III. B. 2. SPORT & COMMERCIAL FISHING: See graphic 3 for illustration of salmon, & graphic 4 for illustration of herring & bottomfish.

> a. Sportfish: Recreational fishing is a very popular pastime among Alaska's residents and visitors. Most activity is directed towards freshwater locations. Relatively little sportfishing occurs during winter.

Because of their proximity and, accessibility to the State's major population center, sport fisheries of the Kenai Peninsula are some of the most heavily used in the State. In fact, sportfishing is likely to be the single, most frequently pursued recreational activity on the peninsula. During the salmon seasons, anglers crowd the most popular salmon streams. The Russian River is one of the Kenai Peninsula's most favored sportfisheries for sockeye salmon. The Kenai River, Anchor River, Deep Creek, and the Ninilchik River are major chinook salmon sportfisheries. Coho salmon, Dolly Varden char, and steelhead trout are also sought in these last three streams.

Most recreational fishing on Kodiak Island occurs near the city of Kodiak where fishing areas are accessible by road. The Karluk River is the island's most popular fly-in sportfishery. The Malina Lakes, Afognak Lake, and Big and Little Kitoi Lakes and their tributaries are the waters most frequently fished on nearby Afognak Island.

The Alaska Peninsula receives much less use by sport fishermen than either the Kenai Peninsula or Kodiak Island, even though sportfishing ranks as a major recreational activity there (personal communication, National Park Service, April, 1980). Expensive and limited transportation and the existence of alternate roadside fishing sites near populated areas account for this.

Species most frequently sought by recreational fishermen are chinook, sockeye, and coho salmon, and steelhead trout. Additional sportfish include pink and chum salmon, halibut, clams, shrimp, crab, Dolly Varden char, and rockfish. Major sportfisheries of the Kenai Peninsula, the Alaska Peninsula, and Kodiak Island are illustrated on graphic 15.

Many of the species mentioned above are sought by subsistence and commercial fishermen as well as sportfishermen. Conflicts between the three fisheries are most obvious in the Cook Inlet area. A letter from the Alaska Department of Fish and Game office in Homer (dated February 13, 1980) includes a brief discussion of these conflicts: Commercial

Fishing and Fish Processing: Kodiak is Alaska's premier fishing port. As in most other fishery districts of Alaska, the Kodiak area's fishing industry was traditionally reliant on salmon, supplemented by catches of halibut and herring. However, while salmon remains a very important fishery, the addition of large-scale king crab, tanner crab, and shrimp fisheries, plus other products such as Dungeness crab, and, more recently, bottomfish, have served to make this area's seafood processing industry a highly diversified yearround operation.

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According to Alaska Department of Labor statistics, an annual average of 1,639 persons in the Kodiak area were employed in manufacturing in 1976, almost all of them in fish processing. Using gear registration data, multiplying the various types of vessels by normal crew sizes and then converting employment to an annual average year-round basis, it is estimated that another 850 persons in this area were engaged in fishing in 1977.

Most processing activity in the Kodiak area takes place in Kodiak itself; but several plants, primarily salmon canneries, are lo-cated elsewhere on the island. According to Alaska Department of Fish and Game officials in Kodiak, there are currently six or seven major salmon processors in Kodiak and about five at other locations on the island. However, some processors outside Kodiak operate only during years of good forecasts. In addition, 'Alaska Department' of Fish and Game officials estimated that there are currently 17 or 18 major shellfish processors in Kodiak (some of which are also salmon processors), but only small processors elsewhere on the island. A plant at Old Harbor burned a couple of years ago and some shrimp and crab processing is carried out here by floating processors.

In addition to seafood processors, Kodiak has a plant which processes crab shells and fish wastes to make fish meal and other products. The development of this type of plant became feasible as a result of Federal and State regulations governing the disposal of fish wastes.

Kodiak's Bio-Dry plant is the biggest in the Pacific Northwest and possibly in the entire United States. The plant was built in 1971, primarily to handle crab shells. However, its capacity was greatly expanded in 1974 to also handle finfish wastes. and one with a capacity to make a major contribution to the area's economy. One Kodiak plant, the New England Fish Company, installed a bottomfish line in 1977, and in 1978 added a bottomfish line at its Kodiak plant using Baader filleting equipment for this purpose. However, this company went bankrupt in early 1980. The impact of this action on the Kodiak fish market is unknown at this time. Three Kodiak-based processors can handle bottomfish. In addition, an international seafood company is constructing a plant to process bottomfish.

The main fish and shellfish species harvested in the Cook Inlet management areas include salmon, king crab, tanner crab, Dungeness crab, halibut, shrimp, and herring. This diversified harvest supports: a large fishing fleet and fish and shellfish processing plants in five western Cook Inlet towns: Homer, Seldovia, Kenai, Ninilchik, and Port Graham.

Cook Inlet is divided into two management areas: lower Cook Inlet and upper Cook Inlet. These management areas are, in turn, subdivided into districts. The districts most relevant to an economic assessment of commercial fishing for this proposal are the southern and Kamishak districts in lower Cook Inlet and the central district in upper Cook Inlet. The outer and eastern districts are more oriented to the Seward-based fishing industry.

Commercial fishing in Cook Inlet has always been subject to changing fortunes since it first began in 1882. Year to year variations in the harvest of various species and changes in market conditions influence the degree of effort and success of the fishermen and the profitability of the processing industry and other related economic activities.

