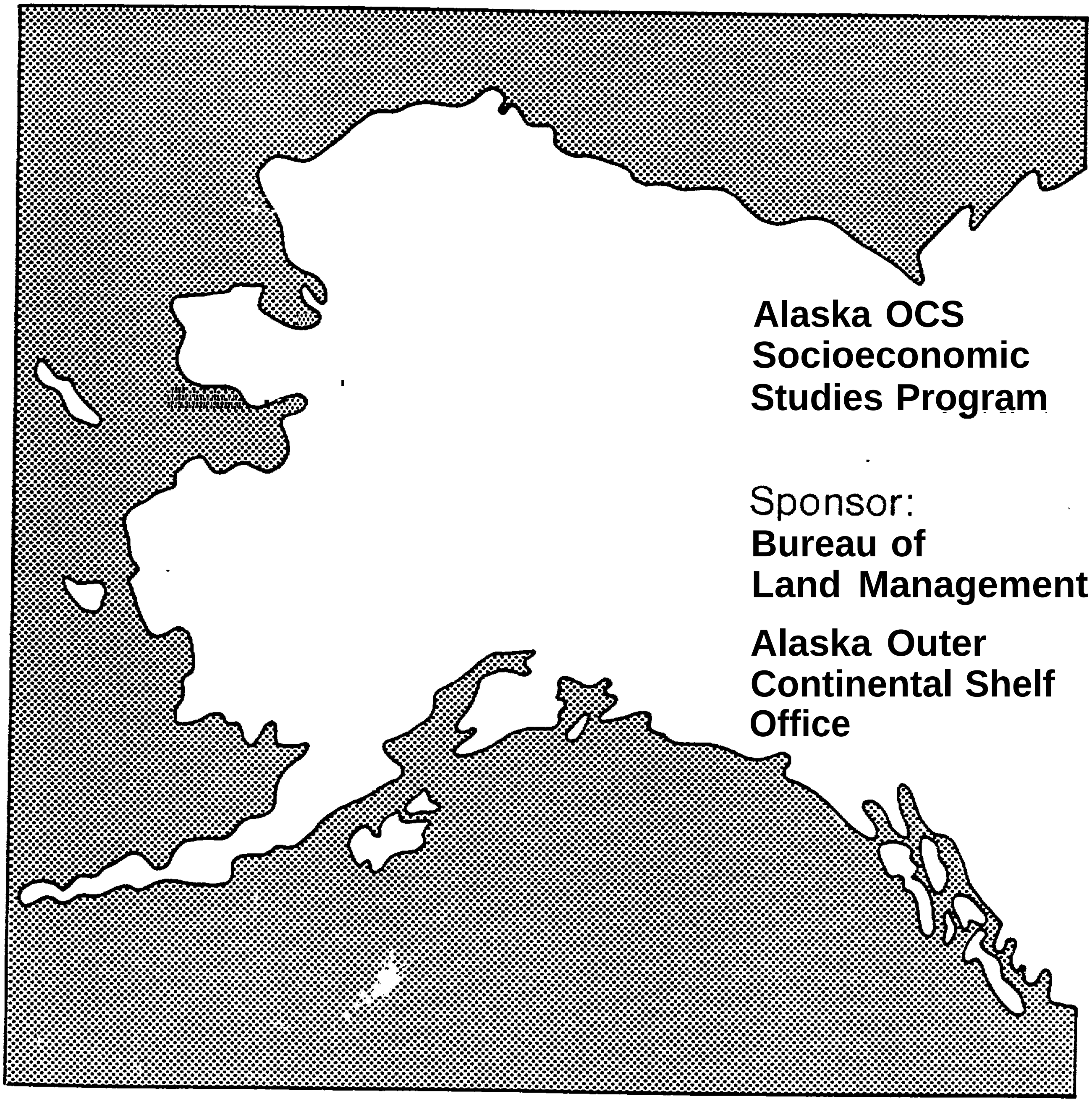
Technical Report

Number 44



Alaska OCS Socioeconomic Studies Program

Sponsor:
Bureau of Land Management

Alaska Outer Continental Shelf Office

Lower Cook Inlet
Petroleum Development Scenarios
Commercial Fishing Industry Analysis

The United States Department of the Interior was designated by the Outer Continental Shelf (OCS) Lands Act of 1953 to carry out the majority of the Act's provisions for administering the mineral leasing and development of offshore areas of the United States under federal jurisdiction. Within the Department, the Bureau of Land Management (BLM) has the responsibility to meet requirements of the National Environmental Policy Act of 1969 (NEPA) as well as other legislation and regulations dealing with the effects of offshore development. In Alaska, unique cultural differences and climatic conditions create a need for developing additional socioeconomic and environmental information to improve OCS decision making at all governmental levels. In fulfillment of its federal responsibilities and with an awareness of these additional information needs, the BLM has initiated several investigative programs, one of which is the Alaska OCS Socioeconomic Studies Program (SESP).

The Alaska OCS Socioeconomic Studies Program is a multi-year research effort which attempts to predict and evaluate the effects of Alaska OCS Petroleum Development upon the physical, social, and economic environments within the state. The overall methodology is divided into three broad research components. The first component identifies an alternative set of assumptions regarding the location, the nature, and the timing of future petroleum events and related activities. In this component, the program takes into account the particular needs of the petroleum industry and projects the human, technological, economic, and environmental offshore and onshore development requirements of the regional petroleum industry.

The second component focuses on data gathering that identifies those quantifiable and- qualifiable facts by which OCS-induced changes can be assessed. The critical community and regional components are identified and evaluated. Current endogenous and exogenous sources of change and functional organization among different sectors of community and regional life are analyzed. Susceptible community relationships, values, activities, and processes also are included.

The third research component focuses on an evaluation of the changes that could occur due to the potential oil and gas development. Impact evaluation concentrates on an analysis of the impacts at the statewide, regional, and local level.

In general, program products are sequentially arranged in accordance with BLM's proposed OCS lease sale schedule, so that information is timely" to decisionmaking. Reports are available through the National Technical Information Service, and the BLM has a limited number of copies available through the Alaska OCS Office. Inquiries for information should be directed to: Program Coordinator (COAR), Socioeconomic Studies Program, Alaska Ocs Office, P. O. Box 1159, Anchorage, Alaska 99510.

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ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM

LOWER COOK INLET PETROLEUM DEVELOPMENT SCENARIOS:

COMMERCIAL FISHING INDUSTRY ANALYSIS

PREPARED FOR

BUREAU OF LAND MANAGEMENT
ALASKA OUTER CONTINENTAL SHELF OFFICE

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NOTICE

ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM
LOWER COOK INLET PETROLEUM DEVELOPMENT SCENARIOS:
COMMERCIAL FISHING INDUSTRY ANALYSIS

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July, 1980

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I. INTRODUCTION

This report is a product of the Alaska Outer Continental Shelf Socio-economic Studies Program. The Alaska Outer Continental Shelf Office of the Bureau of Land Management has sponsored the Socioeconomic Studies Program (SESP) in an attempt to forecast and analyze potential impacts and changes likely to occur at the state, regional, and community levels as a result of proposed Outer Continental Shelf (OCS) lease sales in OCS areas adjacent to Alaska. The SESP has completed studies for the Beaufort Sea, the Northern and Western Gulf of Alaska, and it is conducting studies for the Lower Cook Inlet and Western Alaska. The subject of this report is the potential interaction of the commercial fishing industry and the OCS oil and gas industry that is likely to occur as a result of the proposed Lower Cook Inlet Lease Sale Number 60. This lease sale is scheduled to take place in August, 1981.

General Objective and Methodology

The objective of this study is to increase our understanding of the potential relationship between these industries and to project the potential impacts on the commercial fishing industry that may occur as a result of the proposed OCS lease sale. The potential impacts on the commercial fishing industry are of particular importance because the commercial fishing industry has been a major source of employment and income in the communities adjacent to the proposed lease sale area and because in the absence of adverse impacts, the commercial fishing industry is expected to be a source of economic growth for these communities. The factors that are expected to stimulate the growth of the industry include: (1) the Fisheries Conservation and Management Act of 1976 in which the United States claimed the right to fishery resources within 200 miles of its coastline, (2) improving fishery resource management, rehabilitation, and/or enhancement programs, and (3) generally favorable long-term market conditions.

The methodology used to meet this objective is as follows:

- The history and current trends of the Cook Inlet-Shelikof Strait commercial fishing industry were documented and examined to develop a basis for projecting fishery development and potential interaction with the oil industry.

- Methods were developed and used to forecast the level of commercial fishing industry activity in the absence of OCS oil activity pursuant to the proposed lease sale.

- The nature and magnitude of projected activities of the commercial fishing and oil industries were analyzed to determine the potential impacts of the proposed lease sale.

The projections of commercial fishing industry activity in the absence of OCS activity, that is, the non-OCS case projections, serve two purposes. They provide a measure of the importance of the commercial fishing industry which may be jeopardized by OCS activity, and they provide a development scenario of the commercial fishing industry that together with the OCS petroleum development scenarios is used to analyze the potential impacts of the proposed lease sale.

The SESP impact evaluation process is divided into three parts: preparation of petroleum development scenarios, analysis of statewide and regional impacts, and analysis of community impacts. The scenarios presented in Technical Report Number 43, Lower Cook Inlet and Shelikof Strait Petroleum Development Scenarios, are the oil and gas development hypotheses driving the impact analysis. Four scenarios of different magnitudes were prepared for the proposed lease sale. One scenario was constructed for each of three U.S. Geological Survey (USGS) resource estimates and the fourth was constructed assuming that exploration occurs but that commercial quantities of gas and/or oil are not found. The petroleum development scenarios provide a range of potential direct employment and equipment characteristics together with the hypothesized timing and location of both in a region. The latter two parts of the evaluation process are dependent on the petroleum development scenarios and are themselves interdependent.

The studies that are summarized in the following reports and in Technical Report Number 43 were used in forecasting the development of the commercial fishing industry and in analyzing potential impacts:

- Technical Report Number 42
  Lower Cook Inlet
  Petroleum Development Scenarios
  Economic and Demographic Analysis

- Technical Report Number 45
  Lower Cook Inlet
  Petroleum Development Scenarios
  Transportation Systems Analysis

- Technical Report Number 46
  Lower Cook Inlet
  Petroleum Development Scenarios
  Local Socioeconomic Systems Analysis

These studies hypothesize: (1) the OCS petroleum activity that may occur, (2) economic and demographic conditions, (3) the nature of the transportation system that will serve and interact with the commercial fishing industry, and (4) the availability of the infrastructure upon which the industry is dependent. In short, these studies project many of the characteristics of the environment in which the commercial fishing industry may operate and which affects the development of the fisheries.

Scope

The Lower Cook Inlet and Shelikof Strait OCS petroleum development scenarios constructed in Technical Paper Number 43 identify Kenai, Homer, and the western side of Afognak Island as potential sites for onshore OCS activity and identify adjacent areas of the Lower Cook Inlet and Shelikof Strait as potential areas of OCS ocean space use associated with the proposed lease sale. The identified areas of ocean space use comprise the Cook Inlet Management Area and the western portion of the

Kodiak Management Area (see Figure 1.1). The focus of this study, therefore, is on the commercial fishing industries of Cook Inlet and Shelkof Strait.

The Cook Inlet commercial fishing industry is defined as the processing activities which occur on the Kenai Peninsula and in the Anchorage area, and the harvesting activities which occur in the Cook Inlet Management Area. This definition includes some harvesting activity that is not closely associated with the communities of Cook Inlet and excludes some harvesting activity that is. The reason for this is that fishermen and fishing boats are extremely mobile; fishermen and boats from Cook Inlet participate in both near and distant fisheries and non-local fishermen and boats participate in Cook Inlet Management Area fisheries. This is a common problem when an area-specific fishing industry is defined since the data required for a more precise definition are typically not available.

The Shelikof Strait commercial fishing industry is defined as the harvesting activities in Shelikof Strait and the proportion of Kodiak Management Area processing activities generated by the Shelikof Strait harvest. The processing activities are not limited to those which occur in the communities of Shelikof Strait since the Shelikof Strait harvest is primarily processed in the City of Kodiak. The exceptions are that limited salmon processing does occur in Shelikof Strait and part of the Shelikof Strait harvest is processed outside the Kodiak Management Area. This definition suggests that with respect to processing activities, the Shelikof Strait commercial fishing industry is an almost nondistinguish-

