caribou hunting than they do of fish boats. The Stepanof Flats and near Mt. Veniaminof are heavily used areas for hunting big game for the Perryville and Ivanof Bay residents. Black-Chignik lakes lowlands are used by Chignik Lake people (Evergreen State College 1977). As

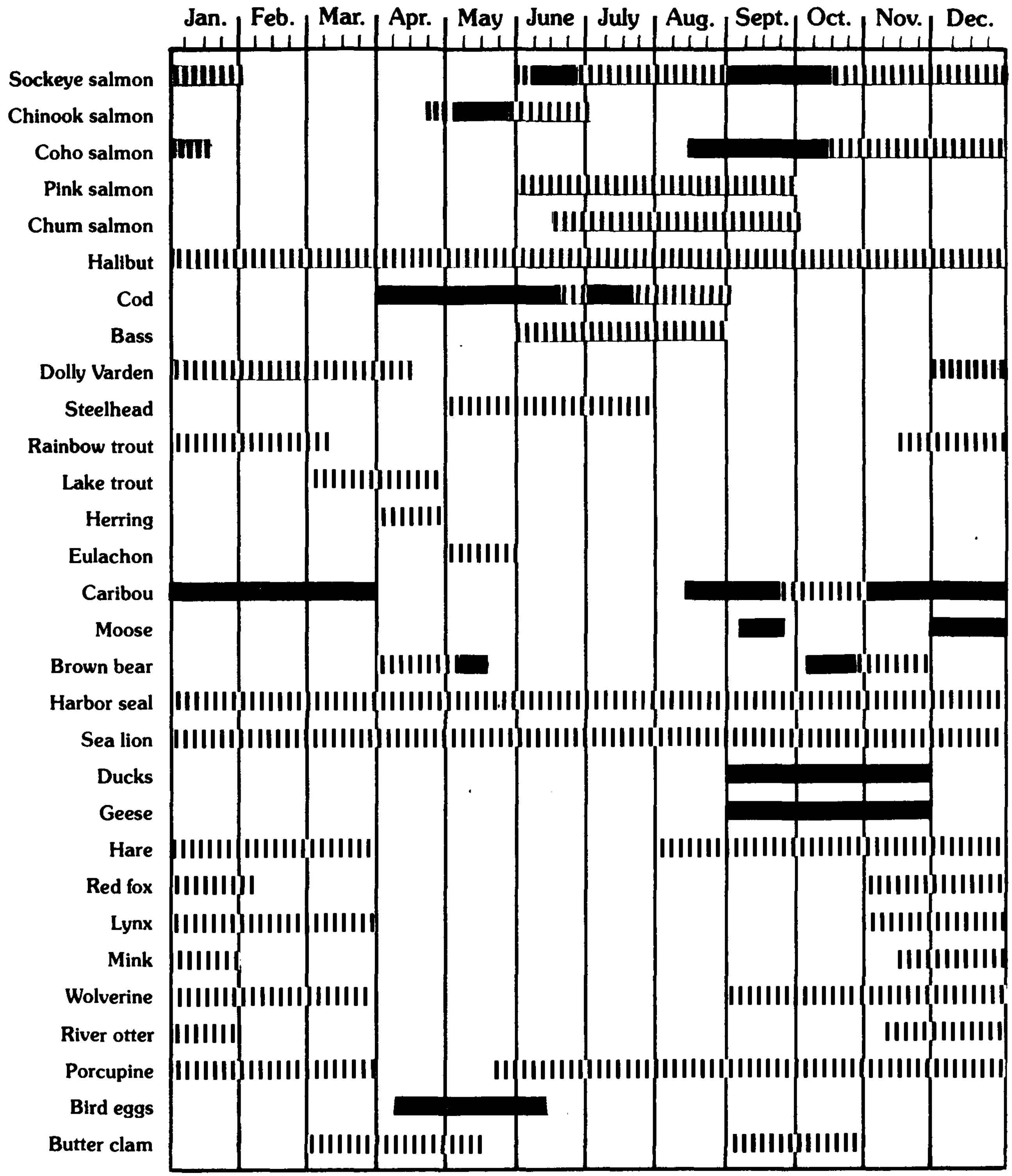


Figure 6. Seasonal round of resource harvests, Chignik subregion. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (1982-1983 field interviews, ADF&G, Div. Subsistence).

(continued)

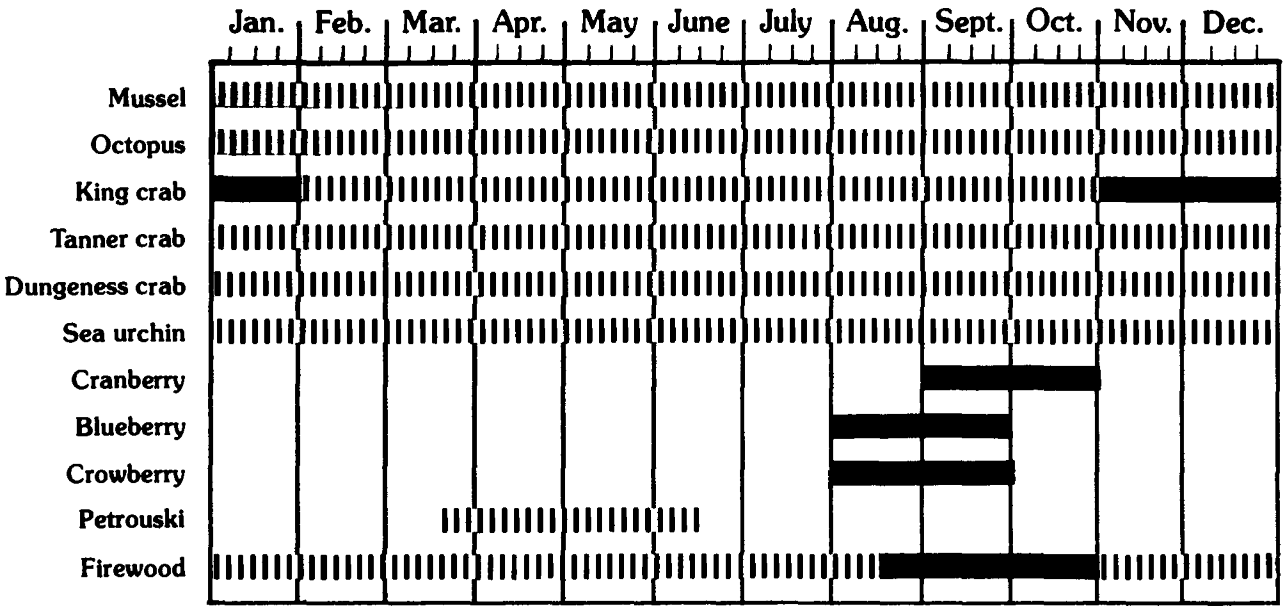


Figure 6 (continued).

access to cariobu grounds is harder for the residents of Chignik and Chignik Lagoon, more effort has been placed on moose hunting. Drainages emptying into the Pacific Ocean and accessible with fishing boats have been the favored hunting areas for these hunters. For local residents with private aircraft, mainly individuals from Chignik Lake and Chignik, more remote and extended distances are travelled to gain access to good hunting grounds.

September marks the beginning of the waterfowl season. Ducks and geese are used in every community. Habitat on the Pacific side of the Alaska Peininsula does not support the large numbers of waterfowl the Bering Sea estuaries support. However, the coastline, bays, and river drainages normally provide a limited number of waterfowl. Kujulik Bay, Stepanof Flats-Stepovak Bay, Ivanof Bay, and Chignik Lagoon are the areas noted for the best waterfowl hunting (ibid.).

Geese are common in the local and preferred areas at Ilnik on the Bering Sea side of the peninsula (Tuten 1976). Chignik Lake residents have a number of kinship ties with Port Heiden and Pilot Point, both locations of exceptionally productive water fowl hunting, and trips are made to these communities during the fall season.

Brown bears are harvested in the late fall just before they go into hibernation, principally for the fat. Of the subregional communities, Perryville and Chignik Lake are the most active users of bear meat and fat (Petterson n.d.). October and November are considered the best months for bear hunting, which is commonly conducted during the night. Late fall is also a time for continued subsistence fishing. Fall fish are a preferred type of salmon. They are taken upstream after the fish have lost most of their fat and will air-dry easily. The fish are usually spawned-out. Chignik Lake is a favorite place to harvest cohos, which may be dried or salted, at this time of the year. Small mammals are also hunted. Often, after school young boys will take three-wheelers and skirt the village looking for hares or porcupines. They will use a shotgun, club, or snare in the harvesting of these species. Other times, they will be taken incidentally to a caribou hunting trip.

Ptarmigan hunting is considered a late fall or winter activity. The birds are often driven down by snow from the higher elevations and become more accessible at this time of the year. The year-round open water of the Pacific allows for continual harvest of marine resources. Halibut are taken, as are clams, octopuses, mussels, and seals. Crabs, both from commercial and subsistence pots, are a favored winter resource. Until the 1984 regulatory year, a moose season was held in December that allowed local residents opportunity for fresh moose meat in mid winter. Because of declining moose populations, this season has been closed for the foreseeable future. The Caribou season remains open until March 31.

Other wintertime activities include ice fishing, particularly in Chignik Lake, where fishing for Dolly Varden takes place on the lake in front of the village. According to residents of the Chigniks, low pelt prices and time constraints, combined with a strong dependence on the cash income earned during commercial fishing, are the primary factors contributing to the diminishing effort directed toward trapping (Tuten 1976).

As winter gives way to spring, plans once again focus on the upcoming salmon season. There is a slower pace to resource harvesting. Spring bears may be taken. The meat at this time of the year is said to be particularly tender because of the long inactive period of the animal. Seals, sea lions, or walrus will be taken if the opportunity presents itself. Seagull eggs are gathered. This usually entails an outing to nearby islands, the favorite nesting places of the birds. Fishing with hook and line for Dolly Varden provides a change of pace for some of the residents. As May nears, the annual cycle of events is once again to be repeated, but as always details will vary from the previous year.

C. Intercommunity Differences in Resource Use

The differences in resource use among the communties of the subregion relate to the locations and accessiblity of various resources, access to purchased food products, and other environmental characteristics of the individual villages.

Chignik is the most cosmopolitan of the subregional villages, and locally obtained and consumed food items are not pursued with the intensity they are in Chignik lake, Perryville, or Ivanof Bay (Petterson et al. 1982). The isolated village of Ivanof Bay depends on local resources for a large portion of its food base. Chignik Lake residents estimated that 75% of the food consumed in their community was from local resources, whereas some residents of Chignik estimate that around 5% of their diet comes from local resources (ibid.). In Ivanof Bay only two of the 48 residents own a limited entry permit, and yet more than 90% of the entire cash income for the village is generated through these permits. Resource harvest is considered important for providing basic supplies for most households (ibid.).

D. Harvest Levels and Use

Salmon is an important resource in all the communities. Levels of recorded harvest indicate that between 100 and 250 fish is a common number put up by an individual household (tables 34 and 35). Specific research may indicate that these totals do not apply to Perryville, where no on-site research has been conducted. The fish are used fresh, smoked, canned, frozen, salted, and dried. They are used year-round as a preferred food source. Locally prepared salmon are also important to have available for serving at special occasions such as weddings, funerals, and religious holidays. In Chignik Lake, it was noted that during Lent strict Russian Orthodox followers will not eat red meat and save much of the processed salmon to use during this period (field notes).

Caribou and moose provide a locally obtainable red meat source. The absence of commercial outlets and freezing units results in a continuous effort to acquire local sources of protein. Caribou or moose are greatly preferred over an imported mean product. In Chignik one moose per household of five was considered a normal annual harvest (Petterson n.d.). Consistant with the reported decline in the moose population, local residents report that moose are becoming very difficult to find and that the local harvest has fallen. Chignik lake residents depend greatly on caribou, which they harvest at the Black-Chignik lakes lowland area. In 1976, 12 households indicated that they took 57 animals (Tuten 1976). They also took five moose. In the same year, 15 households in Chignik Lagoon reported 25 caribou and 9 moose. Twenty households in Chignik took 8 moose and 15 caribou. As moose become scarcer, hunters are putting more effort into taking caribou.

Table 34. Mean Household (Hsld.) Harvest of Selected Resources, Chignik Subregion

	1975[a]	1981[b]
No. hslds. sampled	41	3
No. people in surveyed hslds.		13
Species		
Moose	0.54	0.33
Caribou	2.37	1.33
Brown bear	0.02	
Seal	0.44	0.67
Ducks	15.6	14.25
Geese	1.02	4.0
Ptarmigan	25.4	3.67 (extremely low)
Fox	.37	
Salmon	126.0	88.0
Spawned-out		33.0
Sockeye		37.0
Coho		6.7
Chinook		0.67
Pink		10.0
Halibut	1.5	33.3 lb
Dolly Varden		23.0
Crab	1.2	(One hsld. kept 50 Dungeness crabs from its commercial harvest; distributed widely through communities, as were shrimp.)
Butter clams		56.0 lb

a Tuten 1976.

b ADF&G 1982[b].

Table 35. Estimated Subsistence Salmon Harvest, Chignik Subregion, 1981

Chinook	Sockeye	Coho	Pink	Total
100	5,840	0	0	5,940[a]

Source: ADF&G 1982.

a A total of 27 subsistence fishing permits were issued, but only 7 completed forms were returned to the ADF&G.

Brown bears taken by the residents of Perryville and Chignik Lake are used for both the fat and the meat. The fat is rendered and used as a condiment with dried fish. The meat may be used fresh or salted and stored for later use. Salted, it keeps for long periods of time and traditionally had been used as a source of food in the lean months of spring (field notes). It is estimated that four or five bears are taken each year (field notes).

Ducks and geese are staple items for all the communities in the subregion. Large numbers of each will be harvested if they are available. They are eaten fresh, or frozen for later use. In Chignik it was estimated that an individual household harvests approximately 35 birds, including ptarmigan, annually (Petterson n.d.). This and other resource harvest levels are shown in table 34.

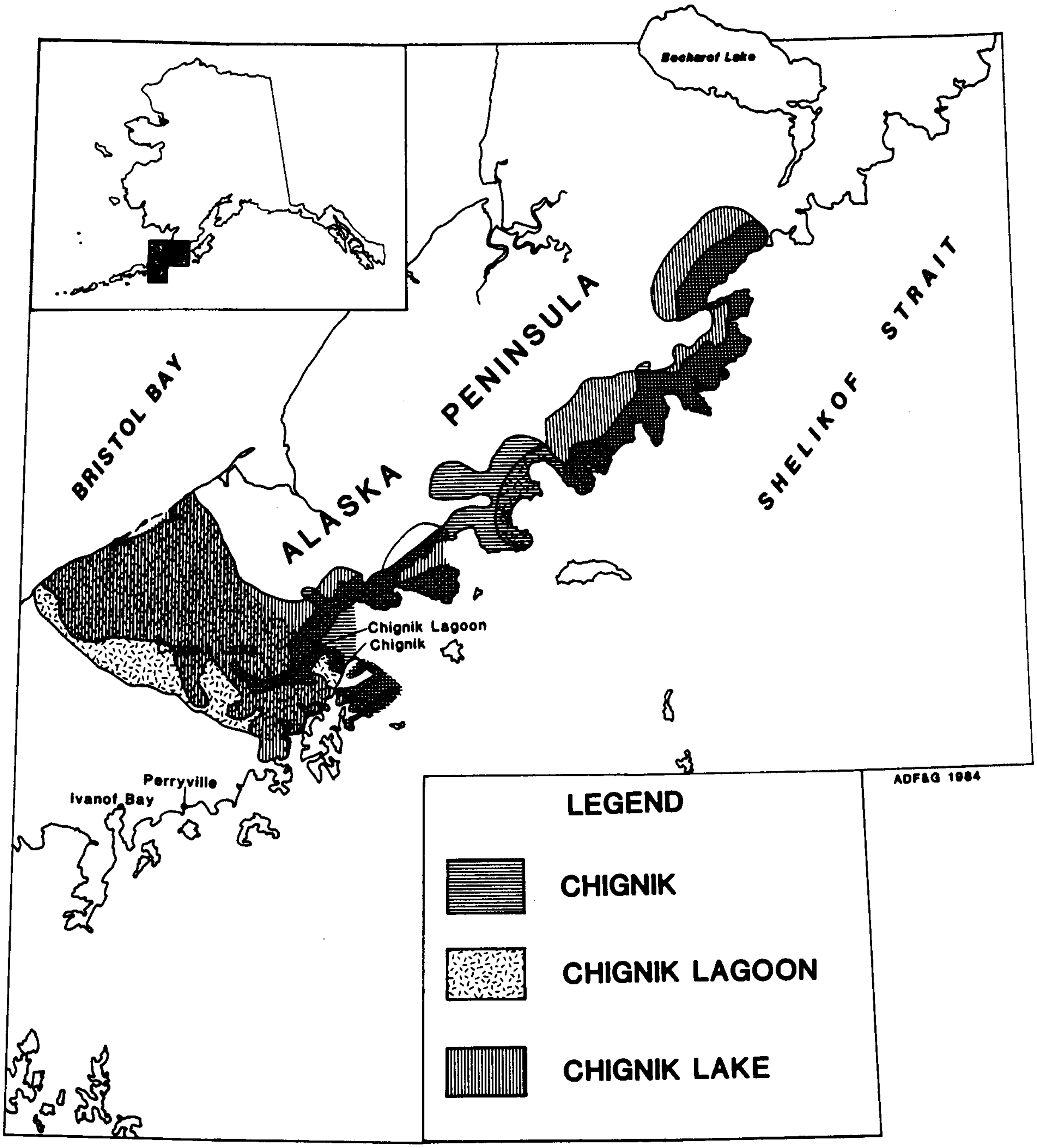
Crabs are kept from commercial catches, as well as being taken under subsistence fishing guidelines. Pots are kept out in front of the villages of Perryville and Ivanof Bay, where they are checked on a regular basis. Crabs, shrimp, and clams are often distributed among family and friends upon returning to the village. The only one of the three species groups regularly frozen is crabs. Chignik Lake residents reported that approximately 25 Dolly Varden were harvested by each household throughout the year, on an average. Seals are taken on an incidental basis, and exact harvest numbers are hard to ascertain. Perryville residents indicated that this resource is consistenly harvested in that community. The oil is widely distributed whenever a seal is taken in any of the villages. The fat does not have to be rendered. Chunks of the fat are put into glass jars and after being allowed to set for a while, the oil drips out. The common recepticle for storing and distributing oil is a two-to-four-cup glass jar. Halibut, harvested mainly in the winter, provides a number of 100 lb fish used in the communities. Not surprisingly, halibut is most frequenly taken by families with commercial fishing vessels. Once the fish is brought onto shore it will be divided and shared with a number of households in the community. Occasionally, a halibut even passes from one community to another. In 1975, Chignik residents reported that 50 halibut were harvested and distributed throughout the subregion (Tuten 1976).

Resource distribution patterns operating throughout the subregion are not formalized. Items and mutual aid tend to radiate out from the nuclear family. Older kinship members will be given shares of successful resource harvests, sometimes to the extent of sending preferred food items to older relatives in Kodiak (field notes). One method of distributing resources is to announce over the CB that extra bear, waterfowl, or whatever has been left at a particular place and available for anyone who wishes to collect it (Petterson n.d.). Another aspect of sharing is the loaning or borrowing of appropriate equipment necessary to the various resource harvest activities. The networks are similar to other distribution networks.

The resources themselves and the activities that are undertaken in harvesting and preserving these resources convey a sense of identification with the area. They provide a bonding among the groups that operate in the various phases of harvesting, preserving, and sharing, as, for example, when a group of Chignik men, father and grown sons, make a trip each year upriver to get fall fish. They spend several nights out catching and processing the fish and upon returning home distribute the catch to the families of all the participants. Two men, one from Perryville and one from Chignik Lake, get together and hunt for fall bear as they have done for years. With each successful kill, they take the products and spread them around their respective communities. The social values reinforced through subsistence resource use are intermeshed with the resource use pursued on a commercial basis. Together, resource harvest and use provide for the well-being of the people residing in the Chingik subregion.

E. The Geography of Harvest Activities

The residents of Chignik and Chignik Lagoon tend to look towards the coastline areas of the Pacific Ocean north of the villages for a good portion of their resource harvest activities (map 8). Moose are hunted in the sheltered bays, and waterfowl are hunted along the coastline. Marine resources are taken from the water in close proximity of the communities, usually in the lagoon proper. The route ot Metrofania River provides access to a southern portion of the coastline where marine invertebrates and mammals are both hunted. For the most part, caribou range more inland, and hunters pursue them in the lowlands or flats.



Map 8. Chignik subregion: areas used by residents of Chignik bay, Chignik Lagoon, and Chignik Lake for subsistence use of fish and game, 1982. No data are presented for Ivanof Bay and Perryville (ADF&G, Div. Habitat).

Perryville and Ivanof Bay residents make heavy use of Stepanof Flats and lower elevations of Mt. Veniaminof, including the Kametolook River uplands. The water in front of each village is used for crabbing, seals, salmon, and other marine resources.

Chignik Lake residents hunt for caribou and moose in the Chignik-Black lakes lowlands. Fish, both salmon and Dolly Varden, are taken from the lake in front of the village of Chignik Lake. Waterfowl hunting occurs at Black lake, Chignik Lake and River, Chignik Lagoon, or, for some, on the Bering Sea side of the peninsula. Brown bears are hunted in the mountains surrounding the village, usually at a spawning stream in the fall. In the spring, they are hunted near the denning areas in the foothills.

The particular sites of local harvesting vary yearly, depending on a number of factors. The location of the game, weather conditions, and available means of transportation are conditions that must be considered each time a resource activity is planned and executed.

Lower Alaska Peninsula Subregional Assessment

I. LOCATION AND ENVIRONMENT

The area from Port Moller south through the northern tip of Unimak Island constitutes the subregion referred to here as the lower Alaska Peninsula. This is the southern end of the Alaska Peninsula, a relatively narrow land mass with several large bays protruding inland from both the Bering Sea and Pacific Ocean coastlines. Several islands are located along the Pacific side. On the western side of the peninsula, swamps and moist tundra characterize the landscape. On the eastern side, volcanoes as high as 8,000 ft dot the coastline. Human settlements are located at Nelson Lagoon, Popof Island (Sand Point), Unimak Island (False Pass), Cold Bay, and at King Cove.

Climatically, all the communities in the region experience maritime conditions. The northern side of the peninsula has lower temperatures and less precipitation than does the southern side. All communities experience moderate-to-heavy winds.

Wildlife is abundant throughout much of the area, and the remoteness of the subregion protects resources from excessive hunting pressures. Two types of wildlife found in the lower Alaska Peninsula command widespread attention. The area is famous for the large size and abundance of brown bears, and waterfowl are noteworthy because of the wide variety of species and large numbers of birds found on the peninsula. The Alaska Peninsula caribou herd found from Port Moller to Unimak Island currently numbers approximately 10,000. This represents an increase over past years, when the herd was estimated to have a stable population of around 6,000 animals. Very few moose are found in the subregion. The ADF&G counted fewer than 10 animals in a winter survey conducted in 1982 (ADF&G files). All five species of North American Pacific salmon are found in the waters of the subregion and, together with shellfish and bottomfish, are important resources. Dolly Varden and arctic char are other widely distributed fish species. A variety of food plants and berries are also present in the area.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITY

Five communities are located in the lower Alaska Peninsula subregion: Sand Point, King Cove, False Pass, Nelson Lagoon, and Cold Bay. With the exception of Cold Bay, development of these communities has been shaped largely by the commercial fisheries industry.

A. Sand Point

Sand Point was originally established in the 1890's as a supply station for San Francisco-based ships that were servicing the emerging cod fishery in the Okhotsk Sea (Langdon 1982). Soon afterwards, an additional cod fishery was developed in the Shumagin Islands. Fox farming on Popof Island and discovery of gold on Unga Island were sources of economic growth in the area during the first part of the twentieth century. As the gold deposits declined in the 1930's, Unga's development ceased. The natural harbor and continued importance of commercial fishing have combined to provide for sustained growth in Sand Point.

The first salmon cannery was established in Sand Point in 1931 by Alaska Pacific Salmon. In 1946, Aleutian Cold Storage began operating a halibut processing plant. Today it has expanded its operations to include the processing of a number of species, adding salmon in 1980 (ibid.), and it is now the only processing facility currently operating in the community.

Sand Point has grown not only through natural increase but also by drawing inhabitants from a number of Aleut villages (Nebesky et al. 1983). The favorable economic climate and variety of services offered led to immigration from nearby villages during the years 1950 to 1970. Today Sand Point serves as the center of the commercial fishing industry for the subregion (ibid.).

B. King Cove

King Cove was founded when Pacific American Fisheries built a salmon cannery there in 1911 (Nebesky et al. 1983). The presence of the cannery attracted a number of northern European fishermen, who took Aleut wives and remained as permanent residents. Aleut families from Belkofski, Sanak Island, Thin Point, Morzhovi, Ikatan, and False Pass were drawn into the community as the men began fishing and the women became cannery workers (Langdon 1982).

The fish processing industry has operated continously in King Cove since it was first opened in 1911. Over the years, it has expanded to include the processing of king crab, salmon roe, and Tanner crab. This has been undertaken in order to meet the needs of the local fishermen and to respond to wider market conditions. Growth of King Cove continues through natural increase and immigration (ibid.).

C. False Pass

Both Unimak, which is the location of False Pass, and Sanak Islands reportedly had numerous Aleut settlements during aboriginal and

Russian contact periods. The inhabitants were referred to as _quagagin_ (or the "easterners") by their other Aleut relatives further down the Aleutian chain (ibid.). The first non-Aleut to explore Unimak was Stepan Glotov, who explored the area in 1759. By 1762, the inhabitants of the island had been exposed to the the intensity of Russian pursuit of sea otters. The violence associated with this activity eventually led the residents of Unimak and Sanak to join with other Aleuts and to defend themselves from the intruders.

By the early 1800's, as regular Russian supplies and contact diminished, the Russians remaining in the Aleutians had adopted an Aleut lifestyle. Russian colonial expansion proceeded to move eastward to the Alaska mainland, to Kodiak, and finally to Southeast Alaska (ibid.). Russian control reemerged when a monopoly charter was granted in the early 1800's. Under the charter, company system freedom for the Aleuts gradually disappeared. Their life changed somewhat in 1825 with the arrival of Father Veniaminov, the first resident Russian Orthodox priest (ibid.). Significant changes he introduced included the establishment of hospitals and schools. Population shifts that had been occuring among the residents of the Aleutians continued, with those living on Unimak Island gradually centering their activities at Morzhovoi, located on the tip of the Alaska Peninsula across from False Pass.

Though the initial transfer of political power from Russia to the United States had little direct effect on Unimak Island, an American salt cod industry had begun to develop in the eastern Aleutian area by 1867. Salmon processing became a factor in the False Pass area when Pacific American Fisheries opened a cannery at Ikatan in 1916. Fish traps were used to catch Bristol Bay-bound salmon, which were then processed in canneries located both at False Pass and on Sanak Island. It was during these years that the residents of Sanak Islands began commerical fishing, while the villagers from Morzhovoi worked in the cannery itself (ibid.). During the mid twentieth century, as relocation continued, False Pass attracted fewer inmigrants than did Sand Point and King Cove. It did gain a number of Scandinavian residents, who originally come to fish or work in the cannery (ibid.).

D. Nelson Lagoon

Nelson Lagoon is a small Aleut community and is the only village of the subregion located on the northern shore of the peninsula. The village site is on a sand spit that separates the lagoon from the Bering Sea. Originally, Nelson Lagoon was used as a fish camp for Aleuts living in the Port Moller area. It appears that in times past Port Moller supported a substantial population; a large archeological site covering several acres has been investigated by

Japanese archeologists since the early 1960's (ibid.). Though evidence is not definitive, three local groups may have coexisted in the area, one at Bear River, one at Port Moller, and one at Herendeen Bay, during the latter part of the nineteenth century. It is possible that the population of Nelson Lagoon may be descended from the original Aleut inhabitants of the general area. European influence was added when Scandinavian men married local Aleut women.

A salmon saltry was built at Nelson Lagoon in 1916 but did not survive. Betweeen 1915 and 1918 a salmon cannery operated at a site on Egg island, near the present site of the village. It also did not continue operation (ibid.). Due to the efforts of Charles Franz, a number of residents from a village located at Herendeen Bay joined with several households already living in the Nelson Lagoon area to form the present community. The Nelson family, which included a widowed mother and 13 children, provided a substantial population base for the new community, and in 1958 a school was established. During the last 8-to-10 years, the community has seen an increase in the number of housing units built. Village services and facilities have been expanded with state and federal aid (ibid.).

E. Cold Bay

Although in aboriginal times the location of Cold Bay may have been an important land bridge instrumental in the migrations of Asiastic peoples to North America, the present community has relatively recent origins (Nebesky et al. 1983). When the Japanese occupied the outer Aleutian islands of Attu and Kiska, the United States established a series of military bases along the Aleutian chain. A large air base, Fort Randall, was built on the shore of Cold Bay in 1942. Thousands of troops were stationed at the base during World War II. Except for a small maintenance staff, the base was abandoned immediately after the war (ibid.). Over the years, the airstrip, which is the third longest in Alaska, has been transferred from the U.S. Air Force to Reeve Aleutian Airways, to the Federal Aviation Administration, and finally to the State of Alaska Department of Transportation and Public Facilities. Utilization of the airport facilities increased with American participation in the southeast Asian war. The end of that war and the development of commerical aircraft capable of making nonstop flights to the Orient has diminished the use of the Cold Bay flight facilities (ibid.).

In 1960, the Izembek NWR was created in an area north of the community. The headquarters for the 415,300 acre refuge are located in Cold Bay. The Izembek State Game Refuge, which encompasses Izembek Lagoon, was establishd in 1972. The ADF&G established a fish hatchery on Russell Creek in 1980 (ibid.).

III. POPULATION

Table 36 presents data on population change in the five extant communities for the 1960 to 1980 time period. Table 37 presents population data from United States census documents for 1880 to 1980; communities that are no longer inhabited are included in this table.

As is shown in table 36, the communities of Sand Point and King Cove exhibit the greatest rate of population growth. As stated earlier, this growth is due both to immigration and natural increase. Sand Point has the best-developed private business sector in the subregion and is expected to continue growing in its role as the area service center (Langdon 1982). The city of King Cove (1981) has presented two scenarios for that community's potential population growth. One suggests a gradual increase if community characteristics remain relatively unchanged. The second indicates greater population increase if additional fish processing sites near the community become available.

Table 36. Recent Population Trends, Lower Alaska Peninsula Subregion

Community	1960	1970	1980	Avg. Ann. Growth Rate 1960-1980	Avg. Ann. Growth Rate 1970-1980
Sand Point	254	360	625	4.6	5.7
King Cove	290	283	460	2.3	5.0
Cold Bay	86	256	228	5.0	-1.2
False Pass	41	62	70	2.7	1.2
Nelson Lagoon	--	43	59	--	3.2
Subregional total	671	1,004	1,442	3.9	3.7

Source: U.S. Bureau of Census 1960, 1970, 1980

The size of Cold Bay's population reflects its importance as a transportation corridor for the Aleutians. The decline in aviation-related personnel that has occurred has been compensated for somewhat with increases in the USFWS and ADF&G staff (Nebesky et al. 1983). Nelson Lagoon and False Pass appear to be relatively stable demographically. This trend will probably continue as long as the local commercial fishery remains stable (Langdon 1982).

Table 37. Census Population of Lower Alaska Peninsula Subregion, 1880-1980

Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980
Belkofski	268							119	57		
(Balkofski Village)		185	147		129	123	140				
Cold Bay										256	228
False Pass								42	41	62	70
Herendeen Bay					51		13				
King Cove								162	290	283	460
(King Cove Village)							135				
Nelson Lagoon										43	59
Morzhovoi Village		68			60	22	17				
Nikolaivsky	43										
Ozernoi		45									
Pavalof Harbor					62	52	61	68	53	39	
Panloff Harbor					62						
Popof Island		132									
Port Moller							45				
(Mashikn)	40										
Protassof	100										
Sand Point			16		60	69	99	107	254	360	625
Simonof Island							13				
Thin Point		231									
Unga					313	150	152	107	43		
(Ounga)	185										
Unga Island (other)							79				
Unga Town		159	175	108							
											1,442

Source: ADL 1981, Rollins 1978.

Four communities of the subregion, Nelson Lagoon, False Pass, King Cove, and Sand Point, share a number of unifying elements. Aleut, Scandinavian, and Russian ancestry characterize the backgrounds of most of the residents of these communities. Kinship networks, commercial fishing interests, ancestral ties to the land, and an association with Russian Orthodoxy contribute to the shared cultural identity. English is the common language, but Aleut is understood and used by older residents. Cold Bay does not share these common elements. Rather, the majority of the community is transient, is not involved with commercial fishing, and does not possess kinship ties with other communities in the subregion. As table 38 shows, only 4.4% of the residents of Cold Bay are Alaskan Native, compared to at least 59% for the other communities of the subregion.

Table 38. Changes in Ethnicity from 1970 to 1980, Lower Alaska Peninsula Subregion

Community	Percent Native-1970	Percent Native-1980
Sand Point	72.2	59.4
King Cove	89.0	80.0
Cold Bay	10.2	4.4
False Pass	93.5	85.7
Nelson Lagoon	90.7	93.2

Source: U.S. Bureau of Census 1970, 1980.

Kinship plays an important role in the social and economic relationships among all the communities except Cold Bay. Most people consider themselves to be of Aleut origin (Langdon 1982), and kinship affiliation is an important factor in organizing the group composition in a number of activities. The crews on the commercial fishing vessels of the residents of the lower Alaska Peninsula are often composed of nuclear or extended family members. Brothers fish with one another, fathers fish with sons, and, beyond this first level, cousins fish with cousins, and so forth (ibid.). Mutual aid is offered along the same kinship networks, such as when sisters babysit for brothers who are out fishing. The composition of these groups is similar to that of groups engaged in subsistence activities.

A second mechanism of organizing work groups is along generational lines. This type of grouping is particularly exhibited in hunting parties formed among similarly aged men (Reed 1981, Langdon 1982).

IV. TRANSPORTATION AND ACCESS

All the communities of the lower peninsula are accessible only by air and by sea. Reeve Aleutian Airways serves Cold Bay, the community with the most sophisticated flight facilities. A runway of approximately 10,400 ft, a crosswind runway of approximately 5,200 ft, and navigational flightaid equipment assure that the Cold Bay airport is operational on most days, at least for larger aircraft. Air charter services must contend with fog and wind conditions that limit smaller, lighter aircraft. Reeve has scheduled service into Cold Bay six days a week, usually with two or three flights a day. Extensive use is also made of small single and twin engine aircraft operated by local charter air carriers.

Cold Bay is serviced by several waterborne carriers. Shipping is possible year-round; however, weather conditions during winter are hazardous. In addition to the barge lines that regularly call at Cold Bay, the Alaska Marine Highway System ferry M/V Tustumena and the Chevron bulk fuel carrier arrive on a regular basis.

There are several miles of gravel roads around the community left from the military presence at Cold Bay during World War II, but the USFWS is blocking off a number of roads within the Izembek NWR in an attempt to reestablish vegetation. False Pass has an old 4,300 ft runway that has been split in two by a stream, and only small aircraft can be accommodated. The community is served on a regular weekly basis with amphibious aircraft stationed in Cold Bay. These flights carry passengers, mail, and light cargo. Cargo barges serve the community on an irregular basis. Occasionally, freight is dropped off at King Cove and ferried to False Pass in fish boats.

There are no roads or motorized vehicles other than three-wheelers and all-terrain vehicles in the village. Three rough grassy air strips accommodate small aircraft, which are the most common form of transportation in and out of Nelson Lagoon. Occasionally, floatplanes land on the lagoon. Transportation services are provided by air charter from one of the nearby communities. There is limited barge service to the community, which brings fuel and cargo from Seattle. There are no maintained roads in or around Nelson Lagoon, though a number of motorized vehicles are owned by local residents.

Sand Point has a 3,800 ft gravel runway, which is used by Reeve Aleutian Airways to provide scheduled air service. There are two nonscheduled air charter operators based in Sand Point. Sea access is used extensively by the commmunity. Vessels from four companies visit Sand Point every two weeks. In addition, the state ferry system provides transportation to Kodiak twice a year.

In spite of having a 4,300 ft runway approximately 5 mi from town, most of the air traffic into King Cove is via a thrice-weekly amphibious aircraft from Cold Bay that lands in the cove, daylight and weather conditions permitting (Nebesky et al. 1983). All flights are VFR and in daylight. Various companies service King Cove with waterborne carriers throughout the year. Weather conditions can make winter travel hazardous for ships and boats. Occasionally, the harbor freezes up but not the cove itself. The cove is protected from major seas and swells by Deer Island, located approximately 4.5 mi to the south.

V. LAND STATUS

Land status in each of the five communities is tenuous, as much of it has yet to be conveyed. In Sand Point, Aleutian Cold Storage Company owns a major portion of townsite property (ibid.). Of the remaining acreage within the corporate limits of the city, a small percentage is either privately or state owned, while the larger portion is federal land, with a portion settled by the Shumagin Corporation under provisions of the Alaska Native Claims Settlement Act. Much of the land surrounding the city is part of the Alaska Peninsula Wildlife Refuge.

King Cove, too, is surrounded by the Alaska Peninsula Wildlife Refuge. The townsite consists of 42.5 acres patented to the BLM Federal Townsite Trustee in 1962. Individual land parcels have been deeded to occupants. All unpatented land in the township has been selected by the King Cove Village Corporation (ibid.). The BLM has not conveyed this land as yet.

The unpatented land selected by the village corporation of False Pass has also yet to be conveyed to the corporation. The corporation has also selected two townships from adjacent lands in the Aleutian NWR. All but a small portion of Unimak Island is part of the Aleutain NWR, a great portion of which is classified as wilderness. The Nelson Lagoon Corporation has selected all unpatented land in the township in which the village is located. It also selected approximately two additional townships from adjacent land; however, the BLM has not yet conveyed title to the village corporation (ibid.).

There is very little private land in Cold Bay. The majority of the land is under federal ownership, tied up in convenyances to Native corporations, or unvailable for lease or disposal by the state (ibid.). There is also land under state ownership managed by the Division of Aviation, DOT/PF. With the exception of two privately owned homesteads, all other land in the vicinity of the community lies within the Izembek NWR. The state has jurisdiction over 95,300 acres of tidal lands below the mean high tide within the refuge, which has been legislatively designated Izembek State Game Refuge.