A measure of the dollar value to fishermen of today's Cook Inlet fisheries can be gauged from Alaska Department of Fish and Game data. The department reports that in 1976, income to fishermen from the salmon and shellfish commercial catch in the Cook Inlet management area was \$22,098,169.

The commercial fishery in the Central district of upper Cook Inlet is almost exclusively a set and drift gill net salmon fishery and accounts for roughly 90 percent of the upper Cook Inlet salmon catch. All five salmon species are harvested in upper Cook Inlet, with sockeye (40 percent), pinks (31 percent), and chums (22 percent) accounting for a 25-year average of 93 percent of this management area's salmon catch.

Upper Cook Inlet is a far more productive salmon area than lower Cook Inlet, averaging an annual harvest about fourfold that of the latter area. The years 1976-1978 have seen above-average harvests in upper Cook Inlet. The 1978 total catch of 5,076,838 salmon was the highest since 1964, while the sockeye salmon catch of 2,613,374 fish for the 1978 season was also an all-time high. The 1977 season yielded the highest odd-year harvest on 4,020,300 totalling record, salmon of all species (ibid.). The 1979 season resulted in a below-average harvest, primarily because of a below-average catch of sockeye salmon.

"The existing conflict between sport and commercial salmon fishermen in Cook Inlet is well documented. An extreme increase in Cook Inlet's recreational halibut catch in recent years has created another sport/commercial fishery conflict. In 1978 the estimated sport catch of halibut in Cook Inlet from May 15 to August 31 was 300,000 pounds or 14 percent of the commercial landings of 2,208,000 pounds. There have also been significant increases in subsistence salmon, crab, and shrimp fishing throughout the inlet in recent years. In 1978, approximately 35,000 to 40,000 pounds of king crab were taken in Kachemak Bay under the subsistence provisions."

The salmon fishery has been a factor in the economy of Kodiak Island since 1882 when the first cannery was built at Karluk. The composition of salmon species taken in the Kodiak area has changed since the early days. Until 1900, sockeye salmon was the primary species taken. However, after 1910 pink salmon became increasingly important and are the main species taken today. Chum are now the second most commonly taken species (although third in value), followed by sockeye, coho, and chinook. See the DES for sale 46 for more details regarding the commercial fishery around Kodiak.

Bottomfish have traditionally been taken in the Kodiak area for king and tanner crab bait. However, processing of bottomfish for human consumption is a new, developing fishery in this area A noteworthy feature of the upper Cook Inlet salmon fishery is the strong, periodic cycle in its salmon runs. On the average, all five species are more numerous in even years, especially pink salmon, and this exaggerates the alternating pattern of high and low runs in successive years.

It is only recently that Homer has replaced Seldovia as the dominant fish and shellfish processing port in the Homer-Seldovia area. Before 1975, about 80 to 90 percent of the seafood products in the area were processed at Seldovia. The recent change is believed to be due primarily to Homer's attractiveness as a base for local fishermen, to the presence of a larger resident workforce available for fish processing and to Homer's more convenient road-connected location.

Homer has two major processing plants, one operated by Seward Fisheries (a subsidiary of Icicle Seafoods) and the other by Whitney-Fidalgo Fisheries, Inc. Both plants are year-round operations, purchasing and processing all major species landed at Homer: salmon, king crab, tanner crab, Dungeness crab, halibut, and shrimp. The Seward Fisheries plant freezes its product while the Whitney-Fidalgo plant ices and ships out its product for final processing at other company plants in Anchorage and Seattle. Both plants also process herring roe and purchase clams and other bait fish.

Plant officials report that employment at Seward Fisheries peaks in July-August and December at about 125 workers and averages about 60 for the rest of the year. The Whitney-Fidalgo plant employs a peak of about 60 workers for 4 months and an average of 20 for the rest of the year.

Whitney-Fidalgo reports that all of its plant employees are local residents. The Seward Fisheries plant regularly employs about 50-60 local workers, with transients making up the rest of its workforce. The same firm indi-cated that retaining a full workforce through the winter months has proven difficult.

According to plant officials, there are about 300 boats delivering fish and shellfish to their plants, nearly all (95 percent to 100 percent) being owned by lo-cal, resident fishermen. The processors do not own any fishing boats themselves. Seward Fisheries states that it charters about eight fish tenders to collect and deliver salmon to its plant while Whitney-Fidalgo charters between 15 and 20 tenders for the same purpos... المجمورة ويعرف المحالين المحالا الموجد المحافظ والورد

The city of Homer has adopted a positive attitude toward bottomfish development. The city is pursuing a port improvement program designed to capitalize on the city's potential to attract and service a new bottomfishery. At the same time, a local entrepreneur is proposing to develop a 26.3 hectare (65 acres) fisheries industrial park on the Homer Spit. The industrial park is aimed at meeting the demand for waterfront industrial sites, marine repair and service facilities, and moorage anticipated to arise from expansion into groundfish.

In the city of Kenai, there are two salmon processing plants located near the mouth of the Kenai River. The plants are operated by Kenai Packers and Salamatof Seafoods, Inc. Both purchase and freeze salmon harvested by upper Cook Inlet fishermen. In the past, Salamatof Seafoods, Inc. has also processed salmon caught in Northwest Alaska after the peak of the Cook Inlet run. Because of their concentration on salmon processing, employment generated by these plants is highly seasonal and partly dependent upon a transient workforce.