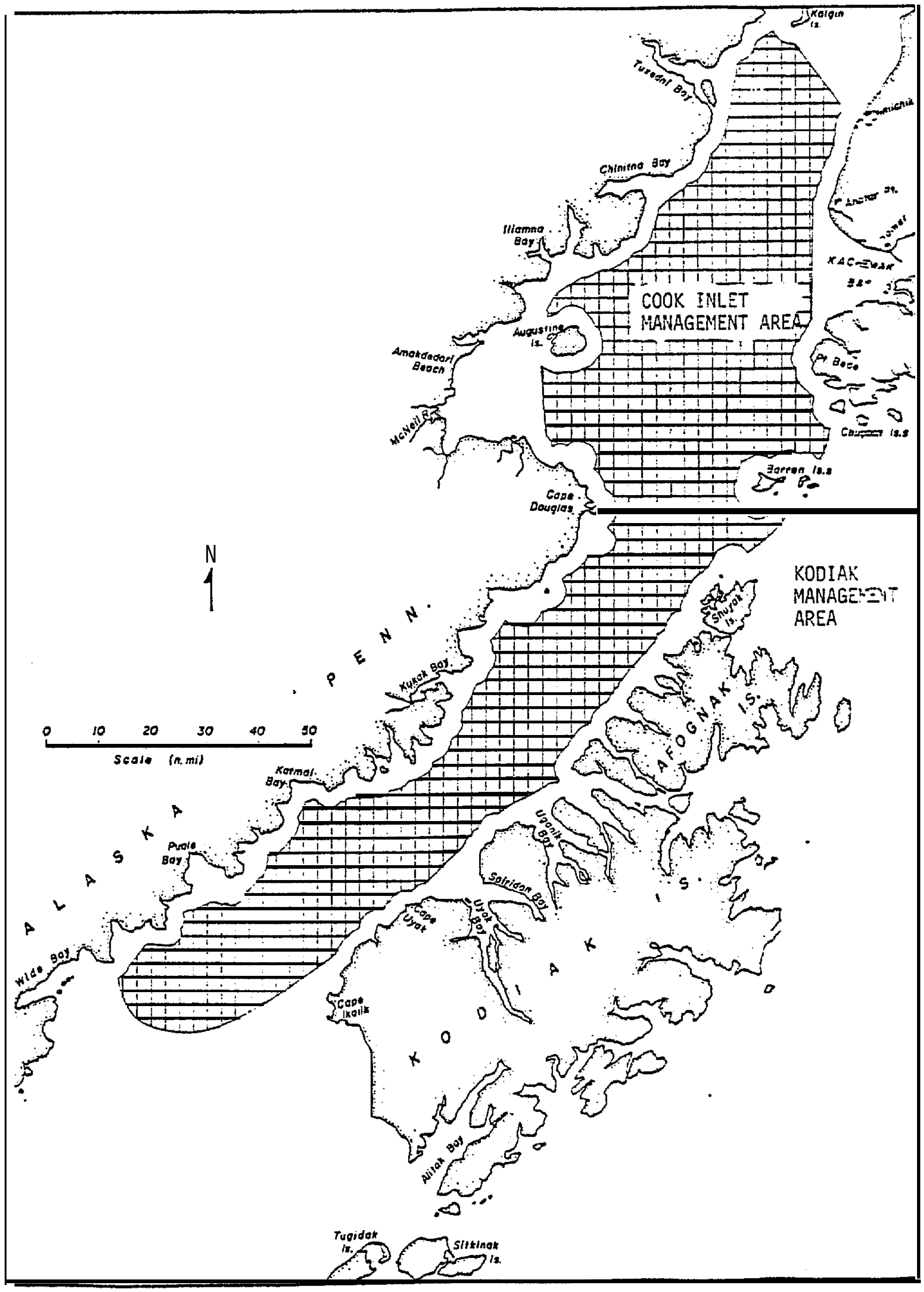

Figure 1.1: Lower Cook Inlet-Shelikof Strait Study Area.

able part of the Kodiak commercial fishing industry. The same is true with respect to harvesting since with few exceptions, the fishermen and boats that participate in the Shelikof Strait fisheries also participate in other Kodiak Management Area fisheries, and in many instances, operate out of the City of Kodiak, not out of Shelikof Strait communities. The Shelikof Strait commercial fishing industry is therefore analyzed as a subsector of the Kodiak commercial fishing industry.

Although the chosen definitions of the Cook Inlet and Shelikof Strait commercial fishing industries do have the problems noted above, they are thought to be appropriate for the purposes of this report for the following reasons: the objective of this report is to analyze the potential impacts within the area most closely associated with the proposed lease sale area, the OCS activity pursuant to the proposed lease sale is expected to primarily compete with fishing industry activities included in these definitions, and the data required to measure and project fishing activities using more precise definitions are not available.

In this report, past levels of harvesting and processing activity are documented, future levels of activity are projected through 2000 in the absence of OCS petroleum activity pursuant to the proposed lease sale, and the potential differences that may occur as a result of various levels of OCS activity are analyzed for each commercial fishing industry. The indexes of harvesting activity include:

- weight and value of harvest by species and/or species groups,
- number of boats,

- employment and income,
- frequency and seasonality of ocean and harbor space use.

The indexes of processing activity considered are:

- number of processing plants,
- employment and income,
- processing capacity,
- requirements for water and electricity.

The items that are discussed in the development and assessment of the forecasts of these indexes of commercial fishing industry activity include:

- local participation in harvesting and processing activities,
- market channels and arrangements,
- factors of change,
- ocean space use conflicts,
- conflicts between recreational and commercial fisheries,
- the organization of the commercial fish industry and potentially critical economic and political trends.

The level of analysis is primarily at the industry or regional level since commercial fishing industry time-series data are typically not available by community; however, the data required to make rough allocations of industry activity by community groups within a region are available and are used to do so. The community or community groups within the Cook Inlet region are (1) Anchorage, (2) Kenai, Soldotna, and Ninilchik, and (3) Homer, Seldovia and Port Graham. The communities within the Shelikof Strait region are (1) Larsen Bay and Uganik Bay and (2) Kodiak.

The Nature of the Non-OCS Projections

There are two reasons one cannot predict with complete certainty the level of activity of a commercial fishing industry: (1) the level of activity is determined by complex and generally poorly-understood relationships among the level of activity and the elements of the biological, physical, governmental, and market environments a fishery inhabits and (2) the future characteristics of these environments are not known with certainty. However, based both on the past relationships between industry activity and a small number of elements of these environments and on the expected characteristics of these elements, one can determine how the level of activity is expected to change. The projections presented in this study, therefore, indicate how a commercial fishing industry is expected to change and not necessarily how it will, in fact, change. For example, if the probability of an industry expanding is 90 percent and the probability that it will decline is 10 percent, we would expect the industry to expand although it may, in fact, decline. The projections, therefore, indicate where an industry appears to be headed. The models on which the projections are based, and the projections themselves, are presented and discussed in later chapters.

The Nature of the Impact Analysis

This study considers three potential sources of OCS impacts on the commercial fishing industries of Cook Inlet and Shelikof Strait. They are the competition for (1) labor, (2) components of a community's infrastructure, and (3) ocean space. The competition can potentially have beneficial and/or adverse impacts on a commercial fishing industry. It is generally not possible to quantify the potential impacts and thus calculate the level of fishing industry activity in the presence of OCS activity. The reasons for this are as follow:

- Past experiences of interactions between the commercial fishing and OCS petroleum industries such as have occurred in the North Sea, the Gulf of Mexico, or Upper Cook Inlet, are not sufficiently well documented to indicate whether changes which occurred in the associated fisheries once OCS activity began were a result of the OCS activity or other factors.

- The nature of the fisheries, OCS activity, and other economic activities may be sufficiently different in the Lower Cook Inlet and Shelikof Strait that experiences elsewhere may not indicate the magnitude of potential impacts in the proposed lease sale area.

- The impacts that occur will be determined by the degree of compatibility which exists between the activities of these industries and efforts that are taken to reduce the adverse effects and increase the beneficial effects; but since the SESP is not a planning study seeking alternative or mitigating solutions and is not intended to make recommendations for actions, it is inappropriate to make impact projections on the basis of assumptions as to what mitigating actions will be taken.

- Although the fisheries will be potentially impacted by the changes in the biological environment that will result from OCS activities, the potential biological effects are so varied and at this time so poorly understood that there is not sufficient information to generate scientifically-defensible projections of the biological changes that will occur and the resulting impacts on the activity of the commercial fishing industry.

This does not, however, mean that no meaningful impact analysis is possible, but it does mean that neither an empirically nor a theoretically sound basis exists which can, for example, be used to forecast a 15 percent reduction in catch in 1995 due to the OCS activity associated with the high-find case. The characteristics of the activities of these industries and, in some instances, the data of past experiences can be used to analyze the nature of the interactions that are expected to occur and to determine which aspects of commercial fishing activity may potentially be affected.

It should be remembered that projected impacts are based on hypothetical levels, timings, and locations of OCS activity reacting with hypothetical levels of fishing activity and, therefore, indicate what may happen if the commercial fishing and OCS petroleum industries attempt particular activities at a particular time and place; the projected impacts, therefore, indicate what can happen and not what will necessarily happen.

Study Outline

The remainder of this chapter consists of a brief outline of the subjects addressed in subsequent chapters and appendixes.

- Chapter II includes a discussion of the specific methods and assumptions, (i.e., the models), used to forecast the levels of activity of the Cook Inlet and Shelikof Strait commercial fishing industries in the absence of OCS activity associated with the proposed Lower Cook Inlet Lease Sale Number 60. The specifications of the forecast models are included in Appendix A.
- Chapter III is divided into two sub-chapters, one for each of the two commercial fishing industries. Each sub-chapter includes: (1) a brief introduction to one of the two industries, (2) the non-OCS case projections generated for that industry using the models developed in Chapter II, and (3) an assessment of the feasibility of such forecasts in terms of the projections of popu-

lation, employment, physical systems, and transportation systems presented in other SESP reports and in terms of the components of the market and governmental environments that are not included in the projection models. The introduction to each commercial fishing industry includes selected historical data.

- Chapter IV consists of: (1) a summary presentation of both the OCS petroleum scenarios and the associated pertinent projections of economic conditions, physical systems, and transportation systems presented in other SESP reports, (2) an analysis of the potential impacts on the commercial fishing industries of projected OCS activity, and (3) a summary of potential impacts.
- Appendix A contains the models used to forecast exvessel prices and harvesting activity.
- Appendix B consists of material that is not area or fishery specific. The topics discussed include conflicts among commercial fisheries, recreational fisheries, and non-fishing marine traffic; fishing vessel accidents; Alaska marine oil spills; and the market environment of the commercial fishing industry.
- Appendixes A, B, and C of Northern and Western Gulf of Alaska Petroleum Development Scenarios: Commercial Fishing Industry Analysis contain information which is useful in understanding the commercial fisheries of Cook Inlet and Shelikof Strait. The titles of the appendixes are:

“Fishery Biology, An Overview of the Alaska Commercial Fishing Industry,” and “Documentation of the Development of the Commercial Fishing Industries of Kodiak, Seward, Cordova, and Yakutat."

II. MEASURING AND FORECASTING COMMERCIAL FISHING INDUSTRY ACTIVITY

Two of the principal objectives of this study are to document the past levels of activity of the commercial fishing industries of Cook Inlet and Shelikof Strait and to develop forecast models of fishery activity. The indexes of industry activity used in this documentation and the models used to project the value of these indexes are the subject of this chapter.

Measures of the Activity of a Commercial Fishing Industry

A commercial fishing industry consists of a harvesting sector and a processing sector. There are also industries or sectors of industries that are directly and perhaps wholly dependent on one or both sectors of the fishing industry, but are not strictly part of the fishing industry. Examples of this include firms which sell fuel, repair services, and mechanical or electronic gear to fishing boats, and firms that provide transportation, construction, and/or maintenance services for fish processing plants. Although the levels of activities of these industries are interdependent, the focus of this study is on the commercial fishing industry. Therefore the measures or indexes of activity discussed in the following two sections are those for the harvesting and processing sectors of the commercial fishing industry and not those for peripheral industries.

HARVESTING

Several of the measures of harvesting activity addressed in this study are quite straightforward and require little explanation; others, due to their less frequent usage and/or more ambiguous meanings require a more complete explanation. Both types of measures are defined and discussed in this section.

Catch

Catch refers to the weight and/or value of a harvest during a specific period of time. Typically the weight is stated in pounds and the value is in dollars, however, for herring and groundfish the weight is often stated in metric tons. When catch is measured in terms of dollars, it is typically the va' ue of the harvest to the fishermen that is being measured. This wil' , of course, equal the product of the average ex-vessel price of the fish harvested and pounds harvested, where the ex-vessel price is the price, in dollars per pound, paid by whoever buys the fish from a fisherman.

It should be noted that there are two sources of error in the harvest value and exvessel price data that are available. The first source of error is that accurate records of the exvessel price of each sale have not been kept by the Alaska Department of Fish and Game (ADF&G) or the other governmental agencies (e.g., Commercial Fisheries Entry Commission (CFEC)) which publish average exvessel price and/or harvest value data;

therefore, these data are estimates and at times rather rough estimates of prices and values. The second source of error occurs because in addition to the direct payments per pound of fish, processors may on occasion also pay bonuses to fishermen or provide non-monetary rewards such as storage space or assistance in obtaining credit. These monetary and non-monetary payments that are not made per pound of fish sold are indeed part of the value of the catch to fishermen, but they are not included in ADF&G or CFEC estimates of value or average exvessel price.

Number of Boats

The number of boats that participate in a fishery is a limited measure of fishery activity since the degree of participation measured in terms of the number of landings, days fished, or catch varies greatly among boats. Data on the number of boats are, however, available from the ADF&G and CFEC and, as will be seen, they serve as a basis for estimating employment.

Employment

Employment statistics for the harvesting sector of a commercial fishing industry are not available from the Alaska Department of Labor because fishermen, including crew members, are typically considered to be self-employed and, therefore, are excluded from the Department of Labor's chief source of employment statistics, the quarterly reports of employers. In the absence of historical employment data, employment is defined as participation in a fishery. Specifically, employment in a fishery is defined to equal the product of the number of boats and the average crew in that fishery. This measure of employment does approximate the number of fishermen who are at one time during the year associated with a fishery, but it does not indicate the amount of time spent in a fishery. When the employment data are summed over all the fisheries in a management area to calculate the employment in the harvesting sector of a commercial fishing industry, double counting occurs since a fisherman often participates in more than one fishery. The method used to reduce the latter problem is discussed in a subsequent section.

Income

There are numerous ways to define income in the harvesting sector, but the data that are available dictate which definition is used in this study. Alternative measures of income and a discussion of the measure used are presented below.

Gross income, net income, and fishermen's income are three alternative measures of income. Gross income equals the income directly generated by harvesting activities and as such would include all payments, both monetary and non-monetary, made in exchange for the harvesting activity of vessels. Net income equals gross income minus non-labor costs, and fishermen's income equals the pre-tax monetary and non-monetary income received by the crews, including skippers, in exchange for the labor services they provide.