VI. MONETARY ECONOMY

Commercial fishing and seafood processing are the economic bases of the subregion. Salmon, crab, and shrimp are currently harvested commercially. Bottomfish, particularly cod, were formerly an important commercial product, and there are indications that they could become so again (Langdon 1982).

With reference to commercial salmon fishing, the five communities lie within the Alaska Peninsula Management Area. The management area is divided into six districts, all of which are fished by local residents.

All five species of the Pacific salmon are harvested. Pink and sockeye salmon are the most significant in terms of tonnage and total value to the local residents. Under the limited entry regulations, fishermen licensed to harvest salmon in the Alaska Peninsula Management Area may use one or more of three gear types: purse seine, drift gill net, or set gill net. The distribution of the permits by community in table 39 illustrates the tendency for King Cove and Sand Point fishermen to own the majority of the purse seine permits. Among income categories of the Alaska Peninsula fishermen, multivessel, multipermit seine fishermen tend to be the most affluent (table 40).

The various types of permits will be fished with a number of different strategies in mind. The particular strategy of a fisherman will depend on the type or types of permits held, specific fishing locations preferred, plus the gear and vessel that is available. Fishermen from the various communities tend to use similar fishing strategies (Langdon 1982, Reed 1981).

After salmon, crab is the most important species commercially fished by residents of the lower Alaska Peninsula. Red king, blue king, and both C. opilio and C. bairdi of Tanner crab are taken by fishermen from King Cove and Sand Point who participate in the fall and winter commercial crab season (Langdon 1982). Virtually all crab is taken from the southside of the peninsula. False Pass and Nelson Lagoon fishermen have not participated in the crab fishery on a regular basis. Several False Pass men have gone as crew members on crabbers in years when the salmon season was poor (ibid.).

While Nelson Lagoon residents have a significant population of king crab located nearby in Port Moller, which they use for subsistence purposes, the species is not fished commercially. Factors contributing to the nonparticipation include the following: no local processing is available; the stock in Port Moller protected from the Bering Sea is not large; and local boats are not equipped for crab fishing in the Bering Sea (ibid.).

All communities except Nelson Lagoon and Cold Bay have seafood processing facilities, which depend greatly on transient crews brought to the local canneries from the lower 48 and other parts of Alaska. There are few local residents employed at the canneries. False Pass and Nelson Lagoon have virtually no commercial economic activity other than that associated with commercial fishing and seafood processing (ibid.).

In addition to employment associated with seafood processing, each community has a limited number of jobs in the public sector. These are usually associated with the postal service, school, and city or village councils. In terms of commercial enterprises, Sand Point offers the widest ranges of services and, consequently, the greatest opportunity for employment.

Table 39. Approximate Number of Limited Entry Permits Held by Residents, Lower Alaska Peninsula Subregion, 1980

	Drift Net Permits	Set Net Permits	Purse Seine Permits	Total Permits
Sand Point	29	39	50	118
King Cove	39	12	37	88
Cold Bay	--	--	--	--
False Pass	10	7	8	25
Nelson Lagoon	15	18	2	
Total	93	76	97	266

Source: Nebesky et al. 1983: 12 from ADF&G.

Table 40. Average Household (Hsld.) Income, Lower Alaska Peninsula Subregion, 1980

	Personal Income ($ x 1,000)	No. Hslds.	Avg. Hsld. Income
Sand Point	$8,918.8	186	$47,951
King Cove	4,278.8	114	37,533
Cold Bay	1,678.1	49	34,247
False Pass	638.3	21	30,396
Nelson Lagoon	--	18	--
	15,514.0	370[a]	41,930

Source: Nebesky et al. 1983.

a Excludes Nelson Lagoon.

King Cove, the next largest community, is underdeveloped in the private sector, and employment opportunities are extremely limited (ibid.). Cold Bay, because of its noninvolvement with commercial fishing and processing, has a very different economic structure from the other communities of the subregion. In a recent study of Cold Bay employment patterns, more than 90% of the jobs were classed as basic or primary employment, as opposed to secondary employment. This compares with a national average of approximately 40% primary employment (ADCRA n.d.). Most Cold Bay residents have year-round, stable salaried jobs and steady incomes. This contrasts with the the seasonal work and variable incomes from fishing industry work that is characteristic for residents of other communities in the subregion.

VII. USES OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Used

Because of the aquatic environment of the subregion, residents have access to a wide variety of marine resources. Of these, salmon is the resource most fequently harvested. Other marine resources utilized include crabs, halibut, shrimp, seals, sea lions, clams, octopus, cod, sea urchins, and mussels.

Among the land mammals, caribou is an important food source for local residents. Waterfowl are harvested during the fall. Dolly Varden are taken and seagull eggs gathered in the spring. A variety of food plants and berries are also used throughout the subregion.

B. Seasonal Round of Harvest and Use

Activities undertaken in harvesting and preserving local resources follow similar patterns from year to year based principally on the cyclic nature of the resources themselves. The use patterns are also affected by the availability and cost of equipment needed to harvest and use fish and game resources, the time demands of income-producing work, the weather, cash income, and work that produces wild food, the personal health of the individual harvester, and other factors. Figure 7 depicts a generalized seasonal round for the subregion. Early summer marks the beginning of the salmon season, for both commercial and subsistence fishing. Salmon are often kept from an individual household's commercial catch. If not procurred in this manner, subsistence salmon are harvested with either set gill nets or beach seines. Chinook, sockeye, and coho are the three species most frequently harvested (table 41). In Sand Point, set gill nets are located near the village. King Cove residents use beach seines in southside streams. Residents from False Pass generally take their subsistence salmon from Urilia Bay or Thin Point. Several Cold Bay residents reported taking their subsistence fish from Mortensen's Lagoon.

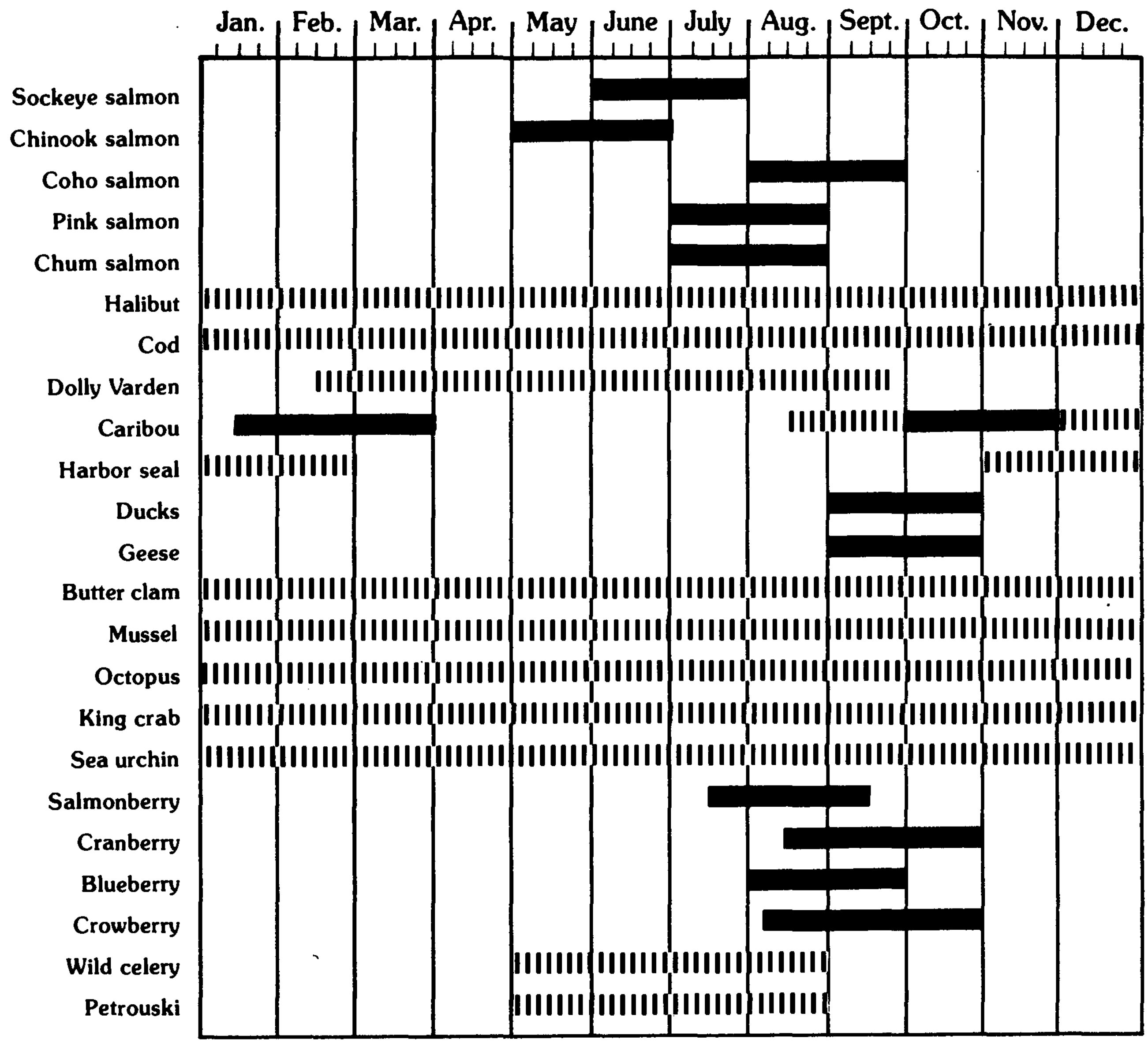


Figure 7. Seasonal round of resource harvests, lower Alaska Peninsula subregion. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (1982-1983 field interviews, ADF&G, Div. Subsistence).

Table 41. Subsistence Harvest of Salmon in the South Peninsula District as Reported on Subsistence Permits Returned[a]

	No. Permits	Chinook	Sockeye	Pink	Coho	Chum	Total
1975	61	4	1,367	1,662	676	818	4,527
1976	--	0	409	350	338	208	1,305
1979	55	50	1,550	500	1,150	350	3,600
1980	85	100	2,440	900	1,800	500	5,700
1982	85	20	1,600	1,700	3,550	300	7,170

Source: Langdon 1982 for 1975, 1979, 1980, 1982 data; ADF&G 1980 for 1976 data.

a Figures are extrapolated from permit returns.

Salmon, particularly chinook and sockeye, are eaten fresh during the early part of the run. For later use, salmon is frozen, smoked, dried, canned, and salted. Some families continue to process the backs and heads of chum and pink salmon for traditional uses, such as in <u>choomlaw</u>, an Aleut dish.

Early fall is the time when subsistence activities are most intensive. As the commercial salmon season slows down, people take the opportunity to harvest resources for their own use. Berries become available towards the latter part of summer, and groups of women, children, or entire families gather large quantities of the valued food source. The favored berries of the subreigon include blueberries, salmonberries, mossberries, strawberries, and cranberries. They will be used fresh or preserved by freezing or jarring for use later in the year.

August and September are the time when many people process cohos, a preferred salmon species in the area. August also marks the opening of the regulatory year's caribou season, and many households begin hunting for fresh meat. Various forms of transportation are used in harvesting efforts: skiffs, fish boats, off-road vehicles, highway vehicles, and airplanes. Sand Point men often make use of commercial fish boats to scout the bays.

Hunting activity is concentrated on the waterways; apparently, little time is spent inland (Langdon 1982). King Cove hunters often hunt in the valleys north of the community on the east side of Cold Bay, which is a favored grazing ground for the southern Alaska Peninsula caribou herd during the fall and winter. The flat lands at the head of Pavalof Bay are also hunted extensively. Additionally, caribou are occasionally hunted from skiffs as the animals come for salt at the water's edge. Animals from the Unimak herd are harvested by False Pass residents. Occasionally, caribou may be taken in the vicinity of the village, but more frequently hunters travel to the north shore of the island and hunt between Swanson's Lagoon and Urilia Bay (ibid.). Residents of Nelson Lagoon do not have close access to caribou and must travel to the Hoodoo River area or over to Port Moller. Those living in Cold Bay have access to caribou hunting along the road system surrounding the community. Caribou hunting continues throughout the winter. The legal season for caribou ends the last part of March. The majority of residents reported on their harvest tickets in 1983 that they used either a highway vehicle or an off-road vehicle in their hunting effort (ADF&G 1982). The only community mentioning regular use of moose is Nelson Lagoon. According to Langdon (1982), hunters from several households obtain moose by travelling to the east side of the mountains at the head of Herendeen Bay.

Fall waterfowl are a highly prized food resource in all the communities of the lower Alaska Peninsula. Hunting begins in September when the season opens and continues throughout the fall. October is a time of concentrated waterfowl hunting effort (Langdon 1982). Sand Point residents hunt both at Unga Island and on the mainland, particularly at Left Hand Bay. Some residents also fly out to Izembek Lagoon or Nelson Lagoon for waterfowl hunting. King Cove men use Morzhovoi as a preferred area for local hunting, but Kinzaroff Lagoon, located at the head of Cold Bay, is also used (ibid.). False Pass residents also indicated that Morhoivoi is frequently used by members of that community also. Nelson Lagoon residents travel to the Hoodoo River for their fall waterfowl hunting. Izembek Lagoon affords residents quick access to productive waterfowl hunting.

Seal hunting, while feasible throughout the year, most frequently occurs during the winter months. The communities of Sand Point, King Cove, and False Pass indicated that seal products are used by local residents (ibid.). Seal oil is often used as a condiment with dried fish, and seal meat may be boiled or roasted (Reed 1981). Both seal meat and seal oil are widely distributed among commmunity members. Sea lions are taken occasionally, and sea lion flippers are considered a delicacy (ibid.). If a whale washes up on the beach, the meat and blubber may be used.

Commercial crab fishing takes place in the fall and winter months, and a vessel coming home will often have catch to share with family and friends. Because of the ice-free ocean conditions, crab is available for harvest during winter, and there are a number of other marine resources that can be utilized in that season as well. Pots for shellfish are put out on a year-round basis. In addition, octopus, bidarkis, sea urchins, shrimp, and clams are harvested on a regular basis. Halibut and cod are frequently taken when out with commerical fishing boats. Other times, a special trip may be made by local residents for the express purpose of fishing for these species.

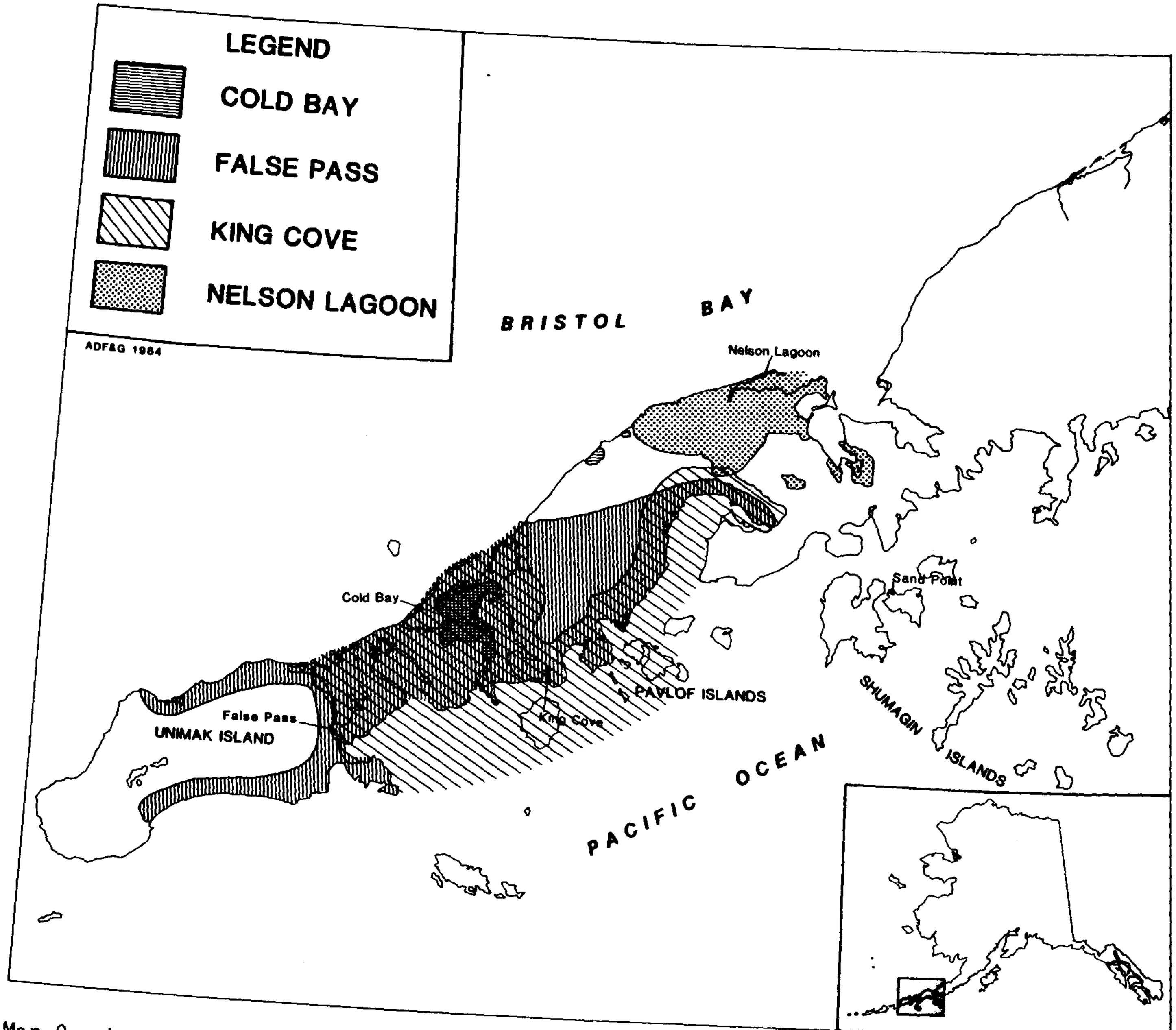
Spring months are a time for limited resource harvest. Some commerical fishermen may go out for herring; others may begin getting their gear and boats readied for the upcoming commercial salmon seaon. As birds begin nesting, a few eggs are gathered on nearby islands. When edible greens become available they too are gathered. Today these plants are mainly used fresh in a variety of soups and chowders, although in the past they were often dried for use during the winter months. Occasionally, this is done by older residents today. Beach celery, commonly call pushky, is a commonly used green, as is wild parsley, petrouski. Petrouski is a favored condiment used with salmon.

C. Intercommunity Differences in Resource Use

The major differences in harvest and use patterns among the residents of the lower Alaska Peninsula surbregion are due to resource availability (map 9). Cold Bay is situated near good caribou and waterfowl areas. Nelson Lagoon, however, is located on a sandy spit, and community residents must travel a considerable distance for many of the subsistence activites, such as caribou hunting. Residents of all the communities depend on locally obtained resources. According to Langdon (1982), False Pass and King Cove exhibited the greatest dependency. An estimated 60% of the protein used by residents of these communities comes from local resources. The amount of protein contributed through subsistence efforts in Nelson Lagoon was given as 50% and 40% in Sand Point (Langdon 1982). No comparable information was available for the residents of Cold Bay.

D. Harvest Levels

The residents of all the communities of the lower Alaska Peninsula place priority on harvesting resources for domestic use. In terms of poundage, caribou and salmon are the important resources (ibid.). Information in table 42 shows that an average of between two and four caribou are used by most households. False Pass residents indicated a higher level of consumption. Salmon levels vary, but between 50 and 200 fish are harvested by the majority of households. Some households in False Pass reported using as many as 500 fish (ibid.).



Map 9. Lower Alaska Peninsula subregion: areas used by residents of Cold Bay, False Pass, King Cove, and Nelson Lagoon for subsistence use of fish and game, 1982. No data are presented for Sand Point (ADF&G, Div. Habitat).

Table 42. Subsistence Use of Local Resources by Lower Alaska Peninsula Residents

Community	Salmon	Other Seafood	Caribou	Waterfowl	Wild Vegetables	Other
Nelson Lagoon	75-130	Halibut, shellfish	2-4	Ducks and geese	Berries	Moose
False Pass	150-200	Halibut, cod, shellfish	6-10	Ducks and geese	Berries	Seal oil
King Cove	50-150	Shellfish, cod, halibut, trout	4	Ducks and geese	Berries	Seal oil
Sand Point	50-200	Shellfish	yes	Ducks and geese	Berries, greens	Seagull eggs
Cold Bay	30	---	yes	yes	yes	

Sources: Langdon 1982, ADF&G 1982[b].

a Numbers are estimates for single households per year.

Kodiak Island Subregional Assessment

I. LOCATION AND ENVIRONMENT

The Kodiak Island subregion includes the city of Kodiak, the settlements connected by road to the city, and the six remote communities with permanent year-round populations located at Akhiok, Karluk, Larsen Bay, Old Harbor, Ouzinkie, and Port Lions. During commercial fishing seasons the island population increases dramatically with the influx of nonresident fishermen, fish processing workers, and service industry employees.

The subregion includes the islands and waterways of the Kodiak Island archipelago. The Kodiak Mountains, a continuation of the Kenai range, reach heights of over 4,000 ft on the main island. Land surface is characteristically steep and rugged and shows the effect of major glaciation. Kodiak Island itself is about 100 mi long with a widest point of about 60 mi and has an area of about 3,500 sq mi. Including Afognak, Sitkalidak, the Trinity Islands, and smaller islands, the total area for the group is approximately 5,000 sq mi. The numerous bays and long fjords create approximately 900 mi of coast in the island group. Most of this coastline consists of exposed high-energy coasts. Afognak Island and the northern portion of Kodiak Island are forested at low elevations in Sitka spruce. Most of the southern half of Kodiak Island is covered with grasses, with areas of high brush at low elevations. Throughout the island group, high elevations are snow-covered through all or most of the year and, because of this, are areas of low biotic productivity.

The bays and fjords of the island group and the surrounding shelf areas comprise some of the world's most productive fishing grounds, with crab, salmon, herring, shrimp, and bottomfish being the fisheries of greatest commercial importance. A very large number of marine fish, marine mammals, shellfish, and anadromous and freshwater fish are available for noncommercial harvest, and major use of these resources is made by island residents.

The maritime climate, land topography, and vegetative patterns of the Kodiak Island group create ecological conditions that have encouraged the rapid expansion of ungulate populations introduced into the area. In particular, deer has become an important resource throughout the island group. Elk has become an important species for hunters on Afognak and Raspberry islands, and goat and feral reindeer are significant species for hunters in limited areas. The Kodiak brown bear has become a prized species for trophy hunters from all over the world; limited hunting for bears for food by Koniag Natives and other Kodiak residents continues to take place.

All of the named communities and most of the subregional population are located on Kodiak Island and nearby Spruce Island, and most of the noncommercial use of fish and game resources takes place there as well. Settlements are coastal, and their location is related to the harvest of fish and game. The sites for the remote communities are in locations where small boat mooring or beaching is possible and where there is good access to anadromous salmon streams, clam beds, and marine fish and mammal populations.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITY

Archeological evidence indicates that the Kodiak Island group has probably been continuously inhabitated since at least 6500 B.C. Ocean Bay I Phase, the oldest cultural tradition with archeological documentation, is represented by sites on Sitkalidak Island, near the mouth of the Afognak River, and elsewhere. The cultural traditions listed in table 43 are delineated by tool assemblages in the archeological record. The differences in these assemblages between Ocean Bay and Kachemak and between Kachemak and Koniag are significant and are interpreted to mean that strong interregional influence or movement of population probably took place during transition periods. The archeological record shows continuity of settlement and of culture during the Koniag phase. This means that the cultural ancestors of modern Kodiak Natives were living in the island group from at least 800-1300 A.D.

Table 43. Prehistoric Cultural Sequence for Kodiak Island Group

Cultural Assemblage	Dates
Koniag phase	800-1300 AD.D. to time of contact
Kachemak tradition Three Saints Bay phase Old Kiavak phase	1500 B.C. to 1000 A.D.
Ocean Bay II phase	4600 B.C.
Ocean Bay I phase	6500 B.C. to 6000 B.C.

Source: BLM n.d.

Kodiak area Natives refer to themselves as "Aleuts"; ethnographically they are refered to as "Koniag Eskimos." The Sugpiaq Eskimo language was spoken throughout the island group at the time of contact; older Koniag continue to speak this language at the present time. Both culturally and lingustically the Koniag have more affinity with Pacific Eskimos of Prince William Sound and with Yupik Eskimos of Bristol Bay than with the peoples of the Aleutian Islands. Kodiak Island Native residents will be referred to as "Koniag" in this report.

Koniag culture has been strongly focused on the sea, and major subsistence use has been made of marine fish, mammals, and invertebrates and freshwater fish. Salmon species, caught both in salt and fresh water, have been key resources. In addition to the species presently used, which are discussed below, Koniag traditionally hunted whales, possibly using aconite poison on spear points. Brown bears were the main land mammal utilized in the precontact period and were probably important sources of fresh meat during part of the year.

All modern and postcontact settlements are located on the coast or coastal lagoons. Almost all archeological sites are also located along the coast, with the few exceptions being inland sites located in southwest Kodiak Island near lakes and waterways where there continue to be strong salmon and steelhead runs, good populations of freshwater fish, and concentrations of brown bear. Early historic and prehistoric data suggest that the Koniag probably followed a seminomadic existence in the precontact period, with seasonal movement from camp to camp determined by the availability of particular fish and game resources.

Kodiak Koniag traded with Koniag living across Shelikof Strait on the Alaska Peninsula, particularly with communities from Kamishak Bay in the north to Chignik in the south. Contact may have been maintained with Yupik-speaking Eskimo people living in the Iliamna Lake area through coastal communities located on Kamishak Bay. Walrus ivory for implements was traded to Kodiak communities (Jordan, pers. comm.), and it is possible that Koniag brought caribou meat from the Alaska Peninsula to Kodiak Island.

The Koniag had a highly developed hunting and fishing technology and lived in an area rich in fish and marine mammal resources. This resource abundance and the skillful harvesting and preserving done by the Koniag supported a relatively high population level and density for a hunting and gathering people. At the time of contact with Russian fur traders in the 1700's Kodiak's population was estimated to be about 6,500 (table 44). Other estimates, including those of anthropologists estimating the carrying capacity of the island group, sugggest that up to 10,000 Koniag may have been living in the archipelago (Jordan, pers. comm.). This population concentration and the abundant and relatively stable resource base permitted development of some cultural institutions more akin to those of northwest coast Indians than to those of more dispersed hunting and gathering bands. In particular, precontact Koniag appear to have had institutionalized chiefs, limited social stratification, and slavery. Additionally, they may have had specialized religious and curing experts, defined territories for fish and game harvest, and structured harvesting groups for whale and other sea mammal hunting.

Table 44. Early Estimates for Koniag Native Population in Kodiak Island Group

Year	Population	Source
1790	5,000	Register of the Shelekof Corporation
1792	6,510	Delarof, includes Koniag living near Katmai
1796	6,206	Baranof, includes same two areas
1803	7,000	Davydof
1805	4,000	Lisiansky. He estimates 10,000 or more in pre-Russian days.
1825	2,819	Wrangell
1851	1,500	Holmberg
1880	1,943	Petroff
1890	1,154	Porter, includes about 200 Koniag at Port Graham and Seldovia

Source: Federal Field Committee for Development Planning in Alaska 1968.

As indicated in table 44, the Koniag population declined dramatically in the years following colonization by Russian fur traders and may have continued to decline during the first part of American administration. Considerable physical force was used by the fur traders to convince Koniag to intensively pursue sea otters, which were the primary basis for Russian interest in the area. Since Russians had access to firearms and steel weapons, many Koniag lost their lives in the early period of conflict or after conscription into fur hunting. In addition, the Koniag population was particularly vulnerable to Eurasian diseases that had not occurred in the area in the precontact period (Wolfe 1982). After the initial conquest, many Koniag died in Russian-American company military adventures and explorations. The Koniag population is estimated to have decreased 25% in the first 8 years of contact and another 25% in the succeeding 12 years. By 1838, the population had dropped to about 2,000 (Oswalt 1967, AEIDC 1975). The population appears to have continued to decline, although at a slower rate, during the latter half of the nineteenth century (see table 44). More humane treatment by governement, provision of health care, and broadened economic opportunities aleviated some of the stress put on the Koniag population. In the last 50 years, the Koniag population has grown, but it is still only a fraction of the precontact population. In 1971, 3,267 individuals qualified under the Alaska Native Claims Settlement Act (ANCSA) and were enrolled in Koniag, Inc. (Davis 1979); about one-third of these persons were living away from Kodiak Island at that time. Based on a 1977 enumeration, the Kodiak Area Native Association estimated the Native population on the island to be about 3,100 in 1983 (ibid.).

Although overhunting for commercial sale early in the Russian period depleted sea otter populations and limited the harvest in later years, sea otter hunting continued to be an active economic pursuit for the Koniag well after purchase of Alaska by the United States in 1867. Intensive hunting with firearms in the American period led to the almost total extinction of sea otters before hunting of these animals was prohibited in 1911.

Many Koniag converted to the Russian Orthodox religion during or after the Russian period, and many families bear Russian surnames. Well into the American period, Russian continued to be the most common second language spoken by the Koniag. This cultural legacy of the Russian period continues to the present time. As an important example, the celebration of Russian Orthodox holidays and religious festivals are major events throughout communities on the island.

The Russians introduced semicommercial harvesting of salmon and other food species. Commercial canneries were opened much later in the 1800's, beginning a pattern of commercial harvesting of resources for export that has been the dominant characteristic of Kodiak economy ever since. For a time, canneries at the mouth of the Karluk River were the largest fish processors in North America. Early commercial fishing was done mainly by non-Native fishermen; Chinese laborers were brought in to do fish processing. Filipino laborers replaced the Chinese work force in the 1930's. Filipino-Americans and citizens of the Philipines continue to be a major component of the cannery work force. Native participation in the commercial fishing industry either as fishermen or as cannery workers was limited until after WW I but has become of major economic importance in the last 35 years.

Throughout the times of drastic change in Koniag society, harvesting of fish and game for subsistence provided most of the food consumed in island communities. Although little is known of precontact Koniag hunting and fishing, active, often forced, participation in sea otter hunting and Russian military expeditions removed many men from Koniag settlements and may have changed patterns of resource harvesting in the years following Russian conquest. Methods and means of harvest changed in the early contact period with the introduction of metal for fish hooks and projectile points and fiber for netting. In subsequent years, wood boats replaced the traditional skin bidarkas, and firearms and steel traps permitted different hunting and trapping strategies.

Until very recently, marine resources have been the most important subsistence fish and game resources available to Kodiak Island residents. Seal, sea lion, salmon, halibut and other marine fish, clams, sea urchins, and other intertidal resources made up most of the subsistence harvest. Whale meat, fat, and skin were important subsistence dietary items until commercial whaling reduced whale populations to very low levels. Because of the island's ecological isolation, indiginous land mammals were limited to brown bear, red fox, river otter, ermine, and tundra vole. Although Kodiak Island is neither a major nesting area for migratory waterfowl nor an important stopping point on waterfowl flyways, both freshwater and saltwater bird species have had importance in subsistence. Game species successfully introduced in this century have changed hunting patterns and become major sources of meat and fat in subsistence diets. Table 45 indicates the sequence by which some non-indiginous species were introduced to Kodiak Island. Black-tailed deer were introduced to the northern part of the archipelago in 1934 to provide a source of meat for island residents, and they have gradually extended their range southward. Deer have become available in major numbers to the communities of Old Harbor, Akhiok, Karluk, and Larsen Bay only in the last 15 years. Elk were introduced on Afognak Island in 1928 and may be extending their range to include Kodiak Island. Mountain goat, Dall sheep, snowshoe hare, beaver, and red squirrel are other game species that have been introduced. Reindeer and herding techniques were introduced in 1921, and small herds of feral animals remain on the southern part of Kodiak. Attempts to establish a moose population have not been successful.

Table 45. Dates of Introduction of Species to Kodiak Archipelago

Species	Year
Reindeer	1921
Roosevelt ElK	1928
Black-tailed deer	1934
Mountain goat	1952-53
Dall sheep	1965

III. POPULATION

The census conducted by the city and borough of Kodiak in 1982 enumerated 12,714 borough residents (table 46). According to figures supplied by the borough, approximately 85% of this population lives in the city of Kodiak or in the area connected by road to the city. About 10% of the borough population resides in the six smaller communities on the island; an additional 5% reside at cannery sites, camps, and other isolated locations mainly in coastal areas. The Coast Guard base population accounts for almost 16% of the total borough population and consists in large part of single young men (table 46).

Table 46. Population of Kodiak Island Borough, 1982

	Population	% Borough Population
Road-connected area		
Kodiak City	5,873	46.2%
Borough Service District #1	1,853	14.6%
Chiniak	185	1.5%
Women's Bay/Bell Flats	521	4.1%
Coast Guard Base	1,995	15.7%
Monashka Bay (beyond Service District #1)	426	3.4%
Total road-connected area	10,853	85.4%
Other communities	1,264	9.9%
No community	597	4.7%
Total population	12,714	

Source: Fried, pers. comm.

According to the Kodiak Area Native Association (KANA) estimate, Koniag and small numbers of other Alaska Natives make up about 24.4% of the borough population at the present time (Davis 1979). Although precise data are unavailable, the population of communities outside the road-connected area and the isolated population outside settlements is overwhelmingly Native. School teachers and non-Natives who have married Natives are usually the only non-Native residents in the small communities.

Table 47 presents census population data for all Kodiak communities from 1880 to the present. The striking demographic change has been the very rapid growth of Kodiak City and the road-connected area in the last 30 years. In 1930, the city of Kodiak had a population of 442, somewhat

Table 47. Kodiak Area Population, 1880-1982

Community	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1982[b]
Afognak	339	409	307	318	308	298	197	158	190		
Alaktalik					72	30	21				
(Ayaktalik)	101	106									
Akniok	114		--	106	94			72	84	115	103
(Alitak)		420				86	82				
Alaganak[a]		48									
Cape Douglas[a]		85									
Chiniak Village	24										
Eagle Harbor		77									
(Orlova)	147										
Isna[a]		30									
Kagniak[a]	109										
Kaguyak		112			52	52	31		36		
Kanatak		26				82	134				
Kaniknuluk[a]		73									
Karluk	302	1,123	470	549	99	192	189	144	129	98	102
Killuda	36	22									
(Kiliuda)											
Kodiak		495	341	438	374	442	864	1,710	2,628	3,798	5,873
(Saint Paul)	288										
Kodiak Station										3,052	
Lake[a]		136									
Larsen Bay	--	20	--			--	38	53	72	109	180
Lesnova	157										
Lowell[a]		12									
Old Harbor	160	86	--		54	84	109	121	193	290	355
Ouzinkie	45	74	--		96	168	253	177	214	143	233
Raspberry Strait							17				
Port Lions										227	291
Three Saints Bay	7										
Uyak Bay		246					20				
(Ooiak)	76										
Woody Island			229	168	104	116	54	111	--	41	
Yelovoi	78										
Borough Service Area One											1,853
Chiniak											185
Women's Bay/ Bell's Flats											521
Rest of borough											3,018
Total Kodiak Island											12,714

a These place names cannot be positively identified in Orth 1967 but are likely to be located in the Kodiak Island area.

b The 1982 figures are from a certified census conducted by Kodiak City and Borough; other figures are from U.S. census reports compiled in Rollins 1978.

larger than Afognak, which was listed as having 298 residents at that time. This growth of population since 1930 was stimulated by the growth of commercial fisheries in the Kodiak area and, to a lessor extent, by the expansion of Coast Guard facilities. Most of the dramatic increase in Kodiak Island's population has been the result of the migration of non-Natives to the island.

The small communities of the island have not experienced a similar increase in population over this time period. Although there have been important fluctuations, the long-term observation is one of population stability, with gradually increasing population levels in recent years. Five of the six small non-road-connected communities on the island have grown since 1970.

There are fewer communities now than there were in earlier times. This represents a consolidation of the population in places with better schools and community services.

Major migration affecting the population of the island has consisted mainly of immigration of Koniag Natives from the non-road-connected communities to the Kodiak road-connected area, emigration of Koniag from the island to other parts of Alaska and the United States, and immigration of non-Natives to the road-connected area. Although the population of outlying communities has not been declining in the last three census periods, little population growth has occured in these communities. At the present time, about 60% of the Koniag population on the island lives in the road-connected area.

VI. USE OF FISH AND GAME AND OTHER NATURAL RESOURCES

Most of the data presented in this section were collected in 1983 as part of a research project by the Kodiak Area Native Association (KANA) and the Divisions of Subsistence and Habitat, ADF&G. The goal of this research was to provide baseline information on the harvest and use of fish and game by island residents. As part of this research, a survey of Kodiak Island residents' noncommercial use of fish and game was completed, and mapping of areas used for resource harvesting was done (KANA 1983; Schroeder n.d.; see appendix 1 for research methodology). Similar questionnaire forms were used in Kodiak City, the rest of the road-connected area, and in the six non-road-connected communities. Special survey samples were drawn of U.S. Coast Guard personnel, the Filipino community, the urban Native population, and the residents of Chiniak.

The data presented in this section depict noncommercial harvest and use of fish and game for all island residents from May, 1982, through June, 1983. Data include harvest and use activities that take place under both sport and subsistence regulation. They also include domestic use of the commercial salmon catch. Since data are available for only a single 12-month period, caution should be exercised in interpreting quantitative data. Noncommercial harvest and use often vary significantly from year to year. (For more complete analyses of these data see KANA 1983 and Schroeder n.d.)

A. Species Harvested

Table 48 presents a listing of most of the fish, game, intertidal, and plant resources known to be used by Kodiak residents. All five species of salmon are harvested on the island; sockeye, coho, and pink salmon are the more important noncommercial salmon species. Halibut and Dolly Varden are other highly utilized fish species. Crab and intertidal species are utilized by most island residents. Sitka deer is the most commonly harvested land mammal. Seal and sea lion continue to be harvested by Koniag.

B. Mean Household Harvests of Fish and Game Resources

Tables 49 and 50 report the mean household harvests in numbers of selected fish and game resources for each non-road-connected community and for samples from the road-connected area for the 12-month study period. Harvests of salmon and other fish and marine invertebrates for commercial sale are excluded from these totals. On a regionwide scale, the subsistence harvest of salmon is presented in the Salmon Human Use: Subsistence Harvest section of this publication.