Commercial c. Finfish: Much of the following discussion is taken from a report by Blackburn (1980). Major commercial fishing areas and/or spawning and rearing areas for the species discussed are illustrated on graphics 2-8.

Salmon: All five species of Pacific salmon are harvested in the Cook Inlet-Shelikof Strait area. Pink salmon predominate in numbers of fish throughout the area. Sockeye salmon is second in importance in Cook Inlet, and third in the Kodiak area, while chum is second in importance in Kodiak, and third in Cook Inlet. Coho ranks fourth, and chinooks fifth.

Pink Salmon: Pink salmon har-vests are important throughout the area with greatest catches generally north of Anchor Point, in Kachemak Bay, along the west sides of Kodiak and Afognak Islands, and scattered along the shore of the Alaska Peninsula (graphic 3). Pinks spawn in virtually every stream throughout the area. Pink salmon runs are not well identified in the streams north of Anchor Point. On either side of Cook Inlet silty water makes counting from an airplane impossible, and emphasis has been placed on sockeye salmon in this area. Over a million pink salmon have been estimated to return to the Susitna River in one year (McLean, et al., 1976). On the west side of Cook Inlet from Bruin Bay to Cape Douglas, there are eight rivers with runs of pink salmon estimated at about 10,000 or more. On the east side of Cook Inlet, from Kachemak Bay south, there are five rivers with runs of pink salmon estimated at 10,000 or more. On the Alaska Peninsula shore of Shelikof Strait there are seven streams in which average aerial counts exceed average aerial counts exceed 10,000 pinks. Most notably, the Karluk River and Red River on southwest Kodiak Island have averaged 380,000 and 320,000 pinks, respectively. Both of these rivers have much stronger runs in even years, and each had more than a million fish in 1978.

Sockeye Salmon: Sockeye salmon are harvested in nearly all areas of Cook Inlet-Shelikof Strait to some extent, but the greatest catches are in Cook Inlet north of Anchor Point, on the south side of Kachemak Bay, in the bays on the west side of the Kodiak Archipelago, and in the Cape Igvak area of southwest Shelikof Strait where sockeyes destined for Chignik are caught (graphic 3).

Since sockeye salmon normally reside in a lake for 1 or 2 years before going to sea, there are fewer rivers that contain them, and the few really large systems produce the bulk of them. In upper Cook Inlet the primary rivers are the Kenai and Kasilof. Considerable runs have been counted in lower Cook Inlet; the largest rivers are Crescent River, immediately north of Tuxedni Bay, English Bay River on the tip of the Kenai Peninsula, and Mikfik Creek in southern Kamishak Bay. Kamishak Bay is unique in the number of small sockeye salmon streams present.

Kenai Peninsula, in the Kukak Bay area, and Wide Bay on the Alaska Peninsula, and in most of the bays on the Shelikof Strait side of the Kodiak Archipelago.

Chum salmon, like pinks, do not rear in freshwater but go to sea immediately after they emerge from the gravel. Thus, they are found in a large number of streams. In upper Cook Inlet, little reliable information exists on their size or where they spawn. They use the Susitna River extensively, but they are the only salmon not found in the Kenai and Kasilof Rivers. On the west side of lower Cook Inlet, there are a number of streams with chum salmon. Three streams, one on Chinitna Bay, one on Inishkin Bay, and one on Cotton-wood Bay support 10,000 chum salmon each. There are about 5,000 chums in a stream in Ursus Cove, and on the south side of Kamishak Bay there is one stream with 50,000, and three with 10,000 chums each. There are few chums in the Kachemak Bay area. There is a run of 1,000 in a stream on Seldovia Bay, 5,000 in a stream on Port Graham, and 2,000 in a stream on Port Chatham.

On the Alaska Peninsula side of Shelikof Strait, chums are widespread with 25 rivers having runs of greater than 1,000; three of these have runs greater than 10,000. On the Shelikof Strait side of the Kodiak Archipelago there are 16 rivers with more than 1,000 chums; six of these rivers have more than 10,000.

Coho Salmon: Coho salmon are harvested throughout the proposed lease area to some extent (graphic 3). The greatest catches are made north of Anchor Point, near the Karluk River and along the west side of the Kodiak Archipelago.

Coho salmon spend a year or more of their early life in a stream before going to sea, thus suitable freshwater habitat is important to them. Their run size is not well-known, partly because they are the last salmon in many streams. They are known to use the Susitna River extensively, and 30,000 are estimated to return to the Kenai River. There are a number of rivers with substantial runs of coho between the Kenai River and Kachemak Bay, but the south side of Kachemak Bay has fewer coho salmon streams. On the west side of the inlet, cohos are present in virtually every stream north of Chinitna Bay, but run sizes are not known. South of Chinitna Bay there are 13 streams with cohos, six of which contain runs of 1,000 or more. In the Kodiak area cohos are much less common. One stream on the Alaska Peninsula side of Shelikof Strait contains about 3,000 coho, and seven streams on the Shelikof Strait side of the Kodiak Archipelago contain coho. Of these, the Karluk and Red Rivers contain the only sizeable runs with about 8,500 and 1,000, respectively.

