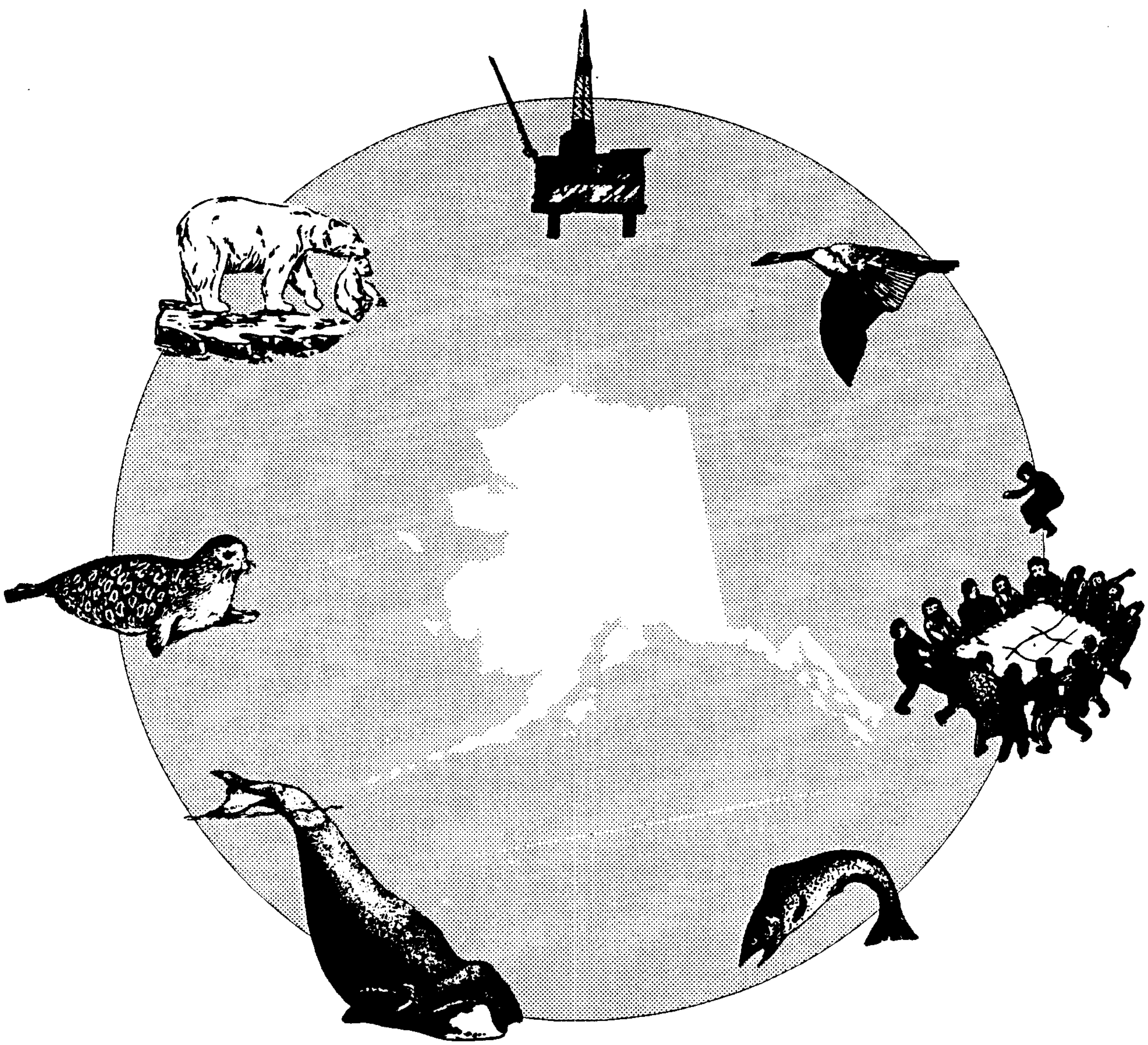
OCS Study
MMS 94-0048

Commercial Fishing Industry of the Gulf of Alaska

Social and Economic Studies



U.S. Department of the Interior
Minerals Management Service
Alaska Outer Continental Shelf Region

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COMMERCIAL FISHING INDUSTRY OF THE GULF OF ALASKA

Prepared for

Minerals Management Service
Alaska Outer Continental Shelf Region
Leasing and Environment Office
Social and Economic Studies Unit

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NOTICE

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This report was prepared under the helpful guidance of Mr. Tim Holder, Minerals Management Service. Principal authors were Patrick Burden of Northern Economics, James Richardson of ResourcEcon, Jon Isaacs of Jon Isaacs and Associates, with assistance from William Jensen and Hans Radtke of Resource Valuations, Inc..

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ABSTRACT

The Gulf of Alaska is a frontier area for Outer Continental Shelf (OCS) petroleum exploration and an area of bountiful fisheries harvests in the North Pacific. In addition to a number of investigations about the physical environment of the Gulf of Alaska, the Minerals Management Service (MMS) has conducted five studies since 1980 to predict and analyze potential impacts and changes in commercial fishing due to oil and gas activities. MMS also conducts economic and demographic forecasts for the regions and communities that may host onshore OCS activities. The commercial fishing industry is the most important and most volatile economic sector in the region. Any assessment of prospects for economic growth among the communities is dependent upon an accurate understanding of the importance of the fishing industry.

The purpose of this study is to provide MMS with an update of the earlier commercial fishing studies with the focus on contribution of the industry at the community level. The study examines the overall status of the commercial fishing industry in the Gulf of Alaska, identifies the share of the industry captured by the several principal ports, and develops a forecast of the commercial harvest and fishing related employment.

The objectives of the study are to : (1) Describe the current status of the Gulf of Alaska fishing industry and the nature of the involvement of some of the principal Alaska communities that participate in it, and (2) provide a forecast of future harvest levels and employment for both the industry and the principal fishing communities.

The Gulf of Alaska study area defined by MMS includes state and federal waters within the 200-mile fishery conservation zone and bound to the east by the Southeast Alaska Archipelago, southcentral Alaska and the Kenai Peninsula to the north, and the Alaskan Peninsula and the Aleutian Islands to the west. Communities addressed in this study include Cordova, Homer, Kenai, King Cove, Kodiak, Seward, Unalaska/Dutch Harbor, and Yakutat. The project entailed a literature review, field work in the study communities, and unpublished computer data base files obtained by MMS from the Alaska Commercial Fisheries Entry Commission and National Marine Fisheries Service. This information was used to describe the Gulf of Alaska fishing industry, and the relationship of the industry to the study communities.

Based on review of the literature, discussions with industry and agency personnel, and development of a simulation model of the Alaska fishing industry, researchers concluded that the economic base of most Gulf of Alaska communities is dependent on the local fishing fleets and processing plants. The present high utilization levels for major fishery stocks will exacerbate any downturn in resource levels because, with the exception of very low-value species, there are no new fisheries left to exploit and competition for remaining stocks will increase.

With the exception of Kodiak and Unalaska/Dutch Harbor, the fishing industry in coastal communities is dependent upon the traditional salmon fishery for most of its revenues. Many fishers have altered their boats from single-purpose salmon fishing boats to combination boats that can pursue other species in order to increase income and offset the volatility associated with reliance upon a single species. The industry in Kodiak and Unalaska/Dutch Harbor are

more oriented to the groundfish and crab fisheries although salmon is a significant contributor to annual harvests in Kodiak. The groundfish industry trawl fleet is primarily dependent upon walleye pollock for its financial health, and the crab fleet is supported mainly by C. opilio crab.

In general, salmon abundance in the area is near its historic peak although variability exists in many management areas. Groundfish stocks are at low levels of abundance although management efforts are resulting in some stock increases. Crab stocks are also at low levels of abundance. Some increases in abundance are being noted in C. Opilio and Dungeness stocks.

Study area residents are primarily salmon fishermen. Local residents use their salmon vessels to pursue herring, halibut, sablefish, and Pacific cod to a lesser degree. The trawl fleet and the larger vessels in the crab fleet primarily involve vessels from Kodiak and Unalaska/Dutch Harbor.

Processing plants in Unalaska/Dutch Harbor primarily handle crab and groundfish. Other plants in the study area focus on salmon although other species may be processed. Plants in Kodiak handle all species harvested in the Gulf of Alaska. Most processing plant employees are nonresidents of the State and the local community.

Local communities have an interest in maintenance of the fisheries resource base and the health of the fishing fleets because commercial fishing and processing are major sources of employment and wage and non-wage income. In rural communities, the lack of other employment opportunities makes fishing income and employment even more important. In addition, in the more rural and smaller communities, fish processing companies develop their own dock, electric, fuel, and water infrastructure which are often used directly by a community or are available as a backup.

Local taxation of processed and landed products, processing plants and fishing vessels, and the raw fish tax which the state shares with communities are major sources of income. These revenues fund local government jobs, services, and public works improvements, and also contribute to municipal permanent funds in some communities. Such revenues also allow communities more flexibility in developing, operating, and maintaining infrastructure. They are less dependent on user charges to cover costs and less dependent on state revenue sharing.

The presence of a significant fishing industry improves the quality of life in local communities by 1) providing employment and income, 2) creating municipal revenues, 3) providing demand-based justification for state funding of capital projects, and 4) providing a user base (fleet and processors) which generates service charge revenues to cover or assist with operations and maintenance costs and amortization of infrastructure.

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1. INTRODUCTION

1.1 Purpose and Scope of the Study

The Gulf of Alaska is a frontier area for Outer Continental Shelf (OCS) petroleum exploration and an area of rich fisheries harvests in the North Pacific. The fisheries that occur in the Gulf of Alaska are important contributors to the social and economic vitality of local communities and the State of Alaska. The Minerals Management Service (MMS) has recognized that damage to the resource or conflict with human activity may occur as a result of OCS exploration.

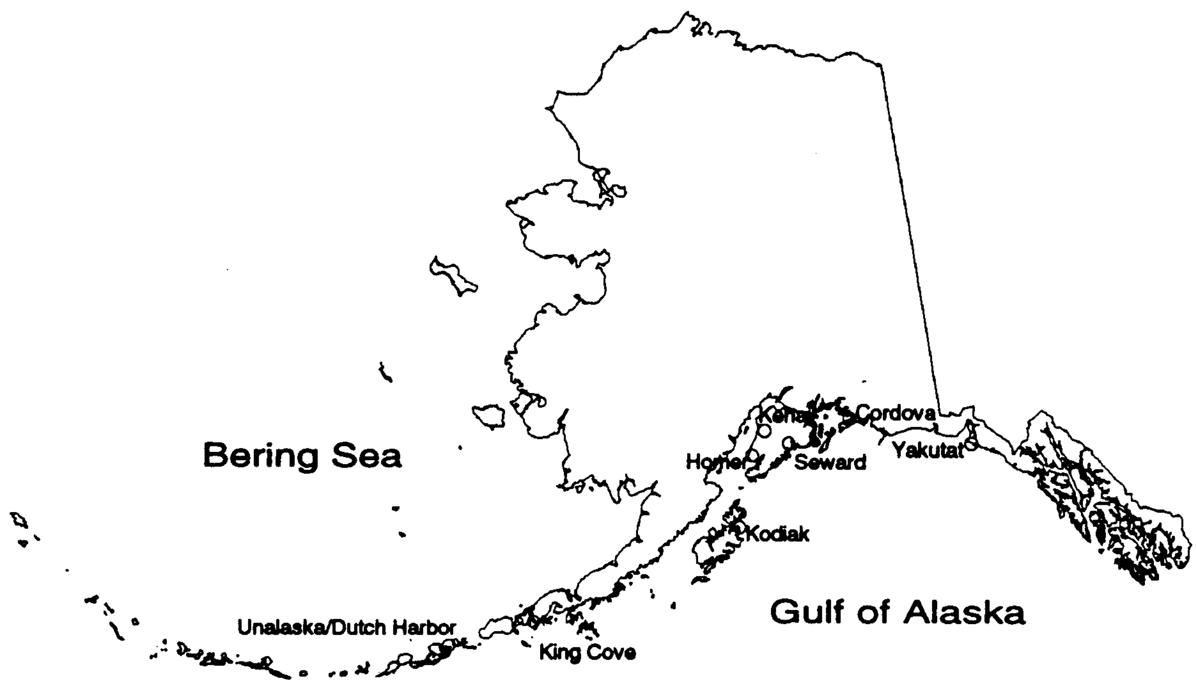
MMS and other federal and state agencies are charged with protecting the human and natural environments in addition to permitting development of the resources of the Outer Continental Shelf. The Outer Continental Shelf Lands Act, as amended Section 20, mandates MMS to study the environment to obtain data pertinent to sound leasing decisions. These environmental studies are conducted to assist in prediction, assessment, and management of effects of proposed oil and gas leasing and development on the human, marine, and nearshore waters.

The MMS has supported a number of studies related to fisheries research and community socioeconomic and sociocultural systems in the Bering Sea. Studies of the physical environment have encompassed literature reviews, distribution and abundance studies, ecosystem studies, and modeling studies to describe regional oceanographic circulation patterns. In addition, MMS has conducted 5 studies since 1980 through its Social and Economic Studies Program (SESP) to predict and analyze potential impacts and changes in commercial fishing industries due to oil and gas activites. Because of the nature of the available secondary source data, there was limited discussion of the contribution of the industry to the economies of local communities in the first 4 reports. The fifth report focused on communities in the Bering Sea. The communities of Unalaska/Dutch Harbor and King Cove which are addressed in this report were also included in the Bering Sea study (See MMS Technical Report 90-0026).

1.2 Study Area

The study area is defined as the geographic region bound to the east by the Southeast Alaska Archipelago, southcentral Alaska and the Kenai Peninsula to the north, and the Alaskan Peninsula and the Aleutian Islands to the west. Communities addressed in this study include Cordova, Homer, Kenai, King Cove, Kodiak, Seward, Unalaska/Dutch Harbor, and Yakutat. These communities are shown in Figure 1.2-1.

Figure 1.2-1: Study Area and Communities



The study area includes state and federal waters within the 200-mile exclusive economic zone. This region includes a number of different state and federal fishery management areas and parts of others. Some areas are primarily salmon, and others are for groundfish and/or crab. The management areas, as defined by the Alaska Commercial Fisheries Entry Commission and National Marine Fisheries Service, included in this discussion of Gulf of Alaska fisheries are:

Peninsula/Aleutians	Yakutat
Chignik	Southeast
Kodiak	Eastern Gulf of Alaska
Cook Inlet	Central Gulf of Alaska
Prince William Sound	Western Gulf of Alaska

Selection of these areas is not totally consistent with the Gulf of Alaska definition proposed by MMS. For example, the Peninsula/Aleutians area includes part of the Bering Sea. Other management areas such as the Aleutian Islands and Adak encompass Gulf of Alaska waters but are primarily Bering Sea fisheries. Use of sub-area information would improve the accuracy of the data but would require an order of magnitude increase in the analysis effort. Management area data are adequate to evaluate the effect of Gulf of Alaska fisheries on the study communities.

This report is divided into three major sections: Descriptive material on Gulf of Alaska fisheries (Section 2.0), a discussion of the interaction between the industry and eight local communities (Section 3.0), and a description of the computer model developed to provide forecasts of harvest-related and processing employment in each of the study communities (Section 4.0).

2. CHARACTERISTICS OF THE GULF OF ALASKA FISHERIES

2.1 Introduction

The waters of the Gulf of Alaska contain a rich variety of salmon, herring, groundfish, crab, shrimp and other species. This chapter of the report presents historical harvest levels for the various species and provides the background for projections of future harvests through 2010. The future harvest projections are presented in Section 4.0.

2.2 Regulatory and Management Structure

2.2.1 Management Agencies

Commercial fishing in the Gulf of Alaska waters and other areas of Alaska, are managed by one or more of several regulatory agencies. Inshore fisheries, those occurring within three miles of Alaska's shoreline, have been managed by the Alaska Department of Fish & Game since statehood in 1959. Offshore waters, three to 200 miles, have been managed by the North Pacific Fishery Management Council since it was formed in 1976. Outside of the 200 mile limit, fisheries off Alaska are managed by international treaty agreements. The structure and species managed for each of the different agencies is discussed below.

2.2.1.1 Alaska Department of Fish & Game

The Alaska Department of Fish & Game (ADF&G) is responsible for maintenance, protection, and development of the fishery resources of Alaska. The Commissioner of ADF&G has the responsibility for operations and administration of the divisions within ADF&G. The divisions are: Sport Fisheries Division, Commercial Fisheries Division, Wildlife Conservation Division, Habitat Division, Subsistence Division, Administrative Division and Division of Boards. All divisions, with the exception of the Wildlife Conservation Division, contribute in some way to overall fisheries management.

The Alaska Board of Fisheries is the fisheries policy arm of ADF&G. The seven member board is appointed by the Governor to promulgate regulations and policy for fisheries management of Alaska's fisheries resources. They meet at least twice a year to review proposed fishery regulation changes and decide on the regulations to be placed in effect.

ADF&G has statutory authority for fisheries resource management within Alaska's territorial waters (from shore to three miles offshore). However, many of Alaska's fisheries occur beyond this limit. Examples are the king crab and tanner crab fisheries where most catches are made outside the three mile limit. ADF&G maintains management authority for fishing activities beyond the three mile limit through landing laws. This means that a fisherman has to comply with Alaska's fishery regulations if he wants the capability to land on shore in Alaska. Those fisheries operating entirely outside the territorial waters are outside of the jurisdiction of the State and have posed some difficult management issues for ADF&G in the past.

2.2.1.2 International North Pacific Fishery Commission

The International North Pacific Fishery Commission (INPFC) was established in 1953 by convention between the United States, Japan and Canada. The INPFC is responsible for resolution of fishery management issues in areas not covered under the member nations' 200 mile fishery conservation zones. The operation of the INPFC is of particular importance to Alaska since a Japanese high seas salmon fishery operates outside of the U.S. Fisheries Conservation Zone (FCZ) and is not regulated by any other agency.

The INPFC provides a forum for exchange of scientific data on the fisheries of interest to the member nations through publications and regularly scheduled meetings.

2.2.1.3 International Pacific Halibut Commission

Management authority for regulation of the halibut fishery is the responsibility of the International Pacific Halibut Commission (IPHC). The IPHC was established by convention between Canada and the United States in 1923. The biological research produced by this cooperative management authority is a comprehensive body of data for their single target species - halibut. Because the IPHC predates the implementation of the MFCMA, the IPHC retains management authority for the halibut fishery.

2.2.1.4 North Pacific Fishery Management Council

Groundfish and other species in Alaska's Fishery Conservation Zone (FCZ) are managed by the North Pacific Fishery Management Council (NPFMC). The NPFMC is one of eight regional Councils established in 1976 by the Magnuson Fisheries and Conservation Act (MFCMA). The NPFMC meets regularly to review data on the fisheries resource and make recommendations for regulations. Their recommendations are made to the Secretary of Commerce, and if approved, gain the force of law. The NPFMC also made recommendations to the Secretary concerning allocations of groundfish to joint-ventures and direct allocations to foreign nations until their participation in fisheries off Alaska was phased out.

2.2.2 Current and Future Management Issues

Fisheries issues come before the regulatory agencies on a continual basis. Some of the issues involve biological conservation of the resource, others involve use patterns or allocation of the harvest among various user groups. Within Alaska's 200 mile limit, the most pervasive event in recent years has been the displacement of the foreign fleet with a domestic groundfish fleet. This growth was made possible by the Magnuson Fisheries and Conservation and Management Act of 1976. Foreign fishing allocations for the Gulf of Alaska were phased out by the North Pacific Fishery Management Council after implementation of the MFCMA. The last year for foreign fishing in the Gulf of Alaska was 1986.

For several years after its beginning in 1977, the NPFMC was able to make popular management decisions by reducing foreign fishing effort. Once fisheries off Alaska became entirely domestic however, use conflicts did not cease, they just involved new players. The NPFMC has experienced much greater difficulty in mediating allocation disputes between domestic parties than they enjoyed when dealing with foreign fisheries.

Several fisheries management issues are currently being proposed, discussed or are in the process of being analyzed for future management decisions. The manner in which these issues are resolved will, to some extent, shape the future fisheries in the Gulf of Alaska. Several of these issues will be discussed briefly below.

2.2.2.1 Limited Entry in the Groundfish Fisheries

While Alaska has had license limitation of its salmon fisheries since 1975 and many herring fisheries in the state have also been limited, groundfish fishing effort has not been limited. Limited entry in the halibut fishery has been investigated and analyzed for several years. Beginning in 1979, the NPFMC evaluated limited entry alternatives for the halibut fishery. They went so far as establishing a moratorium for entry into the fishery in 1982, but the moratorium was overturned by the Secretary of Commerce.

The NPFMC has also had requests by fishermen to consider some sort of license limitation program for sablefish. Since both sablefish and halibut are harvested by the same longline fishing groups, halibut limited entry has again emerged for consideration along with sablefish limited entry. In September 1987, the NPFMC adopted a Statement of Commitment to consider limited entry for the longline sablefish fishery, intending to have a system in place by 1989. The NPFMC approved an individual quota system for halibut and sablefish in the fall of 1992. The final rule for the halibut/sablefish individual fishing quota (IFQ) was published by the Secretary of Commerce in November 1993, with implementation scheduled for 1995.

The IFQ system will assign fishing shares to halibut and sablefish fishermen, based on their past level of participation in the fisheries during 1988, 1989 or 1990. Once the plan is implemented, only those fishermen with IFQ shares will be able to harvest halibut and sablefish. The program should bring fishermen more control over their fishing for these two species, by making their own decisions about when they will fish. One potential benefit from the program is a better distribution of fresh halibut on the markets for a longer portion of the year. It is also hoped that fishing efficiencies will result in lower fishing costs and therefore greater profits to the industry.

2.2.2.2 Onshore vs. Offshore

Joint-venture fisheries, where domestic fishermen deliver at-sea to foreign processing ships, provided a "bridge" for Americans to enter the groundfish fishery. The first joint-venture fishery off Alaska was in 1980 (for a detailed analysis of the initial year, see Fisher, 1980). The growth of the joint-venture fisheries turned out to be spectacularly successful. They rapidly displaced foreign directed fishing in the Gulf of Alaska under the priority allocation mechanism of the MFCMA. However, the priority allocation under the MFCMA that allowed joint-ventures to displace directed foreign fishing also put them out of business when the domestic processing capacity was developed to displace the foreign processing ships.

The North Pacific Fishery Management Council (NPFMC) recently dealt with an issue that will shape the future of groundfish fisheries in the Gulf of Alaska. At their June 1991 meeting, the NPFMC passed a groundfish allocation between shore-based and at-sea processors in the Gulf of Alaska and the Bering Sea. They also reaffirmed their intention to enforce a moratorium on new entrants into the factory trawl fleet operating in the Bering Sea and Gulf of Alaska.

In March 1992, the Secretary of Commerce ruled on the onshore-offshore amendment that was approved the NPFMC for the Gulf of Alaska and the Bering Sea allocation. The secretary approved the Gulf of Alaska allocation as submitted by the NPFMC. Almost all of the allowable harvest for the Gulf was allocated to shore-based processors (all of the pollock and 90 percent of Pacific cod). Factory trawlers will be allowed 10 percent of the Pacific cod harvest from the Gulf. However, the recommendations for the Bering Sea were only partially approved. For the 1993 season, the secretary established a 35/65 split between shore-based and factory trawlers for the Bering Sea pollock and Pacific cod quota. For the 1994 and 1995 seasons, the split will be 37 1/2 percent for shore-based processors and 62 1/2 percent for the factory trawler fleet. The allocation decision has survived several court challenges and may remain in place through 1995.

The current onshore/offshore allocation scheme will expire on the first day of 1996. It is not clear what will occur to the allocation after that time. When the initial regulation on onshore/offshore allocations was made by the Secretary of Commerce, he indicated that continuation of the measure was contingent to some extent on the NPFMC developing some type of economic realization program for the groundfish fisheries (e.g., implementation of an IFQ system for groundfish). Since the Council has not developed such a program to date, continuation of the current onshore/offshore allocation scheme may come under review in 1995 and 1996.

2.2.2.3 Moratorium

The quick growth of the groundfish industry has fishery managers concerned about overcapitalization, in sharp contrast to 5 to 10 years ago when they were concerned with establishing American participation in the groundfish industry. The impacts of this development on communities within the study area are mixed. It has resulted in an increased demand for fuel and other support services in Unalaska/Dutch Harbor, but other Gulf ports such as King Cove, Kodiak, Homer, Kenai, Seward, Cordova and Yakutat have not participated to any significant level in this increased activity.

In June 1992, the NPFMC passed a moratorium which will freeze entry into the groundfish fishery to those boats which made landings between January 1, 1980 and February 9, 1992. The moratorium covers all groundfish, halibut, and Bering Sea king and tanner crab fisheries managed by the NPFMC. The proposed rule to implement the moratorium has not been sent from the National Marine Fisheries Service Regional Office to the Secretary of Commerce as of the end of 1993. It is not clear if and when the proposed rule will be submitted to the Secretary, but the earliest the moratorium could be implemented would be 1995.

The NPFMC has analyzed several alternatives to limiting participation in the groundfish fisheries. A great deal of the January 1994 meeting was devoted to review of a comprehensive rationalization program (CRP) for groundfish and crab which would impose IFQ's and other measures. The Council was unable to decide on an approach for a CRP at that meeting. Instead, they decided to pursue license limitation as an initial step towards a more comprehensive program which will be addressed in the future.

2.2.2.4 Allocation of Fishery Resources

There are several long-term regional allocation disputes over fisheries resources within the study area. Since 1981, there has been a developing food and bait fishery at Dutch Harbor. A herring sac-roe fishery that began a few years earlier in Togiak and other western Alaska communities growing rapidly after 1979. Proponents of the western Alaska herring fishery have successfully supported changes in fishery regulations in 1987 and 1989 which reduced the Dutch Harbor herring quota. The Alaska Board was again petitioned to close the Dutch harbor herring fishery in 1991 and in March 1991 further restricted the fishery. This action may have interesting ramifications when either demand in the single market for sac-roe (Japan) declines or when world supply of sac-roe increases. It may have been easier for Alaska to shift over into a food and bait fishery if at least minimal market connections had been maintained. With the current uncertain markets for roe herring, particularly in the Togiak and Norton Sound roe herring fisheries, interest in the food/bait fishery may increase.

A second, and similar allocation conflict concerns the Alaska Peninsula salmon fishery. Fishermen from the Yukon/Kuskokwim area have focused attention on the June Unimak and Shumagin Islands fisheries (i.e., the False Pass fishery) which they feel catch chum and coho salmon bound for their fishing grounds. While biological and management considerations enter into the issue, it is primarily an allocation of fishery resources between different Alaskan communities that is being contested.

There are also at least two major ongoing allocation disputes in Cook Inlet over access to salmon stocks. Sport fishermen are seeking to restrict commercial harvests of king, coho, and sockeye salmon in the drift and setnet commercial fisheries. Cook Inlet commercial fishermen are also at odds with fishermen in the Kodiak districts over bycatch of sockeye bound for Cook Inlet waters. These issues continue to be hotly contested every three years when the Board of Fisheries focuses on Cook Inlet.

Aside from the potential for major economic impacts to communities resulting from allocation decisions, the regulatory uncertainty caused by this system increases risk and costs to participants, and introduces instability into the economic base of local communities.

2.2.2.5 Bycatch

The associated harvest of species that are caught while focusing efforts on another species or resource is another important issue. This harvest of non-target species becomes meaningful when the non-target species are already fully harvested by another fishery, and/or are high value species. The NPFMC has established quotas for bycatch by various gear types. Time restrictions and area closures of the groundfish fishery can occur when these quotas are exceeded. Closures could result in the quotas of targeted species not being achieved. Until information from the recently enacted observer program on domestic vessels becomes available, the bycatch rates for different gear types are subject to considerable error.

The ongoing bycatch issue, one of allocation among the different gear types, is equally divisive. At issue is the bycatch of halibut, crab and salmon, primarily by the trawl fleet. The NPFMC is investigating different methods for placing "incentives" for trawlers to reduce their bycatch.

One bycatch issue that will probably be receiving more attention by the NPFMC is the trawl bycatch of king salmon. Data released by the National Marine Fisheries Service in the past few years indicates bycatch of sufficient magnitude to cause strong concern by affected user groups in Cook Inlet and other areas.

2.2.2.6 Marine Mammals

Another major issue for the all fishermen within the Gulf of Alaska is the depressed levels of marine mammals, primarily stellar sea lions and fur seals. Sea lions have been classified as "threatened" under the provisions of the Marine Mammal Protection Act. If the population declines continue, sea lions may be categorized as "endangered", which could trigger major closures in many fisheries in the Gulf of Alaska. Buffer zones are in place around important rookery areas but if the population does not begin to recover, or declines further, more drastic actions may be taken.

2.3 Fisheries Resources

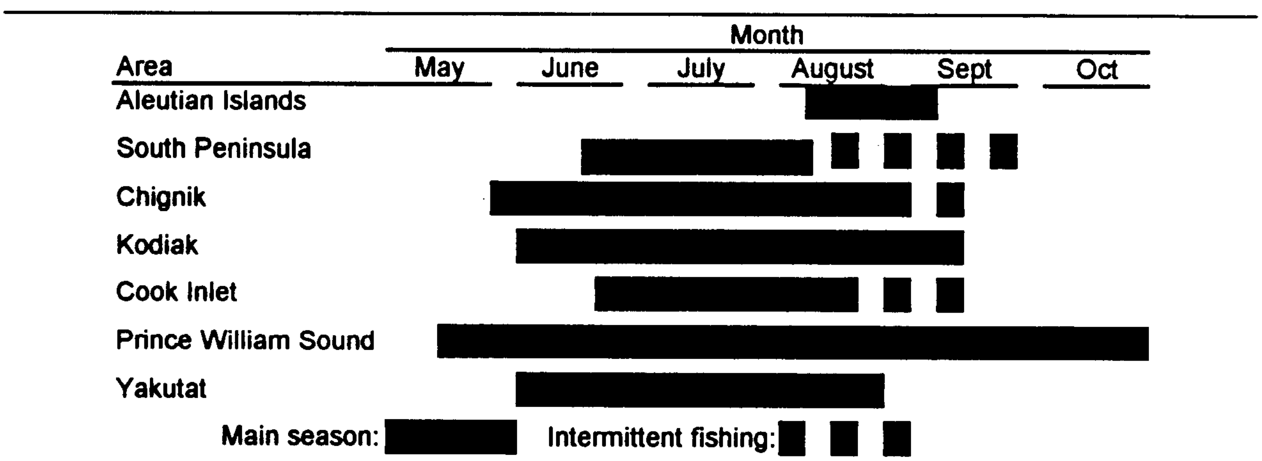
2.3.1 Finfish

2.3.1.1 Salmon

Salmon fisheries provide the largest share of revenues from Gulf of Alaska fisheries. All types of salmon gear is employed in the Gulf: seine, drift gillnet, set gillnet and trolling. The history of salmon harvests date back to the late 1800's. However, harvests in the last decade have set historical high levels. Alaska was able to gain management authority through statehood, where the salmon fishery was previously under federal management. This study focuses on the salmon harvest period from 1960 to the present.

Commercial salmon fisheries within Gulf of Alaska waters are managed by the Alaska Department of Fish & Game (ADF&G). Fishing does not occur in all areas of the Gulf of Alaska due to regulatory restrictions which define open areas. Salmon fisheries are managed in relatively small defined areas. Open periods are restricted to specific periods to allow adequate escapement for spawning requirements. Salmon seasons are constrained partly by regulations and partly by the availability of the salmon. Figure 2.3-1 shows the approximate periods when the major salmon harvesting activity occurs in the Gulf of Alaska.

Figure 2.3-1: Periods of Major Salmon Harvests in the Gulf of Alaska



Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various regions).

The Aleutian Islands: The Aleutian Islands salmon harvest area is part of ADF&G regulatory area "M" (See Figure 2.3-2). The Aleutian Islands regulatory area encompasses all waters in the Aleutian Islands, west of, and including, Unimak Pass. Although this is a large area, the Aleutians receive relatively little salmon fishing effort. According to ADF&G records (Alaska Department of Fish & Game, 1989), all past commercial fishing effort has been at Unalaska Island, with the exception of a 1963 expedition to Attu. With the trend to shorter seasons, there is little incentive for Area "M" salmon fishermen to explore the Aleutians to develop new salmon fishing areas. The seasons are becoming so short, it is necessary for fishermen to direct fishing effort to areas with the highest probability of success.

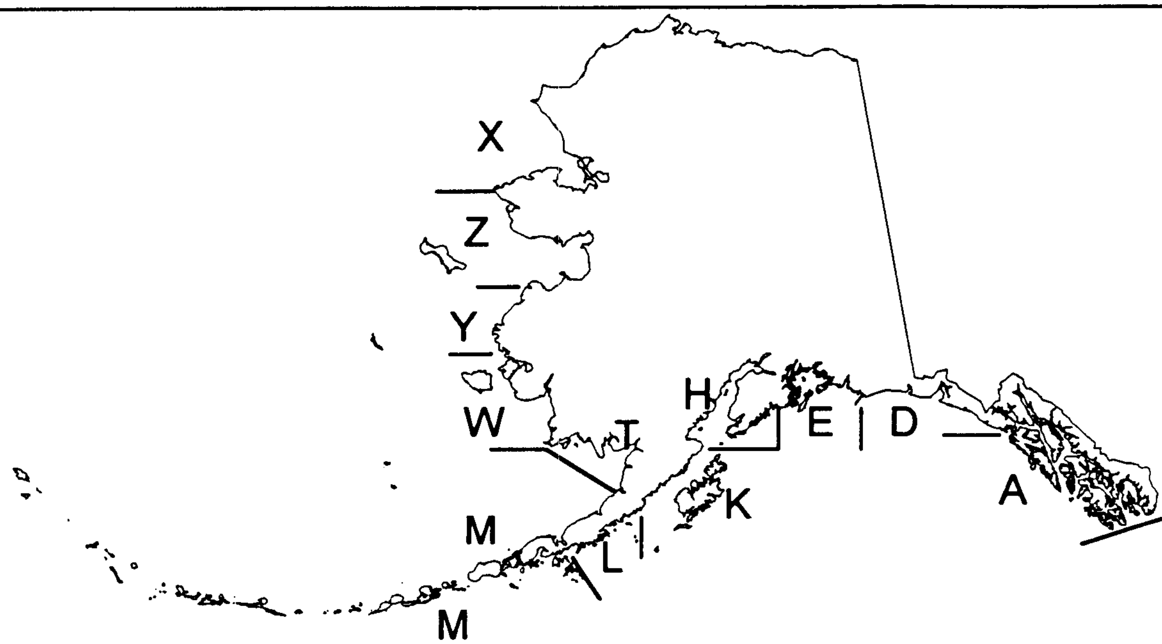
Salmon caught in the Aleutian Islands are primarily pinks, harvested in Unalaska Bay and Makushin Bay on Unalaska Island. The pink runs are typically larger on even years.

In 1992, the Alaska Board of Fisheries made a 3-year commitment to initiate an experimental fishery near Atka Island on the Aleutians. The fishery was intended to target local stocks of pinks and other salmon that were not being utilized. The new fishery is called Area F, Atka-Amlia Islands Management Area. Fishing gear is restricted to 100 fathom set gillnets, to be fished off the beach. The fishery is only open in August, to prevent interception of salmon bound for other areas.

The initial year for the fishery was a limited success. Poor weather and conflicts with halibut fishing prevented higher catches. The total 1992 harvest was 8,553 salmon (Holmes, 1993). Pinks accounted for the 7,932 of the salmon harvest.

The South Peninsula: Regulatory Area M includes all of the Aleutian Islands regulatory area as well as the Alaska Peninsula regulatory area. The Alaska Peninsula area extends from Kupreanof Point west to Scotch Cap Light (South Peninsula) and from Cape Sarichef Light to Strogonof Point (North Peninsula).

Figure 2.3-2: Alaska Commercial Salmon Fisheries Management Areas



Source: Alaska Department of Fish & Game, n.d.

This discussion of the salmon fishery in Area M focuses on the South Peninsula fishery. It is of most importance to King Cove residents and residents of other Aleutian Peninsula communities on the Gulf side of the Alaska Peninsula. Residents from King Cove participate in fisheries on the North Peninsula, however, most of the salmon processed in King Cove are harvested from the South Peninsula. Sockeye is the predominant species in the South Peninsula.

Chignik: The Chignik salmon management area extends along the south side of the Alaska Peninsula, between the Kodiak area to the east and the Alaska Peninsula area to the west. The Chignik Lagoon sockeye fishery is well known throughout Alaska as having the highest market value for their limited entry permits, compared with all other salmon permits. The high market value of the permits reflects the high average gross earnings in the fishery.

Chignik is composed of an 'inside' fishery, the Chignik Bay District and several 'outside fisheries in the Central, Eastern, Western and Perryville districts. The largest portion of the Chignik catch is from the Chignik Bay district.

Kodiak: The Kodiak salmon management areas extends from the Chignik management area to the boundary with the Cook Inlet management area at Cape Douglas and includes Kodiak, Afognak and adjacent Islands. Sockeye, pinks and chums account for most of the salmon harvest off Kodiak, with smaller amounts of coho and kings.

Cook Inlet: The Cook Inlet salmon management area includes all waters west of the longitude of Cape Fairfield and north of the latitude of Cape Douglas. The area is further divided into two main regulatory areas; lower Cook Inlet and Upper Cook Inlet. The dividing line between the two is the latitude of Anchor Point. Seine fishing is limited to lower Cook Inlet, with pinks accounting for a large proportion of the catch, particularly on odd years. Both drift gillnets and set gillnets are used in Upper Cook Inlet. The primary target species is sockeye.

Prince William Sound: Prince William Sound (PWS) salmon management areas extend through all coastal waters and inland drainages entering the northcentral Gulf of Alaska between Cape Suckling on the south and Cape Fairfield on the north. Pinks and chums are the most numerous species caught in the PWS commercial salmon fisheries. In recent years, most of the harvest of pinks has been produced by an extensive aquaculture program. PWS has the largest concentration of commercial fishery-oriented hatcheries in Alaska.

Yakutat: The Yakutat salmon management area extends from Cape Suckling on the north to Cape Fairweather on the south. Most of the salmon fishing is by set gillnets. There is some trolling that takes place on the Fairweather grounds. The troll harvest was not included in the salmon harvests for the Yakutat, since most of the fishermen participating in that fishery are from Southeast Alaska.

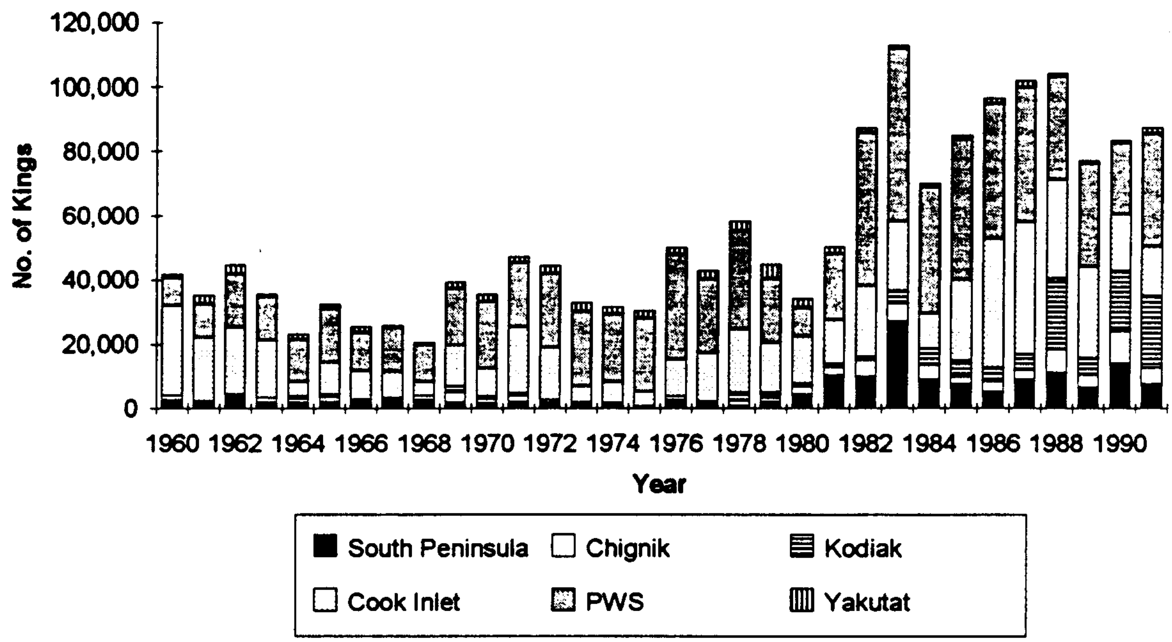
Salmon harvests are presented and discussed by species and management area. There is a common trend in most of Alaska's salmon fisheries to show a sharp increase in harvest levels around 1980. This increase is due to a number of factors, no one of which can be credited with the change. The phasing out of foreign fishing effort after implementation of the Fisheries Conservation and Management Act of 1976 is probably a major factor in the increase. Another factor were the relatively good oceanographic and environmental conditions of the late 1970's. Many years of prudent management following statehood is also a likely factor in the trend. King salmon harvests for the Gulf of Alaska are shown in Table 2.3-1 and Figure 2.3-3. Prince William Sound and Cook Inlet are the areas with the highest harvests of king salmon. The Aleutian Islands does not have a commercial king salmon harvest. King salmon account for relatively modest harvests in Kodiak, Chignik, South Peninsula and Yakutat. The 1990 harvest was 83,164 king salmon. From 1960 to 1990, the harvest level varied from a low of 20 thousand in 1968 to a high of 113 thousand in 1983. Since the peak in 1983, king salmon harvests have remained at high levels.

Table 2.3-1: Chinook (King) Salmon Harvests
(number of fish)

	Management Area							
Year	Aleutians	South Peninsula	Chignik	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
1960	0	1,700	643	2,000	27,539	8,899	908	41,689
1961	0	900	409	1,000	19,778	10,325	2,534	34,946
1962	0	3,300	435	1,000	20,270	16,868	2,747	44,620
1963	0	1,900	1,744	0	17,632	13,259	941	35,476
1964	0	2,000	1,099	1,000	4,622	12,858	1,488	23,067
1965	0	2,100	1,592	1,000	9,751	16,492	1,323	32,258
1966	0	1,400	636	1,000	8,606	12,108	1,555	25,305
1967	0	1,600	882	1,000	8,035	13,497	742	25,756
1968	0	1,400	674	2,000	4,600	11,276	697	20,647
1969	0	1,900	3,448	2,000	12,471	17,424	1,887	39,130
1970	0	1,800	1,225	1,000	8,464	20,432	2,272	35,193
1971	0	2,200	2,010	1,000	19,838	20,142	1,945	47,135
1972	0	1,300	464	1,000	16,174	23,003	2,376	44,317
1973	0	400	525	1,000	5,339	22,638	2,733	32,635
1974	0	500	255	1,000	6,769	20,602	2,214	31,340
1975	0	100	549	0	4,915	22,325	2,224	30,113
1976	0	2,100	763	1,000	11,317	32,751	1,830	49,761
1977	0	500	711	1,000	15,009	22,864	2,549	42,633
1978	0	800	1,603	3,000	19,049	30,435	3,057	57,944
1979	0	2,100	1,266	2,000	14,976	20,078	4,299	44,719
1980	0	4,800	2,325	1,000	14,219	8,643	2,800	33,787
1981	0	10,200	2,694	1,000	13,326	20,782	2,069	50,071
1982	0	9,800	5,236	1,000	21,936	47,871	1,456	87,299
1983	0	26,900	5,488	4,000	21,507	53,879	976	112,750
1984	0	9,200	4,318	5,000	10,755	39,774	1,062	70,109
1985	0	7,900	1,919	5,000	25,129	43,735	1,231	84,914
1986	0	5,600	3,037	4,000	40,036	42,128	1,425	96,226
1987	0	9,200	2,651	5,000	40,840	41,909	2,072	101,672
1988	0	11,100	7,296	22,000	30,754	31,797	893	103,840
1989	0	7,000	3,542	5,000	28,635	32,006	810	76,993
1990	0	14,000	9,901	18,800	17,636	22,163	664	83,164
1991	0	8,000	4,681	22,200	15,309	35,449	1,750	87,389

Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

Figure 2.3-3: Chinook (King) Salmon Harvests
by Gulf of Alaska Management Area



Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

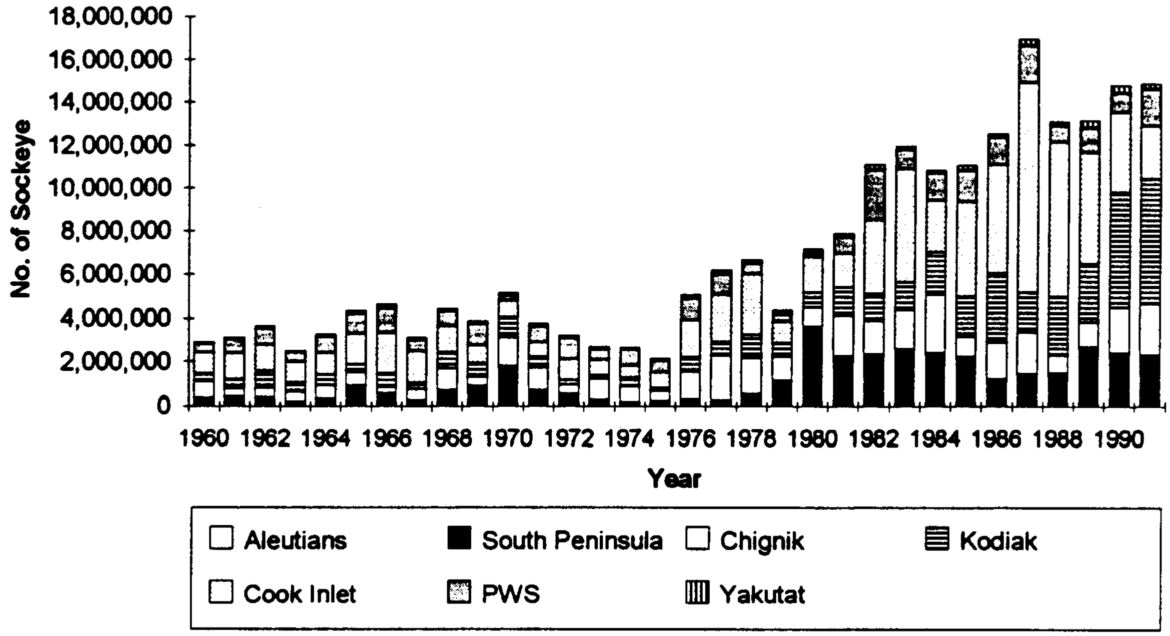
Sockeye harvests for the Gulf of Alaska are shown in Table 2.3-2 and Figure 2.3-4. Similar to king salmon, sockeye showed a sharp increase in harvest levels starting in 1980. In recent years, Cook Inlet and Kodiak have been the big producers in the Gulf of Alaska. The 1990 harvest was 14.8 million throughout the Gulf. Since 1960, the lowest harvest was in 1975 with a harvest of 2.1 million. The highest was in 1987 with a harvest of 16.8 million. The harvest trend has shown a fairly constant rise since 1980.

Table 2.3-2: Sockeye Salmon Harvests
(number of fish)

	Management Area							
Year	Aleutians	South Peninsula	Chignik	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
1960	7,600	379,000	715,969	362,000	948,040	428,733	44,671	2,886,013
1961	2,700	456,800	322,890	408,000	1,185,079	656,911	82,403	3,114,783
1962	5,500	420,000	364,753	785,000	1,172,859	804,324	73,937	3,626,373
1963	4,500	204,400	408,606	407,000	958,101	458,460	52,517	2,493,584
1964	200	370,800	556,890	478,000	990,709	779,991	90,175	3,266,765
1965	0	915,700	599,553	346,000	1,426,352	945,020	120,417	4,353,042
1966	1,000	606,200	219,794	632,000	1,867,447	1,130,278	185,360	4,642,079
1967	200	294,100	462,000	284,000	1,409,106	565,709	88,431	3,103,546
1968	2,000	699,800	977,382	760,000	1,200,146	721,744	80,776	4,441,848
1969	1,900	912,800	394,135	604,000	815,040	1,020,513	117,725	3,866,113
1970	200	1,794,600	1,325,883	917,000	767,532	243,403	112,169	5,160,787
1971	300	715,500	1,016,136	478,000	659,032	741,945	129,206	3,740,119
1972	100	557,800	378,669	222,000	937,621	976,115	131,484	3,203,789
1973	100	330,200	870,352	167,000	699,161	473,044	128,412	2,668,269
1974	0	204,700	662,905	409,000	524,588	741,340	82,413	2,624,946
1975	0	268,400	399,593	137,000	706,878	546,634	73,260	2,131,765
1976	0	375,000	1,163,728	641,000	1,722,290	1,008,912	130,176	5,041,106
1977	0	311,700	1,972,207	623,000	2,154,108	943,943	185,391	6,190,349
1978	1,800	579,500	1,576,283	1,072,000	2,778,071	505,509	130,681	6,643,844
1979	12,200	1,149,700	1,049,497	632,000	988,832	369,583	165,069	4,366,881
1980	9,200	3,613,000	859,966	651,000	1,643,079	208,724	159,152	7,144,121
1981	5,400	2,255,200	1,839,469	1,289,000	1,549,490	784,469	149,573	7,872,601
1982	2,700	2,346,000	1,521,857	1,205,000	3,391,184	2,362,328	212,368	11,041,437
1983	4,400	2,556,600	1,824,175	1,232,000	5,237,378	908,469	152,541	11,915,563
1984	67,200	2,318,000	2,660,478	1,951,000	2,376,616	1,303,515	102,545	10,779,354
1985	2,800	2,214,600	922,151	1,843,000	4,338,954	1,464,563	234,886	11,020,954
1986	7,700	1,223,000	1,645,834	3,155,000	5,022,843	1,288,712	150,619	12,493,708
1987	100	1,449,800	1,898,838	1,793,000	9,749,034	1,737,989	259,979	16,888,740
1988	4,300	1,472,900	795,841	2,698,000	7,153,350	767,674	162,168	13,054,233
1989	8,200	2,660,700	1,159,287	2,629,000	5,173,969	1,175,238	329,563	13,135,957
1990	12,400	2,386,600	2,093,650	5,248,000	3,776,764	911,607	344,461	14,773,482
1991	800	2,322,400	2,360,000	5,704,000	2,503,588	1,735,076	229,854	14,855,718

Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

Figure 2.3-4: Sockeye Salmon Harvests
by Gulf of Alaska Management Area



Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

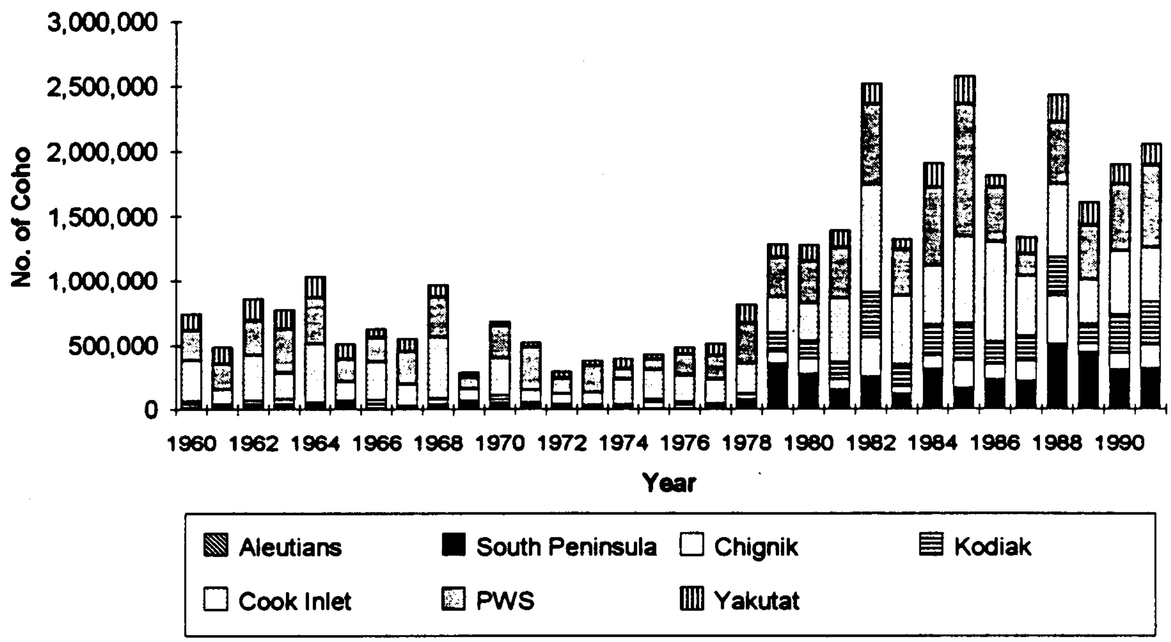
Coho harvests for the Gulf of Alaska are shown in Table 2.3-3 and Figure 2.3-5. Coho also show a sharp increase in harvest levels starting in 1979. Coho harvests are fairly well dispersed among the different management areas. In recent years, Prince William Sound and Cook Inlet have contributed the largest share of the total harvest. Yakutat shows a higher proportion of the total Gulf coho harvest than for king or sockeye. The 1990 Gulf harvest of coho was 1.8 million. Since 1960, the lowest harvest was in 1969 when only 292 thousand were caught. The highest was in 1985 with a harvest of 2.5 million. The trend for coho harvests has been a general increase since 1979, with quite a variation in harvest levels.

Table 2.3-3: Coho Salmon Harvests
(number of fish)

	Management Area							
Year	Aleutians	South Peninsula	Chignik	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
1960	0	1,800	8,933	54,000	314,153	238,744	119,149	736,779
1961	0	10,400	3,088	29,000	119,397	195,858	128,670	486,413
1962	100	12,500	1,292	54,000	358,051	262,038	170,776	858,757
1963	0	16,500	9,933	57,000	203,876	339,892	141,365	768,566
1964	0	13,600	2,735	36,000	462,114	352,343	169,780	1,036,572
1965	0	34,200	9,602	27,000	154,481	168,111	122,207	515,601
1966	0	6,300	1,650	68,000	295,248	189,873	66,252	627,323
1967	0	2,900	13,150	10,000	180,455	247,239	97,211	550,955
1968	100	31,100	2,200	56,000	474,733	309,694	92,005	965,832
1969	0	10,900	18,103	35,000	101,585	94,304	32,262	292,154
1970	100	32,200	15,348	66,000	284,685	252,641	29,748	680,722
1971	0	16,800	14,557	23,000	105,197	327,697	37,420	524,671
1972	0	8,000	19,615	14,000	83,167	124,670	45,704	295,156
1973	0	6,600	22,322	4,000	106,474	199,019	41,213	379,628
1974	0	9,400	12,245	14,000	206,639	76,041	77,556	395,881
1975	0	0	53,283	25,000	227,950	84,109	37,403	427,745
1976	0	200	35,301	24,000	211,926	160,494	51,743	483,664
1977	0	2,100	17,429	28,000	194,397	179,417	92,214	513,557
1978	0	60,700	20,212	49,000	225,889	312,930	137,408	806,139
1979	0	356,500	93,146	141,000	277,559	315,774	95,873	1,279,852
1980	0	274,200	117,862	139,000	285,883	337,123	119,648	1,273,716
1981	200	162,200	78,805	122,000	495,924	396,163	132,127	1,387,419
1982	0	256,000	300,384	344,000	840,829	623,877	148,994	2,514,084
1983	0	127,700	61,915	158,000	527,541	365,469	81,517	1,322,142
1984	0	309,100	110,128	230,000	466,700	609,484	182,256	1,907,668
1985	0	172,500	206,624	284,000	677,540	1,025,046	203,193	2,568,903
1986	100	235,900	116,633	168,000	775,682	426,240	87,871	1,810,426
1987	0	224,700	150,414	192,000	465,758	175,214	124,406	1,332,492
1988	0	505,500	370,410	303,000	567,968	477,816	205,866	2,430,560
1989	0	443,800	68,233	141,000	351,290	424,980	176,847	1,606,150
1990	100	307,200	130,131	293,700	493,996	523,814	148,890	1,897,831
1991	0	317,000	185,000	324,900	429,573	632,372	166,380	2,055,225

Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

Figure 2.3-5: Coho Salmon Harvests
by Gulf of Alaska Management Area



Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

Pink harvests for the Gulf of Alaska are shown in Table 2.3-4 and Figure 2.3-6. Possibly because they are a two-year salmon, pinks show a sharp increase in harvest levels beginning in 1978, one or two years earlier than the other species. Prince William Sound has been the big producer of pink salmon in recent years, with its proportion showing an increasing trend. In 1990, Prince William Sound contributed 44.2 million of the total Gulf harvest of 54.8 million pinks, (or over 80%). Kodiak and the South Peninsula are the other major pink-producing area, however, they are being overshadowed by Prince William Sound. Since 1991, however, the returns of pinks to Prince William Sound have sharply decreased.

The strong aquaculture program in Prince William Sound has continued to increase its production of pink salmon fry. Since 1960, the lowest pink harvest for the entire Gulf of Alaska was in 1973 when only 3.3 million were caught. The highest harvest occurred in 1991 with over

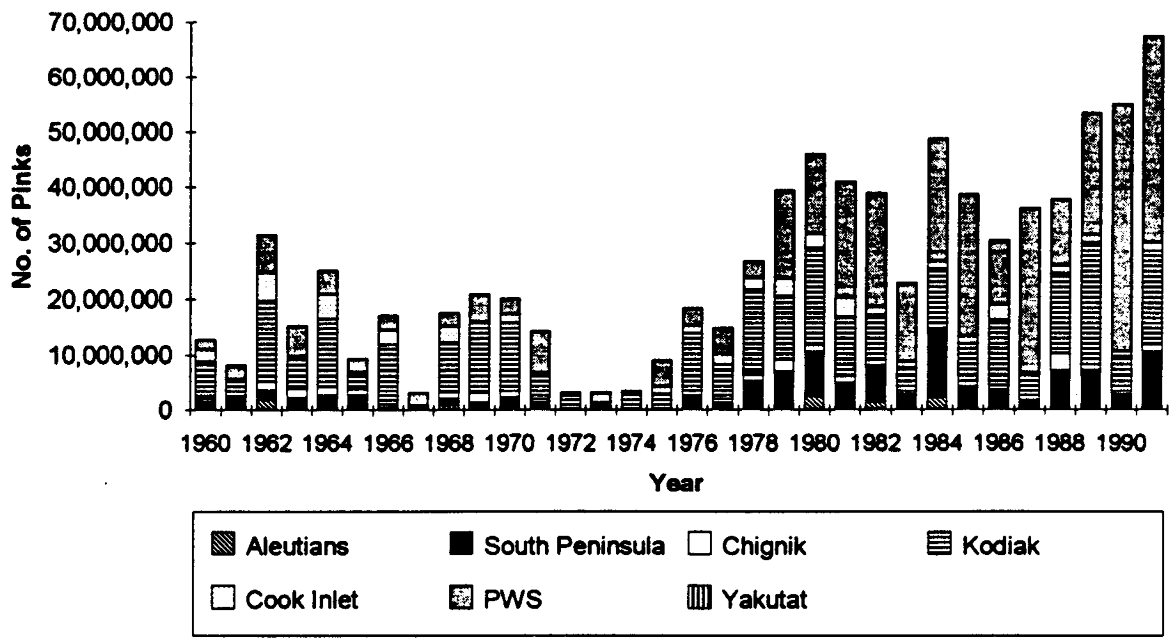
67 million pinks landed. The strong upward trend for pinks may depend upon continuation of the Prince William aquaculture program and other programs.

Table 2.3-4: Pink Salmon Harvests
(number of fish)

	Management Area							
Year	Aleutians	South Peninsula	Chignik	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
1960	444,900	1,197,500	557,327	6,685,000	2,023,252	1,841,896	12,911	12,762,786
1961	94,000	1,727,800	443,510	3,296,000	337,394	2,298,218	63,608	8,260,530
1962	2,001,700	1,965,500	1,519,305	14,189,000	4,960,030	6,742,316	26,063	31,403,914
1963	93,900	2,367,700	1,662,363	5,480,000	234,052	5,295,378	78,697	15,212,090
1964	194,100	2,740,400	1,682,365	11,862,000	4,287,378	4,206,896	40,038	25,013,177
1965	0	2,884,100	1,118,158	2,887,000	139,561	2,460,471	4,402	9,493,692
1966	63,500	302,300	683,215	10,756,000	2,584,985	2,699,418	1,405	17,090,823
1967	7,900	77,800	108,981	188,000	407,717	2,626,340	31,580	3,448,318
1968	902,800	1,287,100	1,290,660	8,761,000	2,863,638	2,452,168	2,130	17,559,496
1969	242,200	1,219,400	1,779,736	12,493,000	236,474	4,828,579	63,692	20,863,081
1970	672,500	1,723,400	1,287,605	12,045,000	1,542,851	2,809,996	3,555	20,084,907
1971	45,500	1,450,100	612,290	4,333,000	428,495	7,312,730	79,973	14,262,088
1972	2,800	78,000	72,240	2,486,000	657,239	57,090	2,903	3,356,272
1973	7,000	58,000	25,445	512,000	633,586	2,065,844	16,998	3,318,873
1974	0	99,700	70,017	2,685,000	534,636	458,619	4,248	3,852,220
1975	0	61,700	66,165	2,945,000	1,398,967	4,453,041	80,043	9,004,916
1976	0	2,367,000	388,917	11,078,000	1,393,188	3,022,426	28,492	18,278,023
1977	0	1,448,600	604,824	6,252,000	1,847,787	4,536,459	75,504	14,765,174
1978	38,100	5,608,800	985,114	15,004,000	2,041,659	2,917,499	30,522	26,625,694
1979	539,400	6,570,500	2,056,999	11,287,000	3,063,911	15,615,810	152,053	39,285,673
1980	2,597,500	7,961,500	1,125,465	17,290,000	2,676,133	14,161,023	141,998	45,953,619
1981	302,800	5,035,900	1,162,613	10,337,000	3,406,352	20,558,304	133,863	40,936,832
1982	1,447,800	6,734,900	873,390	8,076,000	1,342,237	20,403,423	9,886	38,887,636
1983	2,000	2,827,600	321,160	4,603,000	997,934	13,977,116	25,378	22,754,188
1984	2,309,700	11,589,300	446,184	10,884,000	1,317,920	22,119,309	19,870	48,686,283
1985	100	4,433,700	174,966	7,335,000	1,317,536	25,252,924	16,362	38,530,588
1986	42,600	4,031,500	647,125	11,504,000	2,707,653	11,410,302	7,248	30,350,428
1987	0	1,208,600	246,775	5,073,000	311,230	29,230,303	12,910	36,082,818
1988	183,100	7,044,800	2,997,159	14,262,000	1,391,268	11,820,121	120,204	37,818,652
1989	6,700	7,292,700	27,712	22,649,000	1,364,356	21,886,466	59,319	53,286,253
1990	282,800	2,865,900	550,008	5,983,810	935,751	44,165,077	30,839	54,814,185
1991	0	10,615,800	1,190,000	16,642,800	1,608,132	37,295,379	3,051	67,355,162

Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

Figure 2.3-6: Pink Salmon Harvests
by Gulf of Alaska Management Areas



Sources: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

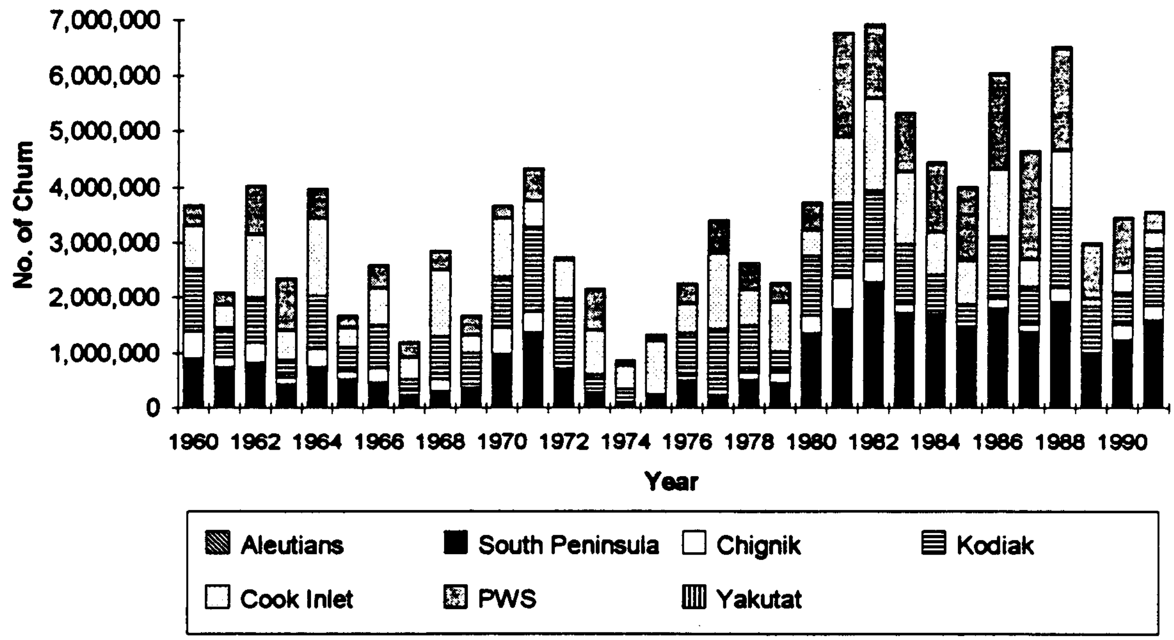
Chum harvests for the Gulf of Alaska are shown in Table 2.3-5 and Figure 2.3-7. Chums increased sharply in 1979 and remained at high harvest levels until the past two years. The 1990 Gulf harvest of chums was 3.4 million. Since 1960, the lowest harvest was in 1974, with 863 thousand caught. The highest harvest was in 1982 with 6.9 million caught. The trend for chum harvests has been an overall increase after 1979, with a substantial drop in 1989 and 1990. Prince William Sound, the South Peninsula and Kodiak consistently account for a large proportion of the total Gulf harvest.

Table 2.3-5: Chum Salmon Harvests
(number of fish)

Year	Aleutians	South Peninsula	Chignik	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
	Management Area							
1960	300	904,400	486,699	1,133,000	776,079	381,858	277	3,682,613
1961	200	748,600	178,760	519,000	405,221	224,401	11,038	2,087,220
1962	1,200	824,800	364,335	795,000	1,149,841	891,880	616	4,027,672
1963	300	461,300	112,697	305,000	525,537	942,900	10,294	2,358,028
1964	2,300	751,000	333,336	932,000	1,402,419	539,047	1,481	3,961,583
1965	0	556,400	120,589	431,000	344,520	201,043	4,094	1,657,646
1966	700	494,400	238,883	763,000	661,818	426,628	3,396	2,588,825
1967	0	245,200	75,543	221,000	382,282	274,234	4,459	1,202,718
1968	800	325,300	223,861	750,000	1,194,248	342,939	13,866	2,851,014
1969	1,500	389,200	67,721	537,000	331,045	320,977	14,927	1,662,370
1970	3,300	981,700	464,674	919,000	1,043,256	230,661	7,093	3,649,684
1971	100	1,366,600	353,952	1,541,000	475,631	579,552	4,986	4,321,821
1972	0	727,500	78,356	1,165,000	705,559	46,088	8,290	2,730,793
1973	0	293,000	8,701	318,000	783,074	740,017	8,995	2,151,787
1974	0	71,500	34,454	248,000	416,148	89,210	4,185	863,497
1975	0	132,900	25,161	85,000	972,627	101,286	3,761	1,320,735
1976	0	532,500	80,221	740,000	520,628	370,657	7,746	2,251,752
1977	0	243,200	110,452	1,072,000	1,379,511	573,166	8,652	3,386,981
1978	0	547,000	120,889	814,000	645,477	489,771	6,181	2,623,318
1979	200	483,000	188,169	358,000	868,847	349,615	7,399	2,255,230
1980	4,900	1,351,200	312,572	1,076,000	464,302	482,214	20,151	3,711,339
1981	6,600	1,770,300	580,332	1,345,000	1,169,642	1,888,822	10,633	6,771,329
1982	6,100	2,272,500	390,096	1,266,000	1,632,051	1,336,878	6,305	6,909,930
1983	11,400	1,701,100	159,362	1,085,000	1,307,177	1,048,737	11,195	5,323,971
1984	33,900	1,656,500	63,408	649,000	772,629	1,229,185	32,230	4,436,852
1985	14,200	1,393,100	26,146	431,000	803,469	1,321,538	12,466	4,001,919
1986	38,800	1,749,700	176,640	1,126,000	1,216,861	1,700,906	16,609	6,025,516
1987	0	1,376,300	127,261	682,000	506,150	1,919,415	14,555	4,625,681
1988	500	1,905,200	267,126	1,426,000	1,030,484	1,843,317	29,247	6,501,874
1989	0	994,200	1,624	836,000	133,332	1,001,809	16,238	2,983,203
1990	1,000	1,237,800	270,004	577,740	367,123	967,384	5,813	3,426,864
1991	0	1,587,400	264,000	1,029,100	304,776	352,222	2,979	3,540,477

Source: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

Figure 2.3-7: Chum Salmon Harvests
by Gulf of Alaska Management Areas



Source: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).

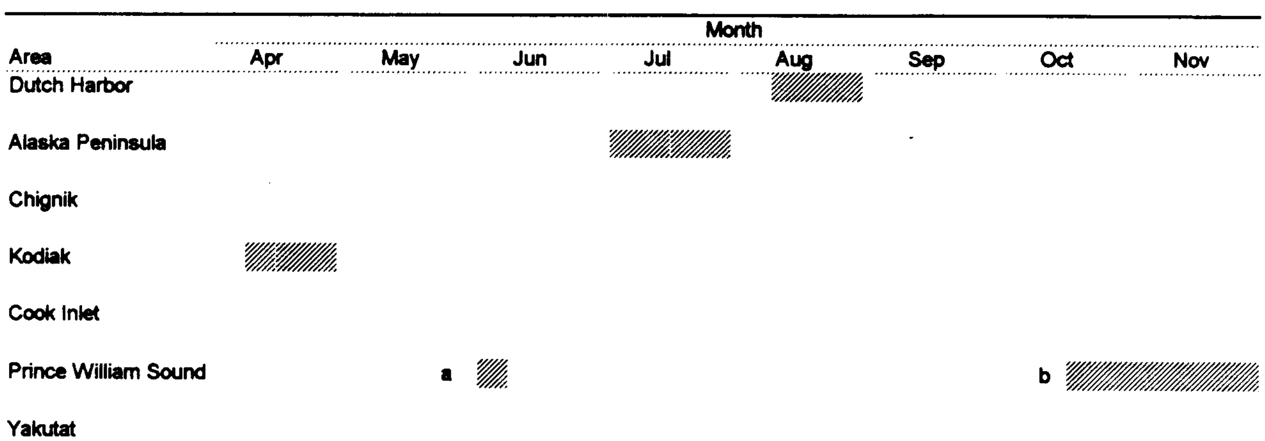
2.3.1.2 Pacific Herring

The Gulf of Alaska has several types of commercial herring fisheries, each with a different character and history. A summary table of herring fisheries in the Gulf is shown in Table 2.3-6. A herring food/bait fishery is located in the waters around Unalaska/Dutch Harbor. There was a historical food fishery for herring in the Bering Sea in the 1920's, 30's and early 40's. The fishery ended with the war and did not begin again until 1979. The South Peninsula herring fishery is for sac-roe. This fishery began in 1979 and has shown modest growth since that time. The Chignik herring sac roe fishery began in 1980, with a harvest of 694 tons. This fishery has shown a declining trend. The 1989 Chignik herring harvest was 66 tons. A Kodiak fishery for herring sac roe began in 1964. Harvests from this fishery have been relatively constant in recent years. The 1990 harvest was 2347 tons. A sac roe herring fishery in Cook Inlet began in 1960, but did not harvest a significant amount until 1969. The fishery has shown wide variation in harvest levels since that time.

There are several types of herring fisheries in Prince William Sound. A fishery for sac roe began in 1969. Harvests from that fishery increased to a high of 14,000 tons in 1981 and have declined since that peak. There was no fishery in 1989 due to the S.S. Exxon Valdez oil spill, however the fishery operated in 1990 with a harvest of 8,800 tons. There are also herring fisheries in Prince William Sound for herring roe on kelp and collection of natural spawn. The herring equivalent of this harvest is shown in column PWS(2) in Table 2.3-6. There is also a food and bait fishery in Prince William Sound shown in column PWS(3) with harvests beginning in 1970.

Figure 2.3-8 shows the relative periods when herring fishing occurs in the Dutch Harbor, Alaska Peninsula, Chignik, Kodiak and Prince William Sound areas.

Figure 2.3-8: Periods of Major Herring Harvests



Source: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).
a Sac roe and herring roe on kelp fisheries.
b Food and bait fishery.

Table 2.3-6: Herring Harvest
by Gulf of Alaska Management Area
(short tons)

Year	Dutch Harbor food & bait	S. Peninsula sac roe	Chignik sac roe	Kodiak sac roe	Cook Inlet sac roe	PWS(1) sac roe	PWS(2) roe on kelp	PWS(3) food & bait	Total
1960									0
1961					1				1
1962					0				0
1963					1				1
1964				568	0				568
1965				657	2				659
1966				2,769	7				2,776
1967				1,662	0				1,662
1968				2,001	20				2,021
1969				1,130	1,347	356	21		2,854
1970				342	4,809	0	761	10	5,922
1971				284	844	919	3,077	20	5,145
1972				215	31	1,773	2,397	5	4,421
1973				831	1,579	6,984	1,225	9	10,628
1974				868	2,655	6,372	2,208	0	12,103
1975				8	4,143	6,082	3,668	0	13,901
1976				5	4,842	2,585	1,940	0	9,371
1977				338	3,199	2,285	1,668	0	7,490
1978				904	419	1,391	563	253	3,530
1979		10		1,735	428	4,139	1,892	1,290	9,494
1980		454	694	2,383	0	6,308	2,451	656	12,945
1981	704	716	447	2,065	0	14,005	499	1,417	19,853
1982	3,565	138	190	1,771	0	7,542	1,264	1,263	15,733
1983	3,567	0	90	2,319	0	2,830	1,241	883	10,929
1984	3,578	211	66	2,163	0	6,180	25	274	12,497
1985	3,480	345	26	1,968	1,348	7,494	205	1,022	15,888
1986	2,394	281	11	1,558	2,154	10,277	453	1,118	18,246
1987	2,503	319	73	2,146	6,918	5,516	767	1,276	19,518
1988	2,004	377	59	2,171	5,605	8,254	897	1,189	20,556
1989	3,081	310	66	2,249	4,971	(4)	(4)	1,226	11,903
1990	820	312	0	2,347	2,264	8,808	1,051	0	15,602
1991	1325	157	0	2,432	1,992	12,665	2,000	0	20,571

Source: Alaska Department of Fish & Game, various years. (Annual Management Reports for the various areas).
(1) Sac roe herring harvest by seine and gillnet fishermen.
(2) Roe on kelp in pounds and from natural spawning.
(3) Herring bait and food harvests.
(4) Fishery closed due to S.S. Exxon Valdez spill.

Gulf-wide herring harvests have varied widely in response to fluctuations in resource abundance. The peak harvests were in 1981, 1987 and 1988. The long term trends in herring fisheries are difficult to predict since recruitment is highly variable each year. Continued high harvests are dependent upon strong year-classes.

2.3.2 Groundfish

The groundfish fisheries in the Gulf of Alaska have experienced a series of major changes since the late 1970's. Until then, groundfish from the Gulf were primarily harvested by trawl and longline vessels from Pacific Rim nations. The rapid growth of the joint-venture fisheries in the early and mid 1980's displaced the foreign fishermen. Direct foreign allocations of Gulf of Alaska pollock ceased after 1985. The foreign directed fishery for Pacific cod ended one year later in 1986.

In the joint-venture fisheries, American vessels caught pollock and other groundfish and delivered the fish to foreign processing vessels at sea. The first significant landings by joint-venture operations was in 1981 with a harvest of 16,900 metric tons (mt) of pollock. The joint-venture fishery experienced explosive growth to a peak in 1985 and then was quickly phased out over the next three years. Since 1988, Gulf groundfish have been allocated to the domestic fishery (where catches are made by domestic catcher boats delivering to domestic processing companies or by domestic catcher-processors).

These rapid changes in the participants in the Gulf of Alaska groundfish fisheries have had and are having profound effects on the groundfish management. From 1977 when the Magnuson Fisheries Conservation and Management Act of 1976 (MFCMA) went into effect until the early 1980's, foreign fisheries predominated. During this period management efforts were directed at reducing perceived "over-fishing" thereby reducing and eventually eliminating catches by foreign fisheries of species of interest to U.S. fishermen. Foreign catch levels were reduced or held constant and efforts were made to transfer catches to "joint-ventures" or domestic fishermen. There was a concerted effort by the fishing industry to remove foreign effort using the provisions of the MFCMA.

The early joint-venture fisheries were encouraged by the management agencies and regulation was minimal. In fact, joint-ventures were often exempted from regulations that were applied to the foreign fisheries for conservation purposes such as time-area closures and by-catch restrictions. However, as the joint-venture fleet grew in size, conflicts began to develop between joint-venture fishermen and wholly domestic fishermen such as crab, halibut and salmon fishermen. Generally these conflicts have focused on by-catch by the trawl fleet of species important to fixed-gear fishermen. More recently, however, conflicts have arisen between different groups of trawlers relating to access to fishing grounds and fish.

2.3.2.1 Pollock

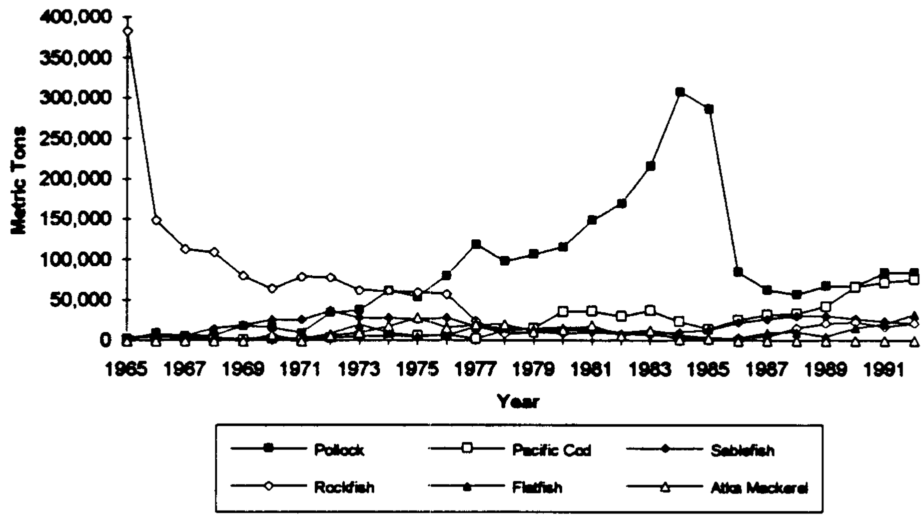
The pollock harvest in the Gulf of Alaska grew steadily from 1965 to about 1980 as shown in Table 2.3-7 and Figure 2.3-9. This table and figure also show the exceptional increase in resource abundance that allowed the fishery to expand to a peak harvest of 306,700 mt in 1984. The harvest then dropped abruptly over the next two years to 84,000 mt in 1986. The harvests have continued to decline since then.

Table 2.3-7: Groundfish Harvests
Gulf of Alaska, 1965-1990
(metric tons)

	Species					
Year	Pollock	Pacific Cod	Sablefish	Rockfish	Flatfish	Atka Mackerel
1965	2,746	583	3,458	382,481	4,697	0
1966	8,940	459	5,178	148,439	4,928	0
1967	6,432	2,154	6,143	112,741	4,506	0
1968	6,168	1,046	15,049	108,574	3,468	0
1969	17,914	1,357	19,375	79,238	2,676	0
1970	15,970	1,830	25,694	63,674	3,859	7,281
1971	9,454	703	25,542	77,985	2,365	0
1972	34,166	3,572	36,453	77,564	8,942	6,282
1973	36,989	5,548	27,487	61,414	19,566	9,494
1974	61,474	5,353	28,006	61,193	9,733	17,531
1975	53,568	5,985	26,094	58,908	5,487	27,776
1976	79,526	7,089	27,733	56,983	6,092	15,539
1977	118,062	2,261	17,135	23,453	16,724	19,455
1978	97,405	12,167	8,875	8,176	15,198	19,586
1979	105,783	14,872	10,352	9,921	13,928	10,959
1980	115,037	35,327	8,509	12,471	15,846	13,166
1981	147,744	36,087	9,916	12,184	14,866	18,727
1982	168,746	29,379	8,556	7,991	9,278	6,760
1983	215,649	36,401	9,001	7,405	12,661	12,260
1984	306,693	23,217	10,230	4,452	6,913	1,153
1985	284,826	14,306	12,479	1,087	3,078	1,848
1986	84,000	24,612	21,614	2,981	2,441	4
1987	62,000	31,432	26,325	4,981	9,925	0
1988	55,970	32,557	29,903	14,865	10,275	0
1989	66,571	41,676	29,842	20,740	5,167	0
1990	66,203	65,923	26,600	22,316	15,411	0
1991	83,319	70,802	23,258	16,619	20,068	0
1992	83,217	74,426	20,813	20,704	31,926	0

Sources: North Pacific Fishery Management Council, "Fishery Management Plan for the Gulf of Alaska Groundfish Fishery (1965-1985 harvests); Stock Assessment and Fishery Evaluation Report for the 1993 Gulf of Alaska Groundfish Fishery, November 1992.