These data indicate that Kodiak residents harvest significant quantities of a large number of fish, invertebrate, bird, and land and marine mammal species. Sockeye, coho, and pink salmon, halibut, and Dolly Varden are the most commonly caught fish species in terms of numbers. King crab was the most important crab species caught in the survey year, and deer and small game were hunted by residents of all island communities. Native residents of non-road-connected communities harvested an average of 1.4 harbor seals and .8 sea lion per household (table 50); harvest figures for residents of Akhiok, Karluk, Larsen Bay, and Old Harbor (table 49) showed a particularly high utilization of marine mammals.

The non-road-connected communities show a higher harvest rate per household for most resources. For example, these communities reported a household average harvest of about 170 salmon, 4.3 deer, and 24 ducks per year; the household average for the general road-connected sample was about 30 salmon, 1.3 deer, and 1 duck (table 50). It should be noted, however, that there were households in all communities and samples that reported high harvest rates and

Table 48. Fish, Game, and Plant Resources Known To Be Used in Kodiak Communities[a]

Fish	Game	Intertidal	Plants
Sockeye salmon	Deer	Razor clam	Salmonberry
Chinook salmon	Brown bear	Butter clam	Cranberry
Coho salmon	Reindeer	Cockle	Blueberry
Pink salmon	Elk	Geoduck	Raspberry
Chum salmon	Goat	Horse clam	Currants
Herring	Harbor seal	Mussel	Crowberry
Halibut	Sea lion	Octopus	Watermelon berry
Cod	Hare	Shrimp	Sourberry
Flounder	Ptarmigan	King crab	Blackberry
Bass	Ducks	Tanner crab	Gooseberry
Sole			
	Geese	Dungeness crab	Elder berry
Snapper	Fox	Gumboot	Strawberry
Dolly Varden	Weasel	Scallop	Rosehip
Steelhead/rainbow	(Ermine)	Sea urchin	Fireweed
Pollock	Land otter		Dandelion
Rockfish	Beaver		
Irish lord			Fiddlehead
(bullhead)	Bird eggs		Nettle
			Goosetongue
			Mushrrom
			Kelp
			Chamomile
			Yarrow
			Wild cherry
			Petrouski
			Wild rice
			Beach greens
			Red clover
			Elder blossoms

Source: Based on field research: Schroeder, ADF&G, Div. Subsistence, Juneau.

a Other species may also be used; consult with local communities for definitive list.

Table 49. Mean Household (Hsld.) Harvest of Selected Species, in Numbers, Kodiak Non-Road-Connected Communities, 1982-83[a]

	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
No. hslds. surveyed	21	20	32	77	32	55
Salmon:						
sockeye	81.4	315.0	84.1	7.5	45.0	25.3
chinook	0.0	18.6	2.6	1.2	.9	.4
coho	31.7	73.4	24.6	56.3	31.4	25.0
pink	85.2	84.9	41.1	74.7	19.1	8.7
chum	16.2	1.4	4.2	40.6	16.2	1.6
Total salmon	214.5	493.4	156.6	180.3	112.6	61.0
Halibut	2.6	4.9	5.3	5.9	3.1	7.7
Dolly Varden	13.8	41.5	24.7	6.6	25.4	7.4
Steelhead/ rainbow	.1	11.6	8.5	1.4	4.5	.3
Butter clams	4.5	2.5	9.3	4.2	4.2	3.7
Crab:						
king	18.5	1.3	6.7	9.2	26.0	20.3
Tanner	2.7	1.2	3.7	3.0	3.2	6.3
Dungeness	.5	2.0	7.6	4.9	7.1	11.1
Deer	3.6	5.4	5.8	5.5	2.6	2.6
Hare	.5	2.6	1.8	1.6	3.4	2.5
Ptarmigan	5.5	8.9	2.2	1.5	0.0	.3
Ducks	31.8	46.4	21.7	20.8	37.1	10.0
Geese	9.4	.1	.1	2.1	3.2	0.0
Harbor seal	3.3	2.5	1.3	1.7	1.4	.1
Sea lion	2.0	1.0	.8	1.0	.2	.1

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Harvest in numbers except clams, which are in 5 gal buckets. Data are for a 12-month period, most often from June 1982 to May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 50. Mean Household (Hsld.) Harvest of Selected Species, in Numbers, Kodiak Road-Connected and Non-Road-Communities, 1982-83[a]

	Kodiak Road-Connected Area					
	General Sample	Coast Guard	Chiniak	Filipino	Native	Non-Road-Connected Communities
No. hslds. surveyed	155	76	17	34	35	237
Salmon:						
sockeye	11.7	3.1	13.9	10.4	16.6	59.7
chinook	.3	.2	1.9	.0	.4	2.5
coho	9.4	4.3	23.4	10.4	13.3	40.6
pink	7.1	7.4	8.9	2.8	9.0	49.0
chum	1.2	.9	4.3	.4	1.2	17.8
Total salmon	29.7	15.9	52.4	24.0	40.5	169.6
Halibut	4.9	6.8	4.4	2.6	1.6	5.5
Dolly Varden	8.5	14.4	5.1	23.0	4.3	15.4
Steelhead/ rainbow	.6	2.8	1.4	2.3	2.3	3.3
Butter clams	1.6	1.0	4.2	3.6	3.5	5.0
Crab:						
king	7.2	10.6	17.3	.8	4.2	14.0
Tanner	4.4	4.7	4.1	1.6	.8	3.7
Dungeness	3.2	3.2	4.5	1.4	2.2	6.3
Deer	1.3	.6	4.4	1.0	1.5	4.3
Hare	1.2	1.6	3.4	1.2	1.4	2.1
Ptarmigan	.7	.6	.4	1.0	.8	2.1
Ducks	.8	.2	3.6	1.1	2.7	23.8
Geese	.0	.1	.2	0.0	1.5	2.0
Harbor seal	.1	0.0	.1	0.0	0.0	1.4
Sea lion	.0	0.0	.1	0.0	0.0	.8

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Harvest in numbers except clams, which are in 5 gal buckets. General sample data are from a random sample of all road-connected areas, excluding Chiniak and Pasagshak. Non-road-connected data combine data from the six remote communities on the island. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the total expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regualations.

that Chiniak households reported harvest levels close to those of the non-road-connected communities.

In tables 51 and 52 mean food weight of fish and game harvests per household are presented (see appendix 2 of this narrative for an explanation of how these calculations were performed.) All harvested species have been organized into a number of resource categories. The reader should note that the category "all fish" includes the category "all salmon"; "all crab" is contained within "all invertebrate"; and "deer," "marine mammals," and "small game" are included within the "all game" category. The mean total household harvest for a community is the sum of "all fish," "all invertebrate," and "all game."

Karluk had the highest mean overall food weight of fish and game harvested for the survey period, with a mean harvest per household of about 3,296 lb. The Filipino sample had the lowest mean food weight harvested, with about 387 lb per household. The non-road-connected communities had higher mean food weight in almost all species categories than respondents in the road-connected samples. This indicates a higher harvest of fish and game for food and a greater dependence on fish and game resources. It should be noted, however, that respondents in the road-connected samples also harvest large quantities of fish and game resources for food; the mean food weight for the general sample was about 475 lb per household.

Per capita food weight figures demonstrate that the harvest of fish and game provided a major source of food in all communities and sample populations surveyed. Per capita harvest ranged from over 800 lb in Karluk to a low of 92 lb for the Filipino sample. The non-road-connected communities harvested a mean of about 435 lb of wild foods in the survey year; the mean for the general sample of the road-connected population was 143 lb, or slightly less than one-third that of the non-road-connected communities.

Figures 8 and 9 show the magnitude and composition of the mean household fish and game harvests (in pounds) by five resource categories. In the non-road-connected communities and in the urban Native sample, salmon species account for the largest portion of harvest in terms of food weight. In the general sample, and the samples of the U.S. Coast Guard and the Filipino population, marine fish, primarily halibut, accounted for the largest portion of wild food harvested. Marine mammals make up a significant portion of the food weight of harvest in the six non-road-connected communities, reflecting continued Native use of these resources. Marine mammals harvesting is restricted by international treaty to Natives at the present time.

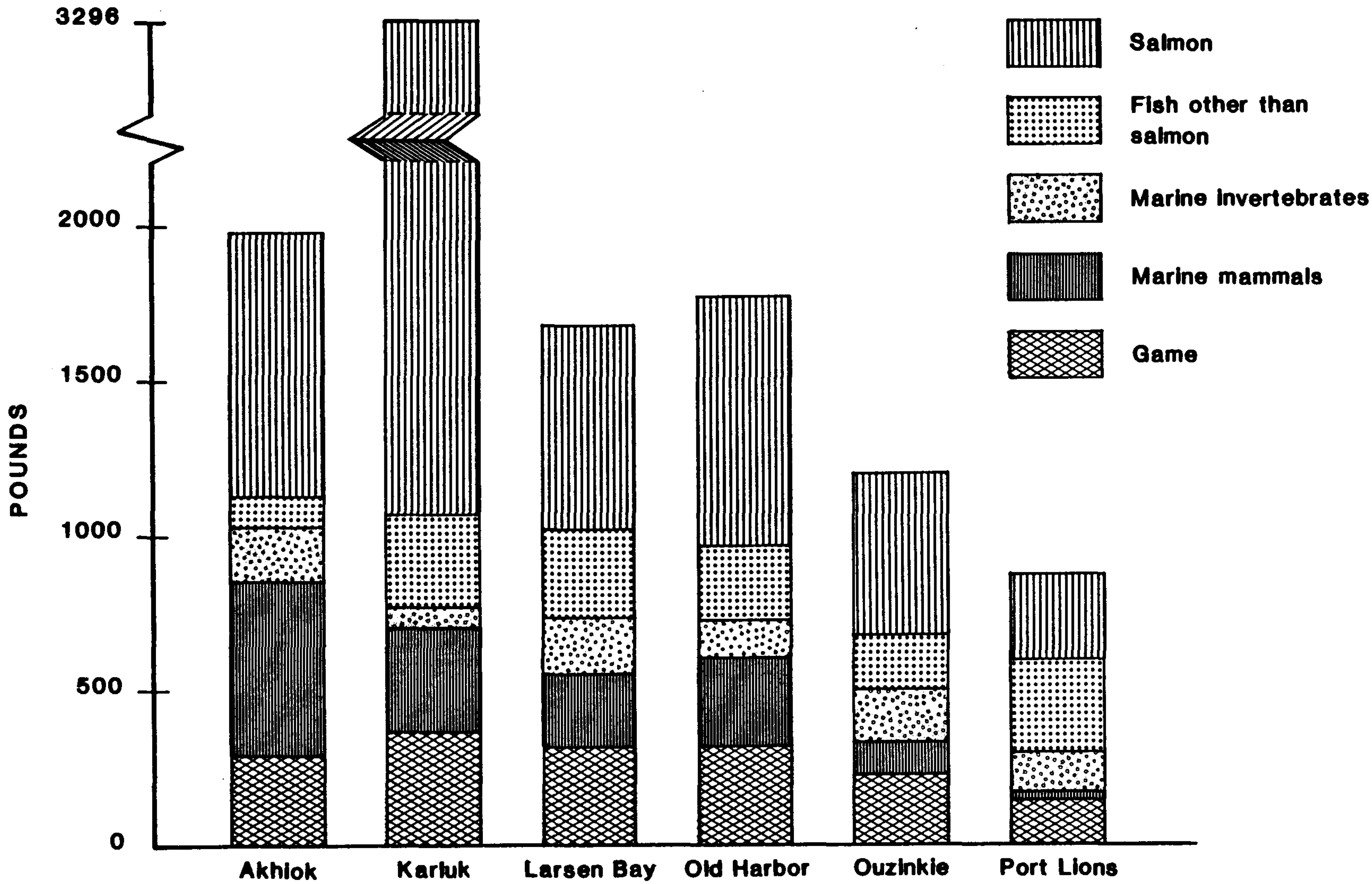


Figure 8. Mean household harvest in pounds for Kodiak non-road-connected communities, by resource category, 1982 to 1983. Data are for a 12-month period, most often from June 1982 through May 1983 (from KANA 1983 survey; figure prepared by ADF&G, Div. Habitat). Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

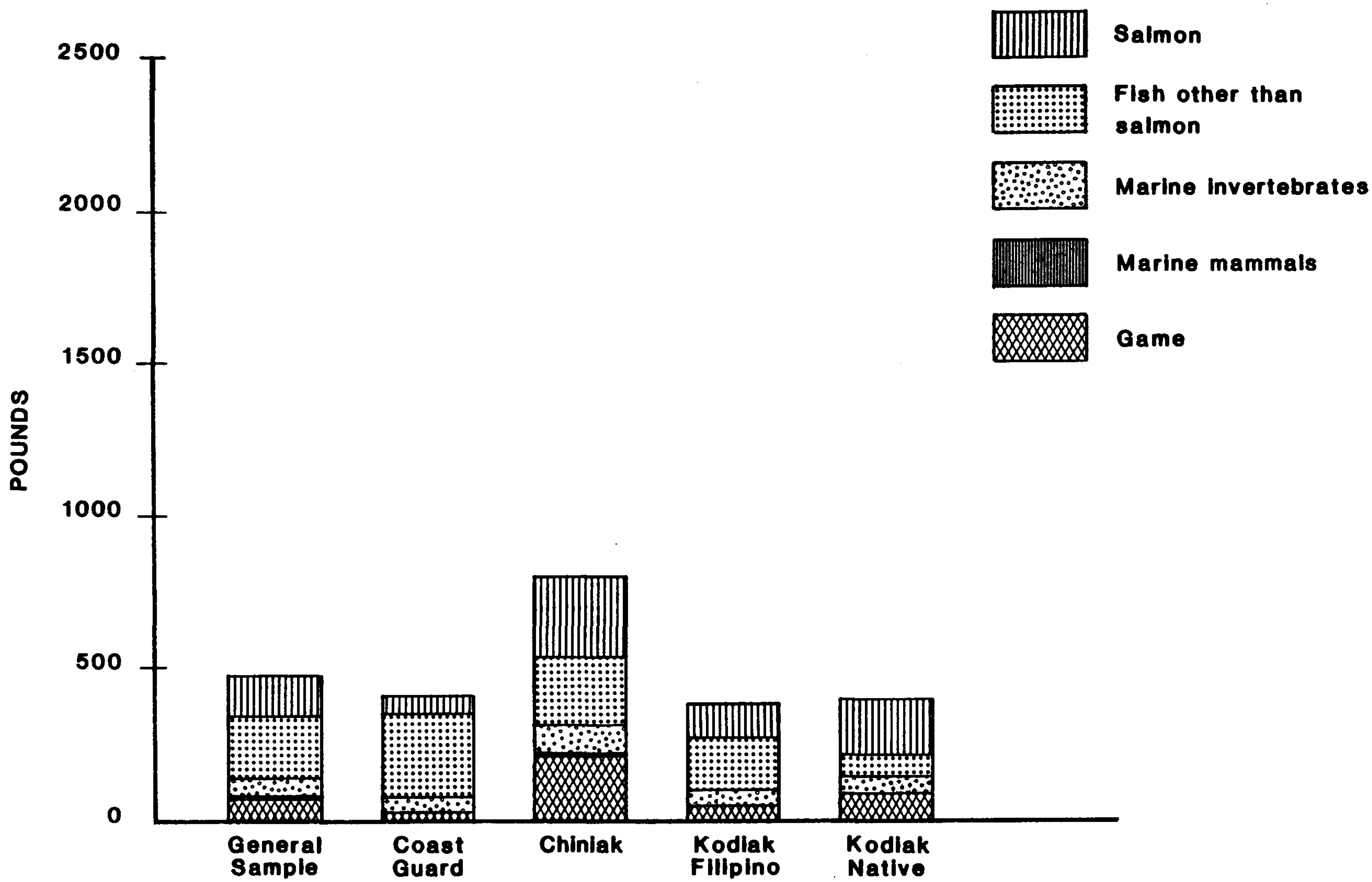


Figure 9. Mean household harvest in pounds for Kodiak road-connected area, by resource category, 1982 to 1983. Data are for a 12-month period, most often from June 1982 through May 1983 (from KANA 1983 survey; figure prepared by ADF&G, Div. Habitat). Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 51. Mean Food Weight of Fish and Game Harvest per Household (Hsld.) and per Capita, Kodiak Non-Road-Connected Communities, 1982-83[a]

	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
No. hslds. surveyed	21	20	32	77	32	55
Species Group						
All salmon	845.0	2,223.2	663.2	795.9	522.5	287.1
All fish	954.5	2,532.2	936.9	1,034.5	707.2	580.9
All crab	47.2	6.5	26.6	29.6	69.9	64.6
All invertebrate	185.3	62.1	190.0	121.0	163.6	118.6
Deer	156.3	235.4	251.1	235.9	110.7	113.1
Marine mammals	547.9	324.7	227.8	281.0	93.0	24.7
Small game	131.2	128.0	59.7	66.6	115.9	30.3
All game	835.4	702.0	538.6	606.6	325.6	168.1
All species	1,975.2	3,296.3	1,665.5	1,758.3	1,196.3	865.9
Mean hsld. size (persons)	3.81	3.95	4.16	3.79	3.34	3.30
Per capita food weight of harvest	518.4	834.5	400.4	463.9	358.2	262.4

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Food weight given in pounds, converted from harvest number using standard conversion factors. Adjusted total for Larsen Bay does not include bear. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer technique used to deal with missing data, column, row, and category totals may not always equal 100% or the total expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 52. Mean Food Weight of Fish and Game Harvest per Household (Hsld.), per Capita Food Weight, Kodiak Road-Connected and Non-Road-Connected Communities, 1982-83[a]

	Kodiak Road-Connected Area					
	General Sample	Coast Guard	Chiniak	Filipino	Native	Non-Road-Connected Communities
No. hslds. surveyed	155	76	17	34	35	237
	Pounds Food Weight per Hsld.					
All salmon	132.0	64.5	264.7	113.1	181.5	747.6
All fish	331.6	326.4	465.1	280.0	258.3	991.2
All crab	26.0	34.0	49.4	5.3	12.5	42.5
All invertebrate	54.7	54.2	96.7	52.2	55.0	135.7
Deer	57.7	24.3	190.6	41.9	65.4	185.2
Marine mammals	9.7	0.0	17.1	0.0	1.3	216.1
Small game	5.1	4.4	17.1	5.8	17.6	74.9
All game	82.8	29.6	232.1	54.3	90.8	471.2
All species	475.2	412.7	793.9	386.6	404.2	1,577.4
Mean hsld. size (persons)	3.32	2.41	3.94	4.18	3.49	3.63
Per capita food weight of harvest	143.1	172.0	203.6	92.0	115.5	434.5

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Food weight given in pounds, converted from harvest number using standard conversion factors. General sample data are from a random sample of all road-connected areas, excluding Chiniak and Pasagshak. Non-road-connected data combine data from the six remote communities on the island. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

C. Mean Numbers and Food Weight of Fish and Game Used

Tables 53 through 56 present data on the use of fish and game. These tables include all resources harvested by a household and kept for its own use during the study period, any resources the household received from the harvests of other households, and any fish kept for domestic use from commercial harvests. Resources given away during the study period were not included in this total. Tables 53 and 54 report the mean amount of selected fish and game resources used per household in numbers, and tables 55 and 56 present mean food weight in pounds of household use of categories of fish and game for each community and sample.

Differences between these two sets of data reflect the distribution and exchange that takes place with harvested fish and game. Overall, the use number and use food weight data for the non-road-connected communities, for the U.S. Coast Guard sample, and for the Chiniak sample are lower than the harvest data for these communities or samples; this means that, on the average, more fish and game was harvested by these surveyed households than was used. Use data for the general sample of the road-connected area, for the Filipino sample, and for the urban Native sample show that mean use of fish and game per household was greater in these samples than mean harvest. Karluk household mean use of salmon and marine mammals is much lower than mean harvest of these resources; this reflects the distribution of salmon and marine mammal meat from Karluk to other communities. Data indicate that urban Natives harvest only about half the fish and game they use.

D. Household Participation in Harvest and Use of Fish and Game Resources

Tables 57 and 58 present data on the participation in harvest or use of categories of fish and game resources by households in each community or sample. Because households with no members who fish and hunt may receive fish and game from other households, use participation is usually higher than harvest participation. General participation and use of fish and game is very high in all communities and samples surveyed. Except for the U.S. Coast Guard sample, which includes many men who have been on the island for only a short while, 100% of respondents reported using at least some fish and game during the survey year. Participation rates were higher in almost every harvest and use category for the non-road-connected communities.

Table 53. Mean Household Use of Selected Resources in Numbers, Kodiak Non-Road-Connected Communities, 1982-83[a]

Species	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
Salmon:						
sockeye	62.1	250.3	66.1	7.9	38.8	19.3
chinook	0.0	14.1	3.1	1.3	1.0	.7
coho	23.6	42.4	22.6	56.0	26.2	16.1
pink	60.2	39.6	44.6	75.4	22.0	6.1
chum	11.2	1.6	4.8	39.3	15.7	1.2
Total salmon	157.1	348.0	141.2	179.9	103.7	43.4
Halibut	1.6	4.9	8.7	6.4	3.4	7.5
Dolly Varden	9.4	25.7	17.3	7.8	21.8	5.2
Steelhead	0.0	9.4	11.5	1.1	6.3	.9
Butter clams	3.8	2.7	7.7	4.5	4.2	3.1
Crab:						
king	17.5	7.5	12.6	9.0	12.1	19.2
Tanner	2.7	4.9	7.0	4.0	5.0	7.4
Dungeness	1.0	5.6	9.8	4.9	7.4	7.7
Deer	3.2	4.2	5.5	4.7	3.2	2.4
Hare	.5	1.6	1.8	1.6	4.8	2.7
Ptarmigan	5.5	8.6	1.8	1.2	.2	.2
Ducks	30.7	37.9	18.8	19.1	37.8	12.0
Geese	9.2	.4	.1	1.9	4.5	0.0
Harbor seal	74.2	67.3	36.3	54.5	29.8	4.1
Sea lion	67.4	20.3	108.0	102.4	8.4	0.0

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Harvest in numbers except clams, which are in 5 gal buckets, and seal and sea lion, which are in pounds. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 54. Mean Household (Hsld.) Use of Selected Resources in Numbers, Kodiak Road-Connected and Non-Road-Connected Communities, 1982-83[a]

	Kodiak Road-Connected Area					
	General Sample	Coast Guard	Chiniak	Filipino	Native	Non-Road-Connected Communities
No. hslds. surveyed	155	76	17	34	35	237
Salmon:						
sockeye	13.1	3.2	14.0	12.9	21.9	48.0
chinook	.8	.2	1.9	.5	.9	2.3
coho	9.1	4.1	21.9	10.5	12.4	34.1
pink	4.3	5.8	7.7	3.0	10.4	43.4
chum	1.0	.8	4.4	.7	1.4	16.9
Total salmon	28.3	14.1	49.9	27.6	47.0	144.7
Halibut	6.3	4.8	4.9	3.5	8.6	6.0
Dolly Varden	7.7	13.7	5.1	20.0	6.2	12.0
Steelhead	.8	2.6	1.4	2.3	3.3	3.8
Butter clams	1.6	1.0	4.1	3.1	3.9	4.3
Crab:						
king	12.0	9.8	18.9	9.3	12.1	12.9
Tanner	7.0	4.8	4.9	12.4	3.7	5.2
Dungeness	6.5	3.2	5.4	23.4	6.1	6.2
Deer	1.8		2.8	1.1	1.9	3.9
Hare	1.7	1.5	4.0	1.2	5.7	2.2
Ptarmigan	.7	.6	.5	1.1	2.0	1.9
Ducks	.9	.2	6.0	1.4	4.0	22.9
Geese	0.0	.1	.3	0.0	2.1	2.1
Harbor seal	6.8	0.0	2.7	0.0	0.0	40.0
Sea lion	9.8	0.0	0.0	0.0	0.0	56.7

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Harvest in numbers except clams, which are in 5 gal buckets, and seal and sea lion, which are in pounds. General sample data are from a sample of all road-connected areas, excluding Chiniak and Pasagshak. Non-road-connected community data combine data from the six remote communities on the island. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regualations.

Table 55. Mean Food Weight of Fish and Game Harvest per Household (Hsld.) by Resource Category, Kodiak Non-Road-Connected Communities, 1982-83[a]

	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
No. hslds. surveyed	21	20	32	77	32	55
Species Group						
All salmon	621.9	1,592.9	594.7	791.9	472.3	205.1
All fish	690.3	1,864.2	990.1	1,045.3	668.0	485.4
All crab	45.3	28.9	47.0	30.4	41.1	61.4
All invertebrate	168.4	90.6	176.5	126.1	146.5	114.7
Deer	137.8	181.5	239.6	201.4	136.3	104.1
Marine mammals	141.6	67.3	144.7	156.8	38.3	4.1
Small game	127.5	106.0	52.4	61.5	126.5	35.7
All game	407.0	389.0	442.7	427.6	322.7	153.0
All species	1,265.6	2,343.8	1,523.7	1,598.2	1,137.2	753.6
Mean hsld. size (persons)	3.81	3.95	4.16	3.79	3.34	3.30
Per capita food weight used	360.5	593.4	371.1	421.7	340.5	228.4

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Food weight given in pounds, converted from harvest number using standard conversion factors. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer technique used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 56. Mean Food Weight of Fish and Game Harvest per Household (Hsld.), by Resource Category, Kodiak Road-Connected and Non-Road-Connected Communities, 1982-83[a]

	Kodiak Road-Connected Area					
	General Sample	Coast Guard	Chiniak	Filipino	Native	Non-Road-Connected Communities
No. hslds. surveyed	155	76	17	34	35	237
All salmon	134.4	59.3	254.5	132.0	210.5	637.8
All fish	386.9	250.8	471.3	337.8	541.2	893.6
All crab	43.3	32.3	55.0	57.5	38.1	42.5
All invertebrate	88.2	50.8	107.7	128.0	107.2	133.3
Deer	79.1	25.6	122.5	47.1	81.2	167.7
Marine mammals	16.5	0.0	2.7	0.0	1.0	96.7
Small game	6.3	4.2	24.8	6.7	33.1	72.9
All game	114.9	31.7	155.4	61.1	128.3	347.2
All species	588.7	334.8	734.4	526.9	776.7	1,360.7
Mean hsld. size (persons)	3.32	2.41	3.94	4.18	3.49	3.63
Per capita food weight used	177.4	138.9	186.4	126.1	222.6	374.8

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Food weight given in pounds, converted from use numbers using standard conversion factors. General sample data are from a random sample of all road-connected areas, excluding Chiniak and Pasagshak. Non-road-connected community data combine data from the six remote communities on the island. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 57. Household (Hsld.) Participation in Harvest and Use of Fish and Game, Kodiak Non-Road-Connected Communities, 1982-83[a]

	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
No. hslds. surveyed	21	20	32	77	32	55
	Percentage Hslds. Harvesting (Percentage Hslds. Using)					
Any salmon species	100% (100%)	90% (100%)	72% (97%)	95% (99%)	81% (97%)	82% (100%)
Any fish species	100% (100%)	90% (100%)	77% (97%)	96% (99%)	84% (97%)	89% (100%)
Any crab species	90% (95%)	25% (85%)	34% (86%)	64% (77%)	53% (94%)	65% (100%)
Any invertebrates	100% (100%)	75% (100%)	93% (97%)	99% (99%)	94% (100%)	94% (100%)
Deer	91% (95%)	80% (95%)	62% (94%)	87% (97%)	59% (91%)	64% (76%)
Marine mammal species	95% (100%)	65% (75%)	28% (50%)	57% (71%)	31% (53%)	9% (9%)
Small game species	95% (100%)	75% (85%)	50% (72%)	82% (91%)	72% (91%)	69% (80%)
Any game species	95% (100%)	85% (100%)	65% (94%)	93% (99%)	78% (94%)	80% (94%)
Any species	100% (100%)	90% (100%)	96% (100%)	100% (100%)	97% (100%)	96% (100%)

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Data are for a 12-month period, most often from June 1982 through May 1983. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 58. Household (Hsld.) Participation in Harvest and Use of Fish and Game, Kodiak Road-Connected and Non-Road-Connected Communities, 1982-83[a]

	Kodiak Road-Connected Area					
	General Sample	Coast Guard	Chiniak	Filipino	Native	Non-Road-Connected Communities
No. hslds. surveyed	155	76	17	34	35	237
	Percentage Hslds. Harvesting (Percentage Hslds. Using)					
Any salmon species	80% (98%)	65% (62%)	94% (100%)	82% (100%)	71% (100%)	87% (99%)
Any fish species	83% (99%)	70% (67%)	100% (100%)	82% (100%)	77% (100%)	90% (99%)
Any crab species	34% (92%)	49% (47%)	74% (94%)	9% (100%)	29% (89%)	58% (88%)
Any invertebrates	71% (96%)	54% (54%)	100% (100%)	85% (100%)	66% (91%)	94% (99%)
Deer	40% (82%)	20% (24%)	59% (88%)	29% (62%)	40% (89%)	74% (91%)
Marine mammal species	1% (2%)	0.0% (0.0%)	18% (6%)	0.0% (0.0%)	3% (9%)	42% (54%)
Small game species	26% (34%)	28% (27%)	29% (47%)	12% (15%)	29% (63%)	74% (86%)
Any game species	47% (86%)	34% (34%)	65% (88%)	32% (62%)	46% (91%)	84% (97%)
Any species	91% (100%)	74% (74%)	100% (100%)	91% (100%)	86% (100%)	97% (100%)

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a General sample data are from a random sample of all road-connected areas, excluding Chiniak and Pasagshak. Non-road-connected community data combine data from the six remote communities on the island. Data are for a 12-month period, most often from June 1982 through May 1983. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

E. Diet Breadth

Diet breadth for all Kodiak communities and samples surveyed is indicated in table 59. Diet breadth is defined here as the total number of types of fish and game resources harvested or used by a household during the study period. For a given ecological environment, diet breadth is one indication of degree of familiarity with the resources available and of the importance of wild resource harvest and use. In table 59, species are arranged in three categories: fish, marine invertebrates, and game. Figures 10 and 11 depict this information in graphic form. Each bar shows the percentage of the average household diet comprised by each resource category for each community or sample.

Diet breadth was found to be generally higher in the non-road-connected communities. In particular, respondents from these communities make use of more game species than other survey respondents. United States Coast Guard respondents made use of only a limited number of resources available to Kodiak residents. With the exception of the U.S. Coast Guard, all communities and samples showed high mean diet breadth for fish and intertidal species.

F. Desired Use of Fish and Game

Survey respondents were asked to estimate how much of a given resource would be "enough" for an average year. In figures 12 and 13, the reported mean household use of each resource during the study period (see tables 53 and 54) is expressed as a percentage of the estimated amount of that resource that would be "enough" for an average year. If the value for a particular species in a community is 100% or greater, this means that, on average, households were able to achieve their desired use levels for that species during the study period. If the value is less than 100%, this means that the average household failed to harvest or receive the amount of that resource that they thought would be "enough."

The figures indicate that, despite high actual use levels, desired use levels are not met for many resources in many of the communities and samples surveyed. Subsistence harvest and use varies seasonally with the distribution and abundance of fish and game species. Seasonal availability, inaccessibility of the resource, hunting and fishing pressure (particularly within the road-connected area), and regulatory restriction are among the possible causes for differences between desired and actual use of fish and game.

Table 59. Diet Breadth: Mean Number of Resources Harvested or Used per Household Kodiak Road-Conncted and Non-Road-Connected Communities, 1982-83[a]

Community/ Sample	Fish Species	Intertidal Species	Game Species	All Animal Species
Akhiok	4.8	6.1	4.6	15.5
Karluk	8.9	5.6	4.6	19.1
Larsen Bay	7.7	5.4	3.3	16.3
Old Harbor	6.1	5.4	3.9	15.4
Ouzinkie	8.2	6.2	3.3	17.7
Port Lions	5.9	5.2	2.4	13.5
All small communities	6.7	5.5	3.5	15.7
General sample	5.6	4.6	1.7	11.9
Kodiak Coast Guard	2.9	1.7	.7	5.3
Kodiak Filipino	6.3	6.2	1.0	13.6
Kodiak Native	6.5	5.6	2.5	14.5
Kodiak Chiniak	6.7	4.5	2.7	13.9
Highest recorded	14	12	12	35

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Data are for a 12-month period, most often from June 1982 through May 1983. General sample data are from a random sample of all road-connected areas, excluding Chiniak and Pasagshak. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

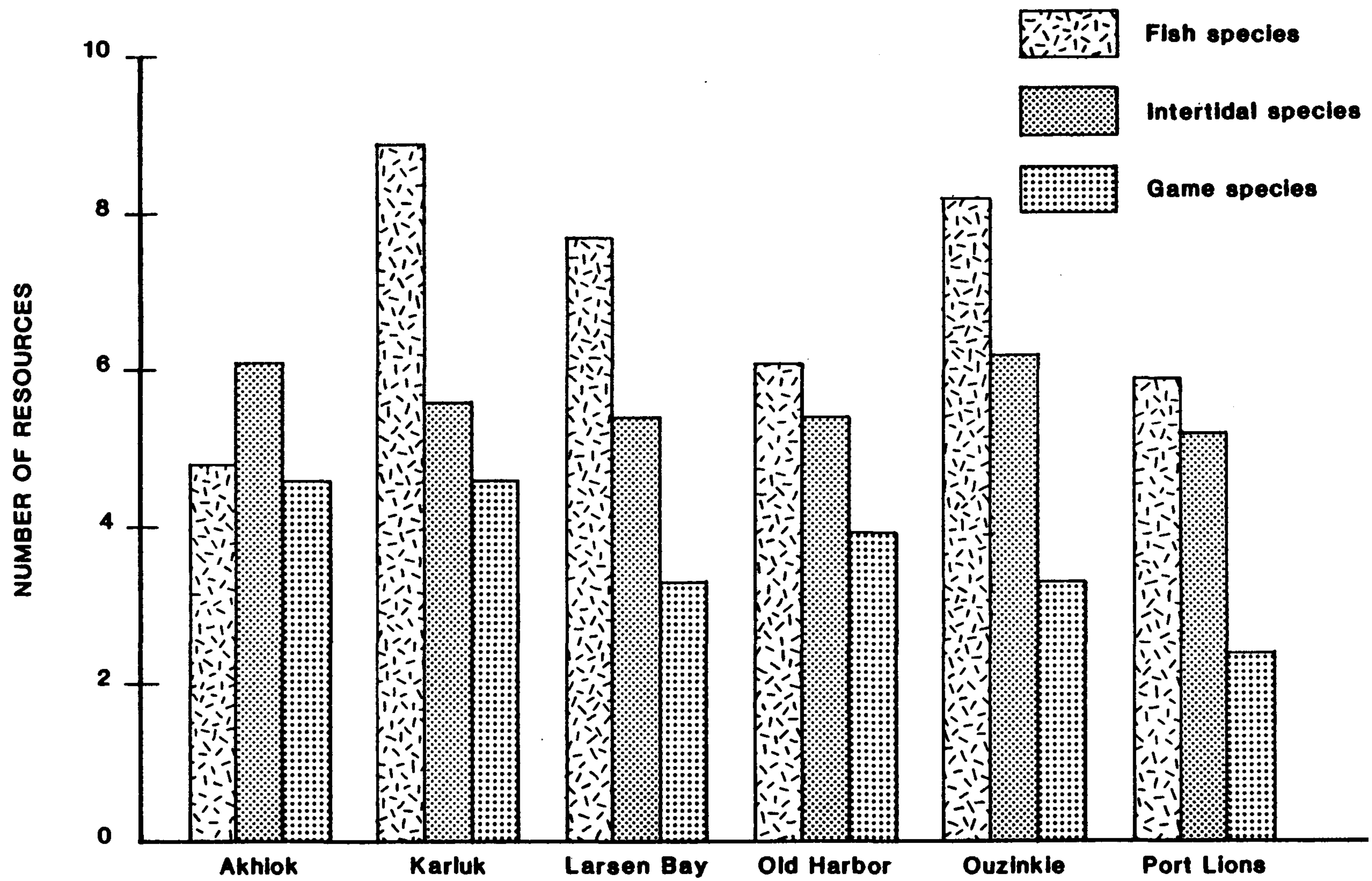


Figure 10. Diet breadth: mean number of resources harvested or used per household, by resource category, for Kodiak non-road-connected communities, 1982 to 1983. Data are for a 12-month period, most often from June 1982 through May 1983 (from KANA 1983 survey; figure prepared by ADF&G, Div. Habitat). Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

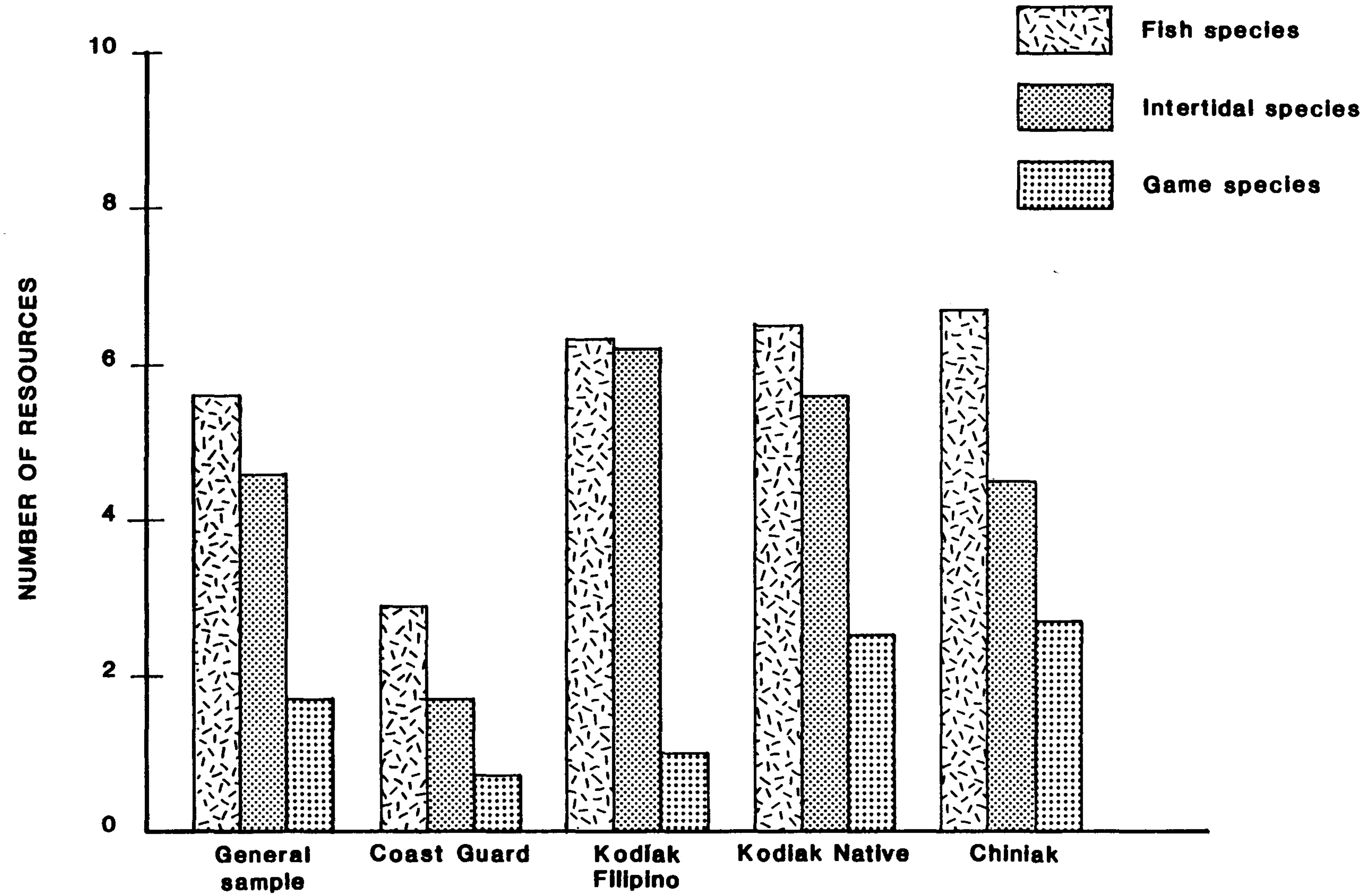


Figure 11. Diet breadth: mean number of resources harvested or used per household, by resource category, for Kodiak road-connected area, 1982 to 1983. Data are for a 12-month period, most often from June 1982 through May 1983 (from KANA 1983 survey; figure prepared by ADF&G, Div. Habitat). Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