Chinook Salmon: Chinook salmon are caught in small numbers throughout the proposed lease area (graphic 3). Greatest catches are in the upper inlet, especially along the east shore, and in the various bays on Kodiak and Shelikof Strait.

Participation in the commercial fisheries by residents of the three towns under study can be determined approximately from records of the Commercial Fisheries Entry Commission. In 1976, there were 356 commercial fishing permit holders in Homer, 184 in Kenai, and 112 in Soldotna. A recent study entitled "A Profile of the Commercial Fishing Industry, Kenai Peninsula Borough," prepared by the Overall Economic Development Program Staff provides more information regarding the commercial fishing of the area.

On the Alaska Peninsula side of Shelikof Strait there are runs of over 5,000 sockeyes in two rivers. On the Shelikof Strait side of the Kodiak Archipelago, there are 13 streams with sockeye salmon runs, most notably the Karluk and Red Rivers with average returns of 350,000, and 150,000 sockeyes per year in the last 10 years. In addition, there are three rivers with more than 10,000 sockeye salmon (two of which have been surveyed only in 1978).

Chum Salmon: Chum salmon are harvested throughout the proposed lease area (graphic 3), with greatest catches between Anchor Point and the Forelands, in Chinitna Bay, Iliamna-Iniskin Bay near Kamishak Bay, in the Port Chatham area on the tip of the

Chinook salmon, like cohos, spend a year or more in rivers before going to sea. Few rivers provide suitable habitat. Chinook salmon are reported to use the Susitna River extensively. There are about nine streams in the upper inlet with chinook; the total run to all of them is about 2,000 to 3.000. Rivers on the east side of Cook Inlet between Anchor Point and the Forelands contain more chinook salmon than any other portion of the lease area. The Kenai River supports a run of 20,000, the Kasilof River supports 3,500, and four other rivsupport between 100 and 2,000 chinook each. On the west side of the inlet, there are three streams between Tuxedni Bay and the Forelands with unknown numbers of chinook. There are no

chinook in rivers of Kamishak Bay or the Alaska Peninsula side of Shelikof Strait.

On Kodiak, there are only two rivers with chinook, the Karluk and Red Rivers with runs of about 4,000 and 2,000, respectively.

Spawning: Although salmon are anadromous, pinks and chums often spawn in sections of streams that are within tidal influence. This practice is extensive throughout the proposed lease area south of latitude of Anchor Point. the Specific streams in which intertidal spawning is known have been identified in Kachemak and Kamishak Bays.

On the Alaska Peninsula and the Kodiak Archipelago, virtually every stream is utilized in the intertidal portion. On Kodiak, this spawning substrate is more important than in other areas as the rivers with the largest runs of pinks and chums are used the most in the intertidal portions.

The salmon fishery Season Peaks: conducted during the months of May through September with almost no catch in Kodiak in May (the figure is constructed from weekly catches and week ending dates, catches and week ending dates, thus some June catch could be taken in the last days of May), and only a little catch in Cook Inlet in May. The sockeye sal-mon fishery is the earliest in the Kodiak region while chinook are the earliest in Cook Inlet. In both areas pick peak in late In both areas, pinks peak in late July and early August. Sockeye peak in July in Cook Inlet and peak in July in Cook Inlet and late June to early July in Kodiak. Chums peak in July and August in both areas, and cohos peak in late July in Cook Inlet and in August in Kodiak. In the Kodiak area, the coho run is sizeable in September, and the species is considered to be un-derutilized. Chinook salmon harderutilized. Chinook salmon harvests are sizable in June and July in both areas.

Commercial Fishery: A substan-tial portion of all salmon pro-duction in the Kodiak area has come from Shelikof Strait (tables III.B.2.c.-1 and -2). Virtually all of the sockeye and chinook production has been in Shelikof Strait because the Karluk and Chignik Rivers have been very important systems.

Based on catches in the early 1970's, the Shelikof Strait region accounts for about 38 percent of the annual pink salmon catch, 84 percent of the sockeye salmon catch, 40 percent of the chum salmon catch, 55 percent of the coho catch, and the bulk of the chinook catch in the Kodiak area. In 1978, the Shelikof Strait accounted for about 49 percent of the Kodiak area catch, and was worth approximately \$15,800,000 to the fishermen. This compares to a 1977 Shelikof Strait salmon harvest which amounted to about 65 percent of the Kodiak catch and was worth approximately \$12,900,000 to fishermen.

Historically, the lower Cook In-let commercial salmon fishery has overwhelmingly been a pink salmon harvest, with chum salmon a distant second (see table According to the Alaska Depart-ment of Fish and Game, the value to fishermen for the total salmon harvest in Cook Inlet in 1976 was \$16,420,610. Sockeye salmon, which had an above-average run that year, accounted \$9,077,530 of the total table III.B.2.c.-5). The for (see table III.B.2.c.-5). The 1979 lower Cook Inlet catch was valued at \$5.5 million to fishermen.