The measure of income that is used in this study, harvest value, is an approximation of gross income which, in turn, is the basis of the other measures of income. As was mentioned in a previous section, the harvest value data that are available exclude bonuses and non-monetary payments that are made in exchange for harvesting activities and, therefore, understate gross income. But the values of the excluded payments are not available, therefore, the harvest value data as reported by the ADF&G and CFEC are used to approximate gross income. Time series data on net income and fishermen's income are not available nor are the data necessary to accurately estimate them. It is, therefore, not possible to estimate net or fishermen's income on the basis of estimates of gross income. Changes in gross income, however, accurately reflect changes in the other two measures of income if the three measures of income change proportionately. If the cost of fuel and other non-labor costs increase more rapidly than gross income, the rate of growth of gross income will exceed that of net income; however in the past, large increases in ex-vessel prices have tended to prevent this from happening and expected increases in exvessel prices may do the same in the future. Differences in the rates of growth of gross and net income and/or changes in crew share agreements can cause a divergence between the rates of growth of gross income and fishermen's income. Due to the complexity and variety of crew share agreements within a fishery and among fisheries, it is not possible to determine if the average crew share is becoming a larger or smaller fraction of gross or net income; it is, therefore, not known which will tend to grow more rapidly, gross income or fishermen's income. Industry sources have indicated, however, that the ratio of fishermen’s income to gross income may be decreasing. If this assessment is and continues to be correct, the forecasted rates of increase in gross income will tend to overstate the rates of increase in fishermen’s income.

In addition to being the most readily available measure of income, gross income may also be the most useful concept in terms of community impact analysis. Some of the expenses that are subtracted from gross income in calculating net income are for goods and services purchased locally, and the boat’s or owner’s share that is not included in fishermen’s income may be income to a local resident and, therefore, part of the “economic base as is local fishermen’s income.

Frequency and Seasonality of Ocean Space and Harbor Use

The frequency and seasonality of ocean space and harbor use is the final index of harvesting activity considered. There is very little historical data concerning the movements of fishing vessels. Their use of ocean and harbor space has not been as well monitored and reported as that of larger vessels. Annual and monthly ADF&G and CFEC data on the number of boats and landings per month provide measures of the seasonality and frequency of ocean space and harbor use.

Local Fishing Activity

Due to the mobility of fishermen and boats among geographically dispersed fisheries, it is difficult to define local fishing effort in a meaningful way; and, due to the lack of data concerning the expenditure and work patterns of fishermen, it is difficult to measure local effort once a definition is selected. The difficulties of defining and measuring local effort in a way that is useful for local economic base analysis is demonstrated by the following example. Consider two fishermen (1) a fisherman from Cordova who fishes for salmon in Prince William Sound and in Oregon and Washington and who resides in Hawaii during the winter, and (2) a shrimp fisherman from Washington who resides in Kodiak with his family during the shrimp season. The proportions of the Cordova fisherman's Prince William Sound fishing income that is spent in Cordova may not be greater than the proportion of the Washington fisherman's Kodiak fishing income that is spent in Kodiak.

Although precise definitions and measures of local fishing effort are neither meaningful nor feasible, the rough measures of local participation that are available do indicate whether or not a fishery is predominately local in nature. For a fishery in which gear permits are area specific (e.g., salmon, herring, and king crab), the index of local participation is the ratio of locally owned permits to total permits. For the other fisheries, statewide gear permits are issued and the index of local participation equals P in the following equation:

$$p = ((PF/TP)\ LP)/B$$

where PF is the number of permits fished statewide, TP is the number of fishable permits statewide, LP is the number of locally owned permits, B is the number of boats that participated in a local fishery, and a gear permit is defined to be locally owned if the gear permit holder listed the local community as his home address on the gear permit application form.

This index is intended to measure the proportion of harvesting activity that is local. The range of such an index would be from zero to one, with zero indicating no local participation and one indicating no non-local participation. For fisheries with permits that are not area specific, the index can exceed one; each index which exceeded one was set equal to one.

PROCESSING

The indexes of processing activity to be addressed in this study require only brief explanations.

Number of Plants

A fish processing plant is defined as a semi-autonomous fish processing facility, therefore, a single firm may have more than one plant in a community or in a management area.

Employment

Average monthly and/or average annual employment statistics are used.

Income

Annual income data are used. For the regions of the study area, more income and employment data are available for food and kindred products than for food processing or fish processing alone due to either confidentiality requirements or reporting procedures. The data for food and kindred products is dominated by fish processing in the study area and, therefore, provide an acceptable approximation of processing employment and income. The degree to which food and kindred products-employment is dominated by fish processing is discussed by area in Chapter III.

Existing Capacity

The concept of processing plant capacity is ambiguous. There are typically a number of constraints of varying strengths and durations. Consider, for example, a canning operation in a plant with unused floor space. It may be possible to process 50 metric tons (110,000 pounds) of fish per day using two ten-hour shifts, but if the machinery cannot be operated at this rate for long before it wears out, the long-term and short-term capacities differ. The long-term capacity is, however, not necessarily less than the short-term capacity since, given time, equipment can be replaced and/or additional equipment can be installed. The measure of capacity reported in this study is intended to approximate the level of output that could be processed on a sustained basis given the existing plant and equipment and assuming fish are available.

REAL VERSUS NOMINAL DOLLARS

Values and prices can be stated in real (i.e., constant) dollars or in nominal (i.e., current) dollars, the difference being that a nominal measure is the number of dollars whereas a real measure is the number of dollars adjusted for changes in the value of a dollar since a base period. For example, the nominal value of the Alaska red salmon harvest increased from $17.5 million in 1961 to $19.2 million in 1975, but since the U.S. Consumer Price Index (CPI) for a"l1 goods increased by 80 percent during this period, the real value of the 1975 harvest in terms of 1961 dollars was $10.6 million. In this examp"le, the number of dollars received from the harvest (i.e., the nominal value) increased by 9.7 percent while the amount of goods and services that could be purchased with the dollars received for the harvest (the real value) decreased by 39.4 percent. Since intertemporal comparisons of nominal dollar measures are relatively meaningless during periods of inflation (i.e., during periods in which the CPI is increasing and, therefore, the value or purchasing power of the dollar is decreasing), and since the forecast period of 1980 through 2000 is expected to be characterized by inflation, projections of values and prices are presented in real dollars. But since many people are accustomed to thinking in terms of current or nominal dollars, the projections are also presented in nominal dollars. The real dollar projections use 1980 as the base year. The U.S. CPI for all goods and services is expected to be approximately 240 for 1980; the real prices and value projections with 1980 as the base year can, therefore, be converted into real prices and values with 1967 as the base year by dividing by 2.4.

Forecasting Traditional Commercial Fishing Industry Activity in the Absence of the OCS Development Associated with Lease Sale Number 60

The models used to forecast the development of the traditional commercial fishing industries of Cook Inlet and Shelikof Strait in the absence of OCS activity pursuant to the proposed lease sale are the topic of the remainder of this chapter.

The fishery development forecasts or scenarios that are constructed are similar to the OCS petroleum development scenarios in that they are based upon estimated or hypothesized levels of resource abundance. A brief outline of the forecast methodology which is used precedes a detailed discussion of the bases of the resource abundance hypotheses and of how they are used to forecast harvesting and processing activity. The methodology is as follows:

- Forecasts of resource abundance provided by the Alaska Department of Fish and Game (ADF&G) or the North Pacific Fisheries Management Council (NPFMC) or based on historical catch data are used to forecast catch.

- The catch forecasts serve as bases for projecting the other indexes of harvesting and processing activity.

- The projections of harvesting activity in Shelikof Strait are based on projections of harvesting activity for the Kodiak Management Area as a whole and estimates of the proportion of that activity which will occur in Shelikof Strait.

- The feasibility of the projections is evaluated in terms of the economic and demographic conditions, transportation systems, and local infrastructure hypothesized in associated SESP reports or elsewhere in this report.

HARVESTING

Resource abundance is the principal determinant of harvesting and subsequent processing activity in all but a few of the traditional fisheries of Alaska. In a majority of these fisheries, quotas set by the Alaska Department of Fish and Game (ADF&G) or the North Pacific Fisheries Management Council (NPFMC) on the basis of its assessments of resource abundance are binding constraints, that is, in any one year and fishery the catch would be larger if it were not for the quotas. The salmon, herring, halibut, king crab, Tanner crab, and shrimp fisheries of the Cook Inlet and Kodiak Management Areas are typically in this group of fisheries. For a small number of relatively minor traditional fisheries, such as those for Dungeness crab and razor clams, resource abundance is a major, but perhaps not the principal, determinant of fishery activity.

The economic conditions are such that it is not profitable for fishermen to harvest the maximum amount the ADF&G or the NPFMC thinks is acceptable. For these fisheries the market constraints are binding, not the quotas based on resource abundance. The market constraints are, however, in part determined by resource abundance. Catch per unit effort and thus costs per unit harvested are related to resource abundance, and the ex-vessel price is directly related to the quality of the fish which, in turn, is related to stock abundance. The quality of the catch is influenced by resource abundance because changes in abundance are often accompanied by changes in age and size structure of the stock.

The dependence of commercial fishing activity on resource abundance creates forecasting problems because the prediction of resource abundance, within reasonable confidence limits, presupposes detailed knowledge of a number of physical and biological processes operating in the marine environment. The need for detailed information can be seen in the prediction that a 0.8°C temperature anomaly in the southern Bering Sea can result in a 11,300 metric ton (24.9 million pound) change in herring production (Laevastu, 1978). Pioneering efforts in the short-term assessment of fisheries production are now taking place in the form of complex computer simulation models. Since the extension of these pioneering efforts to the Gulf of Alaska is beyond the scope of this study, such models have not been used to forecast resource abundance. The forecasts of stock abundance that are used are provided by the ADF&G and the NPFMC or are based on historical catch. The use of these forecasts of stock abundance as a basis for projecting the indexes of harvesting activity is discussed in the following sections.

Catch by Weight

Similar types of resource abundance forecasts are not available from the ADF&G and/or NPFMC for all the commercial fisheries in the study area, therefore, it is not appropriate to apply the same method of forecasting catch to all the fisheries. The nature of the resource abundance forecasts and the ways they are used to project catch are discussed by species.

Salmon.

The ADF&G has stated short-term and long-term catch objectives by man-, agement area for the commercially important species of salmon. These objectives are based on historical catch data and on both public and private fishery development programs including enhancement and rehabilitation. The method used to forecast annual catch based on ADF&G's catch objectives is as follows:

- The catch for 1980 is set equal to the mean annual catch for 1973-1977.

- The annual catch is increased from 1980 through 1985 at the rate that will result in the 1985 catch being equal to the short-term objective. For example, if the mean catch for 1973-1977 is 1.0

million pounds and the short-term objective is 1.25 million pounds, the 1980 and the 1985 catch forecasts would be 1.0 and 1.25 million pounds respectively, and the annual rate of growth during the period would be 4.5 percent.

- The annual catch is increased from 1985 through 2000 at the rate that will result in the year 2000 catch being equal to the long-term catch objective.

- If the short-term objective is less than the five year mean, the annual catch for 1980 through 1985 is set equal to the short-term objective.

- For the salmon fisheries which are of minor importance to commercial fishermen and for which there are no stated objectives, annual catch for the forecast period (i.e., 1980-2000) is set equal to the five-year mean.

- The resulting forecasts of annual catch by species are then allocated among gear types (e.g., purse seine, drift gillnet, etc.) on the basis of the historical allocations of catch by species by gear type.

The mean five year catch, the short-term and long-term catch objectives, the resulting rates of growth, and the allocation factors are summarized in Table 2.1.

Halibut.

The NPFMC and the International Pacific Halibut Commission (IPHC) have jointly set both short-term and long-term catch objectives for the Gulf of Alaska. Since the halibut fleet is very mobile with each boat typically fishing many areas in the Gulf of Alaska, the NPFMC/IPHC objectives for Area 3 are used to forecast catch. Area 3 includes the Gulf of Alaska (see Figure 2.1). The forecast method is as follows:

- The short-term catch objective is less than the five year mean because it is not believed that the past level of catch will permit the desired recovery. The annual catch for 1980 through 1985 is, therefore, set equal to the short-term objective.

- The annual catch is increased from 1985 through 2000 at the rate that results in the year 2000 catch being equal to the long-term catch objective.

- For each area (e.g., Cook Inlet and Shelikof Strait), the catch forecast is the product of the Area 3 forecast and the mean annual proportion of Area 3 catch taken in that area from 1973 through 1977.

TABLE 2.1

BASIS OF SALMON CATCH PROJECTIONS

Kodiak

	Kings	Reds	Pinks	Cohos	Chums
Average Annual Catch 1973-1977 (1,000 lbs)	9.2	2,565	19,258	158	4,316
Short Term Objective (1,000 lbs)	--	3,571	27,778	--	6,327
Long Term Objective (1,000 lbs)	--	5,952	31,746	--	6,790
Rate of Growth 1980-1985	0%	6.85%	7.60	0%	7.95%
Rate of Growth 1986-2000	0%	3.47%	0.09%	0%	0. 48%
Catch Allocated to the					
Purse Seine Fleet	92.8%	75.0%	90. 0%	70.0%	94.2%
Beach Seine	0.0%	0.5%	1.3%	20.0%	0.4%
Set Gillnet Fleet	7.2%	24. 5%	8.7%	10.0%	5.4%

Cook Inlet

	Kings	Reds	Pinks	Cohos	Chums
Average Annual Catch 1973-1977 (1,000 lbs)	260	8,206	4,424	1,250	6,279
Short Term Objective (1,000 lbs)	176	8,930	5,952	1,874	6,329
Long Term Objective (1,000 lbs)	1,540	8,930	9,127	2,249	6,329
Rate of Growth 1980-1985	0.0%	1 .7%	6.12%	8.45%	0.15%
Rate of Growth 1986-2000	15.55%	0.0%	2.89%	1.22%	0.00%
Catch Allocated to the					
Purse Seine Fleet	0.1%	2%	37%	1.5%	1 0%
Drift Gillnet Fleet	5.6%	55%	17%	35%	80%
Set Gillnet Fleet	94.3%	43%	46%	63.4%	10%

The catch objectives were provided by the Alaska Department of Fish and Game.