Figure 2.3-9: Groundfish Harvests
Gulf of Alaska, 1965-1990
(metric tons)



Source: North Pacific Fishery Management Council, 1992.

Until the early 1980's foreign nations harvested most of the pollock resource. As joint venture fisheries grew rapidly in the early 1980's, they displaced the directed foreign fishing. Finally, the growth of the domestic processing and harvesting industry in the late 1980's displaced the joint-ventures. These major changes in the fishery are presented in Table 2.3-8 and depicted in Figure 2.3-10.

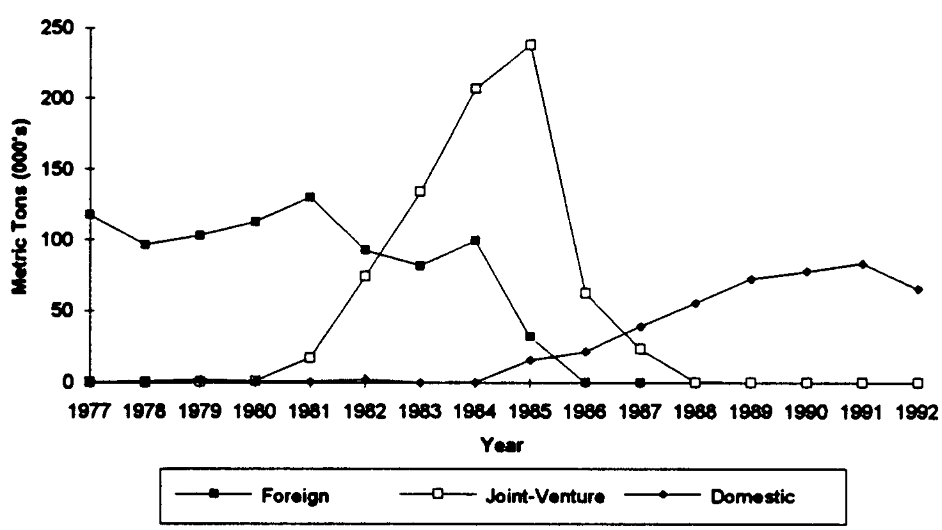
The rapid growth of the pollock resource in the early 1980's was due to exceptionally strong year classes from 1978 and 1979 that entered the fishery in 1981 and 1982. There has been poor (below average) recruitment for each year class since 1978. The NPFMC recommended a 1993 allowable catch quota of 114,400 mt. Expectations are for a continuing decline in resource abundance over the next several years.

Table 2.3-8: Pollock Harvests
Gulf of Alaska, 1977-1990
(metric tons)

	User Group			
Year	Foreign	Joint-Venture	Domestic	Total
1977	117.8	0.0	0.2	118.0
1978	96.4	0.0	1.0	97.4
1979	103.2	0.6	2.0	105.8
1980	113.0	1.1	0.9	115.0
1981	130.3	16.9	0.6	147.8
1982	92.6	73.9	2.2	168.7
1983	81.4	134.1	0.1	215.6
1984	99.3	207.1	0.3	306.7
1985	31.6	237.9	15.4	284.9
1986	0.1	62.6	21.3	84.0
1987	0.0	22.8	39.2	62.0
1988	0.0	0.2	55.8	56.0
1989	0.0	0.0	72.5	72.5
1990	0.0	0.0	77.7	77.7
1991	0.0	0.0	83.3	83.3
1992	0.0	0.0	65.5	65.5

Source: North Pacific Fishery Management Council, 1992.

Figure 2.3-10: Pollock Harvests
Gulf of Alaska



Sources: North Pacific Fishery Management Council, 1990 and 1992.

In setting the allowable catch limit for 1993, the NPFMC rejected a planning team recommendation for a higher allowable catch. Ecosystem concerns, particularly the distressed status of Stellar sea lions was the primary reason for the conservative harvest level.

2.3.2.2 Pacific Cod

Pacific cod is a historic fishery in the Gulf of Alaska. Cod stations were located in areas like Pirate Cove (near the current location of Sand Point) in the late 1800's. These fisheries died out in the 1920's as resource abundance declined. This domestic fishery was eventually displaced by foreign fishermen that primarily used longline gear. Pacific cod catches by foreign fishermen were relatively low, ranging from 34,000 mt in 1980 to 15,000 mt in 1986 when they ceased participation in the fishery (See Table 2.3-9).

Table 2.3-9: Pacific Cod Harvests
Gulf of Alaska
(landings in metric tons)

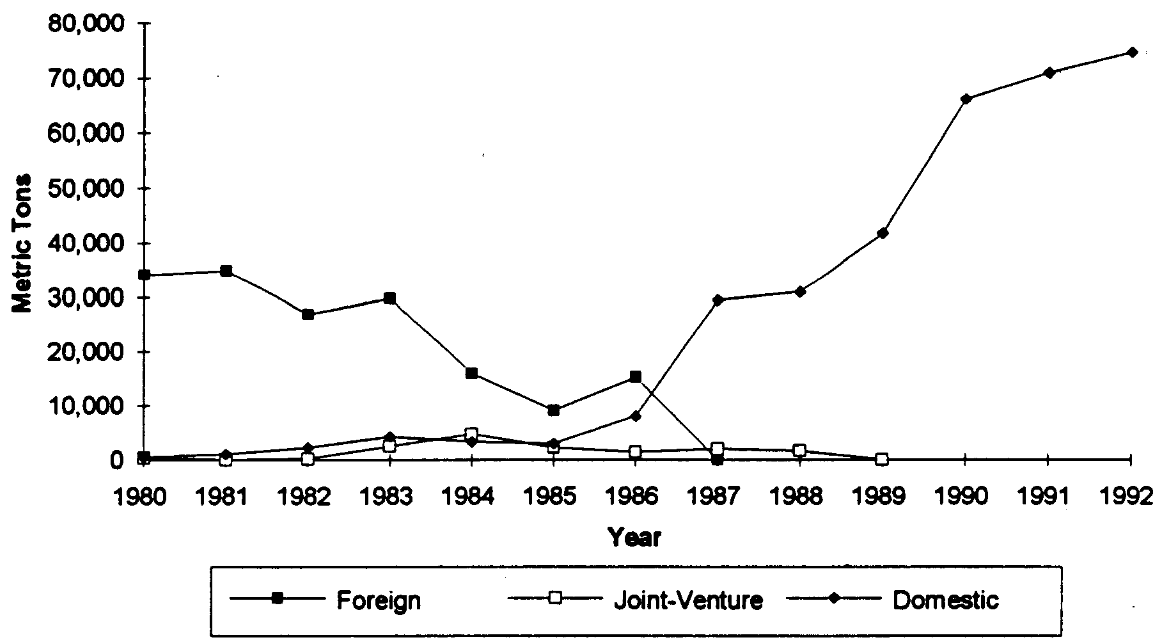
	User Group			
Year	Foreign	Joint-Venture	Domestic	Total
1980	34,245	466	612	35,323
1981	34,969	58	1,061	36,088
1982	26,937	193	2,250	29,380
1983	29,777	2,426	4,198	36,401
1984	15,896	4,669	3,231	23,796
1985	9,086	2,266	2,954	14,306
1986	15,211	1,357	8,045	24,613
1987	0	1,978	29,454	31,432
1988		1,661	30,896	32,557
1989		0	41,676	41,676
1990			65,923	65,923
1991			70,802	70,802
1992			74,426	74,426

Sources: North Pacific Fishery Management Council, 1990 and 1992.

In the early 1980's, U.S. trawlers entered the cod fishery in response to the decline in the world cod catch and increased prices. At the same time, cod from exceptionally strong 1977 year-class were entering the fishable population. Harvests in this domestic fishery have increased in recent years as foreign fishing effort and joint ventures were displaced. The 1990 harvest of

65,923 mt is a result of increased effort. The harvest by user group for the years 1980-1992 is shown in Figure 2.3-11.

Figure 2.3-11: Pacific Cod Harvests
Gulf of Alaska



Source: North Pacific Fishery Management Council, 1990 and 1992.

For 1993 the NPFMC adopted a conservative harvest strategy proposed by the plan team that resulted in an allowable harvest of 56,700 mt. of Pacific cod (NPFMC, 1993). Future biomass projections by NMFS scientists indicate that Pacific cod harvests over the next several years will generally decline under any of the harvest strategies.

2.3.2.3 Sablefish

The yield for this species is relatively low because they are a long lived, slow growing species. Sablefish, although low in abundance, have a high monetary value and were early target species of the Japanese and Soviet trawl and longline fleets. Catches of sablefish by these foreign fleets were high in the late 1960's and early 1970's then declined rapidly as the populations were over-fished (Table 2.3-10). Since 1977, the quotas have been held to very low levels by the NPFMC in order to rebuild the stocks.

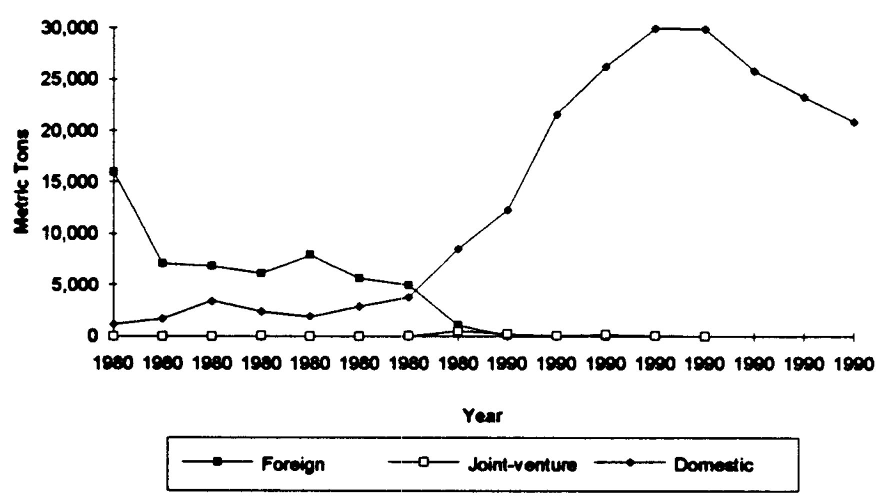
Figure 2.3-12 shows the phase-out of foreign fishing and the corresponding growth in the domestic fishery for sablefish.

Table 2.3-10: Sablefish Harvests
(landings in metric tons)

	User Group			
Year	Foreign	Joint-venture	Domestic	Total
1977	15,961	0	1,179	17,140
1978	7,128	0	1,728	8,856
1979	6,885	18	3,447	10,350
1980	6,138	20	2,384	8,542
1981	7,976	0	1,941	9,917
1982	5,645	1	2,910	8,556
1983	4,966	27	3,761	8,754
1984	1,108	528	8,594	10,230
1985	38	226	12,215	12,479
1986	1	45	21,568	21,614
1987	0	180	26,145	26,325
1988		36	29,867	29,903
1989		0	29,842	29,842
1990			25,701	25,701
1991			23,258	23,258
1992			20,813	20,813

Source: North Pacific Fishery Management Council, 1990 and 1992.

Figure 2.3-12: Sablefish Harvests
Gulf of Alaska



Source: North Pacific Fishery Management Council, 1990 and 1992.

Survey data suggest that above average recruitment has occurred in recent years to these species and that some population increases have been observed. Major increases occurred in 1982 and 1985 in response to strong year classes in 1977 and 1980. The sablefish biomass is in a very similar position to that of the Pacific cod. Stocks are currently at a high level of abundance, but are expected to decline in the near future for lack of strong incoming year classes. The NPFMC chose a 1993 harvest quota of 20,900 mt, based on a conservative approach intended to account for uncertainties in biomass estimation and future recruitment.

2.3.2.4 Pacific Ocean Perch & Other Rockfish

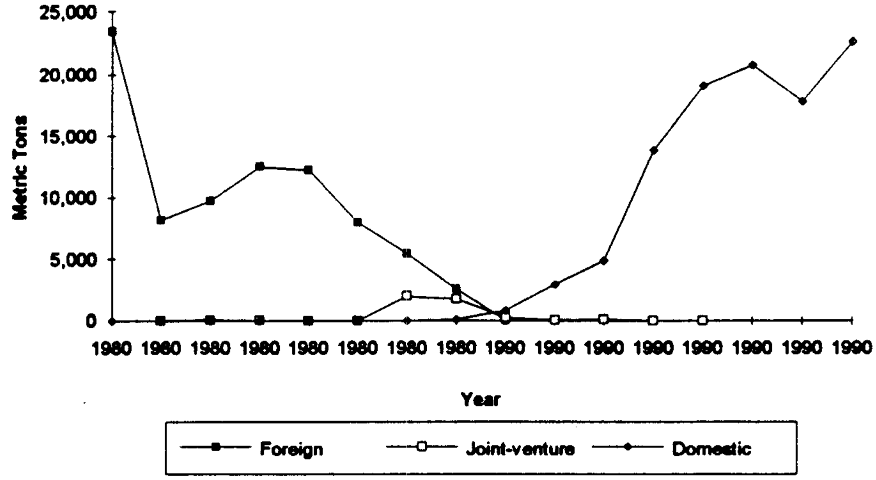
The Pacific Ocean perch (POP) resource in the Gulf of Alaska was heavily fished by Soviet and Japanese trawl fleets throughout the 1960's. Table 2.3-11 and Figure 2.3-13 show harvests of POP and other rockfish declining from 382,481 mt in 1965 to 63,674 mt in 1970. The POP resource was not able to sustain the level of fishing pressure put on it by the foreign fleets and its abundance decreased rapidly. Since the mid-1960's, the resource has been only a fraction of its previous abundance. Figure 2.3-13 shows the transition in the fishery from a foreign fishery to the current domestic fishery.

Table 2.3-11: Rockfish Harvests
Gulf of Alaska
(landings in metric tons)

	User Group			
Year	Foreign	Joint-venture	Domestic	Total
1977	23,441		12	23,453
1978	8,171	0	5	8,176
1979	9,749	67	105	9,921
1980	12,447	20	4	12,471
1981	12,176	7	1	12,184
1982	7,986	3	2	7,991
1983	5,415	1,975	15	7,405
1984	2,599	1,734	119	4,452
1985	8	254	825	1,087
1986	0	37	2,944	2,981
1987		112	4,869	4,981
1988		8	13,771	13,779
1989		0	19,002	19,002
1990			20,705	20,705
1991			17,704	17,704
1992			22,633	22,633

Source: North Pacific Fishery Management Council, 1990 and 1992.

Figure 2.3-13: Rockfish Harvests
Gulf of Alaska



Source: North Pacific Fishery Management Council, 1990 and 1992.

Since 1988, the North Pacific Fishery Management Council has divided Gulf rockfish into three major categories: slope rockfish, pelagic shelf rockfish and demersal shelf rockfish. Shelf rockfish is the largest category and is defined as those rockfish (genus Sebastes) that inhabit waters of the outer continental shelf, generally waters greater than 150-200 meters in depth. Species included in the slope rockfish category include: Pacific ocean perch, northern rockfish, rougheye rockfish, shortraker rockfish, sharpchin rockfish, harlequin rockfish, redbanded rockfish, greenstriped rockfish, yellowmouth rockfish, darkblotched rockfish, aurora rockfish, blackgill rockfish, chilipepper rockfish, pigmy rockfish, shortbelly rockfish, splitnose rockfish, stripetail rockfish and vermilion rockfish. These species were previously managed as either part of the POP complex or 'other groundfish until 1988. One impact of the management change has been to make comparisons of historical harvest difficult, since the groupings of species differs over time. Pacific ocean perch and northern rockfish are the most numerous species, accounting for almost 70 percent of the total slope rockfish biomass (NPFMC, 1992).

Pelagic shelf rockfish include five species of rockfish that inhabit waters of the continental shelf of the Gulf of Alaska and exhibit a midwater, schooling behavior. Species included are: dusky rockfish, black rockfish, widow rockfish, blue rockfish and yellowtail rockfish. Very little is known on the catch history and abundance of these species, since prior to 1988 they were included in the 'other rockfish' management category. Since 1988, harvests have ranged from 1,086 mt and 1,738 mt.

The last category of rockfish is demersal shelf rockfish, found in nearshore waters of the Gulf of Alaska. Species included in this category are: bocaccio rockfish, canary rockfish, China rockfish, copper rockfish, quillback rockfish, rosethorn rockfish, silvergray rockfish, tiger rockfish, yelloweye rockfish and redstripe rockfish. Very little is known of the harvest history or abundance of these species.

For 1993, the NPFMC set an allowable catch quota of 17,247 mt for all rockfish species: 2,560 mt of Pacific ocean perch, 1,764 mt shortraker/rougheye, 5,760 mt of northern rockfish, 5,383 mt of other slope rockfish, 6,740 mt of pelagic shelf rockfish and 800 mt of demersal shelf rockfish.

2.3.2.5 Flatfish

The flatfish complex includes arrowtooth flounder, flathead sole, rock sole, rex sole, Dover sole, yellowfin sole and starry flounder (these species comprised 99 percent of the current biomass of the flatfish complex, NPFMC, 1992). In 1990, flatfish were divided into three categories: deep flatfish, shallow flatfish and starry flounder. The new categories were made to assist the NPFMC in managing halibut bycatch in the flatfish fishery. Arrowtooth flounder is a separate category due to its present high abundance and low commercial value.

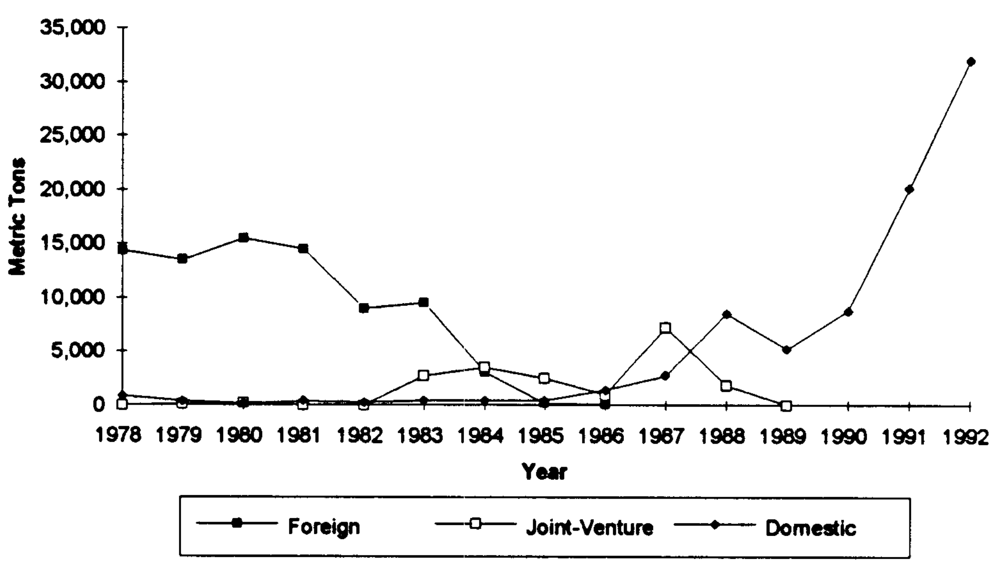
Harvests of flatfish have varied widely (see Table 2.3--12). Until 1984, most of the harvest was taken in the foreign fishery. Joint ventures took over the fishery for short period and were quickly displaced by the domestic fishery. Figure 2.3-14 shows the transition in the flatfish fishery.

Table 2.3-12: Flatfish Harvests
(landings in metric tons)

Year	User Group: Foreign	Joint-Venture	Domestic	Total
1978	14,341	5	852	15,198
1979	13,474	70	384	13,928
1980	15,497	209	140	15,846
1981	14,444	18	404	14,866
1982	8,986	18	274	9,278
1983	9,530	2,692	439	12,661
1984	3,033	3,448	432	6,913
1985	170	2,447	461	3,078
1986	71	961	1,409	2,441
1987		7,207	2,718	9,925
1988		1,781	8,494	10,275
1989		0	5,167	5,167
1990			8,778	8,778
1991			20,068	20,068
1992			31,926	31,926

Source: North Pacific Fishery Management Council, 1990 and 1992.

Figure 2.3-14: Flatfish Harvests



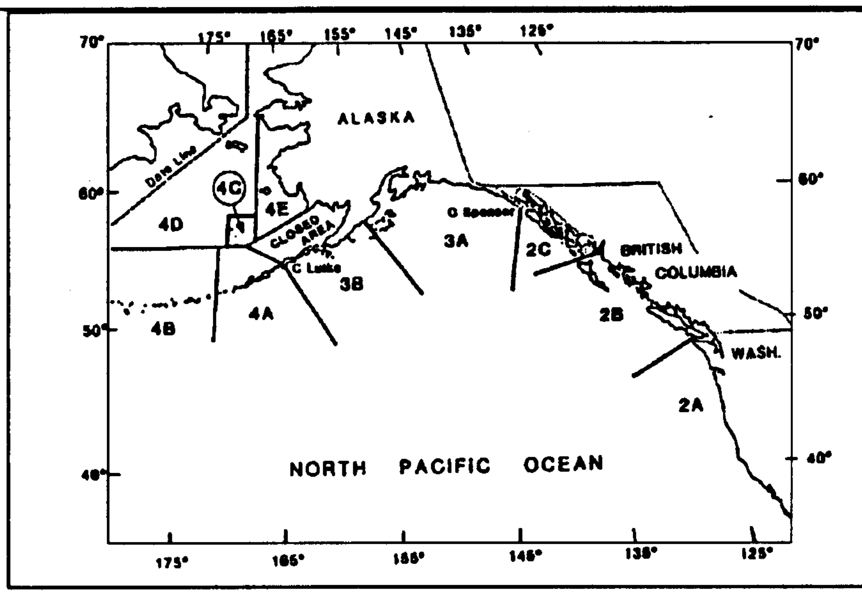
Source: North Pacific Fishery Management Council, 1990 and 1992.

The recommended allowable catch for these fishes for 1993 is 75,980 mt. If area restrictions designed to protect crab and halibut do not interfere with harvests and flatfish markets continue strong, then this level of harvest should be sustainable for several years. It is probable that area restrictions designed to protect crab and halibut may cause the harvest levels to decrease over the next several years.

2.3.2.6 Pacific Halibut

Halibut is a major fishery in the Gulf of Alaska. The halibut resource is managed by the International Pacific Halibut Commission (IPHC). Our study area includes several IPHC regulatory districts Area 3 (which is currently divided into subdistricts 3A and 3B) and Area 4 (which is currently divided into subdistricts 4A, 4B, 4C, 4D and 4E) and are depicted in Figure 2.3-15.

Figure 2.3-15 Halibut Regulatory Areas



Source: North Pacific Fishery Management Council, 1990 and 1992.

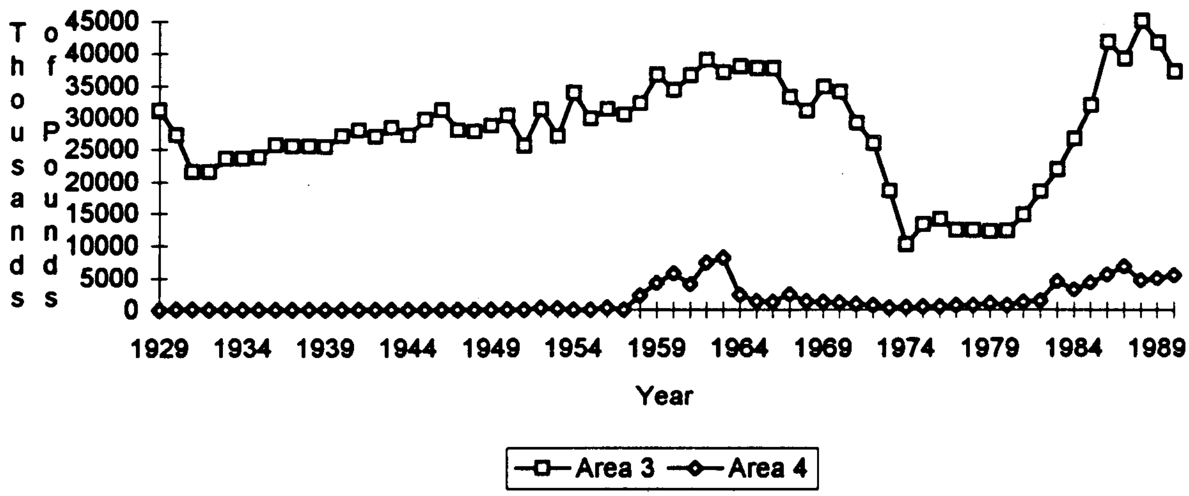
The harvest history for recent years in the Gulf of Alaska is shown in Table 2.3-13 and Figure 2.3-16. Area 3 typically comprises more than half of the entire halibut harvest for all areas. From 1929 to 1962, harvests from Area 3 gradually increased. From 1963 to 1980, Area 3 harvests dropped, but have sharply recovered. Fishing in Area 4 has a shorter history, with little fishing effort prior to 1958.

Table 2.3-13: Halibut Harvests
IPHC Regulatory Areas 3 and 4
(thousands of pounds)

Year	Area 3	Area 4	Total	Year	Area 3	Area 4	Total
1929	31,219	0	31,219	1961	36,446	3,968	40,414
1930	27,176	103	27,279	1962	38,822	7,322	46,144
1931	21,585	102	21,687	1963	36,931	8,136	45,067
1932	21,599	0	21,599	1964	37,887	2,328	40,215
1933	23,506	18	23,524	1965	37,589	1,335	38,924
1934	23,569	0	23,569	1966	37,562	1,195	38,757
1935	23,784	0	23,784	1967	33,108	2,395	35,503
1936	25,604	0	25,604	1968	30,879	1,321	32,200
1937	25,466	0	25,466	1969	34,665	1,233	35,898
1938	25,444	0	25,444	1970	33,919	1,134	35,053
1939	25,313	0	25,313	1971	29,015	866	29,881
1940	26,978	0	26,978	1972	25,869	732	26,601
1941	27,941	0	27,941	1973	18,525	286	18,811
1942	26,954	0	26,954	1974	10,125	437	10,562
1943	28,338	0	28,338	1975	13,261	525	13,786
1944	27,086	0	27,086	1976	13,964	523	14,487
1945	29,594	5	29,599	1977	12,367	681	13,048
1946	31,098	0	31,098	1978	12,310	658	12,968
1947	27,961	0	27,961	1979	12,142	952	13,094
1948	27,737	0	27,737	1980	12,243	713	12,956
1949	28,613	0	28,613	1981	14,676	1,190	15,866
1950	30,237	0	30,237	1982	18,330	1,429	19,759
1951	25,447	0	25,447	1983	21,863	4,422	26,285
1952	31,202	252	31,454	1984	26,474	3,164	29,638
1953	26,899	227	27,126	1985	31,740	4,284	36,024
1954	33,751	41	33,792	1986	41,621	5,594	47,215
1955	29,670	45	29,715	1987	39,074	6,885	45,959
1956	31,229	262	31,491	1988	44,944	4,692	49,636
1957	30,281	39	30,320	1989	41,560	4,956	46,516
1958	32,122	2,176	34,298	1990	37,100	5,481	42,581
1959	36,517	4,157	40,674	1991	34,860	5,987	40,847
1960	34,198	5,649	39,847				

Source: North Pacific Fishery Management Council, 1990 and 1992.

Figure 2.3-16: Halibut Harvests
IPHC Regulatory Areas 3 and 4



Source: North Pacific Fishery Management Council, 1990 and 1992.

The halibut resource has been declining in recent years from peak level achieved in 1986. The estimate for total exploitable biomass of halibut for 1990 was 232.9, a decline of 6 percent over the previous year. The exploitable biomass is defined as all halibut over age 8 years. According to the IPHC, the current abundance levels will continue to decline at a rate of 5-15 percent for the next several years (IPHC Annual Report, 1990).

2.3.2.7 Other Species

Other species include species such as squid, skates, smelts, sharks, etc. which are species of low abundance or little commercial value. Species in this groups fluctuate in abundance, but generally comprise a small portion of the overall catch.

2.3.3 Shellfish

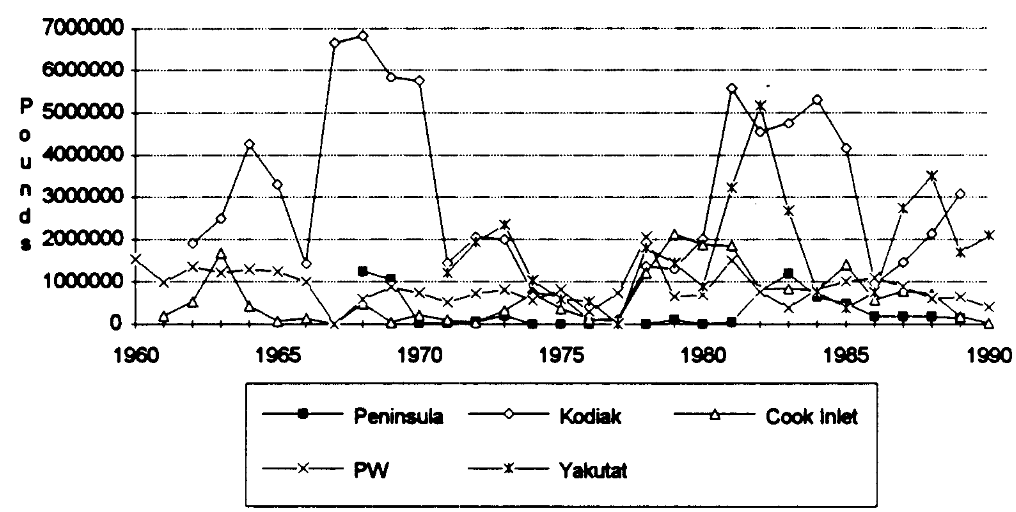
The Gulf of Alaska has historically produced a large amount of shellfish. Most species, however, are at much lower levels of abundance currently than they have been in the past. Fishermen and processing companies have had to diversify their operations into other species as shellfish populations, and catches, declined. Despite the low level of current abundance, shellfish are high- valued species and provide important income to Gulf communities.

This following subsections discuss recent trends in past shellfish harvest and abundance and provides the background for projections of future harvest levels through 2010.

2.3.3.1 Dungeness Crab

The Gulf of Alaska harvests of Dungeness crab from 1960-1991 are shown in Figure 2.3-17. Effort and harvests have been sporadic for Dungeness, particularly in the early years of the fishery. The harvest pattern for Kodiak, the major producing area, shows two peaks. In the late 1960's the fishery grew quickly due to previously unexploited stocks and favorable market conditions. A decline in both factors caused a Dungeness harvests to decline after 1972. Harvests again increased in the late 1970's, following the abrupt decline in king crab stocks. ADF&G does not conduct any type of abundance surveys for Dungeness, except to interview fishermen and conduct commercial catch sampling.

Figure 2.3-17: Dungeness Crab Harvests
By Gulf of Alaska Management Area[a]



Sources: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).
a Alaska Peninsula landings combined with Chignik.

Table 2.3-14: Dungeness Crab Harvests
Gulf of Alaska
(landings in pounds)

	Management Area					
Year	Alaska Peninsula(1)	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
1960				1,524,326		1,524,326
1961			193,683	990,242		1,183,925
1962		1,904,567	530,770	1,353,190		3,788,527
1963		2,487,512	1,677,204	1,216,846		5,381,562
1964		4,254,565	423,041	1,290,929		5,968,535
1965		3,311,571	74,211	1,240,372		4,626,154
1966		1,416,174	129,560	999,341		2,545,075
1967		6,663,668	7,168	n/a		6,670,836
1968	1,259,013	6,829,061	487,859	579,279		9,155,212
1969	1,056,000	5,834,628	49,894	878,518		7,819,040
1970	13,000	5,741,438	209,819	738,634		6,702,891
1971	11,000	1,445,864	97,161	509,824	1,212,198	3,276,047
1972	65,000	2,059,536	38,930	724,673	1,932,574	4,820,713
1973	194,448	2,000,526	310,048	806,377	2,347,752	5,659,151
1974	0	750,057	721,243	559,164	1,031,573	3,062,037
1975	0	639,813	362,815	818,041	579,908	2,400,577
1976	0	87,110	119,298	290,332	537,543	1,034,283
1977	0	113,026	74,705	735,609	n/a	923,340
1978	0	1,362,306	1,215,779	2,053,461	1,799,403	6,430,949
1979	102,320	1,311,275	2,130,963	652,924	1,436,923	5,634,405
1980	0	2,011,736	1,875,281	690,819	895,220	5,473,056
1981	42,296	5,566,463	1,850,977	1,509,257	3,228,301	12,197,294
1982	779,600	4,546,311	818,885	762,182	5,160,135	12,067,113
1983	1,207,128	4,752,148	847,419	379,605	2,666,383	9,852,683
1984	647,497	5,303,052	800,208	826,938	773,356	8,351,051
1985	488,107	4,160,435	1,402,402	1,007,429	371,237	7,429,610
1986	180,261	967,423	563,862	1,090,477	748,192	3,550,215
1987	182,706	1,450,983	783,176	893,174	2,725,040	6,035,079
1988	179,022	2,125,114	719,275	602,969	3,494,368	7,120,748
1989	132,447	3,077,937	178,064	635,976	1,692,549	5,716,973
1990	n/a	n/a	29,502	397,913	2,088,397	2,515,812
1991	80,248	1,414,499	0	70,259	n/a	1,565,006

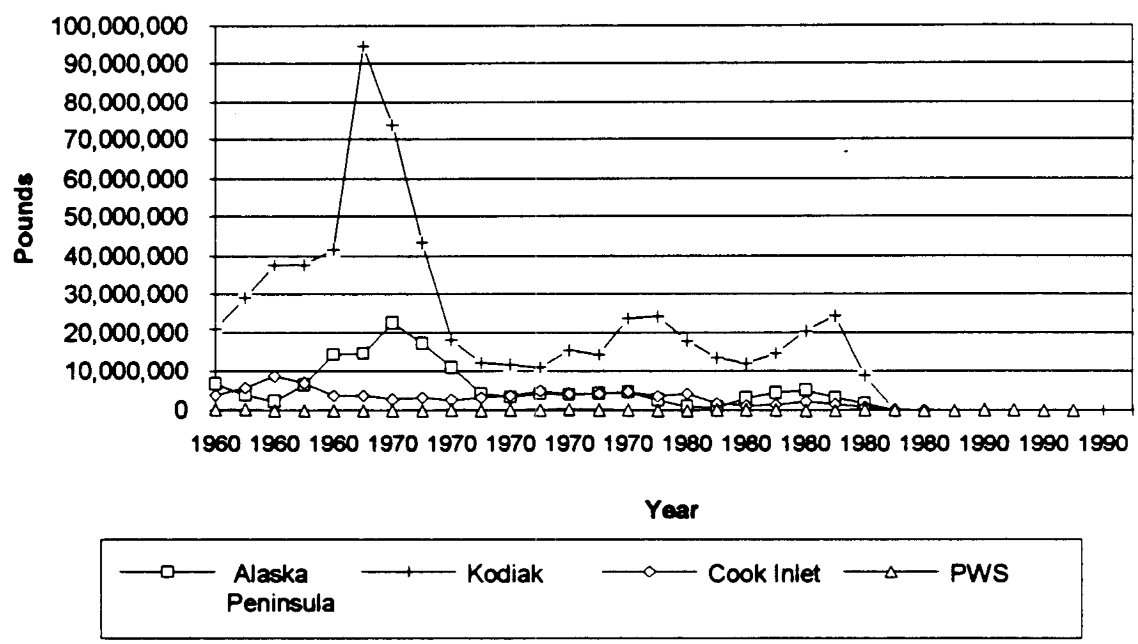
Sources: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).
(1) Alaska Peninsula landings combined with Chignik.

2.3.3.2 King Crab

King crab have provided millions of pounds and dollars to fishermen in the different Gulf fisheries. However, there is currently no commercial harvest from any of the management areas in the Gulf. Most stocks are severely at seriously depressed levels.

The historical catches from 1960-1991 are presented in Table 2.3–15 and shown in Figure 2.3-18. This figure readily shows the quick upsurge in harvests in Kodiak in the mid 1960's, followed by a dramatic crash in 1966 through 1968. The Alaska Peninsula and other areas followed much the same pattern as Kodiak. At present, there is no information to indicate that king crab stocks are recovering sufficiently to allow a commercial harvest.

Figure 2.3-18: King Crab Harvests
By Gulf of Alaska Management Area [a]



Sources: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).
a Alaska Peninsula landings combined with Chignik.

Table 2.3-15: King Crab Harvests
by Gulf of Alaska Management Area
(landings in pounds)

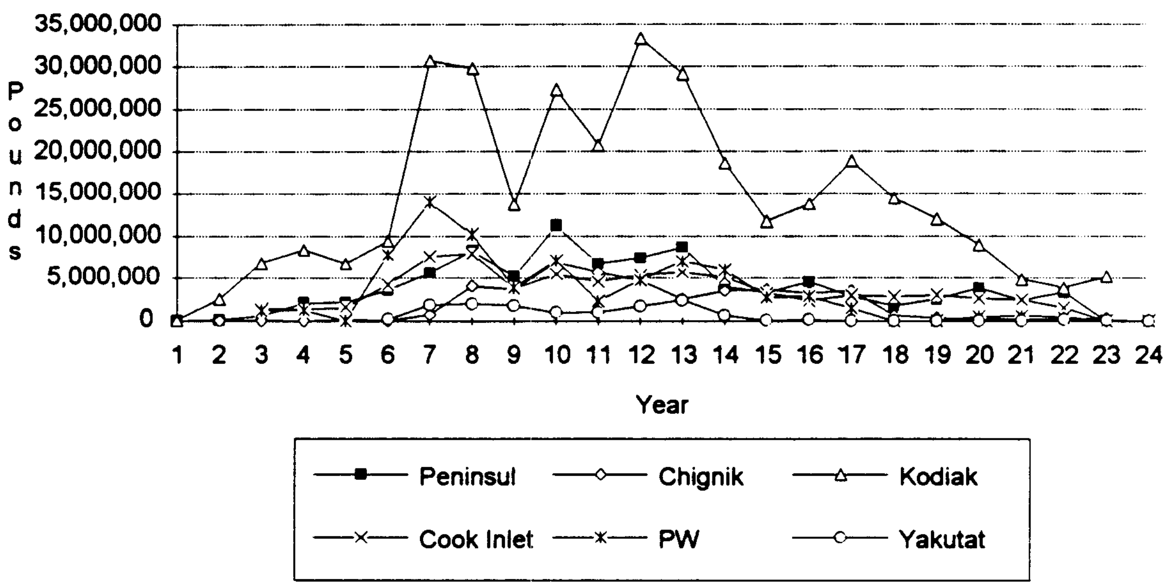
	Management Area				
Year	Alaska Peninsula (1)	Kodiak	Cook Inlet	Prince William Sound	Total
1960	6,700,000	21,064,781	3,804,298	246,965	31,816,044
1961	3,900,000	28,962,900	5,631,051	236,081	38,730,032
1962	2,273,013	37,626,703	8,616,556	31,478	48,547,750
1963	6,539,129	37,716,223	6,935,081	43,569	51,234,002
1964	14,354,060	41,596,518	3,744,014	14,028	59,708,620
1965	14,713,501	94,431,026	3,646,849	5,500	112,796,876
1966	22,577,587	73,817,779	2,823,422	11,000	99,229,788
1967	17,252,307	43,448,492	3,240,520	41,800	63,983,119
1968	10,944,472	18,211,485	2,549,504	200,000	31,905,461
1969	4,137,000	12,200,571	3,227,168	48,100	19,612,839
1970	3,425,760	11,719,970	3,665,447	94,300	18,905,477
1971	4,123,130	10,884,152	4,873,197	144,200	20,024,679
1972	4,069,362	15,479,916	4,149,013	296,200	23,994,491
1973	4,260,674	14,397,287	4,213,585	207,916	23,079,462
1974	4,572,101	23,582,720	4,783,857	85,379	33,024,057
1975	2,605,310	24,061,651	3,552,649	53,423	30,273,033
1976	958,069	17,966,846	4,155,595	17,087	23,097,597
1977	726,382	13,503,666	1,684,719	86,595	16,001,362
1978	3,093,859	12,021,850	1,146,402	114,000	16,376,111
1979	4,453,557	14,608,900	1,347,820	65,688	20,475,965
1980	5,080,632	20,448,654	2,152,614	39,735	27,721,635
1981	3,168,689	24,237,601	1,559,863	30,992	28,997,145
1982	1,683,654	8,729,761	822,359	188,258	11,424,032
1983	0	0	192,531	73,226	265,757
1984			0	40,467	40,467
1985				51,800	51,800
1986				65,837	65,837
1987				68,270	68,270
1988				48,442	48,442
1989				0	0
1990					
1991					

Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).
(1) Alaska Peninsula landings combined with Chignik.

2.3.3.3 Tanner Crab

Tanner crab harvests followed a pattern similar to king crab. As king crab stocks declined, fishermen increased their efforts in the tanner crab fishery. The peak harvest for the entire Gulf was in 1974 (See Table 2.3-16). Harvest levels dipped for a few years and peaked again in 1979. Since 1979, harvests have dropped in all areas. Figure 2.3-19 shows the harvest pattern for tanner crab in the Gulf.

Figure 2.3-19: Tanner Crab Harvests
By Gulf of Alaska Management Area



Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

There has been no fishery in the Alaska Peninsula since 1988, due to the depressed stock levels. The fishery in Cook Inlet also closed in 1988 and remained closed through 1990. There has been a small, but increasing fishery in the Cook Inlet southern district for 1991, 1992 and 1993. Kodiak is the only area still contributing large harvest levels.

Table 2.3-16: Tanner Crab Harvests
by Gulf of Alaska Management Areas
(landings in pounds)

	Management Area						
Year	Alaska Peninsula	Chignik	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
1967	3,100		110,961				114,061
1968	110,610	21,100	2,560,687				2,692,397
1969	606,178	38,100	6,827,312	1,401,496	1,235,613		10,108,699
1970	2,093,600	2,800	8,416,782	1,322,541	1,284,597		13,120,320
1971	2,140,585	152,300	6,744,163	1,591,015	4,159		10,632,222
1972	3,618,900	26,500	9,475,902	4,242,683	7,788,498	222,441	25,374,924
1973	5,615,563	747,788	30,699,777	7,562,708	13,927,868	1,872,357	60,426,061
1974	8,300,578	4,054,873	29,820,899	7,967,807	10,158,000	1,972,752	62,274,909
1975	5,195,800	3,649,444	13,649,966	3,774,884	3,854,000	1,762,589	31,886,683
1976	11,201,941	6,926,161	27,336,909	5,471,293	7,132,744	966,650	59,035,698
1977	6,773,838	5,672,919	20,720,079	4,600,079	2,321,348	1,003,116	41,091,379
1978	7,446,270	4,693,830	33,281,472	5,385,709	4,806,674	1,691,941	57,305,896
1979	8,684,408	2,563,105	29,173,807	5,731,487	7,050,555	2,435,123	55,638,485
1980	3,961,251	3,517,920	18,623,875	5,069,208	5,992,717	642,608	37,807,579
1981	3,294,106	3,653,723	11,748,629	3,268,162	2,775,831	71,302	24,811,753
1982	4,589,042	3,240,576	13,756,159	2,359,758	2,865,651	151,621	26,962,807
1983	2,863,798	3,497,370	18,927,061	2,961,621	1,469,840	11,142	29,730,832
1984	1,789,883	659,043	14,478,066	2,813,821	0	3,665	19,744,478
1985	2,549,686	375,476	12,024,553	3,023,928	0	2,379	17,976,022
1986	3,781,950	188,162	8,996,151	2,630,013	535,377	n/a	16,131,653
1987	2,400,784	195,060	4,833,473	2,447,663	571,132	n/a	10,448,112
1988	3,328,809	183,111	3,888,906	1,539,310	474,092	155,528	9,569,756
1989	0	323,120	5,208,999	0	0	76,816	5,608,935
1990	0	n/a	n/a	0	0	10,475	10,475
1991	0	0	1,917,713	0	0	0	1,917,713

Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

2.3.3.4 Shrimp

Unfortunately, the shrimp resource in the Gulf of Alaska experienced the same disastrous declines as the crab fisheries. Kodiak was probably hardest hit by the collapse of the fishery. In 1971, shrimp landings in Kodiak totaled 82 million pounds. The fishery declined quickly after 1973 and has not recovered. Figure 2.3-20 shows the harvests for shrimp in the Gulf for the period 1960-1990.

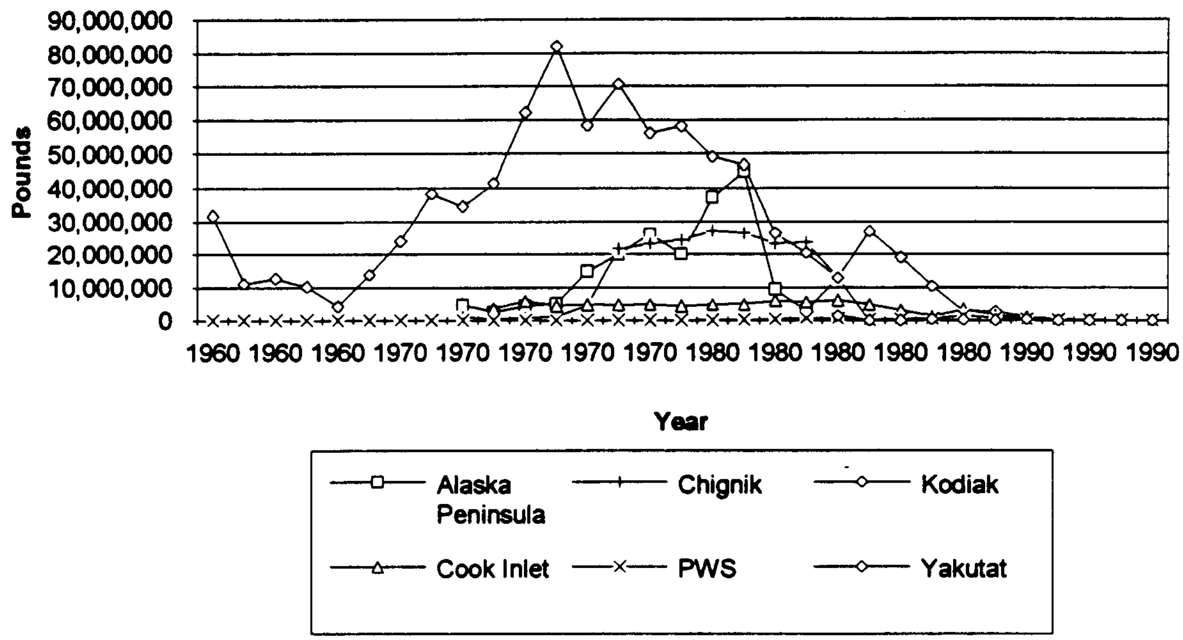
Table 2.3-17: Shrimp Harvests
by Gulf of Alaska Management Areas
(landings in pounds)

	Management Area						
Year	Alaska Peninsula	Chignik	Kodiak	Cook Inlet	Prince William Sound	Yakutat	Total
1960			31,797,985		4,165		31,802,150
1961			11,083,500		0		11,083,500
1962			12,634,027		2,986		12,637,013
1963			10,118,472		919		10,119,391
1964			4,339,114		3,547		4,342,661
1965			13,823,061		3,637		13,826,698
1966			24,097,141		0		24,097,141
1967			38,267,856		625		38,268,481
1968	4,734,596	1,153,721	34,468,713		5,733		40,362,763
1969	2,657,082	419,830	41,353,461	3,871,840	4,297		48,306,510
1970	4,398,800	890,705	62,181,204	5,905,988	16,513		73,393,210
1971	5,262,575	1,091,711	82,153,724	4,520,906	10,916		93,039,832
1972	14,740,801	4,829,117	58,352,319	4,882,082	10,955		82,815,274
1973	19,987,246	21,673,788	70,511,477	4,825,934	9,562		117,008,007
1974	26,145,720	23,392,352	56,203,992	5,031,912	22,202		110,796,178
1975	20,044,112	24,435,480	58,235,982	4,419,019	30,426		107,165,019
1976	37,148,932	27,232,630	49,086,591	4,998,986	136,127		118,603,266
1977	45,003,794	26,512,791	46,712,083	5,064,502	177,033		123,470,203
1978	9,418,276	23,257,869	26,409,366	6,014,044	453,598		65,553,153
1979	3,134,367	23,722,330	20,506,021	5,797,427	678,112		53,838,257
1980	12,843,270	12,843,270	12,863,536	6,181,129	632,501	1,456,997	46,820,703
1981	0	70,948	27,101,218	5,014,953	215,463	n/a	32,402,582
1982		0	19,112,367	3,260,351	525,024	137,085	23,034,827
1983			10,391,207	1,285,938	601,884	446,651	12,725,680
1984			2,779,030	3,524,645	1,475,719	205,920	7,985,314
1985			2,942,922	1,670,791	679,700	42,282	5,335,695
1986			1,145,980	801,968	488,548	487,371	2,923,867
1987			455,468	22,231	320,918	13,714	812,331
1988			10,841	4,878	273,136	1,794	290,649
1989			0	0	24,478	4,302	28,780
1990					30,675	17,111	47,786
1991					n/a		

Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

There has not been a shrimp fishery in the Alaska Peninsula, Chignik, Kodiak or Cook Inlet since 1988. Stock status remains at very low levels. The fishery will not recover until stock conditions improve.

Figure 2.3-20: Shrimp Harvests
By Gulf of Alaska Management Areas



Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

2.3.3.5 Scallops

Kodiak accounts for most of the weathervane scallops harvested in the Gulf. The weathervane scallop fishery began in Kodiak in 1967. The fishery reached a peak of 1.4 million pounds in 1970 and then quickly declined. According to ADF&G (1988), the decline was due to more popular and lucrative crab fisheries. The harvest pattern for weathervane scallops is shown in Figure 2.3-21.

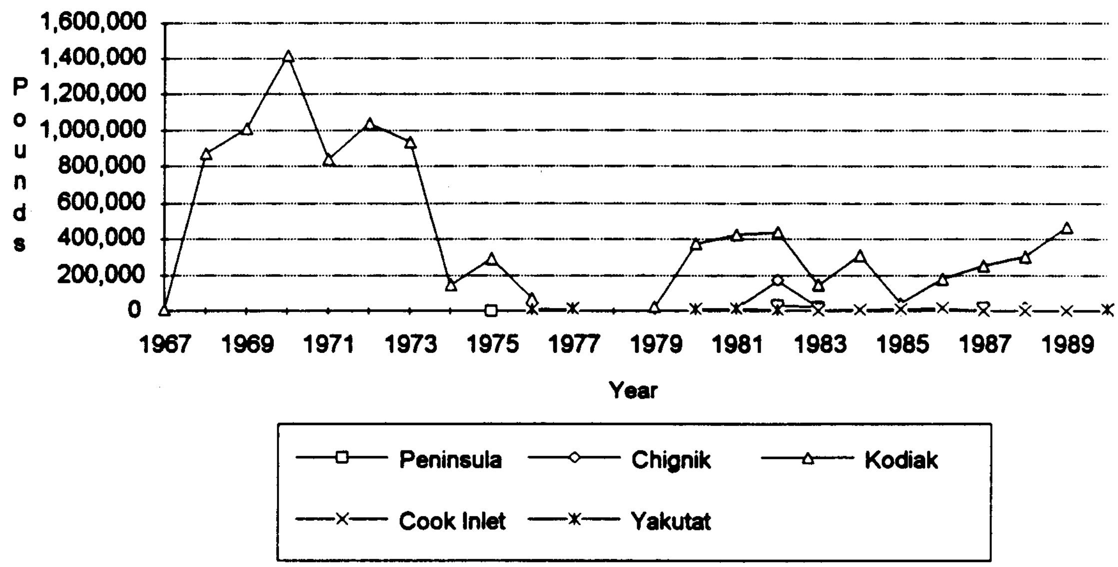
Table 2.3-18: Scallop Harvests
by Gulf of Alaska Management Area
(landings in pounds)

	Management Area					
Year	Alaska Peninsula	Chignik	Kodiak	Cook Inlet	Yakutat	Total
1967			7,718			7,718
1968			872,803			872,803
1969			1,012,860			1,012,860
1970			1,417,612			1,417,612
1971			841,211			841,211
1972			1,038,793			1,038,793
1973			935,705			935,705
1974			147,945			147,945
1975	2,508		294,142			296,650
1976			75,245		11,168	86,413
1977					12,636	12,636
1978						0
1979			24,826			24,826
1980			371,018		11,521	382,539
1981		17,007	424,394		12,663	454,064
1982	33,358	172,333	435,645		7,015	648,351
1983	20,581	23,182	147,747	2,346		193,856
1984			309,502	6,305		315,807
1985	14,515	305	46,971	11,810		73,601
1986			180,600	15,364		195,964
1987	18,392		253,451	1,488		273,331
1988		20,212	302,738	0		322,950
1989			464,421	0		464,421
1990	n/a	n/a	n/a	0	9,210	9,210
1991	0	0	683,261	0	0	683,261

Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

The fishery received new interest in 1980 and harvests increased for several years. No stock assessment for weathervane scallop exist except for dockside interviews and sampling. According to ADF&G biologists, it appears that the scallop stocks will not withstand large amounts of fishing pressure. The stocks did not increase during the late 1970's, even though fishing pressure was very light.

Figure 2.3-21: Scallop Harvests
By Gulf of Alaska Management Area



Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

2.3.3.6 Clams

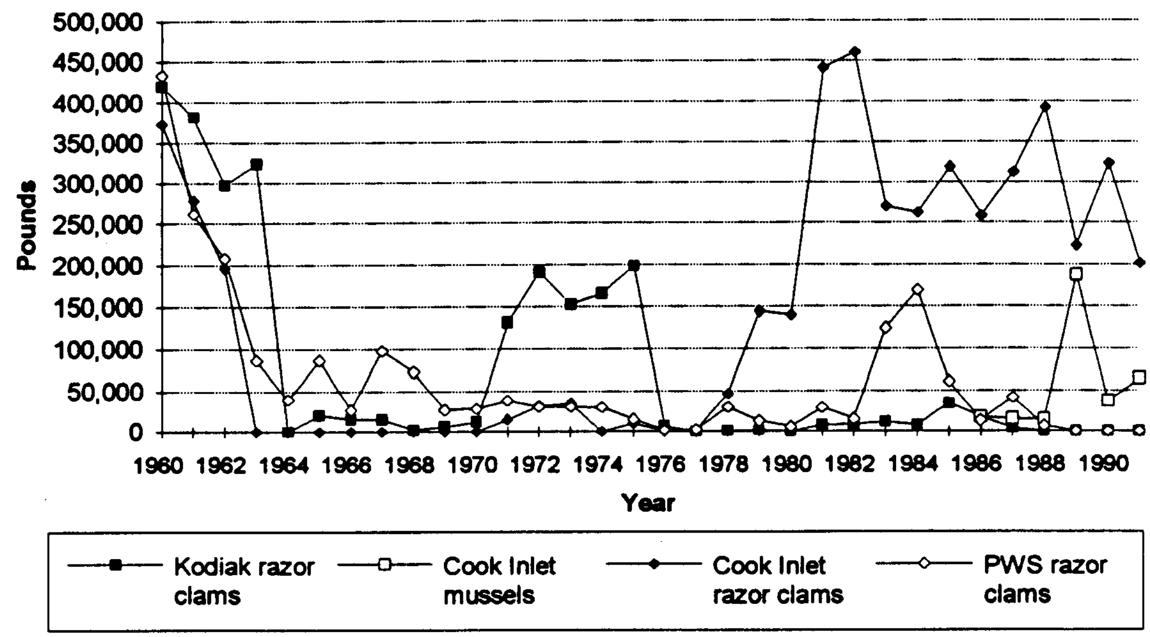
Figure 2.3-22 shows the sporadic nature of the clam fishery in the Gulf of Alaska. Razor clams have been harvested in Kodiak since the early 1920's. The fishery was strong in the early 1960's and declined after the 1964 earthquake, due to a combination of processing regulations, poor market conditions and effects of the earthquake (Alaska Department of Fish & Game, 1988). Effort in the Kodiak fishery has been sporadic in recent years with no harvests reported since 1987.

Table 2.3-19: Clam Harvests
by Gulf of Alaska Management Area
(landings in pounds)

	Management Area				
Year	Kodiak razor clams	Cook Inlet mussels and hardshell clams	Cook Inlet razor clams	Prince William Sound razor clams	Total
1960	420,636		372,872	433,930	806,802
1961	381,971		277,830	261,628	539,458
1962	297,516		195,650	208,698	404,348
1963	323,757		0	86,340	86,340
1964	0		0	39,275	39,275
1965	20,000		0	86,477	86,477
1966	15,400		0	27,063	27,063
1967	15,429		0	98,446	98,446
1968	2,155		0	72,806	72,806
1969	6,384		0	26,887	26,887
1970	12,029		0	27,909	27,909
1971	132,261		14,755	37,972	52,727
1972	190,394		31,360	30,326	61,686
1973	152,116		34,415	30,318	64,733
1974	165,282		0	29,747	29,747
1975	198,381		10,020	15,443	25,463
1976	6,188		0	1,516	1,516
1977	0		1,762	2,160	3,922
1978	400		45,931	29,865	75,796
1979	1,352		144,358	12,904	157,262
1980	0		140,240	5,881	146,121
1981	8,006		441,949	28,970	470,919
1982	8,186		460,639	15,275	475,914
1983	11,608		269,618	124,835	394,453
1984	7,920		261,742	168,426	430,168
1985	33,972		319,034	60,274	379,308
1986	16,945	17,303	258,632	13,122	289,057
1987	3,993	14,869	312,349	40,954	368,172
1988	0	14,449	392,610	6,766	413,825
1989	0	187,083	222,747	0	409,830
1990	0	36,844	323,602	0	360,446
1991	0	64,056	201,320	0	265,376

Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

Figure 2.3-22: Clam Harvests
By Gulf of Alaska Management Area



Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).

The Cook Inlet razor clam fishery has operated sporadically since 1919. Since 1981, harvests have remained relatively constant, varying from 460 thousand pounds to 222 thousand pounds. There is one major processor operating near Kenai to process razor clams. Fluctuation in clam production is mostly a function of market conditions, rather than changes in the clam resource. Future harvest are likely to remain at similar levels.

2.3.3.7 Octopus

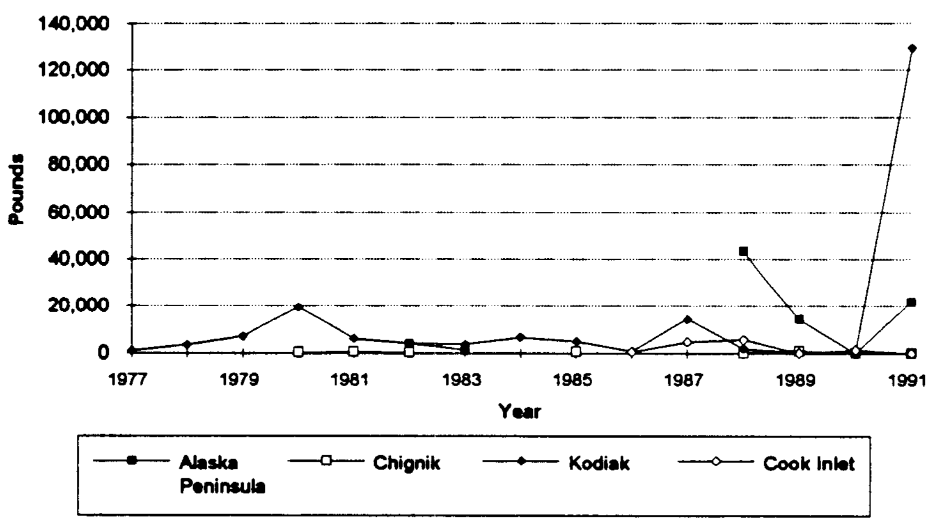
There is a small fishery for octopus in the Gulf of Alaska. Figure 2.3-23 shows the harvests of octopus for the period from 1977-1991. The recent increase in harvests in the Alaska Peninsula and Kodiak result from bycatch in the trawl fisheries for Pacific cod and other species rather than directed effort. Little is known of the octopus resource in the Gulf.

Table 2.3-20: Octopus Harvests
by Gulf of Alaska Management Area
(landings in pounds)

	Management Area				
Year	Alaska Peninsula	Chignik	Kodiak	Cook Inlet	Total
1977			1,000		1,000
1978			3,336		3,336
1979			6,978		6,978
1980		183	19,342		19,525
1981		400	5,872		6,272
1982	3,980	250	3,854		8,084
1983	1,242		3,764		5,006
1984			6,487		6,487
1985	352	421	4,812		5,585
1986			643	435	1,078
1987			14,151	4,512	18,663
1988	43,282	50	1,949	5,569	50,850
1989	13,988	902	109	0	14,999
1990	n/a	n/a	n/a	1,343	1,343
1991	21,812	(1)	129,355	0	151,167

Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).
(1) Chignik landings combined with Alaska Peninsula harvest in 1991.

Figure 2.3-23: Octopus Harvests
By Gulf of Alaska Management Area



Source: Alaska Department of Fish & Game, various years. (Shellfish Annual Management Reports for various management areas).
(1) Chignik landings combined with Alaska Peninsula harvest in 1991.

2.3.3.8 Other species

There are small fisheries for sea urchins in Kodiak and Cook Inlet waters. These fisheries have developed in recent years, primarily for their gonads which are a specialty item in Pacific Rim nations. Harvests in Kodiak have varied between 13 thousand pounds and 190 thousand pounds since 1985. Cook Inlet harvests, which began in 1987, accounted for a range of 224 pounds to 15 thousand pounds. Very little is known about sea urchin abundance or likely future harvest potential.

2.4 Harvesting Sector

The Gulf of Alaska harvesting sector ranges in size from small skiffs, used for seasonal set gillnet and hand longlining, to very large trawlers and crabbers which operate throughout all seasons. The wide range in seasonality, and vessel size and infrastructure requirements for the Gulf of Alaska fleet requires that the fleet be separated into groups for further evaluation. This section presents vessel information by the various gear types used in the Gulf of Alaska.

2.4.1 Domestic Fleet

2.4.1.1 Groundfish Trawl

The Gulf of Alaska groundfish trawler fleet ranges in size from small, coastal trawlers which operate from local ports, to very large vessels which also process their catch. Vessels which conduct harvesting and processing operations are discussed in Section 2.5.2. Vessels that harvest shrimp, herring, or other species using trawl gear are discussed in the shellfish or herring fisheries.

For purposes of this report the trawl fleet is further subdivided into the domestic fleet which delivers to U.S. ports or processors, and the joint-venture fleet which delivered at-sea to foreign flag processors. Joint-venture operations no longer operate in Alaskan waters but the information are presented to aid in understanding the history and future development of the industry. Information on vessels which participated in joint-venture operations is provided in Section 2.4.2.

Harvesting and Operating Mode: Vessels trawling for groundfish in Gulf of Alaska waters operate in several different fishing modes. One fishing mode is to operate as a catcher vessel for a floating processing ship. In the joint-venture fisheries, the processing ship was foreign owned and operated. American-owned joint-venture catcher vessels did not bring their catch on board but rather delivered to the processing ship by transferring the full cod ends of their trawls. Many catcher boats did not have the capacity to store and transport large volumes of fish. As the foreign factory ships were displaced by domestic processors, smaller joint-venture catcher boats which did not have sufficient hold capacity to deliver to shoreside plants tried to establish linkages with domestic motherships or catcher-processors.

A second mode is trawl vessels that can harvest and deliver to a processor (shore-based or floating) in another location. The trawl vessels using this mode haul their catch aboard and deliver it to a processor when they have a full hold.

Catcher-processors are another mode which incorporates catching and processing operations. When fishing is slow, catcher processors may take deliveries from additional catcher-vessels to augment their own fishing capacity. During periods of peak fishing, catcher-processors can keep their processing plants at full operating capacity and do not require additional fishing capability.

Depending on the species, trawlers use either bottom or midwater trawl gear. For bottom hugging species such as yellowfin sole, trawlers use roller gear to keep the trawl as close to the bottom as possible. Midwater trawls are used for pollock and other species at certain times of the year. They can be towed at any depth the fish are found. Net sonars, underwater cameras and other electronic gear can be used to make sure the net is fishing where the fish are located.

Employment and Residency: The Alaska fisheries industry is composed of the fish harvesting, fish processing, and secondary industries. However, little data have been available on employment in the fish harvesting sector since most of this employment is classified as self-employment and is not collected in the continuing survey used to collect nonagricultural wage and salary employment.

The Alaska Department of Labor (ADOL) and the Alaska Commercial Fisheries Entry Commission (CFEC) have collaborated to refine a methodology for estimating employment in the fish harvesting sector. Estimates are based on information contained in fish tickets and crew factors (Thomas, 1987). Fish tickets are completed at the time of delivery of fish or shellfish to the buyer, and include vessel license number, area fished, date of catch, number and species of fish caught, and an assigned, unique number for the permit holder. Crew factors are estimates of the average number of people working on a commercial fishing vessel using a given gear type. Employment tables shown in Section 2.4 for each gear type are based upon this methodology.

In 1986, ADOL published a report entitled Seafood Harvesting and Processing in Alaska, 1982-1983 (Thomas, 1986), which provided a preliminary assessment of fish harvesting employment and information on residency by census area and gear type. The residency pattern for each permit holder was based upon their mailing address, and the crew was assumed to be from the same area as the permit holder. CFEC staff established that this assumption was not valid and, as a result, determination of residency for the harvest sector has ceased. The residency of permit holders is provided in this section, but only as a relative indicator of residency for total gear type employment.

The ADOL publications combine joint venture and longline boats with all trawl vessels into a bottomfish category and do not provide the detail required for this study. The data base information available to MMS does not distinguish between catcher boats and catcher/processors using trawl equipment. However, CFEC data apparently show monthly operations for vessels with shore deliveries, and do not include vessels delivering at-sea or catcher/processors. This assumption is based upon the small number of domestic trawl vessels reflected in the CFEC data, the larger number shown in the number of permits issued as shown in the data bases, and NMFS data on the number of groundfish trawl vessels operating in the Gulf of Alaska (NMFS, 1990).

Table 2.4-1 shows the employment levels for domestic trawl fisheries in the Gulf of Alaska for 1988 through 1990. This employment estimate is derived from the median trawl crew factor of 4.0 developed by Thomas (1986), and the monthly vessel data contained in the CFEC data bases provided to MMS. Monthly information for prior years does not include permit holders that reside outside Alaska.

Table 2.4-1 Employment in the Gulf of Alaska Domestic Trawl Fishery

	Month													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	Total
1988	144	208	304	256	180	120	212	80	152	216	264	148	190	2,284
1989	104	212	408	360	240	180	176	152	88	72	16	4	168	2,012
1990	212	340	512	624	272	92	228	280	252	332	152	0	275	3,296

Data for the number of unique trawl permits or vessels with landings are not available from CFEC databases provided to MMS. The data present the number of permits or vessels by year, community, gear, area, and species. The same vessel can fish for more than one species and in more than one area. Several different approaches were used to estimate vessel or permit numbers using this information but the results were substantially different from other sources.

Table 2.4-2 shows NMFS' residency estimates for the number of vessels that landed groundfish in the Gulf of Alaska domestic trawl fishery for 1986 through 1991.

Table 2.4-2 Residency of Vessels with Landings in the Gulf of Alaska Domestic Trawl Fishery

	At-Sea			Shore-based		
Year	Alaska	Other	Unknown	Alaska	Other	Unknown
1986	0	4	8	27	8	14
1987	0	6	12	52	31	12
1988	0	9	13	67	22	11
1989	4	16	17	68	26	7
1990	1	6	57	57	18	57
1991	6	40	4	60	45	46

Source: Kinoshita et al, 1991.
[a]Preliminary data through August 26, 1991.

Harvest Levels and Earnings: Table 2.4-3 indicates the relative magnitude of total metric tons harvested, and associated earnings for the trawl fleet operating in the Gulf of Alaska. The table combines harvest and earnings data for trawlers and factory trawlers since the data bases do not separate these two vessel types. Earnings are the sum of ex-vessel value for the trawl fishery. Ex-vessel value for factory trawlers are calculated as the average price for on-shore trawl deliveries.

Table 2.4-3 Harvest and Earnings in the Gulf of Alaska Domestic Trawl Fishery

Year	Metric Tons (thousands)	Earnings (millions of $)
1984	4.6	$1.2
1985	20.1	$3.5
1986	38.4	$9.6
1987	76.5	$23.9
1988	109.3	$36.5
1989	35.2	$43.2
1990	179.5	$48.8
1991	138.0	$54.2

Source: Kinoshita et al, 1991.

Vessel Characteristics: Table 2.4-4 shows the size distribution and total number of domestic trawlers operating in the Gulf of Alaska for the 1986 through 1991 time period. The CFEC data bases are by species, gear, and area so the information cannot be summed to arrive at the size distribution for the fleet. The data in Table 2.4-4 are from a National Marine Fisheries Service publication.

Information on other characteristics of these boats is relatively limited. The National Marine Fisheries Service collects a limited amount of information about each vessel for its role in managing the resource. Additional information has to be gleaned from various trade journals, previous reports, personal communications, and proprietary data files. The other characteristics information presented in this and subsequent harvest sector subsections are aggregated from this compendium of sources.

Table 2.4-4 Vessel Size Distribution for Gulf of Alaska Domestic Trawlers

Year	Meters							
	<18.2	18.3-25.6	25.7-33.2	33.3-40.9	41.0-48.6	48.7-56.4	56.5+	Unknown
1986	18	14	10	9	2	3	3	2
1987	35	30	19	14	4	6	4	1
1988	37	31	18	19	3	6	6	2
1989	31	35	24	18	4	7	14	2
1990	40	41	27	30	5	15	23	8
1991[a]	36	46	31	29	3	7	21	28

Source: Kinoshita et al, 1991.
a Preliminary data as of August 26, 1991.

The size and other characteristics of domestic trawlers operating in the Gulf of Alaska has increased in the past few years as shore-based processing plants contracted with catcher boats that are newly converted oil rig supply boats. The vessels average 185 feet in length and are considerably larger than the typical trawl vessel in the domestic or joint-venture fleet.

Table 2.4-5 Selected Characteristics of the Gulf of Alaska Domestic Trawl Fleet

Characteristic	Range	Average
Beam (Width)		
Meters	7 - 10.4	8.8
Feet	23 - 34	29
Loaded Draft		
Meters	2.7 - 6.7	4.3
Feet	9 - 22	14
Horsepower	720 - 1,900	1,100
Fuel Capacity		
Liters	34,100 - 344,400	158,600
Gallons	9,000 - 91,000	41,900
Refuel Volume		
Liters	11,360 - 227,100	101,100
Gallons	3,000 - 60,000	26,700
Fuel Consumption		
Liters/Day	1,900 - 5,700	3,600
Gallons/Day	500 - 1,500	950

Sources: R & M Consultants, 1986.

2.4.1.2 Longline

Harvesting and Operating Mode: This gear type classification includes traditional long line gear, jigging, and the relatively recent introduction of pots (similar to those used for king and tanner crab) for groundfish. Unless otherwise specifically noted these latter gear types are included in results presented for longline gear, and estimates of employment, earnings, and other items include employment and earnings for jigging and groundfish pots.

Longline fishermen fishing for halibut, sablefish, Pacific cod, and similar species use long lengths of groundline (weighted line that sinks), called skates that are strung along the ocean bottom. Skates are traditionally about 300 fathoms (1800 feet) in length and multiple skates are combined into one string that is anchored at both ends. Buoys at each end of the string mark the location of the gear. Short lines called "gangions" are connected or snapped to the skate groundline and connect to the hooks. Longlines are set and pulled with hydraulic winches. Automatic gear is available to bait the hooks and connect the gangions to the groundline. One such system is the Mustad Autoline System. Longlines are left to "soak" on the bottom while waiting for fish. The length of the soak can vary from a couple of hours to 20 to 30 hours or longer if poor weather conditions prevent pickup of the gear. The short openings for halibut in recent years tend to reduce the soak time of longline fishing for that species.

Employment and Residency: Table 2.4-6 shows estimated employment levels for longline vessels operating in the Gulf of Alaska for the 1988-1990 time period. Multiple permits for various species can be fished by a permit holder or vessel during a month. This table uses the maximum number of gear type permits in each area by month to avoid seriously overestimating employment. For example, if there are 1,000 longline halibut permits fished in Area A in May and 800 miscellaneous finfish permits are also fished in that same month, it is assumed that the finfish permits are fished by the halibut permit holders, and the maximum employment is based upon the 1,000 halibut permits. The employment estimate is based upon a 4.3 person crew factor and is for catcher boats only (excludes catcher/processors). This table is derived from data contained in the CFEC data bases, and Thomas (1986). Information on the number of halibut permits fished in 1990 is not yet available so employment is not estimated for that year.

Table 2.4-6 Employment in the Gulf of Alaska Domestic Longline Fishery

	Month													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	Total
88	460	658	1,011	2,997	12,023	10,621	684	361	6,914	4,416	198	120	3,372	40,463
89	138	288	327	3,044	8,867	10,200	529	254	7,985	3,302	155	228	2,943	35,316
90														

Table 2.4-7 shows the residency of domestic vessels that landed groundfish in the Gulf of Alaska with hook & line and pot gear. The hook & line designation used by NMFS includes longline and jigging, but longline gear is the dominant method in this classification. The at-sea columns refer to at-sea processing or catcher/processors, and the shore-based columns reflect traditional catcher boats delivering to shoreside processing plants.

Table 2.4-7 Residency of Vessels with Landings in the Gulf of Alaska Longline Fishery

	At-Sea			Shore-based		
Year	Alaska	Other	Unknown	Alaska	Other	Unknown
1986	1	0	1	792	77	122
1987	3	6	2	1395	119	192
1988	10	6	6	1325	104	140
1989	33	9	35	1122	107	129
1990	40	25	36	1164	189	345
1991 [a]	21	32	1	843	144	723

Source: Kinoshita et al, 1991.
[a]Preliminary data through August 26, 1991.

Harvest Levels and Earnings: Table 2.4-8 indicates the relative magnitude of total pounds harvested, and associated earnings for the longline, jig and groundfish pot fleets operating in the Gulf of Alaska. Earnings are the sum of ex-vessel value for these fisheries. Ex-vessel value for catcher/processors are calculated as the average price for on-shore deliveries.

Table 2.4-8 Harvest and Earnings in the Gulf of Alaska Longline Fishery

Year	Metric Tons (thousands)	Total Earnings (millions of $)
1984	10.2	$7.7
1985	13.1	$16.5
1986	22.6	$27.8
1987	34.9	$42.8
1988	34.5	$62.4
1989	32.2	$54.0
1990	40.3	$45.6
1991 [a]	42.0	$55.1

Source: Kinoshita et al, 1991.
[a] Preliminary data as of August 26, 1991.

Vessel Characteristics: Table 2.4-9 shows the breakdown by different size categories for vessels using longline, jig, and groundfish pots in the Gulf of Alaska.

Table 2.4-9 Size Distribution for Longline, Jig, and Groundfish Pot Vessels
Gulf of Alaska
(Meters)

Year	<18.2	18.3-25.6	25.7-33.2	33.3-40.9	41.0-48.6	48.7-56.4	56.5+	Unk.
1986	843	97	21	5	1	3	0	23
1987	1,507	140	22	7	2	2	1	36
1988	1,417	115	20	10	1	6	0	21
1989	1,216	104	12	10	0	5	0	29
1990	1,313	154	27	16	2	3	0	216
1991 [a]	1,254	161	29	7	0	2	0	311

Source: Kinoshita et al, 1992.
[a]Preliminary data through August 25, 1990.

Longlining is the province of the small boat fleet. Large ships are required to handle trawl gear or king crab pots, but even a small skiff can be used in protected waters to longline for halibut, Pacific cod, and other species. Increasing numbers of gillnet and seine vessels are seasonally outfitted to participate in the spring halibut and sablefish openings, prior to their primary salmon season. In addition to the increasing numbers of small vessels participating in the Gulf of Alaska longline fishery, there are increasing numbers of large catcher/processors joining the fishery. Table 2.4-9 shows the trend toward increasing number of large vessels.

The numbers of longline, jig, and groundfish pot vessels operating in the Gulf of Alaska has increased in recent years. Prices for sablefish and halibut have increased and the longline fleet has moved north and west as quotas are reached in other areas in order to extend the fishing season.

Substantial increases in the number of longline boats in the fleet are not likely. The sablefish and halibut quotas have been decreasing. As the number of boats entering these high-valued fisheries have increased, the quotas have been reached in shorter periods of time resulting in less revenue to the average permit holder. In addition, the NPFMC is considering several different management strategies for sablefish, and possibly other groundfish, that could limit the size of the fleet or limit the fishing pressure. The groundfish pot fleet may increase in size. This gear type has low bycatch rates and the NPFMC is encouraging growth in this gear type to reduce bycatch levels.

Trade journals and other publications write few articles describing small boats. The information presented below in Table 2.4-10 are aggregated from data for fifteen 15 dedicated longline boats that operated from Unalaska/Dutch Harbor in 1986 (R & M Consultants, 1986), and from more recent trade journals which featured longline catcher/processors. This overstates the draft, fuel consumption, and refuel volume of the entire Gulf of Alaska longline fleet since many smaller vessels which longline as a supplement to salmon or other fisheries are omitted. However, these averages are a more accurate representation of that portion of the longline fleet which spends the greatest amount of time in the Gulf of Alaska, and accounts for a significant percent of the harvest.

Table 2.4-10 Selected Characteristics of the Domestic Longline Fleet

Characteristic	Range	Average
Beam (Width)		
Meters	3.6-7.9	5.6
Feet	12-26	18.5
Loaded Draft		
Meters	2.4-4.6	3.2
Feet	8-15	10.5
Horsepower	180-600	370
Fuel Capacity		
Liters	6,056-75,700	23,845
Gallons	1,600-20,000	6,300
Refuel Volume		
Liters	2,650-32,173	9.690
Gallons	700-8,500	2,560
Fuel Consumption		
Liters/Day	379-1,817	946
Gallons/Day	100-480	250

Source: R & M Consultants, 1986.

2.4.1.3 Shellfish

Harvesting and Operating Mode: Crab fishing vessels represent the vast majority of vessels participating in the shellfish fishery. These boats are typically 90 to 120 feet in length, but many newer entrants to the fishery are larger. These large vessels are required in the Gulf of Alaska because of the adverse conditions encountered during the crab seasons as well as the need to transport heavy, bulky loads of crab pots to and from the fishing grounds. Most of the vessels are relatively new steel-hulled with sophisticated electronic gear that aid in setting and locating the pot strings. Crab vessels need the characteristics of: 1) an ability to maintain stability and maneuverability with heavy loads of seawater in the live tanks, 2) a stable working platform for crew members, 3) a large deck to carry upwards of 300 pots, 4) a high pilothouse for good visibility of the deck area and 5) capability to work in other fisheries.

Several types of pots are used for king and tanner crab fishing. Most are made of welded steel rebar and weigh 400 to 500 pounds empty. The most common configuration is square, with dimensions of 6 x 6 x 2.5 feet or 7 x 7 x 2.5 feet. Crab vessels are required to have circulating seawater tanks to hold the crab live until they are delivered to a processor. By law, dead crabs have to be discarded.

Herring is the standard bait for crab fishing in the Gulf of Alaska. It is placed frozen in perforated plastic jars which hang in the pot. Additional "hanging bait" such as fresh caught cod, pollock or other species are commonly included in addition to the herring.

Crab pots are typically fished in a string although each is set individually after being baited. When the pot is launched, the coiled lines unravel. The lines are attached to one or more floats which mark the location of the pot. To haul the pot, the vessel is pulled up on the leeward side of the buoys. The pot line is caught with a grappling line or hook and run through a hydraulic pot lifter. The pot lifter has a slipping clutch which keeps a constant tension on the line as the vessel rises and falls with the swell. This keeps the lines from parting under sudden strains. Once the pot is lifted to the surface, it is picked up with a short boom and set on the pot lifter. The catch is removed, the pot is rebaited and reset.

Employment and Residency: Table 2.4-11 shows estimated employment levels for crab vessels operating in the Gulf of Alaska for the 1988-1990 time period. The table presents the estimated number of persons participating in the fishery each month, and total months of participation in the fishery for each year. The crew factors for crabbers range from 3.0 persons for Dungeness crab in the Aleutian Peninsula area to 5.5 persons in the Western Aleutian area for king and tanner crab, with a median of 5.0 (Thomas, 1986). The decline in the king crab resource and the transition to harvesting lower valued opilio is readily apparent in the change in employment estimates.

Table 2.4-11 Employment in the Gulf of Alaska Shellfish Fishery

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	Total Months
1988	2,345	1,105	370	445	355	1,085	1,355	1,335	670	1,020	715	375	931	11,175
1989	1,365	790	580	140	220	1,055	1,175	1,030	365	675	530	160	674	8,085
1990	1,095	1,025	405	120	185	1,060	1,185	955	310	775	680	360	680	8,155

Source: Derived from crew factors developed by Thomas, 1986, and permit information extracted from data files provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Table 2.4-12 indicates the residency for holders of crab permits in the Gulf of Alaska region. This information differs from that provided for the groundfish fishery since that source provides information only for groundfish. In Table 2.4-12, if an individual holds several permits in different areas or for different species, each permit is counted. This overstates the number of individual permit holders but that information is not available from CFEC data bases and was not identified in the literature review. The residency by each permit does, however, provide a better evaluation of the level of harvesting effort by residency. This table clearly shows the dominant role of out-of-state fishermen in the Gulf of Alaska crab fisheries.