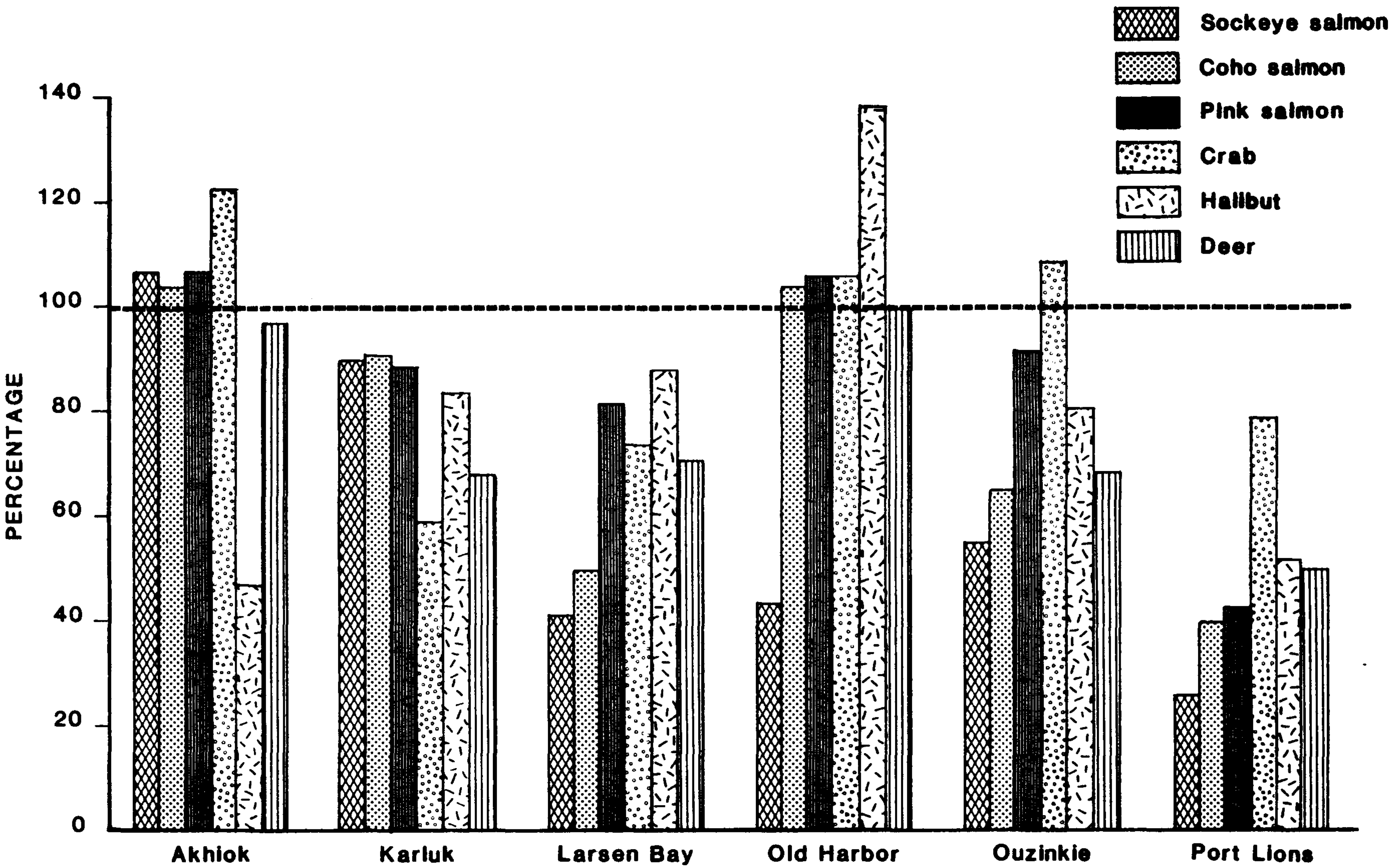


Figure 12. Mean household use of six wild resources in 1982-1983 expressed as a percentage of mean desired use, Kodiak non-road-connected communities. Data are for a 12-month period, most often from June 1982 through May 1983 (from KANA 1983 survey; figure prepared by ADF&G, Div. Habitat). Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

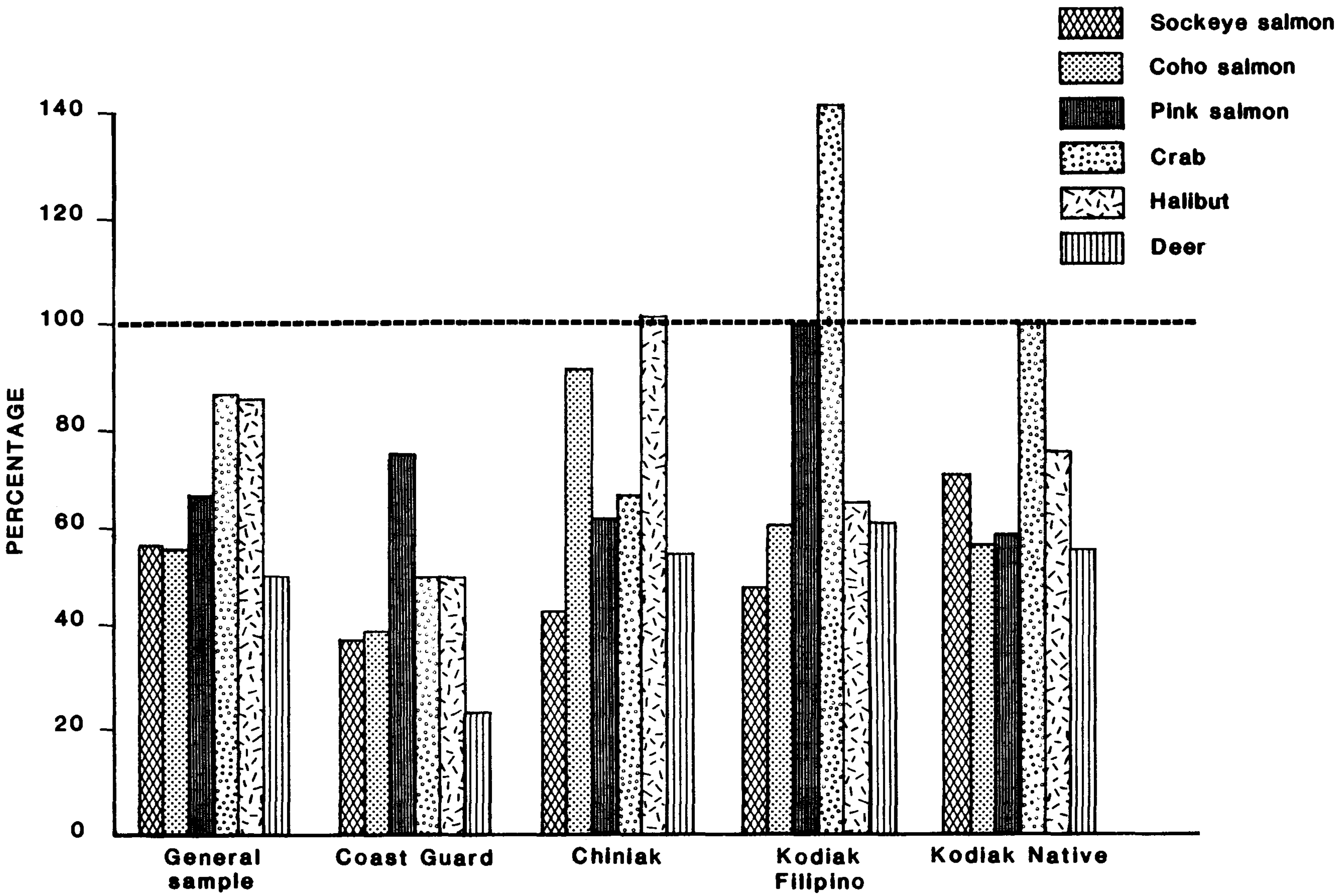


Figure 13. Mean household use of six wild resources in 1982-1983 expressed as a percentage of mean desired use, Kodiak road-connected area. Data are for a 12-month period, most often from June 1982 through May 1983 (from KANA 1983 survey, figure prepared by ADF&G, Div. Habitat). Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

G. Estimated Total Harvest and Total Harvest Weight

Tables 60 and 61 present the estimated total harvest of selected fish and game species by Kodiak Island residents. Table 62 presents the estimated food weight of that harvest. Harvest data and food weight data from the survey were extrapolated to the total population of Kodiak as reported in the most recent census (see appendix 2 for the extrapolation methodology). Extrapolations provide a good estimate of harvest level and importance, but they should not be thought of as exact measurements. According to these data, Kodiak residents harvested approximately 182,000 salmon, 21,000 halibut, 36,500 king crabs, 6,600 deer, and 14,900 ducks for noncommercial use in the 12 months covered by the survey. A total of almost 2.5 million pounds of food from fish and game resources was utilized, with fish accounting for about 1.7 million pounds, marine invertebrates for about 260,000 lb, and game accounting for 500,000 lb.

H. Domestic Use of Commercial Catches

Surveyed households were asked if they took any salmon, halibut, or crab from their own commercial catches of these resources for domestic use during the study period. Tables 63 and 64 report the results, in percentages of total households in each sample. All communities and samples, with the exception of the U.S. Coast Guard and the Filipino sample, had a high percentage of households using salmon, halibut, or crab for domestic use. The number of such households was particularly high in Akhiok, Larsen Bay, Old Harbor, Ouzinkie, and Port Lions and in the Chiniak and Kodiak Native samples. These data indicate that many Kodiak households use part of commercially caught fish and crab for domestic use.

I. Resource Use Areas

Areas used for noncommercial harvest of fish and game by the six rural communities on Kodiak Island were mapped by the Division of Subsistence and Habitat Division of ADF&G with the cooperation of KANA in 1983. Maps 10 and 11 depict the overall contemporary resource use areas of these communities. Information on areas used by residents of the road-connected area was provided by the KANA survey conducted in 1983 and is presented in table 65 and map 12. The following accounts of areas used by communities are taken from these data sources. More detailed information on use areas is on file with the Division of Habitat, ADF&G.

1. Akhiok. Akhiok residents use the coastal and adjacent inland areas from Kiavik Bay to Cape Trinity, all of the coastline of Alitak Bay, Portage Bay, Deadman Bay, and Olga Bay, and the coastal

Table 60. Estimated Total Harvest of Selected Species, Kodiak Road-Connected and Non-Road-Connected Populations, 1982-83[a]

	Road-Connected Area			Non-Road-Connected Area		Total
	City Area	Coast Guard	Chiniak Pasagshak	No Community	Six Communities	
Population	8,247	1,995	611	597	1,264	12,714
Salmon:						
sockeye	29,063	2,566	2,173	9,821	20,764	64,387
chinook	745	166	297	411	870	2,489
coho	23,350	3,560	3,657	6,679	14,121	51,367
pink	17,636	6,126	1,391	8,061	17,042	50,256
chum	2,981	745	672	2,928	6,191	13,517
Total salmon	73,775	13,162	8,190	27,900	58,988	182,016
Halibut	12,172	5,629	688	905	1,913	21,307
Dolly Varden	21,114	11,920	797	2,533	5,356	41,720
Steelhead/ rainbow	1,490	2,318	219	543	1,148	5,718
Butter clams	3,974	828	656	823	1,739	8,020
Crab:						
king	17,885	8,775	2,704	2,303	4,869	36,536
Tanner	10,930	3,891	641	609	1,287	17,358
Dungeness	7,949	2,649	703	1,036	2,191	14,528
Deer	3,229	497	688	707	1,496	6,617
Hare	2,981	1,324	531	345	730	5,931
Ptarmigan	1,739	497	63	345	730	3,374
Ducks	1,987	166	563	3,915	8,278	14,909
Geese	0	83	31	329	696	1,139
Harbor seal	248	0	16	230	487	981
Sea lion	0	0	16	132	278	426

Source: Data from KANA 1983 survey; table prepared by ADF&G, Subsistence Div.

a Harvest in numbers except clams, which are in 5 gal buckets. The total harvest estimate is based on extrapolation from survey figures (see tables 49 and 50). Persons living outside communities were not surveyed. In this computation the assumptions are made that family size and fish and game harvest for this population are the same as for residents of non-road-connected communities. Population data are from Kodiak City and Borough 1982 census, supplied by Linda Fried. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the addition of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 61. Estimated Total Household Harvest of Salmon in Numbers of Fish for Kodiak City Area, 1982-83[a]

Salmon Species	Subsistence Permit Harvest[b]	Total Estimated Harvest[c]	Other Methods of Harvest[d]
Sockeye	13,449	29,063	15,614
Chinook	88	745	657
Coho	4,978	23,350	18,372
Pink	2,641	17,636	14,995
Chum	477	2,981	2,504
Total[e]	21,621	73,755	52,142

a Kodiak City area includes residents of Women's Bay/Bells Flats, Borough Service Area One, City of Kodiak, and Monashka Bay. Population of this area was 8,247 in 1982, according to the Kodiak City and Borough.

b Based on data from 1,008 returned household subsistence permits, Div. Commer. Fish., 1983; Kodiak management area finfish annual report, 1983, ADF&G, Kodiak.

c Estimated total harvest is from table 60 and is based on a random sample survey of 155 households in this area. See KANA 1983.

d The "other methods of harvest" data are derived by subtracting subsistence permit harvest from estimated total harvest. This category of harvest may include salmon caught under sportfishing regulation, salmon kept for domestic use from commercial harvests, and salmon acquired through other means.

e Data presented in this table are best estimates only and should be used with caution.

Table 62. Estimated Food Weight of Total Fish and Game Harvest, Kodiak Road-Connected and Non-Road-Connected Population, 1982-83[a]

	Road-Connected Area			Non-Road-Connected Area		Total
	City Area	Coast Guard	Chiniak Pasagshak	No Community	Six Communities	
Population	8,247	1,995	611	597	1,264	12,714
All salmon	327,893	53,393	41,373	122,980	260,015	805,654
All fish	823,706	270,194	72,695	163,052	344,739	1,674,386
All crab	64,585	28,145	7,721	6,991	14,782	122,224
All invertebrate	135,877	44,867	15,114	22,323	47,196	265,377
Deer	143,329	20,116	29,790	30,465	64,413	288,113
Marine mammals	24,095	0	2,672	35,548	75,160	137,475
Small game	12,669	3,642	2,672	12,321	26,050	57,354
All game	205,678	24,503	36,277	77,512	163,883	507,853
All species	1,180,414	341,633	124,086	259,482	548,620	2,454,235

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Food weight given in pounds, converted from harvest number using standard conversion factors. The food weight estimate is based on extrapolation from survey figures. Persons living outside communities were not surveyed. In this computation the assumptions are made that family size and fish and game harvest for this population are the same as for remote community residents. Population data are from Kodiak City and Borough 1982 census, supplied by Linda Fried. Data are for a 12-month period, most often from June 1982 through May 1983. Because of rounding and the computer techniques used to deal with missing data, column, row, and category totals may not always equal 100% or the totals expected from the additon of constituent numbers. Data include domestic harvest (or use) that takes place under subsistence, sport, and commercial regulations.

Table 63. Percentage of Households (Hslds.) Keeping Salmon, Halibut, and Crab from Commercial Catch for Domestic Use, Kodiak Non-Road-Connected Communities, 1982-83[a]

	Akhiok	Karluk	Larsen Bay	Old Harbor	Ouzinkie	Port Lions
No. hslds. surveyed	21	20	32	77	32	35
Use of salmon from commercial harvest	81%	15%	41%	83%	63%	36%
Use of halibut from commercial harvest	19%	5%	25%	74%	31%	45%
Use of crab from commercial harvest	10%	0%	6%	47%	28%	47%

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subistence.

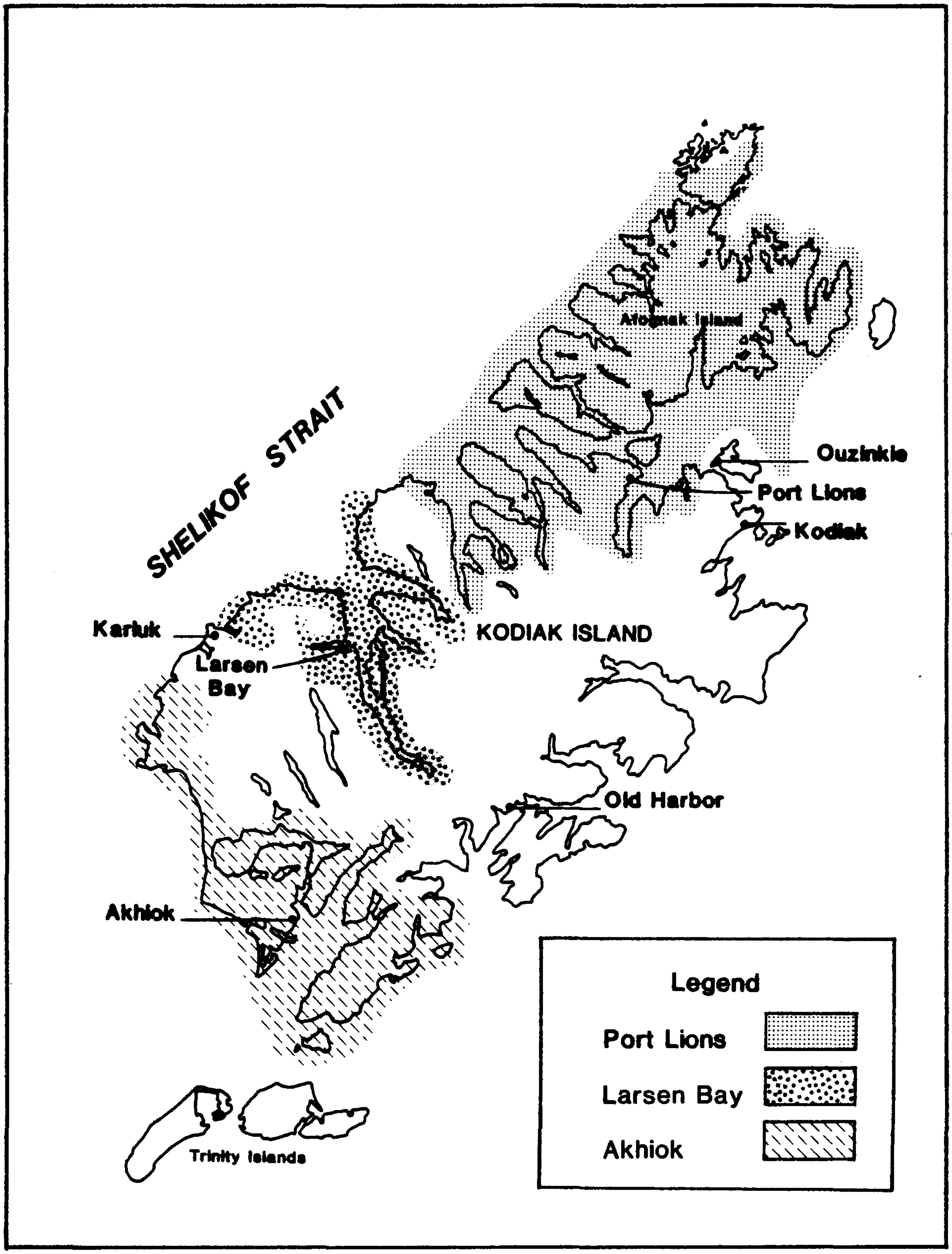
a Data are for a 12-month period, most often from June 1982 through May 1983.

Table 64. Percentage of Households (Hslds.) Keeping Salmon, Halibut, and Crab from Commercial Catch for Domestic Use, Kodiak Road-Connected and Non-Road-Connected Communities, 1982-83[a]

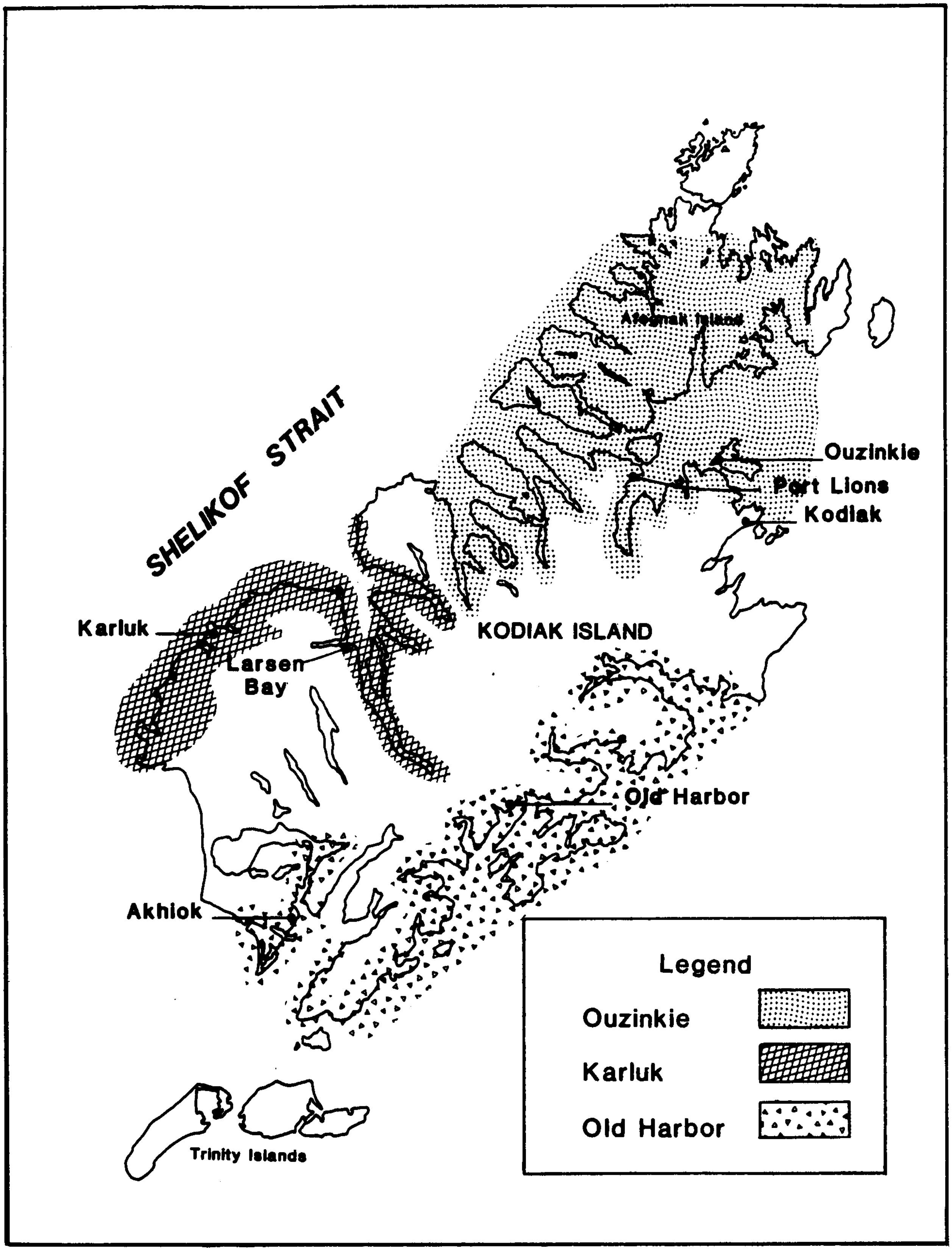
	Kodiak Road-Connected Area					
	General Sample	Coast Guard	Chiniak	Filipino	Native	Non-Road-Connected Communities
No. hslds. surveyed	155	76	17	34	35	237
Use of salmon from commercial harvest	18%	3%	41%	3%	34%	58%
Use of halibut from commercial harvest	13%	3%	41%	6%	14%	44%
Use of crab from commercial harvest	19%	4%	35%	12%	23%	32%

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a Data are for a 12-month period, most often from June 1982 through May 1983. General sample data are from a random sample of all road-connected areas, excluding Chiniak and Pasagshak. Non-road-connected community data combine data from the six remote communities on the island.



Map 10. Kodiak Island subregion, Part 1: areas used by residents of Akhiok, Larsen Bay, and Port Lions for subsistence use of fish and game. Areas depicted are known to be used at time of mapping in 1983. Other areas may also be used. Check with local communities for definitive information (ADF&G, Div. Habitat).



Map 11. Kodiak Island subregion, Part 2: areas used by residents of Karluk, Old Harbor, and Ouzinkie for subsistence use of fish and game. Areas depicted are known to be used at time of mapping in 1983. Other areas may also be used. Check with local communities for definitive information (ADF&G, Div. Habitat).

and inland areas from Cape Alitak to Cape Grant for the harvest of fish and game resources for local consumption. Twoheaded Island, Geese Islands, and the Aiatalik Island group are also important for resource harvest. Tugidak and Sitkinak Islands were used for resource harvesting in historic times, but little resource harvesting has taken place in recent years. Additional coastal areas may be used incidentally for resource harvesting when Akhiok residents are travelling by boat to other communities or commercial fishing.

Coastal habitats are of particular importance for the harvest of seal and sea lion, hunted along rocky shores, and of clams, crabs, and other marine invertebrates, many of which are harvested from the intertidal zone. Deer and waterfowl are hunted in beach areas as well as inland. Anadromous fish species and marine fish are harvested in coastal areas.

The area bounded by a line crossing Alitak Bay from Cape Alitak to Humpy Cove to the south and a line drawn north from Stockholm Point at the entrance to Olga Bay encompasses the resource harvesting area intensively used by Akhiok residents. Most salmon, halibut and other marine fish, clams and other invertebrates, and deer are harvested in this area. The other coastal areas listed are also regularly used, particularly for the harvest of seal and sea lion and for salmon harvesting when fishing in areas closer to the village site is poor.

2. Karluk. Karluk residents use the coastal and adjacent inland areas from Inner Seal Rock near Gurney Bay to the mouth of the Karluk River, from the Karluk River mouth to Harvester Island, and all of the coastal area of Uyak and Spiridon bays, extending to Cape Kuliuk. Additional coastal areas south of Gurney Bay may have been utilized at previous times.

Coastal hunting for seal, sea lion, waterfowl, and deer provides a substantial amount of food for community residents. The coastal areas facing Shelikof Strait are frequently stormy and have few good moorages. Karluk residents frequently hunt and fish in the less exposed areas of Uyak and Spiridon bays. Very close relationships exist between the two communities of Karluk and Larsen Bay.

3. Larsen Bay. Larsen Bay residents use the coastal and adjacent inland areas from the mouth of the Karluk River to Harvester Island, as well as that of Uyak Bay, Larsen Bay, and Spiridon Bay extending to Cape Kuliuk to the north.

These coastal areas of Uyak and Spiridon Bays are used intensively for hunting of seal, sea lion, deer, and waterfowl and for fishing for virtually all species taken by community residents. The coastal area between Harvester Island and Karluk River is used during frequent trips made by Larsen Bay residents to Karluk.

4. Old Harbor. Old Harbor residents use the coastal and adjacent inland areas from Narrow Cape in the northeast to Geese Channel in the southwest. Included are the coastlines and waters of Ugak Bay, Kiliuda Bay, Sitkalidak Strait, Kaiugnak Bay, and Kaguyak Bay. Sitkalidak Island, Towheaded Island, and Geese Islands are also utilized.

Coho, pink, and chum salmon, halibut, crab, deer, waterfowl, seal, and sea lion are the species that account for the greatest part of fish and game harvest by Old Harbor residents in these areas.

5. Ouzinkie and Port Lions. Residents of Ouzinkie and Port Lions fish and hunt the coastlines, bays, and adjacent inland areas of a large portion of north and northwest Kodiak Island and of the southern half of Afognak Island. Areas bounded by Ban Island in the northwest, Miners Point in the west, Spruce Cape in the east, and Tolstoi Point in the northeast are used by Ouzinkie residents. Included are the coastal areas and waters of Tonki Bay, Marmot Strait, Izhut Bay, Marmot Bay, Kizhuyak Bay, Kupreanof Strait, Viekoda Bay, Uganik Passage, Uganik Bay, Raspberry Strait, Malina Bay, and Panamarof Bay. Coastal areas, waters, and inland portions of Spruce Island, Whale Island, Raspberry Island, and Uganik Island are also used. Areas close to communities are used more intensively, particularly for harvesting salmon.

6. Kodiak road-connected area. The areas most intensively used by Kodiak residents are those reachable by road or open skiff. These include Ugak Bay, Chiniak Bay, Monashka Bay, and into Narrow Strait, Kupreanof Bay, and Marmot Bay. Areas further from town are regularly used by hunters and fishermen on longer trips. Because of the large population of the road-connected area, the great number of boats owned by local residents, and the high interest in fishing and hunting, almost the whole coastline of the Kodiak archipelago receives some use from Kodiak residents.

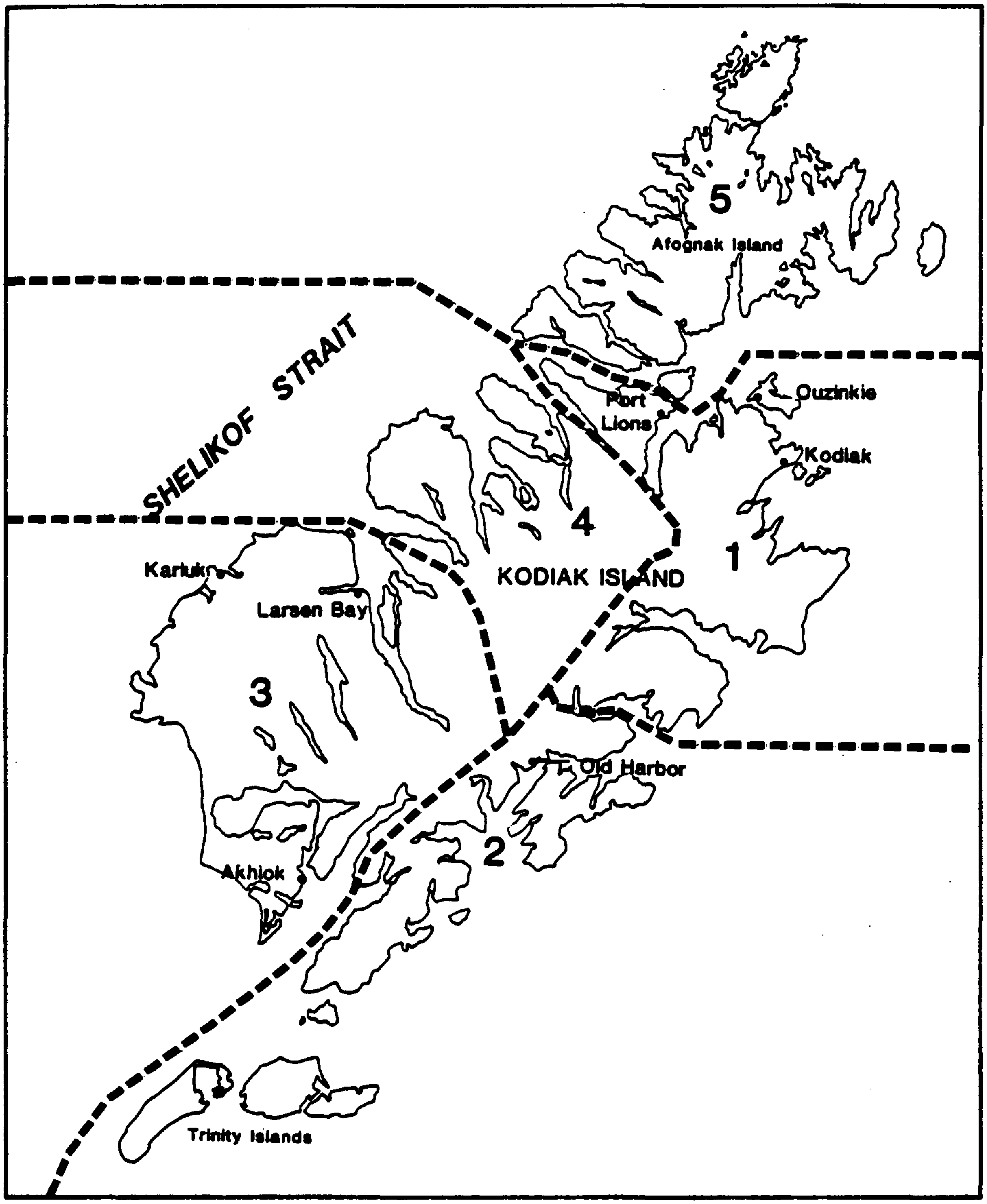
Table 65 and map 12 present data on areas used for different types of fish and game harvesting activities by residents of the road-connected area. Data from the general sample of the road-connected area were used. Not surprisingly, zone one, the area most easily accessible by road or boat from Kodiak City, received by far the most intense use during 1982 to 1983. The other zones of the Kodiak archepelago were used by from 7 to 24% of the surveyed population in the road-connected area.

Table 65. Intensity of Use of Hunting and Fishing Areas by Type of Activity, by Household, Kodiak Road-Connected Population, 1982-83[a]

	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Alaska Pen.	Kenai Pen.	Other
	Percentage of Households Using Each Area (Mean Number of Trips for Each Household in Each Area)							
Salmon fishing	74% (11.1)	2% (.2)	5% (.2)	6% (.2)	15% (.6)	2% (.4)	1% (-)	2% (.1)
Halibut fishing	48% (4.0)	1% (-)	3% (-)	2% (.1)	5% (.1)	- (-)	- (-)	1% (-)
Freshwater fishing	37% (4.8)	1% (-)	1% (.1)	5% (.4)	3% (.1)	- (-)	- (-)	1% (-)
Clam harvesting	56% (2.5)	1% (-)	2% (-)	3% (.1)	3% (.1)	5% (.1)	- (-)	1% (-)
Crab harvesting	30% (3.3)	5% (.3)	3% (.1)	1% (-)	2% (.1)	1% (-)	- (-)	1% (-)
Deer hunting	34% (2.1)	1% (-)	3% (.2)	6% (.3)	12% (.5)	- (-)	- (-)	1% (-)
Brown bear hunting	2% (.2)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
Waterfowl hunting	8% (.4)	- (-)	- (-)	- (-)	3% (-)	- (-)	- (-)	- (-)
Marine mammal hunting	1% (.1)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	1% (-)
Any harvest activity	90%	8%	7%	12%	24%	7%	1%	4%

Source: Data from KANA 1983 survey; table prepared by ADF&G, Div. Subsistence.

a See map 12 for depiction of zone location. Data are from general sample of the road-connected area, excluding Chiniak and Pasagshak. Data are rounded to nearest percentage and nearest decimal point. The symbol "-" indicates that percent use is less that .5%, or mean number of trips is less than .05. Data are for a 12-month period, most often from June 1982 through May 1983.



Map 12. Zonal map of harvest areas for Kodiak road-connected area.

J. Seasonal Rounds of Wild Resource Use

Figures 14 through 19 present the seasonal round of wild resource use for each of the six non-road-connected communities in the Kodiak Island area. Each figure depicts the time of year, in units of quarter months, when some harvesting of a particular resource occurs. The figures indicate reported presence or absence of harvest during a particular quarter month; they do not show intensity of effort.