The halibut catch is Halibut: widely distributed throughout the proposed lease area (graphic 4). The catch is reported by much larger statistical areas than is the catch for other species (table III.B.2.c.-6). Log book data is collected from the com-mercial fishermen and examined for distribution of effort, among other things. There are a few areas where effort tends to be more concentrated than others. These areas are in the vicinity of Anchor Point, off the tip of the Kenai Peninsula south of Kachemak Bay, near the Barren Islands, along the south shore of the Kenai Peninsula, on the east side of Shelikof Strait and into the bays, along the southwest tip of Kodiak Island, and in the Wide Bay area on the west side of Shelikof Strait. There has also been a seasonal trend in the location of the fishing activity. As halibut migrate from deeper water in winter to shallow in summer, the fishery follows. In the early season, about May, the fishery is the most active in deeper areas, and in mid-summer some of the activity is as shal-low as 10 fathoms. Some of the fishermen have reported that halibut seem to follow the salmon into the bays, and halibut have been found with salmon in their stomachs.

Mature halibut concentrate on spawning grounds along the edge of the continental shelf at of the continental shelf at depths from 182 to 455 meters during November to March. Major during November to March. Major spawning sites in the vicinity of lower Cook Inlet include Portlock Bank and Chirikof Island. In addition to these major spawning grounds, there is reason to believe that spawning is widespread and occurs in many areas, al-though not in concentrations as dense as those mentioned above. Evidence to support this conclu-sion is based on the widespread distribution of mature halibut during the winter months as indi-cated by research and commercial fishing (IPHC, 1978).

Spawning of halibut on the Cape St. James spawning ground (near the Kupreanof Peninsula, south of the proposed lease area) occurs from December through March with a peak in mid-January (Van Cleve and Seymour, 1953).

From 1977, commercial fishing has occurred during four brief per-iods from May until July or August. Beginning in 1977, the International Pacific Halibut Commission (IPHC) instituted a split season consisting of four fishing periods of about 18 or 19 days duration with closed periods of 15 days between them. As in the past, the fishing season was closed when the catch limit was attained, regardless of the designated fishing periods.

III.B.2.c.-3 for upper Cook Inlet numbers and table III.B.2.c.-4 for lower Cook Inlet numbers). Over the 25-year period 1954-1979, the average annual salmon catch was 703,496 fish in the following species ratio: pink (77 percent); chum (16 percent); sockeye (6 percent); and coho and chinook (less than 1 percent). During the last 6 years, the av-erage yield has been about equal numbers and table III.B.2.c.-4 erage yield has been about equal to the long-term average. However, due to annual fluctuations in pink runs, there is a significant year-to-year variation in the area's total commercial salthe area's total commercial sal mon harvest. In recent years, the pattern has favored higher catches in the odd years and The lower in the even years. The 1979 catch of approximately 3.3 million fish was the largest catch in history and was 36 per-cent higher than the previous record set in 1962.

IPHC management area 3A includes the Shelikof Strait and Cook Inlet. It stretches for 1609.3 kilometers (1,000 mi) across the entire Gulf of Alaska coastline from Cape Spencer in southeast Alaska to Kupreanof Point on the lower Alaska Peninsula. The total commercial halibut catch in Area 3A between 1960 and 1974 averaged 13018320 kilograms (28.7 mil. lbs) annually, with a low of 4354560 kilograms (9.6 mil. lbs) caught in 1974. However, perhaps 30 to 50 percent of the halibut caught in Area 3A is landed at ports outside the area as far away as Seattle.

The catch of halibut by subarea for 1969-1979 is presented in table III.B.2.c.-6. Statistical Statistical area 261, which represents Cook Inlet except Kamishak Bay, has averaged 614,000 lbs. per year during this time and Kamishak Bay area 272, has averaged about 43,000 lbs. per year. Northern and southern Shelikof Strait, statistical areas 271 and 281, respectively, have averaged 242,000 lbs., and 456,000 lbs. per year. From 1973 through 1979, the ex-vessel value of halibut caught in the Shelikof Strait and landed in Kodiak averaged about \$1,270,000 in 1978 dollars (written communication dated October 16, 1980, Kodiak Island Borough OCS Advisory Council).

Bottomfish: The bottomfish fishery has been directed at walleye pollock, and to a lesser extent, Pacific cod in central Shelikof Strait (graphic 4). The domestic bottomfish fishery in the Kodiak area has just started to exploit the resource. In the Kodiak management area, the landings of bottomfish have been 14,000 lbs. in 1975, 520,000 lbs. in 1976, 638,000 lbs. in 1977, 2,311,000 lbs. in 1978, and 4,761,548 lbs. in 1979. The bulk of these catches were in Shelikof Strait in each year.

During February through mid-April of 1979, catch rates averaging 4,000 lbs. per hour and ranging from 2,000 to over 6,000 lbs. per hour were documented in the domestic bottomfish fishery in Shelikof Strait by observers. The catches were 80 to 90 percent walleye pollock, and about 10 percent Pacific cod. The extent of the area of abundance of these fish is not known. The fishery has not fully utilized the resource so the distribution of the catches does not reflect the distribution of the fish. A 1973 survey, summarized by Hughes and Alton (1974), shows greatest pollock catches in the summer to be at less than 100 fathoms with catch rates of 1,100 lbs. per hour in northern Shelikof, and 4,000 lbs. per hour in a small area in southern Shelikof. The deeper water in mid-Shelikof yielded smaller catch rates.

Population estimates have been calculated from the trawl surveys in Shelikof Strait. These surveys are known to be underestimates since pollock are not all on the bottom; many are in the water column and not available to the gear. In 1961, there were an estimated 14,000 metric tons.