Table 2.4-12 Residency of Permits Fished in the Gulf of Alaska Shellfish Fishery

	Area of Residency			
Year	Gulf of Alaska Region	Other In-State	Out-of-State	Total
1981	1,612	5	207	1,824
1982	1,860	6	306	2,172
1983	1,492	10	271	1,773
1984	1,567	4	212	1,783
1985	1,405	9	170	1,584
1986	668	11	98	777
1987	788	5	75	868
1988	791	5	91	887
1989	1,258	6	128	1,392
1990	1,397	5	215	1,617

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.
[a]Not available.

Harvest Levels and Earnings: Table 2.4-13 indicates the relative magnitude of total pounds harvested, and associated earnings for the crab pot fleet operating in the Gulf of Alaska. This estimate is derived from community level data so there are a number of records subject to non-disclosure rules. Earnings are the sum of ex-vessel value for the crab and other shellfish fisheries. Ex-vessel value for crab catcher processors are calculated as the average price for on-shore crab deliveries. Even though the king crab and C. bairdi tanner crab fisheries have been at depressed levels for several years, 1989 reflects an upturn in total earnings.

Table 2.4-13 Harvest and Earnings in the Gulf of Alaska Shellfish Fishery
(thousands)

Year	Pounds	Total Earnings
1981	91,085,472	$89,520,992
1982	71,769,580	$110,442,062
1983	47,129,817	$54,078,650
1984	40,076,169	$47,921,431
1985	29,768,105	$40,398,193
1986	16,400,995	$26,181,518
1987	12,648,263	$25,693,704
1988	11,973,376	$23,699,155
1989	17,801,915	$34,647,393
1990	17,832,765	n.a.

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.
n.a. Not available.

Vessel Characteristics: The Gulf of Alaska crab fleet is composed of: 1) dedicated vessels which only pursue shellfish species, 2) vessels which are capable of converting to and from trawling and other fisheries, and 3) smaller boats, such as seiners, for which shellfish are a secondary species. Table 2.4-14 shows the size distribution and number of boats participating in the Gulf of Alaska shellfish fisheries. Vessels that participate in more than one fishery, or operate in more than one management area are counted for each permit. As a result, this table overstates the actual number of vessels participating in the Gulf of Alaska crab fishery, but the data provide an indicator of changes in vessel size over time.

Table 2.4-14: Size Distribution for Gulf of Alaska Shellfish Vessels
(Meters)

	Number of Vessels by Size										
Year	<6.1	6.1-12.2	12.3-18.2	18.3-24.3	24.4-30.4	30.5-36.5	36.6-42.6	42.7-48.7	48.8-54.8	54.9-60.9	61.0+
1981	42	444	581	253	149	21	10	2	3	0	3
1982	44	549	700	269	194	36	12	5	5	0	1
1983	39	492	548	205	143	35	21	6	5	1	0
1984	39	590	587	171	108	28	13	2	4	1	0
1985	53	591	488	135	88	23	3	1	0	0	0
1986	46	526	416	108	61	30	9	2	0	0	0
1987	52	615	464	110	48	8	0	1	0	1	0
1988	73	672	498	116	56	4	3	3	3	3	0
1989	86	584	433	85	34	3	1	0	0	8	0
1990	98	575	488	100	61	6	5	0	0	3	2

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.

The number of small crab vessels (<12.2 meters; 39 feet) has increased since 1981, while larger size categories (>12.3 meters; >40 feet) have experienced losses The number of vessels in the 48.8 to 54.8 meter class (160><179 feet) increased substantially in 1988, but it is uncertain if this estimate reflects preliminary data, or if a substantial number of large vessels entered the fishery in that year.

Table 2.4-15 shows selected characteristics for the Alaska crab fleet from a sample of 23 vessels for which data are available (R & M Consultants, 1986).

Table 2.4-15: Selected Characteristics of the Gulf of Alaska Crab Fleet

Characteristic	Range	Average
Beam (Width)		
Meters	6.7 - 12.2	8.9
Feet	22 - 40	29.1
Loaded Draft		
Meters	2.4 - 5.2	4.1
Feet	8 - 17	13.5
Horsepower	370 - 1,500	900
Fuel Capacity		
Liters	34,065 - 43,528	137,396
Gallons	9,000 - 11,5000	36,300
Refuel Volume		
Liters	11,355 - 75,700	41,635
Gallons	3,000 - 20,000	11,000
Fuel Consumption		
Liters/Day	1,514 - 3,785	2,801
Gallons/Day	400 - 1,000	740

Sources: R & M Consultants, 1986.

2.4.1.4 Gillnet

The Gulf of Alaska gillnet fleet is composed of a number of subgroups based upon species, management area and gear type, with varying regulations for each subgroup. These factors result in a wide disparity between the characteristics of the vessels in the fleet. This section aggregates data for the gear type and statistical differences between subgroups are obscured. However, where differences between subgroups are meaningful, the item is discussed. Information on local subgroups can be found in the discussion of the harvesting sector under each community in Section 3.

Harvesting and Operating Mode: Gillnet vessels are among the smallest commercial fishing vessels within the study area, although there are no regulations on size for gillnet vessels operating in the Gulf of Alaska region. Drift gillnet fishermen use floating nets that drift with the water currents. Net length, depth and mesh size is usually set by regulation. The nets are floated with a cork along the headrope and are held down by a leadline along the bottom of the net. Nets are usually set and hauled with a hydraulic net reel. As the net comes over the side of the vessel, salmon are pulled out of the net and placed in the hold. In addition to salmon, drift gillnets are also used for roe-herring fisheries throughout the region.

Set nets are similar to drift nets, but are fished in a single location. Each end of the net is anchored to hold against the tidal currents. The salmon caught are picked from the net from a skiff or after the net is left dry by the receding tide.

Employment and Residency: Table 2.4-16 shows estimated employment levels for the gillnet fishery for the 1981-87 time period. The crew factors for the salmon drift gillnet fishery ranged from 1.25 persons in the Prince William Sound area to 2.0 in Cook Inlet and the Aleutian Peninsula, with an average of 1.75. Set gillnets crew factors were primarily 2.0 except for Kodiak which had 2.5, for an average of 2.1. Herring drift and set gillnet crew factors are 2.0 persons (Thomas, 1986). The crew factors are multiplied by the number of permits fished in each fishery each month to arrive at the employment estimates for each year. The monthly employment estimates are based upon fishing patterns for Alaska residents contained in CFEC data bases provided to MMS. The MMS data bases do not separate that part of Area M (Aleutian Peninsula) fisheries which occur in the Bering Sea from those which occur in the Gulf of Alaska. Since Area M vessels typically begin fishing on the Gulf side before moving north, and some boats return to the Gulf later in the season, this table over-estimates total employment that occurs within the Gulf of Alaska.

Table 2.4-16 Employment in the Gulf of Alaska Gillnet Fishery

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	Total
1988	0	0	238	300	1,343	4,091	5,224	4,849	2,523	381	0	0	1,579	18,949
1989	0	0	170	348	1,119	3,062	3,812	3,562	1,871	97	0	0	1,170	14,041
1990	0	0	0	268	1,156	4,155	5,172	4,856	2,427	186	0	0	1,518	18,220

Source: Derived from crew factors developed by Thomas, 1986, and permit information extracted from data files provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

The Gulf of Alaska salmon fisheries have been subject to limited entry since 1974. Some herring gillnet fisheries have also come under limited entry since that date. The number of participants in these fisheries is obviously affected by the presence or absence of such regulations, but residency patterns are also affected. For this reason, separate tables are presented for the two fisheries. Table 2.4-17 shows the residency of permit holders that fished in the salmon gillnet fishery, and Table 2.4-18 presents similar information for the herring gillnet fishery.

Table 2.4-17 Residency of Permits Fished in the Gulf of Alaska Salmon Gillnet Fishery

	Area of Residency			
Year	Gulf of Alaska Region	Other In-State	Out-of-State	Total
1981	2,072	113	590	2,775
1982	2,056	117	603	2,776
1983	2,136	105	594	2,835
1984	2,189	136	585	2,910
1985	2,195	134	609	2,938
1986	2,181	111	610	2,902
1987	2,195	127	604	2,926
1988	2,218	130	637	2,985
1989	1,654	129	467	2,250
1990	2,200	134	650	2,984

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.

Table 2.4-18 shows residency patterns for herring permits in the Gulf of Alaska area. Some residents have been expanding their efforts in these fisheries for several reasons. First, expensive permits are not required for entry in certain management areas and, second, equipment used for set and drift gillnet salmon fishing which are the predominant methods used by area residents can be used in the herring fishery.

Table 2.4-18: Residency of Permits Fished in the Gulf of Alaska Herring Gillnet Fishery

	Area of Residency			
Year	Gulf of Alaska Region	Other In-State	Out-of-State	Total
1981	286	1	49	336
1982	238	0	38	276
1983	271	2	49	322
1984	300	4	45	349
1985	306	7	51	364
1986	284	5	47	336
1987	313	5	56	374
1988	301	4	58	363
1989	249	0	38	287
1990	235	2	24	261

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.

Harvest Levels and Earnings: Table 2.4-19 summarizes information on harvest and earnings for salmon and herring fisheries in the Gulf of Alaska. These data are estimated from community level data bases and non-disclosure rules prevent some harvest and earnings information from being included in this table. Although Table 2.4-19 under-estimates total harvest and earnings it does provide a relative indication of changes for this gear type. It is evident that higher prices per pound for salmon have resulted in higher earnings to fishermen even though catches may have been smaller than in prior years. The trend in herring fisheries is similar with higher prices resulting in 1988 total earnings almost double the 1981 earnings even though the 1988 harvest was about 40 percent less than the 1981 harvest.

Table 2.4-19: Harvest and Earnings in the Gulf of Alaska Domestic Gillnet Fishery
(in thousands)

	Salmon		Herring	
Year	Pounds	Total Earnings	Pounds	Total Earnings
1981	76,609	$62,988	6,057	$1,464
1982	115,800	$89,837	5,783	$2,012
1983	101,409	$64,370	8,214	$3,642
1984	103,462	$70,457	6,991	$2,705
1985	117,992	$102,704	7,161	$4,460
1986	119,246	$114,853	5,775	$3,342
1987	132,942	$179,268	5,452	$3,562
1988	134,118	$253,134	5,067	$4,091
1989	112,509	$145,079	3,584	$1,812
1990	108,614	n.a.	3,040	n.a.

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.
n.a.: Not available.

Vessel Characteristics: Table 2.4-20 presents aggregate data for the Gulf of Alaska gillnet fleet. Vessel size restrictions similar to the 9.75 meter (32 feet) limit on Bristol Bay drift gillnet vessels do not exist in Gulf of Alaska fisheries, but the 6.1 to 12.2 meter size classification is preferred by many fishermen. The larger vessels (> 12.2 meters) are typically multi-purpose boats also used for salmon or herring gillnet fishing. Vessels which participate in both salmon and herring fisheries are counted twice in this table.

Table 2.4-20: Vessel Size Distribution for the Gulf of Alaska Gillnet Fleet (Meters)

	Number of Vessels by Size										
Year	<6.1	6.1-12.2	12.3-18.2	18.3-24.3	24.4-30.4	30.5-36.5	36.6-42.6	42.7-48.7	48.8-54.8	54.9-60.9	61.0+
1981	251	1,838	123	6	6	4	0	0	0	0	2
1982	309	1,896	118	5	5	3	1	0	1	0	0
1983	360	2,071	113	4	1	1	0	0	0	0	1
1984	215	2,059	112	2	4	2	2	0	0	0	1
1985	46	1,927	110	3	2	1	0	0	0	0	0
1986	127	2,089	121	2	2	2	0	0	0	0	0
1987	127	2,159	145	4	3	2	0	0	0	0	0
1988	117	2,163	183	5	2	1	2	1	0	0	1
1989	109	1,497	159	2	2	0	1	0	1	0	0
1990	140	2,082	284	6	7	0	1	1	1	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.

Improvements in gasoline and diesel power plants are making it possible for larger boats to attain high speeds often required in these fisheries. In some instances newer drift gillnet boats have been built with dual engines totaling over 1,000 horsepower. In contrast, the set gillnet fisheries typically employ outboard motors of 50 to 75 horsepower.

Vessels used exclusively for set gillnet operations are no longer required to obtain a vessel license from the Alaska Department of Fish & Game. As a result, information on these boats is limited.

2.4.1.5 Seine

Harvesting and Operating Mode: Salmon seine vessels fishing within the study area are limited by regulation to a length of 58 feet. Purse seine fishermen actively seek out schools of salmon to set the net. A small, high powered skiff is used to pull the net out from the vessel, pulling the net in a circle to enclose the area thought to contain salmon. Once the skiff is back at the vessel, the circle of the net is completed. The net lines are run through a hydraulic power block. The bottom line of the line is pulled first which "purses" the net (hence the name purse seine) and keeps fish from diving out the bottom of the net. The net is hauled until the catch is in a small part of the net next to the vessel and then the fish are brailed aboard.

Employment and Residency: Table 2.4-21 shows estimated employment levels in the seine fishery for the 1981-1988 period. The Southeast salmon fishery has a crew factor of 5.0 for a purse seine, while Cook Inlet is only 3.75. The average for Gulf of Alaska fisheries is 4.4. Herring purse seine crew factors range from 3.75 in the Cook Inlet area to 5.5 in Southeast (Thomas, 1986). An average crew factor of 4.25 is used for herring purse seine.

Table 2.4-21: Employment in the Gulf of Alaska Seine Fishery

	Month													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	Total
1988	153	0	0	1,084	149	3,200	5,424	5,447	2,486	101	34	0	1,506	18,078
1989	132	0	72	587	242	1,976	3,809	3,674	568	53	13	44	931	11,170
1990	111	0	0	1,207	145	3,464	5,562	5,530	1,346	109	26	0	1,458	17,499

Source: Derived from crew factors from Thomas, 1986; permit information extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

As previously discussed, the presence or absence of limited entry regulations affects the number and residency of participants in a fishery. As a result, separate tables are presented for the salmon and herring fisheries. Tables 2.4-22 and 2.4-23 show the residency of salmon and herring permit holders for the seine gear type. Permits held by local residents have decreased in the salmon fishery, while the number of permits in the herring fishery have increased. Permits held by other Alaska residents have been relatively stable at low levels, while permits held by out-of-state fishermen have increased in both fisheries.

Table 2.4-22 Residency of Permits Fished in the Salmon Seine Fishery

	Area of Residency			
Year	Gulf of Alaska Region	Other In-State	Out-of-State	Total
1981	939	6	359	1,304
1982	907	5	391	1,303
1983	912	6	361	1,279
1984	855	6	391	1,252
1985	850	6	357	1,213
1986	844	5	368	1,217
1987	868	4	382	1,254
1988	893	2	397	1,292
1989	613	0	300	913
1990	923	2	394	1,319

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.

Table 2.4-23 Residency of Permits Fished in the Herring Seine Fishery

Year	Area of Residency: Gulf of Alaska Region	Other In-State	Out-of-State	Total
1981	312	0	38	350
1982	212	0	40	252
1983	177	0	40	217
1984	205	0	42	247
1985	224	0	42	266
1986	270	1	60	331
1987	268	1	49	318
1988	273	1	60	334
1989	190	0	44	234
1990	321	3	68	392

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1992.

Harvest Levels and Earnings: Harvest levels for both salmon and herring peaked earlier in the decade but increasing prices have resulted in earnings for both species reaching records in 1988. The trend in harvest and earnings is shown in Table 2.4-24. The record earnings for salmon in 1988 were due to unusually high prices for sockeye. The data shown in this table are summed from different area and species data by month and are subject to non-disclosure rules. As a result, the data may understate total harvest levels and earnings by the seine fleet.

Table 2.4-24 Harvest and Earnings in the Gulf of Alaska Seine Fishery

	Salmon		Herring	
Year	Pounds	Total Earnings	Pounds	Total Earnings
1981	292,225,363	$151,558,049	40,693,870	$8,839,448
1982	267,134,047	$92,064,936	33,706,716	$7,078,087
1983	234,624,646	$79,012,383	24,817,720	$8,696,263
1984	309,872,483	$114,822,604	30,637,832	$7,006,506
1985	330,931,309	$112,249,368	37,393,888	$13,821,555
1986	310,122,378	$121,334,742	39,690,346	$16,962,195
1987	196,573,499	$127,498,114	35,743,348	$15,941,231
1988	216,609,784	$234,999,629	48,051,592	$18,396,470
1989	296,942,317	$150,061,432	36,329,502	$5,413,742
1990	319,026,205	n.a.	36,099,766	n.a.

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
n.a. Not available.

Vessel Characteristics : The Gulf of Alaska salmon seine fleet is composed of two relatively distinct subgroups; the 17.68 meter (58 feet) "limit" seiner, so-called because of regulations establishing the maximum length of salmon seine vessels, and smaller 12 to 15 meter (40 to 50 feet) purse or beach seiners which generally fish in shallower waters. The number of seine vessels by size category readily shows the trend to larger seine boats in the industry.

Table 2.4-25 Vessel Size Distribution for Gulf of Alaska Salmon Seine Fleet
(Meters)

Year	Vessel Size										
	<6.1	6.1-12.2	12.3-18.2	18.3-24.3	24.4-30.4	30.5-36.5	36.6-42.6	42.7-48.7	48.8-54.8	54.9-60.9	61.0+
1981	32	671	589		4	1					1
1982	24	606	639	2	2						
1983	18	587	636	2	1						
1984	29	526	660	3	1				1		
1985	25	503	672	2							
1986	39	497	693	2							
1987	38	536	716	3	1	1					
1988	31	530	767	3	1	1				1	
1989	26	282	650		2						
1990	33	474	885	3	2	2					

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Many of the salmon seine vessels also participate in the herring fishery but the size distribution of the fleet is different. There is a higher percentage of larger vessels in the herring seine fleet. There are about 1.9 times more salmon seine vessels in the 12.3-18.2 meter size class than in the 6.1-12.2 meter class in the salmon fleet. There are almost 5 times as many larger vessels in the herring seine fleet.

Table 2.4-26 Vessel Size Distribution for Gulf of Alaska Herring Seine Fleet
(Meters)

Year	Vessel Size										
	<6.1	6.1-12.2	12.3-18.2	18.3-24.3	24.4-30.4	30.5-36.5	36.6-42.6	42.7-48.7	48.8-54.8	54.9-60.9	61.0+
1981	2	148	231	4							1
1982	4	87	225	4							
1983	2	77	289	7							
1984	3	81	342	10	1						
1985	5	84	327	8							
1986	7	116	421	11							
1987	4	102	211	7							
1988	5	91	392	7	2						
1989	8	59	270	3							
1990	18	79	388	5							

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

2.4.1.6 Troll

Troll fishermen use a boat with several poles located in the middle of the vessel to extend and disburse lines. Boats may have hydraulic or electric motors to aid in retrieving the fishing lines. These require a power troll limited entry permit. Vessels without these aids require a hand troll limited entry permit.

The poles are placed upright when traveling and lowered to 45 degrees when fishing. Several stainless steel lines run from the vessel through pulleys or other mechanisms on the poles and then down to the fishing gear. Fishermen use a wide array of rigging depending on the boat and the fish being pursued. A half-dozen or more lures may be attached to a single line by use of clips and/or nylon leaders. The lures typically consist of bright spoons, plugs, or bait, and various combinations of these with flashers. When a salmon strikes, the fishermen brings the line in, unsnapping the empty lures until the hooked fish is brought along side the boat and brought aboard using a gaff. Troll-caught fish have a reputation for quality and ex-vessel prices for troll permits are higher than for other gear types.

Employment and Residency: Table 2.4-27 shows estimated employment levels in the troll fishery for the 1988-1990 time period. The power troll fishery has a crew factor of 1.75 and the hand troll fishery has a crew factor of 1.0. These factors were applied to the number of permits for each type of troll permit.

Table 2.4-27: Employment in the Gulf of Alaska Salmon Troll Fishery

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	Total
1988	200	222	402	406	0	620	2,029	1,884	959	905	306	193	677	8,125
1989	124	212	263	350	3	1,366	1,937	1,812	1,135	540	191	143	673	8,073
1990	178	154	330	331	3	1,244	2,003	2,006	1,525	605	173	99	721	8,650

Sources: Derived from Thomas, 1986 and data extracted from files provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Table 2.4-28 shows the residency of permit holders with salmon troll permits. The number of permits fished has declined over the years because some non-transferable hand troll limited entry permits have been revoked. These permits can be revoked due to death of the permit holder or failure to register the permit for two consecutive years. The hand troll salmon fishery is often economically marginal and permit holders will often not participate in poor years. As a result, the number of permits fished can vary substantially.

Table 2.4-28 Residency of Permits Fished in the Salmon Troll Fishery

	Area of Residency			
Year	Gulf of Alaska Region	Other In-State	Out-of-State	Total
1981	1,765	10	273	2,048
1982	1,715	8	282	2,005
1983	1,543	6	251	1,800
1984	1,479	3	265	1,747
1985	1,594	6	288	1,888
1986	1,485	11	280	1,776
1987	1,451	14	267	1,732
1988	1,508	14	223	1,745
1989	1,383	12	235	1,630
1990	1,411	16	257	1,684

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
n.a. Not available.

Harvest Levels and Earnings: Harvest levels for the troll fishery had small increases over the 1981 through 1984 period, and then jumped considerably in 1985 and peaked in 1986. Catches then declined to 8.4 million pounds in 1988, the lowest harvest experienced over the last 8 years. Even though 1988 was a poor year for catches, record high prices resulted in total earnings reaching historic highs. Harvests increased to near record levels in 1989 and 1990.

Table 2.4-29: Harvest and Earnings in the Gulf of Alaska Troll Fishery

Year	Pounds	Total Earnings
1981	12,497,014	$18,963,637
1982	14,423,174	$23,702,820
1983	14,354,441	$15,612,292
1984	14,704,555	$25,731,379
1985	17,812,025	$24,172,434
1986	19,886,456	$27,335,815
1987	12,627,876	$24,325,569
1988	9,425,093	$28,366,261
1989	19,283,866	$22,650,279
1990	19,240,292	n.a.

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
n.a.: Not available.

Vessel Characteristics: The economics of the hand troll and power troll permits results in differences in the composition of these two sub-fleets, with the power troll fleet having larger vessels. In 1990, 19 percent of the hand troll fleet was in the 0-6.1 meter (0-19 feet) category, 74 percent was in the 6.1-12.2 meter (20-39 feet), and 6 percent was in the 12.3-18.2 meter (40-59 feet) class. The power troll fleet had less than 1 percent in the smallest class, 56 percent in the 6.1-12.2 meter (20-39 feet) category, and 43 percent in the 12.3-18.2 meter (40-59 feet) category.

Table 2.4-30: Vessel Size Distribution for the Gulf of Alaska Salmon Troll Fleet

	Vessel Size (meters)										
Year	<6.1	6.1-12.2	12.3-18.2	18.3-24.3	24.4-30.4	30.5-36.5	36.6-42.6	42.7-48.7	48.8-54.8	54.9-60.9	61.0+
1981	344	1,244	362	3	3	1				1	
1982	295	1,224	392	4							
1983	258	1,179	329	1							
1984	218	1,124	369	3	1		2				
1985	222	1,185	438	1		1					
1986	197	1,170	431	2							
1987	166	1,165	420	2							
1988	158	1,212	405	2	1			1		1	
1989	138	1,094	415	2							
1990	149	1,120	477	7	1						

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

2.4.2 Joint-Venture Fleet

The joint-venture fishery has been totally displaced by domestic operations since 1989 in the Gulf of Alaska. The following section provides a brief history of the joint-venture fishery in the Gulf of Alaska. No information is provided at the community level.

2.4.2.1 Harvesting and Operating Mode

The joint-venture operation involved U.S. flag catcher boats, primarily trawlers, delivering their catch to foreign flag processing ships at-sea. The typical operation has the catcher boat detaching the cod end (which contains the fish) from the trawl net and towing the cod end to a processing ship. The catcher boat attaches the cod end to a cable from the processing ship which is dragged astern. The transfer is completed by the processing ship bringing the cod end on board for processing.

for delivery to shore based plants. Other characteristics were similar to the domestic catchers trawler fleet.

The joint-venture processing ships were large, foreign owned vessels used exclusively as floating processors. They were typically older vessels that operated since the 1960's or even earlier. The vessels used in the yellowfin sole joint-venture for example, were typically Bolshoi Morpzhini Rybolovny Trawlers (BMRT class large freezer fishing trawler) from the U.S.S.R. They were 278 feet in length and 3100 gross weight tons. Japanese, Korean, Taiwanese and other foreign factory processing ships were similar size or larger.

2.4.2.2 Employment and Residency

Table 2.4-31 uses the total number of permits issued for joint-venture operations (Alaska Commercial Fisheries Entry Commission, 1990) and uses a median crew factor of 4.0 for trawl vessels (Thomas, 1986) to estimate employment. Trawl gear represents the vast majority of vessels engaged in joint-venture operations, although joint-venture permits were issued to longline vessels in 1986 (Terry, Kinoshita, and Brooke, 1990). The decrease in joint-venture activity is readily apparent from this table.

Table 2.4-31: Employment in the Gulf of Alaska Joint-Venture Fishery

Year	Month													Total Crew Mos.
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	
1986	0	28	48	4	8	8	0	12	24	24	24	28	17	208
1987	0	0	4	0	0	0	0	4	8	24	12	0	4	52
1988	4	4	0	0	0	4	12	12	0	0	0	0	3	36

Table 2.4-34 shows the residency of holders of joint-venture permits which were fished during the 1986-1988 time period.

Table 2.4-32: Residency of Permits Fished in the Joint-Venture Fishery

Year	Area of Residency: Gulf of Alaska Region	Other In-State	Out-of State	Total
1986	16	0	46	62
1987	9	0	34	43
1988	5	0	2	7

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

2.4.2.3 Harvest Levels and Earnings

Table 2.4-33 shows harvest levels and earnings for the joint-venture fleet for the 1986-1988 time period. The joint-venture fishery harvest peaked in 1987 although earnings were higher in 1988. As domestic processing capacity continues to increase, joint -venture catches will cease.

Table 2.4-33: Harvest and Earnings in the Gulf of Alaska Joint-Venture Fishery

Year	Pounds (thousands)	Total Earnings (thousands)
1986	65,198	$7,049
1987	32,425	$4,605
1988	a	a

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
[a] Not disclosed.

2.4.2.4 Vessel Characteristics

Table 2.4-34 shows the size distribution, and total number of joint-ventures operating in the Bering Sea for the 1985 through 1987 time period. The size categories for joint-venture boats contained in the CFEC data bases provided to MMS are 0 to 75 feet (0 -22.8 meters), 76 to 100 feet (22.9 - 30.5 meters), 101 to 125 feet (30.6 - 38.1 meters), and greater than 126 feet (>38.2 meters).

Table 2.4-34: Vessel Size Distribution for the Gulf of Alaska Joint-Venture Fleet (Meters)

Year	Number of Vessels by Size				Total
	<22.8	22.9-30.5	30.6-38.1	>38.2	
1986	3	24	29	6	62
1987	1	15	22	5	43
1988	0	7	0	0	7

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

2.4.3 Foreign Fleet

Foreign fishing in Alaskan waters began as early as 1929 when Japanese fishermen began to explore the Eastern Bering Sea. However, these operations were minor in comparison to the volumes of resources harvested in the present fisheries. Since the mid-1950's when the Japanese and then the Soviets rapidly expanded their fishing efforts in the Bering Sea, foreign nationals have predominantly harvested the available resources. Not until recent years have U.S. domestic and joint venture fisheries taken a significant portion of the catch.

The era of foreign groundfish fisheries within the 200-mile FCZ off Alaska ended on December 31, 1987 when the North Pacific Fishery Management Council ended foreign directed fishing allocations. Foreign harvesting vessels will no longer be permitted to operate within the study area boundaries and, subsequently, a discussion of these vessels is not warranted.

No directed foreign fishing allocations were made for the 1988 or subsequent fishing seasons. With the cessation of joint-venture operations, future participation by foreign firms in the Gulf of Alaska fishing industry will entail additional direct investment in U.S. owned fishing companies or shore based processing plants. In recent years, foreign firms have provided a large share of capital for the factory trawler fleet to ensure access to the resource.

2.5 Processing Sector

The Gulf of Alaska processing sector is composed of two different groups which operate within the region: 1) Domestic shore-based facilities, and 2) domestic floating processors and harvester/processors. Foreign floating processors have operated in the region in the past but are being phased out of the fishery and do not represent a significant part of the industry at this point in time.

Seafood resources from the Gulf of Alaska may be transported to processing facilities outside the region (e.g., British Columbia or product frozen in the round and exported). In some years, these exported resources may account for a significant amount of the annual product from such plants. These facilities are not discussed here.

2.5.1 Shore-based Processors

2.5.1.1 Organization and Structure

Many of the shore-based processing plants in the study area have had a long history of operation in the area. The first fish processing activity in the State of Alaska for export was founded by the Russian's on the Kasilof River. Several of the plants in the Alaska Peninsula and Aleutians started in the late 1890's as cod stations. Those early plants processed Pacific cod delivered to the plants by a dory fleet of longliners. As the cod populations declined in the 1920' and 1930's, the plants and the fishermen concentrated on other species primarily salmon. Over the years, many fisheries have come and gone. In the region, a shrimp fishery began in the mid 1970's then died after several years of frantic growth as the shrimp population disappeared. King crab became the base of the many plants in the mid and late 1970's and plants had to move on to other species as the king crab population crashed in 1980. Crab fishing and processing in the Gulf of Alaska now focuses on bairdi tanner crab and Dungeness crab.

•Shore-based plants in the study area began to process Pacific cod and other groundfish in the early 1980's. They have quickly evolved sophisticated processing facilities for groundfish fillets, fish meal and surimi.

There has been a gradual trend to centralization in processing plants. Early in the history of the salmon industry, canneries were located wherever the salmon were. Without refrigeration, the quickly perishable product had to be caught close to the plants. With chilled seawater holding tanks and much faster boats, processing companies have been able to locate in central locations, thus concentrating their investment. With shortened seasons due to increased effort levels, shore-based plants have to diversify in order to maintain high levels of capacity utilization Another trend for processing plants within the study area, as for Alaska as a whole, is foreign ownership of the companies. Many of the companies in the study region have some degree of foreign equity ownership, and several are almost totally foreign owned. For the foreign owners, who are primarily Japanese companies, the purpose of their investment is to maintain some control over the processing and shipment of the product to Japanese market channels. Since much of Alaska's fishery products are shipped to Japan, the vertically-integrated Japanese companies have a strong market advantage.

Processing companies in the study area have had to be flexible in their operations. As fisheries for some species declined, companies had to scramble at times to diversify into new species and products.

Industry organizations for the processing companies include the Pacific Seafood Processors Association. PSPA is a long established association of salmon and crab processing companies working together on management, legislative and other issues of interest to their members. The Southwest Coalition, a new association of shore-based processors, was formed to work with the onshore-offshore issue. On the other side of this issue is the Alaska Factory Trawlers, a Seattle-based group, primarily made up of factory trawlers of large processing ships. These organizations represent the interests of their members, primarily with the North Pacific Fishery Management Council, due to the importance of allocation issues.

Fishermen's cooperatives have been established in certain areas of the region to compete with the traditional processing industry. The growth of these cooperatives has been most successful in Prince William Sound although cooperatives do exist in other areas.

2.5.1.2 Employment and Earnings

Employment: Seafood processing employment is covered under state unemployment laws which require employers to submit reports of monthly employment and quarterly payroll. As a result, employment estimates for the shore-based seafood processing sector are more reliable and accurate than those derived for the harvesting sector. However, floating processors operating beyond the 4.83 kilometer (3 mile) limit of state statutory authority, are not subject to these reporting requirements, and the Alaska Department of Labor contends that a number of floating processors which operate within the boundary do not comply with the regulations. Subsequently, total domestic processing employment in the Gulf of Alaska is understated in most publications. These estimates do, however, provide a reasonable estimate of employment in shore-based processing plants.

The Alaska Department of Labor has estimated seafood processing employment for the Southeast, Gulf Coast, and Anchorage regions and undetermined locations for the 1981 through 1989 period. Undetermined locations are included in this analysis because in the early 1980's these employees were arbitrarily placed in the Anchorage region. Undetermined employment averages 100 to 150 persons in winter months, and approximately 300 persons during the summer. Table 2.5-1 shows employment for the three regions.

Table 2.5-1: Southeast, Gulf Coast, and Anchorage Seafood Processing Employment

	Month												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
1981	2,747	2,853	3,896	5,598	5,962	7,346	12,319	10,788	8,433	6,361	4,959	4,270	6,294
1982	2,586	3,251	3,976	4,025	4,939	6,849	12,416	12,183	8,746	5,317	3,545	3,228	5,922
1983	2,161	2,739	3,672	3,740	4,565	6,457	11,733	11,598	8,080	3,560	3,013	2,749	5,339
1984	1,943	2,079	2,922	3,216	4,157	6,338	11,229	10,430	5,718	3,061	2,883	2,271	4,687
1985	1,786	2,455	2,600	3,382	4,779	6,514	11,899	12,448	8,174	3,185	2,296	3,981	5,292
1986	2,701	3,260	3,237	4,142	5,706	5,281	10,527	11,107	7,026	4,670	3,755	3,289	5,392
1987	3,109	3,700	4,060	4,985	6,154	7,262	11,023	10,154	5,888	5,066	3,787	3,605	5,733
1988	4,027	4,439	5,415	5,157	5,758	8,287	12,898	12,401	8,845	5,115	4,341	4,180	6,739
1989	4,258	4,726	5,267	6,369	6,861	8,850	11,981	12,115	7,168	5,758	4,061	3,719	6,761
1990	2,533	2,869	3,432	4,987	5,427	7,301	10,792	10,338	6,593	3,714	3,401	3,122	5,376
1991	3,104	3,625	3,804	4,789	6,095	6,897	11,473	11,136	7,614	3,672	2,771	2,658	5,637
1992	2,120	3,083	3,448	4,117	4,411	6,852	11,483	9,856	6,971	4,172	2,658	2,545	5,143

Source: Stinson, 1991; and Fried, 1993.

Residency: According to the Alaska Department of Labor (Alaska Department of Labor, n.d.), the seafood processing industry had the largest percent of total wages going to nonresidents of Alaska. Over 50 percent of the workforce in the Aleutians East, Bristol Bay, and Aleutians West regions were nonresidents. Throughout the State, nonresidents accounted for over 51 percent of food processing employment and 48 percent of annual earnings.

Table 2.5-2 presents information for the manufacturing sector in each of the census areas where a study community is located. Although other industries besides seafood processing are included in the manufacturing sector, seafood processing is the dominant industry in most of these areas, and the estimates shown below are representative of the processing industry in the study area.

Table 2.5-2: Resident and Nonresident Total Wages and Employment for the Manufacturing Sector by Census Area, 1988
(Wages in thousands)

	Wages		Employment	
Census Area	Resident	Non-resident	Resident	Non-resident
Kenai Peninsula	$9,918	$3,441	3,299	1,458
Kodiak Island	$15,002	$6,343	2,120	1,691
Valdez-Cordova	$11,418	$8,170	1,863	1,722
Skagway-Yakutat-Angoon	$6,458	$2,604	568	334
Aleutians East	$7,019	$15,484	939	2,379
Aleutians West	$9,371	$10,516	740	1,468

Source: Alaska Department of Labor, n.d.

Operating Characteristics Gulf of Alaska onshore processing plants can be divided into those which primarily process salmon, and those that handle multiple species. A number of the former plants will also handle herring and halibut, but few other species. The latter plants often started by handling salmon, expanded into crab, and have since evolved into groundfish processing. There are also smaller plants which process fish for smoking and other value-added activities but these handle a small share of the resource.

The typical salmon-based plant will operate 180 days per year, starting with herring in April or May and ending with coho processing in September. Larger plants that also process groundfish may operate year-round. Peak periods for plants that process significant amounts of salmon will be in the summer while plants that process large amounts of crab or groundfish may experience peaks in winter months.

Maximum employment in these plants ranges from 130 to 250 persons. During the peak of the salmon runs (1 to 1.5 months), about 80 percent of employees will be processing line workers and the balance will be support staff in such occupations as management, clerical and administrative, machinists, and plant operating engineers. During the off-peak months, employment will drop to 20 to 60 employees, and the proportions of workers changes to about 60 percent line workers and 40 percent support staff. In 1987 the average hourly wage for processing workers was reported as $5.50 per hour, with support staff earning from $7.00 to

$12.00 per hour. Average hourly wages for all cannery workers in southwest Alaska increased to $6.19 in 1990 (Fried, 1990b). Additional detail by type of worker is not available.

After the botulism scare of the early 1980's, and with increased Japanese demand for frozen domestic salmon after their displacement from the U.S. EEZ, most of the salmon processing plants replaced their canning lines with freezers, or added freezing capability to their plant. In a similar fashion, those plants which are in proximity to other resources have begun to expand their operations to process other species. These other species (e.g., crab, halibut, and sablefish) are handled during the off-peak salmon season and represent a relatively small amount of the volume and value handled during the year. However, this diversification does offer better utilization of the plant and labor which is often under-utilized during these slow periods.

The major groundfish processing plants in the Gulf of Alaska are located at Unalaska/Dutch Harbor, Kodiak, and Akutan. Akutan is not one of the communities studied in this report. Expansion into groundfish occurred with displacement of foreign processing capacity. A typical groundfish processing plant will have two or three lines, often in separate buildings. Salmon and crab are part of their product mix which also includes surimi and other groundfish.

These large, multi-line plants operate all year, although each line may be closed for certain periods due to regulatory openings for certain species, or for equipment maintenance. Surimi lines are typically closed for the months of April and May. Plant managers suggested that pollock yields are lower after spawning, and that the fish scatter from the spawning schools and move from midwater to the bottom after this period which increases the number of boats required to keep the plants operating at capacity.

Employment at these plants ranges from 180 to 425, although current expansion at one plant will result in employment levels in excess of 600 persons. About 70 percent of employees are line workers with the balance as support staff. Line workers are generally employed for 6 months contracts. Support staff are often residents of the community, or long-term employees with the company who have extended rotations between the plant and their home. Line workers receive about $5.50 per hour and with overtime average about $1,800 per month. Support workers receive $9.00 to $12.00 per hour and earn $2,600 to $3,200 per month.

2.5.2 Domestic Floating Processors

The domestic at-sea processing industry is composed of two segments: Vessels that only process fish or shellfish, which are often called motherships since they must associate with a group of smaller catcher vessels; and catcher/processors which are vessels that harvest and process while at sea.

The recent buildup of a fleet of domestic floating processors oriented to the Alaska groundfish industry has resulted in a number of articles which, in general, suggest that at-sea processing is a relatively new phenomenon in the industry. Floating processors and catcher/processors have operated in the Gulf of Alaska Sea for a number of years, principally for the traditional salmon and crab fisheries. A portion of the crab fleet is composed of catcher/processors, and floating processors or motherships operate in False Pass, and other management areas where salmon runs are significant. Table 2.5-3 shows the number of dedicated processing vessels and harvest/processor vessels over the past few years. Published data on the number of crab and salmon processing vessels operating in the Gulf of Alaska are not available.

The decreasing number of salmon floating processors is due to increasing efficiencies and improvements in fish heading and gutting equipment, and freezers. This has reduced the number of vessels necessary to handle large volumes of salmon and also reduced the crew sizes on the ships. The recent increase in crab vessels is primarily associated with conversion of inexpensive oil rig supply boats, and the displacement of foreign and joint-venture fleets has occurred with expansion of domestic groundfish processing capacity, both at-sea and on-shore.

2.5.2.1 Organization and Structure

Floating processors have varying types of company organizations, depending on the fishery in which they are primarily involved. Floating salmon processing ships are typically owned and operated by the major salmon processing companies. These vessels can either operate on their own or add additional processing capacity to one of the firm's existing shore-based capacity, as required.

Table 2.5-3: Number of Processing Vessels by Major Species

	Salmon	Crab		Groundfish	
Year	Processor[a]	Catcher/ Processor[a]	Processor[a]	Catcher/ Processor	Processor
1986	52	46	18	11	1
1987	48	47	23	15	1
1988	41	55	20	27	1
1989	40	46	24	40	4
1990				39	10

Sources: Groundfish data from Kinoshita et al. 1991; salmon and crab data from Smith, 1990.
[a] These figures are for vessels that operated throughout State of Alaska waters.

The newly developed floating groundfish processors and factory trawler fleet are primarily new firms, many with foreign financing. There are several 'traditional species' processing companies that have developed factory trawlers, but they are in the minority. Another route into the factory trawling fleet was by successful joint-venture operations that used their market contacts and expertise gained in the joint-venture fisheries to launch into new operations.

Many floating crab processing vessels are owned by the major companies, such as Icicle Seafoods. Others are owned by crab fishermen who moved up to larger boats following successful operations in the late 1970's.

The most visible organization for factory trawlers is the American Factory Trawlers Association. They are involved in lobbying, research and member support for approximately 50 of the large vessels in the fishery.

2.5.2.2 Operating Characteristics

There are a wide variety of domestic vessels processing various species throughout the Gulf of Alaska. Floating processors, or "motherships", have more in common with other vessels of this type than they do with catcher/processors which focus on the same species. The following paragraphs describe the operating characteristics of floating processors followed by catcher/processors.

"Floaters," as they are often called, generally anchor in protected waters and receive crab, salmon, and certain groundfish from smaller catcher boats. Dedicated surimi boats and other large groundfish floating processors usually operate at-sea and receive trawl net cod-ends from catcher boats. Larger catcher/processors will also operate in this manner during times of the year when fish are widely distributed and the vessel cannot catch its processing capacity.

These large vessels remain at sea for extended periods of time and it is not unusual for them to visit port only once in two or three months. Needed supplies are brought from various ports by the catcher boats, crew changes are made by airplane and catcher boats, and product is transferred onto tramp steamers and other cargo ships in protected waters.

Catcher/processors are generally smaller ships although the larger boats of this vessel category exceed the smaller floating processors in size. Most of the catcher/processors operating in the Gulf of Alaska use trawl gear, although longline and pot gear are also employed. Many of the vessels using longline gear also use pot gear since the deck equipment can generally handle both types of gear with little effort.

These vessels are capable of remaining at sea for several months at a time but limited freezer storage typically requires them to unload product every 20 to 24 days (Beeman, 1989). These vessels do unload at-sea or in protected bays to tramp steamers, but since their endurance is generally not as long as the larger floating processors, many of them call at Unalaska/Dutch Harbor where a number of tramp steamers lay at anchor to receive product. They can combine product unloading with refueling, replenishment of other supplies, and crew changes.

When the vessels come into port, they are interested in getting in and out of port as quickly as possible since they are not producing unless they are fishing. They off-load product, a portion of the crew, and garbage. They take on new crew members, water, supplies (including large amounts of packaging materials), and fuel. Any temporary repairs that cannot be handled at sea are completed while in port. Vessels typically return to the Seattle area once a year for major repairs and system overhauls.

2.5.2.3 Employment and Residency

In attempting to determine total employment for domestic factory trawlers, Thomas (1986a) estimated that an average sized factory trawler employs a ship's crew of four to six persons, and about 10 employees per shift on a fillet, headed & gutted, or surimi line, for a total of 24 to 26 persons.

A survey conducted by R & M Consultants (1986) contacted over 100 fishing vessels in Unalaska/Dutch Harbor during the summer of 1986. The survey found that groundfish factory trawlers had a range of 23 to 44 crew members, with an average of 32 for the four vessels contacted. The two mothership processors that were contacted had crew sizes of 81 and 120 persons (average of 100), and 8 crabber/processors had a range of 6 to 44 persons with an average crew size of 15. The one longliner/processor was surveyed in Unalaska/Dutch Harbor during this survey had a crew of 12 persons.

Wiese and Burden (1988) contacted a number of companies involved in the groundfish industry and estimated average crew sizes of 30 persons for a 45.7 to 60.9 meters (150 to 200 feet) groundfish factory trawler, 60 persons for a 60.9 to 76.1 meters (200 to 250 feet) factory trawler, and 60 persons for a 76.1 to 106.6 meters (300 to 350 feet) surimi factory trawler. More recent survey work by NMFS resulted in a crew size of 40 persons for factory trawlers involved in headed and gutted product which are typically the smaller (< 60.9 meters or 200 feet) (Baldwin, 1990). Newer entrants into this segment of the fleet have crew sizes around this 40 person average (Arctic Alaska Seafoods, 1988).

Table 2.5-4 uses estimates of 40 crew members for groundfish factory trawlers of less than 60.9 meters (200 feet) in length, 60 persons for vessels 60.9 to 76.1 meters (200 to 300 feet) in length, and 100 for vessels greater than 76.1 meters (300 feet). Groundfish floating processors are also estimated to have crews of 100 persons, while crab processors are estimated to have crews of 60 persons. Crabber/processors are estimated to have an average crew of 20, and longline catcher/processors are estimated to have a crew of 16 (North Pacific Fisheries Management Council, 1989b). Data are not available to permit monthly estimates of activity for salmon and crab processors or catcher processors, so Table 2.5-4 reflects maximum employment, assuming that all vessels were operating at the same time.

Table 2.5-4: Employment for At-Sea Processors and Catcher/Processors

Species/Vessel Category	# of Vessels	Crew Size	Employment
Crab			
Processor	46	60	2,760
Catcher/Processor	24	20	480
Groundfish			
Processor	10	100	1,000
Catcher/Processor			
Trawl Gear			
< 60.9 meters (200 feet)	35	40	1,400
60.9 - 76.1 meters (201-300 feet)	3	60	180
> 76.1 meters (300 feet)	1	100	100
Longline & Pot	8	16	128
Salmon Processor	40	100	4,000

Sources: Crab and salmon processing vessel figures from Smith, 1990; groundfish vessel size distribution estimated from Snyder, 1989.

Information on residency of crew members for domestic floating processors and catcher processors is limited to descriptions in several trade journal articles and interviews with several vessel captains. This data base is not large enough to extrapolate the findings to the entire processing fleet, but suggests that the vast majority of crew on these vessels are from the home port of the vessel, which is generally Seattle. One company which provides employees for factory trawlers estimates that 25 percent of the crews are Alaska residents and the balance are from other states (Dahlen, 1990).

2.5.2.4 Vessel Characteristics

Table 2.5-5 presents information on vessel sizes for catcher/processors permitted in the U.S. marine waters of Alaska. Agency data bases provided to MMS do not distinguish between catcher boats and catcher/processors for the various gear types, and other sources of the information were not identified. The factory trawler fleet has undergone the most dramatic expansion in the past few years and has attracted the most attention from industry and government analysts. As a result, there is limited information available on other segments of the processing fleet.

Table 2.5-5: Vessel Size Distribution for Catcher/Processors in Alaska Waters,

Meters	<20	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	100+	Total
Number	37	17	12	24	31	13	3	4	3	2	133

Source: Snyder, 1989.

2.6 Other Fishery Development and Marketing Issues

The harvesting sector in Alaska has more than adequate capacity to harvest all of the fishery resources available. The impetus to invest in new boats and equipment continues as the competitive environment forces fishers to upgrade in order to increase, or even maintain their share of the harvest. This overcapitalization of the industry is well documented and various management agencies have investigated methods to control the harvest sector, particularly in the groundfish and crab fisheries over the last few years. An individual fishing quota (IFQ) system is due to go into place in the spring of 1995 for halibut and blackcod. This effort is expected to alleviate some of the pressure in those fisheries and provide experience to gauge the likely outcome of IFQ's or other management systems for other groundfish and crab fisheries..

In addition to the technology that fishers are applying to remain competitive, they are also investigating methods to avoid seasonal closures due to prohibited species caps (PSC). Over the last several years management quotas for trawl caught rockfish and certain flatfish species have not been reached because these fisheries have been closed when the harvest sector has exceed established limits of other species while targeting rockfish and flatfish. The industry is investigating alterations in trawl gear and time and area closures to reduce the bycatch of prohibited species. Similar situations can affect the longline fisheries also.

The processing sector is also facing issues that must be dealt with in the near future. A number of established fishing communities have long had problems with water quality near seafood processing plant outfalls. Water quality regulations are forcing plants to reevaluate the economics of converting wastes to fish meal, bone meal, and fish oil. Seasonal and low-volume operations may have difficulty with the economics of such a facility and may face expensive barging of wastes to approved dumping sites in deeper waters with better circulation.

The Alaska Fishery Development Foundation and the Alaska Seafood Marketing Institute are working to promote to promote new market forms for salmon and other species. These include salmon nuggets, skinless/boneless salmon fillets, and salmon blocks for institutional markets. Other efforts to develop new markets and new product forms include retort packs of smoked salmon, flatfish fillets, and individually quick frozen pink salmon, a species that has typically been canned. In addition to adding value to the raw product and increasing margins with these new products, processors hope to extend their operating season, or at least minimize the time when the plant is not being used effectively in order to contribute to spreading their fixed costs over a larger volume of product, and enable them to attract and keep trained processing plant employees. Achieving year-round operations may require resolution of the prohibited species problem discussed above.

In the Commercial Fishing Industry of the Bering Sea (Northern Economics, 1990) it was noted that some processing capacity had been established in the Pribilof Islands and the fishing industry model called for additional growth in the Pribilof Islands' share of processing capacity in the Bering Sea. A similar shift has been noted in the Gulf of Alaska, primarily in Prince William Sound (PWS). Cordova was the premier processing community in the Sound for decades with only very small plants existing in Valdez and Whittier. The development of Prince William Sound Aquaculture Corporation and Valdez Fisheries Development Association hatcheries in western PWS have placed Valdez and Whittier in closer proximity to the large resource offered by those hatcheries and new plants have developed in those communities. Similar changes are noted in the growth of King Cove and Sand Point although the change is not as readily evident for those two communities.

Growth of the non-profit aquaculture associations has also altered the traditional role of hatcheries in Alaska. The cost-recovery programs of these organizations have resulted in them becoming major harvesters with strong bargaining positions relative to local processors. As a result, they are able to obtain higher prices than local fishermen for salmon.

3. CHARACTERISTICS OF GULF OF ALASKA FISHING COMMUNITIES

3.1 Regional Settings

Eight communities have been selected for the purpose of evaluating their relationship to Gulf of Alaska fisheries: Cordova, King Cove, Kodiak, Kenai, Homer, Seward, Unalaska, and Yakutat (See Figure 1.3-1). The selection of these particular communities is based partially on their participation in previous Socioeconomic Studies Program studies, which provides both a comprehensive data base for this study and an opportunity to compare results with previous investigations. There are similarities and striking differences between many of the communities; these are briefly summarized in the regional descriptions presented in sections 3.1.1 through 3.1.3. However, they have in common a certain degree of reliance on commercial fishing.

The focus of this section of the report is to evaluate selected community characteristics in order to understand community interaction with commercial fishing in the Gulf of Alaska: both the role the community plays in supporting fishing and the impact of fishing on the communities. In addition to a brief description of setting and history (mainly as it relates to commercial fishing), socioeconomic, infrastructure, and fishing industry characteristics are described for each community. Through an understanding of community-fishing industry interaction, this study will attempt to translate fisheries forecasts for the Gulf of Alaska into affects on the eight study communities.

3.1.1 Western Gulf of Alaska

The Alaska Peninsula/Aleutian Islands/Kodiak Island group contains three of the communities of the study area: King Cove, Kodiak and Unalaska/Dutch Harbor. Commercial fishing, processing and support industries dominate the economies of these communities by providing employment and income, and, in most cases, the basis for the majority of municipal revenues (sales tax, property tax, and raw fish tax revenue sharing). Compared to the other two study areas, the Kenai Peninsula and the eastern Gulf of Alaska, the fisheries of this region are diversified, occur year around, and see a high rate of participation by the local workforce in either fishing or fish processing. These communities have weathered changes in both the fisheries and in state revenue sharing.

Some differences exist. King Cove for example, has significant fish processing but permit holder and crew employment is the major indicator of commercial fishing influence; residents have largely shunned processing employment. However, it is a small community with an economy that revolves around commercial fishing. Kodiak on the other hand, has a well developed fishing and support service sector. In addition, Kodiak serves as a regional hub and is the center of the Kodiak Island Borough. Unalaska is in a period of transition, expanding from a fish processing center, to a hub that services the American catcher/processor fleet, and transships cargo between the west coast and the Pacific Rim and other parts of the Aleutians and western Alaska.

3.1.2 Central Gulf of Alaska

Three of the eight communities in the study area are located on the Kenai Peninsula. There are two major commercial fisheries, salmon and halibut, although rockfish, sablefish, and other bottomfish are becoming more important in Homer and Seward. Compared to the more diversified fisheries of the Alaska Peninsula/Aleutian Islands/Kodiak Island, these fisheries are highly seasonal, and revenue and employment in fisheries are dominated by the commercial salmon and related processing industries. However, with the possible exception of Kodiak, the economies of the Kenai Peninsula communities are more diversified than other study area communities, and the relative contribution of fishing and fish processing is less important. The contribution of fishing to sales tax revenues is minor.

3.1.3 Eastern Gulf of Alaska

The eastern Gulf of Alaska communities (Cordova and Yakutat) have more in common with southeast Alaska than with the other two regions. They are geographically isolated and not part of a borough or cohesive region like Kodiak and King Cove. Commercial fishing is not as diversified as in the western Gulf of Alaska, and revolves around salmon and herring. Economic activity and population reflect the seasonal importance of salmon and herring fisheries. Local, state and federal government employment are important contributors to full-time wage employment.

3.2 Cordova

3.2.1 Description/Setting

The City of Cordova occupies 6.35 square miles between Orca Inlet, Eyak Lake, and Mount Eyak on the eastern edge of Prince William Sound. The City lies 160 miles southeast of Anchorage, 411 miles from Juneau, 50 miles southeast of Valdez, and 25 miles west of the Copper River. The Inlet is separated from Price William Sound by Hawkins Island and the island protects Cordova from much of the severe weather of the Gulf. There are daily jet flights between Cordova and Anchorage and Juneau. Rugged terrain surrounds Cordova. Mountains ranging in height from 3,000 to 6,000 feet frame the city to the east, west, and north. The community is nestled at the foot of Mount Eyak upon slopes in excess of 15 percent. Cordova has a maritime climate, characterized by cool summers, and mild winters. Its proximity to both water and mountains result in 167.68 inches of precipitation a year. Approximately 81 inches falls in the form of snow.

The city's proximity to the Copper River Delta and Prince William Sound makes it the launching place for trips to both popular locations. The town is surrounded by the Chugach National Forest, and Native lands owned by the Eyak Corporation and Chugach Alaska Inc.

3.2.2 Socioeconomic Characteristics

3.2.2.1 Local Economy

Historically, Cordova was the terminus of the Copper River Railroad and it's economy relied on massive amounts of copper coming from the Kennicott mine. Cordova served as a transportation and transshipment center for the mine until the mine shut down in 1938. At that point, commercial fishing and fish processing, industries present earlier, became the preeminent industries for the area. Local, state and federal government also contribute to the economy; the Alaska Department of Fish and Game and Chugach National Forest have offices located in Cordova.

Commercial fishing has historically employed many in Cordova. Fishermen go to Prince William Sound to harvest a wealth of resources. Fisheries in the Cordova area include five salmon species, king crab, tanner crab, shrimp, Dungeness crab, razor clams, halibut, herring roe, and herring. Salmon and herring dominate the fishing economy in terms of income. As a result the primary periods of fishing activity are April through September, and many fishermen leave town after the closing of the silver salmon season. In recent years, low salmon prices have affected both the harvesting and processing sectors. Tourism also contributes to employment in Cordova. Sportsmen come in search of black and brown bear as well as moose, mountain goat, Dall Sheep and deer. The Copper River Flats ranks as one of the State's best bird hunting. The river also provides a wide range of fish species including salmon, halibut, flounder, Dolly Varden, cutthroat and rainbow trout. Scenery also attracts visitors to Cordova. Several charter companies operate out of the city offering flights to the Columbia and Bering Glaciers. Eyak Corporation, the village ANCSA corporation, has recently begun logging lands near Cordova.

3.2.2.2 Population

Table 3.2-1 shows the population of Cordova from 1980 through 1992. The population estimates shown here and in subsequent sections for other study communities are based upon estimates by the Alaska Department of Labor. The population increased 32 percent between 1980 and 1990.

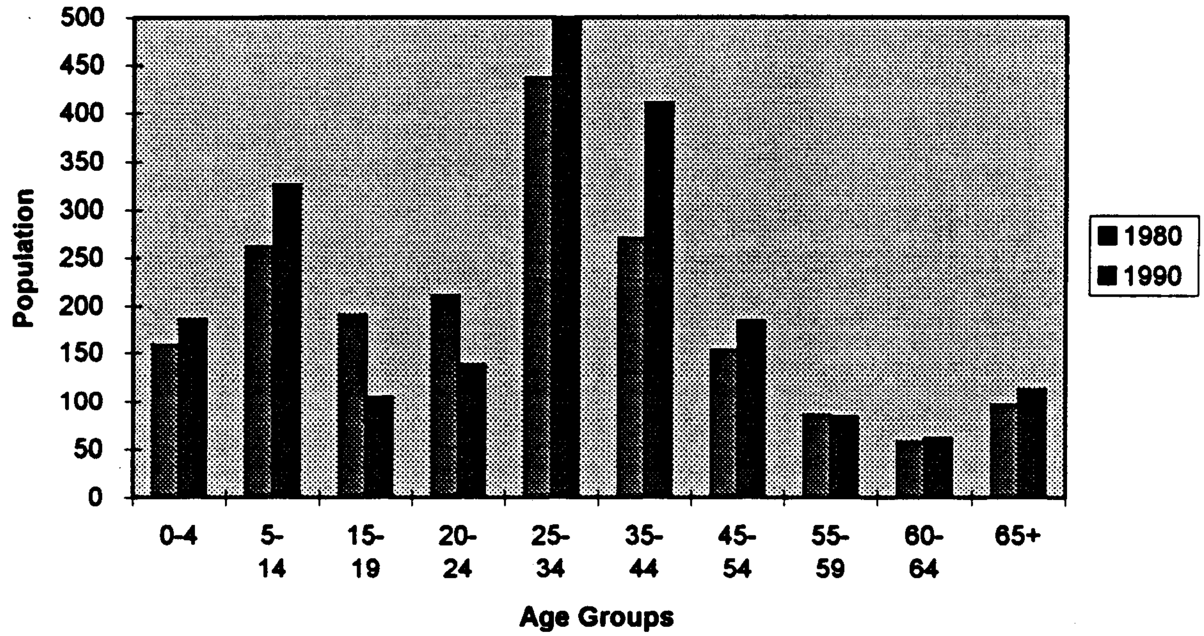
Table 3.2-1: City of Cordova Population, 1980-1992

Year	Population
1980	1,879
1981	2,223
1982	2,244
1983	2,282
1984	1,998
1985	1,901
1986	2,053
1987	
1988	2,048
1989	1,934
1990	2,110
1991	2,171
1992	2,487

Source: Alaska Department of Labor, 1993a, 1993b and 1994.
Note: The Alaska Department of Labor did not publish place estimates in 1987.

Figure 3.2-1 and Table 3.2-2 show the age characteristics of Cordova during the 1980 and 1990 Census.

Figure 3.2-1: City of Cordova Population Age Distribution, 1980 and 1990



Source: U.S. Department of Commerce, Bureau of the Census, 1981 and 1991.

Table 3.2-2: City of Cordova Population Characteristics, 1980 and 1990

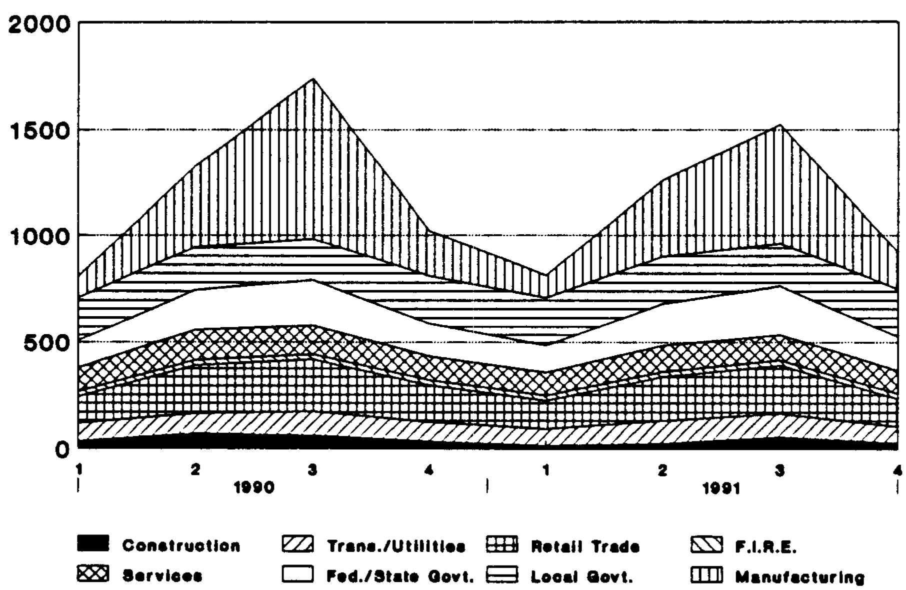
	1980	1990	% change
Male	1,065	1,149	7.9%
Female	855	961	12.4%
Age			
0-4	158	186	17.7%
5-14	261	326	24.9%
15-19	191	105	-45.0%
20-24	211	138	-34.6%
25-34	437	500	14.4%
35-44	270	410	51.9%
45-54	153	185	20.9%
55-59	85	84	-1.2%
60-64	58	62	6.9%
65+	96	114	18.8%
Total	1,920	2,110	9.9%

Sources: U.S. Department of Commerce, Bureau of the Census, 1981 and 1991.

3.2.2.3 Employment

Employment in Cordova includes elements of wage and non-wage income, and full time and seasonal employment opportunities. Most full time wage employment tends to be in the public sector and non-fishery private sector; fish processing (as shown in manufacturing) provides a greater number of jobs but on a seasonal basis. Figure 3.2-2 shows comparative employment for Cordova in 1990 and 1991, and Tables 3.2-3 and 3.2-4 show Cordova census subarea payroll industry series data for the 4 quarters of 1990 and 1991. Government was the major employer in both years. Local government was the major public sector employer, with a four quarter average of 202 employees in 1990 and 215 in 1991. State and local government employment was substantial. In the private sector, manufacturing (seafood processing) provided the most jobs, generally followed by retail trade and services. Manufacturing and construction employment increased in the 2nd quarter and peaked in the 3rd quarter; both declined between 1990 and 1991. The Exxon Valdez oil spill had an impact in 1990, increasing oil clean-up employment in transportation, communications and utilities, and third quarter state government employment.

Figure 3.2-2: Cordova Census Subarea Quarterly Employment, 1990-1991



Source: Alaska Department of Labor, 1992.

Table 3.2-3: Cordova Census Subarea Nonagricultural Employment, 1990-1991

	Year/Quarter				Annual	Year/Quarter				Annual
Category	1/90	2/90	3/90	4/90	Average	1/91	2/91	3/91	4/91	Average
Construction	35	70	63	37	51	15	26	56	29	32
Manufacturing	89	382	757	214	361	101	360	561	171	298
Transportation	84	96	112	90	96	77	106	108	76	92
Trade	125	225	241	169	190	132	203	226	130	173
FIRE	23	24	26	24	24	24	25	25	24	25
Services	112	143	139	113	127	108	123	120	106	114
Miscellaneous	78	123	128	73	101	66	105	139	81	98
Government	329	385	401	374	372	353	415	426	383	394
Federal	33	49	65	50	49	40	52	64	48	51
State	97	138	143	107	121	88	148	163	113	128
Local	199	198	193	217	202	225	215	199	222	215
Total	875	1,448	1,867	1,094	1,321	876	1,363	1,661	1,000	1,225

Source: Alaska Department of Labor, 1992.

3.2.2.4 Income

In 1990, quarterly wage statistics for Cordova were combined with Valdez. Seasonal patterns in construction and manufacturing are still obvious, although Valdez statistics dominate average quarterly wage and payroll data for local government and transportation, communication, and utilities. Table 3.2-4 shows average payroll by industry for the four quarters of 1990. In 1990 transportation, communication, and utilities paid the highest average monthly wage ($4,970, 1st quarter), followed by state government ($3,220, 3rd quarter). Trade consistently averaged the lowest ($1,283, 2nd quarter) with services the next lowest. Transportation, communication, and utilities, followed by state and local government, typically generated the highest average payrolls (up to $11.25 million and $6.1 million, respectively).

Table 3.2-4: Valdez-Cordova Census Area Quarterly Wage Rates, 1990

INDUSTRIAL CLASSIFICATION	1ST QUARTER		2ND QUARTER		3RD QUARTER		4TH QUARTER	
	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)
Mining	*		*		*		*	
Construction	$1,854	$0.85	$2,422	$1.67	$2,290	$1.50	$2,201	$1.19
Manufacturing	$2,913	$1.69	$2,011	$4.60	$2,279	$10.01	$1,745	$2.29
Trans. Comm. & Util.	$4,970	$9.72	$4,321	$9.12	$4,899	$11.25	$4,741	$10.17
Trade	$1,383	$1.69	$1,283	$2.13	$1,434	$2.61	$1,350	$1.91
Finance-Ins. & R.E.	$1,809	$0.59	$1,878	$0.68	$1,784	$0.69	$1,912	$0.72
Services & Misc.	$1,774	$3.01	$1,719	$3.53	$1,748	$4.05	$1,924	$3.73
Government								
Federal	$2,624	$0.75	$2,852	$0.98	$2,685	$1.11	$2,906	$0.96
State	$2,866	$4.81	$3,027	$5.28	$3,220	$5.77	$2,966	$4.58
Local	$2,198	$5.18	$2,633	$6.10	$2,303	$4.44	$2,387	$5.54

Source: Alaska Department of Labor, 1992
* Not disclosed.

3.2.2.5 Public Fiscal Characteristics

Revenues: Table 3.2-5 presents revenue and expenditure characteristics for the City of Cordova for the period of FY 1992. They are broken into General Funds, and Special Funds, which include federal revenue sharing, utilities, education, and capital improvements. The major sources of general revenues are intergovernmental transfers (46.4%) which includes state aid and grants and revenue sharing from the raw fish tax. Taxes are next in importance (25.3%), and include sales, property, and use taxes. Fishing and support industry related property and sales are most likely the major component of these tax revenues.

Expenditures: Principal general fund expenditures include general government (10.2%), finance administration (9.3%), public works (25.7%), public safety (31.1%), economic development (12.7%), information/recreation (7.3%), and other (3.7%). In 1992, the City of Cordova ran a total fund deficiency of $687,616, with a fund balance of $2,247,878.

Table 3.2-5: City of Cordova Revenue and Expenditure Summary

	1992			1991		
	General Fund	Special Funds	Total Funds	General Fund	Special Funds	Total Funds
REVENUES						
Taxes	$538,706	$2,699,290	$3,633,485	$6,787,501	$8,552,424	$9,472,061
Intergovernmental Transfers	$1,052,130	$1,398,085	$1,259,680	$1,715,489	$1,863,531	$2,957,642
Other	$504,036	$373,458	$461,911	$801,576	$1,242,141	$1,714,110
Total Revenues	$2,094,872	$4,470,833	$5,355,076	$9,304,566	$11,658,096	$14,143,813
EXPENDITURES						
General Government	$672,895	$651,139	$764,562	$1,039,836	$1,253,964	$1,525,376
Planning and Zoning	$76,787	$60,143	$94,278	$78,019	$133,457	$340,264
Public Safety	$838,550	$806,703	$1,046,788	$1,290,766	$1,264,231	$1,297,133
Public Works	$941,179	$1,146,086	$1,175,720	$1,446,144	$1,966,837	$2,572,434
Culture and Recreation	$347,153	$362,126	$460,311	$380,359	$475,607	$513,822
Ports and Harbors/Capital outlay	$0	$0	$0	$0	$0	$0
Health Clinic	$5,098	$6,760	$7,505	$7,491	$11,031	$12,000
School Support	$0	$0	$0	$0	$0	$0
Non-departmental	$287,489	$401,831	$253,838	$521,692	$228,708	$577,134
Total Expenditures	$3,169,151	$3,434,788	$3,803,002	$4,764,307	$5,333,835	$6,838,163
EXCESS/DEFICIENCY	$75,886	$671,521	$885,267	$3,082,706	$3,559,390	$6,048,993
FUND BALANCE	$2,292,634	$2,964,155	$3,861,903	$6,944,609	$9,487,508	$15,517,487

Source: City of Cordova, 1993

3.2.3 Infrastructure Characteristics

3.2.3.1 Transportation Facilities

Because the City's terrain and remoteness make highway or rail construction difficult, overland transportation to Cordova is not available. Access to the City is provided by small and large aircraft, as well as boats and ferry transportation. The main airport, located away from town on the Copper River Highway, is large enough for commuter jets which fly daily to Anchorage and Juneau. It measures 10,000 feet by 250 feet, and has air traffic control provided by the Federal Aviation Administration. A smaller airfield is located on the shores of Eyak Lake, and serves small commuter and air taxi operators.

From mid-May to late-September the Alaska-Marine Highway operates three trips a week to Valdez and two trips a week to Whittier in the summer. Ferries run twice weekly to Valdez in the winter months. The ferry calls at the Ocean dock, located a short distance northeast of town. SeaLand Services and Samson Tug and Barge move cargo to and from Cordova. These companies will call at Cordova 2 to 3 times a month depending on the volume of freight.

3.2.3.2 Marine Services

The City of Cordova has recently spent $10 million dollars on the expansion of its small boat harbor. One of the five largest in Alaska, the harbor can accommodate 840 vessels between 20 and 100 feet. The docks have full facilities including: water, fuel, lifts and launching ramps as well as a 140 ton crane and float plane moorage.

3.2.3.3 Utilities

Water, Solid Waste, and Sewer: Water is obtained from groundwater sources near Eyak lake. The Eyak Lake Water Treatment Plant is on the southwest shore of the lake. The city dump, sewer treatment plant, and the solid waste baler are out on Whitshed Road, southwest of town.

Electricity: The Cordova electric supply is managed by the Cordova Electric Cooperative. Power is generated by the Orca Power Plant which utilizes two 2500 kilowatt generator. The Cooperative has decided that diesel is too costly due to a number of factors including; lack of fuel storage, unstable future price, and inefficient method of delivery (currently barge). One alternative would be to receive hydroelectric power from the Copper Valley Electric Association. The City is evaluating development of the Power Creek project.

3.2.3.4 Housing

Community growth opportunity in Cordova is limited. Much of the terrain around the city is unsuited to housing development. Development on the most suitable area, the waterfront, is limited and is reserved for processing expansion.

The City of Cordova had 883 residential housing units in the 1990 census. This represents an increase of 56 units from 1980. Table 3.2-6 shows the 1990 housing inventory. Single family housing, and mobile homes on lots account for over half the housing stock in Cordova.

Table 3.2-6: City of Cordova Housing Characteristics, 1990

TOTAL HOUSEHOLDS/HOUSING UNITS: 883

Occupancy		Housing Value (specified owner-occupied units)	
Occupied Housing Units	773	less than $50,000	20
owner occupied	426	$50,000-99,000	71
renter occupied	347	$100,000-149,000	82
Vacant Housing Units	110	$150,000-199,000	35
Units in Structure		$200,000-299,000	10
1 Unit detached	320	$300,000 or more	0
1 Unit attached	13	Median value	$109,400
2 - 4 Units	171		
5 - 9 Units	57	**Rental Rates**	
10 or more units	100	less than $250	47
mobile home, trailer	222	$250-499	131
		$500-749	100
Households by type		$750-999	11
Families	510	$1,000 or more	5
Married couple	414	Median rent	$448
Male Householder	32		
female Householder	64		
Non-Family	263		
Persons per Household	2.6		

Source: U.S. Department of Commerce, Bureau of the Census, 1991.

Housing in town is scattered, a result of land ownership, geography, and limited city planning. Industrial development has concentrated on the waterfront overlooking Orca Inlet. Businesses are situated uphill from the waterfront. Residential dwellings are placed in any remaining space, predominantly uphill from the businesses where drainage and slope allow. Access to many residential plots in town is restricted to foot traffic due to the inefficient layout and difficult topography of the town.

3.2.3.5 Land Availability

Table 3.2-7 shows the acreage occupied by residential, business, industrial sites, and land occupied by public concerns such as the airport and ski hill.

Table 3.2-7: Existing Use of Cordova Lands & Tidelands, 1985

Land Use	Land Area (acres)	Percent of Total Developed Area
Residential	95.55	18.06
Single Family	(58.28)	(11.02)
Duplex	(3.19)	(0.60)
Triplex	(2.01)	(0.38)
Multi-family	(11.98)	(2.26)
Mobile homes on Lots	(4.97)	(0.94)
Mobile home Parks	(15.12)	(2.86)
Business	7.65	1.45
Industrial	139.96	26.45
Public	281.12	53.13
Eyak Airport	(32.00)	(6.05)
Tripod Ski Hill	(208.58)	(39.42)
Other Public	(40.54)	(7.66)
Total	529.07	100.00

Source: Cordova Coastal Management Program, 1986

A 1985 land use inventory indicated 53.32 acres of public land qualifies for "vacant" status. Of these 53 acres, 17 acres are to be used for industrial expansion. Six acres on the west side of Odiak Pond are ready for development although its proximity to the hospital is of concern. Other parcels scattered about the business district are empty. Most are currently used for snow storage in winter.

The combination of steep slopes and poor drainage in Cordova severely limits land availability. Impermeable bedrock coupled with soils poor in absorption limits the use of septic systems. Heavy precipitation creates massive runoff which collects in areas of little slope creating swampy conditions.

Most developable land in the Cordova area lies northeast of town, out along the Copper River Highway between Eyak Lake and the state airport. A 1986 Cordova Coastal Management Program suggested that area could withstand four times the "predicted growth" over the next 15 years. It is in this direction which most development is presently occurring.

3.2.4 Industry Characteristics

3.2.4.1 Harvesting Sector

Major Fisheries: Salmon fishing remains the dominant fishery for Cordova residents in terms of the number of permits fished (See Table 3.2-8). Herring fishing has increased in importance over the last decade, and local fishermen have also begun to pursue halibut, sablefish, and other groundfish in recent years.

Information on the number of permits shown in Table 3.2-8 and subsequent tables refers to the number of permits actually fished during a given year. Permits which are held by fishermen but not used during the year are not counted. Residency is based upon the address provided at the time the permit is renewed or transferred.

Table 3.2-8: Commercial Fishery Permits Fished by Cordova Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	456	460	451	446	431	414	420	413	360	423
King Crab	20	33	27	4	2	7	6	5	0	1
Tanner Crab	32	39	36	12	7	16	21	21	1	1
Dungeness & Other	35	29	46	55	35	29	21	22	5	2
Herring	117	96	112	83	128	150	161	208	34	178
Sablefish	0	0	3	5	7	11	43	26	10	24
Halibut	62	61	86	47	41	69	119	72	33	n.a.
Other & Unidentified	16	11	13	6	10	16	69	47	19	40
Total	738	729	774	658	661	712	860	814	462	669
Number of residents that fished permits	471	469	488	428	428	422	429	453	341	430

Source: Extracted from data provided by Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

The total number of permits fished by Cordova residents decreased slightly more than 9 percent between 1981 and 1990 and the number of residents owning permits decreased slightly less than 9 percent. The number of salmon and crab permits are down from their peak in 1982, while the number of groundfish permits has increased from the low number of permits held in the early 1980's. The effect of the Exxon Valdez oil spill on the number of permits fished in 1989 is evident.

Salmon fishing remains the predominant activity of Cordova fishermen although the number of salmon permits held by local fishermen has declined slightly from the early 1980's. Almost all of these salmon permits are in Area E, Prince William Sound, management area (See Figure 1.3-1). Table 3.2-9 shows the number and management area for salmon permits fished by local residents since 1981.

Table 3.2-9: Salmon Permits Fished by Cordova Residents

	Year									
Management Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Area D (Yakutat)	1	4	3	1	4	4	2	2	1	3
Area E (Pr. Wm. Sound)	443	443	439	436	417	396	404	396	347	404
Area L (Chignik)	4	4	1	1	0	1	0	0	0	0
Area M (False Pass)	1	1	1	1	1	1	1	1	2	2
Area T (Bristol Bay)	7	8	7	7	9	12	8	10	9	13
Other	0	0	0	0	0	0	5	4	1	1
Total	456	460	451	446	431	414	420	413	360	423

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Cordova fishermen also harvest other species of finfish. Table 3.2-10 presents information on the number of permits for other types of fish held by local residents. Increases in the number of other finfish permits issued to Cordova residents reflects the expansion of the fleet into fisheries other than salmon and halibut. The number of herring permits fished by local residents more than doubled between 1981 and 1988. Total permits for other finfish increased more than 100 percent by 1988 from the 141 permits issued in 1984 and the 168 permits issued in 1982.

Table 3.2-10: Other Finfish Permits Fished by Cordova Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Prince William Sound (E)										
Halibut	60	59	81	41	37	60	103	61	25	n.a.
Sablefish									4	17
Herring	105	86	93	70	118	121	133	175	3	160
Other Fish	16	11	11	4	5	14	49	35	4	29
Cook Inlet (H)										
Halibut	1	2	1	3	2	5	10	8	5	n.a.
Sablefish										
Herring						1	7	2	2	1
Other Fish				2	4		4	6		
Kodiak (K)										
Halibut			1		1	2	4	1	1	n.a.
Sablefish									1	3
Herring	1							1	1	3
Other Fish						1		1	1	2
Peninsula/Aleutians (M)										
Halibut			2	3	1	1	2		1	n.a.
Sablefish										
Herring	2		1			5		1	1	
Other Fish										
Bristol Bay (T)										
Halibut										
Sablefish										
Herring	7	9	17	12	9	15	13	26	19	9
Other Fish										
Other Areas and Unidentified										
Halibut	1		1			1		2	1	n.a.
Sablefish									5	4
Herring	2	1	1	1	1	8	8	3	5	6
Other Fish			2		1	1	5	4	6	8
Unidentified			3	5	7	11	54	27	3	
Total	195	168	214	141	186	246	392	352	88	242

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Cordova fishermen have focused on Prince William Sound shellfish stocks, with few pursuing crab or other species in other management areas. The number of shellfish permits fished by local residents decreased substantially as local stocks declined. Table 3.2-11 presents information on the number and area of shellfish permits fished by Cordova fishermen during the past 8 years.

Table 3.2-11: Shellfish Permits Fished by Cordova Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
King Crab		1								
Tanner	2	1	1							
Other Crab	3	3	7	7	2			2	1	2
Other Shellfish		2	1					1	2	1
Prince William Sound (E)										
King Crab	12	25	24	2	2	4	4	5		
Tanner	27	34	25			10	16	15		
Other Crab	16	8	6	6	7	8	9	6	4	
Other Shellfish	15	16	31	41	26	19	11	11	6	
Cook Inlet (H)										
King Crab				1						
Tanner			3	4	5	1	2	2		
Other Crab										
Other Shellfish								2		
Kodiak (K)										
King Crab	2	5								
Tanner Crab		2	4	8	2	2	1		1	1
Other Crab										
Other Shellfish			1	1						
Other Areas & Unidentified										
King Crab	6	2	3	1		3	2			1
Tanner Crab	3	2	3			3	2	4		
Other Crab	1					1	1			
Other Shellfish						1				
Totals	87	101	109	71	44	52	48	48	14	4

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Harvest: Salmon represent the largest fishery for Cordova residents in terms of pounds harvested. Table 3.2-12 shows the harvest amounts by major species for the 1981 through 1990 time period. These figures should be considered relative indicators of the level of harvest by major species since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest levels since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. Non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.2-12: Fisheries Harvest by Cordova Residents
(millions of pounds)

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	64.4	52.6	33.3	45.8	55.5	24.9	54.5	26.3	54.5	73.9
King Crab	0.1	0.2	0.1			0.1	0.1	0.1	0.0	
Tanner Crab	2.3	2.7	0.7	0.6	0.1	0.4	0.5	0.4		
Other Crab	0.8	0.3	0.7	0.3	0.4	0.6	0.5	0.4	0.3	
Other Shellfish	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Herring	12.4	5.9	3.8	5.7	7.7	10.9	7.3	7.6	0.7	8.8
Sablefish	0.0	0.0	0.0		0.1	0.2	0.3	0.3	0.2	0.3
Halibut	0.3	0.2	0.3	0.1	0.3	0.7	0.7	0.0	0.2	0.0
Other & Unidentified	0.1	0.2	0.1		0.1	0.1	0.4	0.3	0.1	0.4
Non-disclosed	2.1	1.1	7.0	3.8	n.a.	5.1	8.5	7.7	3.6	1.1
Total	82.6	63.2	46.1	56.4	64.3	43.1	72.9	43.2	59.7	84.5

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.
n.a. Not shown in data files.

Employment: Section 2.4 discussed employment by gear type for the Gulf of Alaska fisheries. This section addresses resident employment levels in the harvesting sector for the community of Cordova. Table 3.2-13 presents estimates of employment by fishery and gear type. Gear type estimates are not provided for shellfish, sablefish, or halibut since these species are primarily taken by one gear type (i.e., pots for crab and longline for sablefish and halibut). The table focuses on employment generated by Cordova permit holders. Crew factors estimated by Thomas (1986) for the single year of 1985 are used for the entire 10 year time period since comparable crew factor estimates are not available for other years. The crew factors are averages for the management areas found in the Gulf of Alaska.

This table, and similar tables for other communities assumes that the residency of crew members is the same as the permit holder. Discussions with a number of fishermen resulted in a consensus that there are exceptions to the assumption, but the exceptions would tend to offset each other, making the assumption generally valid. The number of fishing operations is based upon the number of permits fished in each year.