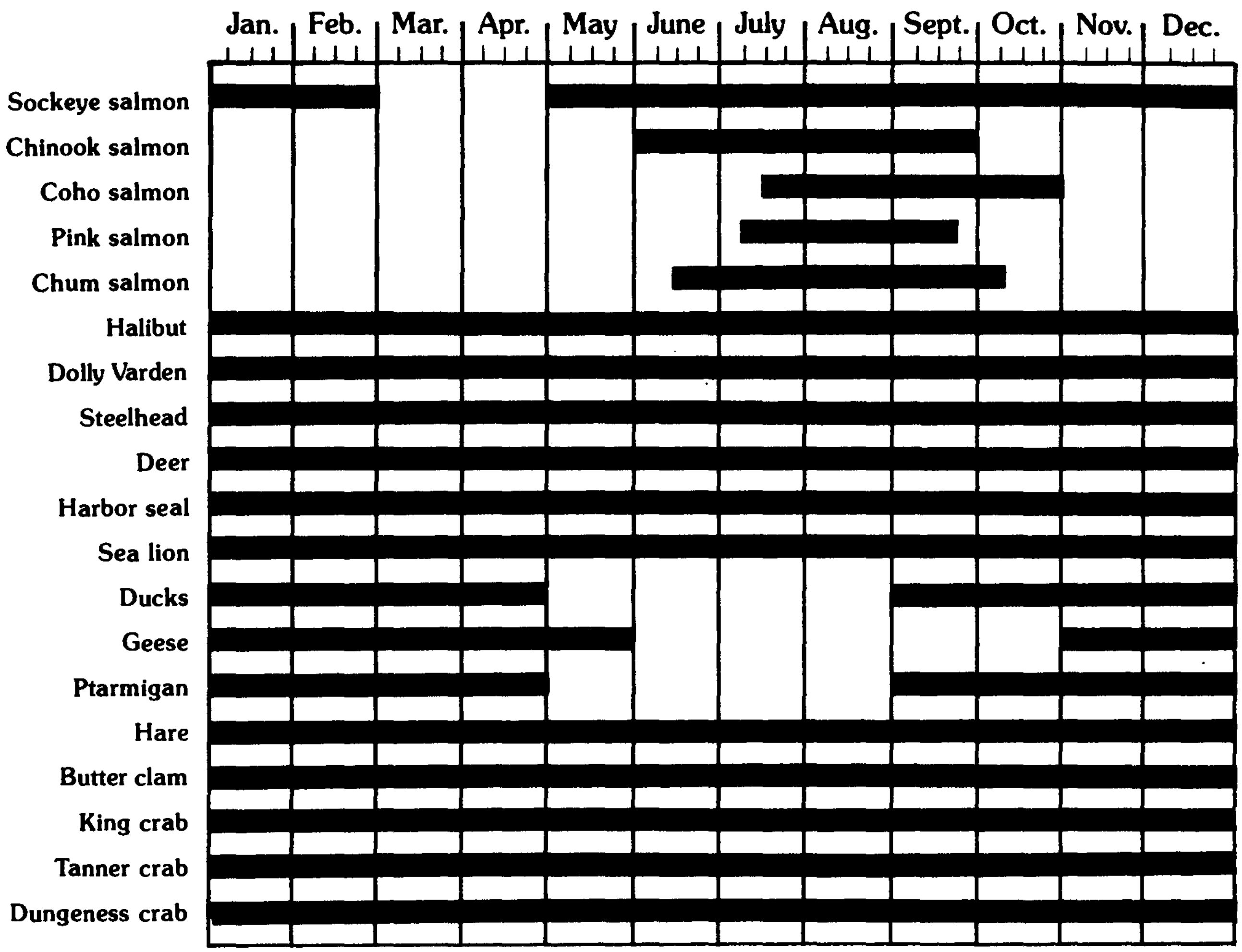


Figure 14. Seasonal round of resource harvests, Akhiok, 1982-1983. Figure represents time period when some harvest may occur and does not indicate intensity of harvest effort. Seasonal round data for other species is on file with Div. Subsistence, ADF&G (1983 field interviews, ADF&G, Div. Subsistence).

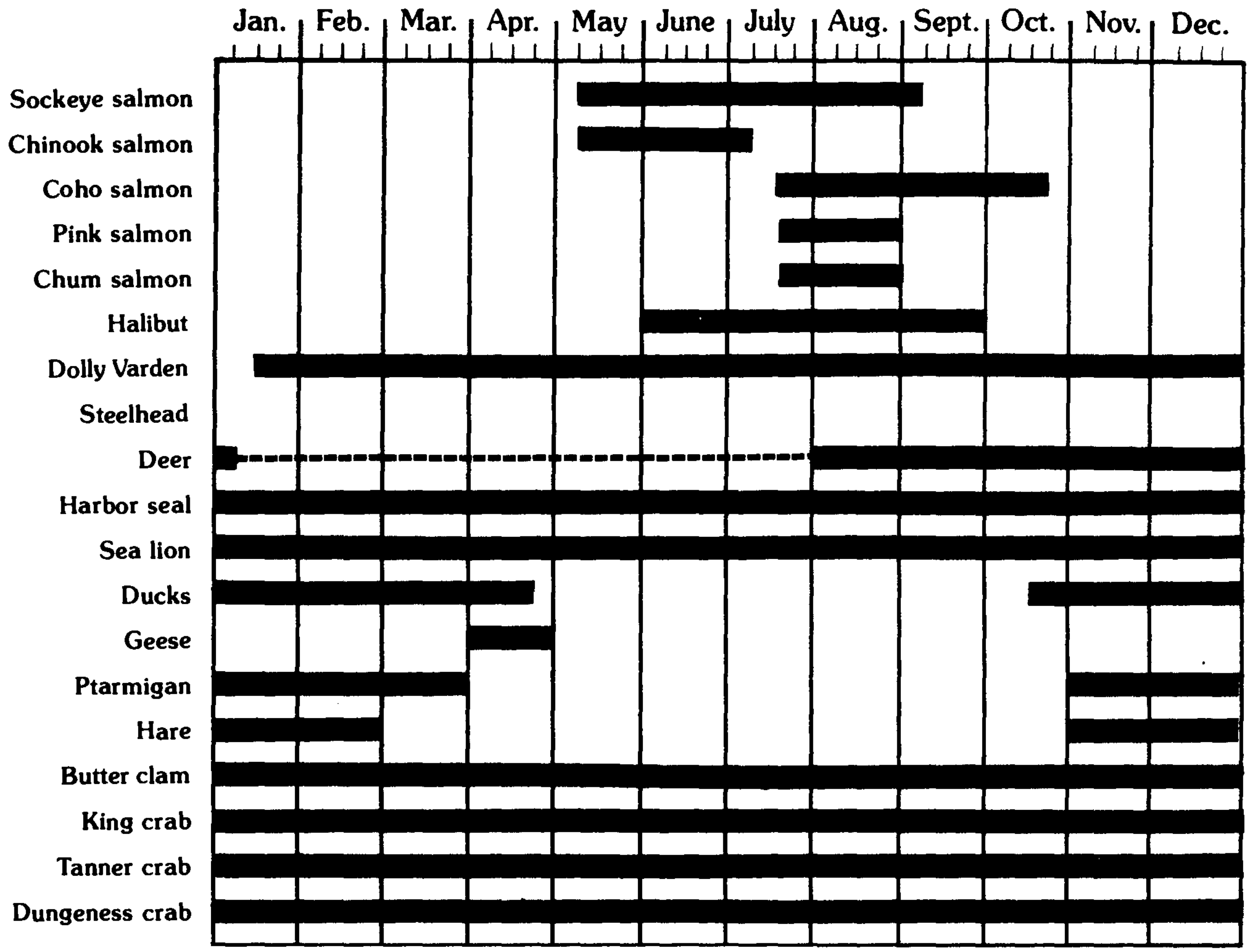


Figure 15. Seasonal round of resource harvests, Karluk, 1982-1983. Figure represents time period when some harvest may occur and does not indicate intensity of harvest effort. Dashes indicate harvest has not been documented but may occur. Seasonal round data for other species is on file with Div. Subsistence, ADF&G (1983 field interviews, ADF&G, Div. Subsistence).

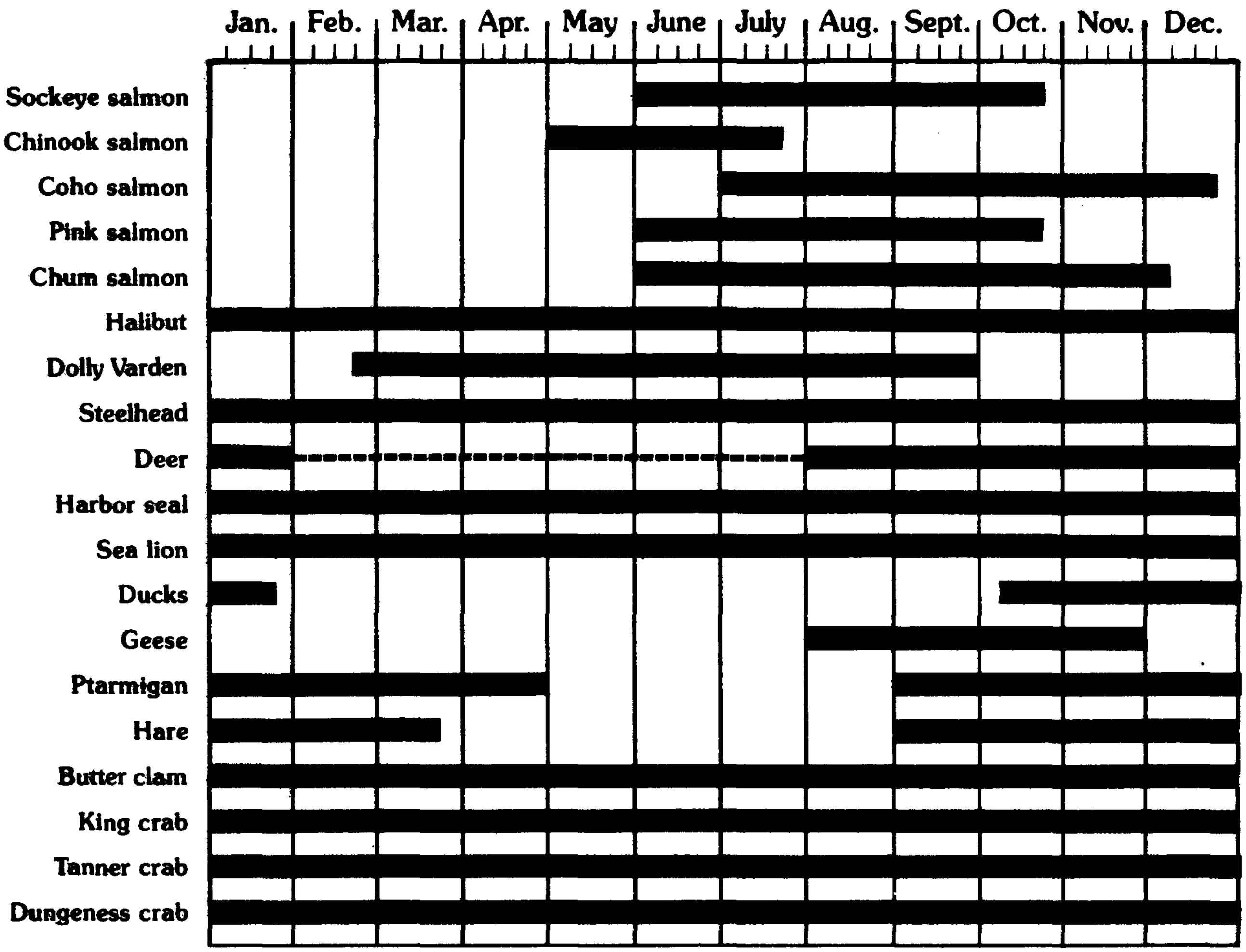


Figure 16. Seasonal round of resource harvests, Larsen Bay, 1982-1983. Figure represents time period when some harvest may occur and does not indicate intensity of harvest effort. Dashes indicate harvest has not been documented but may occur. Seasonal round data for other species is on file with Div. Subsistence, ADF&G (1983 field interviews, ADF&G, Div. Subsistence).

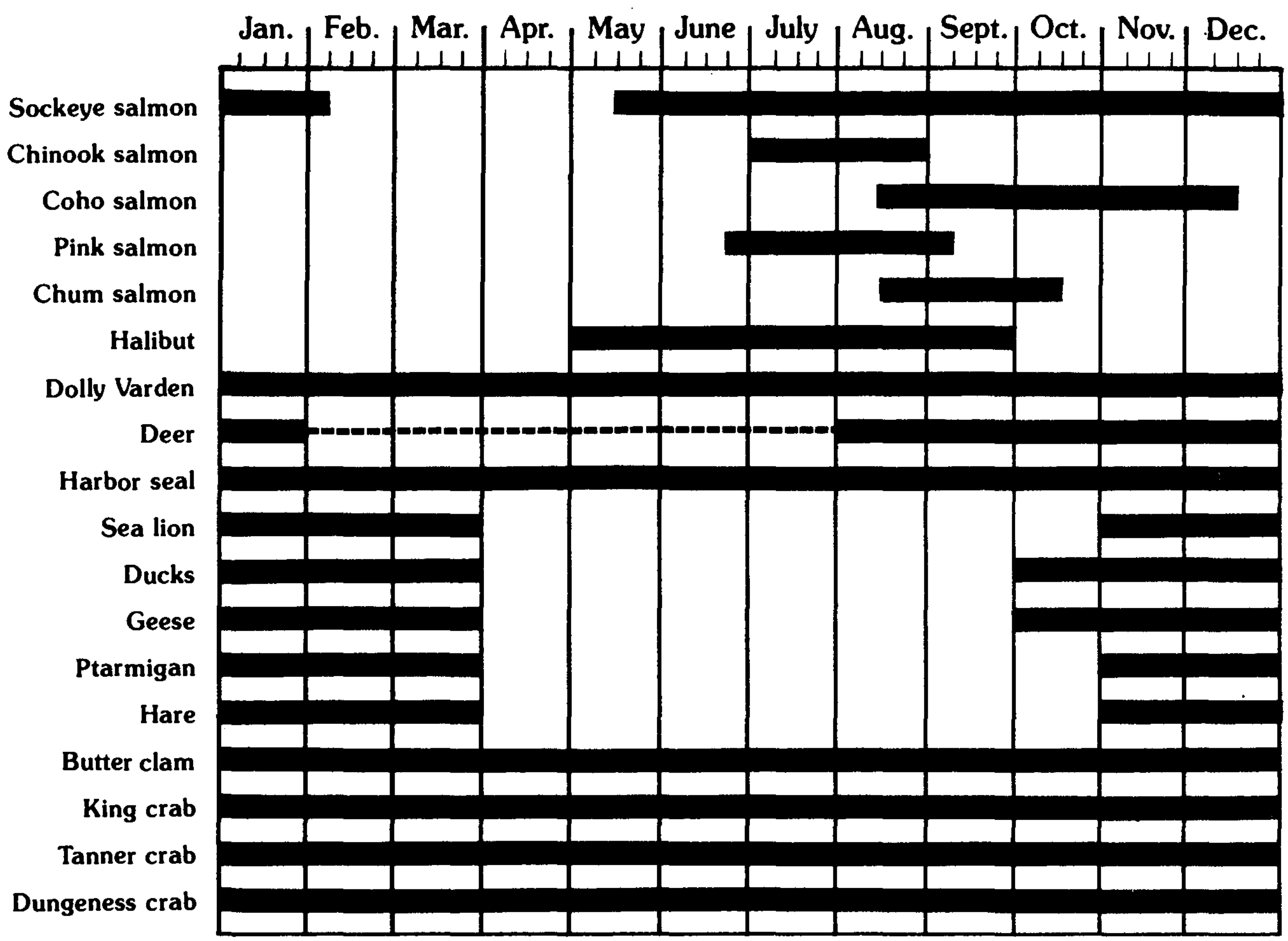


Figure 17. Seasonal round of resource harvests, Old Harbor, 1982-1983. Figure represents time period when some harvest may occur and does not indicate intensity of harvest effort. Dashes indicate harvest has not been documented but may occur. Seasonal round data for other species is on file with Div. Subsistence, ADF&G (1983 field interviews, ADF&G, Div. Subsistence).

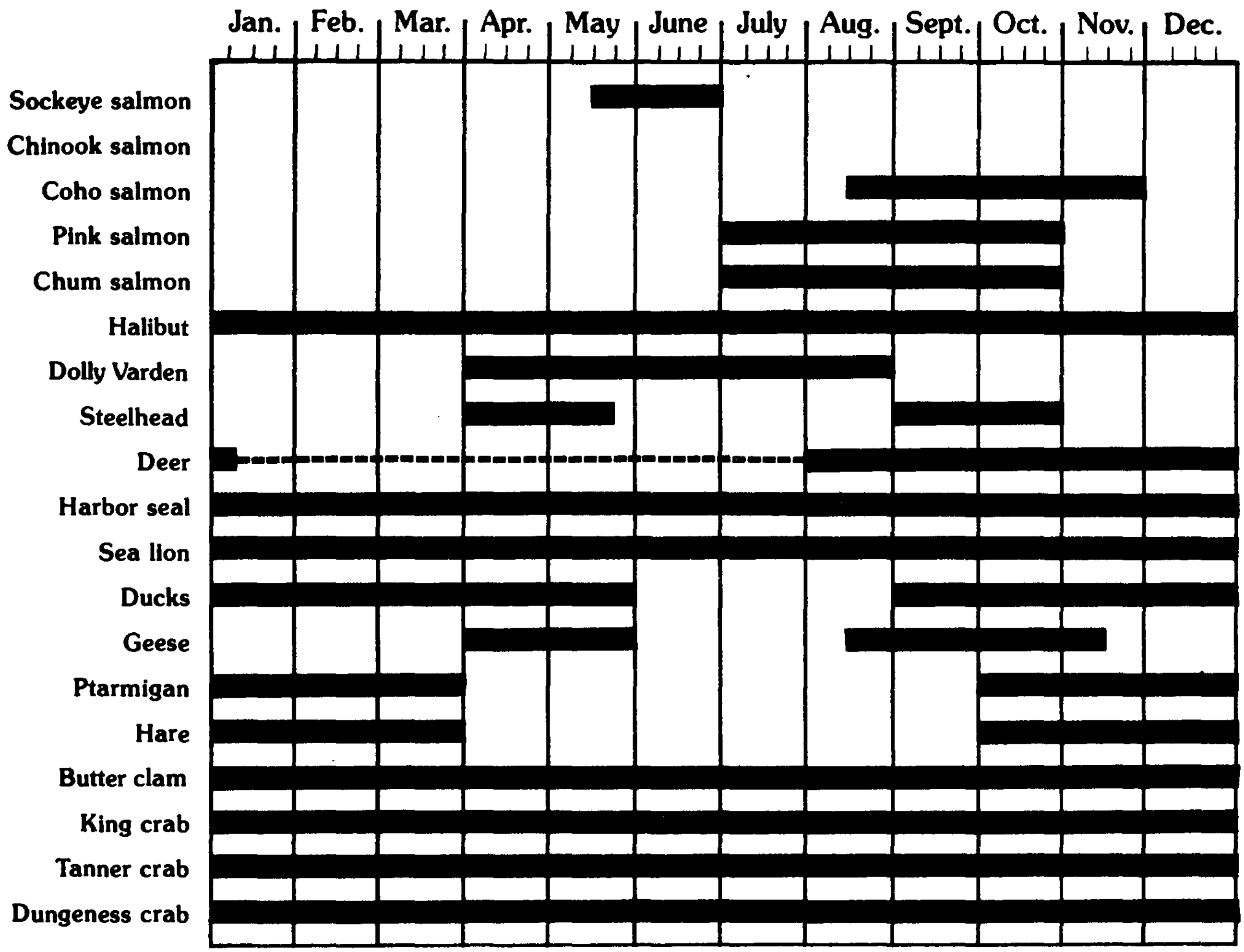


Figure 18. Seasonal round of resource harvests, Ouzinkie, 1982-1983. Fiaure represents time period when some harvest may occur and does not indicate intensity of harvest effort. Dashes indicate harvest has not been documented but may occur. Seasonal round data for other species is on file with Div. Subsistence, ADF&G (1983 field interviews, ADF&G, Div. Subsistence).

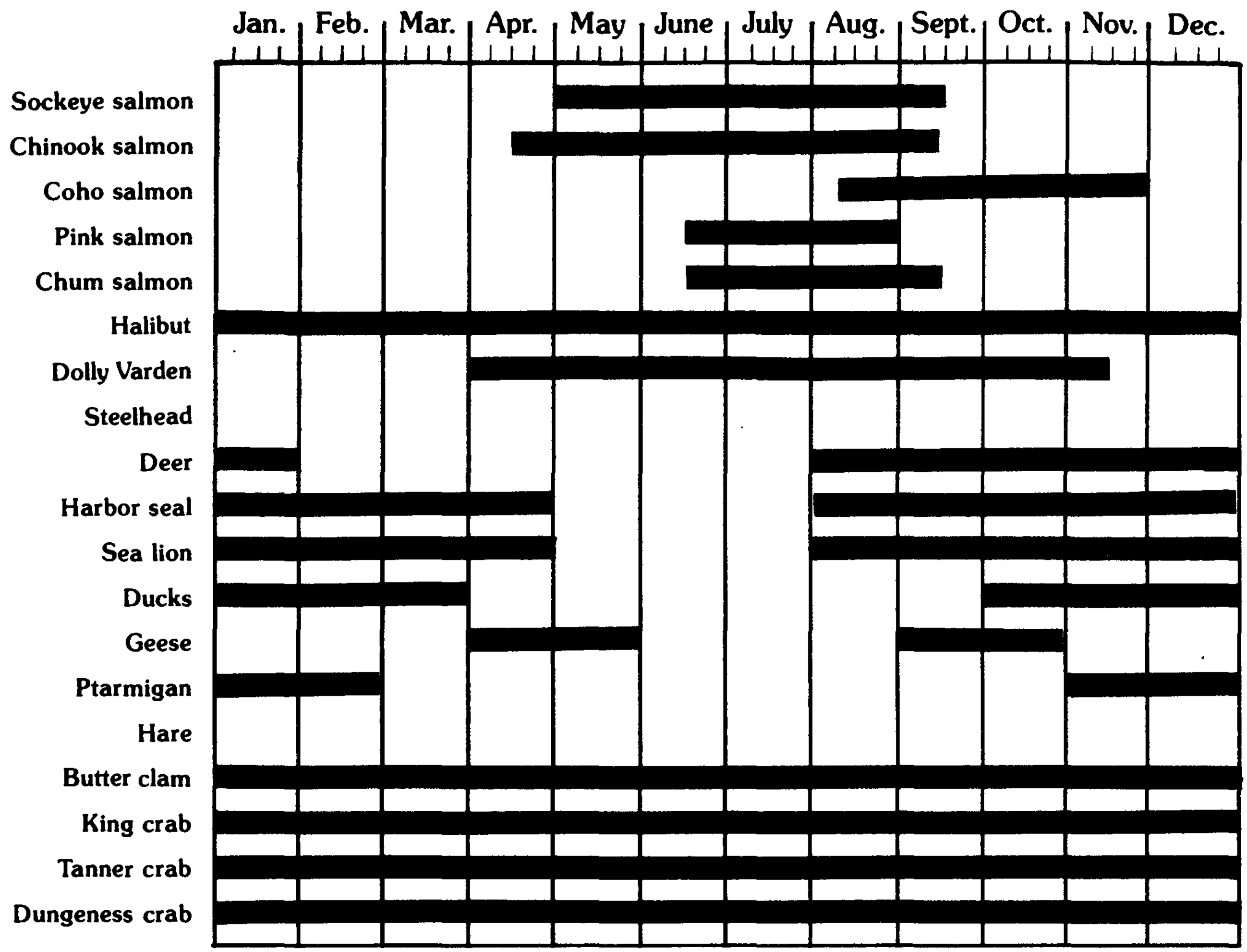


Figure 19. Seasonal round of resource harvests, Port Lions, 1982-1983. Figure represents time period when some harvest may occur and does not indicate intensity of harvest effort. Seasonal round data for other species is on file with Div. Subsistence, ADF&G (1983 field interviews, ADF&G, Div. Subsistence).

Aleutian/Pribilof Islands Subregional Assessment

I. LOCATION AND ENVIRONMENT

The Aleutian-Pribilof islands subregion includes the islands in the Aleutian chain from Unimak Island in the east to Attu Island in the west and St. Paul, St. George, and the small islands in the Pribilof Islands group. Akutan, Atka, Nikolski, St. George, St. Paul, and Unalaska are communities with year-round civilian populations. Although not permanently inhabitated, Attu is considered a home island by a number of people with historic and cultural ties to these places. The United States military bases at Adak Station and at Shemya Station are staffed on a year-round basis with military personnel. The information in this section is drawn primarily from recent studies completed in the communities of Atka, St. George, St. Paul, and Unalaska. Only limited data on the contemporary use of fish and game are available for Akutan and Nikolski. Although hunting and fishing by military personnel could be significant on islands accessible from military bases, no data are available concerning use of fish and game by military personnel based in the Aleutians.

Information on Cold Bay, Sand Point, False Pass, and other communities located on Unimak Island and those parts of the Alaska Peninsula that are part of the Aleut culture area are presented in the lower peninsula subregional narrative. Natives of those communities are also Aleuts and share a common culture and many common patterns of harvest and use of fish and game with Aleuts of the Aleutian chain and the Pribilof Islands.

The islands of the subregion are treeless and windswept and have variable topography. Communities are typically extremely remote even by bush Alaska standards. Table 66 gives some intercommunity air travel distances. Intercommunity travel is particularly difficult because most interisland sea routes are exposed to the open ocean and because bad weather frequently limits air travel. No other area in the world is recognized as having worse weather in general than the Aleutian Islands (Laughlin 1980).

Marine fish, marine mammals, marine invertebrates, and anadromous fish were the main resources used in the precontact period, and they continue to be the main resources harvested for food at the present time. The area of the Aleutian chain is particularly rich; upwelling of nutrients gives this area high biotic productivity. Important commercial fisheries have developed in the subregion to harvest crab and salmon.

Indigenous species of land mammals are limited throughout the subregion (see sections on distribution and abundance). Unimak Island is the natural limit of caribou, brown bear, wolf, wolverine, ground squirrel, and weasel. Almost all terrestrial mammals west of Unimak have been introduced by people. Only the fox is thought to be indigenous to a few of these islands. Barrenground caribou were established on Adak Island in 1958 and 1959. Reindeer were introduced to Atka Island in 1914 and to St. Paul and St. George in 1911; the Atka and St. Paul herds continue to be harvested. Reindeer herds were also established on Umnak and Unalaska. The St. George herd is being reestablished with reindeer from Umnak Island (Veltre and Veltre 1981, 1982; Aleutian Islands NWR Wilderness Study Report 1973).

Table 66. Intercommunity Distances, Aleutian/Pribilof Islands Subregion

Adak	to Atka	90 mi
Unalaska	to Nikolski	116 mi
Unalaska	to Akutan	35 mi
Unalaska	to St. George	320 mi
Unalaska	to Anchorage	792 mi
St. George	to St. Paul	40 mi

Source: ADCRA 1978.

The four Aleutian Islands communities of Atka, Akutan, Nikolski, and Unalaska are situated in locations that permit good access to marine mammal populations, clam beds and other concentrations of marine invertebrates, anadromous fish streams, and to marine fishing areas. Sea otter harvesting historically influenced village siting in the Aleutian Islands. Year-round communities were established in the Pribilof Islands by 1820 by the Russian-American company to facilitate harvesting of fur seals (Jones 1980); these communities later coalesced into the present day communities of St. Paul and St. George.

II. HISTORY AND PATTERNS OF HUMAN ACTIVITY

Aleuts are the Native cultural group present throughout the entire Aleutian archipelago. Aleuts also live in the Shumagin Islands and from Port Moller westward on the Alaska Peninsula (see Lower Peninsula subregional narrative for this area). Archeological data indicate that Aleuts were the sole inhabitants of this area for at least the last 4,000 years and probably for the last 8,500 years (Laughlin 1980). Data also show cultural stability over this time period related to continued reliance on marine resources and to geographic isolation limiting interactions with other cultures. The Pribilof Islands were uninhabitated before the Russian period, although they may have been visited by Aleut hunters (Veltre and Veltre 1981).

Aleuts are linguistically and culturally most closely related to Alaskan Eskimos, although divergence between Aleuts and Eskimos is estimated to have taken place about 9,000 years ago (Laughlin 1980). Linguistic differences existed between the Aleut dialects spoken in different parts of the Aleutian chain and the Alaska Peninsula. Western dialect was spoken in the Commander and Near islands, central dialect in the Rat and most of the Andreanof islands, and eastern dialect in the Fox Islands and Aleut areas of the Alaska Peninsula. The existence of these dialect differences indicates that travel and population movement may have been restricted (ibid.).

Table 67 outlines fish and game resources harvested and methods of harvest that are thought to have been used in the precontact period. Although it is difficult to determine the relative dietary importance of different resource categories from archeological remains and early Russian accounts, sea lion, seal, anadromous fish, halibut, cod, and marine invertebrates were probably important components in the Aleut diet (Veltre and Veltre 1982). Humpback and other whales were intercepted on their migrations through the Aleutian Islands (Laughlin 1980). Whale and sea otter hunting call for cooperation among groups of hunters, and these activities may have been important factors in Aleut social organization and in structuring Aleut social groups.

Vitus Bering first sighted the Aleutian Islands in 1741, and a steady stream of Siberian fur hunters and traders soon followed. Russian superiority in weaponry overcame fierce Aleut resistence to colonization and exploitation. A large portion of the Aleut population was killed in this early contact period (see population section below), and drastic social disruption took place. In the first 50 years of Russian occupation, known as the free trade period, Russian fur traders brutally mistreated the Aleuts and at the same time commanded their labor. Aleut men were forced to hunt sea otters and other furbearers for the fur traders and, after 1799, for the Russian-American Company. Even under the relatively benign company charters of 1821 and 1844, half the adult Aleut men of each community were required to work for three years for the company. The Russian-American company resettled the surviving Aleut population into communities located at or near the sources of furs and consolidated some villages for ease of administration. By 1834, in place of the hundreds of villages that existed at the time of contact, only 27 villages were inhabitated (Jones 1980); some of these remaining villages were at new locations chosen by Russian administrators.

Important breeding grounds for fur seals were discovered by Gerasim Pribilof in 1786 in the island group that came to be named for him. In early harvesting efforts, Aleut laborers were brought to the Pribilof Islands for the season and returned to their home villages for the winter. By the 1820's, however, permanent villages on St. George and St.

Table 67. Major Fish and Game Resources Harvested and Harvest Technology Used by Aleuts in the Precontact Period

Harvest Category	Harvest Technology
Offshore hunting for sea mammals, including whales, hair seals, sea lions, sea otters, and fur seals.	Sight and surround sea mammals with bidarkas or baidars. Kill with harpoon, spear, and club. Salvage of large whales that wash ashore. Possible use of aconite poison for whales.
Onshore hunting for sea mammals, including hair seals, sea lions, fur seals.	Surprise animals on shore or on small islands. Approach by foot or boat. Kill with spear, harpoon, and club. Possible use of nets.
Bird hunting on water for all all species of ducks.	Stalk birds on water surface. Kill animal with bird spear or arrow. Net birds on lakes from blinds.
Bird hunting at nesting sites for all species of nesting birds.	Bird cliffs approached by boat from below or by rope from above. Birds caught with snares, bolas, handnets, leisters, clubs, or by hand at nests and away from nesting areas.
Offshore fishing, halibut, cod, and other species.	Fish from boats with hook and line or leister.
Onshore fishing, primarily for salmon and Dolly Varden, but also for halibut, cod, and other species.	Fish with hook and line from shore. Fish with nets, leisters, weirs, and by hand at stream mouths and in streams.
Intertidal and beach collecting for marine invertebrates (many species), algae, washed up fish, sea mammals, and birds.	Beachcombing. Use of prying tool to loosen shellfish and octopus from rocks. Collection in grass baskets and gut and skin containers.

Source: Veltre and Veltre 1982, from McCartney 1977.

Paul islands had been established; most Aleut settlers in these villages originally came from Atka and Unalaska (Jones 1980, Veltre and Veltre 1981). The subsequent history of the people of the Pribilofs is different from that of other Aleut communities. Under both Russian and American political administrations, most aspects of Aleut life in the Pribilof Islands were determined by changing policies relating to fur seal harvesting. (See Jones 1980 for a detailed discussion of the Pribilof Aleuts under United States administration.)

Commercial sea otter hunting continued after transfer of the Aleutian Islands to American rule in 1867, but overhunting almost eliminated the species from the islands before hunting was prohibited in 1911. Whale hunting declined in the late 1800's because of commercial hunting of whale populations in the Bering Strait. Fur seals continue to be harvested in the Pribilof Islands.

During World War II, Aleuts were evacuated from St. Paul, St. George, Atka, Akutan, Nikolski, Unalaska, and other permanently inhabitated communites and were interred in camps in Southeast Alaska. Camp conditions were similar to those in internment camps for Japanese-Americans. Some villages were not reestablished after the war; this has resulted in further consolidation of the Aleut population into the present communities. Some Attu villagers were held as prisoners in Hokkaido by the Japanese until the end of the war.

Large-scale commercial fishing, particularly for king crab, has developed in the Aleutian Islands in the last 15 years. Dutch Harbor (Unalaska) has developed as a major important port for the fishing fleet active in the area. In years when the king crab harvest is good, Dutch Harbor ranks among the nation's top ports in terms of the value of fish and crab landed. Floating processors use Akutan Bay and other sheltered harbors in the chain. Area fisheries draw fishermen from many parts of Alaska and the Pacific northwest. Aleut participation in the fisheries has been limited in many communities, possibly because of the heavy capitalization for entry permits, boats, gear, and equipment required for participation in the area's fisheries.

III. POPULATION

Aleut subsistence technology was well developed and able to make efficient use of the abundant marine resources found in the island chain. This technology supported a population estimated to be about 16,000 at the time of contact (Laughlin 1980). Small communities of Aleuts existed on most of the islands of the chain. Uninhabitated islands were visited for resource harvesting. About 10,000 to 11,000 Aleuts lived in the Fox Island area, including Aleut parts of the Alaska Peninsula, 4,000 to 5,000 in the Rat and Andreanof islands, and about 1,000 in Near Island communities when the first Russian ships sailed into the Aleutian Islands (ibid.).

Open warfare with the Russians, the murders and robbery committed by Glotov, Soloviev, and Pushkarev, and the extreme disruption of harvesting activities and social order caused by the wholesale impressing of adult men into fur harvesting resulted in a drastic reduction in Aleut population. In addition, the Aleut population, because of its isolation for thousands of years, was particularly susceptible to Eurasian diseases and may have suffered great losses from influenza, measles, smallpox, and other diseases. As an example of this precipitous decrease in the Aleut population, the number of Aleuts in the Fox Island group declined from an estimated 10,000 to 11,000 at the time of contact to approximately 1,900 by 1790, and it is possible that 50% of this reduction occurred in the first 10 years of colonization, from 1760 to 1770 (ibid.). By the time of the earliest population surveys in 1825, after the Russians had been in the area for about 75 years, the total Aleut population had decreased from the estimated 16,000 to about 1,500 (Berreman 1953). The Aleut population has fluctuated since that time, but it has never recovered from the losses suffered in the 1700's.

Table 68 presents census data for the subregion from 1880 to 1980. Over this time period numerous communities have been abandoned, and there has been a further consolidation of population into the remaining six communities. Of the six communities, Atka and St. George have experienced population stability over the last 60 years. Akutan and St. Paul have experienced gradual growth, while the population of Nikolski has been declining. Changes in population in these communities appear to be the result of a combination of natural increase, movement of people within the subregion, and movement of Aleuts away from and back to the subregion (Langdon 1982). Many people leave the subregion for periods of time because of economic necessity. The population of Unalaska (including Dutch Harbor) has grown dramatically in the last 15 years. A major influx of people from outside the subregion to Unalaska has been taking place as commercial fishing activities develop. The population at the military bases at Adak Station and Shemya Station is determined by national defense policy rather than local considerations.

IV. USE OF FISH AND GAME AND OTHER NATURAL RESOURCES

A. Species Harvested

Tables 69, 70, and 71 present listings of species known to be used in the communities of Unalaska, Atka, and the Pribilof Islands, respectively. The listings for Unalaska and Atka are representative of species harvested in Akutan and Nikolski as well. Although marine and fish resources predominate in both the Aleutian and Pribilof

Table 68. Aleutian and Pribilof Islands Area Population, 1880-1980[a]

	1880	1890	1900	1910	1920	1929	1939	1950	1960	1970	1980
Adak Station										2,249	3,325
Akutan	140	80			66	71	80	86	107	101	169
Akoon[b]	55										
Atka	236	132			56	103	89	85	119	88	93
(Nazan)											
Attu	107					29	44				29
Avantanok	19										
(Avatanak)											
Borka	140	57									
(Biorka)					46	22	20				
Chernovsky	101	78									
Caol Harbor		15									
Dutch Harbor						17	52				
Ikatan Village								29			
Koshigin	74										
(Kashigin)		46									
(Kashega)						38	26				
Korovinsky	44	41									
Makushin	62	51					10				
Orlova	147										
(Eagle Harbor)											
Nikolski	127					109	97	64	92	57	50
Pirate Cove	7				98						
Sannak		132									
Senenovsky[b]		3									
Shemya Station										1,131	600
St. George	92	93		281	138		183	187		163	158
St. Paul	298	244		90	212		299	359	378	450	551
Squaw Harbor										65	
Umnak		91			83						
Unalaska		317	428			226	298	173	218	178	1,322
(Iliuliuk)	406			281							
Unimak						59	88				
Vosnesaensky	22	43									
(Wosnesenski)											
Other											39

Total Aleutian and Pribilof islands population, 1980: 6,326
Total Aleutian and Pribilof islands civilian population, 1980: 2,411

a The 1980 figures are from ADL 1981; other figures are from U.S. census reports compiled in Rollins 1978. Adak Station and Shemya Station have military populations only.

b These place names can not be positively identified in Orth 1967 but are likely to be located in the subregion.

Table 69. Fish, Game, and Plant Resources Known To Be Used in Unalaska, 1982[a]

Game	Intertidal
Sea lion	Sea urchin
Harbor seal	Razor clam
Fur seal	Butter clam
Porpoise	Cockle
Reindeer	Mussel
Ducks	Limpet
Geese	Chiton
Sea gull eggs	Dungeness crab
Other bird eggs	Shrimp
	Snail
Fish	**Plants**
Sockeye salmon	Blueberry
Chinook salmon	Salmonberry
Coho salmon	Mossberry
Pink salmon	Strawberry
Chum salmon	Lingberry
Dolly Varden	Wild celery
Halibut	Petrusky (wild parsley)
Cod	Morel mushrooms
Pogy (greenling)	Giant kelp
Sea bass	Fiddlehead fern
Pollock	"Mouse food"
Flounder	Yarrow

Source: Veltre and Veltre 1982.

a Other species may also be used; consult with local communities for definitive information. Fur seal hunting is presently prohibited by law in the Aleutian Islands; caribou may be hunted near Cold Bay. Ducks include mallards, teals, canvasbacks, scaups, goldeneyes, buffleheads, harlequins, scoters, eiders, and mergansers.