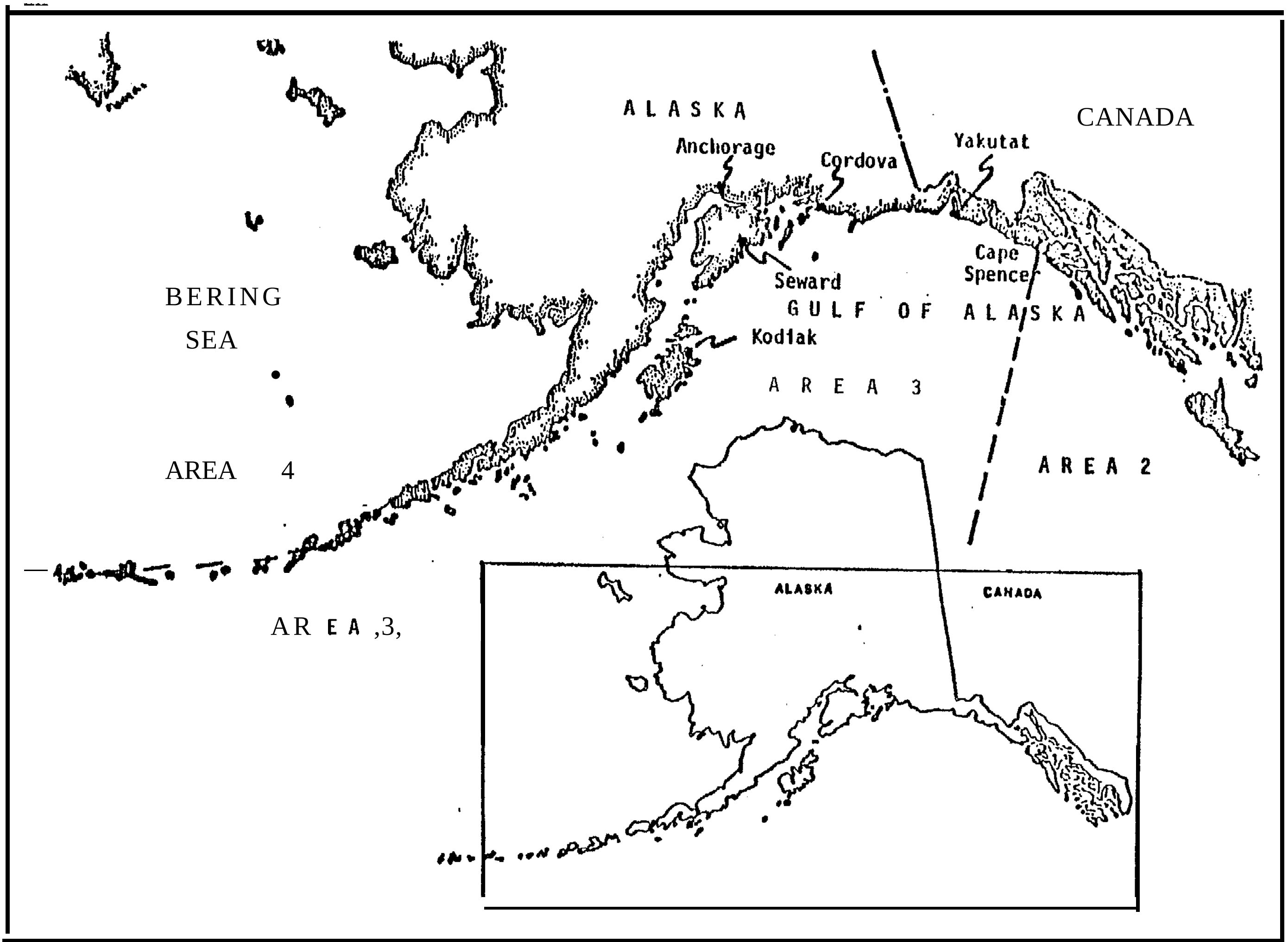

Figure 2.1: International Pacific Halibut Commission Management Areas.

The proportions of Area 3 catch harvested in Cook Inlet and in Shelikof Strait were relatively stable between 1973 and 1977; they ranged from 3.8 to 6.5 percent and from 11.6 percent to 16.9 percent, respectively, and neither exhibited a secular trend. The mean proportions are therefore used in projecting catch in each area. The numerical specifications of this forecast method are summarized in Table 2.2.

Herring.

Neither the ADF&G nor the NPFMC currently has catch objectives for the Gulf of Alaska herring fisheries. The catch forecasts for these fisheries are, therefore, based on information provided by the ADF&G area biologists (see Table 2.3).

King Crab.

Short-term stock assessments provided by the NPFMC and/or ADF&G area shellfish biologists are used as the basis of the catch forecasts. The catch forecasts were held constant during the forecast period or increased at a constant rate during the first five years of the forecast period depending upon the information provided by each area shellfish biologist. The numerical specifications of the king crab catch forecasts are presented in Table 2.4.

Tanner Crab.

The stock abundance information that is available for Tanner crab and

TABLE 2.2

BASIS OF HALIBUT CATCH PROJECTIONS

" Average Annual Catch Area 3 1973-7977 (1,000 lbs)	13,648
Short Term Objectives	11,000
Long Term Objectives?	20,000
Short Term Rate of Increase in Catch	0. 0%
Long Term Rate of Increase in Catch	4.0%

ALLOCATION OF CATCH BY AREA

Cook Inlet	5.1%
Shelikof Strait	13,8%

Source: Alaska Sea Grant Program.

[1]Catch objectives are provided by the International Pacific Halibut Commission and the North Pacific Fisheries Management Council.

TABLE 2.3

BASIS OF HERRING CATCH PROJECTIONS

	Estimated Sustainable Yield (1,000 Pounds)
Kodiak	4,000
Cook Inlet	6,436

These estimates of the sustainable yield are based on the historical catch and information provided by the area finfish biologist.

TABLE 2.4

BASIS OF KING CRAB CATCH PROJECTIONS

Kodiak	
Average Annual Catch 1973-1977 (1,000 lbs)	18,446
Short Term Objective (1,000)[1]	30,000
Long Term Objective[1]	30,000
Short Term Rate of Increase in Catch	0%
Long Term Rate of Increase in Catch	0%
Cook Inlet	
Average Annual Catch 1973-1977 (1 ,000 lbs)	3,674
Short Term Objective[2]	4,211
Long Term Objective[2]	4,211
Short Term Rate of Increase in Catch	2.77%
Long Term Rate of Increase in Catch	0%

[1] NPFMC Fishery Management Plan for Alaska King Crab, 1977; also Martin Eaton, ADF&G Westward Region Area Shellfish Biologist.

[2] Fishery Management Plan for Alaska King Crab, 1977; also Tom Schroeder, ADF&G Area Management Biologist for Cook Inlet.

the methods of forecasting catch based on such information parallel those of the king crab fishery. The specifications of the Tanner crab catch forecasts appear in Table 2.5.

Dungeness Crab.

Neither the ADF&G nor the NPFMC has sufficient stock assessment data to estimate current or future resource abundance. In the absence of such information, historical catch data and the assessments of the local shellfish biologists are used to forecast the Allowable Biological Catch (ABC) for each Dungeness crab fishery. However, since the Dungeness crab fisheries have typically been underutilized, that is, catch has often been below the ABC, market conditions and not resource abundance have been the binding constraint. To project catch in this fishery, it is therefore necessary to consider future market conditions. It is believed that favorable market conditions, such as, increasing exvessel prices and the lack of significant growth of other crab stocks, will result in the Dungeness crab fishereis becoming fully utilized during the forecast period. In the past few years, annual catch has approached the ABC in Cook Inlet, therefore, the projected catch in this area is held constant during the forecast period. In the Kodiak area, catch has been well below the ABC. In this area, the 1980 and the 2000 catch forecasts are set equal to the five-year mean for 1973-1977, and the ABC respectively, and catch is projected to increase at a constant rate over the forecast period. The specifications of the Dungeness crab catch forecasts are in Table 2.6.

TABLE 2.5

BASIS OF TANNER CRAB CATCH PROJECTIONS

Kodiak

Average Annual Catch 1973-1977 (1,000 lbs)	24,473
Short Term Objective (1,000 lbs)[1]	28,000
Long Term Objective[1]	28,000
Short Term Rate of Increase in Catch	0%
Long Term Rate of Increase in Catch	0%

Cook Inlet

Average Annual Catch 1973-1977 (1,000 lbs)	6,541
Short Term Objective (1,000 lbs)[2]	5,313
Long Term Objective[2]	5,313
Short Term Rate of Growth	0.0%
Long Term Rate of Growth	0.0%

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[1]NPFMC Fishery Management Plan for the Commercial Tanner Crab Fishery off the Coast of Alaska, 1978' also Martin Eaton, ADF&G Westward Region Area Shellfish Biologist.

[2]NPFMC Fishery Management Plan for the Commercial Tanner Crab Fishery off the Coast of Alaska, 1978; also Tom Schroeder, ADF&G Area Management Biologist for Cook Inlet.

TABLE 2.6

BASIS OF DUNGENESS CRAB CATCH PROJECTIONS

Kodiak

Average Annual Catch 1973-1977 (1,000 lbs)	713
Short Term Objective (1,000)[1]	---
Long Term Objective	2,000
Short Term Rate of Increase in Catch	5.3%
Long Term Rate of Increase in Catch	5.3%

Cook Inlet

Average Annual Catch 1973-1977 (1,000 lbs)	322
Short and Long Term Objectives	450
Rate of Increase in Catch (It is assumed that annual catch will equal 450,000 pounds from 1980-2000)	0%

[1] Based on Historical Catch; also Martin Eaton, ADF&G Westward Region Area Shellfish Biologist.

[2] Based on Historical Catch; also Tom Schroeder, ADF&G Area Management Biologist for Cook Inlet.

Shrimp.

The relatively stable stocks in the Cook Inlet are thought to be indicative of future resource abundance. However, in the Kodiak area, the area which has dominated the study area shrimp fisheries, future stock abundance assessment is difficult because of both the dramatic decline in stock abundance in the past three years and the uncertainty as to the possibility or timing of a recovery. Based on discussions with the area shellfish biologists, the harvest forecast are as follow:

- The annual Kodiak catch forecast for 1980 through 1989 is 4,540 metric tons (10 million pounds) and the forecast for 1990 through 2000 is 9,070 metric tons (20 million pounds).

- The Cook Inlet forecast is held constant during the forecast period at 2,540 metric tons (5.6 million pounds).

Razor Clams.

The Cook Inlet and Kodiak razor clam fisheries are today minor fisheries in comparison to other fisheries or in comparison to the past levels of activity in the razor clam fisheries. Decreases in resource abundance and adverse market conditions have caused the decline in these fisheries, however, the stocks appear to be increasing and the market conditions are improving. Therefore, a recovery of the fisheries is expected. Constant incremental increases in stock abundance and catch are forecasted.

Catch By Value, Income

The measure of the value of catch or harvesting income being used in this report is the product of the catch by weight and the exvessel price; therefore projections of catch by value require forecasts of both the catch by weight and the exvessel price. The methods used to forecast the former were discussed in the previous section; the methods used to forecast exvessel prices are the subject of this section.

Exvessel prices are estimated by management area fishery using a two-stage process:

- Each statewide exvessel price is forecasted based on (1) an empirically determined relationship between exvessel prices and explanatory variables and (2) the expected values of the explanatory variables.

- Each management area exvessel price is projected based on a recent management area price and the projected increases in the statewide price.

The specifications of the statewide exvessel price models and the past and expected values of the explanatory variables are presented in Appendix A. An example of how a forecast of a statewide price is used to forecast a management area price is as follows: if the statewide model for razor clams forecasts exvessel prices of $1.00 and $1.50, respectively, for 1979 and 1986 and if the actual 1979 exvessel price of razor clams is $0.90 in management area A, the 1986 exvessel price forecast for area A razor clams is $1.35 ($0.90 X $1.50/$1.00). This method of forecasting management area prices based on forecasts of statewide prices is valid if statewide prices and management area prices change proportionately; regression analysis suggests that they do.

There were two reasons for using statewide exvessel price models to forecast management area prices rather than directly forecasting area prices: (1) greater precision is usually achieved in forecasting with a longer time series, and longer time series are typically available for statewide prices than for management area prices and (2) the number of exvessel price models required was one half the number required had individual management area models been used.

Structural changes and the lack of adequate time series data precluded the use of regression analysis to forecast exvessel prices for the herring and razor clam fisheries.

The statewide price of herring is difficult to project using historical data because there are distinct markets and prices for herring products such as roe herring, roe on kelp, and bait, because the relative importance of these products has dramatically changed in the last ten years as a market for Alaska roe products has been established and expanded, and because the roe price has fluctuated dramatically in recent years. In 1961 the statewide exvessel price for herring was $0.01 per pound, in

1979 the exvessel price for roe herring, which now dominates the herring fisheries, was approximately $1.00 per pound, and in 1980 the price is expected to be approximately $0.20 per pound. This phenomenal increase in the price of herring during the past 18 years was due to a change in product mix and improvements in marketing opportunities that are not expected to occur again. The large price increases have resulted in a significant increase in fishery activity which is expected to moderate future price increases. The exceptionally high price in 1979 resulted from a set of market conditions that are not expected to occur again in the immediate future. The nominal exvessel price of herring is projected to increase at the rate of increase of the CPI plus 1 percent.

It is difficult to forecast the exvessel price of razor clams because the growth that is expected to occur in that fishery is principally due to increased marketing opportunities for clams for human consumption, while the price during the past ten years has been principally deter-mined by the demand for razor clams as bait for the Dungeness crab fishery. The increases in supply that are expected will tend to moderate price increases and the nominal exvessel price is expected to increase at the same rate as the CPI.