Table 3.2-13: Harvest Sector Employment of Cordova Residents

		Year									
Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon											
Purse Seine	4.4	678	625	585	576	532	502	541	506	462	502
Drift Gillnet	1.75	525	548	539	534	525	508	501	494	432	508
Set Gillnet	2.1	4	11	19	19	19	19	19	32	6	36
Hand Troll	1	0	0	0	0	0	0	0	0	0	1
Power Troll	1.75	0	0	0	0	0	0	0	0	0	0
King Crab	3.25	65	107	88	13	7	23	20	16	0	3
Tanner Crab	3.3	106	129	119	40	23	53	69	69	3	3
Other Crab	2.6	52	29	34	34	23	23	26	21	13	5
Other Shellfish	3.3	50	63	112	139	86	66	36	46	26	3
Herring											
Purse Seine	4.25	200	140	136	187	183	238	217	242	111	200
Gillnet	2	20	28	38	32	30	52	56	50	18	36
Pound	1										
Sablefish	3.55	0	0	11	18	25	39	153	92	36	85
Halibut	2.5	155	153	215	118	103	173	298	180	83	n.a.
Other & Unidentified											
Longline	2.85	17	0	3	9	14	34	154	108	29	97
Trawl	3.1	9	19	19	0	3	6	6	3	0	
Pots	3.1	22	16	19	6	12	6	3	16	0	12
Other	1.9	0	0	0	2	2	4	2	4	2	

Source: Northern Economics; derived from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

The model discussed in Section 4 projects that harvest employment in the future will remain about the same as present levels, with some modest increase in processing employment.

Ex-vessel Earnings: Table 3.2-14 shows an estimate of ex-vessel earnings for Cordova fishermen. For this table, and subsequent ex-vessel earnings tables, data are provided where they are available. The earnings shown in these tables may not include all earnings for applicable species or gear type fisheries due to non-disclosure rules. The last row in the table shows the total amount of earnings not disclosed by fishery.

The information provided in these tables is shown to provide an indication of the level of earnings and the relative importance of earnings between fisheries. It does not include all earnings and should not be considered as accurately depicting total earnings for a fishery or community. A blank cell in these tables indicates data cannot be provided for this fishery due to non-disclosure rules, but even numbers presented in the table may not include earnings from certain management areas or gear types. Zeroes indicate that Cordova residents did not participate in the fishery. Earnings information for 1990 is not provided because price information is not yet available for that year.

The importance of salmon fishing to the community is readily apparent with salmon accounting for 71 percent of total ex-vessel earnings in 1988.

Table 3.2-14: Ex-Vessel Earnings for Cordova Residents
(millions of $)

Species	Year								
	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon									
Purse Seine	26.6	9.1	5.9	8.7	10.3	4.3	19.9	13.6	21.5
Drift Gillnet	7	13	6.6	11.1	14.2	10.2	15	19.8	13.2
Set Gillnet				0.1	0.1	0.1	0.1	0.7	
Hand Troll	0	0	0	0	0	0	0	0	0
Power Troll	0	0	0	0	0	0	0	0	0
King Crab	0.1	0.6	0.3			0.2	0.2	0.2	0
Tanner Crab	1.7	3.9	0.9	0.7	0.2	0.7	1	0.9	
Other Crab	0.6	0.2	0.6	0.3	0.5	0.6	0.4	0.4	0.3
Other Shellfish	0.1		0.1	0.1	0.1	0.1			.01
Herring									
Purse Seine	2.3	1	0.9	1	2.1	3.3	2.6	2.6	0.2
Gillnet		0.1	0.1	0.1	0.2	0.3	0.3	0.3	
Pound & Other	0.1	0.2	0.2	0.2	0.4	0.8	1.1	2.3	
Sablefish	0.3	0.2	0.4	0.1	0.3	0.9	0.9		0.2
Halibut	0	0			0.1	0.2	0.4	0.5	0.2
Other & Unidentified									
Longline		0					0.1		0.01
Trawl		0.1		0					0
Pots									0
Other	0	0	0						
Non-disclosed	1.8	1	1.8	1.2	1.5	2.8	1.2	6.6	1.4
Total	40.6	29.4	17.8	23.6	30	24.5	43.2	47.9	37.0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

The Cordova fishing fleet is a small boat fleet comprised of a large number of drift gillnet boats in the 20 to 39 feet category, and a smaller number of seine vessels in the 40 to 59 feet category. Data bases provided to MMS give vessel size information by species, gear, and area. If a vessel fishes for salmon, halibut, and shrimp in Prince William Sound, it is counted three times. If it fishes for shrimp in four management areas, in addition to salmon and halibut in Prince William Sound, it is counted six times. The data shown in Table 3.2-15 overstate the actual number of vessels but indicate the vessel sizes which are most active in local fleet.

Table 3.2-15: Number of Cordova Resident Fishing Vessels, By Length

		Year									
Size in Feet	Size in Meters	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-19	0-6.0	20	23	15	13	9	7	13	12	4	15
20-39	6.1-12.1	525	528	536	482	495	500	542	511	389	494
40-59	12.2-18.2	105	119	133	105	103	140	172	155	82	153
60-79	18.3-24.3	22	25	18	10	10	22	37	43	39	24
80-99	24.4-30.4	7	7	9	4	7	14	12	13	4	9
100-119	30.5-36.5	0	0	0	0	0	0	0	0	1	1
120-139	36.6-42.6	0	0	0	0	0	1	1	3	0	0
140-159	42.7-48.7	0	0	0	0	0	0	0	0	0	1
160-179	48.8-54.8	0	0	0	0	0	0	0	0	0	0
180-199	54.9-60.9	0	0	0	0	0	0	0	0	0	0
200+	61.0+	0	0	0	0	0	0	0	0	0	0
Unknown		0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

3.2.4.2 Processing Sector

Cordova is the major center for fish processing in Prince William Sound. In 1988 the port of Cordova ranked 8th of all ports in the U.S. in the United States in value of seafood landed (National Marine Fisheries Service, 1989). There are five processing plants located in Cordova.

Chugach Fisheries/Morpac;
Norquest (former Copper River Fishermen's Cooperative plant);
Eyak Packing;
North Pacific Processors; and
St. Elias Ocean Products.

The Norquest plant is the largest facility, employing over one thousand people in 1992, while St. Elias employed over three hundred. The Chugach Fisheries/Morpac and Eyak Packing plants have not operated during the past few years. The closure of these plants has reduced the level of competition in the processing sector over the last few years. In years with large salmon returns fishermen have had difficulty finding buyers for their fish because the processing capacity of the industry is not capable of handling extremely large returns. They can buy from a small number of fishers and obtain enough to run their plants at capacity. This situation places the fishers at a disadvantage to the processors and they may be forced to take lower prices than they would otherwise occur.

Over the last decade the Prince William Sound Aquaculture Association has constructed, or taken over from the State of Alaska, four hatcheries that primarily produce pink salmon. These hatcheries have been responsible for harvests in excess of 40 million fish, and have altered the historic dependence of Cordova fishermen on other salmon species from the Copper and Bering Rivers. Pink salmon were traditionally canned but the industry has been investigating other markets and frozen pink salmon are now a significant portion of the industry's output. The industry sector is also looking at more value-added processing such as skinless/boneless fillets and frozen packs for institutional users.

3.2.4.3 Support Sector

Cordova has numerous support services for the Prince William Sound fishing fleet. The small boat harbor has 840 slips and 900' of dock space for transient moorage (Alaska Department of Transportation & Public Facilities, 1987). The harbor has two tidal grids that a vessel can rest on while work is performed on the outer hull. A vessel will come to rest on the grid about one-third to one-half of the way through the ebb tide. Daily tidal fluctuations permit a vessel owner to work on a vessel for 4 to 8 hours per tidal cycle using a typical tidal grid. The harbor also has a launch ramp and a crane for boat haulouts up to 45 tons (Ports of Alaska, 1988). Dry storage for boats and gear is available, along with electricity, water and fuel. Food and groceries are available near the harbor and there are a number of hotels in town.

The City of Cordova Municipal dock has a 408' face, with an average draft of 25'. The inside face is 325' with an average draft of 16'. It is equipped with a mobile crane, water and fuel (Ports of Alaska, 1988).

3.3 Homer

3.3.1 Setting/ Description

Homer is located at the southern tip of the Kenai Peninsula, on the north shore of Kachemak Bay at the edge of Cook Inlet. Homer is 120 air miles and 220 road miles southwest of Anchorage. The City was incorporated in 1964.

Homer's most prominent feature is a spit of land extending out into Kachemak Bay. The spit is 4.5 miles long, varying in width from 100 to 500 yards. It is on the spit where practically all of the city's fishing and tourist activity occurs. All of the community's port facilities and processors are located on the spit, as well as the small boat harbor.

Homer was originally inhabited by the Tanaina Athabascan Indians and explored by Russian trappers in the early 19th century. In 1890 coal and gold mining drew men to Homer, who established a town on Homer Spit. In 1942 the U.S. Army built an airfield in Homer for defense purposes. The completion of the airport was followed in 1952 with the completion of the Sterling Highway linking Homer to Anchorage and the main Alaskan road system. The combination of the airport and highway opened up the previously isolated City. As the City's mining slowed down tourism and commercial fishing operations increased dramatically. Homer is now host to a large commercial fishing fleet and is a major summer tourist attraction. The Port of Homer is used to bring goods into the community and export logs and wood chips. It is these industries which support its economy.

3.3.2 Socioeconomic Characteristics

3.3.2.1 Local Economy

Commercial fishing, fish processing, and tourism make up the backbone of Homer's economy. A number of the area's residents are fishermen who harvest a multitude of fish species in Kachemak Bay, Cook Inlet and the Gulf of Alaska including: three species of crab; five species of panelailid shrimp; halibut; cod and rockfish; chinook, coho, sockeye, pink, and chum salmon; and several species of clams.

Homer Spit is the location of four seafood processing companies. Seward Fisheries is the largest of these processors. Although fishing still is the predominant industry in Homer, tourism is quickly growing as an important sector of the City's economy. In the last ten years Homer has experienced a boom in its charter boat industry. These boats are hired out both for sport fishing and for sightseeing around scenic Kachemak Bay.

Homer is currently host to the largest saltwater sport fishing fleet in Alaska. In the early 1980's only a few companies ran a limited number of charter boats but this number has increased until 80 to 100 charter boats may operate from the harbor.

As Homer's population grows, its importance as a shipping port also increases. Homer's location at the southern tip of the Kenai Peninsula is desirable for shipping firms. Completion of its deep water port will boost Homer's importance in shipping and receiving cargo. Several shipping firms are interested in Homer as a shipping center. The Port currently serves as sorting station for containerized cargo, a loading site for lumber bound to the Far East, and shipping point for ocean processors.

3.3.2.2 Population

Table 3.3-1 shows the population for Homer from 1980 through 1992. The population appeared to have peaked in 1988-89, and was estimated at 3,713 for 1992. Table 3.3-2 shows comparative population characteristics for 1980 and 1990. While increasing in overall number, population characteristics remain somewhat similar.

Table 3.3-1: City of Homer Historic Population

Year	Population
1980	2,209
1981	2,588
1982	2,900
1983	3,237
1984	3,373
1985	3,632
1986	3,706
1987	
1988	4,338
1989	4,513
1990	3,660
1991	3,713
1992	3,736

Source: Alaska Department of Labor, 1993a, 1993b, and 1994.

Note: The Department of Labor did not prepare population place estimates in 1987.

Table 3.3-2: City of Homer Population Characteristics

	1980	1990	% change
Male	1,190	1,869	57.1%
Female	1,047	1,791	71.1%
Age			
0-4	199	333	67.3%
5-14	377	623	65.3%
15-19	167	234	40.1%
20-24	198	172	-13.1%
25-34	533	672	26.1%
35-44	316	774	144.9%
45-54	184	389	111.4%
55-59	105	108	2.9%
60-64	54	95	75.9%
65+	104	260	150.0%
Total	2,237	3,660	63.6%

Sources: U.S. Department of Commerce, Bureau of the Census, 1981 and 1991.

3.3.2.3 Employment

Due to its diverse economy, Homer avoided the economic hard times affecting much of the Kenai Peninsula Borough in the mid-1980's. The government is the largest year-round employer in Homer with more than 75 percent of the government work force employed by the local government. Seasonally, fish harvesting and fish processing provide a significant amount of summer employment, as did employment associated with oil spill clean-up activities in 1989 and 1990.

Table 3.3-3 shows the average annual employment for various industries over the years from 1980 to 1990. In 1990, federal, state and local government accounted for 26.2 percent off all jobs. Manufacturing, which includes fish processing, has been dropping off in recent years, but rose in 1990. Employing 33 percent of the work force in 1985 it was the largest employer next to government. By 1988 manufacturing employed 11.3 percent of workers, falling behind trade (21.6%) and services (16.3%), although it rose to 14% in 1990. The reduction in employment in the manufacturing industry and the steady increase in both trade and services testifies to the increased reliance Homer's employment has on the tourist industry.

Table 3.3-3: Homer Census Subarea Annual Average Employment, 1980-1990

Employment Classification	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Federal Government	31	32	36	36	36	39	39	40	45	51	56
State Government	4	5	12	20	18	18	18	25	25	26	27
Local Government	188	151	169	259	282	338	351	347	336	365	380
Total Government	223	188	217	315	336	398	408	412	406	442	463
Mining	0	0	0	0	0	0	0	0	0	0	0
Construction	69	63	93	143	231	252	125	88	130	258	214
Manufacturing	313	452	384	307	241	175	138	115	163	a	304
Transportation/ Communications/ Utilities	186	184	190	158	176	188	177	159	196	305	245
Trade	203	222	224	270	275	314	334	335	312	320	450
Finance/Insurance/ Real Estate	a	a	a	a	a	a	a	a	a	67	51
Services	186	260	272	231	262	270	268	231	235	297	375
TOTAL	1,180	1,369	1,380	1,424	1,521	1,597	1,450	1,340	1,442	1,689	2,132

Source: Alaska Department of Labor, Research & Analysis, 1991.

a Not disclosed.

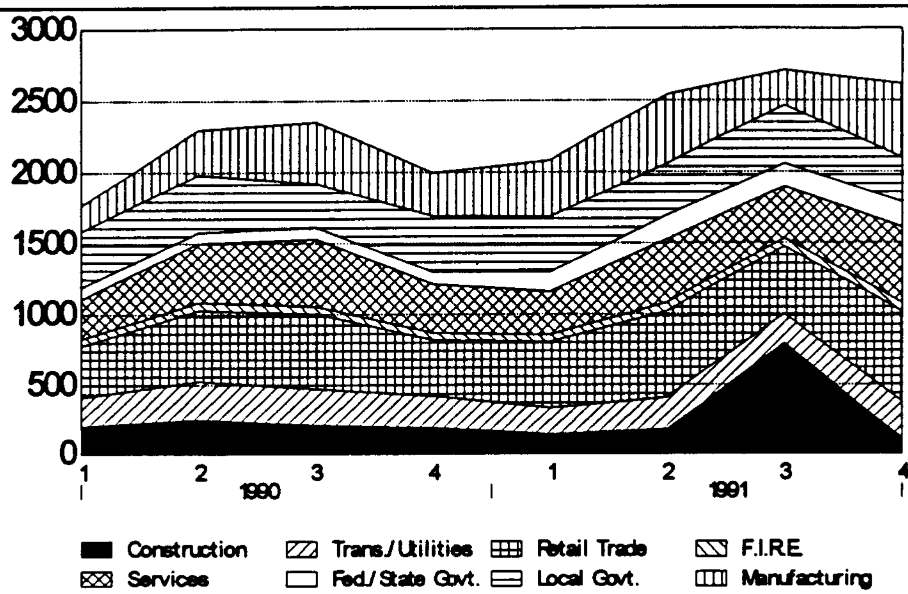
Table 3.3-4 and Figure 3.3-1 show Homer Subarea quarterly employment for 1990 and 1991. As in Cordova, the Exxon Valdez oil spill had an impact on employment characteristics in Homer. Employment in the transportation/communications/utilities sector more than doubled between the 1st and 3rd quarters of 1989, and was about 25 percent greater in 1990 than 1988 levels.

Table 3.3-4: Homer Census Subarea Quarterly Employment, 1990-1991

Industry	Quarter/Year 1/90	2/90	3/90	4/90	Annual Average	Quarter/Year 1/91	2/91	3/91	4/91	Annual Average
Nonag. Wage & Salary	1,764	2,295	2,348	2,121	2,132	1,898	2,387	2,122	2,725	2,283
Mining	0	0	0	0	0	0	0	0	0	0
Construction	202	251	210	193	214	141	181	79	109	128
Manufacturing	176	310	427	303	304	397	481	252	524	414
Trans. Comm. & Util.	212	274	264	230	245	198	231	204	271	226
Trade	367	504	531	396	450	468	608	474	633	546
Finance-Ins. & R.E.	48	54	50	51	51	51	56	58	59	56
Services & Misc.	274	416	475	336	375	296	451	366	538	413
Government	485	486	391	491	463	532	533	567	484	529
Federal	51	57	62	55	56	52	64	64	70	63
State	30	20	21	38	27	88	103	99	103	98
Local	404	409	308	398	380	392	366	404	311	368

Source: Alaska Department of Labor, 1992.

Figure 3.3-3: Homer Census Subarea Quarterly Employment, 1990-1991



Source: Alaska Department of Labor, 1992.

3.3.2.4 Income

Table 3.3-5 shows the average monthly wage by quarter for the Kenai Peninsula Borough for 1990-91. Starting in 1990, the reporting format for quarterly employment and wage information was changed. Quarterly wage rate/payroll data for Kenai Peninsula Borough communities was consolidated under the Borough, where data is influenced by oil industry (mining) employment. In Homer during 1988, construction ($4,544 in the 4th quarter) and federal government ($3,463 in the 3rd quarter) were the highest sectors by wage. Retail trade ($942, 1st quarter), wholesale trade ($975, 1st quarter), and services ($1,073, 1st quarter) provided the lowest average monthly income. Wages in several of sectors increased during the 2nd and 3rd quarters, possibly reflecting summer tourist, construction, and service sector increases, and competition for labor. Prior to the 2nd quarter in 1989, local government and construction created the highest average payrolls (roughly $2 to $3 million).

Table 3.3-5: Kenai Peninsula Census Area Wage Rates, 1990

INDUSTRIAL CLASSIFICATION	1ST QUARTER		2ND QUARTER		3RD QUARTER		4TH QUARTER	
	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)
Mining	$4,204	$13.63	$ 4,298	$14.56	$3,935	$14.67	$4,520	$16.92
Construction	$3,120	$4.65	$3,510	$7.72	$3,868	$9.68	$3,399	$8.20
Manufacturing	$3,522	$10.51	$2,518	$16.00	$2,488	$22.59	$3,326	$12.94
Trans. Comm. & Util.	$2,826	$7.23	$2,768	$8.36	$3,167	$10.33	$2,850	$8.82
Trade	$1,235	$6.65	$1,118	$7.78	$2,433	$8.87	$1,260	$7.68
Finance-Ins. & R.E.	$1,654	$1.30	$1,490	$1.30	$1,202	$1.37	$1,614	$1.38
Services & Misc.	$1,591	$11.50	$1,559	$12.94	$1,595	$14.13	$1,691	$13.38
Government								
Federal	$2,775	$2.06	$2,952	$2.53	$2,887	$2.81	$3,040	$2.57
State	$2,977	$9.45	$3,023	$9.63	$3,102	$10.38	$3,040	$9.79
Local	$2,418	$15.96	$2,817	$19.11	$2,396	$10.63	$2,391	$16.47

Source: Alaska Department of Labor, 1991.

The Exxon Valdez oil spill also had an impact on 1989 wage rates and average payroll in Homer. Wage rates in the transportation/communications/utilities sector more than doubled between the 1st and 3rd quarters and the average payroll went up fivefold. The total average payroll for the 3rd quarter of 1989 was nearly twice that of the 1st quarter.

3.3.2.5 Public Fiscal Characteristics

Revenues: Table 3.3-6 presents revenue and expenditure characteristics for the City of Homer for the period of FY 1991-1992. The major sources of general revenues are taxes and include sales and property taxes. Debt service and capital projects and intergovernmental transfers (46.4%) fluctuate as the second largest source of revenues. Intergovernmental transfers include state aid and grants and revenue sharing from the raw fish tax. Taxes are next in importance (25.3%), Fishing and support industry related property and sales are most likely the major component of these tax revenues.

Table 3.3-6: City of Homer Revenues and Expenditures

REVENUES	1992 General Fund	1991 General Fund
Taxes		
General Property Tax	$1,073,510	$1,105,207
Sales Tax	$1,475,174	$1,526,126
Debt Service and Capital Projects	$1,468,642	$866,618
Penalties and Interest	$17,264	$15,057
subtotal	$4,034,590	$3,513,008
Intergovernmental Transfers		
State	$847,473	$933,773
Borough	$3,100	$4,800
subtotal	$850,573	$938,573
Charges for Services	$819,974	$649,216
Interest and Penalties	$83,519	$177,789
Fees, Permits and Other Revenue	$45,386	$35,982
Total Revenues	$5,834,042	$5,314,568
EXPENDITURES		
General Government	$868,546	$836,998
Public Safety	$1,709,314	$1,752,359
Public Works	$824,763	$789,810
Library	$202,670	$203,540
Oil spill Cleanup	$0	$74,583
Recreation Services	$53,866	$4,309
Debt Service	$1,862,337	$1,060,107
Contributions to Local Agencies	$296,581	$275,829
Capital Projects	$2,171,152	$694,016
other	$3,923	$0
Total Expenditures	$7,993,152	$5,691,551
EXCESS/DEFICIENCY	($2,159,110)	($376,983)
FUND BALANCE	$3,990,241	$6,084,714

Source: City of Homer, 1993.

Expenditures: Principal general fund expenditures include general government (10.2%), public works (25.7%), public safety (31.1%), library, oil spill cleanup, recreation services debt service (7.3%), capital projects (3.7%) and other. In 1991, the City of Homer ran a total Fund deficiency of $376,983, with a Fund balance of $6,084,714; in 1992 the deficiency was $2,159,110 and the fund balance $3,990,241.

3.3.3 Infrastructure Characteristics

3.3.3.1 Transportation Facilities

Homer is accessible by water, sea, and land. The Sterling Highway connects the city with the rest of the Kenai Peninsula and with Anchorage. The State Ferry M/V Tustumena docks at Homer Spit. The Homer Airport (7,400 feet) and the Beluga float plane facility serve as transportation facilities for Homer and the surrounding area, and are owned by the State.

Ferry: The M/V Tustumena carries 200 passengers and 54 vehicles to Dutch Harbor, Cold Bay, King Cove, Sand Point, Chignik, Kodiak, Port Lions, Seldovia, Seward, and Valdez. Several private charter operators carry passengers across Kachemak Bay to the community of Halibut Cove and the City of Seldovia.

Air: Homer has an airport located near the base of the Homer Spit. Several airlines, including MarkAir and ERA, provide daily flights between the Homer airport and Anchorage, with stops at Kenai. Regularly scheduled flights are available to Seldovia, as well as charters to other locations in the surrounding area.

3.3.3.2 Marine Services

The Port of Homer is a dock facility located at the end of the Homer Spit. It handles general and containerized cargo, logs and wood chips, and fish products.

3.3.3.3 Utilities

The City of Homer has responsibility for providing water, sewage treatment, and law enforcement.

Electricity: Until the last few years, Homer Electric Association, Inc. (HEA) purchased power from Chugach Electric's natural gas facility in Beluga. HEA recently constructed their own power generation facility, and receives power from the Bradley Lake hydroelectric facility.

Sewer: The City recently completed the $16 million Homer/Kachemak City sewer project. The new system will bring Homer into compliance with the EPA's Clean Water Act. The Main Treatment Facility is the only remaining construction.

Solid Waste: Solid waste is collected by Peninsula Sanitation which transfers it to the municipal landfill.

Water: Homer receives its water from the 35 acre Bridge Creek Reservoir. Construction of the Dam at the end of the 1980s relieved Homer of its water supply worries by providing the city with a 145 million gallon storage capacity. Current demand is approximately 450,000 gallons a day. Demand is expected to rise to 1.19 million gallons a day by the year 2000. The facility's 1400 gallons a minute capacity is expected to withstand any increases in demand for the foreseeable future.

Improvements made to the water system in the early eighties have rectified problems and improved service on the spit. Storage tanks with 750,000 gallon capacity, together with booster pumps, provide steady water service to industries located on the spit.

3.3.3.4 Housing

Although settlement in Homer began on the spit, today there are few residences remaining there. Housing in the City is almost exclusively on the mainland. Housing costs are below average for the six Gulf of Alaska Communities. The 1990 census reported 1,673 households, with a vacancy rate of 15.6 percent. Single family detached houses predominate, and median value was $91,500. Nearly half of the rental units fell within the $250 - $499 rent per month range; median rent was $420. Table 3.3-7 shows housing characteristics for Homer in 1990.

Table 3.3-7: City of Homer Housing Characteristics, 1990

TOTAL HOUSING UNITS	1,673		
Occupancy		Housing Value (specified owner-occupied units)	
Occupied Housing Units	1,411	less than $50,000	50
owner occupied	763	$50,000-99,000	270
renter occupied	648	$100,000-149,000	155
Vacant Housing Units	262	$150,000-199,000	31
Units in Structure		$200,000-299,000	17
1 Unit detached	860	$300,000 or more	1
1 Unit attached	34	Median value	$91,500
2 - 4 Units	285		
5 - 9 Units	142	Rental Rates	
10 or more units	77	less than $250	79
mobile home, trailer	275	$250-499	359
		$500-749	128
Households by type		$750-999	26
Families	912	$1,000 or more	3
Married couple	706	Median rent	$420
Male Householder	52		
female Householder	154		
Non-Family	499		
Persons per Household	3		
Persons Living in Group Quarters	72		

Source: U.S. Department of Commerce, Bureau of the Census, 1991.

3.3.3.5 Land Availability

Industrial expansion opportunities are good on the eastern side of spit. This area is protected from storm action and is close to harbor. Development on the spit closer to the mainland is limited by ground quality (mudflats and shallow water). Little land is available in downtown area or by the airport, but land is available outside the city limits.

The spit has 1100 acres zoned for industrial use. Plots are available from 1 to 40 acres and range in price from $20,800 to $35,500 per acre. Most of the available land on the spit lies at or below mean high tide requiring the use of pile supported structures, or filling in areas prior to development.

3.3.4 Industry Characteristics

3.3.4.1 Harvesting Sector

The number of Homer residents fishing permits has increased almost 50 percent over the last 8 years (See Table 3.3-8). Total permits fished have increased over 70 percent in the same time. Increases in the number of salmon and groundfish permits fished by Homer residents have more than offset decreases in crab permits.

Table 3.3-8: Commercial Fishery Permits Fished by Homer Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	175	162	183	189	205	232	248	286	191	303
King Crab	48	30	9	4	2	5	18	11	16	17
Tanner Crab	38	55	41	57	59	4	67	99	26	42
Dungeness & Other	146	133	96	110	104	87	108	71	46	31
Herring	55	75	84	62	89	78	72	77	70	81
Sablefish	0	0	1	5	20	38	99	89	57	109
Halibut	155	190	256	232	193	289	443	429	392	n.a.
Other & Unidentified	68	61	41	39	43	48	179	119	72	129
Total	685	706	711	698	715	782	1,234	1,179	870	712
Number of residents that fished permits	356	384	382	367	348	394	465	522	465	428

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

The number salmon limited entry permits fished by Homer residents has increased by 111 over the past 8 years. Bristol Bay (Area T) has accounted for about 40 percent of this increase, with Cook Inlet (Area H) and Prince William Sound (Area E) accounting for about 50 percent.

Table 3.3-9: Salmon Permits Fished by Homer Residents

Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A & D)	1	1	1	0	0	0	0	0	1	1
Pr. Wm. Sound (E)	21	26	27	29	37	40	41	46	46	52
Cook Inlet (H)	108	98	102	104	104	112	124	136	60	142
Kodiak (K)	6	9	4	4	2	6	6	12	1	15
False Pass (M)	8	8	7	6	9	17	14	14	14	18
Bristol Bay (T)	30	17	41	44	50	56	60	76	68	71
Other	1	3	1	2	3	1	3	2	1	2
Total	175	162	183	189	205	232	248	286	191	301

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Table 3.3-10 shows the number of other finfish permits fished by Homer residents. Halibut accounts for over half the total other finfish permits. Sablefish has accounted for a substantial portion of the increase in number of permits fished in the last 5 years. The sablefish fishery was the first to displace foreign fleets from the Gulf of Alaska. Local residents have also begun to pursue Pacific cod in the last few years. The number of herring permits has remained relatively stable during the last 8 years.

Table 3.3-10: Other Finfish Permits Fished by Homer Residents

Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A & D)										
Halibut			1	1	1			1		
Sablefish					2	4	14	7	6	1
Herring						1	1	1	2	2
Other Finfish					1	1	3	6	6	1
Prince William Sound (E)										
Halibut	22	23	22	21	17	43	52	33	33	
Sablefish				1	2	15	33	26	23	41
Herring	22	25	30	14	27	16	16	20		26
Other Finfish					1	11	27	28	28	43
Cook Inlet (H)										
Halibut	130	147	180	162	111	148	231	301	269	
Sablefish				2	1	2	13	15	2	31
Herring	10	7	11	15	27	30	29	28	16	18
Other Finfish	63	57	38	35	33	28	95	41	7	47
Kodiak (K)										
Halibut	3	17	49	45	46	67	77	53	48	
Sablefish			1	1	5	11	15	27	13	20
Herring	5	2	2	7	6	6	1	2	11	5
Other Finfish	3	3	3	3	5	4	16	18	7	15
Peninsula/Aleutians (M)										
Halibut		3	3	2	14	19	45	10	14	
Sablefish				1	2	1	8	5	4	5
Herring	1					1	1	2	3	2
Other Finfish							17	13	6	8
Bristol Bay (T)					1					
Sablefish										
Herring	16	38	34	22	21	23	22	23	37	25
Other Areas and Unidentified										
Halibut			1	1	3	12	38	31	28	
Sablefish					8	5	16	9	9	11
Herring	1	3	6	4	8	1	2	1	1	3
Other Finfish	2	1		1	3	4	20	11	18	15
Unidentified			1				1			
Total	278	326	382	338	345	453	793	712	591	319

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Shellfish stocks in Cook Inlet and the Gulf of Alaska have decreased during the past 8 years, and the number of shellfish permits fished has also declined. Tanner and Dungeness crab stocks in Cook Inlet have decreased significantly in the past few years and the fisheries are currently closed.

Table 3.3-11: Shellfish Permits Fished by Homer Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
King Crab										1
Tanner										1
Other Crab		2						1		
Other Shellfish	2				1			1	1	2
Prince William Sound (E)										
Other Shellfish	4	4	1	3	1	2	2	1	3	
Cook Inlet (H)										
King Crab	36	16	7							
Tanner	32	45	32	50	55		58	86		2
Other Crab	57	65	50	67	66	59	68	59	32	15
Other Shellfish	74	47	35	33	30	24	35	8	7	11
Kodiak (K)										
King Crab	3	7								
Tanner Crab		4	7	7	4	4	3	1	11	23
Other Crab	5	11	7	7	6			1		1
Other Shellfish	2		2						1	1
Peninsula/Aleutians (M)										
King Crab	1	2								
Tanner Crab	2	2	1				1	2	4	
Other Crab			1							
Other Shellfish		1							2	1
Other Areas & Unidentified										
King Crab	8	5	2	4	2	5	18	11	16	16
Tanner Crab	4	4	1				5	10	11	16
Other Crab	1	2								
Other Shellfish	1	1				2	3			
Totals	232	218	146	171	165	96	193	181	88	90

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Employment: The halibut fishery employs the largest number of Homer residents. However, the halibut fishery is limited to a small number of openings of 24 hours duration or less and fishermen are engaged in the fishery for relatively few days per year. Salmon fishing is also regulated by openings but fishermen are involved in the fishery for at least a month, and typically 2 to 4 months. In terms of person-months, the salmon fishery has the largest employment. The model discussed in Section 4 projects that harvest employment will increase in the future and processing employment will remain about the same.

Table 3.3-12: Harvest Sector Employment of Homer Residents

		Year									
Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon											
Seine	4.4	202	180	180	128	154	194	202	282	251	330
Drift Gillnet	1.75	165	175	189	212	224	250	270	292	159	315
Set Gillnet	2.1	74	80	71	80	86	95	101	116	90	101
Hand Troll	1	0	0	0	1	0	0	0	0	0	0
Power Troll	1.75	0	0	0	0	0	0	0	0	0	0
King Crab	3.25	156	98	29	13	7	16	59	36	52	55
Tanner Crab	3.3	125	182	135	188	195	13	221	327	86	139
Dungeness & Other Crab	2.6	164	208	151	192	187	153	177	159	83	42
Other Shellfish	3.3	274	175	125	119	106	92	132	33	46	40
Herring											
Purse Seine	4.25	136	187	170	136	170	204	196	208	230	221
Gillnet	2	18	44	48	32	66	52	38	38	26	26
Pound & Other	1									3	16
Sablefish	3.55	0	0	4	18	71	135	351	316	202	387
Halibut	2.5	388	225	640	580	483	723	1108	1073	980	n.a.
Other & Unidentified											
Longline	2.85	17	63	14	11	46	88	453	271	177	325
Trawl	3.1	71	47	43	47	28	25	19	22	25	22
Pots	3.1	99	71	68	53	78	25	31	31	0	9
Other	1.9	13	4	0	8	4	6	19	10	2	11

Sources: Derived by Northern Economics from Thomas, 1986 and data provided by Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Harvest: Salmon represent the largest fishery for Homer residents in terms of pounds harvested. Table 3.3-13 shows the harvest amounts by major species for the 1981 through 1990 time period.

Table 3.3-13: Fisheries Harvest by Homer Residents
(millions of pounds)

Species	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	17.1	18.0	13.7	13.9	15.3	16.3	19.1	16.2	16.1	22.6
King Crab	1.0	0.6	0.1			0.2	0.4	0.2	0.5	0.6
Tanner Crab	1.4	1.4	1.8	1.5	1.1	0.2	1.0	3.8	4.9	6.0
Other Crab	1.8	1.2	1.0	1.1	1.4	0.4	0.6	0.6	0.1	0.1
Other Shellfish	5.0	0.0	1.0	1.5	1.3	1.1	0.1	0.1		0.1
Herring	7.8	7.4	9.8	7.2	8.1	6.4	5.2	6.0	4.2	6.5
Sablefish	0.0				0.3	0.4	2.1	1.5	1.3	1.3
Halibut	0.8	1.0	1.7	2.0	2.3	3.7	5.0		5.4	
Other & Unidentified	0.1	0.1	0.1	0.1	0.1	0.1	1.7	0.3	0.1	0.5
Non-disclosed	2.2	2.6	1.2	1.8	n.a.	1.4	3.4	4.3	20.6	5.7
Total	37.2	32.3	30.4	29.1	29.9	30.2	38.6	33.0	53.2	43.4

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.
n.a. Not shown in data files.

Earnings: Table 3.3-14 shows the ex-vessel earning for harvest by Homer fishermen. The amounts shown in this table should be considered as relative indicators of the importance of each fishery since this table is summed from species, area, and gear categories which have data subject to non-disclosure rules. The last row in the table provides information on the total value of these non-disclosures and are summed with the other fishery values to arrive at total ex-vessel earnings for the community.

Table 3.3-14: Total Ex-Vessel Earnings of Homer Residents

(Millions of $)	Year								
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon									
Purse Seine	5.7	3.3	1.4	2.3	2.2	2.7	4.2	9.9	3.6
Drift Gillnet	3.2	4.8	5.4	4.2	6.3	8.7	14.6	20.7	8.6
Set Gillnet	0.9	0.7	0.5	0.5	0.9	1	1.4	2.8	2.3
Hand Troll	0	0	0			0	0	0	0
Power Troll	0	0	0	0	0	0	0	0	0
King Crab	1.2	2.2	0.2			0.8	1.4	1.2	
Tanner Crab	1	2.2	2.3	1.9	1.7	0.3	2.4	4.4	5.7
Dungeness & Other Crab	1.3	0.9	1	1.5	1.7	0.4	0.8	0.6	0.2
Other Shellfish	1.8	1.5	0.4	0.6	0.3	0.3	0.1	a	
Herring									
Purse Seine	1.5	1.2	2.1	1.4	2.2	2	2.4	3.5	1.1
Gillnet			0.1	a	0.1	0.1		a	a
Pound & Other		a	0.1				1	0.3	
Sablefish	0.8	1.1	1.8	1.4	2.1	5.2	7.1		1.2
Halibut	0	0			0.3	0.4	0.8	0.4	7.9
Other & Unidentified									
Longline	a	a			a	a	a	0.1	a
Trawl					a	a	a		
Pots	a	a	a	a	a	a	a	a	
Other	a		0						
Non-disclosed	2.4	2.1	0.6	0.9	1	1.4	2.6	1.8	2.3
Total	19.8	20	15.9	14.7	18.8	23.3	38.8	45.7	32.9

Source: Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
a Less than $50,000.

<u>Boat and Gear Characteristics</u>: The small vessels employed in drift gillnet fishing account for over 60 percent of the total vessel activity by Homer residents. These boats are also often employed in halibut fishing, and sometimes in the sablefish fishery. Vessels larger than 18.3 meters (60 feet) are often employed in the crab fishery, and some are larger longline vessels pursuing halibut, sablefish, and Pacific cod. Data provided to MMS give vessel size by species, gear, and area, and Table 3.3-15 sums the vessel information to arrive at information which suggests levels of fishing activity by different sizes of vessels. The data in Table 3.3-15

overstate the actual number of vessels but do indicate the vessel sizes which are most active in the local fleet.

Table 3.3-15: Homer Resident Fishing Vessels, By Length

		Year									
Size in Meters	Size in Feet	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-6.0	0-19	25	24	21	29	8	17	14	10	22	14
6.1-12.1	20-39	344	395	412	395	406	503	701	639	469	323
12.2-18.2	40-59	138	123	126	110	132	151	246	261	194	208
18.3-24.3	60-79	33	25	31	38	56	53	88	77	61	43
24.4-30.4	80-99	24	24	15	13	18	11	26	37	25	31
30.5-36.5	100-119	0	0	0	4	2	0	5	9	7	4
36.6-42.6	120-139	0	0	0	0	0	0	0	5	3	5
42.7-48.7	140-159	0	0	0	0	0	0	0	0	0	0
48.8-54.8	160-179	0	0	0	0	0	0	0	0	0	0
54.9-60.9	180-199	0	0	0	0	0	0	0	0	0	0
61.0+	200+	5	4	3	3	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

3.3.4.2 Processing Sector

In 1992 Homer was listed as the 30th port in the United States in value of seafood landed (National Marine Fisheries Service, 1994). Seward Fisheries is the only major fish processing plant located in Homer although a number of plants have buying stations at the municipal dock in the small boat harbor. The presence of these buyers provides substantial competition for Seward Fisheries. The Seward Fisheries plant processes salmon, crab, and most groundfish species. Salmon makes up about 40 percent of their sales, with halibut and crab accounting for about 20 percent each. Herring roe accounts for about 15 percent of sales and other species make up the balance.

3.3.4.3 Support Sector

The port of Homer is located on Homer Spit. The port has a berthing capacity of 728 stalls and additional transient moorage. There is a waiting list of several years for most size categories of reserved stalls. Lighting, power, water, ice, fuel, and a boat ramp are available (Alaska Department of Transportation & Public Facilities, 1987). There are several tidal grids in the harbor, and lodging, groceries, marine supply stores, and restaurants are located nearby.

Homer also has a full service center, Northern Enterprises, located up the bay from Homer Spit. Northern Enterprises provides numerous services to fishermen, including haul-outs with two Travelifts, mechanical repairs, welding, gear supply, and storage.

3.4 Kenai

3.4.1 Setting/Description

The City of Kenai is located in the northwestern section of the Kenai Peninsula on the mouth of the Kenai River and the eastern shore of Cook Inlet. The City is 60 miles south of Anchorage and was incorporated in 1960.

Kenai was first inhabited by the Kinnats Athabascan Indians. The Kinnats fished the local rivers and traded with surrounding areas. The town of Kenai was established as Fort St. Nicholas by Russian fur traders in 1791, and later evolved as a commercial center and focus of commercial fishing activities. By 1950 Kenai still had only 321 residents, mostly homesteaders who settled the area at the close of World War II. The discovery of oil in 1957 and the completion of the Sterling highway in 1952 created a population boom which still continues today. Presently Kenai is the Kenai Peninsula's largest community. Commercial fishing is still a mainstay of the economy, although tourism and the oil and gas industries are of equal significance.

3.4.2 Socioeconomic Characteristics

3.4.2.1 Local Economy

Historically, Kenai's economy has relied mainly on commercial fishing and fish processing. In the last half-century, however Kenai's economy has diversified through tourism and the oil and gas industry. Every summer Kenai attracts visitors from within and outside the state, coming via the Sterling Highway, or by air. The discovery of oil in Cook Inlet and the Kenai flats brought an industry to Kenai which does not suffer from the seasonal fluctuation common to the fishing and tourism industries. The combination of industries support healthy service and trade sectors.

However, commercial fishing remains an important industry for the Kenai area. Commercial fishing of the Kenai River and Cook Inlet began in the 19th century. Within years of the purchase of Alaska by the United States canneries appeared at Kenai. From that time until the 1960's, commercial fishing remained the mainstay of the Kenai economy.

In 1957 oil was discovered at Swanson River near Kenai and the oil boom began. Today Kenai is host to a growing oil and gas complex including a full field work and supply industry. The Nikiski oil and gas complex north of Kenai includes two refineries, a liquefied natural gas plant, and an ammonia-urea plant. These plants at Nikiski, as well as continuing oil and gas exploration, provide Kenai with jobs and revenues that will continue well into the future.

3.4.2.2 Population

In the last thirty years Kenai has grown from a small city of 778 to 4,374 by 1978 and is now the Kenai Peninsula Borough's largest community with over 6,500 residents. Table 3.4-1 shows the population of Kenai from 1980 through 1990. Table 3.4-2 and Figure 3.4-1 show and compare the age-sex characteristics of the City of Kenai.

Table 3.4-1: City of Kenai Population Change

Year	Population
1980	4,324
1981	4,558
1982	5,261
1983	5,774
1984	6,072
1985	6,518
1986	6,647
1987	
1988	6,543
1989	6,530
1990	6,327
1991	6,535

Source: Alaska Department of Labor, 1993a, 1993b and 1994.

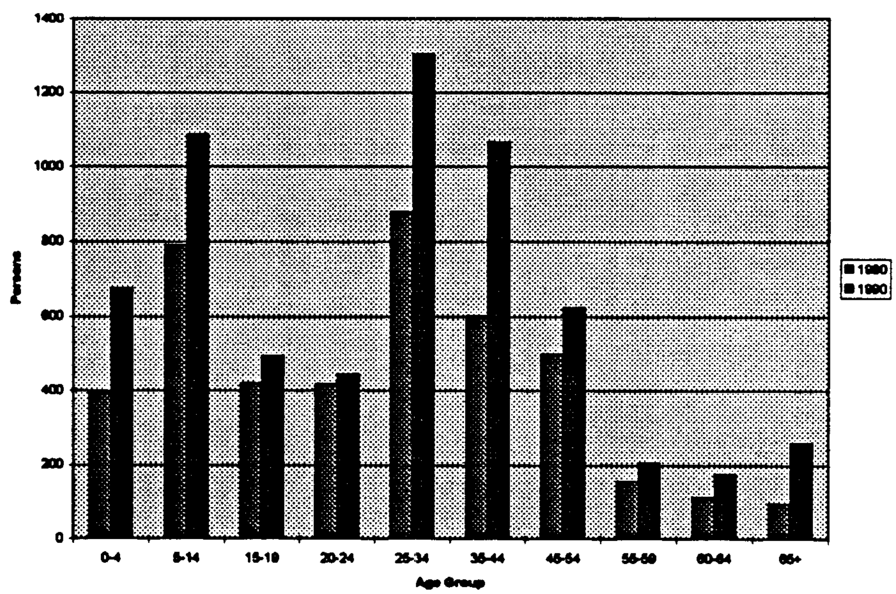
Note: The Alaska Department of Labor did not publish place estimates in 1987.

Table 3.4-2: City of Kenai Population Characteristics, 1980 and 1990

	1980	1990	% change
Total	4,324	6,327	46.3%
Male	2,215	3,269	47.6%
Female	2,109	3,058	45.0%
Age	1980	1990	
0-4	394	673	70.8%
5-14	789	1,086	37.6%
15-19	419	493	17.7%
20-24	418	443	6.0%
25-34	878	1,303	48.4%
35-44	602	1,065	76.9%
45-54	499	624	25.1%
55-59	157	206	31.2%
60-64	114	175	53.5%
65+	96	259	169.8%

Sources: U.S. Department of Commerce, Bureau of the Census, 1981 and 1991.

Figure 3.4-1: City of Kenai Population Age Distribution, 1980 and 1990



Sources: U.S. Department of Commerce, Bureau of the Census, 1981 and 1991.

3.4.2.3 Employment

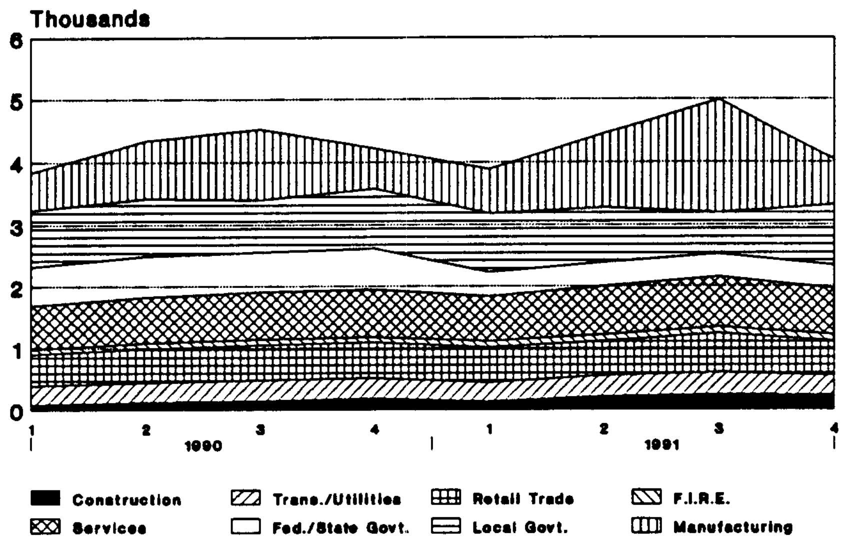
Table 3.4-3 and Figure 3.4-2 present employment statistics for the Kenai census subarea for 1990 and 1991, which includes Kenai, Soldotna, and Nikiski. As seen in the figure, there is a significant seasonal increase in employment during the 3rd quarter, primarily due to seafood processing in the manufacturing sector (with a peak of approximately 1800 employees in the 3rd quarter of 1991), and to a lesser extent in retail trade and services. Compared to other study area communities, the balance and diversity of employment reflects the areas economy. The combined employment of local, state, and federal government, has the highest year-around average. Mining, manufacturing, services, and retail trade represent relatively similar percentages of total employment.

Table 3.4-3: Kenai Census Subarea Quarterly Employment, 1990-1991

	Year/Quarter				Annual	Year/Quarter				Annual
	1/90	2/90	3/90	4/90	Average	1/91	2/91	3/91	4/91	Average
Total	4,927	5,430	5,707	5,411	5,369	4,887	5,468	6,085	4,982	5,356
Mining	868	878	913	991	913	869	817	883	762	833
Construction	85	127	151	191	139	134	221	252	238	211
Manufacturing	599	925	1,136	646	827	709	1,184	1,794	720	1,102
Trans	298	308	328	321	314	302	325	352	315	324
Trade	737	781	815	767	775	753	760	846	749	777
Wholesale	225	225	238	182	218	176	189	212	188	191
Retail	512	556	577	585	558	577	571	634	561	586
FIRE	88	89	89	108	94	101	103	103	100	102
Services/Misc	708	743	758	772	745	723	785	813	745	767
Government	1,544	1,581	1,517	1,617	1,565	1,345	1,274	1,042	1,353	1,254
Federal	80	84	87	90	85	88	92	90	91	90
State	547	566	589	565	567	303	296	289	284	293
Local	917	931	841	962	913	954	886	663	978	870

Source: Alaska Department of Labor, 1992.

Figure 3.4-1: Kenai Census Subarea Quarterly Employment, 1990-1991



Source: Alaska Department of Labor, 1992.

The oil industry has a major influence on employment, contributing to the mining, manufacturing and service sectors. Five plants at the Nikiski area generate over 500 full time year-round jobs. Oil and gas exploration, development, and production sector generate an additional 750-800 jobs in region.

3.4.2.4 Income

Table 3.4-4 shows the average monthly wage by quarter for the Kenai Census Subarea. In 1990, quarterly wage information reporting was consolidated on a Borough-wide basis. In 1990, the mining sector (under which oil and gas employment is reported) provided the highest average monthly income ($4,520, 4th quarter 1990). With the exception of oil spill related employment, it was also the highest paying sector in any of the study area communities. Manufacturing, construction, and state and federal government were also in the upper half of average monthly income. Retail trade, financial/insurance/real estate, and services were the lowest sectors in average monthly wage rates, ranging from $1,118 to $2,433 in 1990.

Table 3.4-4: Kenai Census Subarea Wage & Payroll, 1990

INDUSTRIAL CLASSIFICATION	1ST QUARTER		2ND QUARTER		3RD QUARTER		4TH QUARTER	
	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)
Mining	$4,204	$13.63	4298	$14.56	$3,935	$14.67	$4,520	$16.92
Construction	$3,120	$4.65	$3,510	$7.72	$3,868	$9.68	$3,399	$8.20
Manufacturing	$3,522	$10.51	$2,518	$16.00	$2,488	$22.59	$3,326	$12.94
Trans. Comm. & Util.	$2,826	$7.23	$2,768	$8.36	$3,167	$10.33	$2,850	$8.82
Trade	$1,235	$6.65	$1,118	$7.78	$2,433	$8.87	$1,260	$7.68
Finance-Ins. & R.E.	$1,654	$1.30	$1,490	$1.30	$1,202	$1.37	$1,614	$1.38
Services & Misc.	$1,591	$11.50	$1,559	$12.94	$1,595	$14.13	$1,691	$13.38
Government								
Federal	$2,775	$2.06	$2,952	$2.53	$2,887	$2.81	$3,040	$2.57
State	$2,977	$9.45	$3,023	$9.63	$3,102	$10.38	$3,040	$9.79
Local	$2,418	$15.96	$2,817	$19.11	$2,396	$10.63	$2,391	$16.47

Source: Alaska Department of Labor, 1991.

Mining and manufacturing create the highest average industry payrolls in the Borough ($10 to $22 million); state and local government close behind ($9 to $19 million), with retail trade and the federal government on the lower end ($1 to $3 million).

3.4.2.5 Public Fiscal Characteristics

Revenues: Table 3.4-5 presents revenue and expenditure characteristics for the City of Kenai for the period of FY 1991-1992. The major sources of general revenues are intergovernmental transfers. Intergovernmental transfers include state revenue sharing, municipal assistance, and the raw fish tax. State capital project funding fluctuates but can be a major source of revenue. Taxes are next in importance (25.3%), with sales tax accounting for two thirds of tax revenues. Fishing and support industry related property and sales are most likely a major component of these tax revenues. Interest and miscellaneous revenues also are a significant a source of revenue.

Table 3.4-5: City of Kenai Revenues and Expenditures

REVENUES	1992	1991
Taxes		
General Property Tax	$723,126	$731,457
Sales Tax	$2,798,475	$2,695,852
Franchise	$51,298	$46,620
Penalties and Interest	$6,263	$7,656
subtotal	$3,579,162	$3,481,585
Intergovernmental Transfers		
State		
Revenue Sharing	$333,633	$345,607
Municipal assistance	$583,666	$621,463
Fish Tax	$133,331	$303,594
Capital Project	$6,467,340	$3,443,035
Other	$626,099	$167,152
subtotal	$8,144,069	$4,880,851
Licenses and Permits	$35,455	$20,395
Charges for Service	$987,722	$1,000,114
Fines and Forfeits	$31,005	$34,179
Interest Revenue	$1,577,917	$2,162,335
Miscellaneous Revenues	$2,320,032	$1,775,664
Total Revenues	$16,675,362	$13,355,123
EXPENDITURES		
General government	$2,100,750	$1,797,669
Public Safety	$2,629,781	$2,444,417
Public Works	$1,164,893	$1,242,059
Parks, Recreation and Culture	$783,582	$782,642
Water and Sewer Services	$822,492	$749,272
Social Services	$314,769	$492,312
Airport	$509,906	$319,324
Debt Service	$733,871	$767,888
Capital Improvements	$8,196,137	$1,812,543
Other Financing Uses	$1,181,867	$2,706,900
Total Expenditures	$18,438,048	$13,115,026
EXCESS/DEFICIENCY	($1,762,686)	$240,097
FUND BALANCE	$18,181,564	$19,944,250

Source: City of Kenai, 1993.

<u>Expenditures</u>: Principal general fund expenditures include general government (10.2%), public works (25.7%), public safety (31.1%), parks/recreation/culture, water and sewer services, social services, airport, debt service (7.3%), and capital improvements (3.7%) and other. In 1992,

the City of Kenai ran a total fund deficiency of $1,762,686 with a fund balance of $18,181,564; in 1991 the excess was $240,097 and the fund balance $19,944,250.

3.4.3 Infrastructure Characteristics

3.4.3.1 Transportation Facilities

The Kenai Municipal airport services the Kenai/Soldotna area. Service to Anchorage and other Alaskan communities is provided by several commercial carriers. The airport has a 7,600 foot runway and is operated by the City of Kenai. Historically, fish from Bristol Bay and other western Alaska fisheries have been flown into Kenai for processing.

3.4.3.2 Marine Services

The majority of marine services in the Kenai area are for private use. Most are designed to meet the special use of the oil and gas industry. A new public dock was constructed in 1987. The new dock serves cargo handlers, sport and commercial fishermen, as well as pleasure craft.

3.4.3.3 Utilities

The City of Kenai exercises the following local powers: police and fire protection, water and sewer utilities, street maintenance and lighting, airport, parks and recreation, library, and animal control.

Water: Kenai receives water from two artesian wells located near Beaver Creek. The system has a daily capacity of 1.5 million gallons. Storage reserve is limited although the airport contains a 3 million gallon storage reservoir to be used predominantly for fire fighting capability.

Water demand for the Kenai area averages 0.6 million gallons a day (mgd) in the summer and 0.8 mgd in the winter. Increase in demand during winter is seen as result of people trickling water so their pipes do not freeze. Since half of Kenai residents receive water from private wells, demand figures should be doubled to calculate total water use.

Sewer: The Kenai sewer system is confined to city limits. The treatment plant is located west of the old townsite and has a design capacity of 1.3 million gallons a day. The system has 690 residential hookups and 33 commercial hookups.

Electricity: Electricity is provided by Homer Electric Association.

Natural Gas: Natural gas is supplied by Enstar Natural Gas Company.

Solid Waste: A local company, Peninsula Sanitation, collects solid waste in Kenai. Peninsula Sanitation takes waste to the local landfill.

3.4.3.4 Housing

Table 3.4-6 shows the 1990 housing characteristics. Because of the large oil and gas industry as well as the Kenai's role as a supply station, Kenai is less susceptible to population fluctuations. This stability is evident in the vacancy rates. Compared to other towns Kenai's apartment occupation varies little month to month. Single family units are the predominant housing type; median value is $82,200 and the median rent is $414 per month.

3.4.3.5 Land Availability

A land use survey done in 1978 found almost 80 percent of land inside Kenai to be vacant. Out of 18,270 acres counted the report said 14,510 acres are vacant.

Table 3.4-6: City of Kenai Housing Characteristics, 1990

TOTAL HOUSING UNITS	2,681

Occupancy	
Occupied Housing Units	2,329
owner occupied	1,270
renter occupied	7,059
Vacant Housing Units	352

Units in Structure	
1 Unit detached	1,442
1 Unit attached	23
2 - 4 Units	552
5 - 9 Units	128
10 or more units	273
mobile home, trailer	263

Households by type	
Families	1,626
Married couple	1,294
Male Householder	76
female Householder	256
Non-Family	703
Persons per Household	3
Persons Living in Group Quarters	35

Housing Value (specified owner-occupied units)	
less than $50,000	40
$50,000-99,000	712
$100,000-149,000	210
$150,000-199,000	31
$200,000-299,000	9
$300,000 or more	2
Median value	$82,200

Rental Rates	
less than $250	79
$250-499	611
$500-749	283
$750-999	25
$1,000 or more	3
Median rent	$414

Source: U.S. Bureau of the Census, 1991.

3.4.4 Industry Characteristics

3.4.4.1 Harvesting Sector

Kenai is about 70 miles north of the entrance to Cook Inlet from the Gulf of Alaska and is at the mouth of the Kenai River, a major salmon stream in southcentral Alaska. Cook Inlet is turbid in its upper area due to glacial influence, and has limited habitat for resident fish. As a result, Kenai fishermen are primarily drift gillnet and set net salmon fishermen who also participate in halibut fishing which can be accomplished in the lower inlet. There is limited participation in other fisheries because of travel time and cost to reach the fishing grounds. If an individual is interested in seriously pursuing other fisheries besides salmon and halibut, they would likely move to a community in closer proximity to the grounds.

Salmon permits have accounted for about half of all permits fished by Kenai fishermen in the last 10 years. The number of salmon permits has ranged from 191 in 1981 to 228 in 1983. The number of halibut permits typically ranges from 100 to 120 although the number of halibut permits fished by Kenai residents was as low as 34 in 1989.

Table 3.4-7: Commercial Fishery Permits Fished by Kenai Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	191	215	228	209	219	209	212	207	119	206
King Crab	1	0	1	2	0	0	3	0	0	1
Tanner Crab	1	0	0	0	2	0	1	3	0	1
Dungeness & Other	17	13	6	1	10	14	15	5	5	5
Herring	38	41	52	42	30	31	41	34	35	31
Sablefish	0	1	1	1	1	2	10	8	4	8
Halibut	110	123	171	128	66	103	105	120	94	n.a.
Other	3	6	6	4	0	0	39	20	3	13
Total	361	399	465	387	328	359	426	397	260	265
Number of individuals that fished permits	275	306	347	284	255	260	280	264	226	211

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Over the last 8 years Cook Inlet salmon permits have accounted for 83 to 95 percent of total salmon permits held by Kenai residents. The lowest number of Cook Inlet permits was reached in 1988 and may have been caused by the large salmon run in Cook Inlet in 1987. Permits increased dramatically in price after that season and some permit holders may have sold their permits to capture this increase in value.

Table 3.4-8: Salmon Permits Fished by Kenai Residents

	Year									
Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Area D (Yakutat)	1	1	2	0	1	0	1	1	1	1
Area E (Pr. Wm. Sound)	3	3	3	4	6	5	4	5	7	4
Area H (Cook Inlet)	180	193	202	185	188	179	181	172	90	179
Area K (Kodiak)	1	2	2	2	2	2	2	4	0	2
Area M (False Pass)	1	3	4	6	7	6	7	9	8	9
Area T (Bristol Bay)	5	12	12	11	15	16	16	15	12	10
Other	0	1	3	1	0	1	1	1	1	1
Total	191	215	228	209	219	209	212	207	119	206

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Table 3.4-9 shows information on the number of permits held by local residents for other types of fish. The decrease in permits fished for other finfish in 1985 may be a result of a poor salmon fishing season in 1984. Fishermen with low earnings were forced to take other jobs. Since these other finfish fisheries occur primarily prior to the salmon season, local residents were unable to commit the time and financial resources to engage in the fisheries.

Table 3.4-9: Other Finfish Permits Fished by Kenai Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A & D)										
Halibut		1					1	1		
Sablefish								2		1
Herring										
Other Finfish		1	1	2			2	4		2
Prince William Sound (E)										
Halibut	2	1	6	2	1	2	3	1	1	
Sablefish			1	1		1	4	1		2
Herring	3	1	2			1	1	2		2
Other Finfish			1	1			5	2	1	2
Cook Inlet (H)										
Halibut	104	114	148	116	60	84	85	103	83	
Sablefish		1			1		3	5	3	3
Herring	22	27	37	30	16	17	23	18	19	20
Other Finfish	3	5	4	1			26	9	2	8
Kodiak (K)										
Halibut	4	7	16	8	4	15	15	15	9	
Sablefish						1	3		1	2
Herring	10	5	1	3	6	6	9	9	10	6
Other Finfish							6	5		1
Peninsula/Aleutians (M)										
Halibut				1	1	1	1		1	
Sablefish										
Herring			1							
Other Finfish										
Bristol Bay (T)										
Herring	3	8	6	6	5	5	3	3	4	2
Other Areas and Unidentified										
Halibut			1	1						
Sablefish										
Herring			5	3	3	3	5	2	2	1
Other Finfish										
Unidentified										
Total	151	171	230	175	97	136	195	182	136	52

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Table 3.4-10 presents information on the number and area of shellfish permits fished by Kenai residents. The community has limited participation in these fisheries.

Table 3.4-10: Shellfish Permits Fished by Kenai Residents

Area/Type	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
King Crab										
Tanner										
Other Crab										
Other Shellfish				1						1
Prince William Sound (E)										
King Crab			1							
Tanner										
Other Crab										
Other Shellfish	2	2				1		1	3	
Cook Inlet (H)										
King Crab	1									
Tanner	1				2		1	3		
Other Crab	1				1		1	1	1	
Other Shellfish	14	11	6		9	13	14	3	1	4
Other Areas & Unidentified										
King Crab				2			3			1
Tanner Crab										1
Other Crab										
Other Shellfish										
Totals	19	13	7	3	12	14	19	8	5	7

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Employment: Table 3.4-11 presents estimates of employment by fishery (and gear type for salmon, herring, and other finfish) for the 1981 through 1989 period. The table focuses on employment generated by Kenai permit holders. Crew residency is assumed to be the same as the permit holder. Crew factors estimated by Thomas (1986) for the single year of 1985 are used for the entire time since comparable crew factor estimates are not available for other years. The crew factors used in the table are averages for these fisheries in the Gulf of Alaska.

Salmon fishing employs the largest number of persons although halibut fishery employment has reached comparable levels in prior years. The Cook Inlet salmon fishery, which is the predominant fishery for Kenai residents lasts 5 to 6 weeks for most fishermen. Preparation and other activities require additional time.

The model discussed in Section 4 projects that harvest employment in the future will increase slightly while processing employment will experience a modest decline. Kenai's location on Cook Inlet provides a locational advantage for harvesting the sockeye salmon stocks that return to the area, but local harvesters and processors incur higher relative costs when targeting other, more distant species. Local employment will depend primarily on the strength of the Cook Inlet salmon returns.

Table 3.4-11: Harvest Sector Employment of Kenai Residents

		Year								
Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon										
Purse Seine	4.4	18	22	18	22	26	13	22	31	13
Drift Gillnet	1.75	200	214	221	217	229	201	196	187	30
Set Gillnet	2.1	155	183	202	170	174	191	204	195	206
Hand Troll	1	0	1	3	1	1	0	1	1	1
Power Troll	1.75	0	0	0	0	0	0	0	0	0
King Crab	3.25	3	0	3	7	0	0	10	0	0
Tanner Crab	3.3	3	0	0	0	7	0	3	10	0
Other Crab	2.6	3	0	0	0	3	0	3	3	3
Other Shellfish	3.3	53	43	20	3	30	46	46	13	13
Herring										
Purse Seine	4.25	17	26	26	17	21	30	26	26	21
Gillnet	2	64	70	90	72	20	48	72	54	60
Pound	1									
Sablefish	3.55	0	4	4	4	4	7	36	28	14
Halibut	2.5	275	308	428	320	165	258	263	300	235
Other & Unidentified										
Longline	2.85	9	11	14	6	0	0	105	48	0
Trawl	3.1	0	0	0	0	0	0	0	0	0
Pots	3.1	0	0	0	0	0	0	0	0	9
Other	1.9	0	4	2	4	0	0	4	8	2

Source: Derived by Northern Economics from Thomas, 1986 and data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Harvest: Salmon represent the largest fishery for Kenai residents in terms of pounds harvested. Upper Cook Inlet has relatively few fisheries resources except salmon which migrate through its waters to return to their natal streams. Kenai residents must travel substantial distances to participate in most other fisheries and this distance reduces participation by Kenai fishers. Table 3.4-12 shows the harvest amounts by major species for the 1981 through 1990 time period. These figures should be considered relative indicators of the level of harvest by major species since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest levels since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. Non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.4-12: Fisheries Harvest by Kenai Residents

(millions of pounds)

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	3.2	9.4	9.4	4.2	6.9	8.1	13.1	11.6	9.3	6.3
King Crab		0.0			0.0	0.0		0.0	0.0	
Tanner Crab		0.0	0.0	0.0		0.0			0.0	
Other Crab		0.0		0.0		0.0				0.0
Other Shellfish		0.0	0.0							
Herring	0.1	1.0	1.0	0.2	0.8	0.5	0.3	0.3	0.2	0.1
Sablefish	0.0						0.1			
Halibut	0.1	0.2	0.3	0.4	0.2	0.5	0.6	0.0	0.5	0.0
Other & Unidentified			0.1		0.0	0.0	0.2	0.1		0.1
Non-disclosed	2.2	1.5	1.2	2.3	n.a.	1.5	2.1	2.4	1.0	1.7
Total	5.6	12.1	12.0	7.1	7.9	10.6	16.4	14.4	11.0	8.2

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

n.a. Not shown in data files.

Earnings: Table 3.4-13 shows the ex-vessel earnings of Kenai fishermen. The amounts shown in this table should be considered relative indicators of the importance of each fishery since this table is summed from species, area, and gear categories which have data subject to non-disclosure rules. The last row in the table provides information on the total value of these non-disclosures and are summed with the other fishery values to arrive at total ex-vessel earnings for the community.

Between 1981 and 1989 total ex-vessel earnings ranged from $3.3 million to $28.7 million. Record salmon returns in 1987 and record prices for salmon in 1988 combined to make those two years more than double the total ex-vessel earnings of any previous year.

Table 3.4-13: Total Ex-Vessel Earnings of Kenai Residents

(millions of $)	Year								
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon									
Drift Gillnet	1.9	5.1	4.1	2.2	4.6	5.6	10.8	14	1.2
Set Gillnet	1.1	2.6	2	0.8	2.2	2.8	8.4	12.1	14
Hand Troll	0					0			
Power Troll	0	0	0	0	0	0	0	0	0
King Crab		0			0	0		0	0
Tanner Crab		0	0	0		0			0
Other Crab		0	0	0		0			
Herring									
Purse Seine		0.1	0.1		0.1	0.1			
Gillnet		0.1	0.1		0.1	0.1	0.2	0.2	0.1
Pound & Other		0			0	0			0
Sablefish	0.2	0.2	0.3	0.3	0.2	0.6	0.8		
Halibut	0						a	0.1	0.7
Other & Unidentified									
Longline			a		0	0	a	a	
Trawl	0	0	0	0	0	0	0	0	
Pots	0	0	0	0	0	0	0	0	
Other	0				0	0			
Non-disclosed	0.1	0.8	0.6	1	0.8	0.9	1.5	2.3	0.5
Total	3.3	8.9	7.2	4.3	8	10.1	21.7	28.7	16.5

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

a Less than $50,000.

Boat and Gear Characteristics: Table 3.4-14 shows an increase of about 25 percent in the number of locally owned vessels participating in various fisheries. Almost all of this increase has occurred in the 6.1 to 12.1 meter (20-39 feet) length category. This category is the dominant size of drift gillnet boats used in the Cook Inlet fishery.

Table 3.4-14: Kenai Resident Fishing Vessels, by Length

		Year									
Size in Meters	Size in Feet	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-6.0	0-19	21	29	51	37	11	15	19	18	11	6
6.1-12.1	20-39	192	215	279	235	186	222	258	245	132	134
12.2-18.2	40-59	21	22	21	19	18	18	38	26	21	35
18.3-24.3	60-79	2	0	0	0	0	1	9	8	5	1
24.4-30.4	80-99	4	2	0	0	3	0	5	0	2	5
30.5-36.5	100-119	0	0	0	0	0	0	0	0	0	0
36.6-42.6	120-139	0	0	0	0	0	0	0	0	0	0
42.7-48.7	140-159	0	0	0	0	0	0	0	0	0	0
48.8-54.8	160-179	0	0	0	0	0	0	0	0	0	0
54.9-60.9	180-199	0	0	0	0	0	0	0	0	0	0
61.0+	200+	0	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

3.4.4.2 Processing Sector

In 1992 Kenai was listed as the 4th port in the United States in value of seafood landed (National Marine Fisheries Service, 1994). This reflects near record landings and high prices for sockeye in Cook Inlet that year. Processing plants historically developed in Kenai to can sockeye salmon from Cook Inlet. Sockeye and other salmon species provide most of the raw product for the plants and minor amounts of other species (e.g., halibut and herring) are processed. The processing industry is very seasonal in Kenai with most plants closed during the winter and opening in the spring or early summer for halibut or herring openings.

There are 5 major processing plants currently in Kenai. These are:

Columbia Ward Fisheries;
Dragnet Fisheries;
Inlet Fisheries;
Kenai Packers; and
Salamatof Seafoods.

There are several other large processing plants located near the community of Kenai. These include Cook Inlet Processing at Nikiski, Keener Packing and Royal Pacific Seafoods on Kalifornsky Beach Road, and Trans-Aqua Seafoods and Whitney Seafoods on the Kasilof River. There is substantial competition between these plants during the salmon season, but few of them are open to process other species so local fishermen typically move their vessels to other ports if they pursue other fishing opportunities.

3.4.4.3 Support Sector

Columbia Ward Fisheries and Kenai Packers have a large number of out-of-state fishermen that sell to those plants. To attract and keep this group of fishermen these two plants provide dormitory housing, meals, vessel supplies and repair facilities among other services. Other plants provide some of these services but not to the extent of these two plants. Most fishing vessels tie up at the plants or use anchor buoys provided by the plants that extend throughout the first few miles of the river.

The port of Kenai city dock is located one mile upstream from the mouth of the Kenai River. The dock face provides a 170' face with a maximum draft of 36' (4' at MLLW). There is an eight ton crane, water and fuel available (Alaska Department of Transportation & Public Facilities, 1987). Kenai and the nearby communities also have numerous support services that provide repairs, welding, fishing gear and supplies. Food and groceries are available throughout the area and there are a number of hotels and other types of lodging.

3.5 King Cove

3.5.1 Description/Setting

King Cove is located on the south side of the Alaska Peninsula, between Cold Bay to the west and Belkofski Bay to the east it lies 18 miles southeast of the community of Cold Bay and 625 miles southwest of Anchorage. Incorporated as first class city, it is one of six communities in the Aleutians East Borough. King Cove is located 20 feet above sea level, on a gravel spit that divides an outer embayment and an inner lagoon, and is flanked by steep-sided mountains 1500 feet high. The vegetation is representative of the treeless southern Alaska Peninsula and Aleutians Islands. The climate is typical of the Alaskan maritime zone, with cool summers and mild winters. King Cove is in the path of frequent west-to-east storm tracks of the North Pacific, especially in winter. Periods of strong winds can occur, accentuated by the steep topography which can act as a funnel. Precipitation is relatively light for a maritime climate, although the area is often cloud or fog covered. The waters of the south side of the Alaska Peninsula are ice-free year-around.

King Cove is a fishing community, with significant participation by local residents commercial fishing and fish processing. The community was founded when Pacific American fisheries built a cannery at the head of King cove in 1911. Some migration to the community occurred in response to employment and education opportunities, and residents are largely descendants of native Aleuts, early Russian settlers and European immigrants. Community residents also participate in subsistence activities. In 1981, the King Cove Corporation, a village corporation formed under ANCSA, had 335 stockholders.

3.5.2 Socioeconomic Characteristics

3.5.2.1 Local Economy

Commercial fishing and seafood processing are the major components of the economy of King Cove. Salmon is the primary species harvested and processed, but fishermen also harvest king, tanner, and Dungeness crab, herring for roe, halibut, Pacific cod and sablefish. Minor amounts of other species may also be harvested. Commercial fishing accounted for 45 percent of annual employment income to residents and fish processing accounted for 32 percent of annual employment income to residents in 1984. While not as prominent as commercial fishing, the public sector is also important to the economy. In 1984, the city, school district, and post office accounted for 16 percent of annual employment income to residents and 74 percent of the 46 permanent full-time wage employment. The King Cove Corporation and private businesses are also components of the economy. In addition to Peter Pan Seafoods, other businesses include the Harbor Grill Restaurant, the Fleets Inn Motel, Wilson's Fuel Sales, Gould and Sons Grocery and General Merchandise, Mt. Dutton Cable Television, the Last Hookoff Tavern, Mack's Trucking, and an auto shop.

Subsistence harvests represent a component of the local economy, but are of secondary importance to commercial fishing. Despite the relative affluence of the community, 60 percent of meat, fish, and fowl protein consumed in the community is locally derived. The cash value for replacement of subsistence harvest was estimated at $763,000 in 1984, or 9 percent of wage and non-wage income (Stephen Braund and Associates, 1986a). There is a strong but complex linkage between commercial and subsistence harvest activities, which often includes concurrent harvest efforts and investment in equipment shared for harvest efforts.

3.5.2.2 Population

The Alaska Peninsula and Aleutian Islands have long been inhabited by Native Aleuts. Nearby Belkofski was most likely the nearest settlement, although King Cove was likely used for seasonal harvest activities. The arrival of the Russians in the 18th century initiated permanent changes to Aleut culture. The region's Native population declined from 12,000 at the time of Russian contact to 1,500 by 1825. Transition to American stewardship resulted in commercial diversification of the Aleutians; the cod fishery in particular attracted numerous European immigrants. As mentioned earlier, King Cove was founded as a community when Pacific American fisheries built a cannery at the head of King Cove in 1911. The new cannery attracted Aleut residents of nearby villages with employment opportunities and supplies, and in-migration continued as opportunities elsewhere dwindled and a school was established.

The community has experienced periods of rapid growth over the last four decades, primarily based on new employment opportunities opened up through fishing and fish processing (City of King Cove 1981). Population surged 79 percent during the period of 1950-1960, decreased slightly from 1960 to 1970, and grew by 63 percent between 1970 and 1980. Over the last 8 years, population has increased by 16 percent. The population estimates shown in Table 3.5-1 are taken from Population Overview, published by the Alaska Department of Labor. These estimates are substantially lower than the population estimates used by the City of King Cove and the Alaska Department of Community and Regional Affairs, which estimates the 1989 population at 790 persons.

Table 3.5- 1: City of King Cove Historic Population

Year	Population
1940	135
1950	162
1960	290
1970	283
1980	460
1981	547
1982	521
1983	536
1984	523
1985	513
1986	552
1987	
1988	535
1989	504
1990	677
1991	744
1992	788

Sources: Data for 1940 to 1980 from Stephen Braund and Associates, 1986b; data for 1981 to 1979 and 1991 to 1992 from Alaska Department of Labor, various years; 1990 data from U.S. Bureau of the Census, 1991.
Note: The Alaska Department of Labor did not publish population estimates for places in 1987.

Table 3.5-2 shows 1980 and 1990 population composition by age and sex. The 1990 data are not accurate because the Ram's Creek subdivision was not included within the City of King Cove by the Bureau of the Census. The Bureau of the Census later added these persons to the total population of King Cove but did not update other population data. The 1990 data are presented for informational purposes only. The 1980 and 1990 data should not be compared.

The age structure is characteristic of Alaska's relatively young age structure. Since 1980, the relatively modest population increase has been mostly internal, with approximately 15 births per year and little in-migration. Trends in employment opportunities and the fishing industry are also reflected in population trends. Past city managers have indicated that the closure of the king crab fishery after 1982 has slowed population growth.

Table 3.5- 2: City of King Cove Population Characteristics

	1980	1990	% change
Total	472	457	-3.18%
Male	240	256	6.67%
Female	232	201	-13.36%
Age	1980	1990	% change
0-4	57	27	-52.6%
5-14	83	50	-39.8%
15-19	50	22	-56.0%
20-24	54	53	-1.9%
25-34	96	126	31.3%
35-44	42	78	85.7%
45-54	60	50	-16.7%
55-59	13	25	92.3%
60-64	4	10	150.0%
65+	13	10	-23.1%

Sources: U.S. Bureau of the Census, 1981 and 1991.
Note: The 1990 census data do not include Ram's Creek Subdivision in the City of King Cove.

The population of King Cove experiences a seasonal fluctuation associated with commercial fishing. During the summer, the population increases by up to 450 (Alaska Department of Community and Regional Affairs, 1987).

3.5.2.3 Employment

Employment in King Cove includes elements of wage and non-wage income, and full time and seasonal employment opportunities. Most full time wage employment tends to be in the public sector and non-fishery private sector; fish processing provides a greater number of jobs but on a seasonal basis. Table 3.5-3 shows the Aleutians East Census Area payroll industry series data for the 4 quarters of 1990 and 1991.

Table 3.5- 3: Aleutians East Census Area Quarterly Employment, 1990-1991

	Quarter/Year				Annual	Quarter/Year				Annual
Nonag. Wage & Salary	1/90	2/90	3/90	4/90	Average	1/91	2/91	3/91	4/91	Average
Total	1,307	1,540	1,570	1,287	1,426	1,898	2,387	2,122	2,725	2,283
Mining	*	*	*	*	0	0	0	0	0	0
Construction	7	6	8	*	5	141	181	79	109	128
Manufacturing	910	1,080	1,160	836	997	397	481	252	524	414
Trans. Comm. & Util.	68	78	94	101	85	198	231	204	271	226
Trade	45	61	69	60	59	468	608	474	633	546
Finance-Ins. & R.E.	20	*	19	19	15	51	56	58	59	56
Services & Misc.	21	39	25	21	27	296	451	366	538	413
Government	230	241	190	236	224	532	533	567	484	529
Federal	32	30	29	28	30	52	64	64	70	63
State	*	0	*	*	0	88	103	99	103	98
Local	198	211	161	208	195	392	366	404	311	368

Source: Alaska Department of Labor, 1992.

According to Northern Economics (1990), the King Cove School district was the major public sector employer in 1987, with 23 full time and 2 part-time employees. The City of King Cove employed 5 full time positions and 12 part-time positions. Among the private employers, King Cove Corporation employed 6 persons full-time in 1987. The seafood processing industry (Peter Pan Seafoods) provided only 5 full-time positions in 1987, but also provided 336 part-time positions. The vast majority of these positions are filled by non-residents; in 1985 only 6 percent of the seasonal processing employment was filled by residents of Sand Point. Other private businesses are estimated to provide 6 full-time and 18 part-time positions. The omission of residential housing areas from the City of King Cove by the Bureau of the Census renders the census data ineffectual for analysis of the employment situation in King Cove.

Non-wage employment is also provided by commercial fishing, in the form of permit holders and crew members. Many individuals hold permits for more than one fishery, and as a result, the total number of individuals holding permits is between the number of salmon permit and combined salmon, halibut, and crab permits.

3.5.2.4 Income

The per capita income of King Cove in 1989 was $18,228. Commercial fishing and fish processing dominates income to King Cove residents although its portion of total income varies significantly on a year-to-year basis. Table 3.5-4 shows quarterly wage information for the Aleutians East Census Area for 1990. Construction wages fluctuate significantly, but remain the highest average monthly wage, followed by federal and local government.

Table 3.5- 4: Aleutians East Census Area Quarterly Wage, 1990

	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
INDUSTRIAL CLASSIFICATION	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)
Mining	*		*		*		*	
Construction	$5,016	$0.11	$2,903	$0.06	$6,553	$0.15	*	
Manufacturing	$1,771	$4.83	$1,976	$6.40	$2,224	$7.74	$1,547	$3.88
Trans. Comm. & Util.	$1,925	$0.39	$1,809	$0.42	$1,940	$0.55	$2,012	$0.61
Trade	$1,369	$0.18	$1,181	$0.22	$1,207	$0.25	$1,452	$0.26
Finance-Ins. & R.E.	$984	$0.06	*		$769	$0.04	$799	$0.04
Services & Misc.	$968	$0.06	$538	$0.06	$785	$0.58	$753	$0.05
Government								
Federal	$2,969	$0.29	$3,481	$0.31	$3,253	$0.28	$3,353	$0.28
State	$0		$0	$0.43	$0		$0	
Local	$2,125	$1.26	$2,322	$1.47	$1,869	$0.90	$2,166	$1.35

Source: Alaska Department of Labor, 1992.

3.5.2.5 Public Fiscal Characteristics

Revenues: Table 3.5-5 presents revenue and expenditure characteristics for the City of King Cove for the period of FY 1990 through FY 1991. They are broken into General Funds and Special Revenue, which include sales tax, intergovernmental transfers and other sources. The major sources of 1991 general revenues are sales tax, followed by intergovernmental transfers, which includes revenue sharing from the raw fish tax. Fishing and support industry related sales are most likely the major component of sales tax revenues. The other category represents 90 percent of special revenue with includes service and utility charges.

Expenditures - Principal general expenditures include general government (city council, non-departmental, administration/finance), public works, public safety, utilities (electric, water and sewer, solid waste), boat harbor, recreation programs, health clinic, and other. Among general fund line items, general government is largest, followed by public safety and public works. Special funds are led by electric, followed by the boat harbor and the health clinic. In 1993, King Cove ran a general fund excess of $704,600, and a general fund balance of $833,129.