Table 70. Fish, Game, and Plant Resources Known To Be Used in Atka, 1983[a]

Game	Interdidal
Sea lion	Sea urchin
Harbor seal	Razor clam
Porpoise	Butter clam
Walrus	Cockle
Reindeer	Blue mussel
Ducks	Limpet
Emperor goose	Chiton
Sea gull eggs	Red chiton
Other bird eggs	Octopus
Fox	King crab
	Sea cucumber
	Sea anemone
	Sea snail
Fish	**Plants**
Sockeye salmon	Crowberry (mossberry)
Chinook salmon	Strawberry
Coho salmon	Wild celery
Pink salmon	Petrusky
Chum salmon	Wild rice
Dolly Varden	Yarrow
Halibut	
Cod	
Pogy (greenling)	
Pogy eggs	
Atka mackerel	
Yellow sculpin	
Herring	

Source: Veltre and Veltre 1983.

a Other species may also be used; consult with local communities for definitive information. Ducks include common eiders, mallards, scoters, mergansers, oldsquaws, harlequins, buffleheads, teals, ancient murrelets, king eiders, scaups, goldeneyes, horned and tufted puffins, ptarmigans, common loons, red-throated loons, and guillemots. Other bird eggs include eggs of eider, oystercatcher, puffin, and ancient murrelet.

Table 71. Fish, Game, and Plant Resources Known To Be Used in Pribilof Islands Communities, 1981[a]

Game	Intertidal
Sea lion	Sea urchin
Fur seal	Clams
Harbor seal	Mussel
Reindeer	Limpet
Murre and murre eggs	Chiton
Kittiwake and kittiwake eggs	Hair crab
Cormorant and cormorant eggs	Blue crab
Least auklets and least auklet eggs	Octopus
Lake ducks	Sea cucumber
Sea ducks	
Emperor goose	
Brant	
Sea gull eggs	
Fish	**Plants**
Halibut	Crowberry
Cod	Cloudberry
Sculpin	Raspberry
	Wild celery
	Sagebrush
	Yarrow
	Wild parsley
	Valerian
	Kelp and other seaweed

Source: Veltre and Veltre 1981.

a Other species may also be used; consult with local communities for definitive information. Lake ducks include mallards, pintails, shovelers, buffleheads, greenwing teals, Baikal teals, and other species. Sea ducks includes king, Steller, and common eiders, oldsquaws, harlequins, buffleheads, goldeneyes.

islands, there are significant differences between the two island groups in the marine and fish species that are locally present and in the species that are regularly harvested.

In Aleutian Islands communities, major use is made of the five species of salmon, Dolly Varden, halibut, and cod; clams and other marine invertebrates are other important components of diet. Sea lions and harbor seals are the most important sea mammals harvested, although opportunistic use may be made of fur seal, porpoise, and, occasionally, walrus. Ducks and geese are hunted in all communities, and bird eggs are gathered. Reindeer are harvested on those islands where herds have been established.

Salmon species and Dolly Varden are absent in the Pribilof Islands, and clams and other marine invertebrates are less abundant and less utilized than in the Aleutian Islands. Halibut, cod, and sculpin are the main fish species harvested. Fur seals are by far the most important marine mammal hunted, although significant numbers of sea lions are also taken. Harbor seals are of lesser importance. In addition to duck and geese hunting, people of the Pribilofs make major use of murre, kittiwakes, cormorants, and least auklets that nest on the islands; bird eggs of many species are gathered.

B. Seasonal Round of Harvest and Use

Figures 20, 21, 22, and 23 present data on the seasonality of harvests of major fish and game resources by Unalaska, Atka, Akutan, and Pribilof Island residents, respectively. Harvesting seasonality is probably similar in other subregional communities. Each figure depicts the time of year when some harvesting of a particular resource occurs. The figures indicate reported presence or absence of harvesting during a given time period; they do not show intensity of effort or importance of the resource.

While some resources may be harvested year-round, many of the most important resources can be harvested only during certain times of the year. The runs of salmon species in the Aleutian communities are of limited duration, with peak harvesting generally occuring between July and October. Harvest of ducks and geese in these communities likewise shows strong seasonality. In the Pribilof Islands, fur seals, perhaps the most important resource harvested both in terms of diet and cultural significance, are present only during summer months, and the harvesting season is limited by regulation to mid June to the beginning of August. A harvest limit of 350 adult fur seals for local consumption has been in effect for some time on St. George, despite local needs in excess of this (Veltre and Veltre 1981). Many bird species harvested in the Pribilofs may be harvested only for brief periods throughout the year. Although data are not available for all communities, harvest

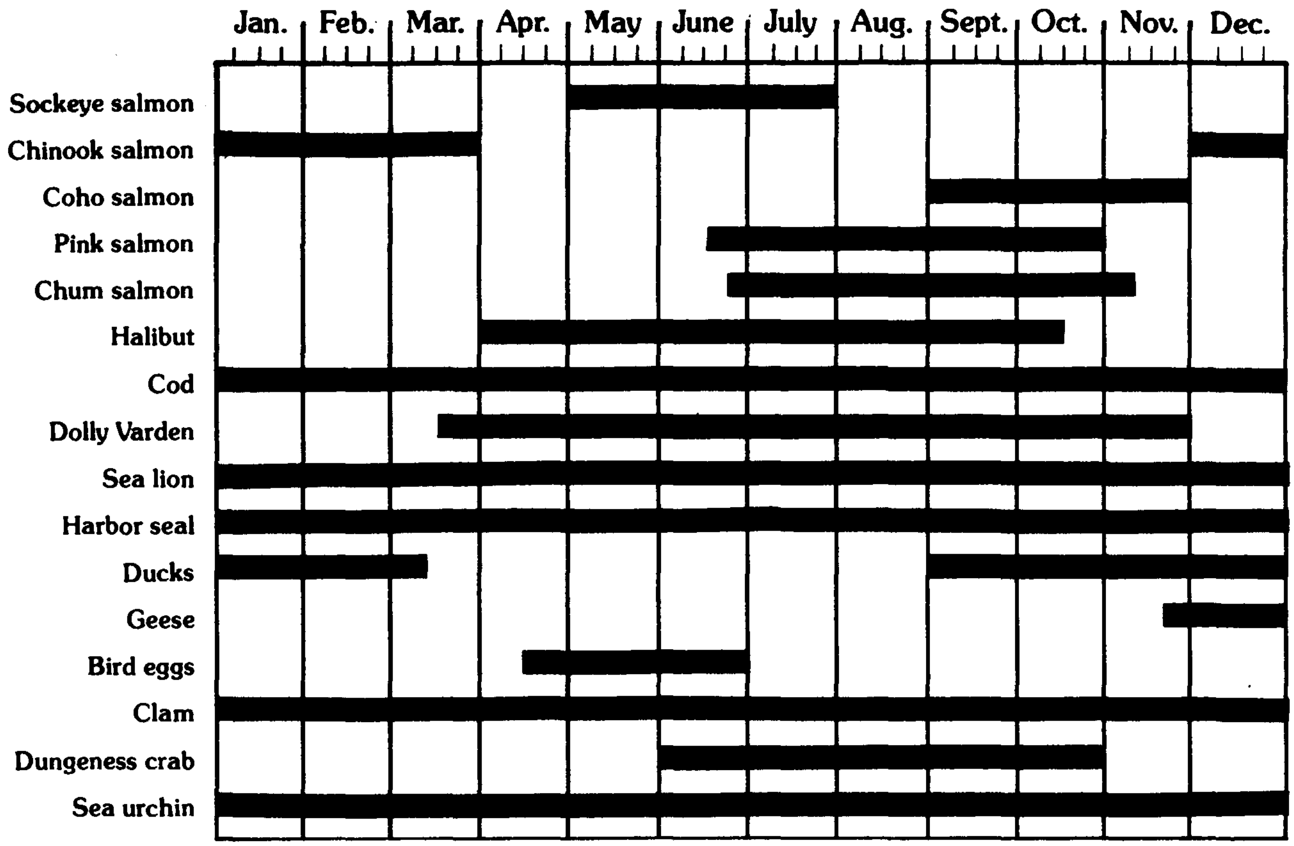


Figure 20. Seasonal round of resource harvests, Unalaska (Veltre and Veltre 1982).

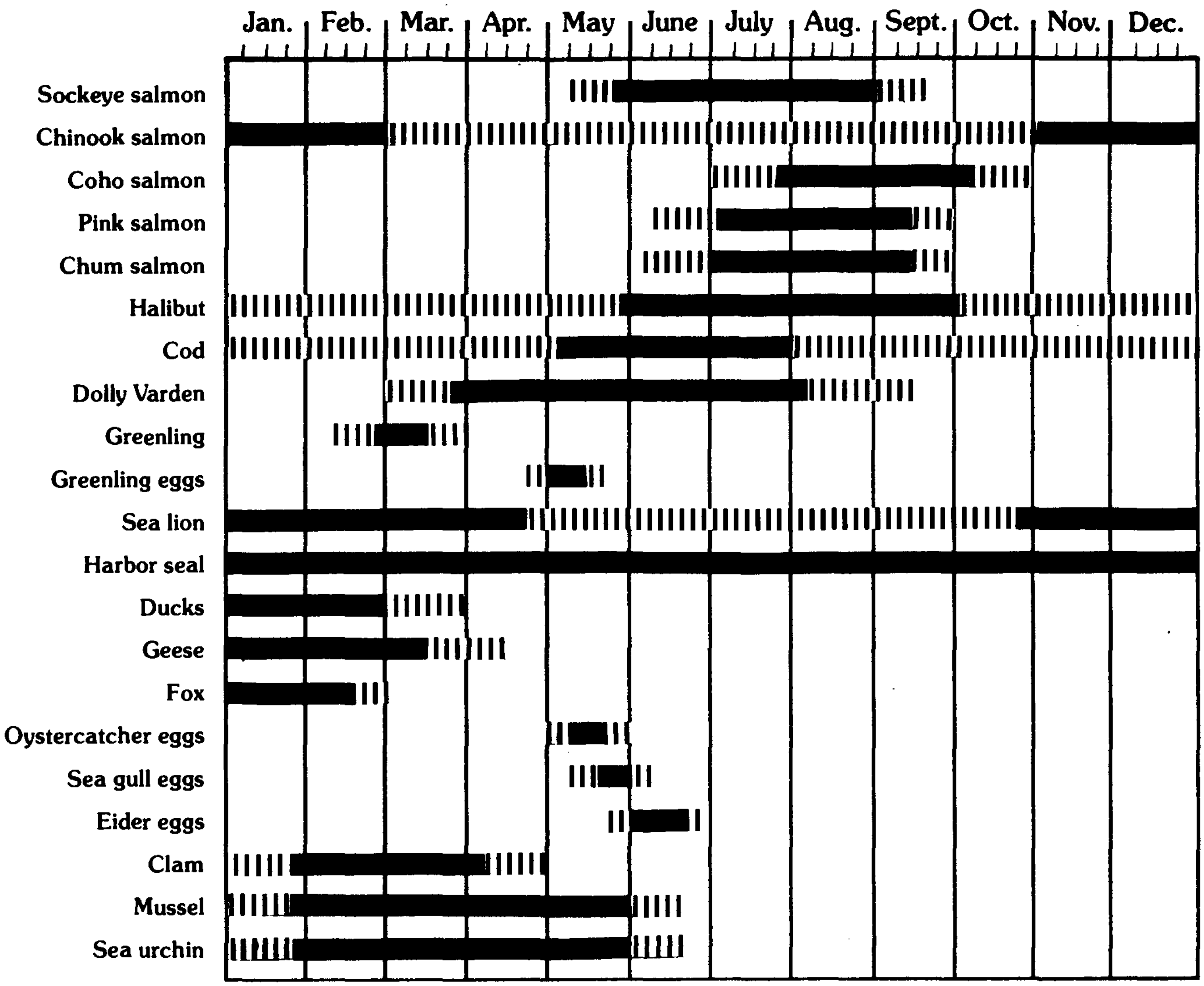


Figure 21. Seasonal round of resource harvests, Atka. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (Veltre and Veltre 1983).

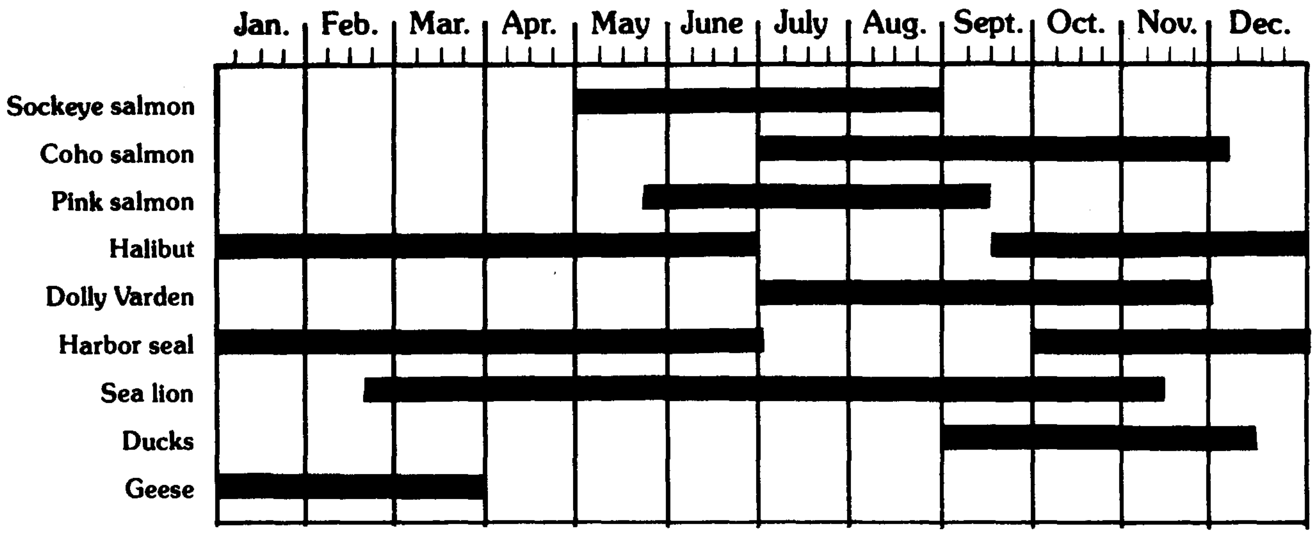


Figure 22. Partial seasonal round of resource harvests, Akutan (adapted from Spaulding 1955).

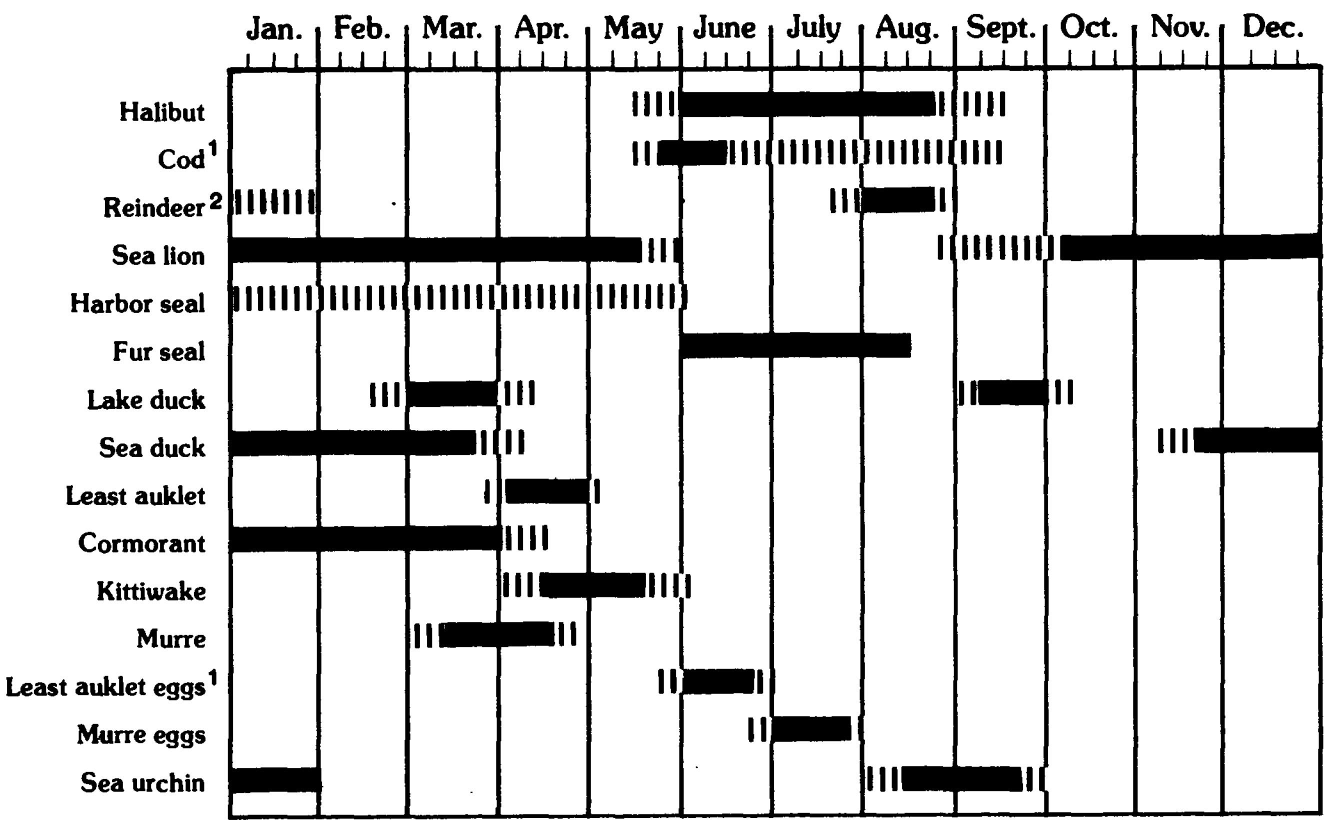


Figure 23. Seasonal round of resource harvests, Pribilof Islands. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort (Veltre and Veltre 1981).

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1. Resource is used primarily in St. George.
2. Resource is used only in St. Paul.

of sea lion, harbor seal, and halibut probably show strong seasonality throughout the subregion (Veltre and Veltre 1981, 1982, 1983).

C. Harvest Levels and Use of Fish and Game

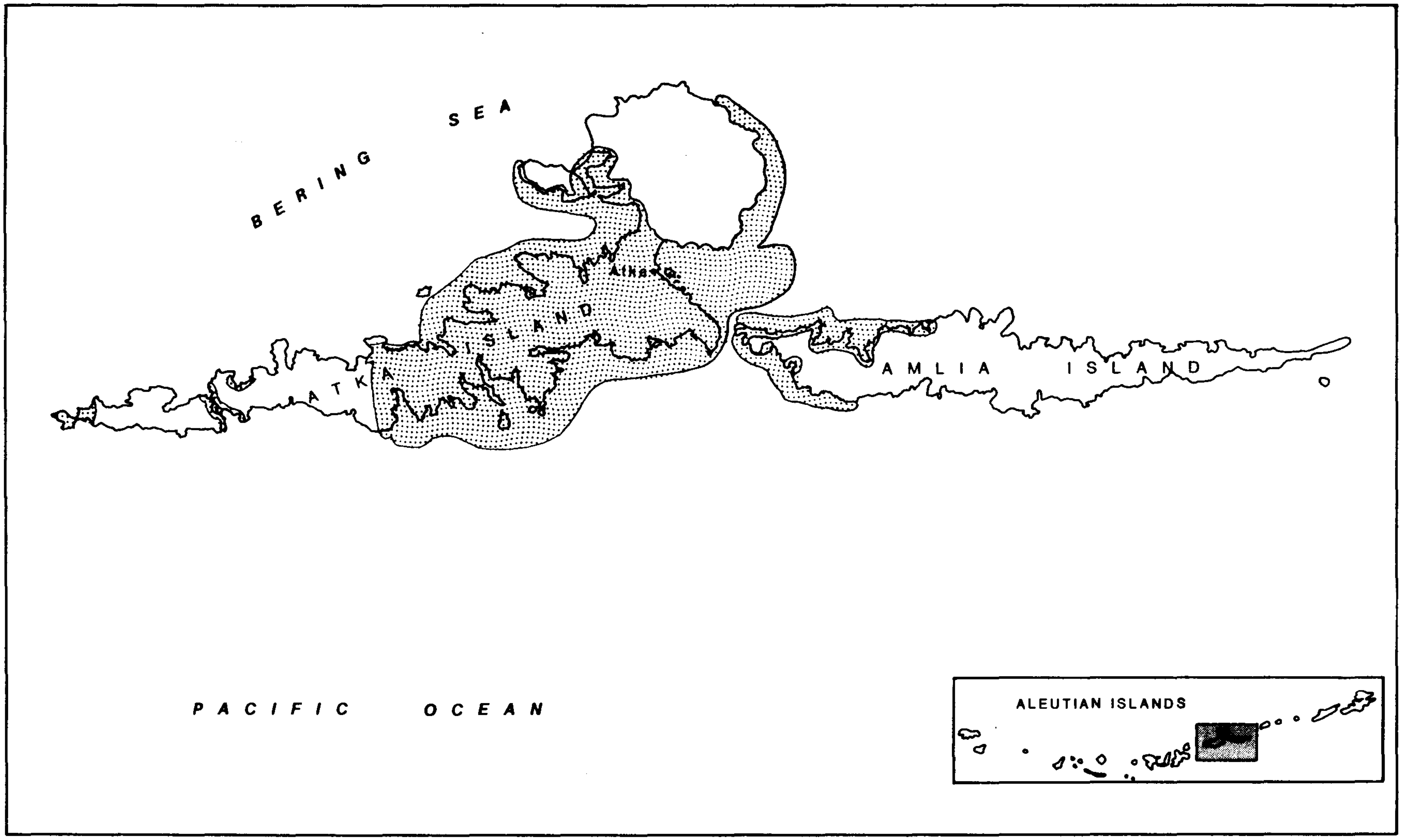
Systematic measurement of harvest and use levels of fish and game in the subregion has not been undertaken. Based on ethnographic accounts, however, high dependence on fish and game resources is characteristic of the subregion (see Veltre and Veltre 1981, 1982, 1983; Laughlin 1980; Jones 1969, 1980; Spaulding 1955; Berreman 1953; Jochelson 1968). This dependence is probably higher in Atka, Akutan, Nikolski, St. George, and St. Paul, where other food supplies are more expensive and often more difficult to obtain than in other communities.

Table 72 presents food weight estimates for the harvest of key fish and game species used on St. Paul and St. George. According to these estimates, seal, sea lion, halibut, and reindeer contribute about 1,700 lb food weight per year for each St. Paul household. Fur seal, sea lion, and halibut contribute about 1,150 lb food weight per year per household in St. George. About 50% of this weight in St.George and 60% in St. Paul is made up of fur seal meat. Residents of both communities harvest and use other resources as well (see table 71); cod, sculpin, ducks, geese, nesting birds, and marine invertebrates are reported to make significant contributions to diet (Veltre and Veltre 1981).

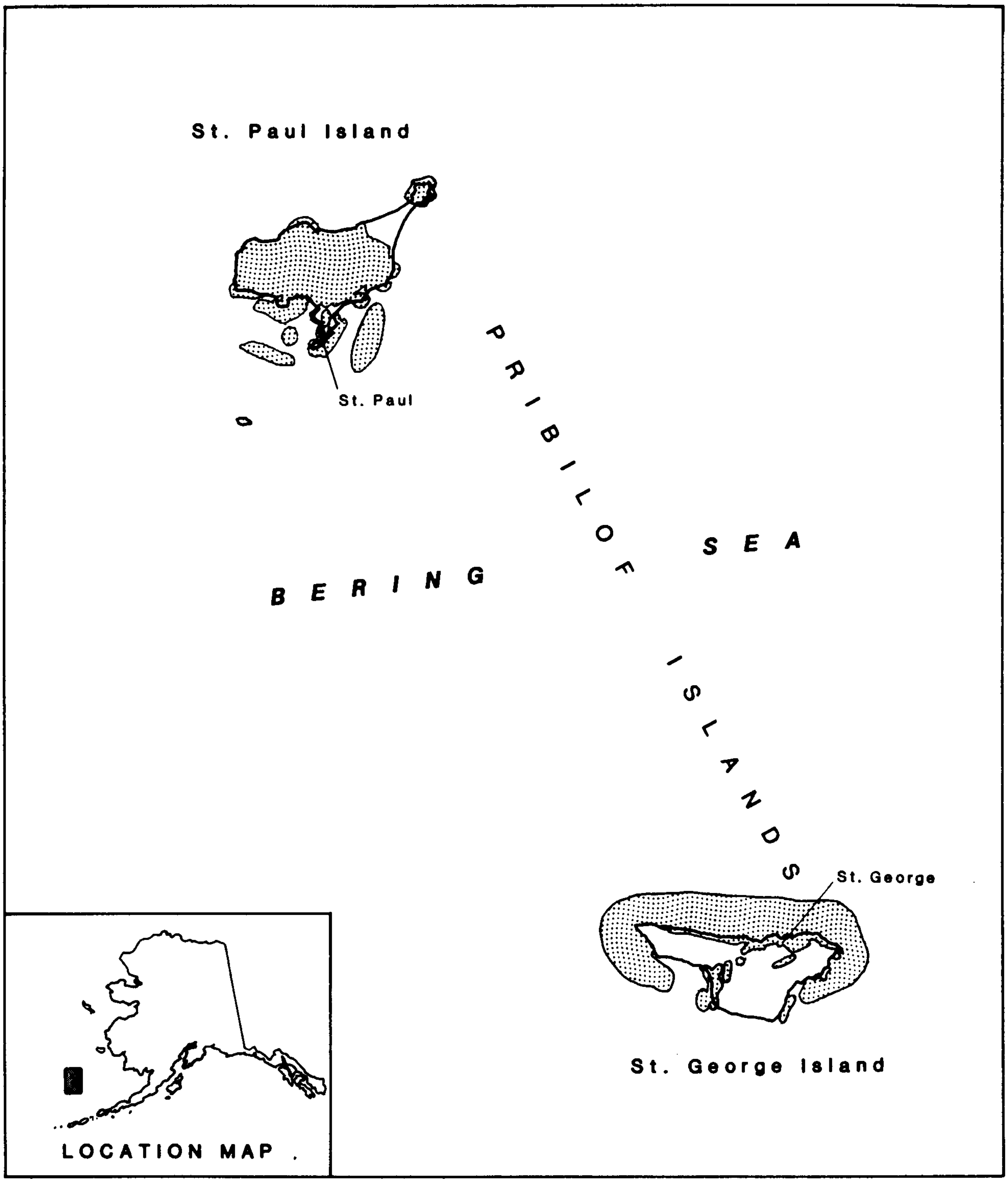
Quantitative harvest estimates are unavailable for other subregional communities. For Unalaska, Veltre and Veltre (1982) reported that, for non-Native residents, salmon was the resource harvested in greatest quantity, followed by halibut and shellfish. For Unalaska Natives, the rank ordering of resouces harvested was salmon, halibut, and either harbor seal or sea lion. From about 20% to 50% of the Native diet came from harvested resources. Non-Native dependency on harvested resources was generally lower than Native dependency (Veltre and Veltre 1982). From about 50% to 75% of the Atkan diet is reported to come from harvested resources in a typical year. Veltre and Veltre (1983) estimate that about 30 harbor seals and 100 reindeer are harvested by Atka residents per year.

D. Resource Use Areas

Areas used by residents of Atka, St. George, St. Paul, and Unalaska for noncommercial harvest of fish and game were mapped as part of research performed under contract with the Division of Subsistence, ADF&G (Veltre and Veltre 1981, 1982, 1983). Data are not available at the present time for Akutan and Nikolski. Mapped information on use areas is on file with the Division of Habitat, ADF&G.



Map 13. Aleutian-Pribilof islands subregion: areas used by residents of Atka for subsistence use of fish and game. Data depicted on this map are based on research conducted in 1974-1977, 1979, and 1983. Other areas may also be used for resource harvesting. Consult with the local community for definitive information (Veltre and Veltre 1983).



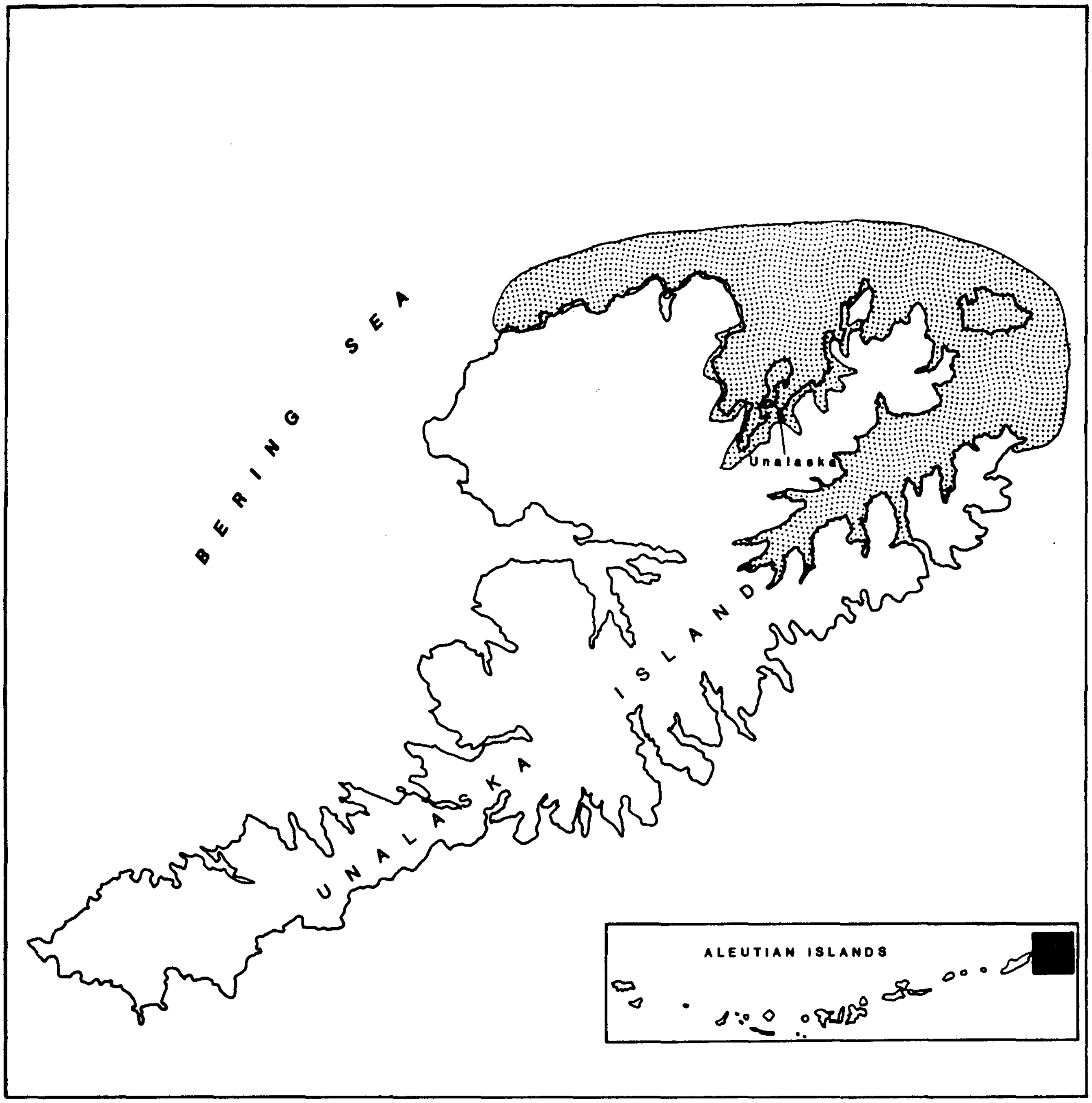
Map 14. Aleutian-Pribilof islands subregion: areas used by residents of St. Paul and St. George for subsistence use of fish and game. Data depicted on this map are based on research conducted in 1980 and 1981. Other areas may also be used for resource harvesting. Consult with the local community for definitive information (Veltre and Veltre 1981).

Table 72. Harvest Food Weight per Household, of Fur Seal, Sea Lion, Halibut, and Reindeer, St. Paul and St. George, 1981 Estimates[a]

St. Paul		St. George	
Population	551	Population	158
No. of Households	100	No. of Households	37
Fur seal, summer	320 lb	Fur seals, local harvest	331 lb
Fur seal, winter	700 lb	Fur seals, from St. Paul	230 lb
Sea lion	105 lb	Sea lion	324 lb
Halibut	513 lb	Halibut	270 lb
Reindeer	54.4 lb	Estimated total food weight per household	1,155 lb
Estimated total food weight per household	1,692 lb		

Source: Computed from Veltre and Veltre 1981 estimates.

a Food weight estimates are calculated from harvest estimates using standard conversion factors. Since many other species are harvested in both communities, totals reflect only a portion of food harvested from the wild.



Map 15. Aleutian-Pribilof islands subregion: areas used by residents of Unalaska for subsistence use of fish and game. Data depicted on this map are based on research conducted in 1982. Other areas may also be used for resource harvesting. Consult with the local community for definitive information (Veltre and Veltre 1982).

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Appendix 1. Survey Methodology

The following section summarizes the methodology followed in the KANA survey of fish and game harvest and use conducted on Kodiak Island in 1983.

1. The Kodiak Area Native Association (KANA) submitted the proposal, Subsistence Activity and Use Patterns Documentation Project, to the Bureau of Indian Affairs on February 25, 1983. This proposal called for gathering baseline data on noncommercial use of fish and game in the Kodiak archipelago. The Division of Subsistence, ADF&G, agreed to provide technical assistance for survey development, sample selection, training of interviewers, and processing of data. Following a meeting with KANA staff on March 24, 1983, the Subsistence Division prepared a draft questionnaire for use in the survey portion of the proposed research.

Interviewing in the six rural communities on Kodiak Island began in early May 1983 and was completed in five of the communities by the end of June 1983. Interviewing in Akhiok was completed in August 1983. In the non-road-connected area, the survey goal was to interview members of each household in each community. In these communities, survey attainment varied from 74% in Ouzinkie to 100% in Karluk based on the household census done at the time of the survey. Refusal rate was less than 9% in all communities. The most common reason for incompleted surveys was that residents could not be contacted during the survey period.

The survey procedure in the Kodiak road-connected area used a sampling methodology suitable to its large, complex population. In addition to the sample of the general population of the area, special sampling frames were set up to provide information about particular user groups. The following samples were selected:

a. Kodiak general sample. This sample was drawn from the total population of Kodiak City, Service Area One, Women's Bay, Bells Flats, and Monashka Bay, excluding the Coast Guard base. City and borough census figures and enumeration maps were used to draw a random sample of this population. Survey achievement was 78%, and refusal rate was 7%. No contact was made at 16% of the households after multiple attempts at different times of the day. (Because of rounding, percentages do not add up to 100.)

b. Kodiak Coast Guard. Contacts were made with the three base commanders, who agreed to send personnel to the base theater to complete survey forms. A random sample was drawn from command duty rosters. Because of duty obligations, however, some individuals selected in the sample were not able to complete surveys. The final Coast Guard sample was not strictly random.

c. Kodiak City Native. This sample was drawn from KANA lists of Natives residing in the Kodiak road-connected area. This was a representative sample of urban Natives, but it was not a strictly random sample.

d. Kodiak Filipino. This sample was drawn from lists of Filipino households prepared by the Filipino Community Association. The sampling was representative but not strictly random.

e. Kodiak Chiniak. This sample was based on a random draw from the resident population of the Chiniak area. Although refusal rate was low (less than 4%), interviewers were unable to contact about one-third of the target households.

Survey work in the Kodiak road-connected area was completed in June and July 1983. Statistical analysis of survey data was done by Bob Schroeder in consultation with James Fall of the Subsistence Division and Tom Peterson of KANA. Computer analysis was done on the University of Alaska computer system, using the Statistical Package for Social Sciences. This work was completed in November 1983.

Appendix 2. Data Transformations

1. Factors used to convert from numbers of animals to food weight, Kodiak Island survey, 1982-1983:

Species	Usable Weight	Source
Fish		
Sockeye salmon	4.21 lb	Conversion factors were derived by taking average round weights for fish caught commercially on Kodiak (ADF&G, 1982[a]) and multiplying these weights by standard factors used to determine food weight from round weight for salmon species (from Dean, pers. comm.). Factors used were: Sockeye .78; Chinook .73; Coho .75; Pink .85; Chum .73
Chinook salmon	12.92 lb	
Coho salmon	5.70 lb	
Pink salmon	2.72 lb	
Chum salmon	5.55 lb	
Herring	.50 lb	Researcher estimate.
Halibut	25.00 lb	
Cod	1.00 lb	
Flounder	1.00 lb	
Bass	1.00 lb	
Snapper	2.00 lb	
Dolly Varden	1.40 lb	Reported value (Behnke 1982).
Steelhead/rainbow	1.40 lb	
Pollock	1.00 lb	Researcher estimate.
Rockfish	2.00 lb	
Irish lord	1.00 lb	
Game		
Deer	43.20 lb	Estimates computed from information supplied by Smith, pers. comm.
Reindeer	62.50 lb	
Elk	225.00 lb	
Goat	61.50 lb	
Brown bear	300.00 lb	Researcher estimate based on hunter reports.
Moose	540.00 lb	Reported value (Behnke 1982).
Harbor seal	45.00 lb	Researcher estimate based on hunter reports. Also see reported live weights (Pitcher and Calkins 1979, Calkins and Pitcher 1982).
Sea lion	200.00 lb	

2. Extrapolation of survey data for all of Kodiak. The extrapolation of harvest figures and weights from sample data to the total census population of Kodiak required the following assumptions and calculatons:

a. It was assumed that households not surveyed had the same family size and harvest characteristics as households that were surveyed in each community or sample.

b. It was assumed that the rural population living away from surveyed communities had the same family size and harvest characteristics as the population living in rural communities who were surveyed.

c. Number of households in each category was determined by dividing the census population by the average household size of the surveyed population for each community or sample.

Community/Sample	Household Size[4]	Population[5]	Estimated No. Households
Akhiok	3.81	103	27.0
Karluk	3.95	102	25.8
Larsen Bay	4.16	180	43.3
Old Harbor	3.79	355	93.7
Ouzinkie	3.34	233	69.8
Port Lions	3.30	291	88.2
Kodiak City[1]	3.32	8,247	2,484.0
Chiniak/Pasagshak[2]	3.91	611	156.3
Coast Guard	2.41	1,995	827.8
Rural No Community[3]	3.63	597	164.5
Total	3.19	12,714	3,980.4

1 This area includes Kodiak City, Service Area One, Women's Bay, Bells Flats, and Monashka Bay.
2 Note that this projection is based on a very limited sample.
3 Note that no surveys were administered to this group.
4 Household size is based on survey data.
5 Population figures are from Kodiak City and Borough Census, 1983.

d. Harvest totals and harvest food weight in tables 60 and 61 were calculated by multiplying household harvest and harvest food weight figures from tables 49 through 52 derived numbers of households.