Number of Boats

In projecting the number of boats that will participate in a fishery, it is useful to distinguish between the fisheries in which entry is restricted by the Commercial Fisheries Entry Commission (CFEC) and those in which entry is not limited. The CFEC limits the number of boats that can operate in a Cook Inlet or Kodiak salmon fishery or Cook Inlet herring roe fishery at any one time by requiring that a gear permit holder be on each boat and by limiting the number of permits issued for each fishery; and in practice, the number of boats participating in each fishery is therefore constrained. If the policies of the CFEC impose a binding constraint on the number of gear permit holders and boats that participate in a fishery, the CFEC's policies alone determine the number of boats. The gear permits are transferable, and the high market values of permits indicate that the constraints are in fact binding. Therefore, to successfully forecast the number of boats in a fishery, one must know what the CFEC will do. Unfortunately, no one, including the CFEC, knows when, or if, or to what extent, it will increase the number of permits by issuing more permits or decrease the number of permits by initiating a buy-back program for a particular fishery. Due to the technical and political problems associated with changing the number of permits, the CFEC is not expected to radically change the number of gear permits. Another reason for expecting the number of permits to be held relatively constant is that the principal objective of the CFEC is to assure that the fisheries are economically viable; that is, that they provide a fair return to participants in the fishery. But once entry is limited and as long as the market value of permits is greater than zero, the market mechanism tends to assure fair rates of return. If the rate of return is exceptionally high in one fishery, the price of a permit in that fishery will increase, the cost of participating in that fishery will increase, and the rate of return will decrease until it equals the expected rate of return in other fisheries. Similarly, if the rate of return is exceptionally low in one fishery, the price of the permit will decrease, the cost of participation will decrease, and the rate of return will increase until it equals the expected rate of return in other fisheries. Due to this automatic adjustment mechanism, it is not necessary for the CFEC to adjust the number of gear permits to maintain fair rates of return.

The expectation that the CFEC will not dramatically change the number of permits is also reflected in the high market values of permits; if it were generally believed within the industry that additional permits would soon be readily available, the permits would not be selling for tens of thousands of dollars. It should also be noted that the harvesting capacity of the existing number of boats in each fishery exceeds the projected catch for the forecast period, so it will not be necessary to increase the number of permits to allow full utilization of the fishery resources.

For the fisheries in which entry is not limited by the CFEC, the number of boats is projected based on the historical relationship between catch and the number of boats, and on projected catch. The specification of these relationships for each fishery is summarized in Appendix A.

Number of Fishermen

The number of fishermen is used as the measure of harvesting employment. For each fishery, the employment forecast is the product of the projected number of boats and the average crew size. The latter is held constant for the forecast period since crew sizes are expected to remain constant.

When the forecasts of the number of boats or fishermen are summed to project the number participating in a management area's fisheries, double counting of both boats and fishermen occurs since each is counted once for each fishery in which it participates. For example, a fisherman who participates in the purse seine salmon fishery, the purse seine herring fishery, and the razor clam fishery would be counted three times. The same would be true of a boat which participated in these fisheries. Although this problem cannot readily be eliminated given the available data, it can be reduced by adjusting for the double counting which occurs within the shellfish fisheries and within the salmon fisheries. The method of adjustment is as follows. The number of boats participating in each shellfish fishery and the number of boats participating in the shellfish fishery as a whole are available from the ADF&G. The same data are available for the salmon fisheries. The ratio of the sum of the boats in each shellfish (or salmon) fishery to the total number of boats in all shellfish (or salmon) fisheries provides a measure of the double counting which occurs in the shellfish (or salmon) fishery.

The ratio indicates the degree to which the double counting of boats occurs in a fishery; for example, if in 1977 the ratio for the shellfish fishery is 1.5, this indicates that the sum of boats overstates the actual total by 50 percent. Using such ratios to adjust the forecasts of total boats and total fishermen participating in a management area's fisheries reduces but does not eliminate double counting. There are two reasons for this: (1) the ratio correctly identified the degree to which double counting of boats occurs within the fishery, but since fishermen are more mobile than boats, the ratio tends to understate the actual double counting of fishermen, and (2) no correction is made for the double counting which occurs due to the mobility of men and boats among the shellfish, salmon and other fisheries. A more appropriate adjustment mechanism is not, however, readily available.

Number of Landings

Forecasts of the number of landings provide a measure of fishing boat traffic and harbor use. The forecasts are based on the historical relationship between the number of landings, catch, and the number of boats, and on forecasts of catch and the number of boats. The specifications of the relationships are summarized by fishery in Appendix A.

PROCESSING

Processing plant activity is measured in terms of the quantity of inputs used and in terms of the income of processing plant employees. The following sections discuss the methods used to project these measures of activity.

Input Requirements

The requirement for a particular input such as labor, electric power, or water can change due to a change in any or all of the following: the quantity of fish processed, the product mix, the technology, and the price of one input relative to the prices of other inputs. The potential effect on input requirements of each type of change and a method of dealing with the uncertainty they present for input requirements are presented in this section.

For a particular area, the quantity of fish processed equals the quantity of fish landed if fish in the round are neither imported nor exported. Unfortunately this condition is not met in either Cook Inlet or Shelikof Strait, and the data required to determine the relationship between catch and processing within either area are not available. If, however, the relationship between catch and processing is relatively stable, the quantities harvested and processed increase at the same rate. Due to both the lack of time series data on interregional movements of fish in the round and the rapid changes that are possible in such movements, there is substantial uncertainty concerning how the relationship between the quantities harvested and processed will change. An additional source of uncertainty as to the quantity of fish that will be processed is the groundfish industry. This industry has not developed sufficiently to determine the quantity of groundfish that will be processed in each area.

Yet another source of uncertainty is the relationship between the quantity of fish processed and the per-unit-of-product requirement for a particular input. If there are economies of scale, the per-unit input requirement decrease as output increases, and therefore input requirements increase less rapidly than output. Conversely, if the production process is characterized by diseconomies of scale, input requirements increase more rapidly than output. The level of output can also affect the per-unit input requirement of a particular input if the desirable input mix changes with output. For example, a relatively capital-intensive method of production may only be feasible at high levels of output. The nature of the production function in the fish processing industry is not sufficiently well understood to determine how the per-unit requirement for each input is related to output.

The product mix, that is the species that are processed, and the product form of each species that is produced affect the input requirements. For example, relatively more labor and electric power is required to produce frozen salmon than to produce canned salmon, and relatively more water is required to process shrimp than to process crab. The data required to account for the changes in input requirements that will result from changes in product mix in terms of species processed are not available; however, there are discernible impacts due to changes in product mix with respect to product form. Frozen products have steadily increased in importance relative to canned products. This is true for most finfish and shellfish species. This change is expected to continue; therefore, everything else being constant, the requirements for labor and electric power are expected to increase more rapidly than the quantity processed.

The effect of technical progress on the requirement of a particular input is ambiguous. If it is characterized by proprotional increases in the productivity of all inputs, the input requirements per unit of output will be reduced for all inputs. However, if it is characterized by a more rapid increase in the productivity of one input, the requirement for that input may increase as it is substituted for what have become relatively less productive inputs. The effect on input requirements of technical progress will therefore depend on both the rate and type of technical progress that will occur, neither of which can be forecasted with much certainty.

Changes in relative input prices tend to change the input mix that processing plants use. For example, if the price of labor increases relative to the price of physical capital, processors will tend to substitute capital for labor, and everything else being constant, the labor requirement will decrease and the requirements for more automated processing equipment and electric power will increase. The change in input requirements that will occur due to changes in relative input prices will depend on both the extent to which relative prices change and the responsiveness of processors to such changes. Although few definitive statements can be made about either, it appears that the relative price of electric power will continue to increase and that the increase will be substantial enough that processors will tend to substitute other inputs for electric power. For example, more expensive but more efficient freezer units will be used.

The preceding discussion of the factors that will determine input requirements indicates that there are a variety of reasons that input requirements cannot be forecasted with a high degree of certainty. To account for the greater uncertainty associated with the rate of development of the groundfish industry and both the rate and type of technical progress, four sets of input requirement forecasts are presented. A set of forecasts is presented for both the traditional fisheries and all the fisheries with and without technical progress. The forecasts for the traditional fisheries are based on the projected change in Cook Inlet and Shelikof Strait catch for the traditional fisheries and the current level of input use. For example, if the total traditional catch is projected to increase by 50 percent by 1988, input requirements are projected to increase by 50 percent assuming no technical progress occurs, or by 20 percent assuming that technical progress results in a 2 percent annual rate of increase in efficiency. The 1988 input requirements would be 120 percent of the current (i.e., 1977) requirements, assuming an annual 2 percent increase in efficiency, since 0.98^{11} equals 0.80, and the product of 0.80 and 150 percent is 120 percent. The projected input requirements for all fisheries are the sum of the requirements for the traditional fisheries plus the requirements for the groundfish fisheries; the methods used to project the latter are discussed in a separate section.

The sets of forecasts that do not allow for increased efficiency tend to set an upper bound on input requirements since the requirements are not expected to increase as rapidly as catch. Technical progress, economies of scale, economies of a more uniform rate of production, increasing input prices, and the gradual substitution of capital for labor will tend to reduce processing input requirements per unit of catch. Therefore, the sets of forecasts that allow for increasing efficiency are perhaps more realistic. A 2 percent rate of increase in efficiency is consistent with the 2.2 percent rate of increase in real income per capita used by the SESP and the long-term historical rate of increase in efficiency for the U.S.

Income

The income of processing plants, defined to equal their payrolls, is the product of employment measured in units of labor services and the average wage rate. Therefore, to forecast income, it is necessary to project the average wage rate and employment. The method used to project the latter was discussed in the previous section, the method used to project the wage rate is based on the historical relationship between the rates of increase in the CPI and the average hourly food processing wage in Alaska, and the projected rate of increase in the CPI. Between 1961 and 1977, the average hourly wage tended to increase 1.184 times faster than the CPI. Based on the assumption that his relationship will continue during the forecast period on the Studies Program’s optimistic assumption that the CPI will increase at an annual rate of 5.5 percent, the average nominal wage rate will increase by approximately 6.5 percent a year.

The Nature of the Forecasts

The forecasting methodology described in this chapter does not generate projections of harvesting and/or processing activity which exhibit the cyclical fluctuations which have historically been characteristic of the commercial fisheries. In this section, the reasons for not attempting to project cycles and the nature of the forecasts are clarified.

There are three reasons cycles are not forecasted; they are as follow:

- For many species, the length and amplitude of the cycles are not constant over time, and the determinants of cycles are not sufficiently well understood and/or predictable to allow one to successfully project cycles.

- A major objective of the ADF&G, with respect to salmon, is to reduce the cyclical fluctuation in the commercial fisheries.

- The accuracy of the forecasts is not sufficient that forecasts of cyclical deviations would be meaningful.

The accuracy problem in fishery forecasting is one that deserves additional attention. One example of the potential magnitude of the forecasting error is provided by the comparison of the ADF&G 1978 preseason estimate of the Bristol Bay pink salmon return of 3.2 million fish and the actual return of 13.8 million. The preseason forecasts are typically more successful than this one was, and perhaps a better measure of the magnitude of error that can normally be expected is provided by The Preliminary Forecasts and Projections for 1979 Salmon Fisheries. In this publication, the point estimate of the statewide salmon harvest is 72 million fish and the range about this estimate is 50 to 100 million fish, that is, there is approximately a 40 percent range about the point estimate within which the actual harvest can fall without surprising anyone. Another example of the potential error associated with fishery forecasts is provided by the experience of the Kodiak shrimp fishery. Between 1969 and 1977, the shrimp catch ranged from 14,200 metric tons (31.5 million pounds) to 37,300 metric tons (82.2 million pounds) and averaged 24,900 metric tons (54.9 million pounds); then in 1978 it fell to 10,300 metric tons (22.8 million pounds) and is now expected to decline even further. Had long-range catch forecasts been made in the mid 1970s, they would have tended to overstate the catch in the late 1970s and early 1980s by a factor of three or four. This experience and others provide sufficient proof that unforeseen changes in the physical, biological, market, and/or governmental environments of the fisheries can cause a rapid decline in a booming fishery, and they can just as readily create new fisheries or turn marginal fisheries into very productive ones.

The inability to forecast cyclical changes in activity can be minimized by thinking in terms of expected or probabilistic levels of fishery activity; for example, if the 1985 salmon catch forecast for a management area is 20,000 metric tons, the implication is that in the mid 1980s, the catch will on average be 20,000 metric tons. The inability to identify secular trends that are or will be developing is a more fundamental problem for which there is no simple solution. As a result of this problem, the forecasts presented in the following chapter indicate the levels of commercial fishing industry activity that are expected given the past and present performance of the industry.

Methods Used to Project Harvesting and Processing Activity for the Groundfish Industries

At this early stage in the development of the Alaska groundfish industry, it is not known how or at what rate the industry will develop. Questions as to the size and type of vessels that will dominate the industry, the importance of onboard versus onshore processing, the number of processing lines per fish processing plant, the average productivity per vessel, and the processing labor requirements have yet to be answered. In the absence of such information, the forecasts of the development of this fishery are by necessity based on a set of assumptions. These assumptions are as follow:

- The allowable biological catch (ABC) for the various groundfish species in the Bering Sea and the Gulf of Alaska will remain at the levels presented in the North Pacific Fisheries Management Council's management plans for the Bering Sea (1979) and the Gulf of Alaska (1978).

- The domestic fisheries will have completely replaced foreign fisheries by the year 2000.

- Domestic catch by species or species group will exhibit constant annual rates of growth from the actual catch in 1978 to the ABC in 2000.

- Catch per boat equals 1,600 metric tons (3,257,000 pounds) in 1978 and will increase at an annual rate of 5 percent.

- The average number of landings per boat will be 50 per year.

- The average crew size, including the captain, will be five.

- The processing plant input of whole fish per man year of processing employment will increase at an annual rate of 3 percent from the current level of 91 metric tons (201,000 pounds).

- Landings per processing plant will average 43,500 metric tons (96 million pounds).

- The average processing plant will occupy 2,690 square meters (29,000 square feet) of interior space on 0.81 to 1.62 hectares (two to four acres) of land, and use 2.2 million kilowatt hours of electricity and 218 million liters (57.6 million gallons) of water per year.

o The Alaska groundfish catch will be processed onshore in Alaska.

The basis of each assumption is presented below. The data required to forecast the ABC for each species are not available. Some data suggest that the ABC for pollock may tend to increase and that the ABC's for other species may also tend to change, but the magnitude of the change or, in some cases, the direction of change is not known; the current ABC's thus provide the best available forecasts.