Table 3.5- 5: City of King Cove Revenue and Expenditure Summary

	1991		1990	
REVENUES	General Fund	Special Revenue	General Fund	Special Revenue
Sales Tax	$812,216	$0	$783,137	$0
Intergovernmental Transfers	$675,476	$41,000	$830,083	$38,000
Other	$175,768	$811,715	$114,473	$651,186
Total Revenues	$1,663,460	$852,715	$1,727,693	$689,186
EXPENDITURES				
General Government	$308,128	$0	$271,926	$0
Public Safety	$263,175	$0	$209,570	$0
Public Works	$272,501	$0	$180,573	$0
Electric	$0	$350,746	$0	$249,521
Water and Sewer	$0	$34,377	$0	$25,887
Solid Waste	$0	$95,134	$0	$62,364
Boat Harbor	$0	$202,737	$0	$130,661
Health Clinic	$0	$174,762	$0	$164,218
Recreational Programs	$50,337	$0	$46,779	$0
Other	$64,719	$0	$121,380	$0
Capital Projects	$0	$0	$0	$0
Debt Service	$0	$0	$0	$0
Total Expenditures	$958,860	$857,756	$830,228	$632,651
EXCESS/DEFICIENCY	$704,600	($5,041)	$897,465	$56,535
FUND BALANCE	$833,129	$1,943	$867,314	($96,570)

Source: City of King Cove Annual Budget, 1992.

3.5.3 Infrastructure Characteristics

3.5.3.1 Transportation Facilities

The airport for King Cove is located approximately 5 miles north of town and is connected to the city road system. The airfield is a state-owned facility with a gravel airstrip 4300 feet long. Service is provided by Peninsula Airways out of Cold Bay.

3.5.3.2 Marine Services

Dock Facilities: The small boat harbor has several wharves which are suitable for movement of crab pots and other fishing gear for large crabbers and trawlers. The Alaska Marine

Highway System ferries, and larger vessels use the Peter Pan docks or the city's new deep draft dock.

Marine Transportation: There are three aspects to the marine transportation system; the City small boat harbor, the Peter Pan Seafoods dock system, and the City's new deep draft dock. The boat harbor has slips for 86 boats, a transient wharf, and an inner harbor dock for loading larger vessels. The inner harbor dock is 370 feet long and 20 feet wide, and is situated in water deep enough to moor boats on both sides. It is used to load and offload crab pots, nets, other heavy gear and supplies. During the peak use in the summer, there have been up to 43 more transient boats than slips in the harbor. During the winter 23 slips were not permanently occupied in 1986 (COE 1986).

The Peter Pan Seafoods dock was the principal loading/unloading facility in town; in addition to commercial fishing traffic, both the state ferry and supply barges unloaded there. Some of this traffic has moved to the City's dock. Peter Pan's primary dock is 400 long. Peter Pan plans to add a floating dock at the end of the existing structure to aid in unloading smaller vessels. Peter Pan also has additional smaller docks, including drydock facilities and a fuel dock.

The City's new deep draft dock consists of a 200 foot by 30 foot structure with a 30 foot wide access road, located southeast of the boat harbor on the seaward side of the spit. The state ferry and some common carrier call at the City's dock to unload freight. The City plans to add fueling service at the new dock, and to add the capability of bringing fuel ashore from the facility.

King Cove receives seasonal service from the Alaska Marine Highway System. The M/V Tustumena makes 6 visits between May and September. Regular year around barge service is provided by two carriers.

Several harbor improvement projects are currently under consideration. The Alaska Department of Transportation and Public Facilities has proposed construction of additional docking and boat launch facilities. A 200 foot by 30 foot small boat ramp and staging area would be constructed in the protected area between the dock access road and the spit. The U.S. Army Corps of Engineers is considering expansion of the small boat harbor by 20 berths, primarily for transient vessels. This would reduce navigation hazards and damage to vessels.

Marine Services: A variety of marine services are available in King Cove, from the City, Peter Pan Seafoods, Seattle Ship's Supply, and other private business and individuals. These include fuel sales, crab pot storage, and a net loft for mending gear. See Section 3.5.4 Support Sector.

3.5.3.3 Utilities

Water and Sewer: Service is provided by the City of King Cove. The Ram Creek Reservoir provides 2 million gallons per day, which meets all year around residential and fish processing needs. Peter Pan Seafoods purchases water from the City. The City is evaluating several alternatives for improving the quantity and quality of water service. The sewer system was installed in 1970 and upgraded in 1986. Nearly 95 percent of the residences are connected.

Solid Waste Disposal: The City has recently constructed a new 4 acre sanitary landfill, and provides residential, commercial, and industrial service.

Electricity: Electrical service is provided by the City of King Cove. Peter Pan Seafoods owns and maintains its own power generation system.

3.5.3.4 Housing

There are 180 single family housing units in King Cove spread between the original townsite and two subdivisions (Ram Creek, 26 units, and Deer Island, 30 units as of 1988). Housing stock includes old wood frame houses, prefabricated HUD houses, larger and more modem homes, mobile homes, and apartments. The 1990 census data shows only 90 occupied units and 39 vacant units, reflecting the omission of housing areas outside the city core area. The median rent estimated by the census was $670 per month and the median value of core area homes was $78,600.

3.3.3.5 Land Availability

Like other Aleutian Islands communities, the restrictive geographic setting places some constraints on land use and community expansion. Developable land in the immediate vicinity of the "downtown" area of King Cove is extremely limited. Most of the remaining buildable land is located at Rams Creek. Other areas that have been identified for potential future development are located beyond the present city limits of King Cove to the north, between the airport and Leonard Harbor.

3.5.4 Industry Characteristics

3.5.4.1 Harvesting Sector

The community of King Cove began in 1911 with the establishment of a cannery at the location and local residents have been salmon fishermen for over 70 years. Salmon fishing remains the dominant fishery for local residents (See Table 3.5-6). King crab harvesting began in the late 1950's and in the late 1960's harvesting of tanner crab commenced. Recent years have seen local fishermen begin to pursue halibut, herring, sablefish, and Pacific cod.

Table 3.5- 6: Commercial Fishery Permits Fished by King Cove Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	78	78	78	73	71	71	68	67	63	63
King Crab	17	22	3	6	5	8	14	8	6	7
Tanner Crab	22	22	33	22	19	21	20	28	27	4
Other Shellfish	0	1	3	4	1	2	0	0	2	2
Herring	4	12	7	12	5	5	4	2	6	1
Sablefish	0	0	1	1	5	14	11	9	3	6
Halibut	0	12	20	9	16	30	53	34	27	n.a.
Other	0	0	2	3	3	8	23	22	12	15
Total	121	147	147	130	125	159	193	170	146	98
Number of individuals that fished permits	70	75	88	78	76	84	86	82	76	68

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990.
Note: 1990 data are preliminary.

The total number of permits held by King Cove residents has increased 40 percent over the 1981 to 1988 time period while the number of individuals owing permits has increased 17 percent. The number of salmon and crab permits are down from their peak of the early 1980's, while the number of groundfish permits is up substantially.

As Table 3.5-6 demonstrates, salmon fishing remains the predominant fishing activity of King Cove residents with salmon permits accounting for about 40 percent of the total permits held by local fishermen in 1988. Over 80 percent of the residents with fishing permits held a salmon limited entry permit in 1988. Almost all of these permits are held in the False Pass (Area M) management area. Table 3.5-7 shows the number and management area for salmon permits held by local fishermen since 1981.

Table 3.5- 7: Salmon Permits Fished by King Cove Residents

	Year									
Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Area M (False Pass)	77	78	78	73	70	70	64	63	60	52
Area T (Bristol Bay)	1	0	0	0	1	1	4	4	3	11
Total	78	78	78	73	71	71	68	67	63	63

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990.
Note: 1990 data are preliminary.

King Cove fishermen also harvest other species of finfish. Table 3.5-8 shows information on the number of permits for other types of fish held by local residents. Increases in the number of other finfish permits issued to King Cove residents reflects the diversification of the fleet into new fisheries. Decreasing participation in herring fisheries has occurred but increasing participation in halibut and sablefish has resulted in increases in the total number of other finfish permits.

Longline fisheries for halibut and sablefish in waters close to King Cove have accounted for the largest increase in the number of other finfish permits held by King Cove residents over the past few years. The types of fisheries and proximity to King Cove reflect the constraints of the resident small boat fleet in the community. Salmon and seine gillnet boats can easily accommodate longline gear, and fishermen can participate in these fisheries prior to and after the primary salmon season.

Table 3.5- 8: Other Finfish Permits Fished by King Cove Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
Sablefish			1	1	1	1				
Herring										
Other Finfish			1	1						
Kodiak (K)										
Halibut							2			
Sablefish										
Herring										
Other Finfish						1	2			
Peninsula/Aleutians (M)										
Halibut		12	19	8	13	28	41	33	27	
Sablefish					2	12	11	8	3	6
Herring	3		3	3	3	2	3	1	2	1
Other Finfish			1		1	7	21	21	11	13
Bristol Bay (T)										
Halibut							3			
Herring	1	12	4	9	2	3	1	1	4	
Other Finfish										1
Other Areas and Unidentified										
Halibut			1	1	3	2	7	1		
Sablefish					2	1		1		
Herring										
Other Finfish				2	2			1	1	1
Unidentified										
Total	4	24	30	25	29	57	91	67	48	22

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990.
Note: 1990 data are preliminary.

King Cove residents have harvested crab since the 1950's. Table 3.5-9 shows the change in number of permits issued for crab harvesting over the 1981-1988 time period. The number of shellfish permits held by King Cove residents reflects the decline in the king crab resource throughout Alaska. Management closures and declining stocks have resulted in fewer vessels harvesting king crab in local waters. The tanner crab resource has been relatively stable through 1988 and the number of permits for this species has not decreased.

Seiners harvested king crab in previous years but the vessels and equipment sustained extensive damage each season since the boats were not stout enough to handle the 500 - 700 pound crab pots traditionally used in the crab fishery. In 1986 a few boats tried a trapezoidal or cone style pot that could be nested and which weigh 100 - 125 pounds. These pots can be easily handled on seine boats without damage to the hull or equipment. The catch rate for these pots is supposedly slightly less than traditional pots, but small boats can carry 80 to 100 of these nested pots in one trip compared to 10 - 16 of the larger pots which have to be stacked. This new technology has attracted the majority of the limit seiners into the fishery (Utecht, 1987).

Table 3.5- 9: Shellfish Permits Fished by King Cove Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Kodiak (K)										
King Crab		1								
Tanner Crab			1							
Other Crab		1	1	1	1	2				
Other Shellfish										
Peninsula/Aleutians (M)										
King Crab	15	20								
Tanner Crab	20	20	28	19	17	18	16	22	21	
Other Shellfish									2	2
Other Areas & Unidentified										
King Crab	2	1	3	6	5	8	14	8	6	7
Tanner Crab	2	2	4	3	2	3	4	6	6	4
Other Crab			2	3						
Other Shellfish										
Totals	39	45	39	32	25	31	34	36	35	13

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990.
Note: 1990 data are preliminary.

Employment: Section 2.4 discussed employment by gear type for the Bering Sea fisheries. This section addresses employment levels in the harvesting sector for the community of King Cove. Table 3.5-10 presents estimates of employment by fishery (and gear type for salmon and herring) for the 1977 through 1986 time period. The table focuses upon employment generated by King Cove permit holders. Crew factors estimated by Thomas (1986) for the single year of 1985 are used for the entire 10 year time period since comparable crew factor estimates are not available for previous years.

This table assumes that crew member residency is the same as the permit holder. There are exceptions to this assumption, but it is believed that the exceptions will offset each other, making the assumption generally true. The number of fishing operations is based on the number of permits with landings in the fishery.

The model discussed in Section 4 projects that harvest employment in the future will remain about the same as present levels, with some modest increase in processing employment.

Table 3.5- 10: Harvest Sector Employment of King Cove Residents

		Year									
Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon											
Purse Seine	4.4	176	180	163	167	167	167	154	150	141	145
Drift Gillnet	1.75	61	60	60	51	51	53	44	40	37	33
Set Gillnet	2.1	8	6	13	13	8	8	17	21	21	23
Hand Troll	1	0	0	0	0	0	0	0	0	0	0
Power Troll	1.75	0	0	0	0	0	0	0	0	0	0
King Crab	3.25	55	72	10	20	16	26	46	26	20	23
Tanner Crab	3.3	73	73	109	73	63	69	66	92	89	13
Other Crab	2.6	0	3	8	10	3	5	0	0	0	0
Other Shellfish	3.3	0	0	0	0	0	0	0	0	7	7
Herring											
Purse Seine	4.25	4	26	30	26	13	17	13	9	26	4
Gillnet	2	6	8	0	12	4	2	2	2	0	0
Pound	1	0	0	0	0	0	0	0	0	0	0
Sablefish	3.55	0	0	4	4	18	50	39	32	11	21
Halibut	2.5	0	30	50	23	40	75	133	85	68	
Other & Unidentified											
Longline	2.85	0	0	17	17	6	20	57	43	9	11
Trawl	3.1	0	0	0	0	0	0	0	0	28	31
Pots	3.1	0	0	3	6	3	3	6	12	0	
Other	1.9	0	0	0	0	0	0	2	10	0	2

Source: Derived by Northern Economics from Thomas, 1986 and data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Harvest: Salmon represent the largest fishery for King Cove residents in terms of pounds harvested. Table 3.5-11 shows the harvest amounts by major species for the 1981 through

1990 time period. These figures should be considered relative indicators of the level of harvest by major species since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest levels since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. Non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.5- 11: Fisheries Harvest by King Cove Residents

(millions of pounds)

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	11.5	14.5	11.0	23.9	11.1	10.9	6.1	14.2	11.3	8.9
King Crab	0.8	0.2				0.1	0.2	0.1	0.1	0.2
Tanner Crab	0.9	0.4	1.0	0.5	1.1	0.7	0.4	1.8	1.0	0.3
Other Crab	0.0						0.0	0.0	0.0	0.0
Other Shellfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Herring		0.3	0.6	0.1	0				0.2	
Sablefish	0.0	0.0				0.3	0.2	0.1		0.1
Halibut	0.0	0.1	0.1	0.1	0.1	0.3	0.5		0.2	
Other & Unidentified	0.0	0.0				0.1	0.2	0.1	0	6.4
Non-disclosed	0.5	0.3	0.3	1.0	n.a.	1.3	1.3	1.2	3.7	0.3
Total	13.7	15.8	13.0	25.6	12.3	13.7	8.9	17.5	16.5	16.2

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.
n.a. Not shown in data files.

Earnings: The salmon fishery is the largest single fishery in terms of gross revenue to the King Cove fleet, and the seine fleet accounts for the major part of this fishery. In years where salmon fishing is poor to average, the combined value of other species can account for a substantial part of total ex-vessel earnings in the community.

Table 3.5-12 shows the ex-vessel earnings of each major species harvested by the resident fleet. These figures should be considered relative indicators of ex-vessel earnings by species and gear type since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest values since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. All non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.5- 12: Total Ex-Vessel Earnings of King Cove Residents

(millions of $)	Year								
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon									
Purse Seine	5.1	3.8	3.3	6.9	4.1	4.2	3.1	11.4	5.5
Drift Gillnet	1.5	1.8	1.5	1.3	1.7	2.3	1.9	2.3	1.7
Set Gillnet	a	a	0.1	0.2	0.1	a	0.1	0.4	0.3
King Crab	1.2	0.8	a	a	a	0.5	0.9	0.6	
Tanner Crab	0.6	0.6	1.1	0.5	1.4	1.3	0.9	2.9	1.8
Other Crab	0	a	a	a	a	a	0	0	0
Other Shellfish	0	0	0	0	0	0	0	0	
Herring									
Purse Seine	a	b	0.1	a	a	a	a	a	
Gillnet	a	b	0	b	a	a	a	a	0
Pound & Other	0	a	0	0	0	0	0	0	0
Sablefish	0	0	a	a	a	0.3	0	a	
Halibut	0	b	0.1	0.1	0.1	0.5	0.6	a	0.4
Other & Unidentified									
Longline	0	0	a	a	a	b	a	b	
Trawl	0	0	0	0	0	0	0	a	
Pots	0	0	a	a	a	a	a	a	
Other	0	0	0	0	0	0	a	a	
Non-disclosed	0.4	0.3	0.4	0.8	0.9	1.8	1.7	0.4	0.7
Total	8.8	7.3	6.6	9.8	8.3	10.9	9.2	18	10.4

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990.

Boat and Gear Characteristics: The local, permanent fleet was composed of approximately 72 boats in 1989 (Northern Economics, 1990). This fleet of 72 vessels was primarily composed of three groups of boats: 1) limit purse seiners; 2) smaller purse seiners; and 3) drift gillnet boats (See Section 2.4 for a discussion of the size and other characteristics of the typical vessels in these groups). Other local vessels include skiffs used by local fishermen for setnet and subsistence fishing. The non-resident, or transient, fleet that uses King Cove includes the three vessel groups mentioned above that fish for salmon in management area M, and crabbers and trawlers calling at King Cove to deliver product, to load or unload crab pots and other gear stored in King Cove, and those acting as tenders for the Peter Pan Seafoods plant in the community.

In 1989, 24 of the total 72 local boats were limit seiners which fish both crab and salmon, and the remaining 48 fish salmon (Northern Economics, 1990). The latter 48 vessels were split evenly between 24 drift gillnet boats which range from 30-42 feet, and 24 seiners in the 32-48 feet class. Non-resident vessels are believed to be comparable to the average boat in their respective gear type.

Data bases provided to MMS show vessel size information by species, gear, and area, and cannot be reliably adjusted to show number of boats by length for all vessels in the community. The data in Table 3.5-13 show the number of vessel licenses which were fished by locally owned boats. This results in figures which are larger than the actual number of vessels, but indicates the vessel sizes which are most active in the local fleet.

Table 3.5- 13: King Cove Resident Fishing Vessels, by Length

		Year									
Size in Meters	Size in Feet	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-6.0	0-19	1	4	4	9	15	12	2	4	2	3
6.1-12.1	20-39	55	61	50	44	38	51	65	60	47	32
12.2-18.2	40-59	43	57	48	45	47	71	94	84	66	47
18.3-24.3	60-79	4	4	3	0	0	0	0	0	0	0
24.4-30.4	80-99	0	0	0	0	0	0	0	0	0	3
30.5-36.5	100-119	4	3	0	0	0	0	0	0	0	0
36.6-42.6	120-139	0	0	0	0	0	0	0	0	0	0
42.7-48.7	140-159	0	0	0	0	0	0	0	0	0	0
48.8-54.8	160-179	0	0	0	0	0	0	0	0	0	0
54.9-60.9	180-199	0	0	0	0	0	0	0	0	0	0
61.0+	200+	0	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990.
Note: 1990 data are preliminary.

3.5.4.2 Processing Sector

The cannery in King Cove was founded in 1911 by Pacific American Fisheries, and until statehood in 1959, depended upon company fish traps for most of its salmon requirements. In 1958 the plant diversified to king crab processing with later inclusion of salmon roe in the 1960's and tanner crab in the 1970's (Earl R. Combs, Inc., 1982). In 1976 the cannery was partially destroyed by fire which prompted construction of an efficient, modern plant in 1979 with further expansion in 1981.

The Peter Pan Seafoods plant is owned by Nichiro Gyogra Kaisha, a major Japanese seafood company that bought the company from the Bristol Bay Native Corporation in 1980. The company is headquartered in Seattle and operates processing plants throughout Alaska. The closest competition for Peter Pan is the Trident Seafoods plant in Sand Point although floating processors do operate in the area prior to late June when they move to Bristol Bay.

The Peter Pan Seafoods plant in King Cove is equipped to can and freeze fish and shellfish. Salmon is the major product handled in the plant, but sablefish, crab, halibut, herring, and Pacific cod are also processed. Tanner crab are the second most important resource to the plant.

Between 1979 and 1985 the King Cove plant processed between 30 and 44.4 million pounds of fish and shellfish on an annual basis (Braund, 1986a). The plant has the capacity to process about 1 million pounds of salmon per day. Of this total approximately 250,000 can be frozen and the remainder would be canned. The daily capacity of the freezing facility is about 300,000 pounds of crab, 100,000 pounds of herring, and 100,000 pounds of halibut.

Peter Pan management provided the following estimates of the percent of their raw product, by species, that comes from the Gulf of Alaska:

Salmon	80%
King Crab	90%
Halibut	90%
Tanner	100%
Black cod	100%
Herring	50%

The King Cove plant has generally been operating 10 months a year, from January through October, and closing during November and December, because of limited deliveries by fishing boats. If sufficient quantities of Pacific cod are delivered by boats during those two months the plant can operate throughout the year.

Peter Pan's competition comes from the Trident plant in Sand Point, and floating processors which operate in local waters. In good years there have been as many as ten floaters in the area, but in other years there may be only one. These ships are in the area during the South Unimak fishery, and after that fishery is complete they proceed to Bristol Bay.

Employment: Normal operation during the summer salmon season requires 250 to 300 employees. With 250 total positions, processing workers will account for approximately 200 positions, support personnel will be 40, and 10 will be administration. During the fall and winter months, employment drops to 55 or less. Management indicated that "a lot" of these 55 persons stay the entire 10 month season. The remaining employees are generally hired for the salmon season.

Processing line employees work one shift, but the shift can last as long as 14 hours (8 a.m. to 12 midnight with an hour off for both lunch and dinner).

Groundfish processing requires an additional 50 - 60 people. The plant does not process groundfish during the summer salmon season so these are additional jobs in the off-peak months.

Few long-term King Cove residents are employed by Peter Pan, although many of the plant's management employees live in King Cove most of the year. Management estimated that less than 1 percent of the plant employees are local residents. During the winter and fall months, approximately 70 percent of the employees are Alaska residents. During the peak summer months state resident employment drops to 50 percent of total employees.

Income: If processing line employees stay for the entire 10 months, they average about $25,000 in wages. Line workers employed during the mid-June to end of August salmon season will make $6-7,000. Average hourly wages are $5.65 for processing line, $12.00 for machinists, and $7-8 for others, except for 2 management staff who are salaried. Management could not provide estimates of average seasonal wages for machinists or other employees. Table 3.5-14 presents an estimate of processing wages paid based upon the wage and income data reported in Northern Economics (1990).

Table 3.5- 14: Average Annual Wages Paid by King Cove Processing Sector

Employee Category	Number of Employees	Average Annual Wages per Employee	Total Wages by Category
Line Workers (Base)	25	$25,000	$625,000
Line Workers (Peak)	175	$6,500	$1,317,500
Support	40	$40,000	$1,600,000
Administrative	10	$25,000	$250,000
Management	2	$50,000	$100,000
Total			$3,712,500

Source: Northern Economics, 1990.

3.5.4.3 Support Sector

Peter Pan Seafoods uses the city landfill, and sewer and water utilities. The plant provides its own power. However, the city and Peter Pan are interconnected so that either power plant can provide power to the other entity in case of an emergency.

There are no public dock facilities for large vessels in King Cove. Alaska Marine Highway System ferries, and private barges with materials and supplies for the community load and unload at the Peter Pan dock. This does not pose a congestion problem according to plant management. Peter Pan ships its product out on barges and trampers that are loaded over its dock.

Air transportation is used for employee transfers and emergency supplies.

Peter Pan and Seattle Ship's Supply provide the primary fleet support available in King Cove: Replacement parts and equipment, mechanics, bookkeeping, mail service, and insurance to the fleet. There are a few, small marine oriented repair businesses in the community. Most supplies are obtained from Seattle although there are limited purchases from communities in the State of Alaska.

Peter Pan employs 4-5 persons in its store during the 10 months that the plant is open. The store manager and employees reside outside the community. Their state of residence is unknown.

3.6 Kodiak

3.6.1 Setting/ Description

The City of Kodiak is situated on Chiniak Bay on the northeastern portion of Kodiak Island in the Gulf of Alaska. The Island lies 35 miles offshore of the Alaska Peninsula, separated from it by the Shelikof Strait. Resting on a bench of land paralleling St. Paul Harbor and nestled at the foot of Pillar Mountain, Kodiak has limited room for expansion in the downtown area. The community rises in elevation from 10 to 800 feet above sea level. The City is 260 miles southeast of Anchorage and 670 miles northwest of Juneau.

Kodiak Island was first settled in 1792 by Alexander Baranof and the Russian American Company when the Russians established the island as a major fur and pelt center. In 1793 the administrative center was moved to its present location, remaining a center of fur trade till 1867, the time of the U.S. purchase of Alaska. Kodiak's first fish cannery opened in 1882 and by the end of the nineteenth century Kodiak had become a center for whaling and fishing in the area. During World War II, a major U.S. Navy Station was established; in 1972, the U.S. Coast Guard took over the facility as a base of operations in the Gulf of Alaska and Aleutian Islands.

In addition to its fishing industry, Kodiak also has a significant government sector. Kodiak incorporated as a home rule city in 1940. It is also the location of the administrative headquarters of the Kodiak Island Borough, which includes six other communities besides Kodiak. The U.S. Coast Guard maintains a major base on Kodiak, with over 992 personnel in 1988. The Kodiak National Wildlife Refuge is headquartered in Kodiak, and the Alaska Department of Fish and Game has research staff located in Kodiak. Several Native corporations maintain offices in Kodiak.

3.6.2 Socioeconomic Characteristics

3.6.2.1 Local Economy

The economy of Kodiak was originally dominated by commercial fishing and fish processing. Currently, there are currently 15 processors in the Kodiak area. Processors predominantly handle salmon, crab, and shrimp. Since World War II, government has been an important component of the economy, and was second to fish processing in industry employment in 1988. Services and retail trade are also important sectors, although their health is usually influenced by spending and employment cycles in the fishing industry and government.

3.6.2.2 Population

Table 3.6-1 shows the population of Kodiak from 1980 through 1992. The city has seen periods of relatively flat growth separated by rapid growth.

Table 3.6- 1: City of Kodiak Historic Population

Year	Population
1980	4,756
1981	4,678
1982	5,873
1983	6,030
1984	6,142
1985	6,173
1986	6,619
1987	
1988	6,651
1989	6,704
1990	6,365
1991	7,299
1992	7,581

Sources: Alaska Department of Labor, 1992, 1993a, and 1994a.

Table 3.6-2 shows selected characteristics of Kodiak's population. Kodiak is currently 14 percent Native and 54 percent male.

3.6.2.3 Employment

Commercial fishing and fish processing is the largest industry sector in Kodiak. The seafood industry employs 55% of the private sector and 38% of the total work force (including military employment.

Table 3.6-3 shows employment figures for 1980, 1984, 1987, and 1990. The two largest employment sectors in Kodiak are manufacturing and government. Fish processing is dominant in the Kodiak economy. Seafood manufacturing employed 1,923 people in 1990, 33 percent of the non-agricultural work force.

Table 3.6-2: City of Kodiak Population Characteristics

	1980	1990	% chang
Total	4,820	6,365	32.05%
Male	2,602	3,503	34.63%
Female	2,218	2,862	29.04%
Age	1980	1990	% chang
0-4	412	603	46.4%
5-14	701	925	32.0%
15-19	406	384	-5.4%
20-24	510	545	6.9%
25-34	1196	1384	15.7%
35-44	699	1242	77.7%
45-54	432	625	44.7%
55-59	168	208	23.8%
60-64	136	161	18.4%
65+	160	288	80.0%

Source: U.S. Bureau of the Census, 1981 and 1991.

Table 3.6-3: Kodiak Census Subarea Non-Agricultural Industry Employment

	Year			
Employment Sector	1980	1984	1987	1990
Total	4,464	4,866	4,734	5,742
Mining	*	*	*	*
Construction	101	342	198	158
Manufacturing	1,880	1,473	1,569	2,062
Food & Kindred Prod.	1,544	1,423	1,534	1,923
Trans. Comm. & Utilities	336	298	222	319
Trade	611	749	834	921
Finance-Ins. & R.E.	98	103	108	111
Services	562	605	717	1,012
Government	1,038	1,164	1,081	1,120
Federal	286	241	234	162
State	207	282	237	285
Local	545	643	610	673

Source: Alaska Department of Labor, various years.

* Not disclosed.

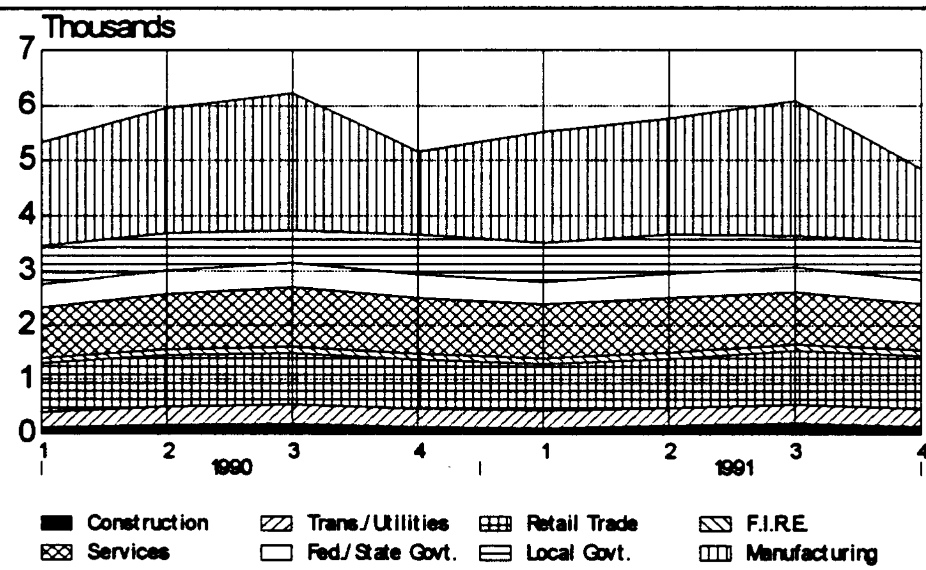
Table 3.6-4 and Figure 3.6-1 show the Kodiak Subarea quarterly employment for 1990 and 1991. Fish processing (manufacturing) has been the largest sector of wage employment (a high of 2,457 in the third quarter of 1991). Retail trade and services were next in the highest number of jobs, followed by local government.

Table 3.6-4: Kodiak Census Subarea Quarterly Nonagricultural Employment, 1990-1991

Industry	Quarter/Year				Annual	Quarter/Year				Annual
	1/90	2/90	3/90	4/90	Average	1/91	2/91	3/91	4/91	Average
Nonag. Wage & Salary	5,360	6,021	6,269	5,318	5,742	5,614	5,920	6,295	5,015	5,711
Mining	0	0	0	0	0	0	0	0	0	0
Construction	129	170	194	139	158	119	166	208	149	161
Manufacturing	1,851	2,274	2,498	1,624	2,062	2,070	2,230	2,622	1,440	2,091
Food & Kindred Prod.	1,752	2,113	2,330	1,496	1,923	1,982	2,096	2,457	1,308	1,961
Trans. Comm. & Util.	273	331	345	328	319	308	315	333	322	320
Trade	893	947	944	900	921	861	902	996	964	931
Wholesale	30	33	42	37	36	35	34	67	28	41
Retail	863	914	902	863	886	826	868	929	936	890
Finance-Ins. & R.E.	97	112	124	109	111	104	115	117	113	112
Services	930	1,011	1,102	1,028	1,018	997	1,009	960	855	955
Agri., Forest, Fish	*	*	*	*	*	*	*	*	*	*
Government	1,148	1,141	1,028	1,164	1,120	1,136	1,160	1,029	1,139	1,116
Federal	157	164	163	163	162	162	164	169	164	165
State	275	296	288	282	285	255	285	290	269	275
Local	716	681	577	719	673	719	711	570	706	677
Unclassified	*	*	*	*	*	*	*	*	*	*

Sources: Alaska Department of Labor, 1992.

Figure 3.6-1: Kodiak Census Subarea Quarterly Employment, 1990-1991

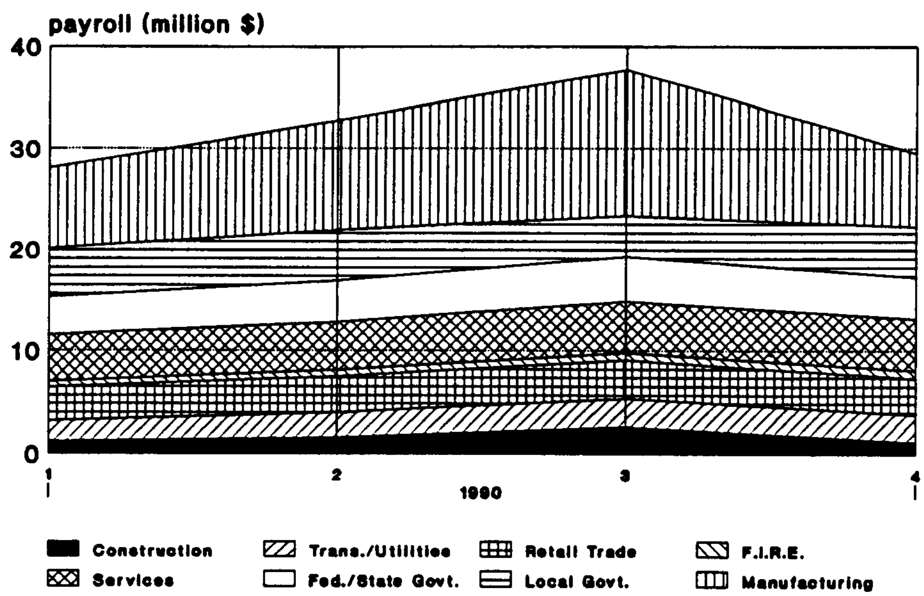


Source: Alaska Department of Labor, 1992.

3.6.2.4 Income

Quarterly wage rate data reporting was combined under the Kodiak Island Borough in 1990. Depending on the particular quarter, highest average wage rates appear in state government and construction (construction, $3,439 in 3rd quarter 1990; state government, $3,385 in the 3rd quarter 1990). The lowest rates appeared in manufacturing, retail trade and services (manufacturing, $1,430, 1st quarter 1990; retail trade, $1,299, 1st quarter 1990).

Figure 3.6- 1: Kodiak Island Borough Census Area Quarterly Payroll, 1990



Source: Alaska Department of Labor, 1991.

In terms of average monthly payroll, manufacturing (seafood processing), and local government generally contribute the most total income (ranging from $14 to $17 million, depending on the specific quarter) with an occasional construction peak. Wholesale trade and F.I.R.E. are at the lower end of the range ($0.5 million to $0.7 million).

3.6.2.5 Public Fiscal Characteristics

Revenues: Table 3.6-5 presents revenue and expenditure characteristics for the City of Kodiak for the period of FY 1991-1992. Revenues and expenditures are presented under general funds, special revenue, capital projects, debt service and total funds. The major sources of general revenues are taxes, followed by intergovernmental transfers and charges for services. Taxes are dominated by sales tax accounting for 90% of tax revenues. Fishing and support industry related property and sales are most likely a major component of these sales and property tax revenues. Intergovernmental transfers include state revenue sharing, municipal assistance, and the raw fish tax. State capital project funding fluctuates but can be a major source of revenue.

Table 3.6-5: City of Kodiak Revenues and Expenditures

	1993			1992		
REVENUES	General Fund	Special Revenue	Total	General Funds	Special Revenue	Total Funds
Taxes						
Property	$500,721	$0	$500,721	$483,166	$0	$483,166
Sales	$4,823,208	$79,203	$4,902,411	$4,941,111	$79,889	$5,021,000
Special Assessment	$0	$203,592	$203,592	$0	$252,048	$252,048
Licenses and Permits	$52,989	$0	$52,989	$38,574 o		$38,574
Intergovernmental Transfers	$1,607,621	$147,672	$5,226,028	$1,994,720	$296,414	$3,477,006
Services charges and sales	$1,084,043	$0	$1,084,043	$950,212	$0	$950,212
Interfund charges	$607,186	$0	$607,186	$605,383	$0	$605,383
miscellaneous	$510,732	$101,447	$858,707	$597,693	$106,300	$893,559
other sources	$0	$0	$1,430,232	0	0	$1,458,968
Total Revenues	$9,186,510	$531,914	$14,865,919	$9,610,859	$734,651	$13,179,916
EXPENDITURES						
General Government	$965,422	$0	$965,422	$915,084	$0	$915,084
Public Safety	$3,279,331	$73,873	$3,353,204	$3,352,772	$0	$3,352,772
Public Works	$1,560,655	$65,184	$1,625,839	$1,332,412	$0	$1,332,412
Parks and Recreation	$507,235	$0	$507,235	$513,614	$0	$513,614
Library	$482,693	$8,615	$491,308	$486,008	$2,558	$488,566
Gibson Cove	$1,267	$0	$1,267	$11,309	$0	$11,309
Nondepartmental	$931,864	$81,029	$1,012,893	$944,156	$402,255	$1,346,411
Debt Service	$0	$0	$180,760	$0	$0	$184,216
Capital Outlay	$0	$0	$3,966,375	$0	$0	$2,771,891
Total Expenditures	$7,728,467	$228,701	$12,104,303	$7,555,355	$404,813	$10,916,275
Other Financing Uses	$1,023,332	$226,900	$1,430,232	$1,038,148	$281,600	$1,458,968
Total Expenditures and other Financing	$8,751,799	$455,601	$13,534,535	$8,593,503	$686,413	$12,375,243
EXCESS/DEFICIENCY	$434,711	$76,313	$1,331,384	$1,017,356	$48,238	$804,673
FUND BALANCE	$4,808,810	$987,560	$10,126,950	$5,332,432	$958,495	$9,753,899

Source: City of Kodiak, 1993.

Expenditures: Principal general fund expenditures include general government, public works, public safety, parks/recreation, library, capital outlay, and debt service. In 1993, the City of Kodiak ran a total fund excess of $1.3 million, and a fund balance $10.1 million.

3.6.3 Infrastructure Characteristics

3.6.3.1 Transportation Facilities

Kodiak Municipal Airport and Lilly Lake: The Kodiak Municipal Airport consists of a single 2700 foot runway running southwest by northeast. The runway ends in Lilly Lake, a float plane facility providing 2100 ft. of takeoff/ landing space. About 25 aircraft use the airport while 20 are based on the Lake. Although float planes are also based at the Channel Seaplane Base, the freshwater facilities at Lilly Lake are seen as critical because of higher maintenance costs of salt water storage. The number of aircraft increases significantly during fish spotting season.

Both the airport and Lilly Lake lack airport facilities and neither are lit. Lack of air traffic control, terrain obstructions in air space, and grade changes which obstruct line of sight on the runway, are causing concern over airport safety. Rectification of these problems is limited by ongoing land use conflicts.

Kodiak State Airport: The Kodiak State Airport is located 4.5 miles southwest of the city of Kodiak. Built to handle Hercules C130's, planes used by the Coast Guard to patrol fisheries, the airport also enables commuter airlines to service the Kodiak area with daily flights from Anchorage. The airport is leased by the Alaska Department of Transportation and Public Facilities from the U.S. Coast Guard.

3.6.3.2 Marine Services

The U.S. Government owns 3,500 linear feet of dock in Kodiak; only half is used. Other dock facilities are explained below. All facilities supply water, gas, and diesel.

Small Boat Harbors: Kodiak has two small boat harbors. Both are owned and operated by the State of Alaska and the City of Kodiak. The older of the two harbors accommodates 150 commercial boats and 66 pleasure boats. It has additional space for 15 to 25 boats in transit. The second harbor is located at Dog Bay and has spaces for 150 small boats in addition to

286 slots for commercial vessels up to 200 ft. in length. The harbor also provides floats for 22 commercial vessels in transit. Additional boat harbor improvements are scheduled for construction.

City Docks: There are three city-owned piers in Kodiak for large commercial vessels (e.g. over 200 feet in length). Pier 1 is used for the Marine Highway ferry and for fueling vessels. Pier 2 is for non- containerized cargo vessels up to 400 feet. long. Pier 3 contains the city's container facility and accommodates vessels up to 660 feet in length. The pier is equipped with a Paceco Portainer Gantry Crane with a 27.5 ton lifting capacity.

Processing Docks: The 16 area processors own a combined 3,700 linear feet of dock space. These dock facilities accommodate 60 to 70 boats averaging 60 feet in length.

3.6.3.3 Utilities

Water: The City obtains its water from surface sources. Storage capacity at Monashka Reservoir is 550 million gallons. The water system can handle 10 million gallons a day, enough to satisfy current demand. Average demand in Kodiak is 6 million gallons a day.

Sewer: The city sewer system is capable of processing 4.1 million gallons of sewer waste per day. The system is currently running at 60 percent total capacity.

Electricity: Electricity is provided by Kodiak Electric Association, Inc. In 1980 KEA serviced 3,178 customers using 55.5 million Kwh of power, twice that of 1970. Power is generated from the Terror Lake Hydroelectric facility, and with diesel generators, the largest diesel system in the State.

Solid Waste: Kodiak Sanitation hauls solid waste to a landfill north of town.

3.6.3.4 Housing

In 1990, there were an estimated 2,177 housing units in Kodiak, excluding the 413 units at the Coast Guard Station. Housing prices are high in Kodiak. The median housing value is $113,800, and the median rent is $642 per month.

Table 3.6-6: City of Kodiak Housing Characteristics, 1990

TOTAL HOUSING UNITS	2,177
Occupancy	
Occupied Housing Units	2,051
owner occupied	870
renter occupied	1,181
Vacant Housing Units	126
Units in Structure	
1 Unit detached	1,005
1 Unit attached	58
2 - 4 Units	450
5 - 9 Units	210
10 or more units	360
mobile home, trailer	94
Households by type	
Families	1,399
Married couple	1,106
Male Householder	97
female Householder	196
Non-Family	652
Persons per Household	3
Persons Living in Group Quarters	377

Housing Value (specified owner-occupied units)	
less than $50,000	13
$50,000-99,000	260
$100,000-149,000	219
$150,000-199,000	113
$200,000-299,000	56
$300,000 or more	9
Median value	$113,800
Rental Rates	
less than $250	90
$250-499	233
$500-749	449
$750-999	258
$1,000 or more	88
Median rent	$642

Source: U.S. Bureau of the Census, 1991.

3.6.3.5 Land Availability

The extreme slopes encountered at the foot of Pillar Mountain restricts development to the north and west of the city. South of Kodiak lies St. Paul's Harbor and the Gulf of Alaska. Large- scale development in Kodiak is most likely to the east of town past the airport, where gentle slopes and amount of available land encourage development.

3.6.4 Industry Characteristics

3.6.4.1 Harvesting Sector

More Kodiak residents fish for halibut than for any other species. Salmon fisheries had the largest participation in the early 1980's but were passed by the halibut fishery in 1983. This reflects the substantial increase in the number of groundfish permits fished by Kodiak fishermen over the last 8 years, while the number of salmon, crab, and herring permits fished have remained stable or declined. Total permits fished by local residents have increased 16 percent while the number of residents holding permits has decreased 8 percent. The average resident permit holder fishes 2.4 permits.

Table 3.6-7: Commercial Fishery Permits Fished by Kodiak Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	340	350	350	331	317	321	329	339	102	360
King Crab	277	295	72	66	48	66	89	73	55	62
Tanner Crab	235	233	275	226	192	190	181	200	188	226
Other Shellfish	125	163	147	145	127	81	42	60	72	121
Herring	293	183	166	176	167	147	136	126	129	96
Sablefish	5	8	7	29	82	149	134	176	146	163
Halibut	251	280	453	463	419	537	582	544	469	7
Other & Unidentified	54	45	65	92	69	187	387	322	235	370
Total	1,580	1,557	1,535	1,528	1,421	1,678	1,880	1,840	1,396	1,405
Number of individuals that fished permits	840	818	891	848	719	707	770	774	645	703

Source: Data from Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Salmon fishing is an important part of Kodiak fisheries. The number of limited entry salmon permits is has ranged from 317 to 350, but Kodiak residents hold about the same number in 1988 as they did in 1981. Kodiak management area (Area K) permits account for about 80 percent of the total salmon permits fished by local residents in 1988. Table 3.6-8 shows the number and management area for salmon permits held by local residents since 1981.

Table 3.6-8: Salmon Permits Fished by Kodiak Residents

	Year									
Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Area A (Southeast)	1	1	1	0	1	1	1	1	1	1
Area D (Yakutat)	0	1	1	0	1	1	1	0	0	0
Area E (Pr. Wm. Sound)	2	4	5	8	8	9	7	7	7	5
Area H (Cook Inlet)	12	4	5	5	5	7	7	8	0	7
Area K (Kodiak)	263	283	278	253	244	244	264	274	44	289
Area L (Chignik)	25	22	22	23	19	17	17	17	16	19
Area M (False Pass)	1	2	1	8	3	3	2	2	6	4
Area T (Bristol Bay)	36	32	36	33	35	37	29	30	27	34
Other	0	1	1	1	1	2	1	0	1	1
Total	340	350	350	331	317	321	329	339	102	360

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

The number of other finfish permits has almost doubled over the last 8 years. This is due to substantial increases in the number of groundfish permits issued since the number of herring permits has decreased during this period. The number of permits issued in the Kodiak management area has almost doubled in 8 years. Smaller, but significant increases have occurred in Area E (Prince William Sound), Area H (Cook Inlet), and Area M (Peninsula/Aleutians). The Kodiak management area accounts for about 65 percent of the groundfish permits issued in 1988.

Table 3.6-9: Other Finfish Permits Fished by Kodiak Residents

Area/Type	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
Halibut	1		1			1			1	
Sablefish	2		1	1	1	5	8	6	10	9
Other Finfish	4	1	1	2		3	7	6	8	8
Prince William Sound (E)										
Halibut		1	1			2			5	
Sablefish			1	2	1	18	24	21	14	26
Herring	20	16	5	13	13	10	12	9		8
Other Finfish	1	1	2			5	11	17	13	22
Cook Inlet (H)										
Halibut	23	11	12	39	21	70	85	75	46	
Sablefish					4	3	4	3	7	8
Herring					4	7	5	7	7	6
Other Finfish	1		5	5	4	1	5	5	7	8
Kodiak (K)										
Halibut	224	251	403	388	313	332	379	390	359	7
Sablefish	3	8	5	21	48	78	66	116	79	104
Herring	124	76	72	75	83	64	63	65	69	50
Other Finfish	38	36	47	79	47	137	312	246	152	269
Peninsula/Aleutians (M)										
Halibut	2	14	19	24	56	71	53	28	36	
Sablefish				2	11	15	1	5	10	3
Herring	34	6	8	5	5	14	12	4	6	2
Other Finfish	4		1	1	3	9	5	12	13	5
Bristol Bay (T)										
Halibut			1						1	
Herring	70	77	58	68	54	51	37	41	46	30
Other Areas and Unidentified										
Halibut	1	3	16	12	29	61	65	51	21	
Sablefish				3	17	30	31	25	26	13
Herring	45	8	23	15	8	1	7		1	
Other Finfish	6	7	8	5	15	32	47	31	40	55
Unidentified									2	2
Total	603	516	690	760	737	1,020	1,239	1,163	979	636

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Table 3.6-10: Shellfish Permits Fished by Kodiak Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
Tanner	1	2		1					1	2
Other Crab	2	3	7	1						
Other Shellfish	2	2		4				1	1	4
Pr. William Sound (E)										
King Crab			1							
Tanner		1								
Other Crab								1	2	
Other Shellfish	1	5	3	5	2	2				
Cook Inlet (H)										
King Crab		1	3							
Tanner	1	4	9	6	9		1			
Other Crab				1		1				
Other Shellfish	1	3	9	13	4	5	2	2	1	4
Kodiak (K)										
King Crab	254	276	12	4	4	4	4	2	1	3
Tanner Crab	182	198	247	204	172	166	146	136	132	168
Other Crab	40	74	91	88	99	62	37	51	44	61
Other Shellfish	73	57	26	25	15	8	1	3	22	51
Peninsula/Aleutians (M)										
King Crab	1	2								
Tanner Crab	20	25	6	2		7	5	12	6	1
Other Crab		12	7	6	1					
Other Shellfish		3	2		1				1	1
Other Areas & Unidentified										
King Crab	22	16	56	62	44	62	85	71	54	59
Tanner Crab	31	3	12	13	11	17	29	52	49	55
Other Crab	3	2	1	2			1	1	1	
Other Shellfish	3	2	1		5	3	1	1		
Totals	637	691	494	437	367	337	312	333	315	409

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

The number of shellfish permits fished by Kodiak residents is down substantially from the early 1980's, reflecting the general decrease in king crab stocks throughout the Gulf of Alaska. Total shellfish permits are down to about half their 1981 number. Vessels have been forced to move to Bering Sea management areas to harvest king crab stocks. Tanner crab stocks in proximity to Kodiak have remained at high enough levels to allow a number of local boats to continue harvesting this species.

The groundfish fisheries have displaced crab as the primary employment generator in Kodiak fisheries. As early as 1983 halibut fishing employed more persons than any of the crab fisheries, but for short periods of time. With the addition of sablefish, pollock, and Pacific cod fisheries in more recent years, the groundfish industry has employed more persons for longer periods of time. Table 3.6-11 demonstrates the diversity of fisheries that are pursued by Kodiak fishermen. Most of the other communities discussed in this study have one or possibly two species which dominate the local fishery, but Kodiak fishermen pursue all species.

The model discussed in Section 4 projects that harvest employment in the future will remain about the same as present levels, with some modest increase in processing employment. Kodiak's location in the Gulf of Alaska with close proximity to fish stocks provides it with an advantage if currently underutilized species are harvested in the future.

Table 3.6-11: Harvest Sector Employment of Kodiak Residents

		Year									
Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon											
Purse Seine	4.4	880	902	884	788	722	704	783	827	84	827
Drift Gillnet	1.75	58	51	60	63	60	70	58	65	47	58
Set Gillnet	2.1	229	250	239	242	252	250	242	242	113	258
Hand Troll	1	0	0	0	0	0	0	0	1	1	1
Power Troll	1.75	2	2	4	2	2	4	2	0	0	0
King Crab	3.25	900	959	234	215	156	215	289	237	179	202
Tanner Crab	3.3	776	769	908	746	634	627	597	660	620	746
Other Crab	2.6	117	237	276	255	260	164	99	138	122	159
Other Shellfish	3.3	274	238	135	172	89	66	13	23	83	198
Herring											
Purse Seine	4.25	842	561	378	429	400	429	353	319	302	242
Gillnet	2	174	102	148	130	142	90	98	98	104	76
Pound & Other	1	36	0	12	44	8	12	16	12	6	1
Sablefish	3.55	18	28	25	103	291	529	476	625	518	579
Halibut	2.5	628	700	1,133	1,158	1,048	1,343	1,455	1,360	1,173	18
Other & Unidentified											
Longline	2.85	17	11	26	71	94	365	781	527	439	476
Trawl	3.1	71	78	109	105	78	143	205	248	202	285
Pots	3.1	59	40	37	62	34	34	50	87	28	267
Other	1.9	15	10	25	25	0	10	63	51	2	27

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

Harvest: Salmon represent the largest fishery for Kodiak residents in terms of pounds harvested. Table 3.6-12 shows the harvest amounts by major species for the 1981 through 1990 time period. These figures should be considered relative indicators of the level of harvest by major species since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest levels since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. Non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.6-12: Fisheries Harvest by Kodiak Residents

(millions of pounds)

Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	37.6	30.9	23.5	37.8	26.2	40.7	21.9	48.6	7.5	33.0
King Crab	22.3	9.5	3.1	2.0	1.5	3.9	4.8	2.9	2.8	4.3
Tanner Crab	19.0	13.7	13.1	9.8	11.3	10.0	17.2	20.6	22.5	23.2
Other Crab	3.3	2.6	4.0	3.7	2.9	0.8	1.4	2.0	2.7	2.1
Other Shellfish	16.1	9.2	2.7	4.8	0.7	0	0	0	0	0.3
Herring	17.0	13.8	14.2	13.3	17.9	12.7	14.5	9.8	8.0	7.1
Sablefish	0	0.1	0	1.0	1.4	3.4	3.6	3.9	4.8	3.7
Halibut	1.2	2.5	5.0	8.2	12.5	15.3	14.0	0	12.9	0.1
Other & Unidentified	1.9	8.0	8.8	5.9	7.3	57.8	66.3	75.0	7.0	63.4
Non-disclosed	4.6	2.7	10.3	14.1	n.a.	5.4	15.1	3.6	34.5	10.0
Total	123.0	93.0	84.7	100.6	81.7	150.0	158.8	166.4	102.7	147.2

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

n.a. Not shown in data files.

Earnings: Crab fisheries were the largest contributors to Kodiak fishermen's earnings in the early 1980's and decline in king crab stocks have reduced the importance of these fisheries. With the exception of 1988 when record high prices for salmon occurred, crab fisheries have continued to provide the largest share of earnings to local fishermen. Salmon has been an important contributor over the 1981 through 1988 time, and halibut catches have increased in importance until they are comparable to salmon catches in value in most years.

Table 3.6-13: Total Ex-Vessel Earnings of Kodiak Residents

(millions of $)	Year								
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon									
Seine	18.1	9.7	7.5	14	8.8	14.4	15.3	43.3	1.6
Drift Gillnet	1.7	1.2	2.3	1.9	2.4	2.5	2.3	3.7	2.4
Set Gillnet	3.8	3.1	1.9	2.8	2.8	7.1	4.3	12.2	7.3
Hand Troll	0	0		0			0		
Power Troll								0	0
King Crab	42.2	31.5	8.6	4.7	3.5	13.8	15.5	12	
Tanner Crab	12.1	24.6	16.4	11.8	14.7	13.8	19.9	23.3	31.3
Dungeness & Other Crab	2.5	2.1	4.3	5.6	3.7	0.9	1.8	2.2	2.9
Other Shellfish	4.6	4	1	2.9	0.1				
Herring									
Purse Seine	3.2	2.7	3.4	2.7	4.9	4	6	5.2	2.0
Gillnet	0.2	0.1	0.4	0.3	0.5	0.3	0.4	0.7	0.4
Pound & Other		0							
Sablefish		a		0.4	1.2	3	1.2	1.1	4.3
Halibut	1.2	2.7	5.5	6	11.5	22.1	20.2		19.3
Other & Unidentified									
Longline			a	0.1	0.1	0.5	a	0.6	1.1
Trawl	0.2	0.9	1.4	0.7	0.5	2.9	0.1		5.8
Pots	a	a	a	a	a		a	0.2	0.1
Other					0				
Non-disclosed	2.3	2.3	3	3.2	4.4	3	2	2.8	13.0
Total	92.1	84.9	55.7	57.1	59.1	88.3	89	107.3	91.5

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

a Less than $50,000.

Table 3.6-14 indicates the Kodiak fleet has increased in size over the last 8 years. The data bases provided to MMS give vessel size information by species, gear, and area so a vessel can be counted multiple times if it participates in different fisheries in different locations with different gear types. However, the increase in activity for the 12.2-18.2 meter category (40-59 feet) and the 24.4-30.4 meter category (80-99 feet) suggests that the number of vessels in these classifications has also increased. These vessel size categories are typical sizes for boats participating in groundfish longline and trawl fisheries in the Gulf of Alaska.

Salmon setnet boats are not longer required to be licensed and this probably accounts for most of the reduction in vessel activity for the 0-6.0 meter (0-19 feet) category.

Table 3.6-14: Kodiak Resident Fishing Vessels, by Length

		Year									
Size in Feet	Size in Meters	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-19	0-6.0	167	142	167	102	50	47	68	53	40	24
20-39	6.1-12.1	522	483	548	516	461	506	542	514	345	310
40-59	12.2-18.2	329	325	290	321	341	430	466	455	370	384
60-79	18.3-24.3	145	152	118	149	136	176	159	122	104	120
80-99	24.4-30.4	94	92	85	107	101	147	122	137	118	114
100-119	30.5-36.5	37	39	51	32	43	45	40	37	35	56
120-139	36.6-42.6	16	14	16	6	2	3	2	4	3	2
140-159	42.7-48.7	4	3	4	1	0	1	3	3	2	4
160-179	48.8-54.8	3	5	7	6	0	1	3	4	0	2
180-199	54.9-60.9	0	0	0	0	0	0	0	0	0	0
200+	61.0+	0	0	0	0	0	0	0	0	0	0
Unknown		0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

3.6.4.2 Processing Sector

In 1992 Kodiak was the number three port in the United States in value of seafood landed (National Marine Fisheries Service, 1994). Processing plants originally located in Kodiak to process halibut and salmon landed by the local fishing fleets. With the development of mechanical shrimp processing equipment in the early 1960's, plants quickly developed capacity to handle increasing deliveries of shrimp. The rapid growth of the king crab fishery in the early 1960's also provided an impetus for growth in the community's processing sector.

Many of Kodiak's processing facilities were destroyed in the 1964 earthquake. When the plants were rebuilt, overall capacity was increased. Several years later, as the shrimp and crab resources collapsed, processors again focused on the "traditional" species of salmon and halibut and many plants expanded into groundfish processing.

There are 12 major processing plants currently in Kodiak. These are:

All Alaskan Seafoods - Star of Kodiak;

Alaska Fresh Seafoods;

Alaska Pacific Seafoods;

Faro's Seafoods;

International Seafoods;

King Crab, Inc.;

Cook Inlet Processors (Gibson Cove);
Eagle Seafoods;
East Point Seafoods;
Ursin Seafoods; and
Western Alaska Seafoods.

The presence of this many processors in the community assures active competition between the companies.

3.6.4.3 Support Sector

Kodiak has extensive support services for its fishing fleet as well as many transient boats that use the port and its facilities. In addition to providing services to fishermen, Kodiak also acts as a regional distribution center for consumer goods and industrial supplies bound for other communities in the region. Kodiak has three marine service areas in the port area.

The Kodiak city float has 22 commercial berths and a 360' face with 38' of draft (MLLW). The city dock is mainly used for loading and unloading, bulk fuel sales, and transient moorage. It has lighting, water and electricity.

The St. Paul harbor provides moorage for most of the Kodiak fishing fleet and transient vessels. It has 150 commercial and 66 pleasure boat stalls, as well as 587 additional berthing spaces (Department of Transportation & Public Facilities, 1987). It has lighting, water, power, and two tidal grids (22' x 120' and 24' x 224').

St. Herman's boat harbor is located just across from the city center on Near Island. It has a 246 stall berthing capacity with additional transient moorage. Lighting, power, and telephones are available on the floats (Department of Transportation & Public Facilities, 1987).

Kodiak businesses provide comprehensive services for fishing vessel owners, including mechanical repair, welding, electronic repair, gear supply, and vessel haul-out. Food and other groceries are available near the harbor and there are a number of hotels and other lodging.

3.7 Seward

3.7.1 Setting/ Description

The city of Seward is located at the head of Resurrection Bay and lies adjacent to Prince William Sound on the Eastern side of the Kenai Peninsula. Seward is 125 highway miles from Anchorage, and combined with rail facilities, makes it an excellent site for transshipping materials from the interior.

Early inhabitants of Seward were Chugach Eskimos. The area was later settled in the early 1900's as the beginning of the Iditarod Trail into Alaska's interior. It was soon designated as the southern terminus of a proposed railway from the interior to the ice-free port, and the railway was competed in the early 1920's. As the southern terminus of the Alaska Railway, Seward became the principal civilian seaport for southcentral and interior Alaska. However, the rising importance of Anchorage and damage created by the 1964 earthquake resulted in the decline in port activities. In recent years, Seward's role as a transportation hub has increased with the construction of the coal export terminal and increased levels of forestry products. The port supports a large commercial fishing fleet as well as a large processing economy.

3.7.2 Socioeconomic Characteristics

3.7.2.1 Local Economy

Seward is primarily a transportation center, with strong government, commercial fishing and tourism sectors. Because of its location at the end of the Alaskan Railroad, Seward's ice free port is used to export coal and other raw materials. Seward is closer to Japan and Korea than some other coal exporters, making it an attractive source of supply. Since 1985 Suneel Alaska Corp. has been exporting 600,000 to 700,000 tons of coal annually from Seward to Korea.

The Alaska Railroad, the state correction facility, and local government employees contribute to the strength of the government sector in Seward. The fishing industry operates in Resurrection Bay and the Gulf of Alaska, and harvests crab; shrimp; halibut; cod and rockfish; and five species of salmon. Like Homer, commercial charter fishing and sightseeing charter operations have been a growing business over the last decade. Special events such as the

4th of July Mount Marathon race and the Seward Silver Salmon Derby contribute to the strength of tourism.

3.7.2.2 Population

Table 3.7-1 shows Seward's 1980 and 1990 age and sex characteristics. Table 3.7-2 shows the population change in Seward between 1980 and 1992.

Table 3.7-1: City of Seward Population Characteristics

	1980	1990	% chang
Total	1,863	2,699	44.87%
Male	1,022	1,593	55.87%
Female	841	1,106	31.51%
Age	1980	1990	% chang
0-4	128	205	60.2%
5-14	231	341	47.6%
15-19	160	135	-15.6%
20-24	232	210	-9.5%
25-34	400	611	52.8%
35-44	221	563	154.8%
45-54	186	282	51.6%
55-59	85	79	-7.1%
60-64	76	104	36.8%
65+	144	169	17.4%

Source: U.S. Bureau of the Census, 1981 and 1991.

Table 3.7-2: City of Seward Historic Population

Year	Population
1980	1,843
1981	1,943
1982	1,839
1983	1,883
1984	2,038
1985	2,152
1986	2,072
1987	
1988	2,463
1989	2,829
1990	2,699
1991	2,806
1992	2,704

Sources: Alaska Department of Labor, 1980-92.
Note: The Alaska Department of Labor did not publish population estimates for places in 1987.

3.7.2.3 Employment

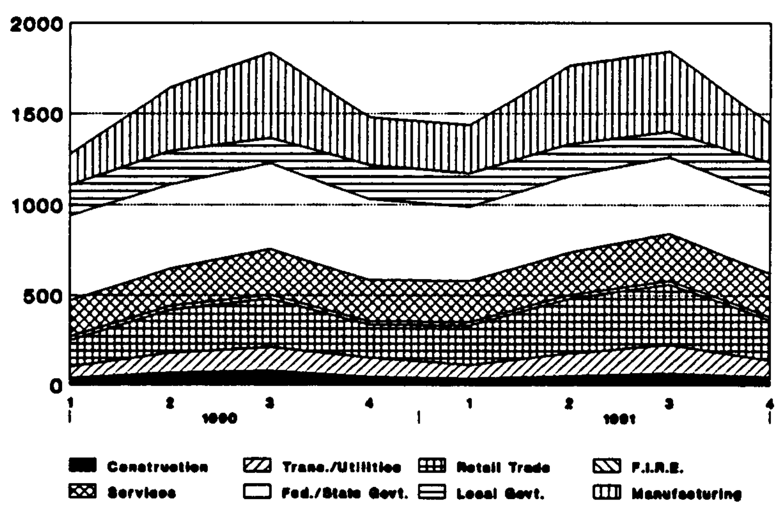
Table 3.7-3 and Figure 3.7-1 show 1990 and 1991 employment by quarter for each industry.

Table 3.7-3: Seward Census Subarea Quarterly Employment, 1990-1991

	Year/Quarter				Annual	Year/Quarter				Annual
Industry	90/1	90/2	90/3	90/4	Average	91/1	91/2	91/3	91/4	Average
Total Industries	1,477	1,858	2,042	1,634	1,753	1,656	1,996	2,101	1,649	1,851
Mining	0	0	0	0	0	0	0	0	0	0
Construction	41	75	86	50	63	39	55	72	48	54
Manufacturing	163	352	470	261	312	260	427	437	212	334
Transportation	66	113	136	110	106	79	131	165	97	118
Trade	202	305	323	233	266	270	353	384	285	323
Wholesale	51	72	61	52	59	51	57	57	64	57
Retail	151	233	262	181	207	219	296	327	221	266
Finance	20	21	20	19	20	19	20	23	21	21
Services & Misc.	192	211	257	231	223	230	241	258	240	242
Ag, Fish & Forest	150	141	147	101	135	170	178	204	139	173
Government	643	641	603	629	629	589	591	558	607	586
Federal	43	49	51	41	46	40	49	53	48	48
State	428	415	418	401	416	364	369	362	381	369
Local	172	177	134	187	168	185	173	143	178	170

Source: Alaska Department of Labor, 1992.

Figure 3.7- 1: Seward Census Subarea Quarterly Employment, 1990-1991



Source: Alaska Department of Labor, 1992

In 1990 employment was dominated by government, particularly state government, which includes the state prison, the marine highway system, and railroad employment. Seafood processing (manufacturing) is next in importance, particularly during the 2nd and 3rd quarters, followed more distantly by trade, services and transportation/communication/utilities.

3.7.2.4 Income

Starting in 1990, the reporting format for quarterly employment and wage information was changed. Quarterly wage rate/payroll data for Kenai Peninsula Borough communities was consolidated under the Borough, where data is influenced by the oil industry (mining) employment.

Historically, state government has consistently had the highest average wage and average payrolls in Seward, followed by the federal government. Wholesale trade and manufacturing, on occasion, have had higher quarterly wage and payrolls.

Table 3.7-4: Kenai Peninsula Census Area Payroll, 1990

	1ST QUARTER		2ND QUARTER		3RD QUARTER		4TH QUARTER	
INDUSTRIAL CLASSIFICATION	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)
Mining	$4,204	$13.63	4298	$14.56	$3,935	$14.67	$4,520	$16.92
Construction	$3,120	$4.65	$3,510	$7.72	$3,868	$9.68	$3,399	$8.20
Manufacturing	$3,522	$10.51	$2,518	$16.00	$2,488	$22.59	$3,326	$12.94
Trans. Comm. & Util.	$2,826	$7.23	$2,768	$8.36	$3,167	$10.33	$2,850	$8.82
Trade	$1,235	$6.65	$1,118	$7.78	$2,433	$8.87	$1,260	$7.68
Finance-Ins. & R.E.	$1,654	$1.30	$1,490	$1.30	$1,202	$1.37	$1,614	$1.38
Services & Misc.	$1,591	$11.50	$1,559	$12.94	$1,595	$14.13	$1,691	$13.38
Government								
Federal	$2,775	$2.06	$2,952	$2.53	$2,887	$2.81	$3,040	$2.57
State	$2,977	$9.45	$3,023	$9.63	$3,102	$10.38	$3,040	$9.79
Local	$2,418	$15.96	$2,817	$19.11	$2,396	$10.63	$2,391	$16.47

Source: Alaska Department of Labor, 1991.

3.7.2.5 Public Fiscal Characteristics

Revenues: Table 3.7-5 presents revenue and expenditure characteristics for the City of Seward for the period of FY 1992. Revenues and expenditures are presented under general funds, special funds, capital projects, and total funds. The major sources of general revenues are taxes, followed by charges for services and intergovernmental transfers. Taxes are dominated by sales tax accounting for half of tax revenues. Fishing and support industry related property and sales are most likely a major component of these sales and property tax revenues. Intergovernmental transfers include the state prison contract, state revenue sharing, municipal assistance, and the raw fish tax. State capital project funding fluctuates but can be a major source of revenue.

Table 3.7-5: City of Seward Revenues and Expenditures

	1992			
	General Fund	Special Funds	Capital Projects	Total Funds
REVENUES				
Taxes	$2,627,050			$2,627,050
Property	$517,098			$517,098
Sales	$1,268,572			$1,268,572
Payment in lieu of Taxes	$693,653			$693,653
Penalty and interest	$46,259			$46,259
Intergovernment transfers	$913,137	$518,231	$186,841	$1,618,209
General Revenue Sharing	$246,862			$246,862
Municipal Assistance	$234,883			$234,883
Jail Contract	$260,000			$260,000
Raw Fish Tax	$153,393			$153,393
Liquor Tax	$17,375			$17,375
Amusement Tax	$624			$624
Licenses and permits	$74,005			$74,005
Assessments	$6,505			$6,505
Charges for Services	$1,879,663			$1,879,663
fines and bails	$18,158			$18,158
Interest	$245,872			$245,872
Miscellaneous	$124,466	$9,318		$133,784
Total Revenues	$5,888,856	$527,549	$186,841	$6,603,246
EXPENDITURES				
General Government	$1,851,718	$355,654		$2,207,372
Public Safety	$1,640,081	$34,651		$1,674,732
Public Works	$692,653			$692,653
Parks and Recreation	$493,106			$493,106
Library	$193,510	$14,705		$208,215
Capital Outlay			$799,308	$799,308
Debt Service	$345,265			$345,265
Total Expenditures	$5,216,333	$405,010	$799,308	$6,420,651
EXCESS/DEFICIENCY	$672,523	$122,539	($612,467)	$182,595
FUND BALANCE	$ 3,415,722	$ 128,325	$ (10,823)	$ 3,533,224

Source: City of Seward, 1993.

Expenditures: Principal general fund expenditures include general government, public works, public safety, parks/recreation, library, capital outlay, and debt service. In 1992, the City of Seward ran a total fund excess of $182,595, and a fund balance of $3,415,722.

3.7.3 Infrastructure Characteristics

3.7.3.1 Transportation Facilities

Airport: The Seward Airport, located at the head of Resurrection Bay, provides air access to Anchorage and Alaska. The airport has two paved runways (the largest a 4,600 foot asphalt strip), one built in the 1920's when the airport began operation and the second in 1952. The airport is owned and maintained by the State of Alaska, Department of Transportation and Public Facilities. Maintenance costs in the first four years of the 1980s ranged from $6,500 for 1981 to just over $41,000 for 1984. One commuter airline as well as several charters use the Airport, however service is hampered by low ceilings and visibility caused by the Kenai mountains. Because of this weather situation, air service is interrupted 35 to 75 days a year.

Railroad: The Port of Seward is an important freight and coal loading terminal for the Alaska Railroad. Passenger service to or from Seward on the Alaska Railroad was halted from 1950 until 1993 when it became available during the summer. Charter passenger service for special trips is also available.

Alaska Marine Highway System: The M/V Tustumena carries passengers and vehicles to various ports around the Gulf of Alaska. Ferry capacity is 200 passengers and 54 cars.

Bus: The Seward Bus Service operates passenger bus service between Seward and Anchorage.

3.7.3.2 Marine Services

Being a major port for the State of Alaska, Seward has an abundance of port facilities. The waterfront contains five separate dock facilities: the Alaska Railroad dock, two city docks, a small boat harbor, and a dock run by the University of Alaska for the University Marine Institute research vessels.

Small Boat Harbor: Seward's small boat harbor contains 550 slips for boats 17 feet to 90 feet in length. An adjoining dock accommodates commercial vessels up to 100 feet in length.

Harbor is equipped with fuel, water, electricity, latrines, showers, motor repair, and a boat launch ramp. The harbor also has a boat lift with a 50 ton capacity. The small boat harbor is scheduled for expansion.

Alaska Railroad Dock: This facility is the largest dock in Seward. In addition to cranes and lifts used for loading freight the facility boasts the Seward Coal Terminal, a state of the art facility handling coal for export markets. The Seward Coal Transfer Facility was built to handle coal arriving in Seward on the Alaska Railroad and load it on ships bound for the Far East. The facility is owned and operated by Suneel Alaska Corp. a subsidiary of Sun Eel Shipping Co., Ltd. Total construction cost of the 34 acre facility was $16.5 million. The facility is currently handling 800,000 metric tons of coal per year, well under its maximum capacity of 3 million metric tons /year.

Seward Marine Industrial Center: The Seward Marine Industrial Center is located across Resurrection Bay from Seward. The Industrial Center is a full service marina and ship repair center and provides vessel maintenance and repair services to all shipping and fishing traffic in the Gulf of Alaska, Bering Sea, and Aleutian Islands.

The Center has a 300 by 80 foot Syncrolift, a large marine elevator system capable of lifting vessels up to 300 feet and 3,000 tons. Boats are lifted to level of shipyard where they can be serviced and repaired.

The City of Seward and the State of Alaska invested $40 million in the Center. It is hoped that the facility will increase efficiency of the Alaskan commercial fishing fleet by eliminating the need for large vessels to travel to Seattle for repairs.

3.7.3.3 Utilities

Water: Seward receives its water from a combination of groundwater sources and surface supply. The groundwater sources provide 3,800 gallons/minute while the surface water supplies 800 gallons/minute. Total water reserves equal 620,000 gallons. Water consumption runs at 2.5 million gallons daily.

Sewer: The Seward waste water system serves the immediate city only. Outlying areas, including the airport and 4th of July Creek are not hooked into the network. Fisheries in the area process much of their own waste for commercial use.

Electricity: Seward receives much of its electricity from Chugach Electric. Power is supplemented with three diesel generators. Total capacity for Seward is 5,500 kW. Electrical system currently operates at full capacity.

Solid Waste: Seward Services collects solid waste for the city. A landfill on the north edge of town is half full. The landfill is expected to reach capacity around 1998.

3.7.3.4 Housing

Table 3.7-6 shows 1990 housing characteristics for Seward. Total housing units were estimated at 1010, slightly over half of which were single family housing. Median housing unit value was $92,400; median rent was $434.

Table 3.7-6: City of Seward Housing Characteristics, 1990

TOTAL HOUSING UNITS	1,010		
Occupancy		Housing Value (specified owner-occupied units)	
Occupied Housing Units	886	less than $50,000	22
owner occupied	420	$50,000-99,000	201
renter occupied	466	$100,000-149,000	103
Vacant Housing Units	124	$150,000-199,000	28
Units in Structure		$200,000-299,000	9
1 Unit detached	542	$300,000 or more	1
1 Unit attached	32	Median value	$92,400
2 - 4 Units	154		
5 - 9 Units	120	Rental Rates	
10 or more units	120	less than $250	73
mobile home, trailer	42	$250-499	198
		$500-749	134
Households by type		$750-999	25
Families	536	$1,000 or more	6
Married couple	399	Median rent	$434
Male Householder	31		
female Householder	106		
Non-Family	350		
Persons per Household	2		
Persons Living in Group Quarters	511		

Source: U.S. Bureau of the Census, 1991.

3.7.3.5 Land Availability

Land is available in the Seward area. Both prices and size vary widely with location. The Seward Marine Industrial Center has 80 acres available at Fourth of July Creek.

3.7.4 Industry Characteristics

3.7.4.1 Harvesting Sector

Seward is located in management area H (Cook Inlet), but its closer proximity to Prince William Sound (management area E) results in many residents fishing in the latter management area (See Figure 1.3-1). The number of Seward residents fishing commercial permits has increased from 90 to 116 persons between 1981 and 1988, an increase of 29 percent. The total number of permits has increased from 130 to 297 over the same time, an increase of 128 percent. Small increases in the number of permits have occurred in the salmon, crab, and herring fisheries, but most of the increase is due to expansion of the groundfish fisheries. Groundfish permits, which include sablefish, halibut, and other, have risen from 47 permits in 1981 to 183 permits in 1988.

Table 3.7-7: Commercial Fishery Permits Fished by Seward Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	37	35	49	46	52	52	48	48	34	45
King Crab	9	10	6	4	1	2	6	1	2	3
Tanner Crab	8	7	8	8	9	6	11	14	1	5
Other Shellfish	9	7	4	13	15	11	12	15	3	5
Herring	20	21	22	25	30	25	27	36	17	26
Sablefish	1	7	8	12	10	19	29	57	36	51
Halibut	42	46	69	58	72	81	97	89	45	
Other & Unidentified	4	8	7	9	11	17	57	37	30	38
Total	130	141	173	175	200	213	287	297	168	172
Number of residents that fished permits	90	94	111	98	112	107	117	116	79	78

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

The number of salmon permits fished by Seward residents has increased by 9 over the last 8 years. This increase has primarily occurred with acquisition of additional Prince William Sound (management area E) permits.

Table 3.7-8: Salmon Permits Fished by Seward Residents

	Year									
Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Area A (Southeast)	1	1	1	1	2	3	3	2	1	2
Area D (Yakutat)	0	0	0	0	0	0	0	0	1	1
Area E (Pr. Wm. Sound)	7	11	18	16	20	21	18	18	12	16
Area H (Cook Inlet)	19	9	17	17	17	17	18	20	11	16
Area K (Kodiak)	1	4	1	1	2	1	1	1	0	2
Area L (Chignik)	4	4	6	5	5	5	5	5	5	5
Area M (False Pass)	0	0	0	1	1	1	1	0	0	0
Area T (Bristol Bay)	5	5	6	5	5	4	2	2	3	3
Other	0	1	0	0	0	0	0	0	1	0
Total	37	35	49	46	52	52	48	48	34	45

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

The number of other finfish permits has more than tripled over the last 8 years. Seward residents have expanded their participation in these fisheries to encompass other management areas and other species. Prince William Sound and Cook Inlet remain as the primary management areas for local fishermen but they have also expanded to other regions. The halibut fishery is still the largest fishery in terms of local resident participation, but the number of sablefish and other finfish permits has also increased substantially.

Table 3.7-9: Other Finfish Permits Fished by Seward Residents

Area/Type	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A & D)										
Halibut				1	1		4	1		
Sablefish		1				1	3	2	7	4
Herring			1	1	1			1		1
Other Finfish	1	1		1		1	4	1	6	4
Prince William Sound (E)										
Halibut	9	12	14	14	15	19	24	25	10	
Sablefish	1	4	7	7	8	8	14	24	13	22
Herring	9	9	10	9	11	10	8	12		10
Other Finfish	1	1	4	4	7	10	26	16	10	17
Cook Inlet (H)										
Halibut	29	29	39	34	41	50	54	52	28	
Sablefish		2	1	2		4	9	4	6	13
Herring	3				6	6	7	11	7	8
Other Finfish	2	6	3	2	2	3	20	11	5	6
Kodiak (K)										
Halibut	4	5	11	6	11	8	7	6	4	
Sablefish				2	1		1	12	7	7
Herring										
Other Finfish					1		1	6	6	5
Peninsula/Aleutians (M)										
Halibut			2	1	2	3	4	4	2	
Sablefish						1	1	2	1	
Herring	1						1			
Other Finfish						1	2	1	1	
Bristol Bay (T)										
Halibut										
Sablefish										
Herring	7	12	9	13	9	6	6	8	6	6
Other Finfish										
Other Areas and Unidentified										
Halibut			3	2	2	1	4	1	1	
Sablefish				1	1	5	1	3	2	5
Herring			2	2	3	3	5	4	4	1
Other Finfish				1	1	2	4	2	2	5
Unidentified										1
Total	67	82	106	103	123	142	210	219	128	115

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Seward has historically had low levels of participation in shellfish fisheries and this continues to the present. The number of fishermen pursuing king crab has declined with the decrease in stock abundance. The number of local residents pursuing tanner crab, principally in Cook Inlet, has increased through 1988 but recent management closures have undoubtedly reduced this number. Other shellfish permits have increased in number over the past 8 years as the shrimp fishery expanded. This is resource has limited abundance at present and further expansion is not likely in the near term.

Table 3.7-10: Shellfish Permits Fished by Seward Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
Tanner	1									
Other Crab		1								
Other Shellfish	2									2
Prince William Sound (E)										
Tanner	2	1						1		
Other Crab										
Other Shellfish	2	1	2	8	10	9	9	9		
Cook Inlet (H)										
King Crab	2	1	3	4						
Tanner	3	5	5	7	7	3	8	11		1
Other Crab				1	1					
Other Shellfish	3	3	2	4	4	2	3	6	2	2
Kodiak (K)										
King Crab	1	3								
Tanner Crab			1	1				1		2
Other Crab									1	
Other Shellfish	2	1								1
Peninsula/Aleutians (M)										
Tanner Crab					1	1	1			
Other Crab										
Other Shellfish		1								
Other Areas & Unidentified										
King Crab	6	6	3		1	2	6	1	2	3
Tanner Crab	2	1	2		1	2	2	1	1	2
Other Crab										
Other Shellfish										
Totals	26	24	18	25	25	19	29	30	6	13

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Table 3.7-11 shows estimates of employment by fishery. The table focuses on participation in the fishery by Seward residents. Crew factors shown in the table are calculated from Thomas (1986) and are averages for the management areas found in the Gulf of Alaska. This table assumes that the residency of crew members is the same as the permit holder.

Over the last 8 years the total number of persons involved in the groundfish fisheries has surpassed the number participating in salmon fisheries. Salmon fisheries had the largest number of participants in 1981 but were surpassed by the combined groundfish fisheries in 1982, and by the halibut fishery alone in 1983. The number of participants in the groundfish fisheries is now about three times larger than number of local residents involved in the salmon fisheries. The model discussed in Section 4 projects that harvest employment in the future will remain about the same as present levels, with a significant increase in processing employment. This growth will occur as a result of further expansion in the groundfish industry.

Table 3.7-11: Harvest Sector Employment of Seward Residents

		Year									
Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon											
Purse Seine	4.4	92	101	132	123	136	123	114	119	92	114
Drift Gillnet	1.75	18	23	21	23	30	35	30	30	9	19
Set Gillnet	2.1	13	13	15	15	8	13	11	8	15	11
Hand Troll	1	1	1	1	0	0	0	0	0	1	3
Power Troll	1.75	0	0	0	0	0	0	0	0	0	0
King Crab	3.25	29	33	20	13	3	7	20	3	7	10
Tanner Crab	3.3	26	23	26	26	30	20	36	46	3	17
Other Crab	2.6	0	3	0	3	3	0	0	0	3	0
Other Shellfish	3.3	30	23	20	40	46	36	40	50	7	17
Herring											
Purse Seine	4.25	64	85	81	89	81	89	94	98	55	102
Gillnet	2	6	2	6	6	18	6	8	20	8	2
Pound	1	8	0	0	4	8	4	4	12	0	1
Sablefish	3.55	4	25	28	43	36	67	103	202	128	181
Halibut	2.5	105	115	173	145	180	203	243	223	113	n.a.
Other & Unidentified											
Longline	2.85	9	17	17	17	23	46	154	103	80	106
Trawl	3.1	0	0	0	0	3	0	3	0	3	0
Pots	3.1	0	0	0	3	6	0	0	0	0	0
Other	1.9	8	4	2	2	0	2	6	2	2	0

Sources: Derived from Thomas, 1986; and data provided by Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Harvest: Salmon represent the largest fishery for Seward residents in terms of pounds harvested. Table 3.7-12 shows the harvest amounts by major species for the 1981 through 1990 time period. These figures should be considered relative indicators of the level of harvest by major species since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest levels since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. Non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.7-12: Fisheries Harvest by Seward Residents

(millions of pounds)

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	5.4	6.6	4.7	8.0	6.3	4.9	7.5	5.2	2.6	7.1
King Crab	0.5			0.1						
Tanner Crab		0.2	0.3	0.3	0.2		0.3	0.1		
Other Crab	0.0		0.0			0.0	0.0	0.0		0.0
Other Shellfish				0.1	0.1	0.1	0.1	0.1		
Herring	2.5	1.6	2.1	2.5	2.6	3.0	2.9	4.3	1.3	3.8
Sablefish			0.1	0.2	0.1	0.1	0.4	0.5	0.9	1.0
Halibut	0.2	0.3	0.3	0.5	0.8	0.8	0.9		0.7	
Other & Unidentified				0.1	0.1	0.1	0.2	0.3	0.1	0.1
Non-disclosed	1.3	2.0	1.1	1.6	n.a.	2.4	2.0	1.4	1.8	2.6
Total	9.9	10.7	8.6	13.4	10.2	11.4	14.3	11.9	7.4	14.6

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

n.a. Not shown in data files.