Other species caught in Shelikof Strait in limited amounts have been sablefish and rockfish. Sablefish constitute about 3 to 5 percent of the catch of the March-April fishery, and are all about 40 to 50 cm, and about age 2 (Low, et al., 1976). Some rockfish have been caught, but nothing is known of their distribution or abundance.

Flounders are collectively a relatively abundant group of fish in all areas. From a survey conducted between 1973 and 1976, flounder constituted 33 percent of the trawl caught biomass in the Gulf of Alaska, and 29.5 percent of the biomass in Shelikof Strait (Ronholt, et al., 1977). Some flounders have a limited; commercial market. Yellowfin sole, flathead sole, butter sole, and Alaska plaice have been utilized. The potential for a flounder market is quite limited, however, since most contain relatively little flesh, and trawling for them is detrimental to the valuable halibut also caught. Catch statistics and areas are not available. This may not be a viable fishery for many years.

Herring: Herring spawning has been documented or reported in nearly every bay on the west side of Kodiak Island (graphic 4). On the west side of Shelikof Strait, herring spawning has been docu-mented only in Kukak Bay. Herring spawning has been reported in virtually every cove and bay on the south side of Kachemak Bay and on the Homer Spit. Herring concentrations have been seen throughout Kamishak Bay in the spawning season, and spawning has been specifically identified off the Douglas River, in Bruin Bay, Ursus Cove, Iniskin Bay, Oil Bay, and Dry Bay. In the upper inlet, the waters are too murky to confirm spawning of herring, but an active gill net fishery yields mature adult herring in the vicinity of the Kenai River during spawning season, and larval herring were found to be abundant in this area throughout the summer of 1976 (Blackburn, 1980).

The bulk of herring spawning occurs during May; however, they also have been reported to spawn in late April and in early June in lower Cook Inlet, and as early as April 18 in Uyak Bay, and as late as the first week of July in Red Fox Bay on Afognak Island.

Herring typically spawn in the intertidal zone, primarily upon vegetation. On the west side of Kodiak Island, herring commonly spawn upon eel grass (Zostera), hair kelp (Demarestia), and rockweed (Fucus). Herring spawn in Kamishak Bay has been found on crab pots at considerable depth, but it is believed that most spawning occurs in the intertidal or immediate subtidal zone. The use of various spawning sites is influenced by salinities and temperatures, and thus, directly or indirectly by upwellings and offshore currents.

The fishery for herring in the proposed lease area in recent years has been conducted in Kachemak Bay, on the west side of the inlet near the Forelands, throughout Kamishak Bay, in Kukak Bay, in all bays on the west side of Kodiak and Afognak Islands, except Malina Bay, and in southern Shelikof Strait between Uyak Bay and Cape Ikolik. Catches have been largest in Kamishak and Kachemak Bays in lower Cook Inlet and in Kukak Bay and the Uyak, Spiridon, Zachar Bay areas in Shelikof Strait. According to Reid (1971), between 1936 and 1959 herring were taken in generally the same areas of Shelikof Strait, but more were taken in central areas of Shelikof, and herring were taken in Kinak and Portage Bays on the south shore of the Alaska Peninsula.

Much of the present fishery is focused on the roe, which is at its prime just before spawning, thus the fishery is active on the spawning grounds from late April through early June. The bait fishery is generally active in the winter and spring. The bulk of the herring fishery occurs in May.

From 1969 through the present, there has been a substantial herring fishery in Cook Inlet, primarily during the spring. From 1969 through 1979, the average harvest has been 1,670.7 tons. The harvest has been in Kachemak Bay, but beginning in 1973, the Kamishak Bay area has been heavily fished, and the area near the Kenai River and the east Forelands has been fished.

Spawning areas for walleye pollock are not specifically delineated, but the winter concentra-tion in Shelikof Strait is a spawning aggregation. The fish are adults full of ripe roe. During 1979, the fishery was very actively catching pollock Pacific cod, and during and late April the catch rate dropped precipitously when the fish apparently spawned. There have been no plankton surveys in Shelikof Strait, but in 1972 and again in 1978, the National Marine Fisheries Service (NMFS) sampled plankton on the east side of Kodiak. These surveys extended to the south end of Kodiak Island, and extremely high densities of pollock eggs were found in this area (Dunn, et al., 1979; Dunn and Naplin, 1974). Since water flow in Shelikof Strait is to the southwest (Science Applications Inc., 1979), eggs spawned in the strait would be transported to the southwest end of the island.

The bottomfish fishery is in its very infancy in lower Cook Inlet.

The commercial herring fishery in the Kodiak area is concentrated in Zachar, Spiridon, and Uyak Bays along the east side of Shelikof Strait, and in Kukak Bay on the east side of the strait. Herring are caught primarily for the sac roe. Since 1969, the largest harvest was 1,842 tons in 1979, and the lowest harvest was 4.6 tons in 1976. From 1975 to 1978, the harvest in the Shelikof Strait area averaged 283 tons (Pederson, et al., 1978). From 1975 through 1978, the average ex-vessel value of herring was about \$113,500 in 1978 dollars (written communication dated October 16, 1980, Kodiak Island Borough OCS Advisory Council).