The domestic groundfish fishery has begun to develop but it is too early to know with a high degree of certainty how rapidly the comestic fishery will develop. There are, however, several reasons for believing that the domestic groundifh fishery will replace the foreign fishery in the next 20 to 25 years; they are as follow: a goal of the Alaska Bottomfish Development Program is, "To develop within a period of approximately 20 years the domestic utilization of Alaska bottomfish resource to the fullest optimum yield." (PDBI, 1979, p. 4); the Arthur D. Little report to the Office of the Governor states that, "Full development of Alaska's bottomfish industry will require 15 to 20 years" (Little, 1978, p. 39); and many of the vessels that have been built for the Alaska shellfish fleets in the past few years have been designed to allow them to enter the groundfish fishery as it becomes more profitable and as the shellfish seasons become shorter. The history of the development of the Alaska groundfish industry suggest that the annual increases in catch will at first be rather small but will become continuously larger as the initial impediments are removed. A growth path resulting from a constant annual rate of growth exhibits this characteristic. The current impediments to development which must be removed for the Alaska groundfish industry to develop and which will be removed as it develops include: the absence of both marketing arrangements between harvesters and processors and well established marketing channels, inadequate harvesting and processing knowledge, the high profitability of alternative traditional fisheries, and the uncertainty of the relative profitability of alternative methods of harvesting and processing.

Current estimates of catch per boat range from less than 1,600 metric tons to over 2,400 metric tons. However, vessel productivity will tend to increase for the following reason: as the fishery develops, (1) vessels designed specifically for groundfish will comprise an increasing proportion of the fleet, (2) average boat size will tend to increase, (3) the knowledge of resource location and harvesting methods will increase, and (4) more efficient harvesting methods will be developed. The estimate of the current catch per boat is based on information provided by Petersburg Fisheries; the catch per boat of 4,680 metric tons forecasted for the year 2000 approximates an estimate by Stokes (1978).

The number of landings per boat per year is based on one landing per five days for 250 days a year; this allows for down time due to bad weather, repairs, and holidays. The estimate of one landing per five days is based on data provided by Petersburg Fisheries.

The average crew size will be in part determined by the degree to which onboard processing occurs and the average catch per trawl; as either increases, the crew size tends to increase. Mechanization will tend to hold the crew size at a constant level despite increases in vessel size. The estimated crew size of five allows for only a minor degree of onboard processing such as, perhaps, gutting. The current crew size is typically four to five.

The estimate of the current processing labor requirement per metric ton of whole fish is based on information provided by Petersburg Fisheries and New England Fish Company. Allowing for a 3 percent annual increase in the productivity of labor results in a productivity figure for the year 2000 that approximates the productivity figure cited in a June, 1978, groundfish research report of the Second Session of the Tenth Legislature of the state of Alaska.

The assumed levels of landings and utilization of building space, land, electricity, and water per processing plant are based on a plant with four fillet lines and accompanying roe and minced fish processing equipment. Stokes (1978) indicates that such a plant operating two eight-hour shifts a day can process 218 metric tons (480,000 pounds) of whole fish per day; and allowing for weekends, holidays, maintenance periods, and some irregularities in deliveries, such a p"lant would process 43,600 metric tons (96 million pounds) of fish a year (i.e., 218 metric tons per day, 200 days per year). Assuming a 10-day cold storage holding reserve, the plant would occupy approximately 2,690 square meters (29,000 square feet) of interior space situated on 0.81 to 1.62 hectars (2-4 acres) of land. The assumed levels of water and electricity usage by such a processing plant are based on the assumed level of production and the water and electricity requirements identified in the previously mentioned 1978 groundfish research report of the Alaska Legislature.

In the absence of a well-developed trend toward either onboard or onshore processing, it is assumed that all processing will occur onshore in Alaska; this assumption will generate upper limit forecasts of the groundfish processing input requirements for individual communities and for the state as a whole, since some processing will occur onboard and some of the onshore processing will occur out of Alaska. Processing pollock onshore has proved to be economically feasible in the case of Icicle Seafoods (Martin, 1978); however, Jaeger (1977) indicates that an onshore processor would have to offer a 76 percent price premium to compete with offshore processors due to the additional costs associated with delivering fish to an onshore processor as opposed to a processor located on the fishing grounds. It is not clear whether onshore processing is cost effective if such a premium is paid. The development plans of a number of onshore processors suggest, however, that they think it will be. But it is not known whether the industry will be dominated by the existing processors or by new entrants to fish processing with different perspectives as to the relative profitability of various methods of processing.

The 1978 catch and the ABC's by species or species group by area and the corresponding annual rates of growth are summarized in Table 2.7, and the corresponding annual catch forecasts are presented in Table 2.8. The following comments concerning the forecasts of groundfish industry activity (see Table 2.9) that are generated by the catch forecasts (see Tab"le 2.8) and the assumed relationships between catch and the other measures of industry activity help explain the meaning of the forecasts. The forecast of the number of boats is in fact a forecast of full-time equivalent boats since the assumed level of catch per boat and number of landings per boat are those that may be expected for a boat that participates in the groundfish fishery twelve months per year. Particularly in the early stages of the de'velopment of the fishery, many boats will participate in the fishery on a part-time basis; therefore, the number of boats in the fishery will exceed the forecast of full-time equivalents. The same is true for the forecast of fishermen; the forecast is of fishermen years and will therefore understate the number of fishermen who participate in the fishery during any one year. The forecast of the number of fish processing plants is based on the forecasted catch and an assumed level of output per plant; the characteristics of the plant on which the estimate of plant productivity is based are described above. If the characteristics of plants differ from those of the plant on which the estimate of productivity is based, the forecast will not be correct. For example, if the processing sector is characterized by a large number

TABLE 2.7

BASIS OF GROUNDFISH CATCH FORECASTS

	1978 Catch (MT)	2000 ABC (MT)	Annual Rate of Growth
Bering Sea			
Pollock	491	1,000,000	4'1 .4%
Sablefish	1	85,000	47.3%
Cod	473	58,700	24. 5%
Other Groundfish	99	476,300	47.0%
All Groundfish	1,064	1,540,000	39.2%
Gulf of Alaska			
Pollock	17	164,700	51 .8%
Sablefish	1	12,500	53. 5%
Cod	44	33,300	35.2%
Other Groundfish	59	145,900	42.6%
All Groundfish	121	356,400	43.8%
Southeast Alaska			
Pollock	570	4,100	9.4%
Sablefish	1,337	4,900	6.1%
Cod	103	1,500	12.9%
Other Groundfish	377	21,700	20.2%
All Groundfish	2,387	32,200	12.6%
Alaska			
Pollock	1,078	1,168,800	
Sablefish	1,338	22,400	
Cod	620	93,500	
Other Groundfish	535	643,900	
All Groundfish	3,572	1,928,600	

Sources: 1978 catch: ADF&G. Agenda #4a, 11/30-12/1/78.
ABC's; NPFMC, Fishery-Management Plan for the Gulf of Alaska Groundfish Fishery During ?978, April 21, 1978. Fishery Management Plan and Final Environmental Impact Statement for the Groundfish Fishery in the Bering Sea/Aleutian Island Area, March 23, 1978.

TABLE 2.8

DOMESTIC PROJECTED GROUNDFISH HARVEST
1980-2000

Bering Sea

Year	Weight (1,000 metric tons)					Real Value ($ million)				
	Pollock	Cod	Sablefish	Other	Total	Pollock	Cod	Sablefish	Other	Total
1980	1.0	0.7	0.0	0.2	1.9	0.2	0.3	0.0	0.1	0.5
1981	1.4	O*9	0.0	0.3	2.6	0.2	0.3	O*O	0*1	0.6
1982	2.0	1.1	0,0	O*5	3.6	0.3	044	0.0	0.1	O*9
1983	2.8	1.4	0.0	0.7	4.9	0.5	0.5	0.0	0.2	1.1
1984	3.9	1.8	0.0	1.0	6.7	0.6	0.6	0.0	0.3	105
1985	5.5	2.2	0.0	1.5	9.2	(3.9	0.8	0.0	0.4	2,1
1986	7.8	2.7	0.0	2*2	12.8	1.3	1.0	0.0	0.6	2.9
1987	11*1	3.4	0.0	3.2	17.7	1.8	1*2	0.0	0.9	3,9
1988	15.7	4.2	0.0	4*7	24.6	2.6	1.5	0.1	1.3	5.4
1989	22.2	5.3	0.1	6.9	34.4	3,6	1.8	0.1	1.9	7*5
1990	31.3	6.6	0.1	10*1	48.1	5.1	2.3	0.2	2.8	10*4
1991	44.3	8.2	0,2	14.8	67,5	7.2	2.8	0.2	4.1	14.4
1992	62.6	10.2	0.2	21.8	94.8	10.2	3*5	O*3	601	20.2
1993	88.5	12.7	0.3	32.1	13306	14.4	4.4	0.5	9.0	28.3
1994	125.2	15.8	005	47.2	188.6	20.4	5.5	0.7	13.2	39.8
1995	177,0	19.6	0.7	69.3	266.7	28.8	6.8	1.1	19.4	56,1
1996	250.3	24.4	1.1	101*9	377.7	40.7	8.5	1.6	28.5	79.3
1997	353.8	30.4	106	149.9	535.7	57.6	10.6	2.4	41.8	112.4
1998	500.3	37.9	2.3	220.4	760.8	81.4	13.2	3*5	61.5	159,6
1999	707.3	47.1	3.4	324.0	1081.8	115.2	16.4	5.1	90.4	227.2
2000	1000.0	58.7	5.(-J	476.3	1540.0	162.8	20.5	7.6	132.9	323.8

TABLE 2.8 (Continued)

Gulf of Alaska

Year	Weight (1,000 metric tons)					Real Value ($ million)				
	Pollock	Cod	Sablefish	Other	Total	Pollock	Cod	Sablefish	Other	Total
1980	0.0	0.1	0.0	0.1	0.2	0.0	000	0.0	0.0	0.1
1981	0.1	O*1	0.()	0.2	0.3	0.0	0.0	0.0	0.0	0.1
1982	0.1	0.1	0.0	0.2	0.5	0.0	0.1	000	0.1	0.1
1983	0.1	0.2	0.0	0.3	0.7	O*O	0.1	000	O*1	0.2
1984	O*2	0.3	0.0	0.5	1.0	0.0	0.1	0,0	0.1	0.3
1985	0.3	O*4	0.0	0.7	1.4	0.1	O*1	0.0	0.2	0.4
1986	0.5	0.5	0.0	1.0	2.0	0.1	O*2	0.0	0.3	0.6
1987	0.7	0.7	O*O	1*4	2.9	O*1	0,2	0.1	O*4	0.8
1988	1.1	0.9	O*1	2*1	“ 4.1	0.2	0.3	0.1	0.6	1.2
1989	1.7	1.2	O*1	2.9	5.9	0.3	O*4	042	0.8	1.7
1990	2.5	1.6	0,2	4.2	8.5	0.4	0,6	0.3	1.2	2.4
1991	3.9	2.2	0.3	6.0	12.3	0.6	0.8	0.4	‘1.7	3.5
1992	5.8	3.0	0.4	8*5	17.8	1.0	100	0.6	2.4	5*O
1993	8,9	4.0	0.6	12.1	25.7	1*4	1.4	O*9	3.4	7.2
1994	13.5	5.5	1.0	17*3	37.2	2*2	109	1*4	4.8	10.4
1995	20.5	7.4	1.5	24.7	54.0	3*3	2.6	2,2	6.9	15.0
1996	31*O	10.0	2.2	35.2	78.5	5*1	3.5	3.4	9.8	21.8
1997	47.1	13.5	3*5	50.3	114.3	7.7	4.7	5.2	14*O	31,6
1998	71.5	18.2	5*3	71.7	166.7	11.6	6.4 ,	8.0	20.0	46.0
1999	108.5	24.6	8.1	102.3	243.6	17*7	8*6	12.3	28.5	67.1
2000	164.7	33.3	12,5	145.9	356.4	26.8	11.6	18.9	40.7	98.1

TABLE 2.8 (Continued)

Southeast Alaska

Year	Weight (1,000 metric tons) Pollock	Cod	Sablefish	Other	Total	Real Value ($ million) Pollock	Cod	Sablefish	Other	Total
1980	0.7	0.1	1*5	O*5	2.9	0.1	0.0	2.3	0.2	2.6
1981	0.7	0.1	1.6	0.7	3.1	0.1	0.1	2.4	O*2	2.8
1982	0.8	0.2	1.7	0.8	3.5	0.1	0.1	2.6	0.2	3.0
1983	0.9	0.2	1.8	O*9	3.8	0.1	0.1	2.7	O*3	3.2
1984	1.0	0.2	1,9	1.1	4.2	0.2	0.1	2.9	0.3	3.4
1985	1.1	0,2	2.0	1.4	4*7	O*2	0.1	3.1	0.4	3.7
1986	1.2	0s3	2.1	1.6	5.2	0.2	0.1	3.2	0.5	4.0
1987	1.3	0.3	2.3	2*O	5.8	0.2	0.1	3.4	0.6	4,3
1988	1.4	0.3	2.4	2.4	6*5	002	0.1	3.6	0,7	4.7
1989	1.5	0.4	2.6	2.9	7.3	O*2	0.1	3.9	0.8	5.1
1990	1.7	0.4	2.7	3*4	8.3	O*3	0.2	4.1	1,0	5*5
1991	1.8	0.5	2.9	4.1	9.3	003	0.2	4.4	1.2	6.0
1992	2.0	0.6	3.1	5.0	10.6	0.3	0.2	4.6	1.4	6.5
1993	2.2	0.6	3.2	6.0	12.0	0,4	0.2	4*9	1.7	7.1
1994	2.4	0.7	3.4	7.2	13.7	0.4	0.3	5.2	2.0	7.8
1995	2.6	0.8	3.6	8.6	15.7	0.4	O*3	5.5	2.4	8.6
1996	2.9	O*9	3.9	10.4	18.0	O*5	0.3	5.8	2.9	9.5
1997	3.1	1.0	4.1	12.5	20.8	0.5	0.4	6.2	3,5	10.6
1998	3*4	1.2	4.4	15*O	24.0	0.6	0.4	6,6	4.2	11,7
1999	3.7	1.3	4.6	18.0	27.7	0.6	0.5	7.0	5.0	13.1
2000	4.1	1.5	4.9	21.7	32.2	0,7	O*5	7.4	6.1	14,7