Earnings: Average ex-vessel earnings over the past 8 years has ranged from $37,800 in 1983 to $100,000 in 1987. Salmon fishing remains the most important fishery for income to Seward residents. It has contributed 50 to 62 percent of total fishing earnings over the past 8 years.

Table 3.7-13: Total Ex-Vessel Earnings of Seward Residents

(millions of $)	Year								
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon									
Seine	3	2.2	1.6	3.1	2	2.1	4.7	4.7	1.7
Drift Gillnet	0.1	0.4	0.2	0.2	0.4	0.6	1.1	1.5	.1
Set Gillnet			0.3	0.1					
Hand Troll				0	0	0	0	0	
Power Troll	0	0	0	0	0	0	0	0	0
King Crab	0.6			a					
Tanner Crab		0.3	0.3	0.3	0.4		0.7	0.3	
Other Crab	0		0			0	0	0	
Other Shellfish				0.1	0.1	a	a	a	
Herring									
Purse Seine	0.5	0.3	0.5	0.5	0.7	1.1	1.4	2.5	0.3
Gillnet							a		
Pound & Other		0	0						0
Sablefish			a	0.1	0.1	0.1	0.4	0.7	0.9
Halibut	0.2	0.3	0.4	0.4	0.7	1.1	1.2		1.0
Other & Unidentified									
Longline				a	a	a	a	0.1	a
Trawl	0	0	0	0		0		0	
Pots	0	0	0			0	0	0	0
Other					0				
Non-disclosed	1.3	1.3	0.9	0.7	1	1.7	2.2	1.4	1.5
Total	5.7	4.8	4.2	5.5	5.4	6.7	11.7	11.2	5.5

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
a. Less than $50,000.

Table 3.7-14 shows the total number of vessels owned by Seward residents that are licensed for various fisheries in the state. The data bases provided to MMS give vessel size information by species, gear, and area. If a single vessel participates in several different fisheries it is counted in each fishery. As a result, the information shown in Table 3.7-14 overstates the actual number of vessels fished by local residents but does indicate which vessel sizes are the most active.

Vessel size classes over 12.2 meters (40 feet) have seen the most rapid growth over the past 8 years. A number of vessels in the 12.2 -18.2 meter (40-59 feet) class may be seiners, or larger drift gillnet boats that have diversified into other fisheries. Boats larger than 18.2 meters (59 feet) are not permitted to operate in the seine fisheries and are too large to be effective drift gill net boats, so they are likely involved in crabbing, trawling, or longlining. Vessels in the 54.9-60.9 meter (180-199 feet) class are likely involved in groundfish trawling since at least one company in Seward operates trawl vessels. However, the ex-vessel earnings data do not reflect participation by these vessels.

Table 3.7-14: Seward Resident Fishing Vessels, by Length

Size in Meters	Size in Feet	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-6.0	0-19	3	5	8	9	4	2	5	4	5	4
6.1-12.1	20-39	70	73	89	89	99	116	133	134	47	53
12.2-18.2	40-59	26	27	39	55	62	62	60	71	56	69
18.3-24.3	60-79	6	11	9	10	8	13	29	37	30	21
24.4-30.4	80-99	2	2	7	4	1	4	3	3	0	4
30.5-36.5	100-119	0	0	0	0	0	0	0	0	0	0
36.6-42.6	120-139	1	1	3	1	1	0	2	5	3	0
42.7-48.7	140-159	0	0	0	0	0	0	0	0	0	0
48.8-54.8	160-179	0	0	0	0	0	0	0	0	0	0
54.9-60.9	180-199	0	0	0	0	0	1	28	35	0	0
61.0+	200+	0	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

3.7.4.2 Processing Sector

In 1992 Seward was listed as the 57th largest port in the United States in value of seafood landed (National Marine Fisheries Service, 1994). Seward Fisheries and Anderson Seafoods are major processing firms in the community. Inlet Salmon has a permanent buying station in Seward but ships the raw fish to its plants which are located elsewhere in the Kenai Peninsula. Other processing firms located elsewhere on the Kenai Peninsula also buy fish in Seward for processing at their plants. Since these fish buyers have limited resources to aid fishers fishing from Seward, most of the competition is between the two shore plants. Seward Fisheries averages about 250 employees, while Anderson Seafoods employs about 50 persons.

Pink salmon account for the largest share of seafood processed in Seward, with black cod, halibut, sockeye and chum salmon, and other groundfish also processed in the community.

Anderson Seafoods has a canning line while Seward Fisheries produces fresh and frozen products. Seward gets most of its salmon from Prince William Sound, while other species are delivered from other harvest areas of Alaska.

3.7.4.3 Support Sector

Seward has substantial support services for its fishing fleet. Seward's Marine Industrial Center is located directly across Resurrection Bay from town. It has nearly 1,000' of dock space, including a 350' Syncrolift drydock capable of lifting ships up to 3,600 tons displacement. The center also has a 250 ton Travelift capable of lifting vessels between 45' and 100' in length. The center has a machine shop, field repair office, fabrication shop, certified divers, shaft repair, welding, and repair supplies (Ports of Alaska, 1988).

The Seward boat harbor is located in town and has berthing capacity of 550 stalls plus an additional 300' of transient moorage. The harbor has a lengthy waiting list of several years for reserved stalls. The floats have lighting, power, and water, and the harbor has a launching ramp, tidal grid, and fuel facilities. A 50 ton Travelift is used to lift smaller boats at the boat harbor. Groceries, restaurants, and lodging are located near to the harbor.

3.8 Unalaska/Dutch Harbor

3.8.1 Description/Setting

Unalaska/Dutch Harbor is a "community" that actually spans two islands of the Fox Island group in the middle of the Aleutian Island chain. Unalaska, the largest city in the Aleutian Islands, was incorporated as first class city in 1942. The portion of the community located on the northeast side of Unalaska Island at the head of Iliuliuk Bay, an arm of Unalaska Bay, is referred to as Unalaska. Dutch Harbor, on Amaknak Island, is located on a sheltered cove on the northwest side of Iliuliuk Bay. Unalaska Island and Amaknak Island are connected at Unalaska/Dutch Harbor by a low highway bridge across the south channel from Captains Bay. Unalaska/Dutch Harbor is located 763 miles southwest of Anchorage.

The terrain of Unalaska Island is characterized by steep, rugged mountains that rise from the shoreline in most areas. In contrast, Amaknak Island is relatively level, and because of this, most of the development and expansion potential is located on this island. The vegetation is typical of the treeless southern Alaska Peninsula and Aleutians Islands, dominated by grass and shrubs. The climate is that of the Alaskan maritime zone, with cool summers and mild winters. Precipitation in Dutch Harbor is 60.5 inches a year, including up to 72 inches of snow. Unalaska/Dutch Harbor is in the path of frequent west-to-east storm tracks of the North Pacific, especially in winter. The waters of the southern Aleutian Chain are ice-free year-around.

There is evidence of pre-contact Aleut settlement on both islands. The first recorded contact with Russian explorers came in 1741. In 1759, Unalaska had a population of over 1,000 contained in 24 settlements. The Russians transported Aleuts from Unalaska to the Pribilof Islands to harvest fur seals. The pre-World War Two American period in Unalaska was characterized by a series of booms and busts. Trade in otter skins was the major economic activity until the turn of the century. Several other factors affected the growth of Unalaska, including its location in relation to major shipping lanes and use as a staging area for the Nome gold rush. Fox farming was a lucrative activity until market collapsed during the Great Depression. Seafood processing of salmon, herring, and whale was established in the early 1900's, although major fisheries based on herring were not established until the late 1920's. In 1941, the U.S. Army and Navy established major bases at Unalaska/Dutch Harbor. After the outbreak of the war, Aleut residents were evacuated from Dutch Harbor and interned in southeast Alaska. The economy was depressed after the war, until interest in the fishing industry increased in the late 1950's; the present crab fishery was established in the early 1960's. Since that time, the level of activity associated with commercial fishing and fish processing has both increased and diversified, and is now the basis of the local economy.

3.8.2 Socioeconomic Characteristics

3.8.2.1 Local Economy

Of all the communities selected for this study, Unalaska/Dutch Harbor has the most diversified and complex fishing-related economy. The fishing and port-related service sector is well developed compared to the other area communities. The port of Unalaska ranked first during 1992 in the amount and value of commercial fish landed (National Marine Fisheries Service, 1994). Historically, fishing and fish processing were centered around the king crab fishery; however, when that fishery was closed in the early 1980's, the fishing industry diversified into bottom fish and related products such as surimi, resulting in a shift from seasonal to year round economic activity. Four major fish processors are located in Dutch Harbor: Alyeska Seafoods, East Point Seafoods, Greatland Seafoods, and Westward Seafoods, and Whitney Fidalgo Seafoods.

The proximity of Dutch Harbor to major shipping routes contributes to its role as a shipping center for fish products and regional distribution of supplies to other communities. Unalaska/Dutch Harbor is served by both American President Lines and Sea Land. Marine support services are provided to the fishing and shipping industry, and include fuel and water, warehousing, ship repair, and lodging and meals. Major operators include Crowley Maritime, Delta Western, Underwater Construction/Northern Offshore, Petro Marine, Offshore systems Inc., and Panama Marine. During 1980-85 oil and gas exploration activities in the Bering Sea, the oil industry used Unalaska/Dutch Harbor as a support base. A support facility was constructed at Captains Bay in 1982 and was operated by OSI until its pullout in 1986 when oil and gas activities ceased. This facility has since been converted to other support services.

The Ounalashka Corporation, the village ANCSA corporation, is an active participant in the community economy. Their primary activity is real estate, leasing property to various users. The City of Unalaska is also an major economic influence. They provide water, sewer and electric service, and operate the small boat harbor, the Ballyhoo dock and the airport facility. In the fourth quarter of 1985, the city accounted for 15 percent of total wage employment and 33 percent of non fish processing wage employment. Alaska Commercial Company and Carl's Commercial Company are the two largest of the five retailers located in the community. Other services include five hotels, seven restaurants, two auto rental and parts/repair services, a bank, and an accounting/property management service.

Native Alaskan residents also participate in subsistence activities, although dependence on this element has declined since the 1960's (Impact Assessment Inc. 1983). Important resources include salmon and halibut, marine invertebrates such as crab, chitons and sea urchins, and berries. Some seal and waterfowl hunting also occurs.

3.8.2.2 Population

Table 3.8-1 presents the historical population characteristics for Unalaska/Dutch Harbor. Because the community has been a temporary home to many transient residents, accurate estimates of resident population have been difficult to obtain (Impact Assessment Inc. 1987). Different methodologies used in estimating population further affect the reliability of population estimates. The figures available show steady growth from 1950 through 1970, followed by a dramatic increase by 1980, peaking again in 1981 and then decreasing in 1983. The growth of the crab fishery and associated processing contributed to the increase in the mid-1970's, and the fishery's decline is reflected in the 1983 population decrease. Recent growth has occurred with the diversification of processing and support services, and the population has nearly doubled since the prior peaks of the early 1980's.

By the mid 1980's the population of Unalaska began to increase although the Alaska State Department of Labor's population estimates through 1989 counted only full-time permanent residents of the community. In 1990 the Bureau of the Census changed the basis for population estimates by including workers employed at local processing plants and living in dormitories or other supplied housing. The population growth shown between 1989 and 1990 is a result of this methodological change.

Table 3.8-1: City of Unalaska Historic Population

Year	Population
1950	173
1960	218
1970	342
1980	1,322
1981	1,944
1982	1,922
1983	1,992
1984	1,447
1985	1,331
1986	1,354
1987	
1988	1,131
1989	1,146
1990	3,089
1991	3,450
1992	3,771

Sources: Impact Assessment Inc. 1983, 1987; U.S. Bureau of the Census, 1991; Alaska Department of Labor, 1993b, 1994b.

The non-resident seasonal component of the Unalaska/Dutch Harbor population has historically been significant; between 1972 and 1977, the non-resident component of the population increased from 21.5 percent to 68.8 percent of total population. In fact, previous studies have broken the transient population into 3 categories: semi-permanent, long-term, and short term. However, as fish processing has diversified the population has become more stable, although peaks from the offshore fishing fleet are occasionally experienced.

Ethnicity and age characteristics are also influenced by the transient component. Between 1970 and 1980, Caucasian increased from 31.0 percent to 64.1 percent of the population;

Alaskan Natives decreased from 63.4 percent to 15.1 percent and other ethnic groups increased from 5.6 percent to 19.3 %. During the boom years, males outnumbered by a ratio of 3:2, and in the 3 age groups from 25 to 54, there were twice as many males as females. As the population has stabilized, relatively more females and families have moved into the community; however, the transient population remains predominantly single male and non-Native individuals leave the community as they get older. By 1990, the Caucasian population was 62%, Asian-Pacific Islanders 19%, Hispanics 13%, and Alaskan Natives 8%. Approximately 88% of the population was 18 years or older in 1990.

3.8.2.3 Employment

Table 3.8-2 and Figure 3.8-1 present Unalaska census subarea quarterly payroll industry series data for 1991 and 1992. Manufacturing (i.e., fish processing) dominates wage employment, accounting for 64 % to 74 % of total employment, depending on the quarter. Local government is second in total employment (6.0 to 8.6%), followed by Transportation, Utilities, and Communication. Seasonal employment fluctuations can be significant in the fish processing sector; in 1991, 2nd quarter employment was 2,387, compared to 1,628 in the 4th quarter.

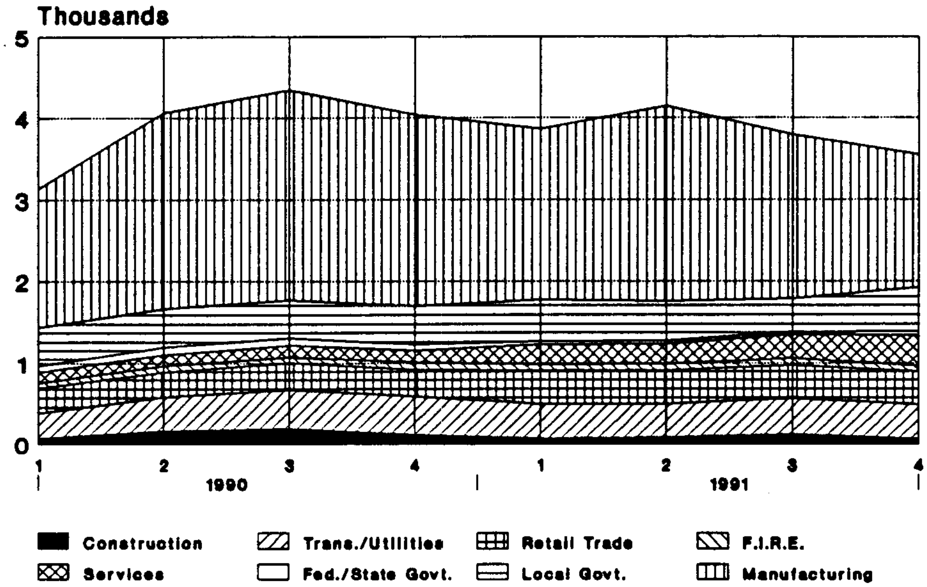
Total quarterly employment ranged from 3,130 in the 1st quarter of 1990 to 4,333 in the 3rd quarter of 1990. Average employment for four quarters stayed roughly the same in 1990 and 1991.

Table 3.8-2: Unalaska Census Subarea Quarterly Employment, 1990-1991

	Quarter/Year				Annual	Quarter/Year				Annual
Industry	1/90	2/90	3/90	4/90	Average	1/91	2/91	3/91	4/91	Average
Total Employment	3,931	3,859	3,755	3,930	3,869	1,898	2,387	2,122	2,725	2,283
Mining	*	*	0	0	0	0	0	0	0	0
Construction	75	173	208	123	145	141	181	79	109	128
Manufacturing	1,689	1,396	1,154	1,450	1,422	397	481	252	524	414
Trans. Comm. & Util.	320	415	469	475	420	198	231	204	271	226
Trade	292	298	328	325	311	468	608	474	633	546
Finance-Ins. & R.E.	69	83	50	90	73	51	56	58	59	56
Services & Misc.	134	137	73	148	123	296	451	366	538	413
Government	1,308	1,282	1,272	1,247	1,277	532	533	567	484	529
Federal	757	725	738	708	732	52	64	64	70	63
State	79	97	85	76	84	88	103	99	103	98
Local	472	460	449	463	461	392	366	404	311	368

Source: Alaska Department of Labor, 1992.

Figure 3.8-1: Unalaska Census Subarea Quarterly Employment, 1990-1991



Source: Alaska Department of Labor, 1992.

3.8.2.4 Income

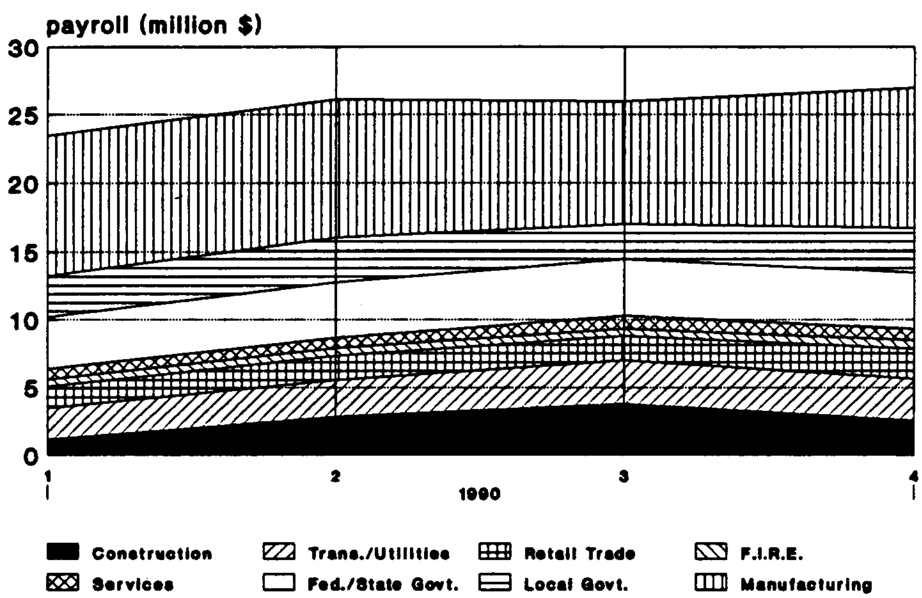
Table 3.8-3 and Figure 3.8-2 show the quarterly payroll for the Aleutians West Census Subarea (which also includes both Akutan and Adak) for the period of 1990. Fish processing dominates total payroll with local government second in payroll value. Manufacturing (i.e., fish processing) dominates payroll income, accounting for 56 percent to 72 percent of total wages, depending on the quarter, although average wages are below the average for reporting classifications. Local government is second in total wages (8.1 to 13.3%) and average quarterly wage, followed by Transportation, Utilities, and Communication. Total average quarterly payroll ranged from $23.9 million in the 1st quarter of 1990 to $28.1 million in the 4th quarter of 1990. Seasonal wage fluctuations are not as significant as employment fluctuations.

Table 3.8-3: Aleutians West Census Subarea Payroll, 1990

(000's of $)	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
Industrial Classification	Avg. Wage	Total Payroll	Avg. Wage	Total Payroll	Avg. Wage	Total Payroll	Avg. Wage	Total Payroll
Mining	$0.00	$0	$0.00	$0	$0.00	$1,897.67	$0.00	$995.94
Construction	$1.04	$17	$1.81	$105	$1.76	$95	53.46	$386
Manufacturing	$1.42	$2,047	$1.36	$2,709	$1.51	$4,439	$0.00	$0
Transportation, Utilities & Communication	$2.07	$342	$2.21	$502	$2.67	$617	$2.34	$489
Wholesale Trade	$0.00	$0	$0.00	$0	$0.00	$0	$0.00	$0
Retail Trade	$1.43	$208	$1.41	$238	$1.52	$328	$1.17	$224
Finance, Insurance & & Real Estate	$1.80	$153	$1.69	$1307	$1.22	$125	$1.55	$135
Services	$2.19	$74	$2.21	$77	$2.23	$71	$2.11	$63
Government								
Federal	$1.69	$49	$1.91	$55	$3.39	$169	$3.44	$254
State	$1.76	$75	$1.74	$59	$1.93	$15	$1.50	$69
Local	$2.66	$893	$2.68	$897	$2.37	$796	$2.21	$835
Miscellaneous	$0.00	$0	$0.00	$0	$0.00	$0	$0.00	$0
Total	$0.00	$4,134	$0.00	$5,015	0.00	$7,020	$0.00	$4,726

Source: Alaska Department of Labor, 1991.

Figure 3.8-2: Aleutians West Census Subarea Payroll, 1990



Source: Alaska Department of Labor, 1991.

3.8.2.5 Public Fiscal Characteristics

Revenues: Table 3.8-4 presents revenue and expenditure characteristics for the City of Unalaska for the period of FY 1986 through FY 1991. They are broken into General Funds and Special Funds, which include federal revenue sharing, utilities, education, port and harbor operations, airport terminal operations and capital improvements. The major sources of general revenues are property taxes (33%), sales and use tax (30%), and state aid and grants (26%), which includes revenue sharing from the raw fish tax. Fishing and support industry related property and sales are most likely the major component of these revenues. Property tax and sales and use tax elements of revenue have remained relatively stable over the last 5 years, offsetting decreasing state aid and grants since FY 1983. Recent special fund revenue trends include the decrease in federal revenue sharing and increase in ports/harbor and airport terminal operations funds.

Table 3.8-4: City of Unalaska Revenues and Expenditures Summary

	1986	1987	1988	1989	1990	1991	1992
REVENUES							
Taxes	$2,358,433	$2,699,290	$3,633,485	$6,787,501	$8,552,424	$9,472,061	$11,012,533
Intergovernmental Transfers	$1,052,130	$1,398,085	$1,259,680	$1,715,489	$1,863,531	$2,957,642	$3,843,415
Other	$504,036	$373,458	$461,911	$801,576	$1,242,141	$1,714,110	$2,180,644
Total Revenues	$3,914,599	$4,470,833	$5,355,076	$9,304,566	$11,658,096	$14,143,813	$17,041,592
EXPENDITURES							
General Government	$672,895	$651,139	$764,562	$1,039,836	$1,253,964	$1,525,376	$2,119,894
Planning and Zoning	$76,787	$60,143	$94,278	$78,019	$133,457	$340,264	$579,526
Public Safety	$838,550	$806,703	$1,046,788	$1,290,766	$1,264,231	$1,297,133	$2,152,044
Public Works	$941,179	$1,146,086	$1,175,720	$1,446,144	$1,966,837	$2,572,434	$3,596,587
Culture and Recreation	$347,153	$362,126	$460,311	$380,359	$475,607	$513,822	$837,816
Ports and Harbors/Capital outlay	$0	$0	$0	$0	$0	$0	$0
Health Clinic	$5,098	$6,760	$7,505	$7,491	$11,031	$12,000	$1,600,000
School Support	$0	$0	$0	$0	$0	$0	$0
Non-departmental	$287,489	$401,831	$253,838	$521,692	$228,708	$577,134	$757,873
Total Expenditures	$3,169,151	$3,434,788	$3,803,002	$4,764,307	$5,333,835	$6,838,163	$11,656,691
EXCESS/DEFICIENCY	$75,886	$671,521	$885,267	$3,082,706	$3,559,390	$6,048,993	$2,411,183
FUND BALANCE	$2,292,634	$2,964,155	$3,861,903	$6,944,609	$9,487,508	$15,517,487	$17,928,670

Source: City of Unalaska, 1993.

Expenditures: Principal general expenditures include general government (city council, non-departmental, admin./finance) (33%), public works (23%), public safety (23%), and a contingency fund (7%). Value of expenditures associated with general government, public works, and public safety have all slightly deceased since FY 1983, although percentages have basically stayed the same.

3.8.3 Infrastructure Characteristics

3.8.3.1 Transportation Facilities

Port Facilities: Table 3.8-5 shows the characteristics of Unalaska/Dutch Harbor transportation infrastructure, which is the most extensive in the region. This includes a city small boat harbor, 14 dock facilities (including ship repair), and a state and city operated airport. The marine network is oriented towards commercial fishing, including boat storage and repair, other marine services, fish offloading and product shipment. The city plans expansion of the Unalaska Marine Center, (when money becomes available) which could include cold storage. Several firms are presently doing a feasibility study on cold storage at Unalaska/Dutch Harbor. Unalaska/Dutch Harbor is served by American President Lines and SeaLand in addition to several smaller shipping and tug and barge companies.

Table 3.8- 5: Unalaska/Dutch Harbor Marine and Airport Infrastructure

Facility	Ownership	Dock Length	Water Depth	Services
Port and Dock Facilities				
Municipal				
Unalaska Marine Center	municipal	1,200 ft	40 ft	Wr,C,Fl,W
Small Boat Harbor	municipal	975 ft	10-90 ft	
Spit Dock	municipal	250 ft	20 ft	W
Private				
Alyeska Seafoods	private	505 & 220 ft	24 ft	Fr,C,W
American President Lines	private	300 ft	40 ft	Wr,Fr,C,W,E
Crowley Maritime	private	410 ft	35 ft	Wr,C,Fl,W,E
Captains Bay Dock	private	150 ft	80 ft	Fr,Fl,W,E
Delta Western Fuel	private	750 ft	45 ft	Wr,C,Fl,W
Delta Western Warehouse	private	2,000 ft	24 ft	Wr,Fr,C,Fl,W,E
East Point Seafoods	private	460 ft	30 ft	Wr,Fr,C,W,E
Unisea Inc.	private	1,640 ft	36 ft	Wr,Fr,C,W
Dutch Harbor Seafoods	private	40 ft		
Offshore Systems Inc.	private	420 ft	40 ft	Wr,Fr,C,Fl,W,E
Royal-Aleutians Seafoods	private		20 ft	C,W,E
Walashek Ship Yard	private		45 ft	C,W,E
Airport Facilities				
Unalaska Airport	state	3900 ft x 100 ft		

Key: Wr - warehouse; C - cold storage; E - electricity; Fl - fuel; Fr - freezer; W- water

Source: Northern Economics, 1990; City of Unalaska, 1993.

The community of Unalaska/Dutch Harbor has four primary harbors and anchorage's: Iliuliuk Bay, Dutch Harbor, Iliuliuk Harbor, and Captain's Bay. The channels to Iliuliuk Bay and Dutch Harbor are free from dangers, except along the shore. Iliuliuk Harbor is obstructed at its entrance by ledges, but is not difficult to transit with vessels under 250 feet in length. Captain's Bay is a broad bay with good holding bottom (National Ocean Service, 1987).

The port of Unalaska/Dutch Harbor has substantial areas of good protected moorage and construction of man-made harbors has not been required to provide protection from storms. Two public moorage facilities were built in the early and mid-1980's to alleviate the congestion that occurred at private docks in prior years. The largest of these is located on the spit which surrounds Dutch Harbor and the smaller mooring space is located in Iliuliuk Harbor in proximity to the Walashek vessel repair facility. The spit dock was designed to provide moorage for most of the larger vessels in the Bering Sea fleet and is operated by the City of Unalaska on land leased from the Ounalashka Corporation.

The dock located in protected Iliuliuk Harbor was originally located at the spit but the design of the dock was inadequate for the large vessels which used the facility so it was relocated to the present location following construction of the present spit dock. Small longliners, draggers, gillnetters, and small recreational boats are the primary users of this structure.

Fishing vessels use docks for three primary purposes: 1) Unloading of product; 2) servicing of vessel; and 3) moorage, which was discussed in the previous section. The processors provide facilities for unloading the vessels that deliver to them.

Catcher/processors and processing ships need to offload the packaged product which they have produced during their time at sea for shipment to markets. In some instances, these vessels deliver over the side to tramp steamers at sea or in protected waters, but they often call at Unalaska/Dutch Harbor to offload product. At present the Ballyhoo Dock owned by the City of Unalaska and the American President Line (APL) dock are the preferred docks for offloading of product. In most cases this frozen, boxed product is loaded into freezer vans for shipment on APL or Sealand vessels.

The concept of a service dock for fishing vessels in the Bering Sea has undergone significant change in the past few years. In the early 1980's vessels would deliver to a processor, then move to the fuel dock, then move to another dock where they could tie up for a period of a few hours to a few days as they replenished and made needed repairs. Since some services required dockside access and boats were often rafted 3 to 4 boats deep, delays were frequent. The present service dock concept attempts to improve efficiency by providing multiple services during the time that the vessel is at the dock face. Vessels are placed on a waiting list for fuel to prevent congestion at the dock and during the time they are refueling (typically 5-8 hours) they use the other services that may be located at the dock. These services may include a ships chandlery, case lot food sales, electronic repair shops, engine repair, net loft, restaurant, liquor and convenience store, dormitory rooms, and storage for nets and pots.

Airport Facilities: The airport is 3900 by 100 feet and runs northwest/southeast across Amaknak Island south of Ballyhoo Mountain. Limited land area, storm erosion, and deep water on the northwest side makes runway expansion difficult and costly. It is barely adequate for jet service, and instrument and visual approaches are limited by runway location and terrain. Airport runway improvements have recently been completed, including repairs, paving, and additional armor rock re-enforcement. The community is served daily by MarkAir, Alaska Airlines, Peninsula Air, and Reeve Aleutian Airways; it functions as a regional transportation hub and serves outlying communities.

The fishing industry uses the airport at Unalaska/Dutch Harbor for crew rotation and emergency supplies and equipment. The often inclement weather at Unalaska/Dutch Harbor, coupled with the short runway length often results in flight cancellations into the community. For vessels awaiting new crew members before sailing or requiring a piece of machinery before they can return to fishing, these delays are costly. Air transportation delays were cited as a major problem by vessel captains in a 1986 survey (R&M Consultants, 1986).

3.8.3.2 Utilities

Water and Sewer: The City of Unalaska provides water and sewer services. Metered water consumption indicates an average production level of over 90 million gallons per month; fish processing is a significant component of demand. System upgrades have resulted in two new wells and 80,000 feet of new pipe since 1988. The City has received $9.0 million from the state for water system improvements since 1988.

The original water and sewer system was built in the 1940's by the Navy. The sewer system has recently been upgraded to accommodate fish processing plants, and serves the majority of the community. Flow averages about 350,000 gallons per day.

Solid Waste: The city operates a 10 acre landfill; a new lined landfill adjacent to the existing facility is under design. Williwaw Services provides trash pickup.

Electricity: The City provides power generation from a 5.1 megawatt diesel generating plant. A separate 1.0 megawatt facility is under construction, with activation estimated in 1993. Peak consumption is 4.1 megawatts. Three of the largest fish processors supply their own power, and one has intertie capabilities with the City system. The majority of other processors purchase their power from the City.

Fuel: Four companies presently sell fuel, and have a combined storage capacity in excess of 20.6 million gallons of marine, automobile, and aviation fuel.

3.8.3.4 Housing

The City has virtually no available vacant housing; every unit is occupied. The condition of housing stock is fair, with the housing in the old townsite World War Two vintage and newer housing located in outlying areas. One 18 unit HUD housing project was completed in 1982, and an additional 15 homes were recently completed. In 1989-91, single family/duplex accounted for 37 percent of the housing; multi-family and trailers accounted for the remaining 63 percent. Group living quarters for processing workers are located adjacent to the various processing plants and provide housing for almost all processing employees. In 1992, roughly 6 percent of this total housing was available for the public.

Table 3.8-6: City of Unalaska Housing Characteristics

TOTAL HOUSING UNITS	682
Occupancy	
Occupied Housing Units	575
owner occupied	148
renter occupied	247
Vacant Housing Units	107
Units in Structure	
1 Unit detached	257
1 Unit attached	42
2 - 4 Units	101
5 - 9 Units	78
10 or more units	97
mobile home, trailer	107
Households by type	
Families	299
Married couple	237
Male Householder	30
female Householder	32
Non-Family	276
Persons per Household	3
Persons Living in Group Quarters	1,614

Housing Value (specified owner-occupied units)	
less than $50,000	29
$50,000-99,000	35
$100,000-149,000	24
$150,000-199,000	20
$200,000-299,000	4
$300,000 or more	1
Median value	$91,500
Rental Rates	
less than $250	23
$250-499	48
$500-749	51
$750-999	64
$1,000 or more	53
Median rent	$741

Source: U.S. Bureau of the Census, 1991.

3.8.3.5 Land Availability

There is vacant land available for new development, although it is limited in the downtown area. There are problems with access to land suitable for support facilities. Ounalashka Corporation, the major landholder, has instituted a policy of leasing land for development by other parties.

3.8.4 Industry Characteristics

3.8.4.1 Harvesting Sector

Groundfish and shellfish harvests in the vicinity of Unalaska/Dutch Harbor are dominated by fishermen from the Pacific Northwest states, and particularly the Seattle area. Although a large number of vessels operate from Unalaska/Dutch Harbor, there are relatively few local residents who participate in these fisheries. Impact Assessment, Inc. (1983) reported that less than a dozen boats were owned by local fishermen. A survey by R&M Consultants (1986) found a similar number of boats substantial enough to endure Bering Sea storms and harvest shellfish and groundfish, although a larger number of skiffs and small boats for use in coastal fisheries were available. This latter survey was undertaken during the month of June and, as a result, all of the smaller resident salmon boats were in other communities participating in salmon fisheries. Table 3.8-7 shows the number and type of commercial fishing permits held by Unalaska/Dutch Harbor residents.

The total number of permits held by Unalaska/Dutch Harbor residents over the 1977 through 1986 time period mirrors the "boom-bust" cycle associated with king crab harvests in the Bering Sea. While the total number of permits held by residents in 1986 is substantially larger than the number held in 1977, 1986 represents an approximate 46 percent decrease from the total number of permits held in 1983. Salmon is the only fishery where the number of permits held by Unalaska/Dutch Harbor residents in 1986 is larger than the number of permits held during the peak years of 1982-1983.

Table 3.8-7: Commercial Permits Fished by Unalaska/Dutch Harbor Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	11	11	12	11	11	14	12	7	7	9
King Crab	50	55	51	35	33	33	42	31	21	18
Tanner Crab	31	39	42	23	21	22	17	29	27	19
Other Shellfish	23	13	14	17	6	3	13	12	8	9
Herring	2	2	2	1	1	0	2	2	2	3
Sablefish	0	4	0	7	2	2	11	8	7	6
Halibut	17	14	30	28	16	17	26	30	27	6
Other	17	23	11	10	12	8	24	36	36	44
Total	151	161	162	132	102	99	147	155	135	114
Number of residents that fished permits	73	65	86	65	45	48	70	66	61	53

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

The number of Bering Sea salmon fishery permits held by Unalaska/Dutch Harbor residents has remained relatively steady over the past few years, although there has been a slight change with the number of permits in Area M (False Pass) decreasing slightly, and the number of Area T (Bristol Bay) permits increasing slightly. Table 3.8-8 shows the number and type of salmon permits held by local fishermen since 1977.

Table 3.8-8: Salmon Permits Fished by Unalaska/Dutch Harbor Residents

	Year									
Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Area E (Pr. Wm. Sound)	0	0	1	0	1	3	2	1	1	1
Area H (Cook Inlet)	0	1	3	1	1	1	1	1	0	1
Area M (False Pass)	8	8	5	5	4	6	5	4	4	4
Area T (Bristol Bay)	2	2	3	5	4	4	3	1	1	1
Other	1	0	0	0	1	0	1	0	1	2
Total	11	11	12	11	11	14	12	7	7	9

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Unalaska/Dutch Harbor fishermen also harvest other species of finfish. Table 3.8-9 shows information on the number of permits held by local residents, by area and species. Total permits held by Unalaska/Dutch Harbor residents for finfish species other than salmon have increased from 1977, but are below the peak year of 1983; comparable to the pattern seen for all permits including shellfish. The only geographic area which has seen an increase in permits is Dutch Harbor. This probably reflects the fact that an expanding small boat fleet at Unalaska/Dutch Harbor is restricted to nearby waters, while owners of larger boats have moved their vessels elsewhere following the decline in crab stocks.

Table 3.8-9: Other Finfish Permits Fished by Unalaska/Dutch Harbor Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
Halibut							1			
Sablefish				1		1	1			
Herring										
Other Finfish				1	1	1	1			
Yakutat (D)										
Halibut			2							
Sablefish										
Herring										
Other Finfish										
Prince William Sound (E)										
Halibut									1	
Sablefish										
Herring										
Other Finfish			1							
Cook Inlet (H)										
Halibut							2	1	1	
Sablefish										
Herring									1	
Other Finfish	1						1			
Kodiak (K)										
Halibut			1				1	2	1	
Sablefish							2		1	1
Herring	1									
Other Finfish					2		4		2	4
Peninsula/Aleutians (M)										
Halibut			7	4	2	1	2			
Sablefish				1	1		2			1
Herring		1	2	1	1		1	2	1	1
Other Finfish	2	1			1		1			2
Bristol Bay (T)										
Halibut								1		
Sablefish										
Herring	2	2	3				1	2		
Other Finfish										
Other Areas & Unidentified										
Halibut	17	14	20	24	14	16	20	26	24	6
Sablefish		4		5	1	1	5	8	6	4
Herring	2	2					1	2		2
Other Finfish & Unidentified	14	22	10	9	8	7	17	36	34	38
Total	39	46	46	46	31	27	63	80	72	59

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

The number of shellfish permits fished by Unalaska/Dutch Harbor residents has decreased significantly since 1980 and the peak years of the king crab fishery (See Table 3.8-10). The decrease in the number of tanner crab permits has not been as great as the decrease in king crab permits, reflecting the current dependence of the crab fleet on tanner stocks.

Table 3.8-10: Shellfish Permits Fished by Unalaska/Dutch Harbor Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Kodiak (K)										
King Crab		1								
Tanner Crab			5	2	1	2				
Other Crab								1		
Other Shellfish			2							
Peninsula/Aleutians (M)										
King Crab	3	1								
Tanner Crab	2	2	3	1	2	1	1	2	1	
Other Crab				1						
Other Shellfish										
Other Areas & Unidentified										
King Crab	47	53	51	35	33	33	42	31	21	18
Tanner Crab	29	37	34	20	18	19	16	27	26	19
Other Crab	17	12	12	16	6	3	11	7	2	3
Other Shellfish	6	1					2	4	6	6
Totals	104	107	107	75	60	58	72	72	56	46

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Table 3.8-11 shows estimates of employment by fishery. The table focuses on participation in the fishery by Unalaska/Dutch Harbor residents. Crew factors shown in the table are calculated from Thomas (1986) and are averages for the management areas found in the Gulf of Alaska. This table assumes that the residency of crew members is the same as the permit holder.

Over the last 10 years the total number of persons involved in the groundfish trawl fishery has surpassed the number participating in the king crab fisheries. The number of persons participating in all shellfish fisheries still exceeds the number participating in all groundfish fisheries. The model discussed in Section 4 projects that harvest employment in the future will remain about the same as present levels, with a substantial increase in processing employment.

Table 3.8-11: Harvest Sector Employment of Unalaska/Dutch Harbor Residents

		Year									
Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon											
Purse Seine	4.4	18	18	13	22	18	18	18	13	18	13
Drift Gillnet	1.75	9	11	11	11	12	16	12	7	5	7
Set Gillnet	2.1	4	2	6	0	0	2	2	0	0	0
Hand Troll	1	0	0	0	0	0	0	0	0	0	0
Power Troll	1.75	0	0	0	0	0	0	0	0	0	0
King Crab	3.25	163	179	166	114	107	107	137	101	68	59
Tanner Crab	3.3	102	129	139	76	69	73	56	96	89	63
Other Crab	2.6	44	31	31	44	16	8	29	21	5	8
Other Shellfish	3.3	20	7	7	0	0	0	7	13	20	20
Herring											
Purse Seine	4.25	0	4	13	4	4	0	0	4	4	4
Gillnet	2	10	8	6	0	0	0	4	6	2	4
Pound		0	0	0	0	0	0	4	4	0	0
Sablefish	3.55	0	14	0	25	7	7	39	28	25	21
Halibut	2.5	43	35	75	70	40	43	65	75	68	15
Other & Unidentified											
Longline	2.85	11	3	0	11	3	3	40	51	57	37
Trawl	3.1	37	56	31	19	31	19	31	53	47	87
Pots	3.1	0	12	0	0	0	0	12	3	3	0
Other	1.9	2	2	2	0	2	2	2	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Harvest: Table 3.8-12 shows the harvest amounts by major species for the 1981 through 1990 time period. These figures should be considered relative indicators of the level of harvest by major species since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest levels since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. Non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.8-12: Fisheries Harvest by Unalaska/Dutch Harbor Residents

(millions of pounds)

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	0.9	1.9		2.8	0.4	0.1	0.1			
King Crab	4.2	4.2	3.1	1.3	1.9	3.3	3.0	2.3	1.3	0.3
Tanner Crab	2.7	0.1	3.9	0.1	6.8	10.1	6.4	4.6	4.5	6.4
Other Crab	1.2		0.1				0.1	0.1		
Other Shellfish										
Herring										
Sablefish								0.1	0.1	
Halibut	0.2	0.2	0.2	0.3	0.1	0.2	0.2		0.2	
Other & Unidentified	0.8	2.3	4.2					0.2	55.8	19.5
Non-disclosed	1.6	1.3	4.1	8.6		8.3	23.8	55.2	25.3	38.6
Total	10.6	12.5	15.6	13.1	9.2	22.0	33.6	62.5	87.2	64.8

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

n.a. Not shown in data files.

Table 3.8-13 shows estimated ex-vessel earnings of Unalaska/Dutch Harbor residents over the 1980 through 1989 time period. Although the king crab fishery has declined since the early 1980's, it remains the most important fishery for local residents, accounting for over half of total ex-vessel earnings in most years.

Table 3.8-13: Total Ex-Vessel Earnings of Unalaska/Dutch Harbor Residents

(millions of $)	Year								
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989
Salmon									
Seine	0.4	0.5		0.8	0.2	a	0.1		
Drift Gillnet									
Set Gillnet				0	0			0	0
Hand Troll	0	0	0	0	0	0	0	0	0
Power Troll	0	0	0	0	0	0	0	0	0
King Crab	4.1	4.1	8.1	3.1	5.2	10.3	9.3	7.7	
Tanner Crab	1	3.4	2.3	0.1	2.5	5.4	4.9	3.8	5.0
Other Crab	0.1	0.1	a				a	a	
Other Shellfish				0	0	0			
Herring									
Purse Seine	0					0	0		
Gillnet				0	0	0			
Pound & Other	0	0	0	0	0	0	0		0
Sablefish	0		0						a
Halibut	0.1	a	0.1	0.2	0.1	0.1	0.1		0.2
Other & Unidentified									
Longline			0					a	a
Trawl	0.1	0.3	0.4						3.8
Pots	0		0	0	0	0			
Other			0					0	0
Non-disclosed	1	0.9	1.7	3.4	2.4	2.7	1.5	2.5	3.1
Total	6.8	9.3	12.6	7.6	10.4	18.5	15.9	14	12.1

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Table 3.8-14 shows the total number of vessels owned by Unalaska/Dutch Harbor residents that are licensed for various fisheries in the state. The data bases provided to MMS give vessel size information by species, gear, and area. If a single vessel participates in several different fisheries it is counted in each fishery. As a result, the information shown in Table 3.8-14 overstates the actual number of vessels fished by local residents but does indicate which vessel sizes are the most active.

Table 3.8-14: Length of Unalaska/Dutch Harbor Resident Fishing Vessels

Size in Meters	Size in Feet	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-6.0	0-19	2	4	4	9	3	5	7	7	2	1
6.1-12.1	20-39	11	8	11	16	6	6	17	27	25	13
12.2-18.2	40-59	11	14	3	10	6	4	3	4	16	11
18.3-24.3	60-79	4	6	3	3	2	7	3	3	10	5
24.4-30.4	80-99	6	4	6	3	3	4	7	4	9	5
30.5-36.5	100-119	2	2	0	0	1	1	2	2	5	5
36.6-42.6	120-139	1	0	0	0	0	0	0	0	0	0
42.7-48.7	140-159	0	0	0	0	2	3	2	2	0	0
48.8-54.8	160-179	0	0	0	0	0	0	0	0	0	0
54.9-60.9	180-199	0	0	0	0	0	0	0	0	0	0
61.0+	200+	0	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

3.8.4.2 Processing Sector

The seafood processing industry in Unalaska/Dutch Harbor is presently composed of the following major firms: Aleutian Processors, Alyeska Seafoods, Eastpoint Seafoods, Universal Seafoods, and Westward Seafoods, which is the most recent plant constructed in the community. Icicle Seafoods and Peter Pan Seafoods moor floating processors at docks in Dutch Harbor during the crab season.

In addition to these more permanent processors, a number of floating processors may be anchored within Dutch Harbor during severe weather in the crab season and vying with local processors to purchase crab from catcher vessels. The presence of floating processors increases the level of competition between plants.

In the late 1970's and early 1980's, processing in Unalaska/Dutch Harbor was predominantly oriented to king crab. In subsequent years the industry has been forced to modify existing plants and operations to handle other species and products. A number of the firms which operated in the community in the peak of the king crab season have sold their facilities and left the region. The three largest plants in the community have two separate plants within their facilities. The seafood plant is capable of handling all types of fish and shellfish although crab, halibut, black cod, and Pacific cod are typically the major species. The surimi plant exclusively handles pollock. Incidental species delivered with the pollock are generally transferred to the seafood plant.

Eastpoint Seafoods and San Souchi Seafoods are two firms which have continued their emphasis on crab processing. Aleutian Processors purchased the Whitney from Whitney-Fidalgo Seafoods to process crab.

The plants at Unalaska/Dutch Harbor produce a wide variety seafood products that are shipped to markets in Japan or to the Pacific Northwest for transshipment of final markets. The Unalaska/Dutch Harbor processing industry now operates all year although each plant has its peak season at different periods depending upon the various species produced.

The processing industry at Unalaska/Dutch Harbor has changed over the last decade. Groundfish processing and surimi production represent a different type of employment in the region. Surimi production is relatively sophisticated and require stable, long-term workers for work on rigidly controlled shifts.

A trend towards employment of Alaska residents was evident at all of the processing companies in Unalaska/Dutch Harbor and is based upon several factors. First, is the State of Alaska's emphasis on local hire and the perceived notoriety that the processing sector has incurred for hiring workers from outside of the State. The processors are sensitive to this issue and have responded to the pressure. Second, the shift from large volumes of high profit king crab fisheries to lower profit species has forced processors to cut labor expenses. Some firms are moving away from the traditional six month contract with free transportation to Seattle, and replacing it with a standard employment concept with rewards for longevity (Impact Assessment, Inc., 1987). Other companies actively seek employees among local residents of Unalaska/Dutch Harbor.

3.8.4.3 Support Sector

Unalaska/Dutch Harbor is the major marine support facility in the Bering Sea and development of the support sector is a major component of growth in the community. Some of the services provided in the community are directly tied to the fishing industry, such as marine electronics and repair, while others, such as a floral shop, were founded to provide services to the local population. Alaska Commercial Company and Carl's Commercial Company, grocery and general retail stores in the community provide examples of firms which serve the fishing industry and the local populace.

The support industry in Unalaska/Dutch Harbor has changed significantly over the past decade. For example, in previous years, technicians were flown into Unalaska/Dutch Harbor to repair electronic equipment, but these Seattle-based firms now have locally-based technicians to repair and calibrate equipment. Several major diesel engine manufacturers now offer repair service in Unalaska/Dutch Harbor, where in prior years it was quite common to have both parts and mechanics flown to Unalaska/Dutch Harbor from Anchorage or Seattle when boats were disabled (Centaur Associates, 1984).

Seafood processing is classified as a manufacturing standard industrial classification (SIC) code, but in the context of a support sector to the fishing industry, crab pot manufacturing and repair is the primary manufacturing activity in Unalaska/Dutch Harbor. Several small businesses now build and repair pots for the crab fleet. Local welding shops and vessel repair firms also do limited metal fabrication for the processing industry and the Bering Sea fleet.

Fueling facilities have also increased during the past decade. For a number of years, Chevron operated the only public fuel dock in Unalaska/Dutch Harbor, and provided fuel for the fishing fleet as well as being a depot for movement of petroleum products to western Alaska. The Chevron facility was purchased by Delta Western in April 1986 and they continue to operate the facility. Petro Marine, a subsidiary of the Seward-based Harbor Enterprises, started business in Unalaska/Dutch Harbor at the former Sea Alaska facility in December, 1984. The company expanded its presence by operating from the OSI dock and the City-owned Ballyhoo Dock. Crowley Maritime and OSI have also initiated fuel service within the past 5 years.

In addition to fish processing specific activities, Universal Seafoods owns a number of other facilities and services in the community. These include the Unisea Mall, the Unisea Inn, the Royal Aleutian Hotel, and the restaurant located at the Unalaska/Dutch Harbor airport.

3.9 Yakutat

3.9.1 Setting / Description

The City of Yakutat lies on the northwestern edge of the Yakutat Forelands and rests on the shore of Monti Bay adjoining larger Yakutat Bay. The city is approximately 225 miles south of Cordova, the nearest port to the north, 175 miles northwest of Juneau, and 150 miles from Cross Sound, the nearest southern harbor. Early inhabitants of the Yakutat area included Eyak, Tlingat, and Athabascan Indians. Some level of Russian missionary contact occurred, but a community was not really established until the turn of century, with the construction of a salmon cannery, sawmill, and small railroad. Little change took place until World War II, when 10,000 soldiers were located in an army camp at the current airport site. Traditionally the means of livelihood in Yakutat, fishing and fish processing remain the mainstay of the economy.

3.9.2 Socioeconomic Characteristics

3.9.2.1 Local Economy

The Yakutat economy has relied on five main industries since 1960. As there are no other communities within more than 100 mile radius from Yakutat, much of Yakutat's economy is supported by government payroll. Yakutat's largest economic strength lies in the natural resources surrounding the city. This strength is reflected in its industries: commercial fishing, timber harvesting, tourism, and hunting and fishing.

Commercial fishing is a large industry in Yakutat. Fish processing is the only manufacturing that occurs in Yakutat. The city's first cannery was built in 1904 and operated for 66 years before going bankrupt in 1970. Today, canneries process two types of salmon, sockeye and coho. Halibut and crab processing supplement the industry, although salmon remains the mainstay.

Subsistence hunting and fishing is vital to the economy of Yakutat. A survey taken in 1986 found that 92% of the households used salmon not taken commercially and half of the homes used wood heat. Residents utilize the consistent supply of mollusks, urchins, herring spawn, octopus, and Dungeness crab contained in the inter-tidal zone, harvesting items as needed.

Salmon is a mainstay of residents food supply and bear and moose assist households in the winter months.

3.9.2.2 Population

Table 3.9-1 shows the population of Yakutat from 1980 through 1992. The population has gradually increased, with the exception of a short down-turn in the mid 1980's. In 1992, population was reported for the newly formed City and Borough of Yakutat, showing an increase due to larger municipal boundaries. Table 3.9-2 shows selected population characteristics for Yakutat in 1980 and 1990.

Table 3.9-1: City of Yakutat Historic Population

Year	Population
1980	449
1981	430
1982	462
1983	469
1984	470
1985	456
1986	446
1987	
1988	527
1989	508
1990	534
1991	552
1992	508

Sources: Alaska Department of Labor, 1990, 1993b and 1994b.
Note: The Alaska Department of Labor did not publish population estimates for places in 1987.

Table 3.9-2: City of Yakutat Population Characteristics

	1980	1990	% change
Total	454	544	19.82%
Male	237	287	21.10%
Female	217	257	18.43%
Age	1980	1990	% change
0-4	49	45	-8.2%
5-14	94	100	6.4%
15-19	33	42	27.3%
20-24	40	41	2.5%
25-34	106	95	-10.4%
35-44	55	105	90.9%
45-54	26	47	80.8%
55-59	18	10	-44.4%
60-64	7	18	157.1%
65+	26	31	19.2%

Sources: U.S. Bureau of the Census, 1981 and 1991.

3.9.2.3 Employment

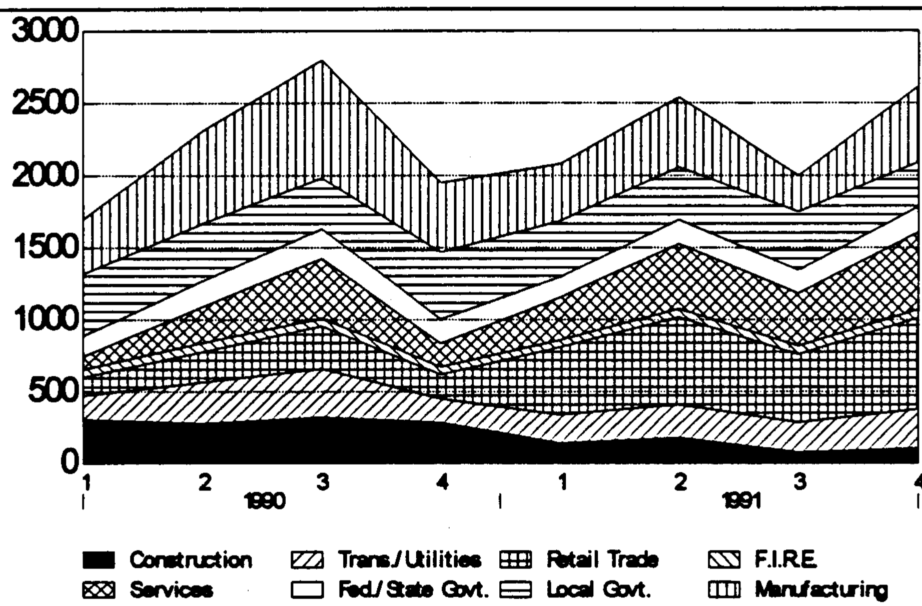
Table 3.9-3 and Figure 3.9-1 show Skagway-Yakutat-Angoon subarea quarterly employment for 1990 and 1991. Total employment shows a cyclical pattern, with a low during the 1st quarter, peaking to a high in the 3rd or 4th quarter. Employment for many of the sectors are not disclosed, which makes it difficult to determine the largest employers. Government accounts for up to 50% of quarterly employment; retail trade, services, and transportation/communication/utilities are also significant employers.

Table 3.9-3: Skagway-Yakutat-Angoon Census Subarea Quarterly Employment, 1990-1991

	Quarter/Year				Annual	Quarter/Year				Annual
Nonag. Wage & Salary	1/90	2/90	3/90	4/90	Average	1/91	2/91	3/91	4/91	Average
Total Employment	1,649	2,345	2,807	1,947	2,187	1,898	2,387	2,122	2,725	2,283
Mining	*	*	*	*	4	0	0	0	0	0
Construction	3	9	8	11	294	141	181	79	109	128
Manufacturing	383	638	816	483	409	397	481	252	524	414
Trans. Comm. & Util.	168	282	334	164	219	198	231	204	271	226
Trade	124	216	297	168	201	468	608	474	633	546
Finance-Ins. & R.E.	55	61	56	54	57	51	56	58	59	56
Services & Misc.	90	252	415	163	230	296	451	366	538	413
Government	573	579	559	618	582	532	533	567	484	529
Federal	109	134	159	115	129	52	64	64	70	63
State	35	44	48	38	41	88	103	99	103	98
Local	429	401	352	465	412	392	366	404	311	368

Source: Alaska Department of Labor, 1992.

Figure 3.9-1: Skagway-Yakutat-Angoon Census Subarea Quarterly Employment, 1990-1991



Source: Alaska Department of Labor, 1992.

3.9.2.4 Income

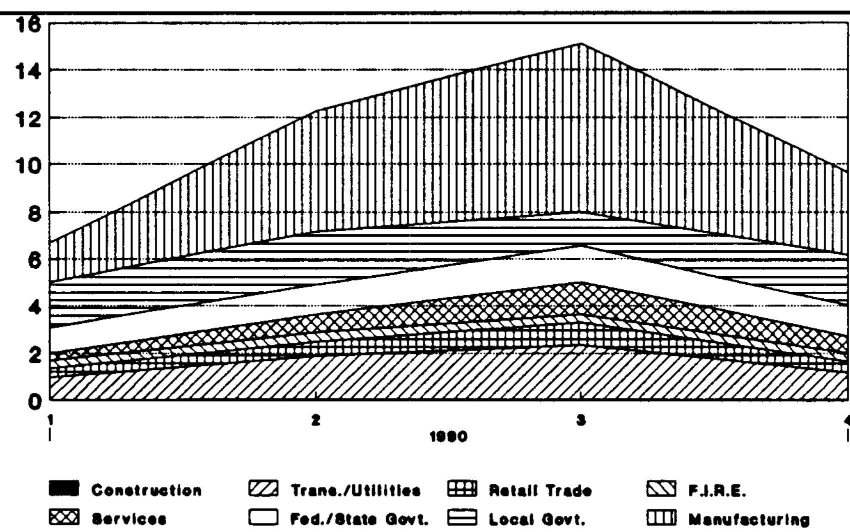
Starting in 1990, the reporting format for quarterly employment and wage information was changed. Quarterly wage rate/payroll data for Yakutat was consolidated under the Skagway-Yakutat-Angoon reporting unit. These communities have relatively similar economies and are considered representative for Yakutat.

Table 3.9-4: Skagway-Yakutat-Angoon Census Subarea Quarterly Payroll, 1990

	1ST QUARTER		2ND QUARTER		3RD QUARTER		4TH QUARTER	
INDUSTRIAL CLASSIFICATION	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)	Average Monthly Wage	Total Quarterly Payroll ($ mill.)
Mining	*		*		*		*	
Construction	$1,498	$0.01	$1,536	$0.04	*		$1,458	$0.05
Manufacturing	$1,401	$1.61	$2,679	$5.13	$2,905	$7.11	$2,401	$3.48
Trans. Comm. & Util.	$1,927	$0.97	$2,168	$1.83	$2,297	$2.30	$2,340	$1.15
Trade	$984	$0.37	$938	$0.61	$1,055	$0.94	$894	$0.45
Finance-Ins. & R.E.	$1,933	$0.32	$2,079	$0.38	$1,837	$0.31	$2,165	$0.35
Services & Misc.	$1,109	$0.30	$971	$0.73	$1,146	$1.43	$1,409	$0.69
Government								
Federal	$2,173	$0.71	$2,279	$0.92	$2,382	$1.13	$2,801	$0.97
State	$3,371	$0.36	$2,844	$0.39	$2,771	$0.40	$3,089	$0.35
Local	$1,539	$1.98	$2,970	$2.23	$1,370	$1.45	$1,534	$2.14

Source: Alaska Department of Labor, 1991.

Figure 3.9-2: Skagway-Yakutat-Angoon Census Subarea Quarterly Payroll, 1990 (Millions of $)



Source: Alaska Department of Labor, 1992.

3.9.2.5 Public Fiscal Characteristics

Revenues: Table 3.9-5 presents revenue and expenditure characteristics for the City of Yakutat for the period of FY 1991-1992. The major sources of revenues are intergovernmental transfers, followed by taxes and special assessments. School funds account for half of the governmental transfers; fish tax revenues are approximately 10%. Taxes are dominated by sales tax, accounting for more than half of tax revenues. Fishing and support industry related property and sales are most likely a major component of these sales and property tax revenues. State capital project funding fluctuates but can be a major source of revenue.

Expenditures: Principal expenditures include education, administration, public works, public safety, and the health clinic. In 1992, the City of Seward ran a total fund deficit of $81,666; in 1991 the deficit was $313,796 and the fund balance was $908,961.

3.9.3 Infrastructure Characteristics

3.9.3.1 Transportation Facilities

Yakutat is not connected to the rest of the state by a road system. Forest Highway #10, completed in 1975, is the only road access to anywhere near Yakutat. Because of its location the most practical and most frequently used access to Yakutat continues to be by water. Yakutat's roads are maintained by the State Department of Transportation and Public Facilities and the City.

An airport was constructed during World War II and is currently serviced by two commercial jets with daily flights to Juneau and Anchorage.

3.9.3.2 Marine Services

Yakutat's small boat harbor with 79 stalls was financed by the State of Alaska.

3.9.3.3 Utilities

Water: Water is obtained from a well system, and stored in two 120,000 gallon storage tanks, and enters the distribution system through gravity flow. A 35,000 gallon tank stores water for emergency use. Yakutat's fishing and fish processing industry are the major users.

Electricity: Electricity is diesel generated and is provided by the City.

Table 3.9-5: City of Yakutat Revenues and Expenditures, 1991-1992

	1992	1991
REVENUES		
Taxes		
General Property Tax	$121,666	n/a
Sales Tax	$174,019	n/a
Payment in Lieu of Taxes	$3,735	n/a
Penalties and Interest	$832	n/a
subtotal	$300,252	$308,777
Intergovernmental Transfers		
Federal Government (Forestry Receipts)	$636,299	$376,687
State		$1,632,893
Revenue Sharing	$34,945	
Municipal assistance	$47,945	
Fish Tax	$235,273	
School district	$1,347,708	
Capital Project	$303,571	
Other	$7,806	
subtotal	$2,613,547	$2,009,580
Special Assessments	$11,338	$24,059
Charges for Service	$84,274	$15,444
Other	$155,569	$285,949
subtotal	$251,181	$325,452
Total Revenues	$3,164,980	$2,643,809
EXPENDITURES		
Administration	$392,269	$445,916
Public Safety	$130,237	$96,030
Public Works	$218,811	$188,720
Planning and Zoning	$59,633	$65,135
community Services	$4,130	$12,794
Small Boat Harbor	$27,315	$21,266
Airport	$9,540	$1,845
Health Clinic	$236,242	$246,687
Mariculture Priject	$14,813	$67,995
Education	$1,849,853	$1,749,261
Capital Improvements	$303,803	$61,956
Total Expenditures	$3,246,646	$2,957,605
EXCESS/DEFICIENCY	($81,666)	($313,796)
FUND BALANCE	$907,420	$906,961

Source: City of Yakutat, 1993.

3.9.3.4 Housing

Table 3.9-6 shows 1990 housing characteristics for Yakutat. Housing is predominantly single unit detached, with approximately two thirds owner occupied. Median housing value for owner occupied units is $67,200; median rent is $425 per month.

Table 3.9-6: City of Yakutat Housing Characteristics

TOTAL HOUSING UNITS	189		
Occupancy		Housing Value (specified owner-occupied units)	
Occupied Housing Units	175	less than $50,000	20
owner occupied	106	$50,000-99,000	50
renter occupied	69	$100,000-149,000	11
Vacant Housing Units	14	$150,000-199,000	2
Units in Structure		$200,000-299,000	0
1 Unit detached	132	$300,000 or more	2
1 Unit attached	0	Median value	$67,200
2 - 4 Units	10		
5 - 9 Units	12	Rental Rates	
10 or more units	0	less than $250	7
mobile home, trailer	35	$250-499	26
		$500-749	18
Households by type		$750-999	2
Families	115	$1,000 or more	1
Married couple	78	Median rent	$425
Male Householder	17		
female Householder	20		
Non-Family	60		
Persons per Household	2.94		
Persons Living in Group Quarters	19		

Source: U.S. Bureau of the Census, 1991.

3.9.3.5 Land Availability

Yakutat is essentially surrounded by lands owned by the federal government and controlled by the Tongass National Forest. The major private land owner is the village ANCSA corporation. Private lands are available for development in the vicinity of the community.

3.9.4 Industry Characteristics

3.9.4.1 Harvesting Sector

The number of Yakutat residents holding commercial fishing permits has decreased from its peak of 161 in 1981 to 143 in 1990. The lowest number of residents holding permits (140) was recorded in 1989. In contrast, the total number of permits increased from 208 to 273 over the same 8 years, but declining to about the 1980 level by 1990. Analysis of the data in Table 3.9-7 suggest that almost all residents who fish commercially hold salmon permits, and participate in halibut and other fisheries as the opportunity arises.

Table 3.9-7: Commercial Fishery Permits Fished by Yakutat Residents

	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	160	147	151	152	157	144	145	141	140	143
King Crab	3	4	3	1	1	0	0	0	0	1
Tanner Crab	3	6	4	3	6	3	1	0	1	1
Other Shellfish	9	9	12	13	13	13	13	14	6	10
Herring	0	4	0	0	0	1	0	0	0	0
Sablefish	0	0	0	0	0	1	3	4	1	3
Halibut	32	47	42	51	40	38	36	38	37	
Other	1	2	1	0	0	14	43	76	71	60
Total	208	219	213	220	217	214	241	273	256	218
Number of residents that fished permits	161	155	159	154	147	141	140	145	149	138

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Salmon is the major fishery in Yakutat although its relative importance has decreased over the past 8 years. In 1981 salmon permits accounted for 77 percent of all permits. In 1988 this percentage had decreased to 52 percent. In 1990 salmon permits had increased to 66 percent. Management area D (Yakutat) remains the most important salmon fishing area for local residents. Local residents had 9 permits in other management areas in 1990 compared to 132 in area D.

Yakutat fishermen have long participated in the local halibut fishery, but are recent entrants into the sablefish and other finfish fisheries. Table 3.9-9 shows the number of Yakutat residents that fished for other finfish from 1981 through 1990.

Table 3.9-8: Salmon Permits Fished by Yakutat Residents

	Year									
Area	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Area A (Southeast)	1	0			5	3	5	7	5	7
Area D (Yakutat)	159	147	149	148	150	139	137	132	134	134
Area T (Bristol Bay)			1	3	2	2	2	2	1	1
Other			1	1			1			1
Total	160	147	151	152	157	144	145	141	140	143

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Table 3.9-9: Other Finfish Permits Fished by Yakutat Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
Halibut	32	47	3					2		
Sablefish							1	2		3
Herring										
Other Finfish	1		1			13	15	18		10
Yakutat (D)										
Halibut			39	51	40	38	34	36		
Sablefish										
Herring						1				
Other Finfish		2				1	25	56		50
Prince William Sound (E)										
Halibut							1			
Sablefish							1	1		
Herring										
Other Finfish							1	1		
Cook Inlet (H)										
Halibut										
Sablefish								1		
Herring										
Other Finfish								1		
Other Areas and Unidentified										
Halibut							1			
Sablefish						1	1			
Herring		2								
Other Finfish		2								
Unidentified							2			
Total	33	53	43	51	40	54	82	118		63

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

A small number of local residents have been involved in shellfish harvesting during the past 8 years. Declines in king crab and tanner crab stocks have resulted in local fishermen electing to not pursue these species. Local Dungeness crab and shrimp stocks have been the primary shellfish species harvested since 1981.

Table 3.9-10: Shellfish Permits Fished by Yakutat Residents

	Year									
Area/Type	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Southeast (A)										
King Crab	3	4	3	1	1					1
Tanner	3	6	4	3	6				1	1
Other Crab	8	7	8	7	6	6	7	6	4	5
Other Shellfish	1	2	4	5	7			8	2	5
Other Areas & Unidentified										
King Crab										
Tanner Crab						3	1			
Other Crab										
Other Shellfish				1		7	6			
Totals	15	19	19	17	20	16	14	14	7	12

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

Table 3.9-11 shows estimates of employment by fishery and gear type. Gear type estimates are not provided for shellfish, sablefish, or halibut since these species are taken primarily by one gear type (i.e., pots for crab and longline for sablefish and halibut). Crew factors shown here are averages for management areas within the study region of the averages developed by Thomas (1986) for management areas throughout the State. This table assumes that crew residency is the same as the permit holder.

Set gillnet salmon fishing has the highest participation level by local residents. Halibut, crab, and herring fisheries have remained important employment generators for the community. Most resources in the area are being fully utilized, and Yakutat is a substantial distance from other processing centers. As a result, the model discussed in Section 4 projects that harvest and processing employment in the future will remain about the same as present levels.

Table 3.9-11: Harvest Sector Employment of Yakutat Residents

Species	Crew	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon											
Purse Seine	4.4	0	0	0	0	0	0	0	0	0	0
Drift Gillnet	1.75	0	0	4	7	4	4	5	4	2	2
Set Gillnet	2.1	260	235	235	229	229	227	233	223	231	231
Hand Troll	1	34	33	35	36	42	28	25	29	26	28
Power Troll	1.75	4	4	4	5	7	11	9	7	5	7
King Crab	3.25	10	13	10	3	3	0	0	0	0	3
Tanner Crab	3.3	10	20	13	10	20	10	3	0	3	3
Other Crab	2.6	21	18	21	18	16	16	18	16	10	13
Other Shellfish	3.3	3	7	13	20	23	23	20	26	7	17
Herring											
Purse Seine	4.25	0	4	0	0	0	4	0	0	0	0
Gillnet	2	0	6	0	0	0	0	0	0	0	0
Pound		0	4	0	0	0	0	0	0	0	0
Sablefish	3.55	0	0	0	0	0	4	11	14	4	11
Halibut	2.5	80	118	105	128	100	95	90	95	93	n.a.
Other & Unidentified											
Longline	2.85	0	0	3	0	0	3	11	11	11	11
Trawl	3.1	0	0	0	0	0	0	0	0	0	0
Pots	3.1	0	0	0	0	0	0	0	0	0	0
Other	1.9	2	4	2	0	0	25	76	144	127	106

Source: Derived by Northern Economics from Thomas, 1986 and data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Harvest: Table 3.9-12 shows the harvest amounts by major species for the 1981 through 1990 time period. These figures should be considered relative indicators of the level of harvest by major species since they are constructed from detailed records which are subject to non-disclosure rules. Estimates for certain species may understate harvest levels since data for certain areas may be non-disclosed and not included in the annual estimate shown in the table. Non-disclosed data for the community are included in the last row of the table prior to the total.

Table 3.9-12: Fisheries Harvest by Yakutat Residents

(millions of pounds)

Species	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon	2.4	2.4	1.5	2.5	3.0	1.5	2.4	2.8	2.8	2.8
King Crab	0	0.1	0	0	0	0.0	0.0	0.0	0.0	0
Tanner Crab	0	0.1	0.1	0	0.1	0	0	0.0	0	0
Other Crab	0.1	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Other Shellfish	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0	0.1
Herring	0.0	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0
Sablefish	0.0	0.0	0.0	0.0	0.0	0	0	0	0	00
Halibut	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0.2	0
Other & Unidentified	0	0	0	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Non-disclosed	0.1	0.1	0.2	0.2	0	0.1	0.2	0.2	0.2	0.2
Total	2.7	3.1	2.2	3.0	3.4	2.0	3	3.3	3.4	3.4

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.

Note: 1990 data are preliminary.

n.a. Not shown in data files.

Earnings: Other fisheries may provide employment opportunities for Yakutat residents but salmon fisheries are the only significant producers of fishery related earnings for the community. Salmon fisheries contributed from 70 to 94 percent of total ex-vessel earnings during the past 8 years. Crab fisheries have contributed in excess of 10 percent in some years, and halibut contributed 10 percent of total ex-vessel earnings in 1986.

Table 3.9-13: Total Ex-Vessel Earnings of Yakutat Residents

(millions of $)	Year									
Species	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Salmon										
Seine	0	0	0	0	0	0	0	0	0	
Drift Gillnet	0	0								
Set Gillnet	2.1	1.7	0.9	1.8	2	1.4	3.5	6.1	2.8	
Hand Troll	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.3	a	
Power Troll						0.1				
King Crab		a				0	0	0	0	
Tanner Crab		0.1	a		a			0		
Other Crab	a	0.2	0.2	0.1	a	a	0.1	0.1	0.1	
Other Shellfish			a	a	a	a	a	a		
Herring										
Purse Seine	0		0	0	0		0	0	0	
Gillnet	0		0	0	0	0	0	0	0	
Pound & Other	0		0	0	0	0	0	0	0	
Sablefish	0	0	0	0	0					
Halibut	0.1	0.1	0.1	0.1	0.1	0.2	0.2		0.2	
Other & Unidentified										
Longline	0	0		0	0					
Trawl	0	0	0	0	0	0	0	0	0	
Pots	0	0	0	0	0	0	0	0	0	
Other				0	0					
Non-disclosed	0.1	0.1	0.1	0.2	0.3	0.2	0.2	0.3	0.2	
Total	2.4	2.3	1.4	2.4	2.7	2	4.1	6.8	3.3	

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
a. Less than $50,000.

The Yakutat fleet is a small boat fleet, comprised of a number of skiffs and smaller vessels used primarily for the set gillnet salmon fishery, that also participate in other local, near-shore fisheries. The reduction in the number of vessels in the 0-6.0 meter (0-19 feet) class is due to a change in regulations that did not require licenses for salmon set gillnet skiffs.

Table 3.9-14 shows data on the vessel size information by species, gear, and management area. Vessels that participate in more than one fishery are counted for each species, area, and gear type that they are involved with. As a result, Table 3.9-14 indicates the vessel sizes that are most active. The data cannot be used to estimate the number of resident vessels in each size category.

Table 3.9-14: Yakutat Resident Fishing Vessels, by Length

Size in Meters	Size in Feet	Year 1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
0-6.0	0-19	42	80	93	60	24	24	23	31	27	14
6.1-12.1	20-39	49	69	79	80	73	87	70	82	63	54
12.2-18.2	40-59	5	4	1	0	4	6	9	16	5	8
18.3-24.3	60-79	0	0	0	0	0	0	0	0	0	0
24.4-30.4	80-99	0	0	0	0	0	5	6	4	1	2
30.5-36.5	100-119	0	0	0	0	0	0	0	0	0	0
36.6-42.6	120-139	0	0	0	0	0	0	0	0	0	0
42.7-48.7	140-159	0	0	0	0	0	0	0	0	0	0
48.8-54.8	160-179	0	0	0	0	0	0	0	0	0	0
54.9-60.9	180-199	0	0	0	0	0	0	0	0	0	0
61.0+	200+	0	0	0	0	0	0	0	0	0	0
	Unknown	0	0	0	0	0	0	0	0	0	0

Source: Extracted from data provided by the Alaska Commercial Fisheries Entry Commission, 1990 and 1992.
Note: 1990 data are preliminary.

3.9.4.2 Processing Sector

Sitka Sound Seafoods is the only shoreside processing plant operating in Yakutat. In some years floating processors will anchor in nearby waters and provide competition. Otherwise, there is little competition in the processing sector.

Sitka Sound Seafoods leases the fish buying and processing plant, and the cold storage dock from the City of Yakutat. The company also operates three buying facilities in the area that provide product to the processing plant. During the peak of the salmon season the processing plant employs over 100 people and averages over 50 people from April through September. Since 1987, fish purchases have averaged over 7 million pounds annually (Thompson, 1992). The most important species are salmon, Dungeness crab, black cod, and halibut.

The company pays a 1¢ per pound rental to the city for lease of these docks and plant. Annual rent payments have ranged from $83,091 in 1987 to $259,845 in 1988. Rents in 1989 and 1990 were $203,294 and $206,917, respectively.

3.9.4.3 Support Sector

In addition to the cold storage dock and plant that the City rents to Sitka Sound Seafoods, the city also operates the small boat harbor and seaplane float.

4. Fishing Industry Model

4.1 Introduction

This section describes the fishing industry model (FIM) developed for this project and provides forecasts of harvest-related and processing employment in each of the study communities. Sensitivity tests of the FIM are also included in this report.

The objectives of the commercial fishing industry study call for a methodology to 1) determine the total harvest of various species for the Gulf of Alaska fishing industry through 2010, and; 2) estimate local harvest and processing employment. Information on projected harvest and processing employment will be used in the Rural Alaska Model (RAM) to forecast direct and indirect effects on community population, employment, and income.

The work presented here is an empirical model, designed to simulate the responses of individuals and firms to changes in the fishing industry and the resultant effect on local communities. The model is designed for ease of use and updating by its users in accordance with the objectives of the study. Sophisticated modeling efforts were not desired by MMS and have not been implemented here. Harvest and employment forecasts will change over time and the user is encouraged to modify the appropriate worksheets as new information becomes available. The NPFMC and NMFS have developed other models of the fishing industry that should also be reviewed. However, these models focus primarily on the fishing industry and have limited linkages with coastal communities.

This version of the FIM expands upon the version previously developed for the Bering Sea in MMS Technical Report 138. Although the technical requirements of this report called for a model that addressed the Gulf of Alaska, fishing vessels move freely between the two areas, and some communities receive harvests from both areas. Forecasting fishery related employment in Unalaska, for example, without including harvests from the Bering Sea or the Gulf of Alaska would not result in reliable projections. As a result, the model has been expanded to include the Gulf of Alaska and the Bering Sea, and the study communities addressed in both reports. The following communities noted with an asterisk (*) are the study communities identified in the scope of work for this report and the model results are provided for these communities. The other communities were addressed in MMS Technical Report 138 and results from the expanded model are not provided for these communities.

Akutan	Kodiak*	Seward*
Cordova*	Port Heiden	Unalakleet
Homer*	Port Moller	Unalaska*
King Cove*	Saint Paul	Yakutat*
Kenai*	Sand Point	

4.2 Model Structure

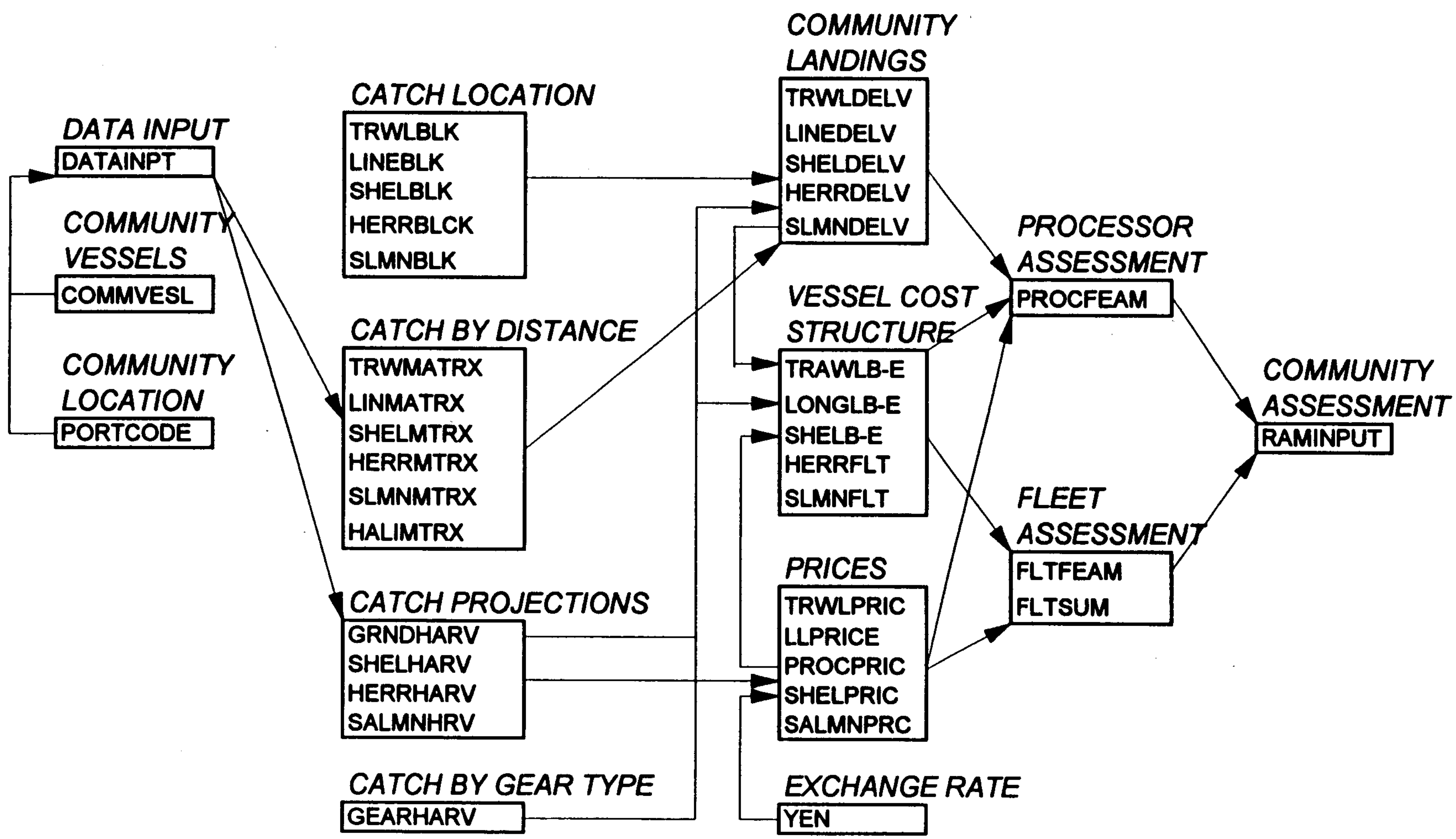
The methodology discussed in the following sections has been formulated to meet the objectives described above using a microcomputer spreadsheet model with data provided by the National Marine Fisheries Service (NMFS), Alaska Commercial Fisheries Entry Commission (CFEC), Alaska Department of Fish and Game (ADF&G), Alaska Department of Labor (DOL), and limited survey data. Microsoft Excel was selected as the spreadsheet program since at the time the original model was developed it was the only major spreadsheet program available with the capability to link spreadsheets. Separate spreadsheets are developed for major data and analytical methods, and linked to provide the model structure.