## Table III.B.2.c.-1 Commercial Salmon Catch for Shelikof Strait, 1975-1978 (numbers of fish listed by species)

| Year | Chinook | Sockeye | Coho   | Pink      | Chum    | Total     |
|------|---------|---------|--------|-----------|---------|-----------|
| 1975 | 6       | 109,491 | 19,345 | 1,720,942 | 46, 176 | 1,896,021 |
| 1976 | 386     | 502,894 | 14,382 | 4,848,548 | 306,552 | 5,672,562 |
| 1977 | 483     | 524,948 | 15,719 | 2,451,199 | 54,856  | 3,534,205 |
| 1978 | 1,959   | 820,091 | 40,299 | 7,063,368 | 311,126 | 8,236,843 |

Sources: Alaska Department of Fish and Game, Marine and Coastal Habitat Management Project. 1978. "Table 2-6" Resource Report for Cook Inlet Sale No. 60. Alaska Department of Fish and Game. 1979. Kodiak Management Area 1978 Finfish Annual Report, pp.133-138.

## Table III.B.2.c.-2 1978 Commercial Salmon Catch for Shelikof Strait and the Kodiak Management Area (numbers of fish listed by species)

| Geographical   |         |           | Spe    | cies       |         |            |
|----------------|---------|-----------|--------|------------|---------|------------|
| Area           | Chinook | Sockeye   | Соћо   | Pink       | Chum    | Total      |
| Afognak        | 159     | 50,416    | 21,630 | 665,223    | 26,089  | 763,517    |
| Uganik &       |         |           |        |            |         |            |
| Uyak           | 403     | 181,744   | 3,602  | 2,712,587  | 116,489 | 3,014,826  |
| Karluk         | 70      | 87,791    | 11,594 | 1,367,390  | 7,420   | 1,474,265  |
| Sturgeon River | r       |           |        |            |         |            |
| & Red River    | 873     | 214,533   | 2,304  | 2,081,372  | 8,580   | 2,307,662  |
| Mainland       | 454     | 285,606   | 1,169  | 236,796    | 152,548 | 676,573    |
| Total -        |         |           |        |            |         |            |
| Shelikof       | 1,959   | 820,091   | 40,299 | 7,063,368  | 311,126 | 8,236,843  |
| Total -        | . ·     |           |        |            |         |            |
| Kodiak Area    | 3,228   | 1,071,782 | 48,795 | 15,004,065 | 814,345 | 16,942,215 |

<sup>1</sup> Breakdown by geographical and statistical area.

Source: Alaska Department of Fish and Game. 1979. Kodiak Management Area 1978 Finfish Annual Report, pp. 133-138.

#### Table III.B.2.c.-3 Salmon Catch by Species Upper Cook Inlet 1969-1979 (numbers of fish listed by species)

| Year              | Chinook             | Sockeye   | Coho    | Pink      | Chum      | Total     |
|-------------------|---------------------|-----------|---------|-----------|-----------|-----------|
| 1969              | 12,398              | 692,254   | 100,952 | 33,442    | 269,855   | 1,108,881 |
| 1970              | 7,398               | 729,034   | 271,910 | 777,526   | 775,959   | 2,562,376 |
| 1971              | 19,765              | 636,303   | 100,910 | 35,624    | 327,029   | 1,119,357 |
| 1972              | 16,086              | 879,824   | 80,933  | 628,580   | 630,148   | 2,235,571 |
| 1973 <sup>1</sup> | 5,194 <sup>2</sup>  | 670,025   | 104,420 | 326,184   | 667,573   | 1,773,396 |
| 1974              | 6,671               | 524,181   | 203,135 | 494,827   | 399,553   | 1,628,367 |
| 1975              | 4,790               | 684,818   | 227,372 | 336,359   | 951,796   | 2,205,135 |
| 1976              | 10,867              | 1,664,149 | 208,678 | 1,256,744 | 469,185   | 3,609,623 |
| 1977              | 14,867              | 2,052,481 | 192,593 | 553,855   | 1,233,486 | 4,047,151 |
| 1978 <sup>3</sup> | 17,631              | 2,613,374 | 221,019 | 1,656,548 | 568,266   | 5,076,838 |
| 1979 <sup>3</sup> | 13,594              | 932,571   | 253,358 | 76,497    | 655,027   | 1,931,047 |
| 21-Year           |                     |           |         |           |           |           |
| Average           | 10,505 <sup>2</sup> | 1,123,702 | 218,645 | 855,238   | 618,366   | 2,826,457 |
|                   |                     |           |         |           |           |           |

Even Year 1,909,190 Average 35,169 1,241,907 285,980 1,646,494 723,085 Odd Year Average 9.591 1,016,242 157,433 135,913 523,167 1.842.346

<sup>1</sup> Opening date moved to late June in Central, early July in Northern District. First year of fishing only on late chinook salmon run. Averages and totals for chinook 1973 to 1979 only.

Preliminary figures.

Source: Alaska Department of Fish and Game. December 1979. Upper Cook Inlet Report to the Board of Fisheries.