Table 2.8 (Continued)

Alaska

Year	Weight (1,000 metric tons)					Real Value ($ million)				
	Pollock	Cod	Sablefish	Other	Total	Pollock	Cod	Sablefish	Other	Total
1980	1.7	0.9	1.5	0.9	5.0	O*3	0.3	2.3	C)*2	3.1
1981	2.2	1*2	1.6	1.1	6.1	0.4	0.4	2.4	O*3	3.5
1982	2.9	1.5	1.7	1.5	7.5	0.5	O*5	2.6	0.4	4.0
1983	3.8	1.8	1.8	2.0	9*4	0.6	0.6	2.7	0.6	4.5
1984	5.1	2.2	1.9	2.6	11.9	0.8	0.8	2.9	0.7	5*3
1985	6.9	2.8	2.1	3*5	15.3	1*1	1*O	3.1	1.0	6.2
1986	9.5	3*5	2.2	4.8	20.0	1.5	1.2	3,3	1.3	7.4
1987	13.1	4.4	2.4	6.6	26.4	2.1	1.5	3.6	1,8	9.1
1988	18.2	5.5	2.5	9.1	35.3	3.0	1.9	3,8	2.5	11.2
1989	25.4	6.9	2.7	12.7	47.6	4.1	2.4	4.1	3.5	14.2
1990	35*5	8.6	3.0	17.7	64.9	5.8	3.0	4.5	4.9	18.3
1991	50,0	10.9	3.3	24.9	89.1	8.1	3.8	5.0	7.0	23.9
1992	70.5	13.7	3.7	35.3	123.2	11*5	4.8	5.6	9.9	31,7
1993	99.6	17.3	4.2	50.2	171*3	16.2	6.0	6.3	14.0	42.6
1994	141.1	21.9	4.9	71.7	239.6	23.0	7.7	7*4	20,0	58,0
1995	200.1	27.8	5*8	102.7	336.4	32,6	9.7	8.8	28.7	79.8
1996	284.2	35.3	7.2	147.6	474.2	46.3	12.3	10.9	41.2	110.6
1997	404.1	44.9	9.1	212.6	0670.8	65.8	15.7	13.8	59.3	154,6
1998	575.2	57.3	12.0	307.1	951.5	93.6	20.0	18,1	85.7	217.4
1999	819.6	73.1	16.2	4’44.3	1353*1	133,4	25.5	24.4	124.0	307.4
2000	1168.8	93.5	22.4	643.9	1928.6	190.3	32.6	33.9	179.7	436,5

TABLE 2.9

DOMESTIC GROUNDFISH INDUSTRY
1980-2000

Bering Sea

Year	Catch (1000 MT)	Real Value ($ Million)	Number of Boats	Number of Landings	Number of Fishermen	Number of Plants	Processing Inputs: Employees	Processing Inputs: Land hectares	Processing Inputs: Electricity million KWH	Processing Inputs: Water million liters
1980	1.9	0.5	1.1	54.7	5.5	0.0	2000	0.1	0.1	9*7
1981	2.6	0.6	1*4	70,7	7.1	0.1	26.3	0.1	O*1	13.1
1982	3.6	0.9	1.8	91.7	9.2	0.1	34.8	0*1	O*2	17.8
1983	4*9	1.1	2.4	119*4	11.9	0.1	46,2	0.1	0.2	24.4
1984	6.7	1.5	3.1	156.1	15.6	O*2	61.6	0.2	0,3	33,5
1985	9.2	2.1	4.1	204.8	20.5	0.2	82.4	O*3	0.5	46.1
1986	12.8	2.9	5.4	269..8	27.0	0.3	110.6	0.4	0,6	63,8
1987	17.7	3*9	7.1	356.4	35.6	0.4	149.0	0.5	0.9	88.5
1988	24.6	5.4	9.4	472.4	47.2	0.6	201,3	0.7	1.2	123.1
1989	34.4	7*5	12.6	627.9	62.8	0.8	272.8	1.0	1.7	171.8
1990	48.1	10.4	16.7	836.8	83*7	1.1	370.6	1.3	2.4	240.4
1991	67.5	14.4	22.4	1118.0	111.8	1.5	504.8	1,9	3*4	337.3
1992	94.8	20.2	29.9	1496.9	149.7	2.2	689.0	2.6	4,8	474,2
1993	133.6	28.3	40.2	2008.5	200.9	3.1	942.5	3*7	6.7	668.1
1994	188.6	39.8	54.()	2700,1	270.0	4.3	1291.6	5*3	9*5	943.0
1995	266.7	56.1	72.7	3636.1	363.6	6.1	1773.1	7*4	1305	1333.4
1996	377.7	79.3	98.1	4904.4	490.4	8.7	2438.0	10.5	19.1	1888.5
1997	535.7	112.4	132.5	6624.7	662.5	12.3	3357.1	14.9	27.0	2678.4
1998	760.8	159.6	179.2	8960.4	896.0	17.4	4628.9	21.2	38.4	3803.9
1999	1081.8	227.2	242.7	12134.5	1213.4	24.8	6390.3	30.1	54.6	5409.0
2000	1540.0	323.8	329.0	16451.5	1645.2	35*3	8832.0	42.9	77*7	7700.0

TABLE 2.9 (Continued)

Gulf of Alaska

Year	Catch (1000 MT)	Real Value ($ million)	Number of Boats	Number of Landings	Number of Fishermen	Number of Plants	Employees	Processing Inputs: Land hectares	Processing Inputs: Electricity million KWH	Processing Inputs: Water million liters
1980	0.2	0.1	0.1	6.9	0.7	0.0	2,5	O*O	000	1.2
1981	0.3	0.1	0.2	9.3	0.9	0.0	3.4	0.0	0.0	1.7
1982	0.5	O*1	0.3	12.5	1.3	0.0	4.8	0.0	0.0	2.4
1983	0.7	0.2	0.3	17.0	1.7	0.0	6.6	0.0	0.0	3.5
1984	1*O	0.3	0.5	23.0	2.3	0.0	9*1	0.0	O*O	4.9
1985	1.4	O*4	0.6	31,2	3.1	0.0	12.6	O*O	O*1	7*O
1986	2*O	0.6	0.9	42.5	4.3	0.0	17.4	O*1	O*1	10*1
1987	2.9	0.8	1.2	58.0	5.8	0.1	24.2	O*1	0.1	14*4
1988	4.1	1.2	1.6	79.2	7.9	0.1	33.8	0.1	0.2	20.6
1989	5*9	1*7	2*2	108,3	10.8	0.1	47*1	0,2	0.3	29.6
1990	8.5	2.4	3.0	148.5	14.8	0.2	65.8	0.2	0.4	42.7
1991	12.3	3.5	4.1	203,8	20.4	0.3	92.0	0.3	0.6	61.5
1992	17.8	5.0	5.6	280,3	28.0	0.4	129.0	0.5	O*9	88.8
1993	25.7	7.2	7.7	386.1	38.6	0.6	181.2	0,7	1.3	128.4
1994	37.2	10.4	10.7	532.8	53*3	009	254.8	1.0	1*9	186.1
1995	54.0	15.0	14.7	736.4	73.6	1.2	359.1	1.5	2.7	270.0
1996	78.5	21.8	20.4	1019.5	101.9	1.8	506.8	2*2	4.0	392.6
1997	114.3	31.6	28.3	1413.8	141.4	2.6	716.4	3.2	5.8	571.6
1998	166.7	46.0	39.3	1963.8	196.4	3.8	1014.5	4.6	8.4	833.7
1999	243.6	67.1	54.6	2732.2	273.2	5,6	1438.9	6.8	12.3	1217.9
2000	356.4	98.1	76.1	3807.4	380.7	8.2	2044.0	9*9	18.0	1782.0

TABLE 2.9 (Continued)

Alaska

Year	Catch (1000 MT)	Real Value ($ Million)	Number of: Boats	Number of: Landings	Number of: Fishermen	Number of: Plants	Employees	Processing Inputs: Land hectares	Processing Inputs: Electricity million KWH	Processing Inputs: Water million liters
1980	5*O	3.1	2.9	142.7	14.3	0.1	52.2	0.1	0.3	25.2
1981	6.1	3.5	3*3	164.9	16.5	0.1	61.4	O*2	0.3	30.5
1982	7.5	4*O	3*9	193.3	19.3	0.2	73.4	0.2	O*4	37.6
1983	9.4	4.5	4.6	230,0	23.0	002	89,0	0.3	0.5	47.0
1984	11.9	5.3	5.6	277.8	27.8	0,3	109.6	0.3	0.6	59.6
1985	15.3	6.2	6*8	340.5	34*O	0.4	137.0	"0.4	0.8	76.6
1986	20.0	7*4	8.5	422,9	42.3	0.5	173*5	0.6	1.0	100.0
1987	26.4	9*1	10,6	532.0	53.2	0.6	222.4	0.7	1.3	132.1
1988	35*3	11.2	13.5	677.0	67.7	0.8	288.5	1*O	1.8	176.4
1989	47.6	14.2	17.4	870.4	87.0	1.1	378.2	1,3	2.4	238.2
1990	64.9	18.3	22.6	1129.2	112.9	1.5	500.1	1.8	3*3	324.5
1991	89.1	23.9	29.5	1476,6	147.7	2*O	666.7	2.5	4.5	445.5
1992	123.2	31.7	38,9	1944.4	194.4	2.8	895.0	3*4	6.2	616.0
1993	171.3	42.6	51*5	2575.7	257.6	3.9	1208.6	4,8	8.6	856.7
1994	239.6	58.0	68*6	3429.6	343.()	5.5	1640.5	6.7	12.1	1197.8
1995	336.4	79.8	91.7	4586.8	458.7	7.7	2236.7	9.4	17.0	1682.1
1996	474.2	110.6	123.2	6158.1	615.8	10,9	3061.2	13.2	23.9	2371.2
1997	670.8	154.6	165.9	8295.3	829.5	15.4	4203.7	18.7	33.8	3353.9
1998	951.5	217.4	224.1	11206.5	1120.7	21,8	5789.2	26.5	48.0	4757*5
1999	1353*1	307.4	303.6	15177.9	1517.8	31.0	7993.1	37.7	68.3	6765.6
2000	1928.6	436.5	412.1	20602.9	2060.3	44.2	11060.7	53.7	97*3	9643.0

TABLE 2.9 (Continued)

Southeast Alaska

Year	Catch (1000 MT)	Real Value ($ Million)	Number of Boats	Number of Landings	Number of Fishermen	Number of Plants	Processing Inputs: Employees	Processing Inputs: Land hectares	Processing Inputs: Electricity million KWH	Processing Inputs: Water 'million liters
1980	2.9	2.6	1.6	81.1	8.1	0.1	29.7	0.1	0.1	14.3
1981	3*1	2.8	1.7	84.9	8.5	0.1	31.6	001	0.2	15.7
1982	3.5	3.0	1.8	89.1	8.9	0.1	33.8	0.1	O*2	17.3
1983	3.8	3,2	1.9	93*7	9.4	O*1	36.3	O*1	0.2	19.1
1984	4.2	3.4	2.0	98.7	9.9	0.1	39.0	O*1	0.2	21.2
1985	4.7	3,7	2.1	104.4	10.4	0.1	42.0	091	0.2	23.5
1986	5.2	4.0	2.2	110.6	11.1	0.1	45.4	0.1	0.3	26,2
1987	5.8	4.3	2.4	117.6	11.8	0.1	49.2	O*2	0.3	2902
1988	6.5	4.7	2.5	125.4	12.5	0.1	53.5	0.2	0.3	32.7
1989	7.3	5.1	2.7	134*1	13.4	0.2	58.3	0.2	0.4	36.7
1990	8.3	5.5	2.9	143.9	14*4	0.2	63.7	0.2	0.4	41,4
1991	9.3	6.0	3.1	154*9	1505	0.2	69.9	0.3	0.5	46.7
1992	10.6	6.5	3.3	167.2	16.7	0.2	77.0	O*3	0.5	53.0
1993	12.0	7.1	3.6	181.1	18.1	0.3	85.0	0.3	0.6	6 0 0 2
1994	13*7	7.8	3.9	196.7	19.7	O*3	94.1	0,4	0.7	68.7
1995	15.7	8.6	4.3	214.3	21.4	O*4	104.5	0,4	0.8	78.6
1996	18.0	9*5	4.7	234,3	23.4	0.4	116.5	0.5	O*9	90.2
1997	20.8	10.6	5*1	256.8	25.7	O*5	130.1	0.6	1.0	103.8
1998	24.0	11*7	5.6	282.3	28.2	0.5	145.8	0.7	1*2	119.8
1999	27.7	13.1	6.2	311.2	31.1	0.6	163.9	Oil	1.4	138.7
2000	32.2	14.7	6.9	344,0	34.4	0.7	184.7	0.9	1.6	161.0

of plants with one to two groundfish lines, the forecasts will understate the number of processing plants by a factor of two to four; conversely, if there is more concentration and specialization in groundfish processing and plants have more than four lines, the forecasts will overstate the number of plants. There are efficiencies associated with plants of four or more lines, but there is a tendency in the industry for existing processors to expand into a new fishery once it begins to develop and other fisheries begin to contract. The former will tend to result in fewer but larger plants but the latter will have the opposite effect. As the industry begins to develop, the latter may result in the forecasts understating the number of plants, but in the long run, efficiency may become the dominant factor in determining plant size. The forecast of the number of plants is also based on the assumption that two shifts of eight hours each are run 200 days per year. If fewer shifts are run per year, the forecast will tend to understate the actual number of plants. The forecasts of processing input requirements for labor, water, electricity and land are based on estimates of the input requirements per unit of whole fish and are therefore somewhat independent of plant size. The processing labor forecast is in terms of man years.