The model runs in Microsoft Excel 4.0 or later under Microsoft Windows 3.1. It is recommended that the computer used with this model have at least 10 MB of RAM, and more is preferable.

Figure 4.2-1 shows the basic model structure including the file names grouped by general function, and the major linkages between major functions. File names are presented as capital letters within the boxes in Figure 2.0-1 and the text in this section. The following subsections describe the files within the model, starting with the DATAINPT.XLS (data input) file that requires user input for each community or time period selected. Representative tables are shown for each file. Due to the large size of many of these files the tables show selected parts of the file sufficient to demonstrate the basic structure.

The model is loaded in 5 groups or workbooks of files as they are called in Excel 4.0. The amount of memory required to load all of the model files, Excel, and Windows exceeded the 10 MB of memory available on the computer. Opening these workbooks within Excel automatically opens the files contained in the workbook and permits those files to be run within the memory constraints of the computer. These workbooks are titled FIM1.XLW, FIM2.XLW, FIM2A.XLW, FIM3.XLW, and FIM4.XLW.

Figure 4.2-1: Fishing Industry Model



4.3 Data Input

The FIM is structured to permit the user to develop basic forecasts of community level employment and income with minimal effort. All user inputs for basic projections are performed in the DATAINPT.XLS file. Table 4.2-1 shows the upper portion of the file. This file is not contained in the initial FIM1.XLW workbook. The DATAINPT.XLS file is opened with standard Excel opening commmands. After the DATAINPT.XLS file is loaded the user should answer yes to the question *"Update references to unopened documents?"* when that phrase appears on the monitor screen. This same response should be used when opening any of the workbook files.

The shaded cells require user input. The name of the port and the year of interest (through 2021) are the primary inputs. Additional inputs are the percent of community residents in the present processing workforce, and the percent of total processing workforce that are employed by community residents. This first input is used to identify the employment and income provided by the processing sector to community residents, and the second input is used to calculate the percent of total processing income that goes to community residents who own local processing plants. After making any required changes the DATAINPT.XLS file shouuld be saved.

The data requirements shown in Table 4.2-1 are the minimum needed to run the model. Other inputs have default values that can used for most communities, but the user should review them to ensure that a specific community's circumstances fit the default values. The subsequent sections of DATAINPT.XLS show the number of vessels of certain gear types and sizes whose owners reside in the community of interest. These numbers are automatically linked from COMMVESL.XLS. The numbers in that file are derived from Commercial Fisheries Entry Commission (CFEC) data files provided to MMS.

Table 4.3- 1: DATAINPT.XLS (1)

	A	B	C	D	E	F
1	DATA INPUT FOR ALASKA FISHERIES INDUSTRY MODEL					
2	*(SHADED CELLS REQUIRE USER INPUT)*					
3		*(ALL DATA INPUT MUST BE IN CAPITAL LETTERS)*				
4						
5						
6	PORT:		LOCATION:	LONGITUDE	LATITUDE	
7	YEAR:			162.19	55.03	
8	AREA:	M				
9	LOCAL RESIDENTS AS % OF PROCESSING EMPLOYMEN					
10	PERCENT OF WORKFORCE EMPLOYED BY RESIDENTS					
11						
12	PERCENT OF CATCHER-PROCESSORS SUPPORTED				0%	
13	FROM OR BASED IN COMMUNITY					

The next sections of DATAINPT.XLS provides information on the processing sector in the community. One matrix in the file provides information on the species processed in each study community. This information can usually be readily obtained from plant managers. In a few instances the coefficients have been modified to less than one (1) if the processing plants handle smaller amounts of a species than indicated by the model. For example, Dutch Harbor and Akutan are both located within relatively close proximity of a large yellowfin sole biomass but the flesh of this species deteriorates rapidly due to enzyme problems and the time for a vessel to return to port typically results in an unacceptable product. As a result, the local processing plants do not encourage their catcher boats to target on the species. In other instances the processing plants ask their boats to focus on species that are higher valued or for which there are ready markets.

Table 4.3- 2: DATAINPT.XLS (2)

	A	B	C	D
14	FLEET INPUT			
15	NUMBER OF VESSELS			RESIDENT
16	TRAWL:			
17	< 100' TRAWLER			1
18	125-200' TRAWLER			0
19	125-200' FACTORY TRAWLER			0
20	200-250' FACTORY TRAWLER			0
21	250'+ FACTORY TRAWLER			0
22	TOTAL			1
23				
24				
25	LONGLINE:			RESIDENT
26	< 60' LONGLINER			26
27	60-100' LONGLINER			0
28	100'+ LONGLINER/ PROCESSOR			0
29	TOTAL			26
30				
31				
32	CRAB:			RESIDENT
33	< 60' CATCHER			17
34	60-90' CATCHER			0
35	90-120' CATCHER			0
36	120'+ CATCHER/ PROCESSOR			0
37	TOTAL			17
38				
39				
40	SALMON			RESIDENT
41	SEINER:			34
42	GILLNET:			22
43	SETNET:			7
44	TROLL:			0
45	TOTAL			63
46				
47				
48	HERRING			RESIDENT
49	SEINER:			2
50	GILLNET:			2

Table 4.3- 3: DATAINPT.XLS (3)

	A	B	C	D	E	F	G
53	PROCESSOR INPUT			Local Residents		% of Processing Workforce	
54				as % of Processing		Employed by Resident	
55		Species		Employment		Processing Plant Owner	
56		Processed		3%		0%	
57		in Community					
58	Species Name	(0= N, 1= Y)					
59		AKUTAN	CORDOV	HOMER	KENAI	KING COVE	KODIAK
60	Gn/ Ps Chinook	1	1	1	1	1	1
61	Gn/ Ps Sockeye	1	1	1	1	1	1
62	Canned Sockey	0	1	0	1	1	1
63	Gn/ Ps Coho	1	1	1	1	1	1
64	Gn/ Ps Pink	1	1	1	1	1	1
65	Canned Pink	0	1	0	1	1	1
66	Gn/ Ps Chum	1	1	1	1	1	1
67	Salmon Roe	1	1	1	1	1	1
68	Bait Herring	1	0	1	1	0	1
69	Roe Herring	1	1	1	1	1	1
70	Pollock (Surimi)	1	0	0	0	0	1
71	Pollock (Fillets)	1	0	0	0	0	1
72	Sablefish	1	1	1	1	1	1
73	Rockfish	0.1	1	1	1	0.1	1
74	Pacific Cod	1	1	1	1	1	1
75	Yellowfin Sole	0.1	0	0	0	0	0
76	Greenland Turbot	0.1	0	0	0	0	0.1
77	Other Flatfish	0.2	0	0	0	0	1
78	Pacific Halibut	1	1	1	1	1	1
79	Other Finfish	0	0	0	0	0	0.1
80	King Crab	1	1	1	1	1	1
81	Tanner Crab	1	1	1	1	1	1
82	Hair Crab	1	0	0	0	1	0
83	Dungeness Crab	1	1	1	1	1	1
84	Other Shellfish	1	1	1	1	1	1

The last section of DATAINPT.XLS provides default values on peak processing employment for different types of processing activities. These numbers can be rounded to the nearest fifty employees and be suitable for the purposes of this analysis. In some communities where there are sufficient numbers of processing plants the information can be obtained from the Alaska Department of Labor. In communities with smaller numbers of plants the plant managers will need to be contacted.

Table 4.3- 4: DATAINPT.XLS (4)

	A	B	C	D	E	F	G
85	COMMUNITY SEAFOOD PROCESSING EMPLOYEES						
86		AL	GOA	GOA	GOA	GOA	GOA
87	# OF EMPLO	AKUTAN	CORDOV	HOMER	KENAI	KING COVE	KODIAK
88	POLLOCK	200	0	0	0	0	500
89	OTHER GROU	100	50	200	50	150	800
90	ALL GROUND	300	50	200	50	150	1300
91	CRAB	400	0	50	0	75	400
92	SALMON	180	200	200	400	400	1200

Two other files provide linked input to DATAINPT.XLS. These are COMMVESL.XLS and PORTCODE.XLS. COMMVESL.XLS contains several tables that provide the number of permit fished by fishery for each community. PORTCODE.XLS provides the latitude and longitude for each community, and the salmon management area that it is located within. DATAINPT.XLS accesses the information in these files even if they are not open.

After closing DATAINPT.XLS the user should proceed to open the all of the workbook files in numerical order. Workbook files have file names ending in ....XLW compared to a normal Excel file that ends in ....XLS. The user should respond affirmatively to questions concerning updating references to unopened documents. After linkages have been established with previous files and the calculations are completed use standard Excel commands to save the workbook. This command is located under the File menu in the Excel header bar. The user should respond affirmatively to questions about saving individual files that are part of the workbook. After the first workbook is opened and then closed the user can undertake the same steps for each subsequent workbook.

4.3.1 Catch Projections

Forecasting of future salmon harvests are based on statistical analysis of past period harvests. After much experimentation with projecting harvests on biological data, ADF&G has resorted to statistical prediction in some management areas. Even when predicting harvests of sockeye to well studied areas such as Bristol, forecasting errors based on biological parameters has been grossly inaccurate.

The objective of the resource forecast section of the model is to be able to project future production (harvest) levels for all areas of the Gulf of Alaska for commercially important species. Some species which are very important to fisheries in adjacent areas are less important or nonexistent in the Gulf. For example, there is no commercial fishery for opilio Tanner crab in the Gulf of Alaska, even though it is a very important fishery in the Bering Sea.

For most cases, projections are made for a single species. Projections for species that are managed by the North Pacific Management Council as an aggregate complex are similarly grouped in the harvest forecasts.

Accurate projections are an integral component of the model, since the results directly influence income and employment which are derived from other sections of the model. Forecasting future harvest levels is a challenging task since the overall environment for the fisheries resource within the Gulf of Alaska is extremely dynamic, i.e. subject to change over time. There is natural fluctuation and/or cyclical variation for many of the commercially important species. Other trends in harvest levels are created by changes in fishing effort patterns. As more exploration and discovery takes place fishermen may find previously unexploited stocks. This type of development can shift commercial production upward, even if the harvest levels of previously exploited stocks are constant or even decreasing. This factor was more important during the 1960's and 1970's as the Gulf of Alaska fisheries were initially developed than it is today or will be in the future. An excellent example was the king crab fishery that developed around Kodiak. This fishery developed rapidly during the early 1960's, targeting on previously unexploited stocks of king crab. The harvest peaked in 1966 and declined very quickly. Once the unexploited population was taken in the expanding fishery, the long term sustainable harvest has been limited by new recruitment into the fishery. As king crab stocks near Kodiak declined, the fleet ranged further from port, increasing harvests from the Alaska Peninsula. However, Alaska Peninsula stocks were not able to sustain the level of harvest and quickly declined in the same pattern as the Kodiak fishery. Once a region's fisheries have been fully developed, the potential for large harvest increments is limited.

Fisheries scientists and managers are constantly adding to their understanding of the population dynamics of commercially exploited species and estimate the current abundance of the species within defined sampling parameters for management purposes. Change to the fisheries resource bases base may occur from human-induced fishing mortality or from other factors (disease, changes to oceanographic conditions, etc.). With an imperfect understanding of population dynamics for fish populations within the Gulf of Alaska, fish management mistakes can cause resource depletion and can exacerbate fluctuations due to natural cycles.

Given the dynamic environment for fish harvest levels in the Gulf of Alaska, there are several demanding requirements for the harvest projection model to be used in this study, which includes:

- The model must be easily understood by planners, decision makers and the general public.

- The model has to be flexible to accommodate forecasting a diverse group of fish species, some of which have very different population dynamics and fishing mortalities.

- The model, to be useful in future applications, has to be replicable, and should be easily updated as future resource related and harvest data become available.

- For optimum use as a planning tool, working with the model must be relatively straightforward so different options that are identified as new information comes available can be investigated.

- The model needs to have a logical and structured approach, so that the results will be reliable and defensible.

In developing this model, we evaluated several existing sources of biological, rather than mathematical, harvest projections currently being completed by resource management agencies. For example, the National Marine Fisheries Service staff annually prepare resource status and recommendations for the following year's harvest of groundfish for the North Pacific Fishery Management Council. Similarly, several annual harvest projections are prepared for salmon and some species of shellfish by regional biologists with the Alaska Department of Fish & Game. While these reports contain much valuable information they were not selected for application in this study for the following reasons:

a) the agency forecasts are typically limited to one year. Our modeling requirements are for many years of future projections

b) even with the single year's forecast, there can be a great deal of difference between the forecast and the actual harvest. Forecasts made by the Alaska Department of Fish and Game for Bristol Bay and Cook Inlet salmon runs, for example, are frequently off by a large margin. These forecasts are made on a population with a relatively well understood yield-recruit relationship and where the magnitude of the parent population is relatively well defined. Even with these advantages, annual forecasts based on biological parameters are frequently very inaccurate. For species with less defined population parameters (as is the case for most groundfish species), projecting future harvest from biological relationships is an even more difficult task than it is for salmon.

c) fishery planning teams for the NPFMC make recommendations for groundfish harvest, based on one or more exploitation rates. The actual quotas, which are highly correlated to harvest, are set by the NPFMC members, who may disregard or alter the recommended harvest levels for any number of reasons

d) in a model of this type, we need to include future forecast levels for all commercially harvested species. For many of these species, we actually have little biological information (such as cyclical variation in the biomass or in recruitment) on which to base forecasts for future harvest levels.

Therefore, the study team focused on a forecasting method that could be applied to all species, and could be relatively easily updated as new information was received.

Several different methods are typically used in forecasting and are discussed briefly below.

1) Expert Opinion - This method is based on the informed opinions of experts who are familiar with and are involved in fisheries management within the region. In a structured approach, expert opinions can be gathered through directed key-informant interviews.

2) Delphi Method - This is a variant of the expert opinion method. It involves an iterative process of compiling and presenting responses to a panel of experts to arrive at a group consensus for issues directed then.

3) Persistence Forecasting - This type of model can take several forms, but has the general characteristic that expectations for the future are based upon what has happened in the past. Specific types of persistence forecasting procedures are listed below.

a) assume that tomorrow will be the same as today - in effect a status quo model, i.e.

$$Y_{t+1} = Y_t$$

where Y_t is the harvest in initial year t

and Y_{t+1} is the estimated harvest in year t+1

b) assume that the proportion of change in the level of production will remain constant through time, i.e.

$$Y_{t+1} - Y_t = Y_t - Y_{t-1}$$

c) the general form of the persistence model is the autoregressive model, i.e.

$$Y_{t+1} = \sum_{j=0}^{\infty} a_j \; Y_{t-j}$$

The forecast value is a weighted linear combination of all past levels of production, where

j is the year, from zero to infinity, and

a_j is the weight of the coefficient for year j. The actual values for weights may be determined from *a priori* knowledge or by statistical evaluation.

4) Trend Extrapolation - This forecasting method assumes the continuance of a previous trend. In a case where the trend is based on a constant absolute change from one period to the next, this method is identical to the persistence model shown in 3(b).

5) Econometric Models - Basically the econometric model involves application of the statistical technique of multiple regression analysis. It estimates the impact of a number of independent variables on the dependent variable to be estimated. Different mathematical functional forms and different combinations of independent variables are tested to get the best fit for the model, or the one which most exactly explains the historical relationships observed. Forecasts for the dependent variable are calculated using estimated future values for the independent variables.

As an example, we can show the model for the estimation of a dependent variable, Y, based upon the explanatory (of independent) variables X and Z, i.e.

$$\hat{Y}_i = \alpha + \beta x_i + \gamma z_i + \varepsilon$$

where:

Y is the estimated production of resource *Y* during year *ι*

α is the slope of the linear equation

β is the estimated coefficient for independent variable x

X_i is the value of variable x for year ι

Υ is the estimated coefficient for independent variable z

Z_i is the value of variable z for year ι, and

ϵ is the error term to account for stochastic variation.

The study team evaluated many different types of forecast models during the course of this study and its predecessor, " The Commercial Fishing Industry of the Bering Sea" (MMS 90-0026). In the Bering Sea study, resource forecasts were made using a simple linear regression model which utilized the production (harvest) from the previous year as a single explanatory variable for most species. In some cases, particularly salmon species, there was an addition of a dummy variable in the regression equation to account for the shift in harvests that occurred after 1979.

In the Bering Sea study referenced above, the use of a more complex regression model for projecting future harvest levels by species was considered. However, the concept was rejected due to several problems. One criteria for the forecasting model was that it would be easily updated. The data requirements for a complex regression model would make updating the model more difficult. Also, the intent of the general approach to forecasting was to have similar approaches for all species. Estimating multi-variable regression models for different species would greatly extend the data requirements for modeling, updating and forecasting. Finally, forecasting with an econometric model requires estimation of the future values of the independent variables which are as difficult to predict in many cases as the variable being forecast.

One of the problems encountered in completing the harvest forecasts in the Bering Sea study was when harvests had changed dramatically, up or down, over recent years. The regression line estimated from the data, when projected 30 years into the future, estimated harvest levels outside the bounds for any harvests historically achieved. To resolve this problem, the harvest level was truncated and held constant where the forecast went outside the upper or lower bounds for historical high or low levels.

In selecting a methodology for harvest forecasts in this study, several new approaches were investigated. One of the approaches investigated was the cyclical nature of fish populations and harvests over time. The intent of this investigation was to see whether a mathematical function could estimate these cyclical fluctuations, and thus would be a good predictor of future population abundance and harvest levels. The study team utilized a software program called Jensen Scientific Tablecurve, which applies hundred of mathematical functions to a data set, selecting the one which most closely 'fits' the data. The results of applying the Jensen Tablecurve program to several species did not encourage further experimentation with this approach. One of the troubling aspects of the approach was that it lacked a theoretical basis, i.e. there was no scientific reasoning which led to the choice of one function over another, it was a purely random process.

Another method investigated was to see whether trends in environmental conditions could be correlated with long term fluctuations in resource abundance and harvests. Research biologists are just beginning to apply more emphasis on ecosystem modeling which includes changes in oceanographic and environmental conditions. Some of the research being funded to evaluate impacts resulting from the EXXON VALDEZ spill in Prince William Sound addresses changes affecting production of pink salmon and herring.

One of the most likely considerations for an important environmental variable is water temperature since that affects both growth rates and the food supply. The study team reviewed a model developed by a research biologist evaluating changes in recruitment of pollock and herring in the Bering Sea as a function of water temperature (Wespestad, 1991). In that study, a strong correlation was shown between strong recruitment years and warming trends in water temperature. This approach was not followed in this study due to limitations on the scope and available resources of the project. However, utilizing ocean temperature and other oceanographic factors should definitely be considered for further research.

The method selected for harvest projection for this study is a form of the autoregressive model discussed in the above section. The general integrated autoregressive moving-average (ARIMA) model incorporated all of the requirements for the model. The ARIMA model is specified by (p, d, q) where p is the order of the autoregressive operator, d is the order of the difference, and q is the order of the moving-average operator. If

$$p = 0 \quad q \neq 0$$

the model reduces to a pure moving-average process. If,

$$p \neq 0 \quad q = 0$$

then the model reduces to a pure autoregressive process. If both p and q equal zero, the model reduces to a *random walk*. For a general discussion of the specifications and characteristics of the different models, see Makridakis, Wheelwright and McGee (1983).

The forecast models were calculated using **SYSTAT: The System for Statistics**, which was run on a PC microcomputer in a Windows environment. This software provides extensive capability for statistical analysis, and includes a comprehensive section for time series analysis, including ARIMA models. The extensive capability of the system allowed thorough exploration of different specifications of the forecasting models. In addition other models for time series analysis, such as the FOURIER model were investigated, but were rejected in favor of the ARIMA model. This was primarily because the characteristics of the data series for many of the fish species harvested in the Gulf of Alaska do not follow a regular cyclical pattern which is most appropriate for the FOURIER process. However, another factor in rejecting the FOURIER model was difficulty in meeting our study objective of developing one approach to be utilized for all species throughout the Gulf. Again, a study more directly focused on forecast of a particular species in the Gulf may find further investigation of the FOURIER model valuable.

In examining the harvest data by species and plotting the data in a simple scatterplot, it quickly became obvious that there was an upward trend in harvests for most species. In order to make the data series *stationery* (i.e. with a constant variance), the trend can be removed by *differencing* and the non-constant variance can be corrected by taking a log transformation of the data series. Differencing transforms the data series by replacing the values by the differences between each value and the previous value, thereby removing the trend. In specifying the models for forecasting fish harvests, both of these were completed, with the log transformation occurring first.

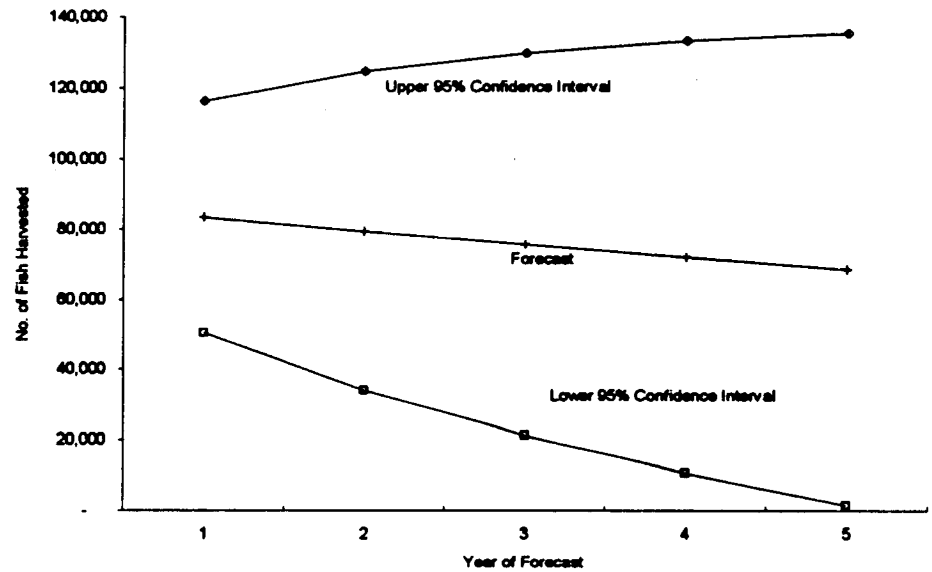
In estimating the specifications of the ARIMA models, our general intent was to keep the model as simple as possible to facilitate replication. There was no theoretical justification for specification of higher orders of the moving-average operator. Several different specifications were tried, but the models generally were not enhanced by their inclusion. An interesting characteristic of the SYSTAT system is that is incorporates built-in safety features to keep from badly misspecifying a model. In many cases, when a model was set to project 30 years, the program would cease after several iterations with an error message that the forecasts were not reliable.

The study team contacted the statistical designer for the SYSTAT Inc. to discuss the problem with models ceasing calculation before completing 30 year forecasts. The advice given with respect to forecasting 30 years was an emphatic "don't do it". The statistician for SYSTAT felt we were extending the reasonable expectation for any forecasting model to extend forecasts beyond five to seven years. When we explained the requirement for such a forecast in completing long term forecasts to drive the economic model, the advice received was to keep it as simple and straightforward as possible to remove potential bias and errors. The model chosen was selected on the basis of simplicity, low mean square error (MSE) and confidence parameters for the resulting forecasts.

The specification selected for the forecast models was ARIMA (1,1,0). The results of the models are shown in the following figures.

In reviewing these projections, it is important to note that the forecast is a single point. We know as we increase the years of the forecast, the confidence interval quickly diverges from this midpoint. As an example, Figure 4.3-1 shows the 95 percent confidence intervals for the king salmon harvest forecasts. The graph vividly demonstrates the uncertain nature of the harvest projections. We can be fairly certain that the forecasts in the first several years are likely to be close to the actual harvest which will be achieved. As we move further into the future, we are less sure of the estimates. The dispersion patterns for the confidence intervals can be taken as a measure of variation in the anticipated harvest levels.

Figure 4.3-1: Confidence Intervals Associated with King Salmon Harvests



Using our example from Figure 4.3-1 the harvest projection and 95 percent confidence intervals for king salmon harvests in the Gulf of Alaska are:

	Lower 95 % bound	Forecast	Upper 95% bound
1st year	50,321	83,206	116,091
2nd year	33,817	79,224	124,631
3rd year	21,113	75,433	129,752
4th year	10,533	71,823	133,112
5th year	1,401	68,385	135,369

Similar results were obtained for the other projections. This figure readily illustrates the quick dispersion of the confidence interval for the forecasts even over the relatively short period of five years. When extending the forecasts to 20 and 30 years, as required in this model the level of confidence in the projections decreases as the forecast period is extended into the future. In addition to providing a measure of caution in use of long range forecasts, these results heighten our awareness of the desirability of periodic updates of the model.

The model files ending in "...harv.xls" or "....hrv.xls" contain the projected harvest levels for the major resource groups. The contents of the tables are similar.

Figure 4.3-2: Pollock Harvest and Projection

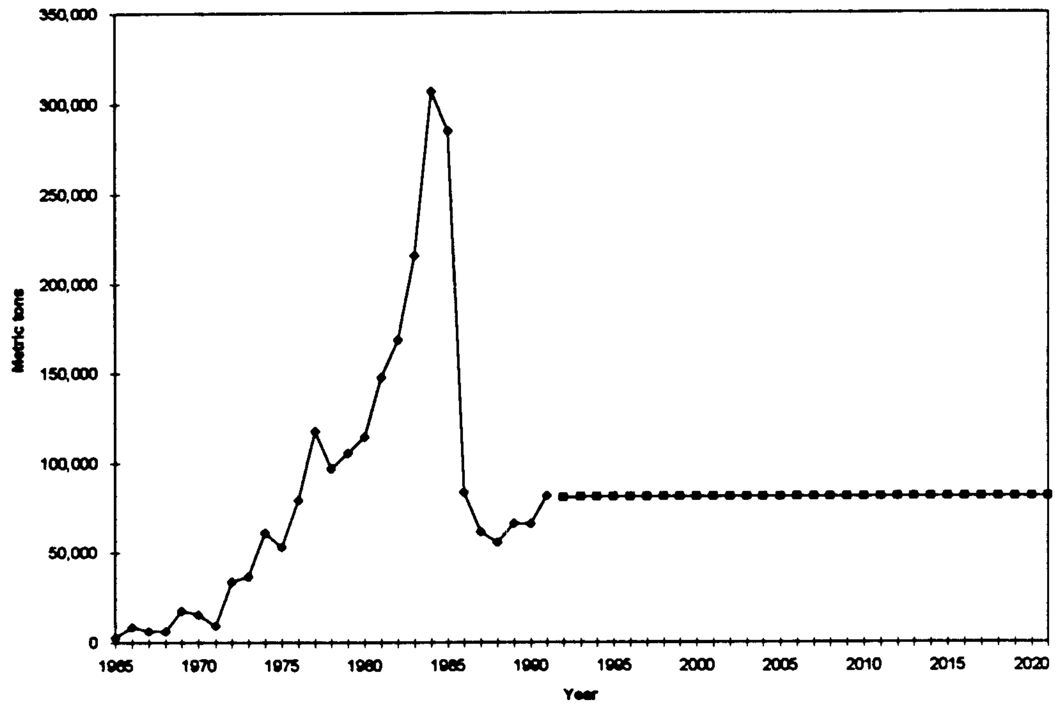


Figure 4.3-3: Pacific Cod Harvest and Projection

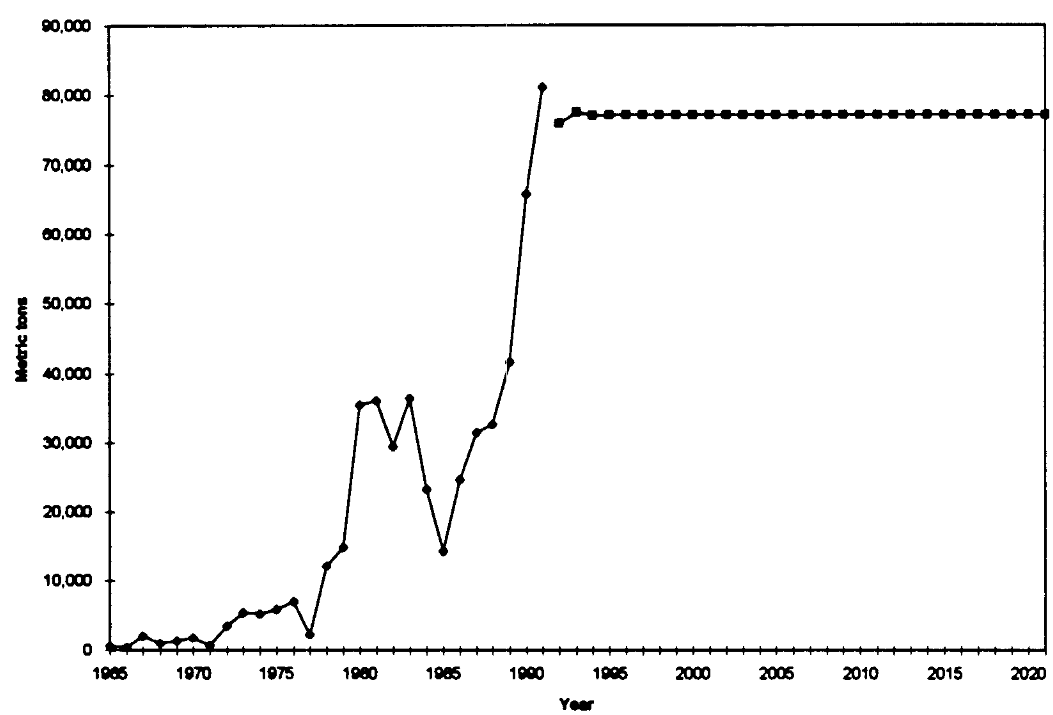


Figure 4.3-4: Sablefish Harvest and Projection

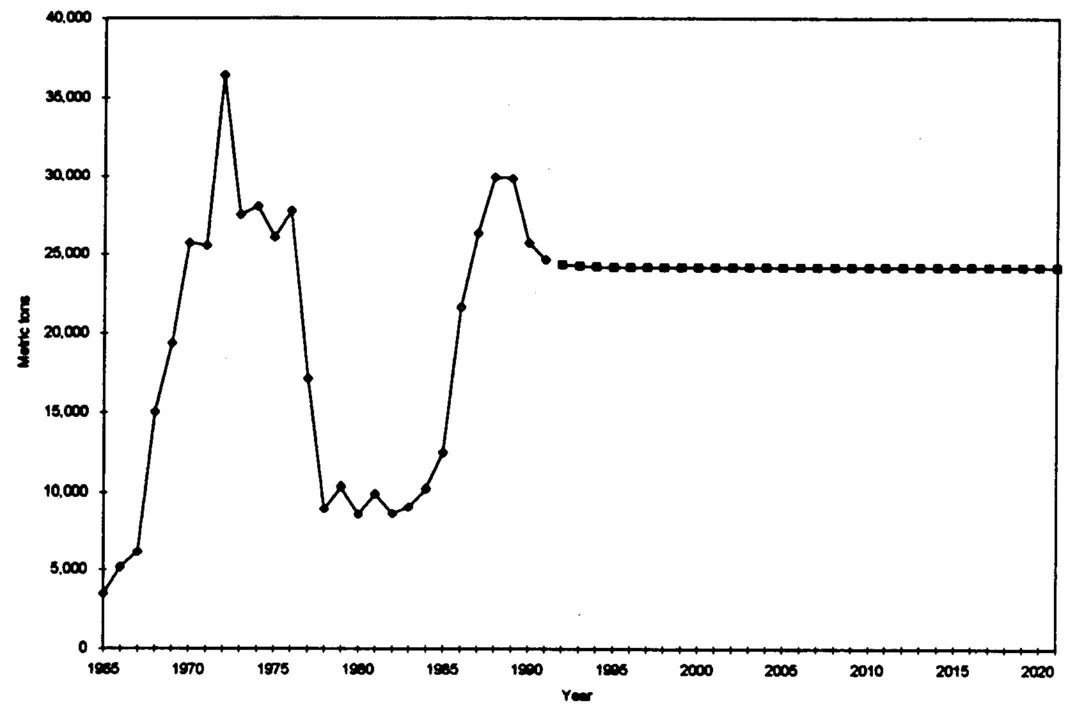


Figure 4.3-5: Rockfish Harvest and Projection

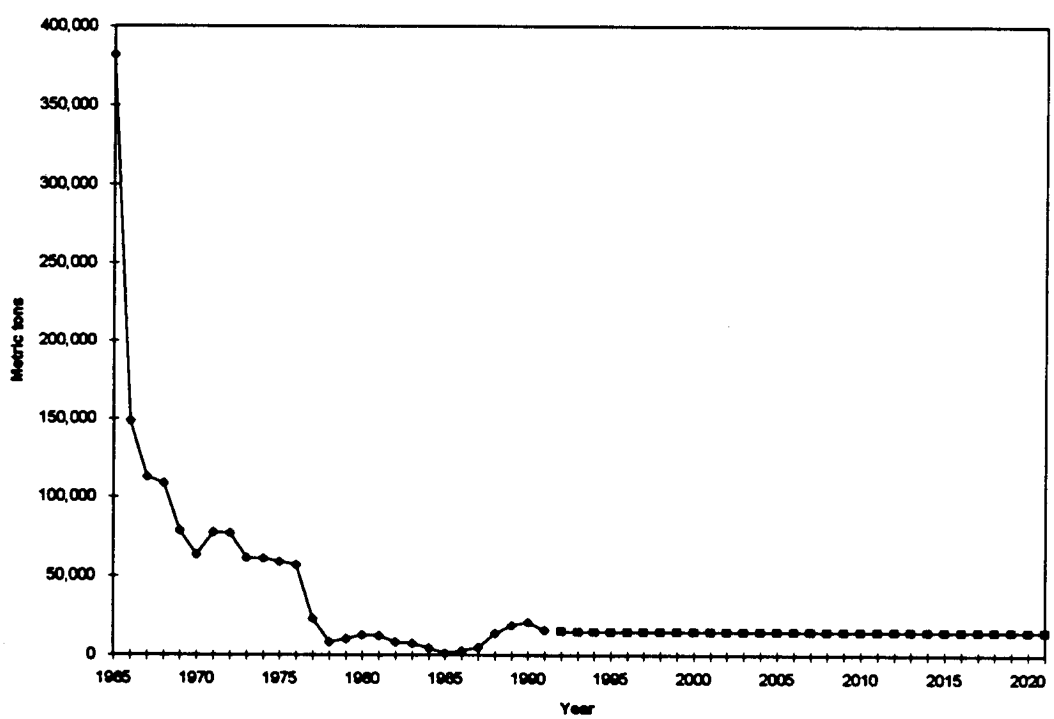


Figure 4.3-6: Herring Harvest and Projection

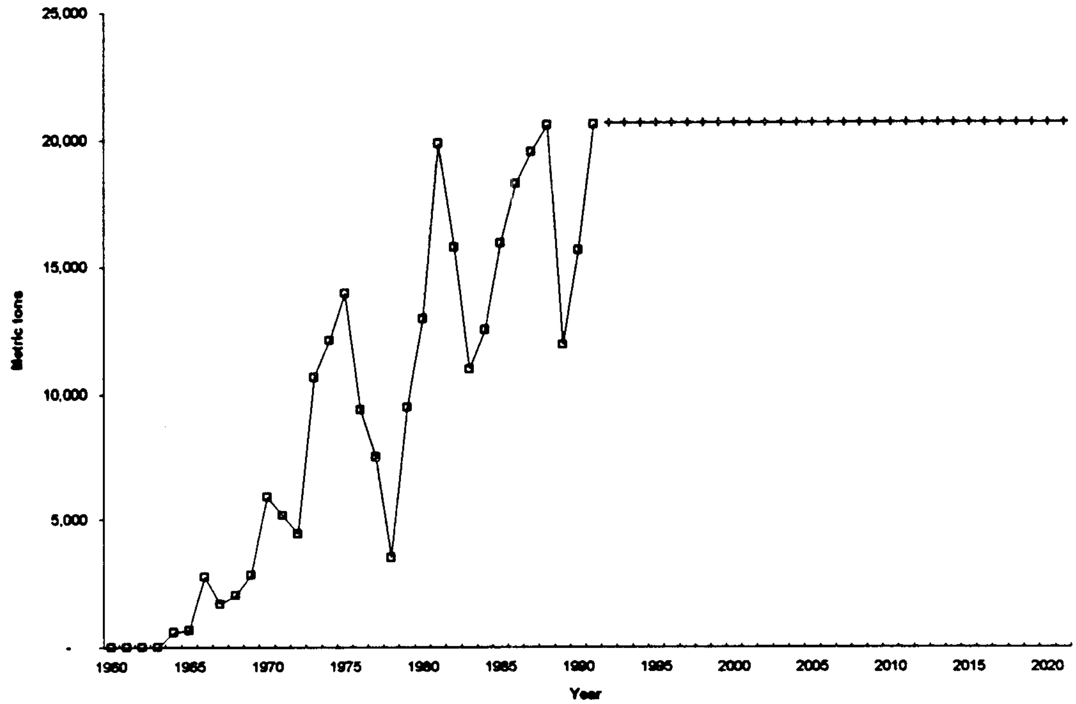


Figure 4.3-7: Halibut Harvest and Projection

Figure 4.3-8: King Crab Harvest and Projection

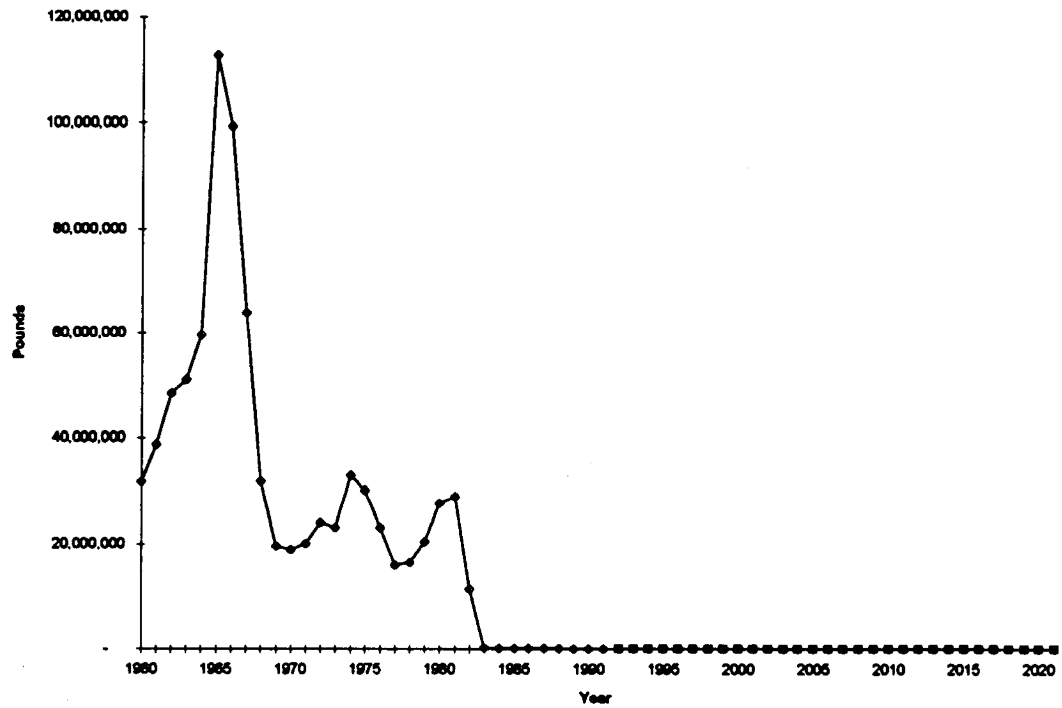


Figure 4.3-9: Tanner Crab Harvest and Projection

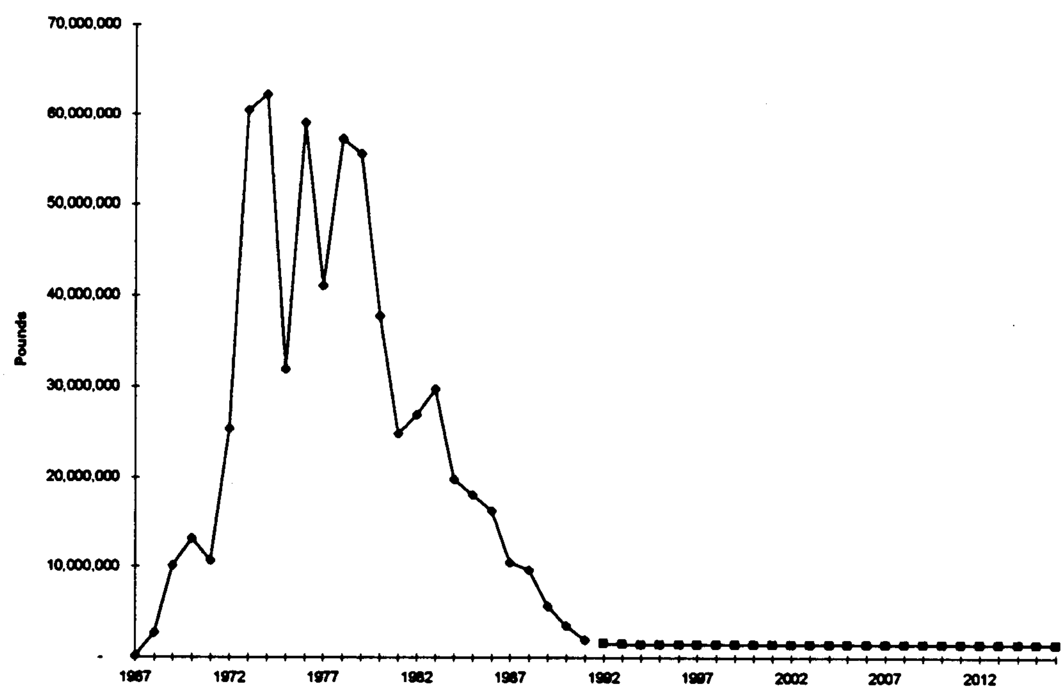


Figure 4.3-10: Dungeness Crab Harvest and Projection

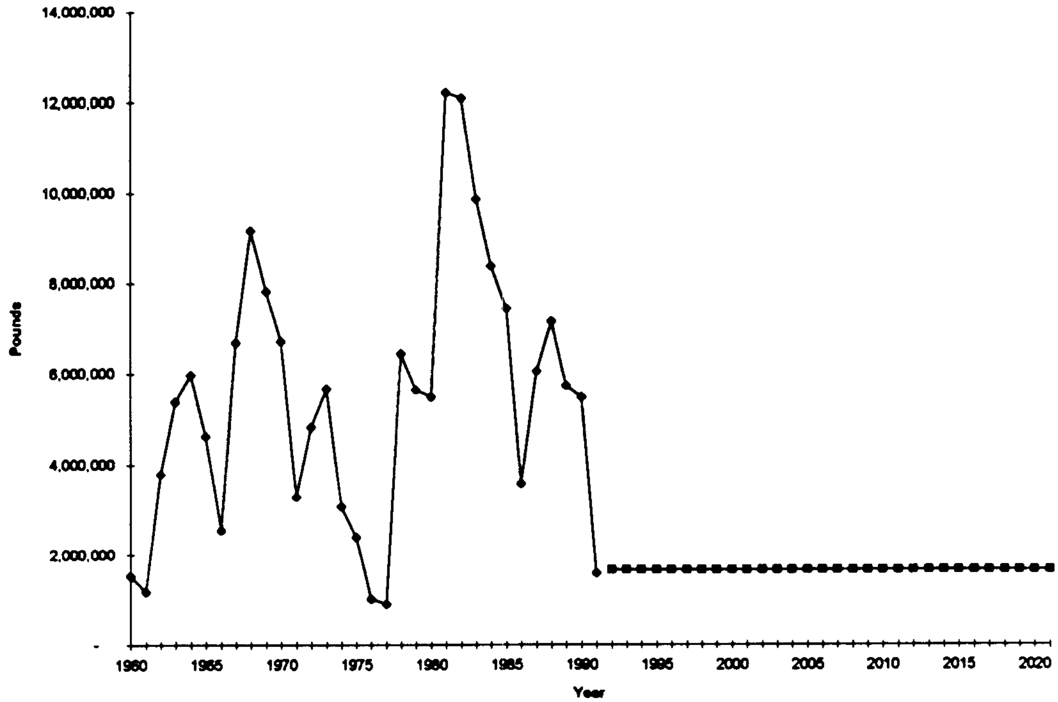


Figure 4.3-11: Shrimp Harvest and Projection

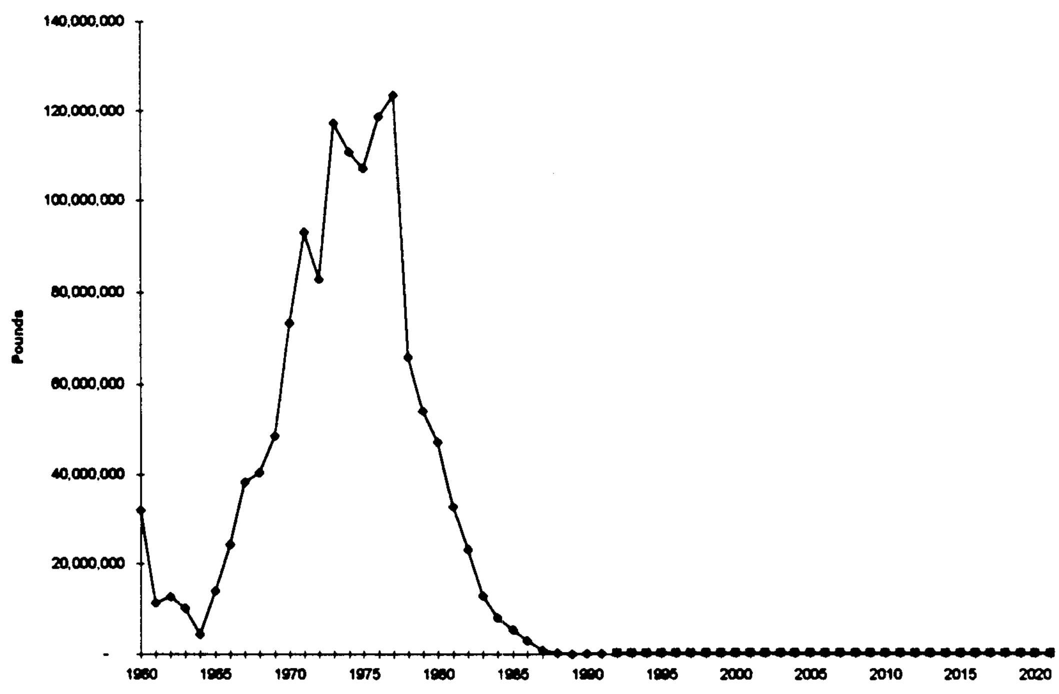


Figure 4.3-12: Scallop Harvest and Projection

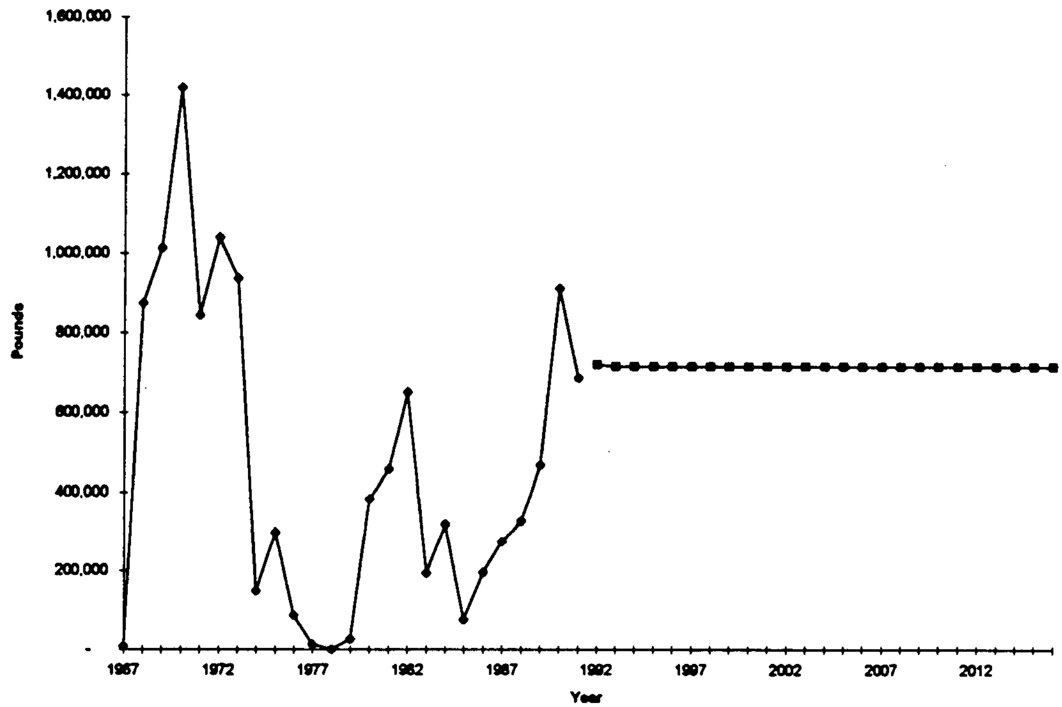


Figure 4.3-13: Clam Harvest and Projection

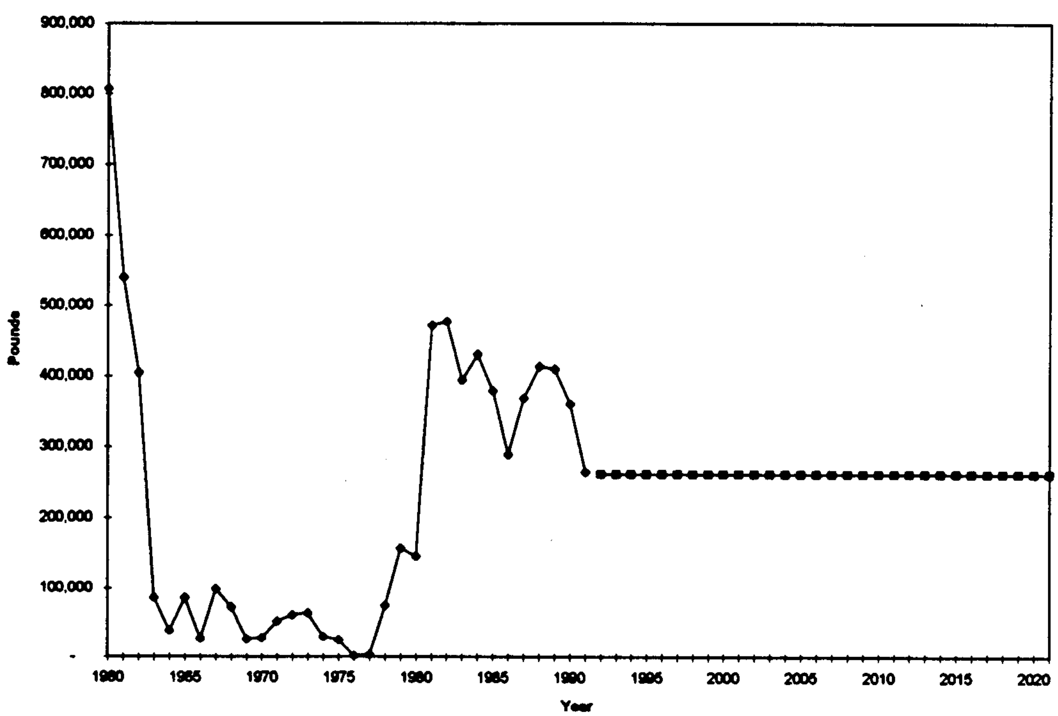


Figure 4.3-14: Octopus Harvest and Projection

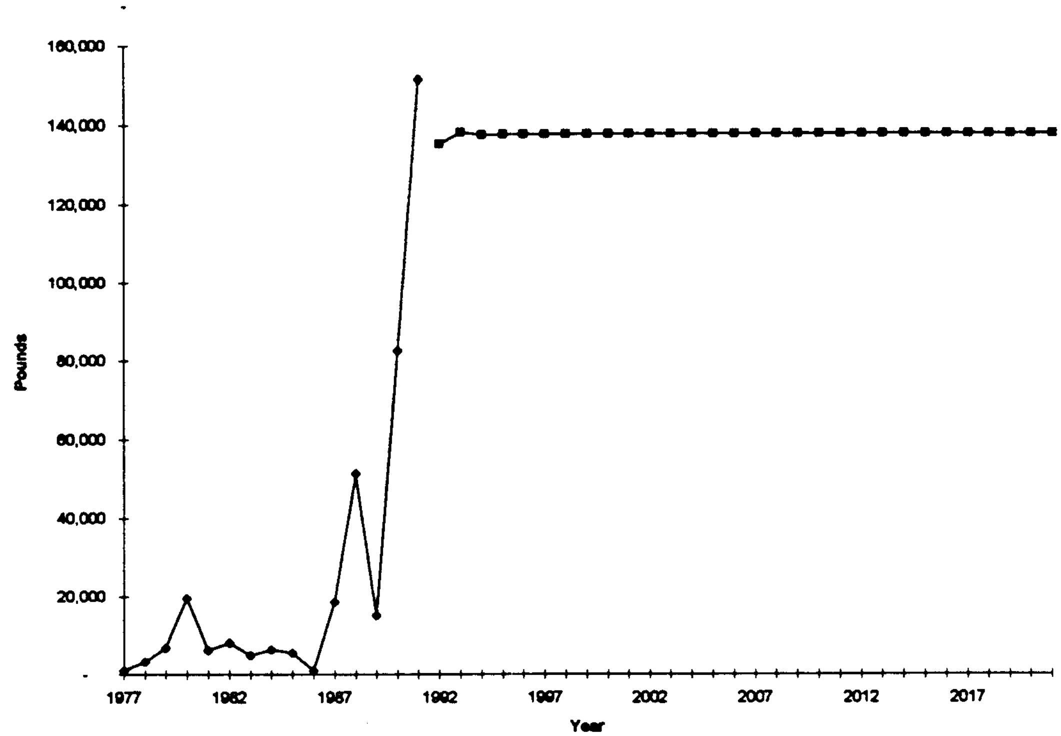


Figure 4.3-15: King Salmon Harvest and Projection

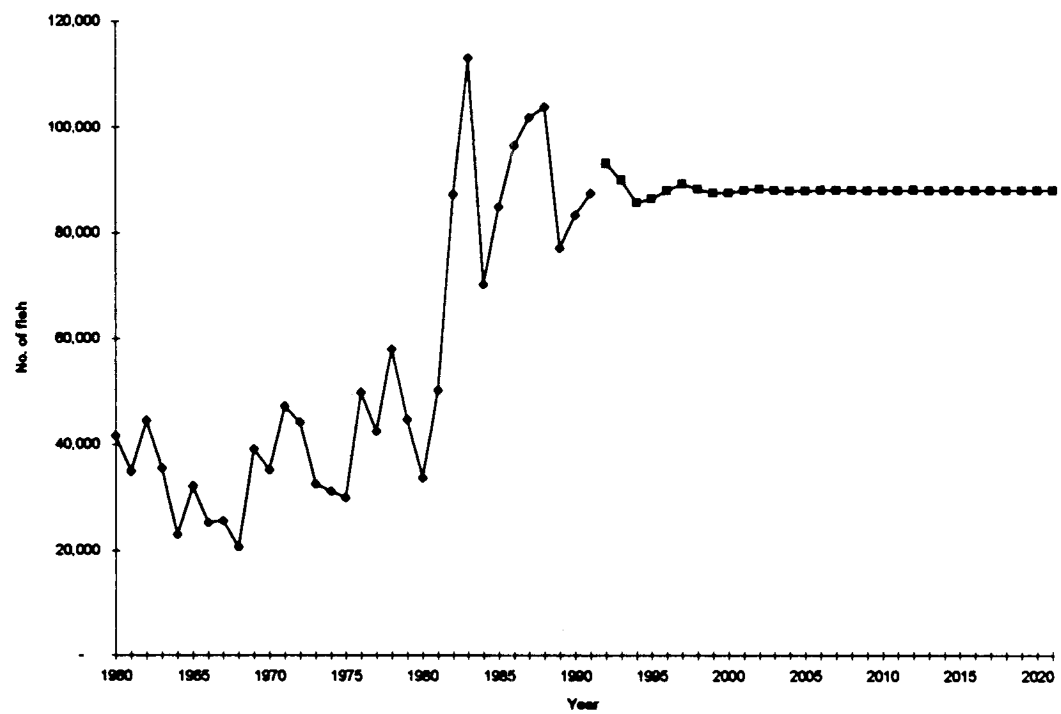


Figure 4.3-16: Sockeye Salmon Harvest and Projection

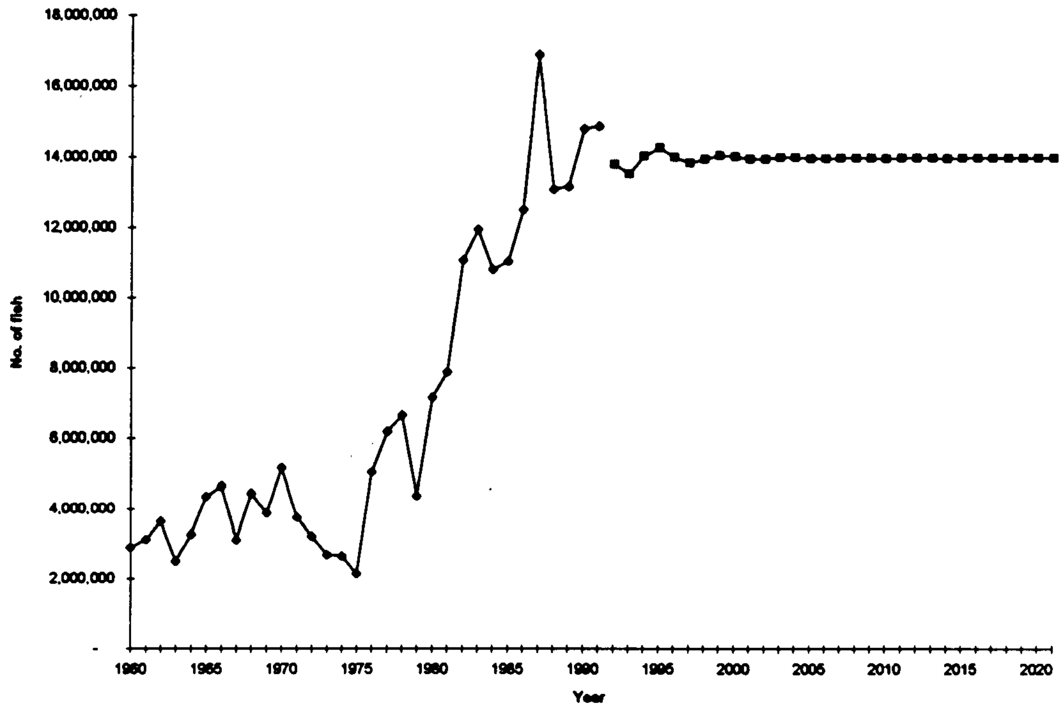


Figure 4.3-17: Coho Salmon Harvest and Projection

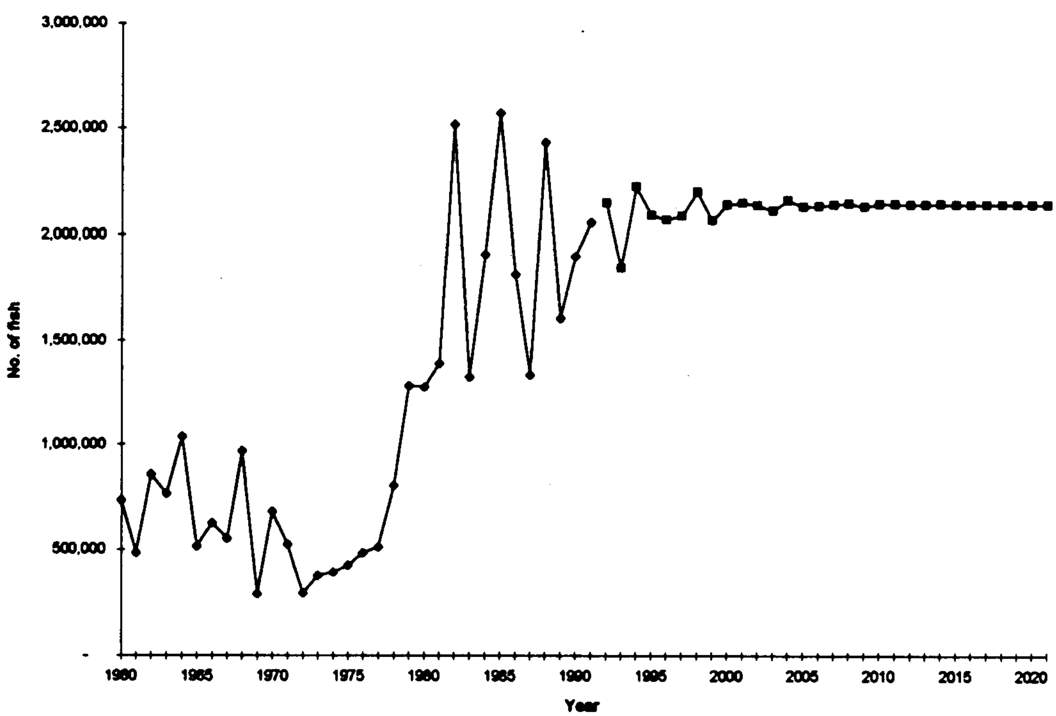


Figure 4.3-18: Chum Salmon Harvest and Projection

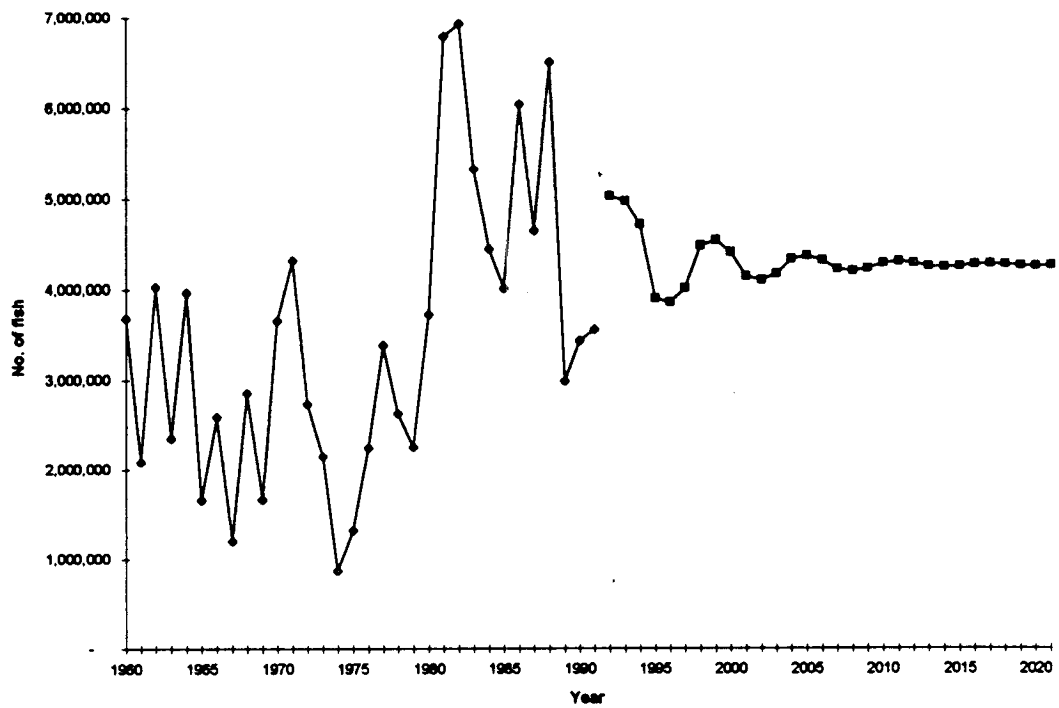
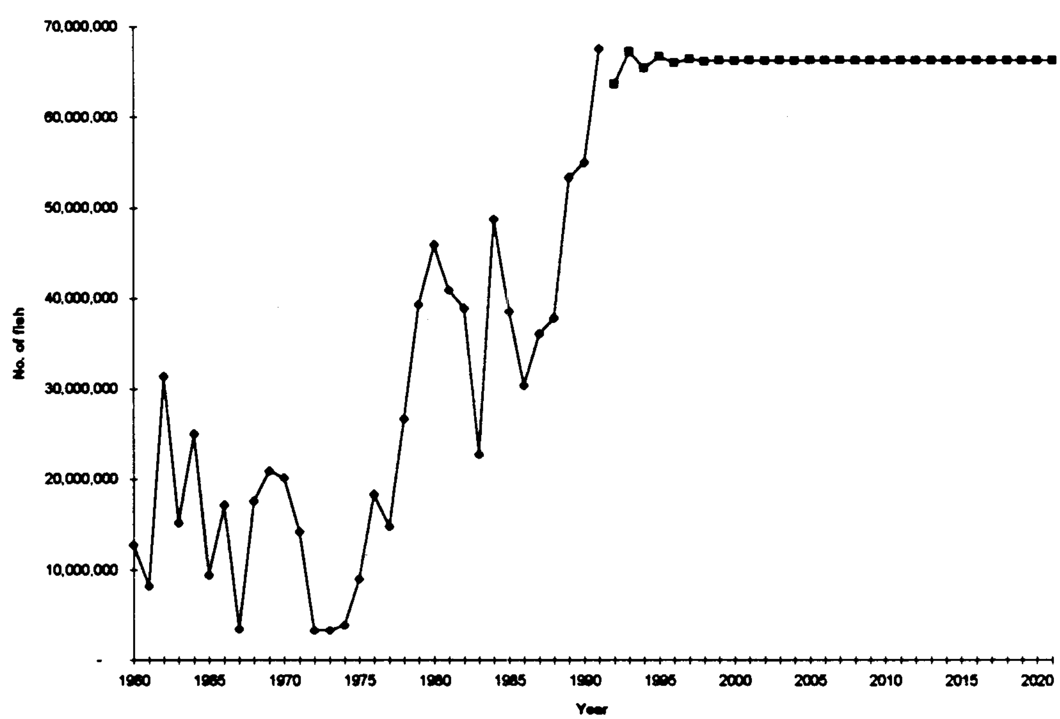


Figure 4.3-19: Pink Salmon Harvest and Projection



4.3.2 Catch Location

The model files ending in "....blk.xls" are a set of tables that show historic harvest patterns throughout the marine waters of the state and extending to the boundary of the 200-mile Fishery Conservation Zone. There are separate files for each fishery type (trawl, longline and other, crab, salmon, and herring). Each fishery has different patterns of harvest and often have different statistical reporting areas.

The salmon, herring, and crab data were provided by CFEC and the groundfish data were provided by NMFS. The salmon and herring data are for years 1986 through 1988 and the crab data are for 1988. Groundfish data are for 1986 through 1989. To the extent that the distribution of present or future harvests vary from the patterns reflected in these previous years the model will be inaccurate. These tables and files should be modified to reflect substantial changes in the distribution pattern as information becomes available. These may be due to factors such as enhanced hatchery production or the anticipated reduction in returns to the Kenai River due to over-escapement in that system. Tables 4.3-5 and 4.3-6 provide an example of the data contained in these files. The agencies provided catch (in pounds or metric tons) by species by statistical area. That information was then converted into the percent of harvest for each statistical area. Some statistical areas are not included in these tables due to non-disclosure rules. The percentages for salmon, herring, and halibut are based on a statewide distribution pattern. There are separate groundfish and crab percentages for the Gulf of Alaska and the Bering Sea/Aleutian Islands due to different management regimes, quota systems and other factors.

Table 4.3- 5: SLMNBLK.XLS (1)

	Salmon Statistical	Pounds				
Area	areas	King	Sockeye	Coho	Pink	Chum
GOA	11600	98,291	4,423	472,631	21,221	10,220
GOA	15700	194,764	219	9,461	1,729	840
GOA	18100	30,984	375	270,089	1,684	775
GOA	18400					
GOA	18900	70,034	378	141,711	1,428	405
GOA	19100	6,424	43	17,126	75	12
GOA	19900					
GOA	20010	70	8,211	65,773	30	11

Table 4.3- 6: SLMNBLK.XLS (2)

Area	Salmon Statistical areas	% OF HARVEST	King	Sockeye	Coho	Pink	Chum
GOA	11600		2.45%	0.00%	2.81%	0.02%	0.02%
GOA	15700		4.86%	0.00%	0.06%	0.00%	0.00%
GOA	18100		0.77%	0.00%	1.61%	0.00%	0.00%
GOA	18400		0.00%	0.00%	0.00%	0.00%	0.00%
GOA	18900		1.75%	0.00%	0.84%	0.00%	0.00%
GOA	19100		0.16%	0.00%	0.10%	0.00%	0.00%
GOA	19900		0.00%	0.00%	0.00%	0.00%	0.00%

4.3.3 Catch by Distance

The files in this group (ending in "....MTRX.XLS" or "...MATRX.XLS", an abbreviation for matrix) contain a set of tables that establish the distance between each study community and each statistical area, and calculate the percent of harvest from each statistical area that goes to each community. Files have been developed for trawl and longline and other gear for the groundfish fishery, and for the crab, salmon, herring, and halibut fisheries.

The distance calculation uses the latitude and longitude of each community as provided in Dictionary of Alaska Place Names (Orth, 1967) and the latitude for each statistical area. Most statistical areas for groundfish and crab are based on one degree latitude by ½ degree longitude cells for which the identifier of the statistical area is the latitude and longitude of the southeast comer of the cell. The distance equation adjusts this identifier to calculate the distance from the community to the midpoint of the one degree by ½ degree cell. The centerpoint of those groundfish and crab statistical areas that do not conform to these measurements were taken from maps provided by the management agencies. MMS provided the latitude and longitude for the centerpoint of salmon and herring statistical areas from maps provided by the Alaska Department of Fish and Game. The latitude and longitude are converted from degrees and parts of degrees expressed in minutes, to degrees and percent of degrees to facilitate the calculations.

To ensure that distances between communities and harvest locations reflect maritime distances, adjustments are made to ensure that the transit through False Pass or Unimak Pass is required for community-harvest location pairs that are in different areas. In those instances where either the origin or destination is located in the Bering Sea and the other end of the link is in the Gulf of Alaska, the table calculates the distance from False Pass to each harvest location and community and adds them together to arrive at a total distance. The National

Ocean Service (1989) suggests that vessels with drafts greater than 24 feet not transit False Pass. Few of the fishing vessels operating in Alaska have drafts greater than this suggested channel constraint so False Pass is regarded as the likely transit point for most vessels.

Table 4.3-7 provides an example of file. The row and column headings used in these files are the same as the "...BLK.XLS" files. The intersection of a specific community-column and cell row in the matrix provides the distance between the pair in nautical miles.

Table 4.3- 7: TRWMATRX.XLS (1)

	A	B	C	D	E	F	G	H
1	Distance Function				COMMUNITY	AKUTAN	CORDOVA	HOMER
2	Rad=	57.2957795			AREA	AL	GOA	GOA
3					LONGITUDE	165.46	145.45	151.27
4					LATITUDE	54.08	60.33	59.37
5					Calc Long	165.77	145.75	151.45
6		S.E. comer	Mid-Point		Calc Lat	54.13	60.55	59.62
7	Area	of Block	Longitude	Latitude				
8	GOA	1325601	132.5	56.25		1135.17	488.68	633.95
9	GOA	1355601	135.5	56.25		1035.84	412.04	545.08
10	GOA	1365731	136.5	57.75		998.67	330.06	478.37
11	GOA	1375730	137.5	57.75		966.65	304.06	448.30
12	GOA	1405830	140.5	58.75		876.44	192.26	340.17
13	GOA	1415900	141.5	59.25		850.59	149.75	304.11
14	GOA	1425931	142.5	59.75		827.12	108.26	270.98

The halibut fishery in Alaska is managed with 8 designated management areas. Given the small number of management areas the catch location data ("...BLK.XLS") information for halibut are included in the HALIMTRX.XLS (halibut matrix) file.

The second table in this file (starting on row 169) calculates a distance coefficient between each community-cell pair. The coefficients are based upon equations derived from information on percent of harvest (by weight) by distance to port of landing for crab, trawl, longline, and salmon fisheries provided by CFEC and NMFS. The distance equation varies for each fishery due to differences between typical vessels in each fleet, the distance between major harvest areas and processing centers, characteristics of the harvested species and other factors.

Figure 4.3-1 shows the actual data received from CFEC and the results of the regression equation developed for salmon. The equations suggest that most vessels deliver to the nearest port, which is the normal pattern, but some vessels travel substantial distances, likely traveling past other ports, before making deliveries. The greater the distance the smaller the percentage of harvest delivered to a port. Examples of vessels traveling long distances can be found throughout the fishing industry. A few halibut schooners routinely travel to Seattle after a halibut opening to obtain higher prices; crabbers travel from their primary opilio grounds near St. Paul and St. George to deliver at Dutch Harbor to sell to their primary processor, obtain necessary repairs, or take a few days of rest; and trawlers may travel past Akutan to reach Dutch Harbor for crew change.

Table 4.3-8 shows the calculated distance coefficient between each community-cell pair. The coefficients are based upon equations derived from information on weight or percent of harvest by distance to port of landing for crab, trawl, longline, and salmon fisheries provided by CFEC and NMFS. The distance equation varies for each fishery due to differences between typical vessels in each fleet, the distance between major harvest areas and processing centers, characteristics of the harvested species and other factors.

Figure 4.3- 20: Salmon Distance Equation

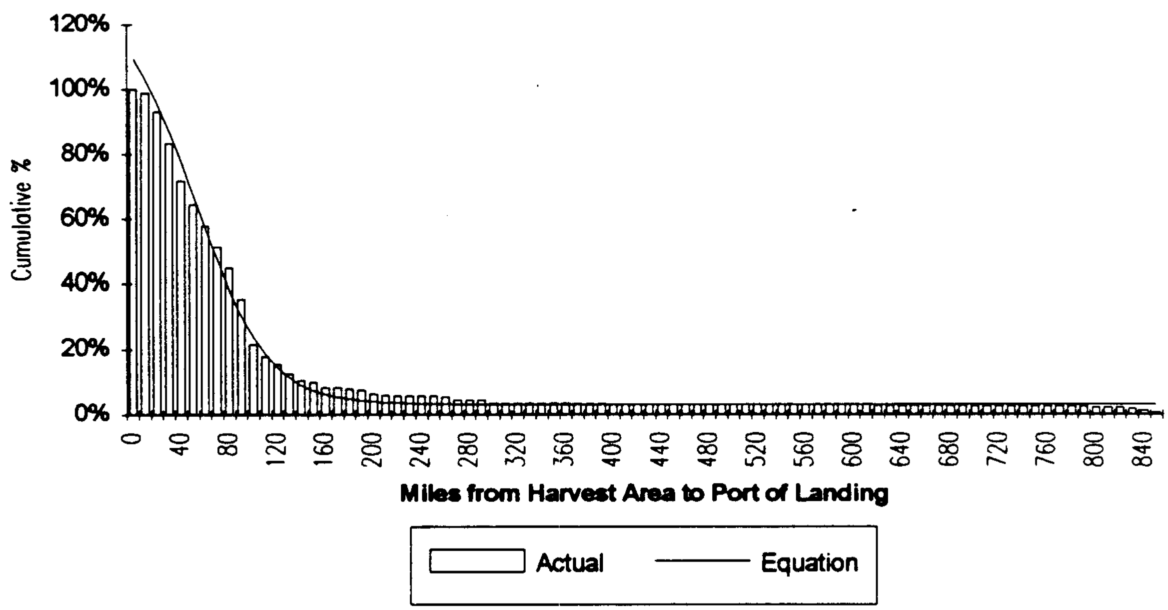


Table 4.3- 8: TRWMATRX.XLS (2)

	A	B	C	D	E	F	G	H
169			Parmeter	Value				
170	Trawl Percentage		a	0.956882				
171			b	0.00598				
172						AKUTAN	CORDOVA	HOMER
173						AL	GOA	GOA
174	GOA	1325601				0	0	0
175	GOA	1355601				0	0	0
176	GOA	1365731				0	0	0
177	GOA	1375730				0	0	0
178	GOA	1405830				0	0	0
179	GOA	1415900				0	0.0613571	0
180	GOA	1425931				0	0.3094736	0
181	GOA	1435931				0	0.4631131	0
182	GOA	1455900				0	0.4882786	0
183	GOA	1465901				0	0.4713188	0.04437
184	GOA	1465904				0	0.4713188	0.04437

The third table in this file (Table 4.3-9) and other files in the same group calculate the percent of harvest from each cell that is landed in each community. This distribution of harvest is accomplished with a production-constrained gravity model. The general form of the gravity model equation is:

$$T_{ij} = \frac{(H_i E_j)/D_{ij}}{\sum_j ((H_i E_j)/D_{ij})}$$

The total interaction (T) or movement of harvest from cell $_i$ to port $_j$ is a function of the harvest level (H) at cell $_i$ and employment (E) at port $_j$, divided by the distance (D) between cell $_i$ and port $_j$.

The estimated peak number of employees for salmon , crab, surimi, and other groundfish is employed to represent the attractive force of the port. The "pull" of the port diminishes with increasing distance. The rate at which this pull decreases is a based on the distance equation developed for each major gear type or fishery. In order to allocate a specific cell's harvest between communities the total interaction between all cells and all ports must be calculated and used to derive a specific percentage for each cell-community pair.

Several additional "communities" are included in this file to account for the capacity of floating processors in the salmon and crab industries and the large shoreside processing capacity in Bristol Bay.

Table 4.3- 9: TRWMATRX.XLS (3)

	A	B	C	D	E	F	G	H
337	Groundfish Percentage by Community					AKUTAN	CORDOVA	HOMER
338					Employment	300	50	200
339	GOA	1325601				0.00%	0.00%	0.00%
340	GOA	1355601				0.00%	0.00%	0.00%
341	GOA	1365731				0.00%	0.00%	0.00%
342	GOA	1375730				0.00%	0.00%	0.00%
343	GOA	1405830				0.00%	0.00%	0.00%
344	GOA	1415900				0.00%	9.05%	0.00%
345	GOA	1425931				0.00%	34.81%	0.00%
346	GOA	1435931				0.00%	46.43%	0.00%
347	GOA	1455900				0.00%	43.38%	0.00%
348	GOA	1465901				0.00%	29.04%	10.93%
349	GOA	1465904				0.00%	29.04%	10.93%
350	GOA	1475830				0.00%	13.82%	38.94%

4.3.4 Catch by Gear Type

The GEARHARV.XLS file provides information on the percent of harvest by different gear types for various groundfish and salmon species. Information from the Alaska Department of Fish and Game and Pacific Coast Fisheries Information Network (PACFIN) are used to establish these percentages by management area. In addition to those gear types shown in Table 4.3-10 the file also includes set gillnet and troll for the salmon fishery, and seine and gillnet for the herring fishery.

Salmon and herring are divided between gear types in each area according to averages for 1980 through 1988 and 1990 through 1991. Data for 1989 are omitted because of the effect of the Exxon Valdez spill. Distribution between groundfish gear types is based upon the last full year of information from PACFIN. It is anticipated that the NPFMC will ultimately adopt an IFQ program for all fisheries within their jurisdiction and that the allocation between gear types under this IFQ program will approximate more recent distribution patterns rather than historic averages so the last full year is employed to reflect this assumption..

Table 4.3- 10: GEARHARV.XLS

	A	B	C	D	E	F	G	H
1	CATCH PERCENTAGE BY WEIGHT							
2								
3								
4	SPECIES/ GEAR TYPE (From January 27, 1992 PacFin report)							
5	BERING SEA	POLLOCK	PACIFIC	YELLOWF	OTHER F	TURBOT	SABLEFIS	POP & OT
6	TRAWL	99.96%	59.00%	100.00%	99.60%	77.00%	16.00%	82.00%
7	HOOK & LINE	0.04%	38.00%	0.00%	0.40%	23.00%	84.00%	8.00%
8	OTHER	0.00%	3.00%	0.00%	0.00%	0.00%	0.00%	10.00%
9	GOA							
10	TRAWL	99.97%	75.00%	100.00%	99.50%	63.00%	9.08%	86.90%
11	HOOK & LINE	0.03%	10.00%	0.00%	0.50%	37.00%	90.00%	13.00%
12	OTHER	0.00%	15.00%	0.00%	0.00%	0.00%	0.00%	0.10%
13	salmon fm 1989 and 1990 salmon by gear and mgmt area reports fm ADF&G computer divisio							
14	SALMON				AREA			
15	SEINE	A	D	E	H	K	L	M
16	KING	0.18%	0.18%	1.00%	0.06%	92.12%	100.00%	0.50%
17	RED	6.42%	6.42%	6.40%	3.20%	62.46%	100.00%	7.00%
18	COHO	2.70%	2.70%	2.41%	2.65%	81.46%	100.00%	10.00%
19	PINK	78.96%	78.96%	90.29%	50.25%	81.73%	100.00%	86.00%
20	CHUM	57.95%	57.95%	84.66%	7.25%	86.42%	100.00%	63.00%
21								
22	DRIFT	A	D	E	H	K	L	M
23	KING	0.91%	0.91%	99.00%	4.16%	0.00%	0.00%	67.00%
24	RED	59.78%	59.78%	93.50%	59.85%	0.00%	0.00%	83.00%
25	COHO	7.79%	7.79%	97.09%	63.86%	0.00%	0.00%	46.00%
26	PINK	3.52%	3.52%	0.76%	23.19%	0.00%	0.00%	13.00%
27	CHUM	29.80%	29.80%	13.91%	82.12%	0.00%	0.00%	31.00%
28								

4.3.5 Community Landings

Those files ending in "....DELV.XLS" provide the estimates of landings by species in each port. These estimates are calculated by multiplication of vectors from the "...HARV.XLS", "...BLK.XLS", "GEARHARV.XLS", and "...MTRX.XLS" files. The projected harvest levels for each major fishery are distributed among the potential harvest locations by historic data in the "...BLK.XLS" files, portioned between competing gear types according to "GEARHARV.XLS" files and allocated between communities in accordance with "...MTRX.XLS" files.