Species	Usable Weight	Source
Hare	2.00 lb	Reported values (Behnke 1982).
Ptarmigan	.70 lb	
Ducks	2.50 lb	Reported value (Thomas 1982).
Geese	5.00 lb	Reported value (Wolve 1979).
Bird eggs	.05 lb	Researcher estimate.
Invertebrates		
King crab	2.30 lb	Stratton, pers. comm.; Major, pers.
Tanner crab	1.60 lb	comm.
Dungeness crab	.70 lb	Also see reported commercial harvest weight (Nippes et al. 1983).
All clams, Cockles, Geoducks, Mussels, Gumboots, Sea urchins	5.00 lb/ 5 gal bucket	Researcher estimate, also pers. comm., Ron Stanek, ADF&G, for razor clams.
Octopus	4.00 lb	Researcher estimate.

These conversion factors were used to convert number of animals harvested to weight of usable meat or fish in pounds. Conversion factors are based on published reports of species average live weight or average harvest weight when these exist. In other cases the best estimates of field biologists, researchers, and community informants have been used. For fish species, conversion is based on headed, gutted weight of carcass. For game species, conversion is based on weight of meat and bones usually used by hunters after dressing, skinning, and trimming takes place.

Conversion factors are very conservative. In some communities use may be made of additional parts of fish and game species for human consumption, consumption by dogs and domestic animals, and for garden fertilizer.

Salmon Human Use: Subsistence Harvest

INTRODUCTION

Within the Southwest Region, all five species of Pacific salmon (chinook, chum, coho, pink, and sockeye) common to Alaskan waters are taken for subsistence purposes in each of the five commercial fisheries management areas. These areas include Kodiak, Chignik, Alaska Peninsula, Aleutian Islands, and Bristol Bay. Seasons, types of gear, and gear size vary among areas. Restrictions pertaining to subsistence salmon harvest are detailed in the annual subsistence regulations adopted by the Alaska Board of Fisheries. Briefly summarized, the lawful gear types authorized within one or more areas of the Southwest Region include drift gill nets, set gill nets, spears, and seines (ADF&G 1983).

The narratives that follow provide a brief, general description of the locations within each of the management areas where subsistence fishing for salmon occurs. The tables that accompany the narratives provide information on the subsistence effort. This information is based on 1) number of permits issued, 2) the number of families in the area who use subsistence-caught salmon, or 3) the area finfish management biologists' estimates generated from observation of and conversation with local subsistence fishermen. The tables also provide an estimate of the magnitude of the subsistence salmon harvest. This estimate is based on 1) catches reported by permit holders, 2) extrapolations of limited permit return information, or 3) area management biologists' estimates generated from observation of and conversation with local subsistence fishermen.

The documented harvest levels are conservative figures due to several factors. Many permit holders do not report their catches. Some persons harvest salmon without permits. Some fish taken in commercial fisheries are kept for personal use and are not reported. For these reasons a totally accurate accounting of the subsistence catch cannot be made, and it is likely that the figures are less than the total actual subsistence catch of salmon. The numbers, therefore, serve as estimates of the subsistence harvest.

Within the Southwest Region salmon subsistence harvest trends have been noted that frequently link subsistence effort with the commercial fishery. During 1974, early season commercial closures in most districts of Bristol Bay resulted in unusually high subsistence use of salmon resources (e.g., Nushagak-Togiak subsistence catches showed a 47% increase over the harvest in 1973) (ADF&G 1974b). In 1975, extensive closures of the commercial salmon fishery in the Chignik area resulted in subsistence effort and harvest that was over twice the historical norm (ADF&G 1975c). In 1980, subsistence harvest in the Nushagak portion of Bristol Bay increased significantly from that in 1979. The number of permits issued, however, did not rise proportionately. The increased fish harvest was probably due to a long price dispute early in the summer that precluded commercial fishing, a large salmon run, the free time for subsistence fishing, and the economic uncertainty resulting from the price dispute (ADF&G 1980b).

Conversely, it was noted that during 1978 the people on the Alaska Peninsula did not depend as much on subsistence fishing as normal because of record commercial catches that year (ADF&G 1978a). A more detailed discussion of the subsistence use of salmon is included in each of nine subregional subsistence human use assessments sections in this publication.

I. KODIAK MANAGEMENT AREA

Based on reported subsistence harvest information derived from permit return data, the Chiniak section of the General District and the East Afognak section of the Afognak District account for the majority of the salmon subsistence harvest in the Kodiak Management Area. Other important subsistence fisheries occur within the Alitak Bay section of the Alitak District, Uganik Bay in the Uganik Bay District, and the Sitkalidak section of the General District in the vicinity of Old Harbor (ADF&G 1982d; Manthey, pers. comm.).

Concentrated subsistence fishing effort is directed toward the early run of sockeye salmon and late run of coho salmon to the Karluk River. Much subsistence fishing also occurs on stocks of coho salmon in the vicinity of Spruce Island. On Afognak, significant subsistence fishing effort takes place in the vicinity of Afognak Bay (ADF&G 1978).
The majority of the salmon subsistence harvest in the Kodiak Area consists of sockeye, coho, and pink salmon. Sockeye salmon usually account for better than 50% of the annual reported subsistence catch. Incidental numbers of chum and chinook salmon are also taken.

Table 73 presents salmon subsistence harvest as documented in annual ADF&G commercial fisheries management reports for the Kodiak Management Area.

II. CHIGNIK MANAGEMENT AREA

The major subsistence fishery is located in the vicinity of Chignik Lagoon. Other reported subsistence harvest occurs near the village of Perryville and in Ivanoff Bay (ADF&G 1977d). Sockeye salmon is the major salmon species harvested in the Chignik subsistence fishery (Probasco, pers. comm.). Table 74 presents salmon subsistence harvest data as documented in annual ADF&G commercial fisheries management reports for the Chignik Management Area.

Table 73. Kodiak Management Area Subsistence Catch and Effort of Salmon Harvest (in Numbers of Fish)

Year	Permits Issued	Permits Returned	Catch[a]					Total[b]
			Chinook	Chum	Coho	Pink	Sockeye	
1973	400	149	7	1,166	2,289	1,393	4,453	9,308
1974	367	90	1	128	846	1,094	1,909	3,978
1975	508	90	1	221	922	947	1,141	3,232
1976	536	243	4	370	962	2,275	4,338	7,949
1977	739	451	54	317	2,508	2,849	8,119	13,847
1978	860	539	50	572	3,699	2,747	7,239	14,307
1979	1,085	697	111	333	3,840	3,300	10,376	17,960
1980	1,239	756	67	566	4,407	2,755	13,746	21,581
1981	1,166	733	44	470	3,729	2,278	12,756	19,277
1982	1,276	933	110	667	7,192	3,558	16,615	28,143

Source: ADF&G 1982d; Manthey, pers. comm.

a Figures presented in this table reflect only the harvest as reported on returned subsistence permits. No extrapolation of data has been made.

b More detailed subsistence harvest data is available in the annual management reports for the Kodiak Area, where district and section level specific information is presented.

III. ALASKA PENINSULA MANAGEMENT AREA

A. North Peninsula

Concentrated subsistence fishing effort occurs on the north side of the Alaska Peninsula in the Port Heiden vicinity and at Nelson Lagoon. Subsistence activity occurs on a smaller scale in the Ilnik Lagoon and at the Port Moller cannery (ADF&G 1978d). Coho, sockeye, and at times chinook salmon are the major species found in the North Peninsula subsistence catch.

B. South Peninsula

On the southside of the Alaska Peninsula important subsistence harvest areas are found in Cold Bay, Thin Point Lagoon, King Cove, False Pass, and at Sand Point (Shaul, pers. comm.). Sockeye and coho salmon dominate the South Peninsula catch, although numbers of pink and chum salmon are also included. Tables 75 and 76 present salmon subsistence harvest as documented in annual ADF&G commercial fisheries management reports for the Alaska Peninsula Management Area.

Table 74. Chignik Management Area Subsistence Catch and Effort of Salmon Harvest (in Numbers of Fish)

Year	Permits Issued or No. Families	Permits Returned	Catch					
			Chinook	Chum	Coho	Pink	Sockeye	Total
1973	29	?	0	705	264	720	3,160	4,849
1974[a]	35	?	100	900	600	100	3,500	5,200
1975[a]	55[b]	?	0	250	1,000	250	8,000	9,500
1976[c]	(50 families)	[d]	100	150	1,500	500	6,000	8,250
1977[c]	(90 families)	[d]	50	600	2,400	1,800	9,700	14,550
1978[e]	?	?	50	600	500	2,100	6,000	9,250
1979[e]	?	?	9	0	0	6	7,710	7,725
1980[a]	67	38	6	0	0	4	7,805	7,815
1981[a]	27	7	100	0	0	0	5,840	5,940
1982[a]	68	15	2	0	8	1	2,320	2,331

Sources: Years 1973-74: INFPC; all other years: ADF&G 1975c-1982c.

a Estimated total subsistence harvest extrapolated from limited permit returns.
b Estimated number of subsistence fishermen.

c All figures are very rough and include reported catch, people who probably took fish without a permit, people who had a permit and didn't return it, and fish (primarily chinook salmon) kept during commercial fishing.

d Estimated number of families that caught and used subsistence salmon.

e Estimated catch.

IV. ALEUTIAN ISLANDS MANAGEMENT AREA

Within the Aleutian Islands, the most intensive subsistence harvest of salmon occurs in Unalaska Bay. Other areas that depend heavily on subsistence fishing include Akutan Village on Akutan Island, Nikolski Village on Umnak Island, and Atka Village on Atka Island (Shaul, pers. comm.).

Pink salmon comprise the majority of the subsistence harvest of salmon in the Aleutian Islands, although sockeye and coho salmon are also taken in lesser numbers. A few chinook and chum salmon are also harvested. Table 77 presents salmon subsistence harvest as documented in annual ADF&G commercial fisheries management reports for the Aleutian Islands Management Area.

Table 75. Alaska Peninsula Management Area (North Side) Subsistence Catch and Effort of Salmon Harvest (in Numbers of Fish)

Year	Permits Issued or No. Families	Permits Returned	Catch: Chinook	Chum	Coho	Pink	Sockeye	Total
1973[a]	?	?	150	950	610	0	1,300	3,010
1973[b]	?	?	(200)	(1,000)	(700)	0	(1,400)	(3,300)
1974[a]	?	?	136	177	1,314	0	357	1,984
1975	27	?	106	86	331	1	570	1,094
1976	?	?	0	211	276	0	432	919
1977[c]	8	5	15	6	66	0	93	180
1978[c]	13	9	69	12	318	0	330	729
1979[d]	(13 families)		500	50	300	0	250	1,100
1980[d]	(13 families)		500	0	600	0	300	1,400
1981[d]	(21 families)		550	0	750	0	900	2,200
1982[e]	(38 families)		30	0	1,500	0	800	2,330

Source: ADF&G 1973a-1982a.

a Numbers and species estimated in consideration of species available and success of permittee (where known).

b Figures in parenthesis () reflect estimated actual catch.

c Catch reflects only data from returned permit reports.

d Figures are a guess based largely on approximate number of families, the time that commercial strike ended, and the magnitude of runs (primarily chinooks).

e Figures are a guess, based largely on approximate numbers of families and verbal conversation with several individuals.

V. BRISTOL BAY MANAGEMENT AREA

Within the Bristol Bay Management Area subsistence catches of salmon normally range between 100,000 and 200,000 fish each year. Prime areas where significant subsistence fishing is conducted are the Lake Iliamna-Lake Clark drainage in the Naknek-Kvichak District and the Nushagak and Togiak district drainages (ADF&G 1975b).

Table 76. Alaska Peninsula Management Area (South Side) Subsistence Catch and Effort of Salmon Harvest (in Numbers of Fish)

Year	Permits Issued or No. Families	Permits Returned	Catch					Total
			Chinook	Chum	Coho	Pink	Sockeye	
1973[a]	?	?	0	840	795	125	140	1,900
1973[b]	?	?	(100)	(1,000)	(800)	(150)	(250)	(2,300)
1974[a]	?	?	0	1,811	550	580	2,131	5,072
1975	61	?	4	818	676	1,662	1,367	4,527
1976	?	?	0	208	338	350	409	1,305
1977[c]	42	26	7	545	1,377	122	620	2,671
1978[c]	10	4	2	44	37	18	15	116
1979[d]	(55 families)		50	350	1,150	500	1,550	3,600
1980[d]	(85 families)		100	500	1,800	900	2,400	5,700
1981[d]	(76 families)		10	1,000	2,200	500	2,800	6,510
1982[d]	(85 families)		20	300	3,550	1,700	1,600	7,170

Source: ADF&G 1973a-1982a.

a Numbers and species estimated in consideration of species available and success of permittee (where known).

b Figures in paranthesis () reflect estimated actual catch.

c Catch reflects only data from returned permit reports.

d Figures are extrapolated from permit returns.

Historically, large numbers of fish were taken for feeding dog teams. This practice was greatly reduced with the introduction of the snowmachine but has begun to increase again with the renewed interest in dog racing and sport mushing (ADF&G 1982b). In addition, an increasing local population, better reporting, and a considerable number of nonwatershed residents (e.g., Anchorage and other Southcentral Alaska residents) who come to the area to participate in the harvest have caused the catch to gradually increase in recent years (ADF&G 1980b, ADF&G 1982b).

Competition for the resource and for fishing space resulted in regulation changes in 1981 for the Naknek River drainage and the Iliamna-Lake Clark drainage that restrict the issuance of salmon subsistence permits to only those persons domiciled in those areas. The watershed residency restrictions apply only to subsistence permits (ADF&G 1982b).

Table 77. Aleutian Islands Management Area Subsistence Catch and Effort of Salmon Harvest (in Numbers of Fish)

Year	Permits Issued or No. Families	Permits Returned	Catch: Chinook	Chum	Coho	Pink	Sockeye	Total
1973[a]	?	?	0	0	60	450	60	570
1973[b]	?	?	0	0	(100)	(500)	(100)	(700)
1974[a]	?	?	0	0	220	627	50	897
1975	12	?	0	125	168	906	27	1,226
1976	?	?	1	41	58	459	356	915
1977[c]	33	17	0	1	36	1,138	166	1,341
1978[d]	25	15	0	0	325	1,020	28	1,373
1979[e]	(54 families)		0	0	1,850	3,350	650	5,850
1980[e]	(72 families)		10	0	1,260	4,540	250	6,060
1981[e]	(102 families)		10	150	1,300	3,600	600	5,660
1982[e]	(92 families)		5	20	320	2,775	270	3,390

Source: ADF&G 1973a-1982a.

a Numbers and species estimated in consideration of species available and success of permittee (where known).

b Figures in parenthesis () reflect estimated actual catch.

c Catch reflects only data from returned permit reports.

d Catch from Unalaska only.

e Includes data from Unalaska-Dutch Harbor only. No data available from Atka, Nikolski, and Akutan, or the military bases. Figures are extrapolated from permit returns.

In 1982, a personal use fishery was allowed for the first time in Bristol Bay. This was a special fishery established by the Board of Fisheries to allow nonwatershed residents the opportunity to participate in times of surplus. The personal use fishery is restricted to the Naknek River and is not allowed until the upper range of the escapement goal has been reached (ibid).

All five species of salmon are taken in the subsistence harvest. Based on the numbers harvested, the vast majority are sockeye salmon, over 79%, based on the 10-year average catch for the years 1973-1982. Chinook and chum salmon each account for approximately 6% of the 10-year average catch, and pink salmon amount to slightly over 5% of the catch. Coho salmon amount to a bit more than 4% of the catch.

Table 78 presents the salmon subsistence harvest as documented in annual ADF&G commercial fisheries management reports for the Bristol Bay Management Area.

Table 78. Bristol Bay Management Area Subsistence Catch and Effort of Salmon Harvest (in Numbers of Fish)

Year	Permits Families	Catch[a]					Total[d]
		Chinook	Chum	Coho	Pink	Sockeye	
1973[b]	452	7,200	8,000	3,300	100	69,800	88,400
1974[b]	607	9,900	12,700	7,100	6,200	149,800	185,700
1975[c]	701	8,600	7,500	8,500	1,300	175,400	201,300
1976[c]	716	8,400	9,100	3,500	4,400	120,900	146,300
1977[c]	738	7,000	9,100	6,600	300	127,900	150,900
1978[c]	773	8,100	16,200	4,400	12,700	127,600	169,000
1979[c]	829	10,300	7,700	7,300	500	116,500	142,000
1980[c]	1,243	14,100	13,100	7,300	10,000	168,600	213,100
1981[c]	1,112	13,000	11,500	2,200	2,600	132,100	171,400
1982[c]	806	13,700	12,400	11,500	8,600	110,800	157,000

Source: ADF&G 1982b.

a Catches rounded to nearest hundred fish.

b Data expanded to include all family units of the area.

c Data derived from subsistence permits only and extrapolated to account for permit reports not returned.

d More detailed subsistence harvest data are available in the annual management reports for the Bristol Bay area, where district catch and river system specific information is presented.

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Subsistence Economies

INTRODUCTION

This section presents information on the significant contribution made to the economies of Southwest Alaska communities by the subsistence use of fish, game, and other renewable resources. Subsistence uses are integral parts of community economies in much of the Southwest Region, and they parallel and complement commercial fishing, trapping, and other commercial uses of fish and game. Subsistence uses are frequently overlooked in economic analyses because these uses of natural resources are not priced in commercial markets and are not reported as individual income nor as community revenue. The fish and game taken for customary and traditional uses are usually highly valued components of subsistence socioeconomic systems in communities of the Southwest Region. In many communities, fish and game taken for subsistence uses are harvested in large quantities and supply a major portion of the food consumed (see table 79). In other communities, where the absolute quantities of subsistence foods used are lower, subsistence harvest and use may continue to be important in organizing the community economy and maintaining social and cultural continuity.

The analysis undertaken in this section assesses the role of subsistence harvest and use of fish and game in the economy of communities of the Southwest Region. Because subsistence economy has a different relationship with cash and markets than other beneficial uses of resources, there are no widely accepted direct methods for calculating the "dollar value" of subsistence or subsistence economic components, as might be done for other economic sectors. In addition, because subsistence is inherently a nonmonetary activity, analysis of subsistence economy draws heavily on methods and concepts from social anthropology. Methods of assessing the economic importance of subsistence are being developed by the Division of Subsistence and will be reported subsequent to this guide.

As well as providing data, this section includes an examination and analysis of definitions and characteristics of subsistence economies. The different meanings given to subsistence and the subsistence economy share some common features, the most important of which concern the traditional use of fish and game resources.

As shown below, the concept of subsistence has legal standing in state and federal law and regulatory significance in the management of fish and game and land and water resources in Alaska. It plays a central role in the socio-cultural understanding of Alaska Native cultural groups and is central to Native Alaskans' ethnic identity and view of their own cultures and to the lifestyle and relationship to the natural environment of many non-Native

Table 79. Mean Per Capita Food Weight (in Pounds) of Subsistence Harvest of Fish and Game, Southwest Region Communities, Most Recent Data[a]

Community	Per Capita Food Weight/ Year of Data	Source
Togiak subregion		
Manokotak	373 (1973)	Gasbarro and Utermohle 1974, based on household survey
Togiak	---	
Twin Hills	---	
Nushagak River subregion	1,034 (1973)	
Ekwok	---	Gasbarro and Utermohle 1974, based on household survey for 1973 data; Wright, reported in Wolfe 1983 for 1983 data, based on household survey.
Koliganek	---	
New Stuyahok	843 (1973), 896 (1983)	
Portage Creek	---	
Nushagak Bay subregion	354 (1973)	
Aleknagik	---	Gasbarro and Utermohle 1974, based on household survey
Clarks Point	---	
Dillingham	---	
Iliamna Lake subregion	736 (1973)	
Igiugig	---	Gasbarro and Utermohle 1974, based on household survey for 1973 data; Behnke 1982, based on household surveys for 1980 and 1981 data
Iliamna	---	
Kakhonak	---	
Levelok	---	
Newhalen	---	
Nondalton	803 (1973), 1,038 (1980), 738 (1981)	
Pedro Bay	---	
Upper Peninsula subregion	165 (1973)	
Egegik	---	Gasbarro and Utermohle 1974, based on household survey for 1973 data; Morris, pers. comm., for 1981 and 1982 data, based on limited sample
King Salmon	---	
Naknek	---	
Pilot Point	---	
Port Heiden	---	
South Naknek	328 (1981), 227 (1982)	
Chignik subregion	598 (1975)	
Chignik	---	Tuten 1976, based on household survey
Chignik Lake	---	
Chignik Lagoon	---	
Ivanoff Bay	---	
Perryville	---	
Lower Alaska Peninsula Subregion	---	
Cold Bay		
False Pass		
King Cove		
Nelson Lagoon		
Sand Point		

(continued)

Table 79 (continued).

Community	Per Capita Food Weight/ Year of Data	Source
Kodiak subregion		
Akhiok	518 (1983)	KANA 1983 and Schroeder 1984, based on comprehensive household survey
Karluk	834 (1983)	
Larsen Bay	400 (1983)	
Old Harbor	463 (1983)	
Ouzinkie	358 (1983)	
Port Lions	262 (1983)	
Kodiak road-connected area	143.1 (1983)	
Aleutian/Pribilof Islands subregion		
Adak Station	---	Computed from data found in Veltre and Veltre 1981, based on household survey
Akutan	---	
Atka	---	
Attu	---	
Nikolski	---	
Shemya Station	---	
St. George	270 (1981)*	
St. Paul	307 (1981)*	
Unalaska	---	

Source: See the subregional narrative sections for more complete data on harvest.

* Calculation does not include all species known to be used on St. George and St. Paul.

Alaskans. The purpose of this section is to provide the best available information that may inform the planning process about different aspects of the subsistence economy in Alaska.

Since the subsistence hunting and fishing economy of Southwest Alaska functions in close relationship with a cash economy that also may be based on resource harvesting, baseline data on the community cash economy, including commercial fishing, are also provided here.

The first part of this section presents an overview of the characteristics of subsistence economy drawn from social science literature and from research in Alaska. The second part presents research findings on the relationship between subsistence and cash economy in Southwest Alaska. The final part reviews the legal and regulatory treatment of subsistence.

I. SUBSISTENCE SOCIETY, CULTURE, ECONOMY

Anthropological literature, including both case studies of individual societies and theoretical publications, provides the principal data sources for describing general characteristics of subsistence hunting, fishing, and gathering. This literature portrays subsistence as being a characteristic of a community, society, or culture and does not define subsistence solely in terms of the actions or behaviors of an individual person or household. Research reports produced by the Division of Subsistence are the main sources for data on recent subsistence economies in Alaska and, in particular, the geographical area covered by this guide book. Although both sets of literature are reviewed below, original sources should be consulted when feasible. See the bibliographies in Lee and Devore (1968), Moran (1981), Smith (1983), Sahlins (1972), Winterhalder and Smith (1981) for references to the world literature on hunting and gathering economies and Anderson (1982, 1983), ADF&G (1984), Langdon and Worl (1981), Langdon (1984), McMillan (1982), and Wolfe and Ellanna (1983) for bibliographic references on subsistence economies in Alaska.

A. Subsistence Characteristics

1. Domestic mode of production. Anthropologists studying subsistence hunting, fishing, and gathering societies have tended to see the economies of these societies as differing dramatically from those of cash-and-market-oriented societies. Sahlins (1972) summarized existing work done on the economy of small-scale societies that are peripherally connected to world market systems. He examined work and production in simple societies, with specific interest in how much work people have to do to meet their needs and how food produced was shared and exchanged within communities. This work led to the formulation of the idea of the "domestic mode of production" and to an interest in delineating the ways in which this mode of production differs from that found in the economies of large-scale societies. Some of the more important characteristics of the domestic mode of production were seen to be the following:

   - Maximum use of resources available does not take place; this may give the appearance of underproduction.

   - Work load appears to be light by modern industrial standards.

   - Production is usually organized by kinship group.

- Except for division of labor by gender and age, there is little economic specialization.

- Production technology is simple and small-scale.

- Systems of distribution and exchange of harvested resources are integrated with kinship, social organization, and social institutions.

- Production is overwhelmingly directed toward domestic use rather than exchange.

- Surplus production is collectively distributed within the kinship-based domestic unit, typically a network of households.

(The above description of characteristics is adapted from Sahlins 1972.)

2. Economics of small-scale societies. Social science research has found that subsistence production, distribution, and exchange in small-scale societies usually resembles the model proposed by Sahlins. Most descriptive analysis of hunting, fishing, and gathering societies that have included economic data have tended to focus on access to resources used, harvest and storage techniques and strategies, distribution and exchange of harvested foods, and the interplay of food-producing activities with environment, culture, and social organization (see Oswalt 1967 or Lee 1979 for examples of this approach). Some recent theoretical approaches building on earlier descriptive ethnography have attempted to explain or predict aspects of hunting, fishing, and gathering social and foraging behavior using human ecology models (Cashdan 1983, Johnson 1982) or optimal foraging models drawn from evolutionary ecology (Smith 1983). In neither the descriptive nor the theoretical efforts have there been systematic attempts to utilize many of the tools of economic analysis developed for studying economies with well-developed cash and market exchange systems. Specifically, social scientists approaching analysis of hunting, fishing, and gathering societies from many theoretical perspectives have not found attempts to translate or reduce subsistence utilization of natural resources to monetary or marketplace economic terms to be productive.

3. Subsistence distribution and exchange. Langdon presents a useful review of general social science research and theory relevant to subsistence economies in his treatment of subsistence distribution and exchange (Langdon and Worl 1981). In his review he delineated economic differences between

subsistence and market-economy activities reported in the literature and pointed out that subsistence systems have been seen to have the following distribution and exchange characteristics:

- Production of subsistence products is primarily for consumption by the harvesting household or kinship group.
- Distribution of subsistence products is carried out through traditional noncommercial (nonmonetary) channels.
- Consumption of most items produced takes place within the kinship group or the community.
- Resources are harvested mainly from local and regional areas near the resident community.
- Production and distribution of subsistence products are organized to provide for household and community security and for continued cultural existence rather than to maximize individual gain or greatest possible yield, given available labor and technology.

(The above description of characteristics is adapted from Langdon and Worl 1981.)

4. Mixed, subsistence-based economies. Lonner (1980) presents a summary of existing literature on subsistence as an economic system from the point of view of policy implications for management of fish and game. He also notes characteristics of a subsistence system.

   Wolf et al. (1984) review the literature on the social change of subsistence societies and develop a theoretical position on the relationship between the domestic mode of production and the industrial-capital mode of production. This review and development of theory occurred as a component of a field study that included two Southwest Alaska communities, New Stuyahok and Togiak. This work postulates that these communities and other communities in Western Alaska that were part of this study have mixed, subsistence-based economics. These economies include a "mix" of subsistence harvest and use of fish and game with cash-economy activities. Cash-generating economic activities in communities of this type include wage employment and production for market sale, with commercial fishing the most important cash-generating activity. Community economies are "subsistence-based" in that subsistence harvest and use are the most reliable or consistent economic activities that take place. In this type of economic system, households commonly have members who participate in both subsistence and cash-economy activities during the year. The eight characteristics of mixed, subsistence-based economies were found to be as follows:

(1) Communitywide seasonal round of fishing and hunting activities for subsistence use: Subsistence harvest and use varies seasonally with distribution and abundance of fish and game species.

(2) Large diet breadth relative to fish and game species available: A large proportion of available food species are utilized.

(3) High overall harvest and use level: Resources harvested make a significant contribution to the support of individual households and the community as a whole. Fish and game supply a majority of meat, fish, and fowl used on a household and community basis.

(4) Noncommercial distribution and exchange networks: Harvested fish and game is distributed between households and between communities.

(5) Traditional systems of land tenure and use rights: Customary law defines access to resource harvest areas and sites such as traplines, fish camp sites, set net sites, and community hunting areas and regulates the resource harvest activities by members of the local social group.

(6) Time allocation: A significant amount of time is spent harvesting and processing subsistence fish and game.

(7) Complementary cash and subsistence activities: Cash income is used to purchase supplies needed for subsistence hunting and fishing; commercial fishing boats and gear may be used for subsistence. Subsistence harvest and use may compensate for uncertain cash income and difficult logistics for importing food.

(8) Domestic mode of production: The organization of subsistence production follows that described by Sahlins (1972).

5. Economies of Southwest Region communities. Review of data presented in subregional narrative sections of this guide indicates that most communities in the Southwest Region have mixed, subsistence-based economies. The military bases at Adak and Shemya have an economy external to the region. King Cove, Sand Point, Unalaska, and possibly some other Southwest Region

communities have mixed economies based on commercial fishing, with active subsistence components. The Kodiak City area and Dillingham have complex economies that include commercial fishing, commerce, government, and other wage employment; however, harvest of fish and game for food in these communities shares many of the characteristics of mixed, subsistence-based economies. Cold Bay and King Salmon have economies based on military and FAA employment.

B. Subsistence Interaction with Cash Economy

In general, delineating the relationship between subsistence and cash-generating economic activities within a community or region has proved to be more problematic than determining characteristics of a subsistence economy. On the one hand, subsistence hunting, fishing, and gathering activities have been found to have significantly different characteristics from cash-generating activities. On the other hand, all existent hunting, fishing, and gathering activities have a cash component and must articulate with cash economies or the market sector of mixed economies. It costs money to engage in subsistence activities; cash outlays for hunting and fishing equipment and supplies may be major expenses in household budgets. In addition, modern political realities do not permit subsistence societies to remain in isolation but require subsistence hunters, fishermen, and gatherers to interact with larger economic structures.

1. Political economy. Two major approaches have been used for analyzing the interaction between subsistence economies and other types of economic systems. In the first, which could be called a political/economic approach, power relationships between the subsistence group and the encompassing cash-oriented society are examined from a historical perspective. Overall, the major aim here is to understand how control over land or access to natural resources by Native or aboriginal people living in small-scale societies has changed through interaction with (and often domination by) larger, more powerful societies (see Leacock and Lee 1982). In most cases in the world where this cultural contact has taken place, traditional and customary subsistence resource use has been severely restricted or even eliminated. In the minority of cases, the political/economic approach examines ways in which Native or aboriginal people have managed to maintain their subsistence economies in the face of external sociopolitical forces (see Asch 1982, Feit 1982, Usher 1981). The political/economic approach examines the interaction between smaller subsistence societies and larger and more powerful cash-oriented societies. Change in the subsistence society

takes place more as an outcome of political struggle, commonly fought in the economic arena, than as the result of cultural contact processes such as acculturation or the diffusion and borrowing of cultural traits.

Thorough analysis of the political economy of subsistence in Alaska has yet to be done. Federal and state laws and regulations have an important impact on the way subsistence interacts with the larger economic system and will influence the future of subsistence societies in rural Alaska. The more influential recent laws and regulations are outlined below. A political/economic approach would examine, in part, how political and policy decisions that affect subsistence are made.

2. Anthropological models. The second approach uses models of social and cultural change, cultural contact, and acculturation. This approach, underlying most applied social science research conducted in Alaska, addresses an array of interrelated questions. What subsistence harvesting and use activities are presently occurring in a given community? What are the levels of harvest and use? How are subsistence foods distributed within a social network? What geographic areas are used for subsistence activities? What is the relationship between commercial fishing and subsistence? How do families meet both their cash and subsistence needs? What changes in the subsistence system are taking place? These are the types of economic questions typically asked in Division of Subsistence research and in subsistence research conducted by other agencies.

II. RESEARCH ON SUBSISTENCE ECONOMIES IN ALASKA

The relationship between subsistence and cash economies has been a component in many of the 107 technical papers published since 1980 by the Division of Subsistence and also has been central to studies conducted in the Canadian Arctic (see Berkes 1981a, 1981b; Freeman 1981; James Bay and Northern Quebec Native Harvesting Research Committee 1980, 1982). Both qualitative and quantitative research has been undertaken. Space does not permit thorough review of this literature, but some of the more important research findings are presented below. Where possible, studies drawn from the Southwest Region will be cited or described. Central research questions pertaining to subsistence have been addressed under the following five headings:

(1) Household income: What are the relationships, if any, between household or personal cash income and subsistence use of fish and

game resources? As household income changes, what happens to traditional subsistence uses and dependencies?

(2) Community income and financial status: What are the relationships, if any, between the general level of financial well-being in a community and subsistence use of fish and game? What happens to patterns of subsistence use of fish and game in more prosperous communities?

(3) Social changes: Is the customary and traditional use of fish and game for subsistence increasing, decreasing, or remaining stable in a particular community or region? What are the main sources for change operating in subsistence economies?

(4) Cash and subsistence economic activities: How are cash and subsistence activities integrated at the household and community level?

(5) Subsistence importance: What is the importance of subsistence harvest and use of fish and game in Southwest Alaska? What is the socioeconomic value of this harvest and use?

A. Household Income and Subsistence Harvest and Use

1. A major research finding has been that there is no simple relationship between cash income, at either the household or the community level, and subsistence use of fish and game. Statistical analysis of data sets based on household surveys in Kodiak Island communities and in Sitka showed no consistent correlation between income and harvest level measures (Schroeder, unpubl. data). Data based on field interviews and observations in all Kodiak communities, in Togiak and New Stuyahok, and in communities in other regions of Alaska indicate that within a given community the households harvesting relatively larger amounts of fish and game are often households that have relatively larger cash incomes as well (Wolfe 1979, Wolfe and Ellanna 1983, Wolfe et al. 1984, Schroeder 1984).

   A number of factors may be responsible for this association. Quite often, individuals and families who are successful at their subsistence pursuits are generally successful in the local social and economic arena.

2. Family development cycle. Other income and harvesting differences may be related to cycles of familial development. Both the ability to produce cash income and subsistence harvest and the need for cash and subsistence foods vary over this developmental cycle (Wolfe et al. 1984).

Newly married couples and households with small children tend to have moderate subsistence food needs, based on the size of the household, and tend to have low incomes. Their harvesting activity is often limited because they lack financial resources to own and operate the gear needed for subsistence and because there are typically only one or two active hunters and fishermen in households of this type. At this stage, households often receive assistance from kinsmen in meeting both subsistence food and cash needs.

Further on in the developmental cycle, household size and the need for subsistence foods typically increase with the maturation of the residential unit, and the proportion of active subsistence harvesters and processors increases. Because there are more potential workers to pool incomes, cash income is higher for these households, and they are likely to be able to buy and maintain the boats, snowmachines, and supplies needed for effective subsistence harvest. These households often supply other households with subsistence foods and with purchased items.

Older couples and households with incomplete work forces, such as those headed by single mothers, tend to have lower overall demand for subsistence foods and lower incomes. Because they have few active hunters and fishermen, they usually harvest less than other households and often depend on households with active hunters and fishers for much of the subsistence foods they consume (Wolfe et al. 1984).

B. Community Income and Subsistence Harvest and Use

Subsistence harvest data do not show that communities with higher monetary income harvest smaller amounts of subsistence resources. No regular relationship exists between overall harvest and use level (table 79) and income level (table 80) in southwest communities where data are adequate for making comparison. In point of fact, very high levels of subsistence harvest are found in certain communities that earn high incomes from commercial fishing in particular years. In a recent study completed in the Western and Southwest regions, Togiak and New Stuyahok were found to have similar patterns of subsistence production and distribution. New Stuyahok harvested a mean of 750-800 lb of subsistence fish and game per capita, indicating high dependence on these resources. Subsistence patterns of the two communities were virtually identical des-

Table 80. Mean Family Income, Southwest Region Communities, 1970, 1978, 1980

Community	X Income 1969	X Income 1978	X Income 1979
Togiak subregion			
Manokotak	4,677	11,547	34,204
Togiak	6,084	8,686	17,559
Twin Hills	5,620	---	12,071
Nushagak River subregion			
Ekwok	8,415	8,247	14,649
Koliganek	11,377	10,980	17,379
New Stuyahok	3,767	10,512	22,503
Portage Creek	---	---	17,675
Ushagak Bay subregion			
Aleknagik	4,955	16,608	49,842
Clarks Point	25,250	13,445	13,306
Dillingham	9,988	17,882	40,006
Iliamna Lake subregion			
Igiugig	9,257	---	49,804
Iliamna	12,550	13,052	6,877
Kakhonak	---	8,645	6,133
Levelok	7,045	7,684	55,499
Newhalen	12,326	---	36,223
Nondalton	8,572	7,712	19,674
Pedro Bay	3,750	13,948	---
Upper Peninsula subregion			
Egegik	5,358	6,795	57,367
King Salmon	12,844	16,918	29,681
Naknek	12,484	13,317	64,259
Pilot Point	9,483	12,050	31,517
Port Heiden	4,625	9,843	32,860
South Naknek	4,875	11,725	52,500
Chignik subregion			
Chignik	21,053	25,766	40,000
Chignik Lagoon	---	26,426	31,690
Chignik Lake	3,478	---	9,804
Ivanoff Bay	---	---	24,369
Perryville	11,608	26,366	14,306
Lower Alaska Peninsula subregion			
Cold Bay	16,151	16,271	32,391
False Pass	18,790	20,343	34,226
King Cove	8,699	20,677	30,924
Nelson Lagoon	22,575	34,292	7,082
Sand Point	6,968	27,034	86,246

(continued)

Table 80 (continued).

Community	X Income 1969	X Income 1978	X Income 1979
Kodiak subregion			
Akniok	7,836	5,529	10,738
Karluk	19,500	7,960	6,526
Larsen Bay	14,400	9,071	23,907
Old Harbor	10,386	14,387	17,804
Ouzinkie	10,439	11,397	38,104
Port Lions	11,216	13,613	25,710
Kodiak City	13,211	17,049	39,101
Kodiak Station (Coast Guard)	9,360	---	19,957
Aleutian/Pribilof Islands subregion			
Adak Station	9,332	23,100	21,499
Akutan	5,820	7,294	5,326
Atka	1,578	8,456	12,222
Attu	---	---	---
Nikolski	6,189	8,742	8,366
Shemya Station	---	---	---
St. George	10,306	16,359	24,680
St. Paul	13,150	14,376	26,611
Unalaska	5,893	16,423	33,987

Source: Data for 1969 and 1979 are from USDC, 1971, 1981, and are based on the 1970 and 1980 censuses; data for 1978 are from ADR 1981 and are based on individual federal income tax returns. Note that 1979 was a record-breaking year for red salmon fishing in Bristol Bay; family income was unusually high in that year.

pite very different household incomes in the year of the study, Togiak with $42,546 per household and New Stuyahok with $14,527 per household for 1982 (ibid.). Harvest levels in Kodiak non-road-connected communities were lower than those for Togiak and New Stuyahok despite generally lower incomes. High levels of subsistence use are found throughout the Southwest Region, and intercommunity differences do not seem to be directly related to mean community income.