# Table III.B.2.c.-4 Salmon Catch by Species Lower Cook Inlet 1969-1979 (numbers of fish listed by species)

| Year              | Chinook | Sockeye | Coho   | Pink      | Chum    | Total     |
|-------------------|---------|---------|--------|-----------|---------|-----------|
| 1969              | 64      | 122,800 | 4,624  | 198,746   | 60,946  | 387.180   |
| 1970              | 107     | 21,077  | 4,860  | 574,863   | 223,410 | 824,317   |
| 1971              | 73      | 22,234  | 4,561  | 392,871   | 148,602 | 568,341   |
| 1972              | 88      | 57,897  | 2,234  | 28,663    | 75,543  | 164,425   |
| 1973              | 145     | 29,136  | 2,101  | 307,403   | 115,513 | 454,298   |
| 1974              | 183     | 27,428  | 6,514  | 50,601    | 19,210  | 103,936   |
| 1975              | 143     | 28,142  | 6,211  | 1,063,432 | 21,646  | 1,119,574 |
| 1976              | 450     | 58,159  | 3,216  | 136,445   | 50,822  | 249.092   |
| 1977              | 217     | 100,058 | 2,872  | 1,292,153 | 145,778 | 1,541,078 |
| 1978 <sup>1</sup> | 1,584   | 156,377 | 5,929  | 353,573   | 69,872  | 587.335   |
| 1979 <sup>1</sup> | 1,259   | 66,848  | 11,212 | 2,997,490 | 225,057 | 3,301,866 |
| 26-Year           |         |         |        |           |         |           |
| Average           | 310     | 43,384  | 5,523  | 634,044   | 120,148 | 803.408   |
| Percent of        |         |         |        |           |         |           |
| Total             | 0.04    | 5.40    | 0.69   | 78.92     | 14.95   | 100.00    |

<sup>1</sup> Preliminary figures.

Source: Alaska Department of Fish and Game. 1979. Lower Cook Inlet Report to the Board of Fisheries.

## Table III.B.2.c.-5 1976 Salmon and Shellfish Harvest for Cook Inlet Management Area (Includes Resurrection Bay)

| Species                 | Chinook      | Sockeye     | Coho        | <u>P</u>       | ink      | Chum        | Total                    |
|-------------------------|--------------|-------------|-------------|----------------|----------|-------------|--------------------------|
| Number of Fish          | 11,400       | 1,728,520   | 213,800     | 1,3            | 92,ŪŪU   | 525,000     |                          |
| Pounds of Fish          | 305,000      | 11,789,000  | 1,372,000   | 5,6            | 28,000   | 4,228,000   | 23,322,000               |
| Price Paid to Fishermen | \$1.00/lb    | \$ .77/1b   | \$ .84/1b   | \$             | .58/1b   | \$ .62/1b   |                          |
| Value to Finnermen      | \$305,000    | \$9,077,530 | \$1,152,480 | \$3,2          | 64,240   | \$2,621,360 | \$16,420,610             |
| Species                 | Trawl Shrimp | King Cra    | <u>b</u>    | Dungeness Crab | Tanner   | Crab        | Total                    |
| Number                  |              | 603,0       | 00          | 36,900         | 2,307    | ,000        |                          |
| Pounds                  | 6,443,000    | 4,954,0     | 00          | 119,300        | 5,935    | ,000        | 17,451,300               |
| Price Paid to Fishermen | \$ .11/1b    | \$ .65/     | 16          | \$ .63/lb      | \$.2     | 6/1b        |                          |
| Value to Fishermen      | \$ 305,000   | \$3,220,1   | 00          | \$ 75,159      | \$ 1,543 | ,100        | \$5,677,559 <sup>2</sup> |

Hultiply by .0004535147 to obtain metric tons. Includes 322,000 pounds of pot shrimp, price \$.42/lb - value is reflected in total for shellfish - \$135,303.

Sources: Data from Alaska Department of Fish and Game, Juneau, Soldotna, and Homer. Table from Kenai Peninsula Borough, Overall Economic Development Program staff. February, 1978. A Profile of the Commercial Fishing Industry, Kenai Peninsula Borough. Soldotna, AK.

## Table III.B.2.c.-6 Halibut Commercial Harvest by Statistical Subarea Cook Inlet/Shelikof Strait 1969-1979 (thousand lbs dressed weight<sup>1</sup>)

|         | Cook     | Inlet    | Sheliko          | f Strait |  |
|---------|----------|----------|------------------|----------|--|
|         | Statisti | cal Area | Statistical Area |          |  |
| Year    | 261      | 272      | 271              | 281      |  |
| 1969    | 515      | 11       | 62               | 500      |  |
| 1970    | 349      | 80       | 481              | 544      |  |
| 1971    | 541      | 43       | 73               | 473      |  |
| 1972    | 416      | 65       | 313              | 994      |  |
| 1973    | 665      | 34       | 533              | 759      |  |
| 1974    | 658      |          | 220              | 244      |  |
| 1975    | 547      | 13       | 390              | 304      |  |
| 1976    | 646      | 37       | 327              | 589      |  |
| 1977    | 726      | 57       | 163              | 380      |  |
| 1978    | 682      | 101      | 67               | 125      |  |
| 1979    | 1,013    | 31       | 36               | 102      |  |
|         |          |          |                  |          |  |
| Average | 614      | 43       | 242              | 456      |  |

<sup>1</sup>Multiply by .0004535147 to obtain metric tons.

Sources: 1969-1978 data: U.S. Department of the Interior, Bureau of Land Management. 1980. Pelagic and Demersal Fish Assessment in the Lower Cook Inlet Estuary System. Final Report, Research Unit 512, p. 30. 1979 data: International Pacific Halibut Commission (personal communication).