Table 4.3- 11: GEARHARV.XLS

Species (mt)	AKUTAN	CORDOVA	HOMER	KENAI	KING COVE
Pollock	93,353	0	0	0	0
Pacific Cod	7,358	682	1,802	84	4,556
Yellowfin Sole	791	0	0	0	0
Other Flatfish	1,370	0	0	0	0
Greenland Turbot	164	0	0	0	0
Sablefish	64	33	26	1	40
Other Rockfish	37	357	114	5	30
Atka Mackerel	46	0	0	0	0
Squid	59	0	0	0	0
Other Fish	0	0	0	0	0
Halibut	0	0	0	0	0
TOTAL	103,241	1,071	1,941	90	4,627

The salmon file "SLMNDELV.XLS" also estimates the total pounds of salmon harvested in each management area. This estimate is calculated by multiplying the projected harvest by species with the historic harvest percentage of each species in each management area.

4.3.6 Prices

4.3.6.1 Salmon

This version of the FIM employs 1992 constant dollars for price forecasting and analysis.. The constant 1992 salmon price data were graphed and a review of these figures indicated no readily discernible trends in salmon prices in recent years. Previous analyses had shown a clear link with the exchange rate between the Japanese Yen and the U.S. Dollar, however this correlation has not been significant in recent years. As a result, average prices over varying time frames are used for projections of future salmon prices. The time periods employed to calculate the average price are different for some species since there appear to be points in time where the price changed substantially and remained at the different level, suggesting a structural change in the market or industry. For example, Figure 2.7-1 shows a substantial price change for king salmon occurring in 1973. Prices since that time have remained above the prices experienced during the 1969 through 1973 time. Figures 2.7-2 through 2.7-5 show prices for the other salmon species in 1992 constant dollars.

Figure 4.3- 21: Statewide King Salmon Ex-Vessel Prices

(constant 1992 dollars)

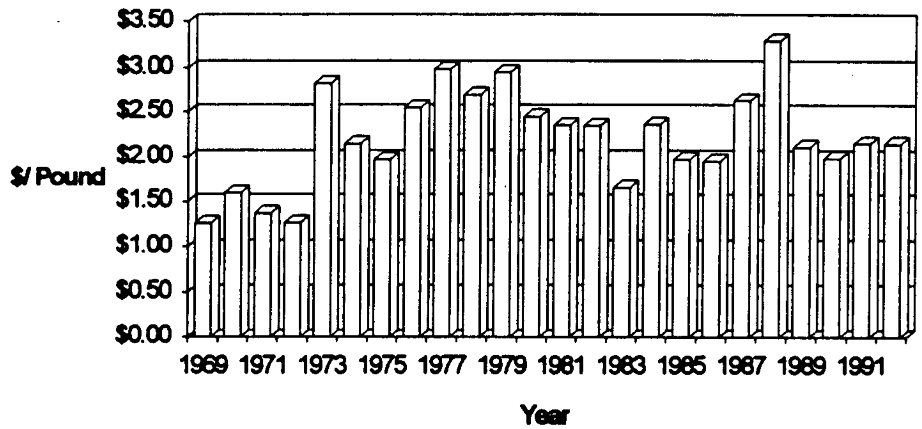


Figure 4.3- 22: Statewide Sockeye Salmon Ex-Vessel Prices

(constant 1992 dollars)

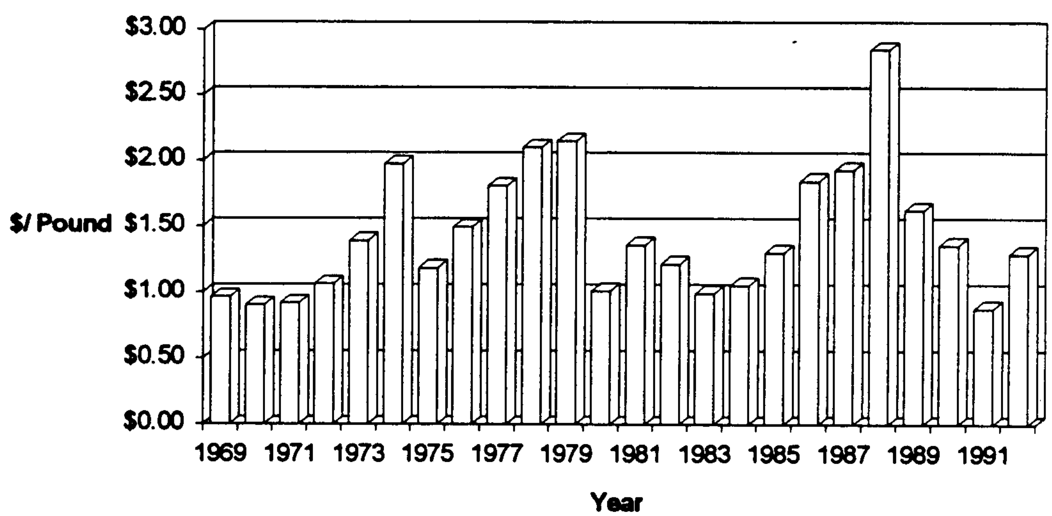


Figure 4.3- 23: Statewide Coho Salmon Ex-Vessel Prices
(constant 1992 dollars)

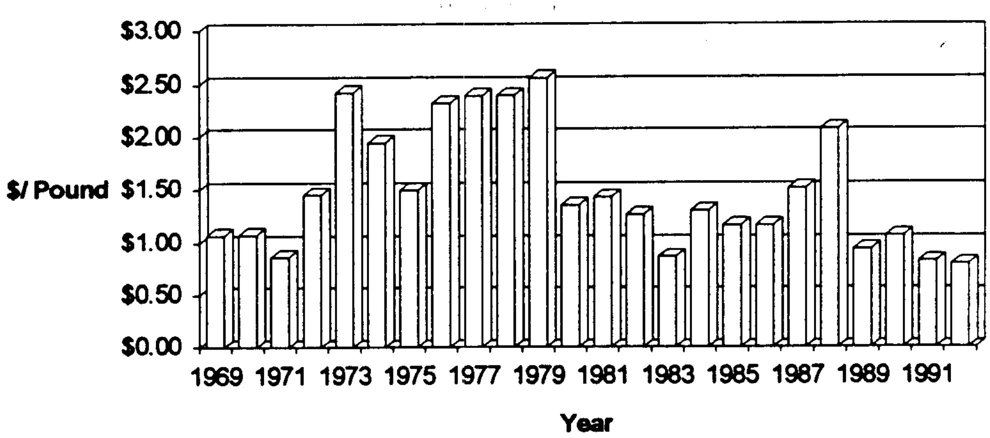


Figure 4.3- 24: Statewide Pink Salmon Ex-Vessel Prices
(constant 1992 dollars)

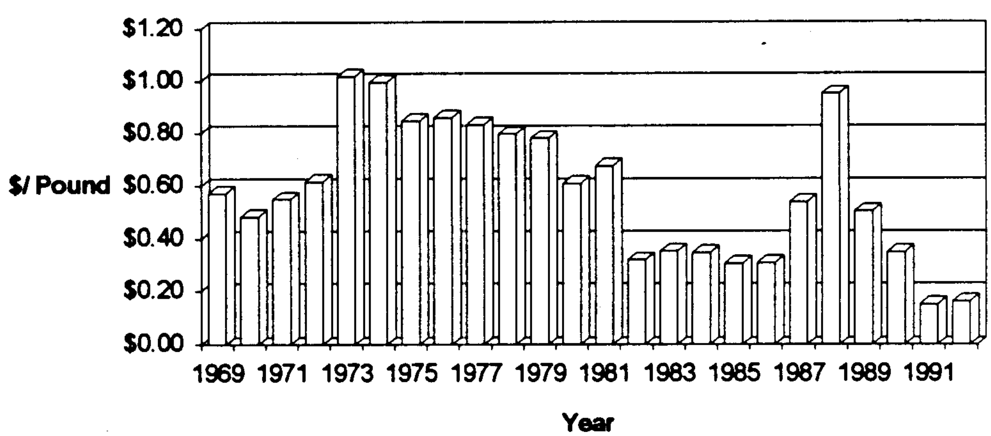
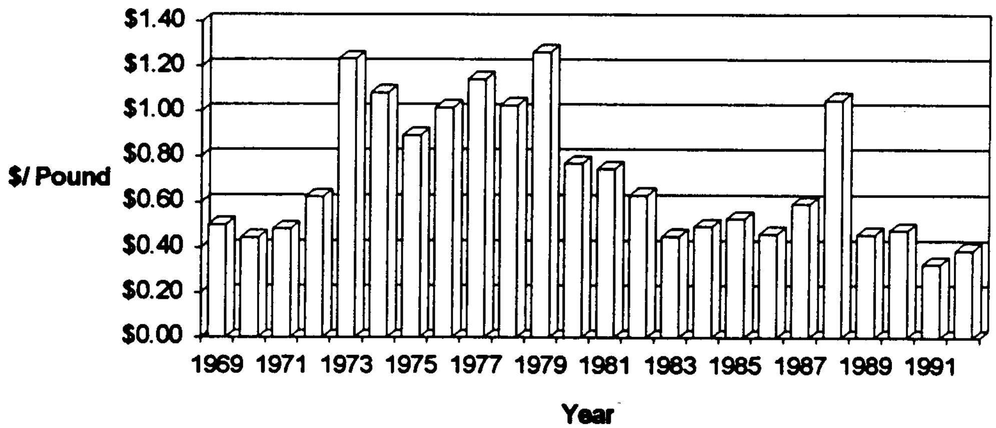


Figure 4.3- 25: Statewide Chum Salmon Ex-Vessel Prices
(constant 1992 dollars)



4.3.6.2 Groundfish

The Bering Sea FIM used PACFIN ex-vessel prices for groundfish. Average PACFIN groundfish ex-vessel prices continue to be used in this analysis since with few exceptions the data generally cover only the last six years and are considered too short for time series analysis. In addition, groundfish ex-vessel prices expressed in constant 1992 dollars do not display noticeable price trends. Table 2.7-1 shows the nominal prices for 1985 through 1992. Data for 1980 through 1984 are not shown in this table although they are contained in the file. Column B shows average price by species in constant 1992 dollars. A similar table was developed for longline and other gear because there are differences in prices paid for various species caught by the two gear types.

Table 4.3- 12: TRWLPRIC.XLS

	A	B	H	I	J	K	L	M	N	O
1	EX-VESSEL TRAWL PRICES		DOMESTIC TRAWL VESSELS							
2			GROUNDFISH ESTIMATED EX-VESSEL PRICES PER POUN							
3		PRICES	FOR ALL AREAS (1980 - 1992 IN NOMINAL $)							
4		IN 1992 $	1985	1986	1987	1988	1989	1990	1991	1992
5	ARROWTOOTH FLOUNDER	0.080			0.1	0.063	0.076	0.048	0.079	0.059
6	UNSPECIFIED TURBOTS	0.119		0.128	0.133				0.094	0.046
7	TURBOTS	0.096		0.128	0.128	0.063	0.076	0.048	0.085	0.045
8	ALASKA PLAICE	0.123					0.188	0.06	0.109	0.099
9	GREENLAND TURBOT	0.158	0.134	0.202	0.202	0.202	0.1	0.1	0.099	0.034
10	REX SOLE	0.171	0.1	0.1	0.1	0.227	0.074	0.132	0.286	0.133
11	ROCK SOLE	0.165	0.302	0.109	0.066	0.126	0.139	0.109	0.144	0.153
12	YELLOWFIN SOLE	0.186		0.138	0.092	0.171	0.285	0.205	0.168	0.083
13	OTHER FLATFISH	0.093	0.078	0.077	0.061		0.068	0.083	0.075	0.127
14	UNSP. FLATFISH	0.092	0.192	0.061	0.063	0.058	0.053	0.041	0.052	0.094
15	ALL FLATFISH	0.164	0.236	0.141	0.104	0.135	0.132	0.114	0.15	0.098
16										
17	BLACK ROCKFISH	0.152	0.143	0.144				0.096	0.177	0.101
18	SHORTRAKER ROCKFISH	0.264				0.171		0.1526	0.462	0.257
19	UNSP. DEMERSAL ROCKFIS	0.206				0.1	0.239	0.173	0.212	0.233
20	UNSP. PELAGIC ROCKFISH	0.277				0.24	0.327	0.175	0.338	0.185
21	UNSP. SLOPE ROCKFISH	0.231				0.21	0.21	0.184	0.276	0.181
22	YELLOWEYE ROCKFISH	0.242	0.4	0.331	0.082				0.102	0.112
23	OTHER ROCKFISH	0.269	0.204							
24	PACIFIC OCEAN PERCH	0.198	0.129	0.145	0.192	0.092	0.116	0.193	0.202	0.125
25	THORNYHEADS	0.380	0.151	0.243	0.423	0.371	0.4	0.368	0.354	0.511
26	UNSP. ROCKFISH	0.185	0.181	0.219	0.171	0.166	0.18	0.117	0.154	0.059
27	ALL ROCKFISH	0.191	0.142	0.162	0.208	0.118	0.139	0.156	0.232	0.178
28										
29	ATKA MACKEREL	0.160		0.193	0.133	0.119	0.178	0.107	0.133	0.126
30	LING COD	0.305		0.21				0.282	0.333	0.302
31	PACIFIC COD	0.215	0.146	0.105	0.173	0.13	0.136	0.147	0.206	0.237
32	SABLEFISH	0.569	0.37	0.37	0.427	0.801	0.719	0.661	0.9	0.605
33	WALLEYE POLLOCK	0.092	0.053	0.054	0.078	0.076	0.079	0.086	0.09	0.133
34	UNSP. ROUNDFISH	0.188								0.188
35	ALL ROUNDFISH	0.116	0.11	0.082	0.097	0.086	0.088	0.094	0.105	0.142
36										
37	UNSPECIFIED SQUID	0.144		0.128	0.134	0.19	0.19	0.07	0.104	0.05
38	UNSP. GROUNDFISH	0.203	0.204	0.228	0.162	0.364	0.084	0.072	0.212	0.032
39	MISC GROUNDFISH	0.209	0.204	0.227	0.162	0.318	0.125	0.072	0.192	0.106
40										
41	ALL GROUNDFISH	0.119	0.111	0.088	0.099	0.09	0.09	0.097	0.111	0.136
42	USCPI		1.076	1.096	1.136	1.183	1.24	1.34	1.362	1.418
43	Sources: 1980-84 data from Ex-vessel price estimate files obtained from									
44	Elaine Dinneford at CFEC. 1985-92 data from PacFin data base, Pacific Marine Fisheries Commission.									
45	1992 DATA FROM PACFIN REPORT OF NOV. 6, 1992									

4.3.6.3 Shellfish

The worksheet SHELPRIC.XLS contains three different prices for crab: 1) statewide ex-vessel prices for shoreside deliveries; 2) ex-vessel prices for at-sea deliveries, and 3) prices for processed crab.

Statewide ex-vessel crab prices have increased substantially over the past two decades, and most crab species display trends of increasing prices (1992 dollars) over this time period (See Figures 4.3-8 through 4.3-11). Time series analyses of these data resulted in extremely high prices in few years. These results were judged to be above the likely area of future prices so a 5-year moving average was employed to project future prices.

Figure 4.3- 26: Statewide Dungeness Crab Ex-Vessel Prices

(constant 1992 dollars)

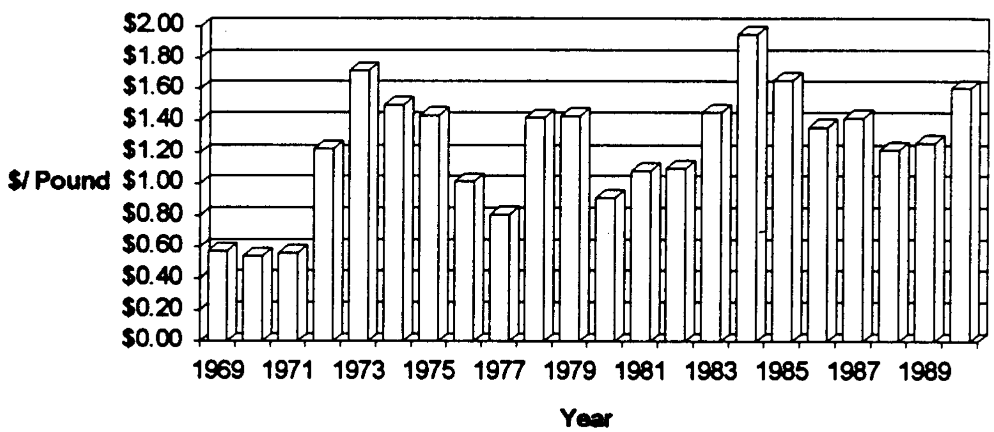


Figure 4.3- 27: Statewide Bairdi Crab Ex-Vessel Prices

(constant 1992 dollars)

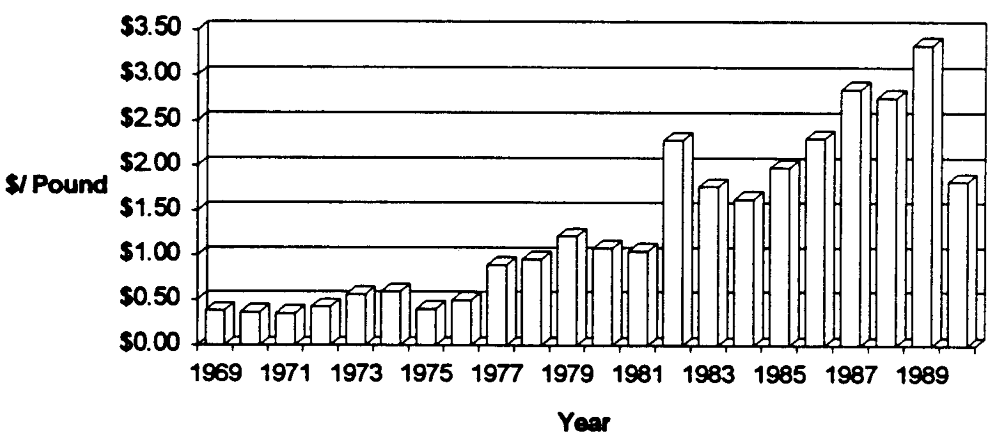


Figure 4.3- 28: Statewide Opilio Crab Ex-Vessel Prices

(constant 1992 dollars)

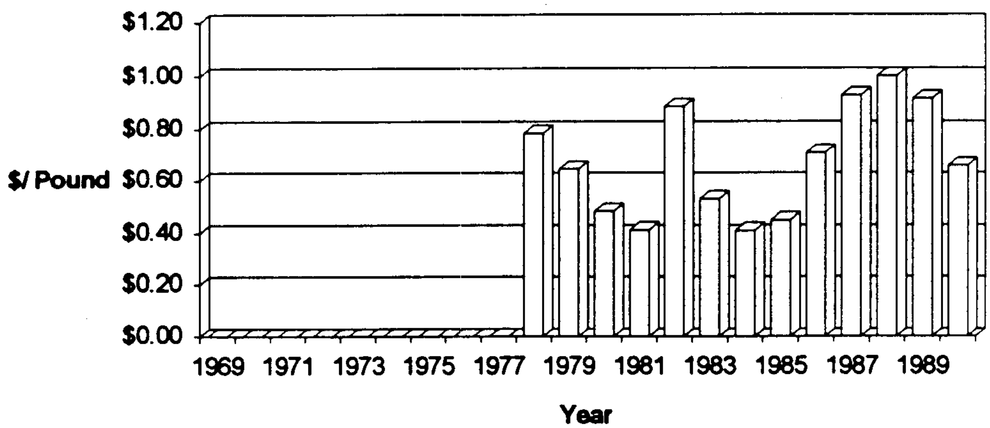


Figure 4.3- 29: Statewide Red King Crab Ex-Vessel Prices

(constant 1992 dollars)

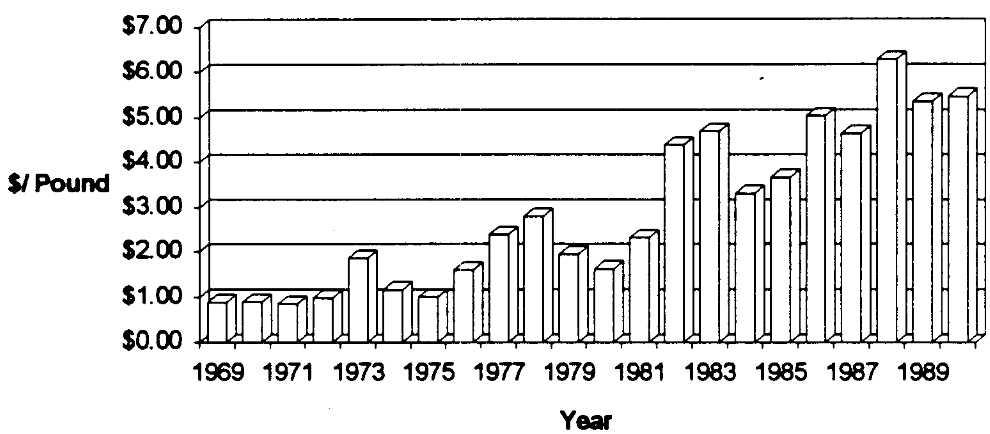


Figure 4.3- 30: Statewide Blue King Crab Ex-Vessel Prices

(constant 1992 dollars)

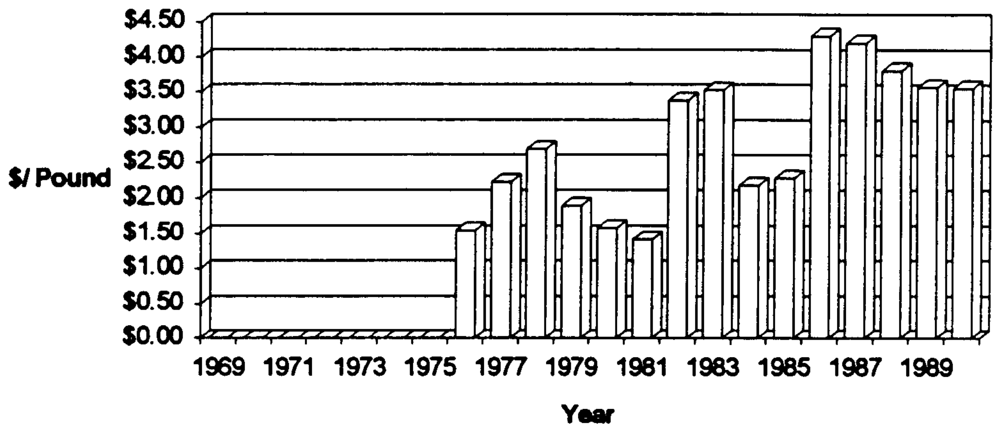
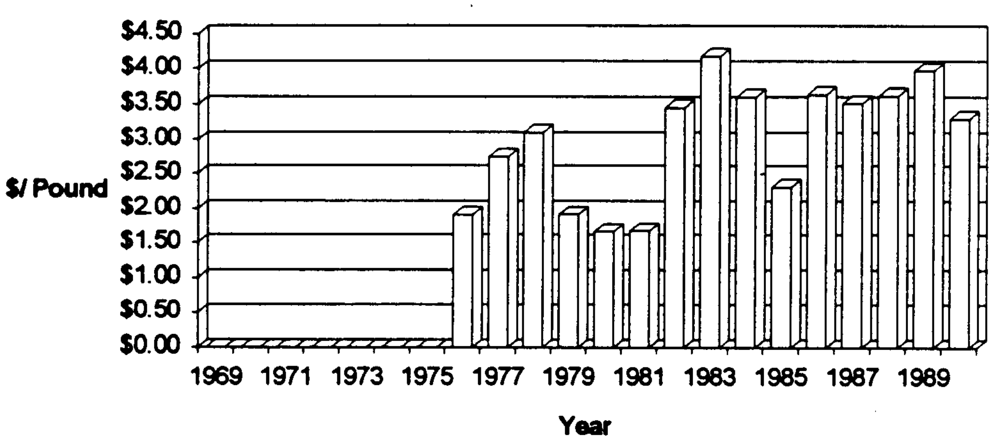


Figure 4.3- 31: Statewide Brown King Crab Ex-Vessel Prices

(constant 1992 dollars)



A substantial portion of Bering Sea and Aleutian Islands area crab harvest is processed by floating processors purchasing crab from catcher boats in more distant regions of these management areas. The prices paid by these operations are typically less than shorebased processing plants. Much of the crab purchased from vessels working in these areas is obtained by floating processors operating in the region due to the large distances between these harvest areas and Bering Sea ports. Ex-vessel prices for Area R (Adak) and Western Aleutian management areas are considered to be representative of prices paid by floating processors throughout the Bering Sea and Aleutian Islands areas. However, these data series are shorter than for other management areas and incomplete for some species. Future at-sea prices are calculated by use of ratios of at-sea prices vs. shoreside prices over the 1980 through 1989 time period.

4.3.6.4 Processed Product Prices

The "pink sheets" of the Fishery Market News were employed as a surrogate for processed groundfish prices at the processor for the FIM since other data were not available. Information is now available from the weekly processor reports that more accurately reflects the actual production prices in Alaska (Kinoshita et al, 1992). Information from this source is presently available for 1990 and 1991. A ratio of these prices to ex-vessel prices was established and an average of this ratio is applied to future ex-vessel values to arrive at future groundfish product prices. Similar ratios are developed for crab and salmon and longer time series are available to construct these ratios. Shellfish product price ratios were estimated from product prices contained in Fishery Market News and Seafood Trends, and ex-vessel prices contained in SHELPRIC.XLS. Salmon product price ratios were estimated from ADF&G production leaflets for various year through 1985 subsequent data from Knapp (1992), and ex-vessel values from SHELPRIC.XLS.

4.3.7 Vessel Cost Structure

This group of files contains proforma income and expense statements for the major vessel types operating in Alaska waters. The salmon and herring files are different from the other files since the number of all salmon and most herring participants is fixed by a limited entry program. For all practical purposes this limits the number of vessels involved in the fishery. Table 4.3-13 shows the upper part of SLMNFLT.XLS. This section of the file presents information on the total catch in the management area and landings to the designated community by species, allocation by gear type, and the area and gear type price adjustments.

Table 4.3- 13: SLMNFLT.XLS (1)

SALMON FLEET MODEL						
	Total Catch by Weight			% of Catch by Weight		
	Management Area	Local Area	SEINE	DRIFT	SET	TROLL
King	413,017	109,251	1%	67%	33%	0%
Red	34,928,682	6,777,988	7%	83%	10%	0%
Coho	4,217,712	1,625,955	10%	46%	44%	0%
Pink	59,116,200	10,459,205	86%	13%	1%	0%
Chum	17,098,023	6,444,557	63%	31%	6%	0%
				Adjustment by Area/Gear		
	STATEWIDE	ADJUSTED	S01	S03	S04	S15
Price per Pound	PRICE	AREA PRICE	SEINE	DRIFT	SET	TROLL
King	$2.38	$1.62	$1.67	$1.59	$1.64	$0.00
Red	$1.44	$1.48	$1.48	$1.48	$1.52	$0.00
Coho	$1.21	$0.96	$0.92	$0.97	$0.96	$0.00
Pink	$0.39	$0.36	$0.35	$0.40	$0.39	$0.00
Chum	$0.52	$0.47	$0.47	$0.49	$0.47	$0.00

Table 4.3-14 shows proforma income and expense statements for each type of salmon vessel. Revenues are calculated by applying the forecast prices for each salmon species (with an area adjustment for each management area) by the estimated total catch in each management area calculated in SLMNDELV.XLS, allocating between gear types according to average percent of harvest, and dividing by the number of permits for each gear type fished in 1990 in the management area contained in COMMVESL.XLS.

Expenses are based on fieldwork conducted in 1987 and 1990 for this study and the previous work on the Bering Sea, Braund's work in King Cove (1986), CFEC information on other seine and drift fisheries throughout the state (Muse and Schelle, 1986; Keith, Muse, and Schelle, 1987), and a survey of expenditures of Bristol Bay drift and set gillnet fishermen for the City of Dillingham (Northern Economics, 1988). These estimates shown below are considered to be representative of the gear types throughout the state but these estimates may vary significantly between management areas.

All vessel owners are assumed to operate their vessel. Owners are assumed to make boat payments or contributions to a Capital Construction Fund account for future boat purchases with subsequent reduction in net income.

Table 4.3- 14: SLMNFLT.XLS (2)

	SEINE	DRIFT	SET	TROLL
Market Value of Boat:	$250,000	$80,000	$4,000	$40,000
Crew Size (incl. owner):	5	3	2	1.75
Days Operating	75	75	45	90
Days Fishing	30	30	30	60
Revenues per Vessel	$214,684	$310,700	$70,458	$0
Less Expenses:				
Variable Expenses:				
Vessel & Engine Repair	$7,500	$2,400	$120	$0
Gear Replacement	$3,750	$1,200	$60	$0
Fuel & Lubricants	$4,875	$3,450	$675	$0
Food & Supplies	$5,625	$3,375	$1,350	$0
Bait & Ice	$0	$0	$0	$0
Dues & Fees	$1,000	$600	$100	$0
Transportation	$3,500	$1,500	$1,000	$0
Management	$0	$0	$0	$0
Miscellaneous/Packaging	$500	$400	$362	$0
Crew Shares	$57,171	$93,210	$4,932	$0
Total Variable Costs	$83,921	$106,135	$8,599	$0
Contribution Margin				
Fixed Expenses:				
Insurance	$11,250	$4,050	$515	$0
Boat & Permit Payments	$40,342	$33,056	$5,796	$0
Office/Accounting/Legal	$1,000	$1,000	$200	$0
Miscellaneous	$2,000	$1,300	$300	$0
Total Fixed Expenses	$54,592	$39,406	$6,811	$0
Net Return	$76,171	$165,159	$55,048	$0

The NPFMC recently adopted a moratorium on new entrants into the halibut fisheries and is considering a similar moratorium for crab and groundfish fisheries off Alaska. The number of vessels participating in these fisheries is much larger than the number needed to efficiently harvest the resource and many persons consider these fisheries over-capitalized. The number of trawl, longline, and crab vessels engaged in these fisheries is estimated by use of break-even analysis. This technique was employed in the Bering Sea study and Weise and Burden (1988) published results of a comparable analysis in a prominent trade journal. The technique assumes that the number of vessels in a fishery will increase or decrease so that excess profits or losses are eliminated. The break-even model assumes instantaneous reaction for fleet adjustments although there would be lags of several year in all likelihood. Break-even analyses are prepared for five classes of trawl vessels, three classes of longline vessels, and four classes of crab vessels. Tables 4.3-15 and 4.3-16 provide an example break-even table for a small groundfish trawl vessel.

Table 4.3- 15: TRAWLB-E.XLS (1)

BREAK-EVEN ANALYSIS

FISHERY: GROUNDFISH TRAWL

COMMENTS: UNDER 100 FOOT CONVERTED CRAB BOAT

BREAK-EVEN CALCULATION FACTORS

1. CONSTRUCTION COST (1978)	$800,000	
2. CONSTRUCTION LOAN - 75%	$640,000	
3. CONVERSION COST (1983)	$500,000	
4. CONVERSION LOAN	$375,000	
5. ANNUAL BOAT LOAN PAYMENT	$124,000	(11%, 8 yrs)
6. ANNUAL CONVERSION PAYMENT	$109,000	(14%, 5yrs)
7. CREW SIZE (INCLUDES SKIPPER)	5	
8. CREW SHARE (TOTAL %)	35	
9. DAYS OPERATING	220	
10. DAYS FISHING	155	

11. PROJECTED PRICE/MT	AT SEA	SHORE
POLLOCK	$173	$203
PACIFIC COD	$308	$474
YELLOWFIN SOLE	$176	$409
ATKA MACKEREL	$183	$353
OTHER FLATFISH	$155	$361
POP/ROCKFISH	$282	$421
SABLEFISH	$339	$1,254

12. PROJECTED DELIVERY LOCATION	% AT SEA	% SHORE
POLLOCK	75	25
PACIFIC COD	50	50
YELLOWFIN SOLE	100	0
ATKA MACKEREL	100	0
OTHER FLATFISH	75	25
POP/ROCKFISH	50	50
SABLEFISH	20	80

13. WEIGHTED PRICE/MT (BLENDED SHORE AND SEA PRICES)	
POLLOCK	$180
PACIFIC COD	$391
YELLOWFIN SOLE	$176
ATKA MACKEREL	$183
OTHER FLATFISH	$207
POP/ROCKFISH	$352
SABLEFISH	$1,071

14. CATCH PERCENTAGES	LOCAL AREA	BS/AI AREA
POLLOCK	0.00%	70.38%
PACIFIC COD	90.96%	6.05%
YELLOWFIN SOLE	0.00%	10.04%
ATKA MACKEREL	0.00%	2.54%
OTHER FLATFISH	0.00%	7.85%
POP/ROCKFISH	5.66%	2.99%
SABLEFISH	3.38%	0.15%
TOTAL	100.00%	100.00%

Table 4.3- 16: TRAWLB-E.XLS (2)

15. WEIGHTED AVG. PRICE/MT (ALL SPECIES - ITEMS 13 & 14 COMBINED)

WEIGHTED AVERAGE PRICE/MT	$412	$201

16. DIRECT EXPENSES (RELATED TO SALES)

CREW SHARE	35 % OF AVG. PRICE/MT
MANAGEMENT FEE	2 % OF AVG. PRICE/MT
TOTAL	37 % OF AVG. PRICE/MT

17. GROSS PROFIT MARGIN

WEIGHTED AVERAGE PRICE/MT	$412	$201
LESS: DIRECT EXPENSES	$152	$74
GROSS MARGIN	$260	$127

18. INDIRECT OPERATING EXPENSES

FUEL/OIL	$106,890
GROCERIES	$16,500
VESSEL/MACHINE MAINTENANCE	$80,000
GEAR MAINTENANCE	$75,000
SUPPLIES/EQUIPMENT	$19,000
TRANSPORTATION/FREIGHT	$24,500
INSURANCE-HULL/MACHINERY (6.5%)	$85,000
INSURANCE-P & I @ $7000/MAN	$35,000
OFFICE/UTILITIES	$6,000
ACCOUNTING/LEGAL/CONSULTING	$16,000
DUES AND SUBSCRIP ASSOCIATION FEES	$20,000
RETURN ON INVESTMENT @ 15%	$42,750
LOAN PAYMENTS	$233,000
OTHER	$10,000
TOTAL	$769,640
TOTAL-LESS FUEL/GROCERIES (ADJUSTMENT FOR CREW DEDUCTIONS)	$646,250

19. BREAK-EVEN CALCULATIONS:

	ADJUSTED EXPENSES / GROSS MARGIN	+	FUEL AND FOOD / AVG PRICE/MT
KING COVE	$646,250 / $260	+	$123,390 / $412
GOA	$646,250 / $127	+	$123,390 / $201

	KING COVE		GOA
BREAK-EVEN CATCH (MT) =	2,785		5,702
INCOME =	=	$1,147,447	$1,146,216

	MT	INCOME	MT	INCOME
POLLOCK	0	$0	4,013	$722,340
PACIFIC COD	2,533	$990,532	345	$134,895
YELLOWFIN SO	0	$0	572	$100,672
ATKA MACKERE	0	$0	145	$26,535
OTHER FLOUN	0	$0	446	$92,736
POP/ROCKFISH	158	$55,493	171	$60,192
SABLEFISH	94	$100,763	8	$8,568
TOTALS	2,785	$1,146,789	5,702	$1,145,938

Note: figures may not add due to rounding.

The model assumes that the fleet of vessels for each gear type, with the exception of surimi producers, will catch the different species and species complexes (e.g., rockfish) in the same proportion as the harvest projections (e.g., GRNDHARV.XLS). Competition will cause all of these species to be targeted annually by the total fleet although no individual vessel will harvest all of them. Individual catcher-processors will not produce all of the products shown in the respective tables, but the entire catcher-processor fleet will.

Operating cost data for the trawl, longline, and crab fleets are based upon several surveys of vessel owners and captains (R&M Consultants, Inc., 1986; ResourcEcon, 1987; Alaska Department of Commerce and Economic Development, 1988; Northern Economics, 1988; Weise and Burden, 1988; North Pacific Fisheries Management Council, 1989; A.T. Kearney, 1991, and; Brown, 1992), and information developed from protocols for this study and the Bering Sea study. Additional information incorporated here is derived from conversations with fleet managers, marine architects, major suppliers, and financial statements. This large data base suggests that the estimates used in the break-even models are representative of operating costs for the each class of gear type although estimates for individual vessels may differ significantly from these aggregated figures.

These worksheets are linked with other files so that changes in price, harvest, processing employment in a community, and other changes will affect the number of boats in the fleet. Much of the operating cost data have been also developed to change as vessel operating parameters change.

Longline and crab vessels under 60 feet (18.3 meters) in length are assumed to be primarily salmon fishing boats operating in these fisheries on a part-time basis and costs are allocated to these fisheries based on the amount of time the fisherman is involved in them.

4.3.8 Processor Assessment

The PROCFEAM.XLS file contains two distinct worksheet area for the processing sector. The first section (Tables 4.3-17 and 4.3-18) illustrate the physical flow of product through the plant, tracing values of each species and financial contribution to the plant. Columns B, C, and D are linked to previous worksheets in the model. Subsequent columns are either default values or calculated from other columns. Yield is taken from Recoveries and Yields from Pacific Fish and Shellfish (Crapo, Paust, and Babbitt, 1988). There are a number of product forms available from each species and the form and yield selection was based upon the predominant type as identified in Kinoshita et al (1992). Process cost data was taken from information developed by William Jensen and Hans Radtke for the Alaska Fisheries Economic

Assessment Model in southcentral and southeast Alaska, and subsequent work by Radtke for this study.

Labor requirements for species/products (in finished weight) were obtained during discussions with Western Alaska processing plant managers during field work in 1987 and 1990, and more recent conversations with plant managers in southcentral processing plants. This labor requirement vector is created from interviews with managers from eleven processing plants and, since no plant handles all of these products, most of the estimates are based on four to five data points; the resultant range between the high and low points is large.

Table 4.3- 17: PROCFEAM.XLS (1)

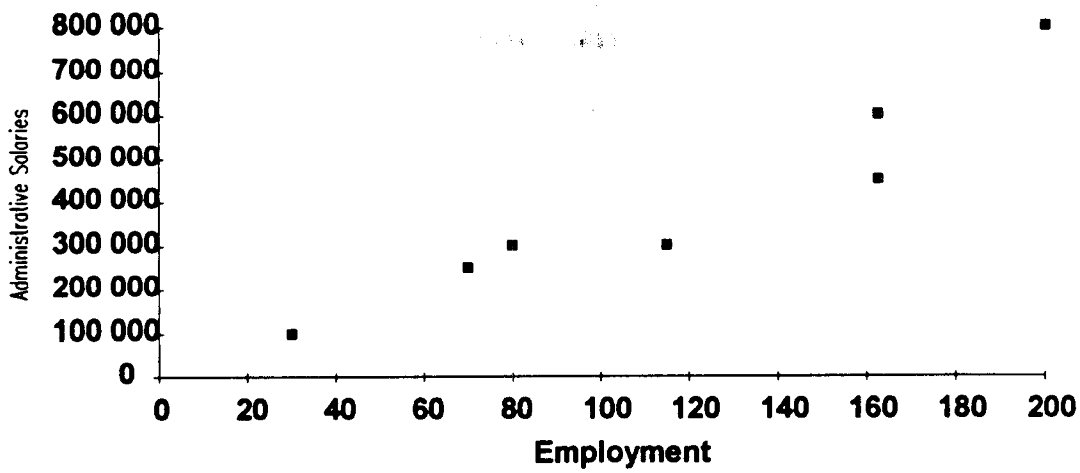
	A	B	C	D	E	F	G	H
1	PROCESSOR FEAM MODEL							
2	Homeport:	KING COVE						
3	Year:	1992						
4								
5			Species					
6		Total Annual	Processed	Price	Assumed	Yield of	Raw	Process
7		Port Landings	in Community	of Raw	Processed	Processed	Product	Labor
8	Species Name	in Pounds	(0=N, 1=Y)	Product	Product	Product	Cost	Cost
9								
10	Gn/Ps Chinook	109,251	1	$1.62	D/H- Off/Fro	72%	$2.36	$0.25
11	Gn/Ps Sockeye	5,693,510	1	$1.48	D/H- Off/Fro	74%	$2.15	$0.25
12	Canned Sockeye	1,084,478	1	$1.48	Canned	67%	$2.38	$0.20
13	Gn/Ps Coho	1,625,955	1	$0.96	D/H- Off/Fro	75%	$1.41	$0.25
14	Gn/Ps Pink	4,183,682	1	$0.36	D/H- Off/Fro	73%	$0.67	$0.25
15	Canned Pink	6,275,523	1	$0.36	Canned	65%	$0.76	$0.20
16	Gn/Ps Chum	6,444,557	1	$0.47	D/H- Off/Fro	74%	$0.80	$0.25
17	Salmon Roe	1,534,608	1	$0.00	Cured	38%	$0.00	$0.30
18	Bait Herring	0	0	$0.18	Frozen	100%	$0.18	$0.10
19	Roe Herring	1,397,666	1	$0.36	Frozen	100%	$0.36	$0.10
20	Pollock (Surimi)	0	0	$0.09	Surimi	18%	$0.51	$0.12
21	Pollock (Fillets)	0	0	$0.09	Fillet	28%	$0.33	$0.30
22	Sablefish	370,047	1	$0.83	Delivered D/H-Off	98%	$0.84	$0.15
23	Rockfish	6,978	0	$0.22	D/H-Off	41%	$0.54	$0.25
24	Pacific Cod	10,878,624	1	$0.24	D/H-Off	63%	$0.38	$0.30
25	Yellowfin Sole	0	0	$0.19	D/H-Off	69%	$0.27	$0.30
26	Greenland Turbot	0	0	$0.34	D/H-Off	74%	$0.45	$0.30
27	Other Flatfish	0	0	$0.16	D/H-Off	74%	$0.22	$0.30
28	Pacific Halibut	830,058	1	$1.58	Delivered Dressed	98%	$1.61	$0.15
29	Other Finfish	0	0	$0.16	D/H - Off	70%	$0.23	$0.30
30	Red King Crab	379,487	1	$4.81	Sections	69%	$6.97	$0.20
31	Blue King Crab	162,499	1	$3.42	Sections	65%	$5.26	$0.20
32	Brown King Crab	191,865	1	$3.22	Sections	69%	$4.67	$0.20
33	Bairdi Tanner Crab	432,425	1	$2.30	Sections	68%	$3.38	$0.25
34	Opilio Tanner Crab	4,373,225	1	$0.75	Sections	68%	$1.10	$0.25
35	Hair Crab	1,035	1	$1.37	Sections	100%	$1.37	$0.25
36	Dungeness Crab	57,035	1	$1.39	Sections	60%	$2.32	$0.25
37	Other Shellfish	0	1	$0.00	Sections	64%	$0.00	$0.25
38								
39	Total Pounds	46,032,507						

Table 4.3- 18: PROCFEAM.XLS(2)

	I	J	K	L	M	N	O	P
5				Variable	Sales	Contrib.		
6	Other	Other	State	Bad	Cost of	Price of	Margin of	Qunatity of
7	Process	Process	Fish	Debt	Process	Process	Process	Product per
8	Costs-a	Costs-b	Taxes	Expense	Product	Product	Product	Labor Hour
9								
10	$0.31	$0.00	$0.053	$0.01	$2.99	$2.84	($0.14)	100
11	$0.31	$0.00	$0.049	$0.01	$2.77	$2.84	$0.06	100
12	$0.40	$0.00	$0.049	$0.02	$3.05	$3.93	$0.89	100
13	$0.31	$0.00	$0.032	$0.01	$2.02	$2.08	$0.07	100
14	$0.31	$0.00	$0.012	$0.01	$1.25	$1.14	($0.11)	100
15	$0.40	$0.00	$0.012	$0.01	$1.38	$1.76	$0.38	100
16	$0.31	$0.00	$0.016	$0.01	$1.39	$1.27	($0.11)	100
17	$0.31	$0.00	$0.000	$0.00	$0.61	$0.00	($0.61)	100
18	$0.25	$0.00	$0.002	$0.00	$0.00	$0.62	$0.00	250
19	$0.25	$0.00	$0.005	$0.00	$0.72	$0.73	$0.00	250
20	$0.33	$0.05	$0.001	$0.01	$0.00	$1.64	$0.00	1000
21	$0.42	$0.00	$0.001	$0.01	$0.00	$1.29	$0.00	200
22	$0.40	$0.00	$0.011	$0.01	$1.42	$2.56	$1.14	150
23	$0.32	$0.00	$0.003	$0.01	$1.12	$1.05	($0.07)	150
24	$0.35	$0.00	$0.003	$0.01	$1.04	$1.06	$0.02	200
25	$0.35	$0.00	$0.002	$0.01	$0.00	$1.33	$0.00	150
26	$0.35	$0.00	$0.004	$0.01	$0.00	$1.33	$0.00	150
27	$0.35	$0.00	$0.002	$0.01	$0.00	$1.33	$0.00	150
28	$0.30	$0.00	$0.021	$0.01	$2.10	$2.33	$0.23	200
29	$0.35	$0.00	$0.002	$0.01	$0.00	$1.36	$0.00	150
30	$0.45	$0.00	$0.063	$0.05	$7.73	$9.24	$1.51	100
31	$0.45	$0.00	$0.044	$0.03	$5.99	$6.57	$0.58	100
32	$0.45	$0.00	$0.042	$0.03	$5.39	$6.19	$0.79	100
33	$0.45	$0.00	$0.030	$0.02	$4.13	$4.94	$0.81	65
34	$0.45	$0.00	$0.010	$0.01	$1.82	$2.27	$0.46	65
35	$0.45	$0.00	$0.018	$0.01	$2.10	$2.74	$0.64	65
36	$0.45	$0.00	$0.018	$0.02	$3.05	$3.00	($0.05)	65
37	$0.45	$0.00	$0.000	$0.00	$0.00	$0.00	$0.00	65

The second part of PROCFEAM.XLS provides an aggregated income statement for all processing plants operating in the community. The Bering Sea study used five different types of processing plants of the seven types identified in Alaska. The variable expenses were a direct function of employment or product, and a review of the fixed expenses revealed that they also could be expressed in according to their relationship to employment or production. Figure 4.3-19 shows the relationship between employment and administrative salaries.

Table 4.3- 19: Relationship of Employment and Administrative Salaries



Not all of the relationships are as closely correlated as employment and administrative salaries. Figure 4.3-20 compares employment with utility costs. The correlation for these variables is much weaker than demonstrated in the previous figure. A review of all the fixed expenses indicated that a linear relationship with employment or production was within the variability in the responses used to construct the different processing plant classes and significantly reduced the complexity of this part of the model.

Table 4.3- 20: Relationship of Employment and Utilities

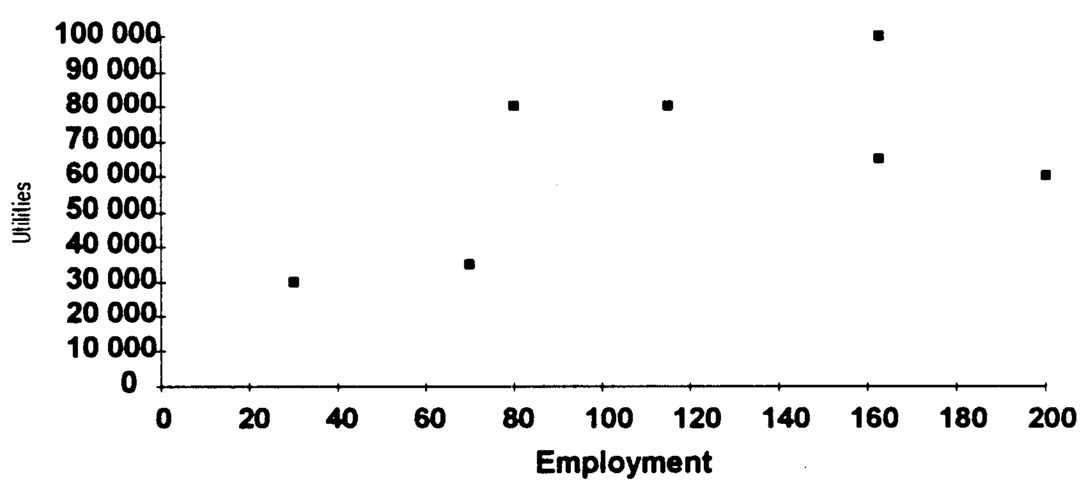


Table 4.3-21 shows the aggregate income statement for the community's processing plants. This information is calculated from information in other worksheets or presented in the product flow matrix of this file.

Table 4.3- 21: Processor Income Statement

	A	B	C	D	E
41	Aggregate Income Statement for Processors				
42	Market Value	$57,611,292			
43	Line Emp.	201	FTE Employees for normal line operations		
44	Support Emp:	74	(37 % of line employees)		Total
45	Total Employment	276			
46					
47	Revenue		$57,611,292		
48					
49	Less Expenses:			Percent	Community
50	Variable Expenses:			Community	Cash Flow
51	Raw Product Cost(3)		$30,644,045		
52	Direct (Processing) Labor		$7,768,814	3%	$233,064
53	Other Variable-packaging (4&5)		$11,086,651	5.0%	$554,333
54	Other Variable Expenses		$0	0.0%	$0
55	Other Variable Expenses		$556,875	0.0%	$0
56	Bad Debt Expense		$288,056	5.0%	$14,403
57	Total Variable Expenses		$50,344,442		$801,800
58					
59	Contribution Margin		$7,266,850		
60					
61	Fixed Expenses:				
62	Administrative/Support Salaries		$3,093,627	3.0%	$92,809
63	Maintenance and Repair		$309,119	5.0%	$15,456
64	Utilities		$134,606	40.0%	$53,842
65	Telephone		$94,903	0.0%	$0
66	Insurance		$91,378	0.0%	$0
67	Taxes		$55,870	50.0%	$27,935
68	Supplies		$81,795	20.0%	$16,359
69	Miscellaneous		$79,639	50.0%	$39,820
70	Loan Payments (2)		$937,597	0.0%	$0
71	Interest Expense (6)		$314,653	0.0%	$0
72	Total Fixed Expenses		$5,193,188		$246,221
73					
74					
75	Net Operating Margin		$2,073,661		$1,048,021
76					
77	(1) Market value is estimated at 100% of sales; assets are 75% of sales.				
78	(2) Loan amounts are assumed to represent 10% of market value				
79	at 10% interest rate for 10 years. Loan payments are used rather				
80	than depreciation because the RAM input requires total income				
81	to the community which is a function of cash flow.				
82	(3) Includes fish tax				
83	(4) Includes general costs of processing - such as equipment rentals,				
84	can costs, and chemical additives.				
85	(5) Costs of packaging are generally borne by the buyer.				
86	Sales price is f.o.b. processing plant.				
87	(6) Interest expenses for pack loans are estimated at 25% of variable				
88	costs for 3 months at 10% interest rate.				

4.3.9 Fleet Assessment

The fleet assessment section is composed of FLTFEAM.XLS AND FLTSUM.XLS. FLTFEAM.XLS summarizes the revenue and expense statements contained in the break-even models and revenue expense statement for the salmon and herring fleets and applies estimates of the percent of those funds spent locally in communities throughout the state to arrive at the total funds spent in the designated community. Survey information for expenditures by factory trawlers in Unalaska/Dutch Harbor is available and since this community is the primary support center for this fleet of vessels, these expenditure percentages are thought to be fairly accurate. Local community expenditures for the other fleets is based on statewide information and can vary significantly between communities. This file provides total expenditures in the community by the fishing fleet, crew shares paid, and income to vessel owners on a resident and non-resident basis.

Table 4.3- 22: FLTFEAM.XLS (1)

	A	B	C	D	E	F
1	VESSEL FEAM MODEL				RESIDENT	NONRESIDE
2	HOME PORT:	KING COVE	TOTAL EXPENDITURES:		$7,805,865	$2,661,847
3	YEAR:	1992	CREW SHARES:		$5,086,680	$1,790,119
4			TOTAL OWNERS INCOM		$7,157,958	$3,613,462
5			TOTAL:		$14,963,824	$6,275,309
6	TRAWL					
7		Catcher Boat		Factory Trawler		
8		Under 100'	100-150'	125-200'	200-250'	300'+
9						
10	Revenue	$1,149,635	$1,638,721	$6,904,000	$9,545,000	$18,485,000
11	Less Expenses:					
12	Variable Expenses:					
13	Vessel & Engine Repair	$80,000	$145,000	$630,000	$520,000	$1,700,000
14	Gear Replacement	$75,000	$103,000	$450,000	$350,000	$1,000,000
15	Fuel & Lubricants	$106,890	$134,162	$702,000	$631,000	$1,728,000
16	Food & Supplies	$35,500	$43,750	$340,000	$245,000	$455,000
17	Packaging	$0	$0	$327,540	$251,190	$815,520
18	Dues & Fees	$20,000	$25,000	$20,000	$20,000	$50,000
19	Transportation	$24,500	$24,500	$780,000	$860,000	$1,200,000
20	Management	$11,845	$32,774	$0	$954,500	$924,250
21	Miscellaneous	$0	$0	$360,000	$394,000	$300,000
22	Crew Shares	$359,186	$520,033	$1,795,040	$3,722,550	$3,512,150
23	Total Variable Costs	$712,921	$1,028,220	$5,404,580	$7,948,240	$11,684,920
24	Contribution Margin	$436,714	$610,501	$1,499,420	$1,596,760	$6,800,080
25	Fixed Expenses:					
26	Insurance	$120,000	$140,000	$212,500	$325,000	$1,100,000
27	Boat & Conversion Payments	$233,000	$324,000	$458,000	$535,000	$2,337,000
28	Office/Accounting/Legal	$22,000	$63,000	$770,000	$120,000	$500,000
29	Miscellaneous	$10,000	$13,000	$100,000	$175,000	$2,200,000
30	Total Fixed Expenses	$385,000	$540,000	$1,540,500	$1,155,000	$6,137,000
31						
32	Net Return	$51,714	$70,501	($41,080)	$441,760	$663,080

Table 4.3- 23: FLTFEAM.XLS (2)

	A	G	H	I	J	K
6	TRAWL			Percent Spent Locally		
7		Catcher Boat		Factory Trawler		
8		Under 100'	100-150'	125-200'	200-250'	300'+
9						
10	Revenue					
11	Less Expenses:					
12	Variable Expenses:					
13	Vessel & Engine Repair	20%	20%	15%	15%	15%
14	Gear Replacement	25%	25%	20%	20%	20%
15	Fuel & Lubricants	85%	85%	91%	91%	91%
16	Food & Supplies	50%	50%	15%	15%	15%
17	Packaging	0%	0%	0%	0%	0%
18	Dues & Fees	0%	0%	0%	0%	0%
19	Transportation	0%	0%	20%	20%	20%
20	Management	0%	0%	0%	0%	0%
21	Miscellaneous	50%	50%	20%	20%	20%
22	Crew Shares	20%	15%	0%	0%	0%
23	Total Variable Costs					
24	Contribution Margin					
25	Fixed Expenses:					
26	Insurance	0%	0%	0%	0%	0%
27	Boat & Conversion Payments	0%	0%	0%	0%	0%
28	Office/Accounting/Legal	20%	15%	2%	2%	2%
29	Miscellaneous	30%	30%	20%	20%	20%

Table 4.3- 24: FLTFEAM.XLS (3)

	A	B	C	D	E	F
1	VESSEL FEAM MODEL				RESIDENT	NONRESIDE
2	HOME PORT:	KING COVE	TOTAL EXPENDITURES:		$7,805,865	$2,661,847
3	YEAR:	1992	CREW SHARES:		$5,086,680	$1,790,119
4			TOTAL OWNERS INCOM		$7,157,958	$3,613,462
5			TOTAL:		$14,963,824	$6,275,309

FLTSUM.XLS incorporates information on the number of vessels, crew size, and resident and nor-resident split to estimate the number of full-time equivalent employment positions provided by the harvest sector. The McDowell Group(1989) developed estimates of the typical time involved in fishing and preparation required for skippers and crew for different fisheries and gear types(e.g., salmon seine, >75' crabber, >5 net tons longliner). These estimates did not correspond directly with the vessel categories used in this study so some adjustment was necessary. These adjusted months of employment were multiplied by the number of crew (including the skipper) employed on the number of vessels calculated in those break-even models and the salmon and herring fleets. Tables 4.3-25 and 4.3-26 show an example of FLTSUM.XLS.

Table 4.3- 25: FLTSUM.XLS(1)

	A	B	C	D	E	F	G
1	FLEET SUMMARY						
2				LOCATION:			
3	PORT:	KING COVE		LONGITU	LATITUDE		
4	YEAR:	1992		162.19	55.03		
5	AREA:	M					
6							
7					NON-	VESSELS OPERATING IN:	
8	NUMBER OF VESSELS			RESIDEN	RESIDEN	LOCAL AREA	ALL ALASKA
9	TRAWL:						
10	<100' TRAWLER			1	0	0	75
11	125-200' TRAWLER			0	0	0	75
12	125-200' FACTORY TRAWLER			0	0	0	27
13	200-250' FACTORY TRAWLER			0	0	0	23
14	250'+ FACTORY TRAWLER			0	0	0	27
15	TOTAL			1	0	0	227

Table 4.3- 26: FLTSUM.XLS (2)

	A	B	C	H	I	J	K	L	M	N
1	FLEET SUMMARY						TOTAL MONTHS			
2							440	870	206	576
3	PORT:	KING COVE					TOTAL FTE			
4	YEAR:	1992					37	73	17	48
5	AREA:	M					SKIPPER	CREW	SKIPPE	CREW
6					MONTHS FISHING		LOCAL AREA FTE EMPLOYMENT			
7				CREW	& PREPARATION		RESIDENT		NON-RESIDENT	
8	NUMBER OF VESSELS			SIZE	SKIPPE	CREW	SKIPPE	CREW	SKIPPE	CREW
9	TRAWL:									
10	<100' TRAWLER			5	5	3	5	12	0	0
11	125-200' TRAWLER			5	12	12	0	0	0	0
12	125-200' FACTORY TRAWLER			40	12	12	0	0	0	0
13	200-250' FACTORY TRAWLER			60	12	12	0	0	0	0
14	250'+ FACTORY TRAWLER			75	12	12	0	0	0	0
15	TOTAL						5	12	0	0

4.3.10 Rural Alaska Model (RAM) Input

The last worksheet in the model summarizes data from PROCFEAM.XLS, FLTFEAM.XLS, and FLTSUM.XLS to provide information required for the Rural Alaska Model (RAM). The RAMINPT.XLS file has been modified since the Bering Sea FIM to include vessel and processing plant expenditures in the local community. Table 4.3-27 presents an example of RAMINPT.XLS.

Table 4.3- 27: RAMINPT.XLS

	A	B	C	D	E	F
1	INPUT TO RAM					
2	Port:	KING COVE				Year
3	Year:	1992				1992
4						
5	Estimated Output Data for RAM Model:					
6	Total Shoreside Employee Income:					$10,862,441
7	Resident					$325,873
8	Non Resident					$10,536,568
9	Total Processor Operating Margin:					$2,073,661
10	Resident					$0
11	Non Resident					$2,073,661
12	Total Crew Income:					$6,876,800
13	Resident					$5,086,680
14	Non Resident					$1,790,119
15	Total Vessel Owner/ Skipper Income:					$10,771,420
16	Resident					$7,157,958
17	Non Resident					$3,613,462
18	Other Community Income					
19	Processing Plant Purchases					$722,147
20	Resident Vessel Purchases					$7,805,865
21	Non Resident Vessel Purchases					$2,661,847
22	Estimated Employment: (FTE)					
23	Shoreside Employees:					276
24	Resident					8
25	Non Resident					267
26	Total Harvest Employment (FTE)					174
27	Vessel Crew:					121
28	Resident					73
29	Non Resident					48
30	Vessel Owners/ Skippers:					54
31	Resident					37
32	Non Resident					17

4.4 Community Forecasts

This section provides the RAMINPT.XLS file for each Gulf of Alaska study community for the years 1992, 2000, and 2010. Model runs were also done for each of the Bering Sea communities previously studied to ensure that the model gave reliable projections for these communities. These projections are not included here.

4.4.1 Cordova

Table 4.4- 1: Cordova Model Projections, 1992-2010

INPUT TO RAM							
Port:	CORDOVA				Year	Year	Year
Year:	1992				1992	2000	2010
Estimated Output Data for RAM Model:							
Total Shoreside Employee Income:					$4,082,131	$8,321,649	$8,150,743
Resident					$621,532	$249,649	$244,522
Non Resident					$3,460,600	$8,072,000	$7,906,221
Total Processor Operating Margin:					($145,330)	$4,655,736	$4,578,098
Resident					$0	$0	$0
Non Resident					($145,330)	$4,655,736	$4,578,098
Total Crew Income:					$7,596,415	$10,751,586	$10,559,570
Resident					$6,816,106	$10,224,166	$10,053,284
Non Resident					$780,309	$527,421	$506,286
Total Vessel Owner/Skipper Income:					($6,999,419)	$4,746,535	$4,343,132
Resident					($7,292,221)	$4,440,528	$4,052,091
Non Resident					$292,802	$306,007	$291,041
Other Community Income							
Processing Plant Purchases					$399,618	$585,229	$573,838
Resident Vessel Purchases					$16,255,910	$19,219,237	$19,041,654
Non Resident Vessel Purchases					$1,345,265	$886,878	$853,977
Estimated Employment:							
Shoreside Employees:					148	225	221
Resident					4	7	7
Non Resident					144	219	214
Total Harvest Employment					516	502	501
Vessel Crew:					316	309	308
Resident					288	288	288
Non Resident					28	21	20
Vessel Owners/Skippers:					200	193	192
Resident					178	178	178
Non Resident					21	14	14

4.4.2 Homer

Table 4.4- 2: Homer Model Projections, 1992-2010

INPUT TO RAM							
Port:	HOMER				Year	Year	Year
Year:	1992				1992	2000	2010
Estimated Output Data for RAM Model:							
Total Shoreside Employee Income:					$8,159,139	$8,457,318	$8,221,244
Resident					$244,774	$253,720	$246,637
Non Resident					$7,914,365	$8,203,599	$7,974,607
Total Processor Operating Margin:					$485,510	$192,987	$157,802
Resident					$0	$0	$0
Non Resident					$485,510	$192,987	$157,802
Total Crew Income:					$14,814,961	$14,338,856	$14,168,206
Resident					$10,928,774	$10,797,280	$10,729,145
Non Resident					$3,886,188	$3,541,577	$3,439,061
Total Vessel Owner/Skipper Income:					$13,259,305	$11,267,123	$10,715,134
Resident					$4,675,789	$4,368,241	$4,208,665
Non Resident					$8,583,515	$6,898,881	$6,506,469
Other Community Income							
Processing Plant Purchases					$555,532	$568,605	$551,941
Resident Vessel Purchases					$28,119,427	$27,978,942	$27,907,341
Non Resident Vessel Purchases					$6,653,754	$6,421,118	$6,309,770
Estimated Employment:							
Shoreside Employees:					188	195	190
Resident					6	6	6
Non Resident					183	189	184
Total Harvest Employment					693	709	709
Vessel Crew:					416	427	427
Resident					276	276	276
Non Resident					140	151	151
Vessel Owners/Skippers:					277	282	282
Resident					131	131	131
Non Resident					145	151	151

4.4.3 Kenai

Table 4.4- 3: Kenai Model Projections, 1992-2010

INPUT TO RAM						
Port:	KENAI			Year	Year	Year
Year:	1992			1992	2000	2010
Estimated Output Data for RAM Model:						
Total Shoreside Employee Income:				$14,652,349	$14,327,039	$13,915,847
Resident				$439,570	$429,811	$417,475
Non Resident				$14,212,779	$13,897,228	$13,498,372
Total Processor Operating Margin:				$2,354,494	$3,759,186	$3,636,994
Resident				$0	$0	$0
Non Resident				$2,354,494	$3,759,186	$3,636,994
Total Crew Income:				$18,169,213	$16,735,758	$16,282,729
Resident				$4,642,095	$4,401,286	$4,334,679
Non Resident				$13,527,118	$12,334,471	$11,948,050
Total Vessel Owner/Skipper Income:				$25,872,668	$20,250,216	$18,714,143
Resident				$4,454,607	$3,720,095	$3,524,856
Non Resident				$21,418,061	$16,530,121	$15,189,287
Other Community Income						
Processing Plant Purchases				$971,222	$964,357	$937,689
Resident Vessel Purchases				$10,716,192	$10,458,498	$10,387,384
Non Resident Vessel Purchases				$23,261,238	$22,195,023	$21,794,753
Estimated Employment:						
Shoreside Employees:				384	383	372
Resident				12	11	11
Non Resident				372	371	360
Total Harvest Employment				1,077	1,104	1,105
Vessel Crew:				576	595	596
Resident				94	94	94
Non Resident				483	501	502
Vessel Owners/Skippers:				501	509	510
Resident				72	72	72
Non Resident				429	438	438

4.4.4 King Cove

Table 4.4- 4: King Cove Model Projections, 1992-2010

INPUT TO RAM							
Port:	KING COVE				Year	Year	Year
Year:	1992				1992	2000	2010
Estimated Output Data for RAM Model:							
Total Shoreside Employee Income:					$6,881,657	$10,862,441	$10,641,487
Resident					$1,018,587	$325,873	$319,245
Non Resident					$5,863,070	$10,536,568	$10,322,243
Total Processor Operating Margin:					$1,934,126	$2,091,594	$2,093,936
Resident					$0	$0	$0
Non Resident					$1,934,126	$2,091,594	$2,093,936
Total Crew Income:					$6,043,270	$6,875,047	$6,713,215
Resident					$3,982,341	$5,085,235	$4,958,577
Non Resident					$2,060,929	$1,789,812	$1,754,639
Total Vessel Owner/Skipper Income:					$8,191,769	$10,759,772	$10,413,237
Resident					$4,409,519	$7,154,465	$6,862,829
Non Resident					$3,782,250	$3,605,307	$3,550,407
Other Community Income							
Processing Plant Purchases					$624,909	$722,147	$708,413
Resident Vessel Purchases					$6,674,675	$7,804,421	$7,672,401
Non Resident Vessel Purchases					$3,161,113	$2,665,493	$2,631,786
Estimated Employment:							
Shoreside Employees:					241	276	270
Resident					7	8	8
Non Resident					234	267	262
Total Harvest Employment					182	175	176
Vessel Crew:					127	121	121
Resident					73	73	73
Non Resident					54	49	49
Vessel Owners/Skippers:					55	54	54
Resident					37	37	37
Non Resident					18	17	18

4.4.5 Kodiak

Table 4.4- 5: Kodiak Model Projections, 1992-2010

INPUT TO RAM							
Port:	KODIAK				Year	Year	Year
Year:	1992				1992	2000	2010
Estimated Output Data for RAM Model:							
Total Shoreside Employee Income:					$65,023,564	$63,405,529	$62,607,533
Resident					$1,950,707	$1,902,166	$3,130,377
Non Resident					$63,072,857	$61,503,363	$59,477,157
Total Processor Operating Margin:					$17,759,893	$14,645,590	$14,433,921
Resident					$0	$0	$0
Non Resident					$17,759,893	$14,645,590	$14,433,921
Total Crew Income:					$23,852,178	$26,979,029	$26,630,700
Resident					$17,435,992	$18,388,702	$18,280,769
Non Resident					$6,416,186	$8,590,328	$8,349,930
Total Vessel Owner/Skipper Income:					$2,993,636	$11,707,262	$10,455,937
Resident					$8,408,453	$10,904,387	$10,502,811
Non Resident					($5,414,817)	$802,874	($46,874)
Other Community Income							
Processing Plant Purchases					$4,269,327	$4,251,288	$4,193,383
Resident Vessel Purchases					$46,649,832	$47,636,372	$47,521,739
Non Resident Vessel Purchases					$14,652,526	$16,524,842	$16,286,962
Estimated Employment:							
Shoreside Employees:					1,352	1,397	1,377
Resident					41	42	69
Non Resident					1,312	1,355	1,308
Total Harvest Employment					1,739	1,717	1,719
Vessel Crew:					1,246	1,230	1,231
Resident					555	555	555
Non Resident					691	675	676
Vessel Owners/Skippers:					493	487	487
Resident					234	234	234
Non Resident					260	253	254

4.4.6 Seward

Table 4.4- 6: Seward Model Projections, 1992-2010

INPUT TO RAM				
Port:	SEWARD	Year	Year	Year
Year:	1992	1992	2000	2010
Estimated Output Data for RAM Model:				
Total Shoreside Employee Income:		$7,582,951	$10,026,754	$9,785,428
Resident		$227,489	$300,803	$489,271
Non Resident		$7,355,462	$9,725,951	$9,296,156
Total Processor Operating Margin:		($315,237)	($1,320,747)	($1,303,919)
Resident		$0	$0	$0
Non Resident		($315,237)	($1,320,747)	($1,303,919)
Total Crew Income:		$6,676,300	$7,091,306	$6,906,458
Resident		$2,249,465	$2,247,792	$2,230,652
Non Resident		$4,426,836	$4,843,515	$4,675,806
Total Vessel Owner/Skipper Income:		$7,924,030	$5,799,804	$5,267,161
Resident		$390,806	$395,856	$356,417
Non Resident		$7,533,224	$5,403,948	$4,910,744
Other Community Income				
Processing Plant Purchases		$494,362	$635,534	$620,032
Resident Vessel Purchases		$6,066,204	$5,951,377	$5,933,491
Non Resident Vessel Purchases		$7,546,412	$9,009,505	$8,822,366
Estimated Employment: (FTE)				
Shoreside Employees:		188	252	246
Resident		6	8	12
Non Resident		183	245	234
Total Harvest Employment (FTE)		528	516	516
Vessel Crew:		346	299	299
Resident		251	79	79
Non Resident		95	219	219
Vessel Owners/Skippers:		181	218	217
Resident		34	31	31
Non Resident		148	187	187

4.4.7 Unalaska

Table 4.4- 7: Unalaska Model Projections, 1992-2010

INPUT TO RAM							
Port:	UNALASKA				Year	Year	Year
Year:	1992				1992	2000	2010
Estimated Output Data for RAM Model:							
Total Shoreside Employee Income:					$78,564,377	$90,837,199	$91,031,277
Resident					$7,856,438	$2,725,116	$4,551,564
Non Resident					$70,707,939	$88,112,083	$86,479,713
Total Processor Operating Margin:					$33,463,012	$37,319,445	$37,344,644
Resident					$0	$0	$0
Non Resident					$33,463,012	$37,319,445	$37,344,644
Total Crew Income:					$21,247,044	$21,122,059	$21,249,957
Resident					$1,940,110	$1,936,825	$1,936,825
Non Resident					$19,306,934	$19,185,234	$19,313,131
Total Vessel Owner/Skipper Income:					$34,182,690	$33,996,874	$34,164,411
Resident					$1,105,905	$1,081,989	$1,081,989
Non Resident					$33,076,785	$32,914,885	$33,082,422
Other Community Income							
Processing Plant Purchases					$5,682,878	$6,640,746	$6,659,490
Resident Vessel Purchases					$5,119,062	$5,115,762	$5,115,762
Non Resident Vessel Purchases					$146,712,025	$147,391,535	$147,749,602
Estimated Employment: (FTE)							
Shoreside Employees:					2,056	2,407	2,410
Resident					206	72	120
Non Resident					1,850	2,334	2,289
Total Harvest Employment (FTE)					4,648	4,672	4,676
Vessel Crew:					4,426	4,450	4,453
Resident					55	55	55
Non Resident					4,371	4,395	4,397
Vessel Owners/Skippers:					222	222	223
Resident					16	16	16
Non Resident					206	206	207

4.4.8 Yakutat

Table 4.4- 8: Yakutat Model Projections, 1992-2010

INPUT TO RAM							
Port:	YAKUTAT				Year	Year	Year
Year:	1992				1992	2000	2010
Estimated Output Data for RAM Model:							
Total Shoreside Employee Income:					$939,979	$1,339,046	$1,336,870
Resident					$93,998	$40,171	$66,844
Non Resident					$845,981	$1,298,875	$1,270,027
Total Processor Operating Margin:					$786,301	$720,119	$720,947
Resident					$0	$0	$0
Non Resident					$786,301	$720,119	$720,947
Total Crew Income:					$871,443	$869,271	$868,761
Resident					$857,043	$856,225	$855,734
Non Resident					$14,400	$13,047	$13,027
Total Vessel Owner/Skipper Income:					$71,097	$58,096	$52,056
Resident					$61,215	$51,227	$45,230
Non Resident					$9,882	$6,869	$6,826
Other Community Income							
Processing Plant Purchases					$64,254	$88,639	$88,433
Resident Vessel Purchases					$2,737,858	$2,736,820	$2,736,197
Non Resident Vessel Purchases					$26,655	$25,302	$25,282
Estimated Employment: (FTE)							
Shoreside Employees:					19	29	29
Resident					2	1	1
Non Resident					17	28	27
Total Harvest Employment (FTE)					99	99	99
Vessel Crew:					50	50	50
Resident					50	50	50
Non Resident					1	1	1
Vessel Owners/Skippers:					48	48	48
Resident					47	47	47
Non Resident					1	1	1

4.5 Discussion of Model Results

There are several sources of data that can be used to evaluate the model results. These include Department of Labor statistics on employment, National Marine Fisheries Service data on pounds landed by port, and other studies that have been completed for the study communities or Alaska fisheries.

Because of the extensive literature base available on King Cove that community was used to initially develop the model and the model results were compared with known information from these other studies. Braund (1986) reported that the Peter Pan plant in King Cove processed between 30 and 44.4 million pounds of fish and shellfish annually between 1979 and 1985. The model predicted about 45 million pounds in 1992. The higher level of pounds processed is reasonable given that Peter Pan is now processing groundfish in significant quantities and did not do so in earlier years.

The model calculated 241 full-time equivalent (FTE) employment positions for 1992. The Department of Labor (DOL) suggested that number is very close to the actual average employment for the 12 month period ending with first quarter of 1992.

Griffin (1992) provided information that the total pounds of raw product delivered to Unalaska shore plants in 1991 was 520 million pounds of groundfish and 75 million pounds of shellfish. The model calculated 570 million pounds of groundfish and 80 million pounds of shellfish in 1992. The new Westward Seafoods plant was not operating at full capacity during the early part of 1991 so it is likely that more seafood was processed in Unalaska/Dutch Harbor during 1992.

The model calculated 2,055 FTE seafood processing employees in 1992 and the DOL data indicate average employment of about 1,860 employees over the 12 month period ending with the third quarter of 1991. Opening of the Westward Seafood plant in 1991 would increase the average employment figures for 1991 and 1992.

The model calculated non-resident vessel expenditures in Unalaska of $146 million in 1992. The factory trawler fleet was reported to have spent over $117 million in Alaska in 1990 (A.T. Kearney, 1991). Most of these expenditures would have occurred in Unalaska/Dutch Harbor. It is reasonable to expect that expenditures by non-resident trawlers, longliners, and crabbers would result in total vessel expenditures of the level calculated by the model.

Kodiak's average annual employment in 1991 was approximately 2,000 persons. The model only calculated 1,350. After the model runs were completed the DOL provided information that the employment estimates used in DATAINPT.XLS for salmon processing in Kodiak were too low by about 600 persons. Time did not permit the model to be rerun for Kodiak but it is anticipated that this change would increase the total FTE employment to correspond to DOL data.

The results for Kodiak suggest that the model is sensitive to underestimating employment in a community. However, the model calculates FTE employment levels in St. George and St. Paul that are larger than present employment, even with competition from floating processors in close proximity to the communities. This suggests that the model is sensitive to employment estimates in areas of the state where competition between a number of ports is very keen and where the ports are located in relatively close proximity (within the slope indicated by the travel distance equation). In those areas with few ports and where fisheries resources are located at a distance from other competing ports, processing plants are capable of attracting additional landings and the model anticipates their expansion.

The model appears to respond satisfactorily to changes in harvest volumes. For example, statewide pink salmon harvests in 1992 were below recent catch levels and are about 40 to 45 percent of the forecast long term harvest levels. In Cordova, which is a major processing center for pink salmon in Prince William Sound, the model shows slight losses to the processing plants, reductions of one-third in processing plant employment levels, and reduction in processing plant expenditures in the local community. Employment in the harvest sector remains relatively constant although owners of the vessels incur losses.

Increased ex-vessel prices translate into increased profits for vessel owners and marginally increased profits for processing plant operators. Employment levels remain relatively constant with increased prices.

GLOSSARY

ADF&G	Alaska Department of Fish & Game
COMMVESL.XLS	Excel file containing information on community vessel characteristics.
DATAINPT.XLS	The primary Excel input file where the user specifies community and year of interest. Some default values may also be modified.
FEAM	Fisheries Economic Assessment Model developed by William Jensen and Hans Radtke.
FIM	Fishing industry model
FLTFEAM.XLS	Excel file containing a modified version of that portion of the FEAM spreadsheet model dealing with the fishing fleet.
FLTSUM.XLS	Excel file summarizing data from FLTFEAM.XLS.
GEARHARV.XLS	Excel file that allocates harvest by species among gear types based on historic catch percentages.
Gn/Ps	Gillnet/Purse Seine
GRNDHARV.XLS	Excel file containing harvest projections by groundfish species.
HALIMTRX.XLS	Excel file containing distance between mid-points of halibut management areas and communities, and historic harvest data by management area.
HERRBLK.XLS	Excel file showing herring harvest in tons or percentage by statistical area.
HERRDELV.XLS	Excel file showing estimates of herring landings by community.
HERRFLT.XLS	Excel file showing pro forma income statements for the herring fleet.
HERRHARV.XLS	Excel file containing harvest projections for herring.
HERRMTRX.XLS	Excel file containing distance between herring statistical areas and communities, a distance coefficient, and the percent of herring harvest from each statistical area delivered to each community.
IFQ	Individual fishing quota
LINEBLK.XLS	Excel file showing longline harvest by species by statistical area.
LINEDELV.XLS	Excel file showing estimates of longline deliveries by species to each community.

LINMATRX.XLS	Excel file containing distance between groundfish statistical areas and communities, a distance çoefficient for the longline fleet, and the percent of longline harvest from each statistical area delivered to each community.
LLPRICE.XLS	Excel file containing historic longline caught groundfish price data and projections.
LONGLB-E.XLS	Excel file that contains pro forma income statements for several vessel sizes and calculates the number of longline vessels that can be supported by harvest levels and prices in the subject year.
MMS	Minerals Management Service
NMFS	National Marine Fisheries Service
NPFMC	North Pacific Fisheries Management Council
PACFIN	Pacific Coast Fisheries Information Network
PORTCODE.XLS	Excel file containg latitude and longitude for each community plus the samon management area the community is located in.
PROCFEAM.XLS	Excel file containing a modified version of that portion of the FEAM spreadsheet model dealing with processors. The file calculates a revenue and expense statement for the processing sector.
PROCPRIC.XLS	Excel file containing historic processor prices and projections.
RAM	Rural Alaska Model (RAM) developed by the Institute of Social and Economic Research.
RAMINPUT.XLS	The Excel file containing the input for the RAM. This information is the primary output of the fishing industry model.
SALMNHRV.XLS	Excel file containing salmon harvest projections.
SHELB-E.XLS	Excel file that contains pro forma income statements for several vessel sizes and calculates the number of shellfish vessels that can be supported by harvest levels and prices in the subject year.
SHELBLK.XLS	Excel file showing harvest by shellfish species by statistical area.
SHELDELV.XLS	Excel file showing estimates of shellfish landings by species to each community.
SHELHARV.XLS	Excel file containing shellfish harvest projections.

SHELMTRX.XLS	Excel file containing distance between groundfish statistical areas and communities, a distance coefficient for the shellfish fleet, and the percent of shellfish harvest from each statistical area delivered to each community.
SHELPRIC.XLS	Excel file containing historic shellfish prices and projections.
SALMNPRC.XLS	Excel file containing historic salmon prices and projections.
SLMNBLK.XLS	Excel file showing harvest by salmon species by statistical area.
SLMNDELV.XLS	Excel file with estimates of shellfish landings by species to each community.
SLMNFLT.XLS	Excel file showing pro forma income statements for the herring fleet.
SLMNMTRX.XLS	Excel file containing distance between salmon statistical areas and communities, a distance coefficient for the salmon fleet, and the percent of salmon harvest from each statistical area delivered to each community.
TRWLB-E.XLS	Excel file that contains pro forma income statements for several vessel sizes and calculates the number of trawler vessels that can be supported by harvest levels and prices in the subject year.
TRWLBLK.XLS	Excel file showing harvest by groundfish species by statistical area.
TRWLDELV.XLS	Excel file with estimates of groundfish landings by species to each community.
TRWMATRX.XLS	Excel file containing distance between groundfish statistical areas and communities, a distance coefficient for the trawl fleet, and the percent of trawl harvest from each statistical area delivered to each community.
TRWLPRIC.XLS	Excel file containing historic trawl caught groundfish prices and projections.
YEN.XLS	Excel file containing historic Japanese Yen/U.S. Dollar exchange rates and projections.

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