C. Social Change

1. Change in harvest and use of fish and game. Research conducted throughout Alaska indicates that subsistence use of fish and game continues to be of high economic significance in most rural communities where studies have been done based on harvest and use levels, social and cultural emphasis, and general conformance to the Joint Boards of Fish and Game subsistence criteria. There has been no general trend away from dependence on subsistence resources. Some specific changes in harvest and use,however, have been noted:

    (1) Replacement of working dog teams with snowmachines in the

late 1960's and early 1970's resulted in a major decrease in the harvest magnitude of certain species of salmon and other resources that were used as dog food in mainland Southwest Alaska (Pelto 1973, Wolfe 1979).

(2) Throughout the Southwest Region increased mobility resulting from the recent change to snowmachines and the earlier change to use of outboard motors has meant that hunters and fishermen may use home communities more efficiently as bases of harvesting rather than fishing, hunting, and trapping camps. In general, better means of transportation has compensated for the forced sedentariness that took place due to state educational laws requiring children to attend schools.

(3) Certain subsistence foods are commonly preserved by freezing now that rural electrification has reached many remote communities. Other methods of preservation, including smoking and drying, continue to be used.

(4) The expansion of the Sitka deer population on Kodiak Island in the last 15 years has resulted in increased subsistence use of that species, particularly in Akhiok, Karluk, Larsen Bay, and Old Harbor. The decline in the moose population on the Alaska Peninsula has limited use of this species.

(5) Poor snow cover has limited land hunting activity on the Alaska Peninsula and Kodiak Island in recent years.

(6) Trapping activity has fluctuated with changing prices for furs.

2. Continuity in harvest and use of fish and game. Although methods and means of harvest have often changed with the introduction of modern nets and firearms, aluminum boats, gasoline engines, and other equipment, there has been considerable continuity in many characteristics of subsistence economy (see section above), as closely as can be determined. Accounts of early subsistence hunting and fishing in Southwest Alaska are reported in VanStone (1967, 1971) for the Nushagak River area; Oswalt (1967) for the Yupik Eskimo cultural area; Laughlin (1980) for Aleutian Island Aleuts; Jochelson (1933) for Aleuts; Veltre and Veltre (1981, 1982, 1983) for Aleuts of Atka, Unalaska, St. George, and St. Paul; Dumond (1977) for Aleuts, Eskimos, and Koniag; and AEIDC (1975) for Koniag. Recent accounts of the same areas and ethnic groups are reported in Wolfe et al. (1984) for Togiak and New Stuyahok Yupik Eskimos, Behnke (1982) for Nondalton Dena'ina and the

Iliamna Lake area Yupik Eskimos, Veltre and Veltre (1981, 1982, 1983) for Aleuts of the Aleutian and Pribilof Islands, and KANA (1983) and Schroeder (1984) for Kodiak Island Koniag. Comparison of these accounts demonstrates substantial continuity over time. The common features frequently found in this comparison include the following:

- A large diet breadth of species harvested

- Customary land tenure systems for harvest sites and areas; communities located near good access to fish and game resources

- A seasonal round of harvest and use activities that is generally followed by community members

- Widespread exchange and distribution of harvested resources both within and between communities; sharing often central to both kinship and community social organization

- Traditional processing and preservation techniques for subsistence food

- Division of labor for doing subsistence work typically by age and by gender

- A major proportion of the local diet comprised of subsistence foods

D. Cash and Subsistence Economic Activities

Two recent major studies conducted by the Division of Subsistence addressed questions of the relationship between subsistence and cash economy. A study completed in 1983 examined the relationship between resource use and socioeconomic systems in nine communities and two larger areas spread throughout the state (Wolfe and Ellanna 1983). Nondalton was the community from the Southwest Region included in this study. The second study examined subsistence-based economies in coastal communities in Southwest Alaska with the specified purpose of looking at subsistence and cash economy interactions (Wolfe et al. 1984). Togiak and New Stuyahok, both located in the Southwest Region, were among the four communities included in this study.

The first study found that fish and game harvesting conformed closely to the "domestic mode of production" model described above in case studies done in Nondalton, Dot Lake, Tyonek, and Yukon River delta communities. In these communities, the integration of hunting and fishing with a cash economy was similar. The cash economy in these areas was found to offer few and sporadic job opportunities and low monetary incomes (table 80). Monetary income was used to support local subsistence hunting and fishing in the mixed subsistence-based economies of these communities (Wolfe and Ellanna 1983). Some of the highest harvest levels found in the state were reported for those communities (table 79).

Togiak and New Stuyahok, as well as the other two communities, Quinhagak and Goodnews Bay, where field work took place in 1983 for the second study, are in many ways typical of the small, relatively isolated Native communities found throughout the Southwest Region. Research findings from this specific study are indicative of the general relationship between cash and subsistence economies that probably exists in other communities in the region. Based on field work and analysis done in 1983 in each of the four study communities, Wolfe et al. (1984) reached the following main conclusions:

(1) Production for market trade has not interfered with the traditional seasonal round of harvest and use of fish and game, although residents of the four study communities have used imported harvest technologies and trapped and fished for commercial sale since the late 1800's.

(2) Current levels of market involvement and technological acquisition have not significantly disrupted the traditional subsistence economy.

(3) Traditional social organization at the household and community level continues to be strong. The incorporation of market production has not made the traditional social organization maladaptive or obsolete.

(4) Production for market sale, new harvesting and processing technologies, and wage employment have been integrated with the traditional subsistence economy. Households combine the economic activities of commercial fishing, wage employment, and subsistence harvest of fish and game in such a way that these activities are mutually supportive.

(5) A more differentiated local economic system was found to be one result of market involvement.

(6) There was no evidence of nucleation of the family unit or a restriction in the circle of obligations linking members of large extended families.

(7) There was no evidence of diminished subsistence production due to increased cash activities.

(8) There was no evidence of a reduced participation in subsistence distribution networks due to greater cash involvement.

(9) Among case study households, high involvement in commercial fishing or wage employment mixed with commercial fishing was associated with an increased breadth and number of subsistence and commercial fishing gear.

(10) Greater productivity in subsistence and cash-operating activities triggered certain economic leveling mechanisms, primarily the sharing of subsistence products and harvesting equipment with kinsmen within the community.

(11) Overall commercial fishing and wage employment have been integrated with traditional subsistence production and exchange in the study communities in such a way that they are mutually supportive. The cash-economy activities are accommodated within traditional subsistence production and distribution systems.

The relationships between subsistence and cash economies found to be operative in the study communities are probably similar to those that obtain in many other communities in the Southwest Region, most of which appear to have high involvement in traditional subsistence economic activities and limited wage employment and commercial fishing as the main sources of cash income.

E. Importance of Subsistence

The subsistence use of fish and wildlife species in the Southwest Region obviously has great value. When questioned about the importance of subsistence hunting and fishing, many residents quickly respond that subsistence is central to their "way of life." Although local residents are seldom analytical about it, clearly they are referring to the interconnected social, cultural, nutritional, and economic values embodied in hunting, fishing, and gathering activities. These values are expressed in many ways, through local residents' private and public words, by their expenditures of effort and money in subsistence activities, and in the ways they use, share, and distribute the products of these activities.

1. <u>Nutritional and economic value of subsistence harvest</u>. Unfortunately, these values are difficult to quantify and compare with values placed on fish and wildlife by other users or with activities that could preempt subsistence uses, such as resource development and land disposals. First, monetary terms are not appropriate measures because the goals of local

economic systems based on subsistence production are not to convert harvest of fish and game into remuneration, but to perpetuate the family and social group. Second, evaluation techniques used to date focus on the products of fishing and hunting, while ignoring the activities themselves -- the production, distribution, exchange, and consumption -- which are centered on use of these resources. These activities may be equally, if not more important than the value of the products themselves.

One obvious but very narrowly defined value of subsistence hunting and fishing is the nutritional quality of the product. The fish, sea mammals, land mammals, birds, and intertidal species harvested for food by residents in Southwest Alaska provide large quantities of high-quality protein, fat, and essential vitamins. Generally, these products are nutritionally superior to foods imported into the region. A much more complex marketing infrastructure and much higher monetary expenditures would be required to make imported foods available to all residents of Southwest Alaska.

As detailed in previous sections, subsistence hunting, fishing, and gathering are significant components of the village and regional economy. Monetary and subsistence income complement each other and together provide the basis for livelihood in many local communities. Without subsistence hunting and fishing, many communities in the Southwest Region probably could not continue to exist. If this were to happen, the costs to government from displacement of villages would include direct subsidies to help them survive or government support to build another regional economic base. One way of evaluating subsistence resources might be to estimate these costs to society if subsistence opportunities were foreclosed.

2. <u>Social, cultural, and psychological value of subsistence</u>. Not only do subsistence activities and products have nutritional and economic values, but they also are the basis of family and community organization in many areas of the Southwest Region. Family activities, particularly in the Yupik and Athapaskan communities, are centered around fishing and hunting. Families are bound together by the distinctive labor roles of men and women and different responsibilities of different age groups. The distribution and exchange of subsistence products link families and provide an expression of kinship ties and social order. They also provide social support and welfare to certain segments of the community, especially the elderly and the needy. The recruitment and deployment of cooperative groups, such as hunting partners and fishing crews, help integrate communities. It is the relations among people that wildlife

harvesting generates, not simply the relations between man and wildlife, that are important.

For the individual, fishing and hunting are the basis of psychological well-being and social adjustment. The roles of harvesting, processing, and distributing subsistence products are imbued with deep personal meaning for participants. These are based upon traditional values, belief systems, and idealogical structures that are culturally learned. Disruptions in hunting and fishing are likely to have profound psychological consequences for people who measure worth by the ability to provide their families and their community with wild foods. Disruption of subsistence hunting and fishing would also be likely to lead to disruptions of the family and social order, as manifested by indicators such as alcoholism, drug abuse, family disintegration, community violence, and declining welfare of the elderly. An accurate evaluation of subsistence use of fish and wildlife would have to consider the costs to government of maintaining family and community order and health in the absence of culturally meaningful subsistence activities.

In summary, the subsistence value of fish and wildlife is very great and cannot be reduced to simple substitutes. Any realistic assessment of value must address a much wider range of issues, including the questions of value to whom, the broad role of subsistence in local economies, societies, and cultures, and the potential costs to state and federal government of disruptions of subsistence activities.

II. LEGAL CONTEXT

A. Overview

1. Relevant laws. The State of Alaska Subsistence Law of 1978, the State of Alaska Boards of Fisheries and Game procedures of 1982, the Alaska National Interest Lands Conservation Act (ANILCA) of 1980, the Department of Natural Resources (ADNR 1982), and the Coastal Management Standards set forth the main legal and procedural treatment of subsistence relevant to the purposes of these Alaska habitat guides. This section summarizes this legal context. (For a more complete coverage, see original documents, Laws of Alaska, 1978, SCS CSHB 960 am S. chapter 151; 5 AAC 99.010, Joint Boards of Fisheries and Game Subsistence Procedures, 1982; 96th Congress Public Law 96-487-Dec. 2, 1980, Sections 801-816; Department of Natural

Resources [ADNR 1982, 1983]; AS 38. Public Lands; and Coastal Management Standards, 6 AC 80.)

2. Uniform definitions of subsistence. The state subsistence law, ANILCA, and Boards of Fisheries and Game regulations provide clear operating definitions of subsistence. As can be seen below, the state and federal laws are very similar; the only differences of note between them are that the language of the federal statute itself ties subsistence to rural residency, whereas the state does so through interpretation by the Alaska Board of Fisheries and Game in regulation.

3. Subsistence as a community characteristic. As legislative history demonstrates, the intent of both laws is to treat the existence of subsistence as a community rather than a personal characteristic. By implication, subsistence uses are part of the "customs" and "traditions" handed down within a particular type of sociocultural group that has a longstanding relationship with a region or territory. In determinations of whether subsistence uses exist, the Boards of Fisheries and Game have most often considered community data rather than set up criteria individuals would have to meet to qualify for subsistence. An individual's use of resources falls under subsistence provisions if that individual is a member of a community where subsistence has been determined to take place.

4. Lack of legal provisions for income or economic test of subsistence. Neither the state subsistence law nor ANILCA includes provision for an income or other economic test to determine which communities or individuals qualify for subsistence harvest of fish and game. In fact, an economic need requirement or qualification would be inconsistent with the language of ANILCA and with congressional intent, as amply evidenced in legislative history. For example, in discussing the policy expressed in ANILCA/802(1), Representative Udall noted that it "also requires that regulatory systems which employ income requirements not be imposed upon rural residents" (126 Cong. Rec. H10546, daily ed., November 12, 1980). This means that the state legislature, Boards of Fisheries and Game, or other agencies cannot narrow the definition of subsistence to encompass only economic need, based, for example, on individual income level, if the state is to remain in compliance with federal law (Spengler, pers. comm.).

5. Subsistence priority. In addition to defining subsistence uses of fish and game and establishing a priority for subsistence uses, both state and federal law also stipulate how allocation should take place if it is necessary to restrict legitimate subsistence uses of fish and game in order to protect the

continued viability of species populations. These "second tier" criteria provide for discrimination among subsistence users on the basis of direct dependence on the resources in question as the mainstay of livelihood, local residence, and the availability of alternative resources. To date, it has not been necessary to invoke this legal provision.

B. State Subsistence Law

1. Definition of subsistence. The Alaska legislature passed the state subsistence law in 1978. "Subsistence uses" were defined to mean

> the customary and traditional uses in Alaska of wild renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter or sharing for personal or family consumption; (AS 16.05.940[23])

   The State of Alaska's statutory definition does not include the term "rural," but the Alaska Boards of Fisheries and Game have interpreted it as such, an interpretation supported by legislative history.

2. Manditory authorization. The Alaska legislature in inacting the subsistence law narrowed the Alaska Boards of Fisheries and Game former discretion and required that, if subsistence uses exist, they must be authorized, unless sustained yield of resources would be jeopardized (AS 16.05.251 [b] and AS 16.05.255 [b].

3. Subsistence priority. As does ANILCA, state law provides for priority to be given to subsistence uses of fish and wildlife over competing uses:

> Whenever it is necessary to restrict the taking of fish to assure the maintenance of fish stocks on a sustained-yield basis, or to assure the continuation of subsistence uses of such resources, subsistence use shall be the priority use. (Sec 4, AS 16.05.251, [b]; amended 1978) (AS 16.05.255 [b] contains the same mandate and priority with regard to game.)

   This restriction is to come into effect when limitation on harvesting activity is needed for sound resource management, and, in effect, means that subsistence uses are the last fish and wildlife uses to be restricted. In application, the establishment of this legal subsistence priority has not affected the ability of the Boards of Fisheries and Game to regulate subsistence harvest of fish and game through establishing seasons and bag limits, stipulating means and methods of harvest, or using other management tools, so long as these regulations provide for reasonable opportunity for subsistence harvest.

4. <u>Distinguishing among subsistence users</u>. This section continues:

> If further restriction is necessary, the board shall establish restrictions and limitations on and priorities for these consumptive uses on the basis of the following criteria:
> 1) customary and direct dependence upon the resource as the mainstay of one's livelihood;
> 2) local residency; and
> 3) availability of alternative resources.
>
> (AS 16.05.251, sec. 4, [b]; amended 1978)
> (AS 16.05.255 [b])

This second legal direction establishes procedures to be followed if there is not enough of a particular resource to provide a reasonable opportunity for all subsistence uses even after commercial, sport, and other uses of that resource have been eliminated.

5. <u>Subsistence hunting areas</u>. State law further permits the establishment of areas where only subsistence hunting is allowed if this is needed to ensure adequate subsistence harvests. Under this provision, a

> "subsistence hunting area" means an area in which only subsistence hunting of the affected species is permitted and which is managed for maximum food potential. (Sec. 11, AS 16.05.257 [h][2], amended 1978)

To date, no "subsistence hunting areas" have been created. In most respects, the state subsistence law is similar to the federal subsistence law.

C. Alaska National Interest Land Conservation Act

1. <u>Importance of subsistence</u>. In 1980, the United States 96th

Congress, in establishing a legal framework for subsistence, found and declared that

> (1) the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands and by Native Alaskans on Native lands is essential to Native physical, economic, traditional, and cultural existence and to non-Native physical, economic, traditional, and social existence;
>
> (2) the situation in Alaska is unique in that, in most cases, no practical alternative means are available to replace the food supplies and other items gathered from fish and wildlife which supply rural residents dependent on subsistence uses; (16 USC 3111, emphasis added)

These congressional findings acknowledge that continued subsistence use of fish and game is essential for the existence of rural Alaskans. Subsistence is found to be essential to the physical, economic, and traditional existence of both Native and non-Native Alaskans. A distinction is made between the cultural existence of Natives and the social existence of non-Natives. "Culture" usually encompasses the belief systems, world view, kinship relations, and other features that contribute to unique ethnic identify. "Social" usually refers to the actions and behaviors of a group of people in a community. Congress further recognized the food importance of subsistence harvest of fish and game.

2. Priority for subsistence uses. This act states the policy of Congress that,

> (1) consistent with sound management principles, and the conservation of healthy populations of fish and wildlife, the utilization of public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands; . . . the purpose of this title is to provide the opportunity for rural residents engaged in a subsistence way of life to do so;
>
> (2) nonwasteful subsistence uses of fish and wildlife and other renewable resources shall be the priority consumptive uses of all such resources on the public lands of Alaska when it is necessary to restrict taking in order to assure the continued viability of a fish or wildlife population or the continuation of subsistence uses of such population, the taking of such population for nonwasteful

> subsistence uses shall be given preference on the public lands over other consumptive uses. (16 USC 3112)

ANILCA provides the following definition of subsistence:

> . . . the term "subsistence uses" means the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade. (16 USC 3113)

3. <u>Distinguishing among subsistence uses</u>. The act establishes the following preference or priority for subsistence uses on all federal lands in Alaska and establishes means of discriminating among subsistence uses in situations where resources cannot provide reasonable opportunity for all subsistence uses:

> the taking on public lands of fish and wildlife for nonwasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes. Whenever it is necessary to restrict the taking of populations of fish and wildlife on such lands for subsistence uses in order to protect the continued viability of such populations, or to continue such uses, such priority shall be implemented through appropriate limitations based on the application of the following criteria:
>
> (1) customary and direct dependence upon the populations as the mainstay of livelihood;
> (2) local residency; and
> (3) the availability of alternative resources. (16 USC 3114)

Further provisions of this title stipulate strict conditions that must be met if a proposed land use decision may have adverse effects on subsistence. ANILCA also requires public participation mechanisms, in the form of advisory committees and regional councils (16 USC 3115). The committees and councils are to play a meaningful advisory role in the regulatory process (16 USC 3115) and in the making of land use decisions that would "significantly restrict subsistence uses" (16 USC 3120).

4. <u>Subsistence and land use decisions</u>. With respect to subsistence and land use decisions, the act provides that,

in determining whether to withdraw, reserve, lease or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions, the head of the Federal agency having primary jurisdiction over such lands or his designee shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. (16 USC 3120)

5. State compliance with ANILCA. Because the secretary of the interior has certified that the state program provides for the definition of and priority for subsistence uses and the local participation mechanisms specified in ANILCA, the State of Alaska is authorized to continue managing fish and wildlife resources on federal land within the state. The state framework includes the statutes discussed above and the regulations of the Alaska Boards of Fisheries and Game.

D. Alaska Boards of Fisheries and Game

1. Eight criteria of subsistence. The Alaska Joint Boards of Fisheries and Game, in a joint procedural regulation to implement the Alaska subsistence law, acknowledged that subsistence uses are customary and traditional uses by rural Alaska residents that can be identified by eight criteria.

> Customary and traditional subsistence uses by rural Alaska residents will be identified by using the following criteria:
>
> (1) Long-term, consistent pattern of use, excluding interruption by circumstances beyond the user's control such as regulatory prohibitions;
>
> (2) A use pattern recurring in specific seasons of each year;
>
> (3) A use pattern consisting of methods and means of harvest which are characterized by efficiency and economy of effort and cost, and conditioned by local circumstances;
>
> (4) The consistent harvest and use of fish or game which is near, or reasonably accessible from, the user's residence;

(5) The means of handling, preparing, preserving, and storing fish or game which has been traditionally used by past generations, but not excluding recent technological advances where appropriate;

(6) A use pattern which includes the handing down of knowledge of fishing or hunting skills, values and lore from generation to generation;

(7) A use pattern in which the hunting or fishing effort or the products of that effort are distributed or shared among others within a definable community of persons, including customary trade, barter, sharing and gift-giving; customary trade may include limited exchanges for cash, but does not include significant commercial enterprises; a community may include specific villages or towns, with a historical preponderance of subsistence users, and encompasses individuals, families, or groups who in fact meet the criteria described in this subsection; and

(8) A use pattern which includes reliance for subsistence purposes upon a wide diversity of the fish and game resources of an area, and in which that pattern of subsistence uses provides substantial economic, cultural, social, and nutritional elements of the subsistence user's life. (5 AAC 99.010. Joint Boards of Fisheries and Game Subsistence Procedures)

The procedures direct the boards

> to determine the amount of fish and game necessary to provide fully for reasonable opportunities to engage in these customary and traditional uses. (5 AAC 99.010. sec. c)

and to

> adopt regulations that provide an opportunity for the subsistence taking of fish and game resources in amounts sufficient to provide for the customary and traditional uses identified . . . and consistent with sound conservation (5 AAC 99.010. sec d)

2. Subsistence priority. The joint boards also stipulated that, under certain circumstances, subsistence use would have a priority over other uses of fish and game, and stated

that each board will exercise all practical options for restricting nonsubsistence harvest before subsistence uses are restricted. (5 AAC 99.101. sec. f)

3. <u>Regulation of subsistence hunting</u>. These Joint Boards of Fisheries and Game criteria and procedures provide the regulatory framework for the management and allocation of fish and game resources that allow for subsistence uses. In actuality, the boards have not found it necessary very often to implement the provision for giving subsistence uses a priority over other uses in making allocation decisions. Most subsistence hunting takes place under general hunting regulations that are considered to provide the "reasonable opportunities to engage in these customary and traditional uses" specified by joint board procedures. This means that there usually are not special seasons, bag limits, hunting procedures, or other rules that apply only to subsistence hunting.

4. <u>Regulation of subsistence fishing</u>. Regulation of subsistence fishing by the Board of Fisheries has been more complex. In the Southwest, Western, Arctic, and Southeast regions of the state, any Alaska resident may participate in most of the subsistence fisheries. Regulation of subsistence fisheries in these regions commonly specifies gear types, fishing periods, harvest limits, and reporting requirements. The Board of Fisheries has not found it necessary or useful to apply the subsistence criteria in determining what communities may participate in these fisheries. Under current regulations, for example, an Anchorage resident may participate in most subsistence fisheries in the Bristol Bay or Kodiak area under the same terms as a local resident.

   The Board of Fisheries has more rigorously applied the eight subsistence criteria in regulating subsistence fishing in the Interior and Southcentral regions, in part because of greater pressure on available fish resources and easy access to harvest locations in the areas connected by road to urban areas. The Board of Fisheries created a new use category, "personal use fishing," in order to be able to provide for those uses that no longer qualify as subsistence once the criteria have been applied. Personal use fishing is regulated in the board's discretion (as are sport and commercial fishing) rather than under mandatory provisions such as those governing subsistence.

E. Department of Natural Resources Law and Policy

Policy of the DNR is guided by Alaska Statutes, Title 38, Public Lands. Some provisions are made under this law for recognizing subsistence as a beneficial use of public land:

> The primary public interests in retaining areas of state land surface in public ownership are
>
> (1) to make available on a sustained-yield basis for a variety of beneficial uses including <u>subsistence</u>, energy development, aquaculture, forestry, grazing, sport hunting and fishing, hiking, snowmobiling, skiing, and other activities of a type which can generally be made available to more people and conducted more successfully if the land is in public rather than private ownership. (AS 38.04.015, emphasis added)

Under this law, local municipalities or Native regional corporations must be informed concerning land disposals proposed in their areas, and notice of said disposals must be made, although the DNR is not bound to act in accord with local views (AS 38.05.305 and AS 38.05.345).

There is no recognition in state land policy or public land legislation of the economic significance of subsistence land use to Alaskan communities and rural residents. As of 1983, the proposed policy for land offerings and disposals by the DNR includes scant provisions for maintaining subsistence as it is defined with respect to fish and game management (ADNR 1983). Public hearings and public or agency review of land use plans are the main vehicle for considering subsistence land uses under present state law and policy.

F. Alaska Coastal Management Program

Provisions of the Alaska Coastal Management Act of 1977 and accompanying Standards and Guidelines of the Alaska Coastal Management Program provide for subsistence use of fish and game through land use controls developed in district coastal management plans. The objectives of the program call for

- the protection and management of significant historical, cultural, natural and aesthetic values and natural systems or processes within the coastal area. (Sec. 46.40.020 [5])

The council explicitly directs that

(a) Districts and state agencies shall recognize and assure opportunities for subsistence usage of coastal areas and resources.

(b) Districts shall identify areas in which subsistence is the dominant use of coastal resources.

(c) Districts may, after consultation with appropriate state agencies, Native corporations, and any other persons or groups, designate areas identified under (b) of this section as subsistence zones in which subsistence uses and activities have priority over all nonsubsistence uses and activities.

(d) Before a potentially conflicting use or activity may be authorized within areas designated under (c) of this section, a study of the possible adverse impacts of the proposed potentially conflicting use or activity upon subsistence usage must be conducted and appropriate safeguards to assure subsistence usage must be provided. (6 AAC 80.120)

Under the act there are also other provisions for including areas important for subsistence hunting, fishing, food gathering, and foraging as "areas which merit special attention." Within a given coastal region, certain areas may require special management because they have outstanding value to the general public, are particularly sensitive to change, or because plans for the area or claims upon its resources could preclude other uses.

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B. Abbreviations

ACMP	Alaska Coastal Management Program
ADCED	Alaska Department of Commerce and Economic Development
ADCRA	Alaska Department of Community and Regional Affairs
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADL	Alaska Department of Labor
ADNR	Alaska Department of Natural Resources
ADR	Alaska Department of Revenue
AEIDC	Arctic Environmental Information and Data Center
AOU	American Ornithological Union
BBCMP	Bristol Bay Cooperative Management Plan
BLM	Bureau of Land Management
EPA	Environmental Protection Agency
EPS	Environmental Protection Service (Canada)
ERL	Environmental Research Laboratory
FAO	Food and Agriculture Organization of the United Nations
IMS	Institute of Marine Science
INPFC	International North Pacific Fisheries Commission
IPHC	International Pacific Halibut Commission
IUCN	International Union of Conservation of Nature and Natural Resources
ISEGR	Institute of Social, Economic and Government Research
MMS	Mineral Management Service
NEGOA	Northeast Gulf of Alaska
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NPS	National Park Service
NWAFC	Northwest and Alaska Fisheries Center
NWR	National Wildlife Refuge
OCSEAP	Outer Continental Shelf Environmental Assessment Program
OMPA	Office of Marine Pollution Assessment
PWSRFPT	Prince William Sound Regional Fisheries Planning Team

USDC	United States Department of Commerce
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USDL	United States Department of Labor
USFWS	United States Fish and Wildlife Service

C. Wildlife Management Goals and Objectives

The following are the goals and subgoals that form the basis for wildlife management by the Alaska Department of Fish and Game. The first goal applies to all species managed by the department. Application of the second goal and the selection of one or more of its subgoals varies by species and/or area managed.

Outline: WILDLIFE MANAGEMENT GOALS*

I. TO PROTECT, MAINTAIN AND ENHANCE WILDLIFE POPULATIONS AND THEIR HABITATS FOR THEIR INTRINSIC AND ECOLOGICAL VALUES SO ESSENTIAL TO THE MAINTENANCE OF A HEALTHY ENVIRONMENT AND THE WELFARE OF MAN.

II. TO PROVIDE FOR OPTIMUM BENEFICIAL USE OF WILDLIFE BY MAN.

   A. To provide for subsistence use of wildlife by Alaskan residents dependent on wildlife for sustenance.

   B. To provide for diversified recreational uses of wildlife.

   C. To provide for scientific and educational use of wildlife.

   D. To provide for commercial use of wildlife.

* Source: 1980 ADF&G Wildlife Management Goals.

WILDLIFE MANAGEMENT GOALS

I. TO PROTECT, MAINTAIN AND ENHANCE WILDLIFE POPULATIONS AND THEIR HABITATS FOR THEIR INTRINSIC AND ECOLOGICAL VALUES SO ESSENTIAL TO THE MAINTENANCE OF A HEALTHY ENVIRONMENT AND THE WELFARE OF MAN.

Wildlife and man are interdependent constituents of an environment shared with all other living things. Recognition of this fundamental relationship is reason enough to preserve wildlife and to maintain its natural role in the environment. In addition, there is great value in assuring for man's benefit and enjoyment the continuance of an environment as biologically rich and diverse in the future as in the present. For the people of the State and the Nation Alaska's wildlife is an invaluable source of inspiration, sustenance, and recreational and economic benefits. It is capable of providing benefits to man in perpetuity if its welfare is safeguarded. Because wildlife is especially vulnerable to human activities, it requires the most careful stewardship man can provide.

The foremost consideration in protecting and maintaining indigenous wildlife populations is providing habitat in the amount, kind and quality necessary to meet the requirements of wildlife species. Wildlife populations cannot survive without adequate habitat, and efforts to protect animals directly without also protecting their habitat or correcting habitat deficiencies often prove to be ineffectual.

Alteration of habitat is one primary way man affects wildlife populations. Although some species can inadvertently benefit from certain habitat alterations resulting from man's activities, many others can be adversely affected. Long-term habitat degradation usually results in reduced numbers and fewer species of wildlife. Even where habitat are purposely modified to benefit populations of particular species, reductions in populations of other species may be unavoidable.

Protection, maintenance, and manipulation of wildlife habitat are important management activities of the Department. Important wildlife habitats will be identified and protective legislation, classification or designation of such habitats will be sought. Land management agencies, organizations, and individuals will be encouraged to protect wildlife habitats from degradation or to minimize adverse impacts of development or other land uses on land under their control. Where appropriate, habitat may be restored or improved to enhance selected wildlife populations.

Wildlife as well as its habitat must be protected from the detrimental influences of man. Disturbances injurious to wildlife must be minimized. Competition and conflicts with domestic animals must also be minimized and the introduction of undesirable exotic animals avoided. The introduction of diseases carried by domestic animals, transplanted wild animals, or animals kept as pets must be prevented. Use of wildlife must be regulated to ensure that allowable use tolerances are not exceeded. Illegal and wasteful uses must be controlled to assure protection of the resource and to maximize human benefits from its use.

Greater public appreciation for and awareness of wildlife and its requirements are necessary for public support for effective programs to protect and benefit wildlife. Successful, progressive wildlife management requires objective decisions based on the best biological information that can be gathered by competent professionals.

II. TO PROVIDE FOR OPTIMUM BENEFICIAL USE OF WILDLIFE BY MAN

Optimum beneficial use of wildlife is that use which 1) does not adversely affect the wildlife populations, 2) results in desirable products of use, and 3) is based on desirable allocations of such products among users. Such use, in the aggregate, serves to maximize benefits to be people of Alaska and the Nation.

Depending on the objectives of management, there are many levels and kinds of use which can be considered "optimum". Wildlife can support a variety of uses on a continual basis so long as its capability to sustain such use is not impaired. Because values placed upon wildlife vary, management must provide opportunities for an array of different uses if benefits are to be realized by all concerned. Also, because there are finite limits to wildlife populations and the uses they can support, management must provide for simultaneous uses wherever possible if benefits are to be optimized. Although different uses are generally compatible, some conflicts do occur, and sometimes provision for some uses may require the exclusion of others. Regulatory separation of incompatible uses in time and space can reduce conflicts and facilitate an optimum level and mix of beneficial uses.

Attainment of the following subgoals should ensure that the people obtain optimum beneficial use from Alaskan wildlife.

SUBGOAL A. To provide for Subsistence Use of Wildlife by Alaskan Residents Dependent on Wildlife for Sustenance.

Direct domestic utilization of wildlife is important to many residents for sustenance and to many other citizens as a valuable food supplement. Beyond directly satisfying food requirements, domestic utilization of wildlife helps preserve Alaskan cultures and traditions and gives gratification to the strong desire of many Alaskans to harvest their own food. These attributes of subsistence use are considered genuinely important to the physical and psychological well-being of a large number of Alaskans. Accordingly, subsistence receives priority among the various beneficial human uses.

Within legal constraints and the limits of resource capabilities, wildlife will be allocated to subsistence users on the basis of need. Needs of individuals, families, or cultural groups differ in type and degree and it is recognized that subjective judgement will be an unavoidable necessity in establishing actual need. Elements considered in establishing the level of need include cultures and customs, economic status, alternative resources (including availability of social services), place of residence, and voluntary choice of life style. Limitations on the productivity of wildlife stocks may limit continued increases in the number of subsistence users.

In some circumstances subsistence users also may be participants in recreational or commercial harvesting. Where subsistence users can satisfy their needs by recreational or commercial methods, special regulations for subsistence priority should be achieved by existing regulatory techniques, such as open and closed seasons, bag limits, control of methods and means of take, and controlled use areas. Even when special regulations are necessary, commercial and recreational uses might not need to be prohibited entirely prior to any restrictions on subsistence uses. But, in any case, traditional and customary subsistence users would continue to receive a priority harvest opportunity in regulatory systems.

Management of wildlife populations for subsistence use may involve manipulation of the numbers and/or sex and age structure of the population. Where possible, differential use or sex or age segments of wildlife populations will be used to accommodate subsistence or other use demands. Wildlife populations generally will be managed to optimize sustained productivity. Recreational and commercial uses will be permitted where and to the extent that they do not interfere with or preclude subsistence resource use.

SUBGOAL B. To Provide for Diversified Recreational Uses of Wildlife

In many areas of the state, recreation, in its various forms, is the dominant use of wildlife. In addition to sport hunting and trapping, recreational uses include observation and photography, both incidental to other activities and as the primary objectives, and wilderness experience, including the aesthetic rewards of being aware of or observing animals in natural interactions with their environment. The Department has the responsibility to provide for these diverse, yet generally compatible uses.

The emphasis of management for recreational use will be to provide opportunities for varied recreational experiences rather than to maximize the yield of animals, even though success in observing or taking animals is recognized as an important element in user satisfaction. Varied experiences are often provided through *de facto* differences in biological, physical, and demographic characteristics of various areas and through regulated factors such as participation rates, methods and means of use, timing of use, and bag limits.

Quality of experience is an important concern to many recreational users. Although aesthetics are a matter of individual preference, elements of quality most commonly identified include low user densities, controlled methods of transport, undisturbed wilderness character, minimal intrusions by other users, and a reasonable expectation of success. The opportunity to observe or be selective for large animals is another aesthetic consideration which may add significantly to the recreational experience.

At the other end of the recreational use spectrum are those uses allowing unrestricted opportunities for user participation. Beyond limiting use to optimum sustained yield levels, management for maximized opportunity provides for unlimited participation and traditional freedom of choice of access methods.

SUBGOAL C. To Provide for Scientific and Educational Use of Wildlife.

The Alaskan environment, including its wildlife, is a unique natural laboratory for the scientific study of ecosystems and wildlife biology, and for the educational enrichment of the people. Such studies are necessary to achieve a scientific basis for identifying and evaluating management options. Scientific study and education have taken place in many areas of Alaska, reflecting the general compatibility of such use with other uses of wildlife. Occasionally, undisturbed or closely controlled conditions are necessary study requirements and justify the designation of areas primarily for scientific and educational purposes. Requirements for such actions specify the extent to which other uses, both consumptive and nonconsumptive, would be encouraged or restricted. In some cases, intensive population or habitat manipulation may be necessary to achieve study objectives.

SUBGOAL D. To Provide for Commercial Use of Wildlife.

Commercial use of wildlife includes the direct consumptive and non-consumptive use of animals where sale of the products or by-products of animals is the primary objective. Indirect commercial use includes services which support recreational or other noncommercial users, and marketing systems utilized for wildlife products. Direct commercial use of wildlife in Alaska today is limited primarily to furbearers and marine mammals which have traditionally supported such use. Principal service industries include guiding, taxidermy, meat processing, photography, and wildlife-related tourist services.
Commercial uses of furbearer and marine mammal resources, responsible for much of the early exploration and settlement of Alaska, still support important industries in rural areas of the state and provide needed supplemental income to many bush residents. However, changing economic and social values and the increasing importance of recreational uses generally are reducing the relative economic importance of direct commercial uses of wildlife. On the other hand, industries serving the continually growing recreational uses of wildlife are becoming more important.

Management will provide for commercial use of wildlife only when it does not threaten the welfare of any wildlife resource, when it is in the economic interest of the people of Alaska, and when it is compatible with other uses. Where commercial use conflicts with other uses it will usually be restricted or eliminated in favor of other uses. Commercial activities which depend on recreational users will usually be restricted or eliminated in favor of other uses. Domestication of wildlife for commercial purposes usually will be opposed, but where allowed it will be strictly regulated to prevent abuse to the resource or inhumane treatment of individual animals.

WILDLIFE MANAGEMENT OBJECTIVES*

Based on these wildlife management goals and subgoals, objectives for the strategic management plans of individual species are selected from the following:

> To protect, maintain, and enhance the (species) population in concert with the components of the ecosystems and to assure its capability of providing sustained opportunities to
>
> 1) view and photograph wildlife;
> 2) subsistence use of wildlife;
> 3) participate in hunting wildlife;
> 4) hunt wildlife under aesthetically pleasing conditions;
> 5) be selective in hunting wildlife;
> 6) scientific and educational study of wildlife;
> 7) commercial use of wildlife;
> 8) protect human life and property in human-wildlife interactions.

Management objectives vary not only according to the concerned species, but also, in many cases, according to the areas involved and the demands made upon the wildlife resource. Because these demands can change with the passage of time, particular management objectives may need to be revised.

Examples of management guidelines are presented in the individual strategic management plans. These guidelines are used to qualify or quantify in a more specific way the recommended management under a specific set of objectives for any particular area. The guidelines are statements about the following:

1. The wildlife population: its size, sex, age structure, and productivity.
2. Use: season length and timing, bag limits, number or distribution of hunters or other users, access, transport, viewing, and aesthetic enjoyment.
3. Habitat: alteration or protection.

* Departmental memo, ADF&G, Division of Game, June 14, 1980.