The two questions that remain to be answered are: (1) is the growth forecasted for the groundfish industry possible in terms of the availability of inputs and (2) where will the development occur? The answer to the first question appears to be yes, the inputs will be available for the following reasons: the increases in input requirements are at first relatively modest; there is currently excess capacity in both the harvesting and processing sectors, the NPFMC'S estimates of current domestic harvesting and processing capacity exceed the annual catch forecasts through the 1980's; and the large increases in input requirements will occur only after the continued development of the industry is well assured and can thus be planned for.

Within the limits set by the location of the fishery resources, the answer to the question concerning the location of the groundfish industry will be determined by the type of boats that dominate the industry. The foreign fleets have consisted primarily of large catcher processors and/or mother ships serviced by large fishing vessels. With the exception of the actual harvesting and onboard processing, the foreign groundfish industry has been located in the home ports of these vessels and those who man them. If a similar fleet is developed in the domestic groundfish industry, it may not be centered in Alaska. However, the domestic trawl fleet is expected to be quite different from the foreign high seas fleet that it will replace. The domestic fleet is expected to consist of a large number of relatively small trawlers and/or multi-purpose vessels from 22.9 to 53.3 meters (75 to 175 feet) in length which will deliver the bulk of the groundfish catch to shorebased processing centers within perhaps 240 kilometers (150 miles) of the fisning grounds. The size of the present and proposed domestic boats limits their capacity to process and preserve fish and therefore tends to determine the ability of a given processing center to service particular fishing grounds. The location of groundfish processing centers will therefore depend on the location of the fishing grounds; however, it will also depend on the current location of traditional fishery processing centers. This is due to both the economies associated with locating a new processing plant where the infrastructure for fish processing already exists and the propensity of existing processing plants to enter new fisheries as their profitability relative to existing fisheries increases and as declines in other fisheries result in excess capacity.

On the basis of the preceding analysis, the Lower Cook Inlet and Shelikof Strait ports would be expected to compete with Kodiak and Seward for groundfish harvested in the Gulf of Alaska. However, due to the greater access to the Gulf fisheries from either Kodiak or Seward and due to the more developed port and harbor facilities that are available in either community, the study area communities are not expected to be major points of landing for the Gulf of Alaska groundfish fleet; but a small boat fishery that will deliver almost exclusively to Lower Cook Inlet ports is expected to develop. The development of such a fishery will in part be made possible by the harvesting, processing, and marketing knowledge generated as the groundfish industry develops elsewhere in Alaska.

It is difficult to determine what the sustainable yield may be for the Cook Inlet and Shelikof Strait groundfish fisheries because unlike the Gulf of Alaska, neither Cook Inlet nor Shelikof Strait has been intensively fished by foreign or domestic fleets. The one exception is halibut; there have been active halibut fisheries in the study area for many years. The proportion of the Area 3 halibut catch harvested in the study area and estimates of the Gulf of Alaska groundfish resources provide estimates of the Cook Inlet and Shelikof Strait groundfish resources. On this basis the Cook Inlet and Shelikof Strait harvests are expected to be approximately 5 and 14 percent, respectively, of the Gulf of Alaska harvest.

The element of the groundfish industry forecast methodology yet to be explained is that used to forecast prices. In the absence of both relevant historical exvessel price data and information concerning the marketing opportunities for domestically harvested Alaska groundfish that are required to forecast exvessel prices, it is assumed that real exvessel prices will remain constant or equivalently that nominal prices will increase at the same rate as the Consumer Price Index.

III. PROJECTIONS OF THE COMMERCIAL FISHING INDUSTRIES OF COOK INLET AND SHELIKOF STRAIT IN THE ABSENCE OF OCS ACTIVITY PURSUANT TO LEASE SALE NUMBER 60

This chapter is divided into two subchapters, one for each of the two fishing industries. Each subchapter includes: (1) a brief introduction to the commercial fishing industry, (2) the non-OCS case projections generated using the methodology discussed in the preceding chapter, and (3) an assessment of the feasibility of the projections in terms of the projections of population, employment, physical systems, and transportation systems presented in other Studies Program reports and in terms of the expected characteristics of the market and governmental environments that are not incorporated in the projection models.

The Cook Inlet Commercial Fishing Industry

The Cook Inlet commercial fishing industry has been defined to consist of the harvesting activity which occurs in the Cook Inlet management area and the processing activity which occurs in Anchorage and on the Kenai Peninsula (see Figure 3.1). Although many Cook Inlet communities are associated with the commercial fishing industry, the activity of the industry is concentrated in Anchorage, Kenai, Soldotna, Ninilchik, Homer, Seldovia, and Port Graham. The commercial fishing industry is an important source of income and employment in Cook Inlet, and in many of the smaller communities it is the major source. The fisheries that have contributed to making Cook Inlet an important, although not a dominant, part of the Alaska commercial fishing industry include salmon, herring, halibut, king crab, Tanner crab, Dungeness crab, shrimp, and razor

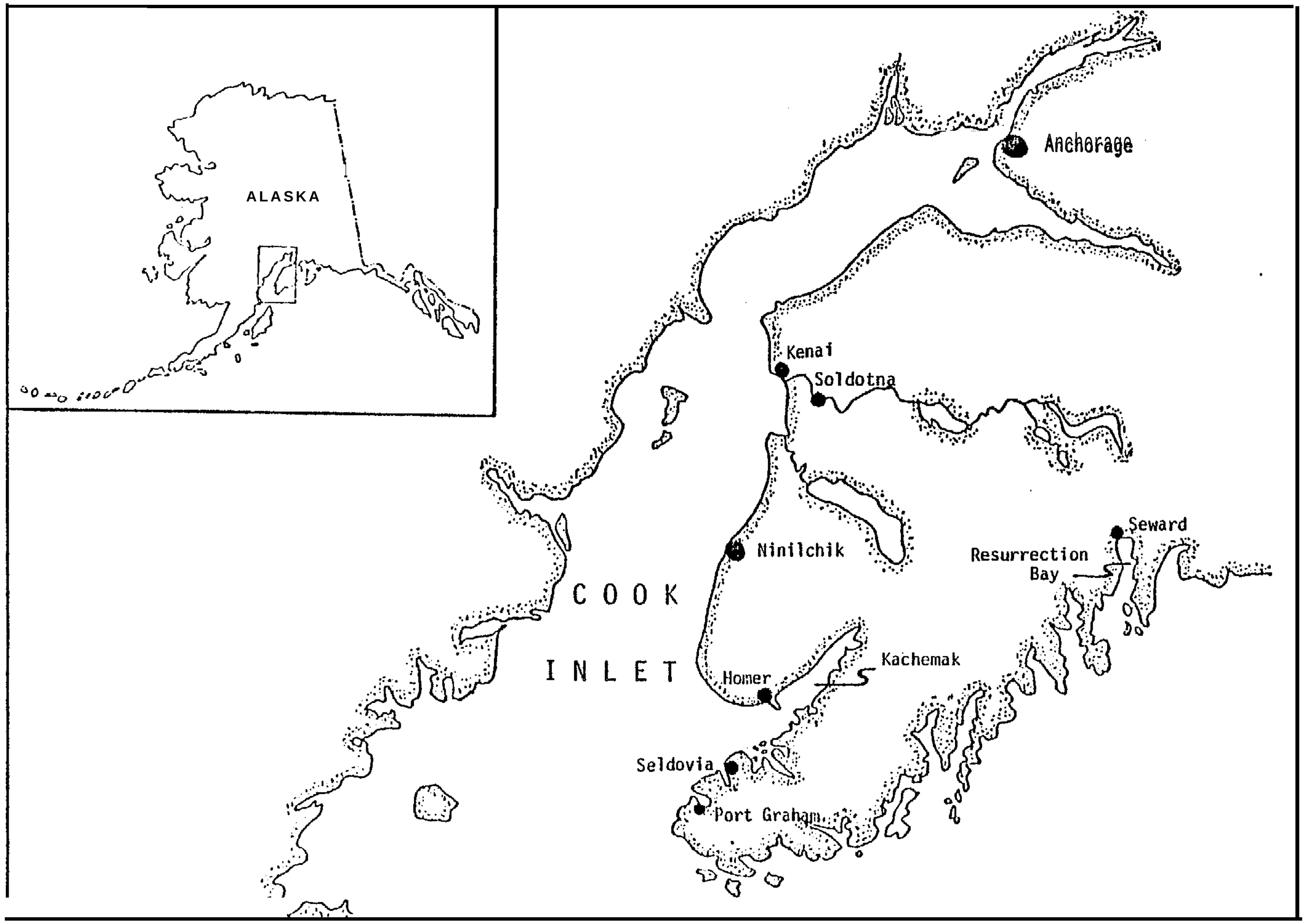

Figure 3.1 : Cook Inlet Management Area,

clams. The importance of each of these fisheries is summarized in Tables 3.1 and 3.2.

During the next twenty years, the growth of the industry is expected to result primarily from increased domestic utilization of the groundfish resource of Cook Inlet. Resource management, enhancement, and rehabilitation programs, which are expected to allow further expansion of the salmon and halibut fisheries and stability in the shellfish fisheries, are expected to result in the traditional fisheries being a continuing but moderate source of growth. Between 1980 and 2000, harvest weight and real value are projected to increase by 114 percent and 63 percent, respectively. The corresponding rates of growth for the traditional fisheries alone are 21 percent and 46 percent. Processing employment and real income are expected to increase less rapidly than catch due to increased processing efficiency. Assuming a 2 percent annual rate of increase in processing efficiency, total processing employment is projected to decrease by 5 percent between 1980 and 2000, and real income is projected to increase by 15 percent. If increases in processing efficiency are not allowed for, processing employment and real income are projected to exceed current levels by 36 percent and 64 percent respectively. The projections of harvesting activity by fishery on which this brief summary is based and the projections of processing activity are presented in the following sections.

YEAR	SALMON	HERRING	HALIBUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	ALL SHELLFISH	TOTAL OF FISHERIES INCLUDED” IN THIS STUDY	TOTAL ALL FISHERIES
1973	14,418	3,184	3,972	4,349	8,509	330	4,897	18,085	39,659	39,808
1974	10,341	5,389	1,930	4,602	7,661	721	5,749	18,733	36,393	36,535
1975	18,045	8,298	3,935	2,886	4,952	363	4,752	12,953	43,231	43,248
1976	23,298	9,696	3,418	4,954	5,935	119	6,208	17,216	53,628	53,639
1977	36,012	6,436	3,249	2,027	5,650	76	5,144	12,897	58,594	58,607
Mean	20,443	6,600	3,300	3,764	6,541	322	5,350	15,976	46,301	46,367

YEAR	PERCENTAGE OF SHELLFISH INCLUDED	PERCENTAGE OF MISCELLANEOUS FISH INCLUDED	PERCENTAGE OF ALL FISH INCLUDED
1973	99.55	97.87	99.62
1974	100.00	97.43	99.61
1975	99.91	99.92	99.96
1976	99.99	99.89	99.97
1977	99.98	99.82	99.97

Percentage of All Included Fisheries

YEAR	SALMON	HERRING	HALIBUT	KING CRAB	TANNER CRAB	DUNGENESS CRAB	SHRIMP	ALL SHELLFISH
1973	36.35	8.02	10.01	10.96	21.45	0.83	12.34	45.60
1974	28.41	14.80	5.30	12.64	21.05	1.98	15.79	51.47
1975	41.74	19.19	9.10	6.67	11.45	0.83	10.99	29.96
1976	43.44	18.98	6.37	9.23	11.06	0.22	11.57	32.10
1977	61.46	10.98	5.54	3.45	9.64	0.13	8.77	22.01

Sources: ADF&G Annual Catch and Production Reports and Salmon and Shellfish Catch Reports, IPHC Annual Reports.

TABLE 3.2

COOK INLET HARVEST VALUE
1969-1976

VALUE IN $1,000

Year	Salmon	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Total
1.969	2133	54	731	158	7	68	3151
1970	3531	192!	1089	133	27	237	5209
1971	2302	268	1247	212	24	289	4342
1972	3814	0	1509	717	15	425	6480
1973	7064	249	2870	1447	198	384	12212
1974	6935	478	2163	1532	397	2808	14313
1975	8315	331	1185	693	171	1086	11781
1976	14138	948	3518	1246	63	852	20765

Percentage of Value by Fishery

1969	67.69	1.71	23.20	5.01	O*22	2.16	100.00
1970	67.79	3.69	20.91	2.55	0.52	4.55	100*OO
1971	53.02	6.17	28.72	4.88	0.55	6,66	100.00
1972	58.86	0	23.29	11.06	0.23	6.56	100.00
1973	57.84	2.04	23.50	11.85	1.62	3*14	100.00
1974	48.45	3.34	15.11	10070	2.77	19.62	100.00
1975	70.58	2.81	10.06	5,88	1*45	9.22	100.00
1976	68.09	4.57	16.94	6.00	0.30	4.10	100.00

Source: Commercial Fisheries Entry Commission Gross Earnings File.

HARVESTING

Projections of harvesting activity and limited historical data are presented by species or species group in this section. The models used in making the projections are discussed in Chapter II.

Salmon

Three distinct Cook Inlet salmon fisheries can be defined by gear type; they are the purse seine, drift gill net, and set gill net fisheries. The Upper Cook Inlet areas are primarily gill net areas, and the Lower and Outer Cook Inlet areas are primarily purse seine areas. Some of the pertinent differences between these fisheries are summarized in Table 3.3.

TABLE 3.3

CHARACTERISTICS OF THE COOK INLET SALMON FISHERIES

	Purse Seine	Drift Gill Net	Set Gill Net
Season[1]	July-August	June-August	June-September
Typical Boat Size[2]	(26-35 feet)	(26-35 feet)	(under 25 feet)[3]
Crew Size	4	2	1

[1] Fishing occurs during prescribed periods each week during the season.

[2] To convert to meters multiply by 0.305

[3] In some areas, set gill net gear can be used without a boat.

In recent years there have been red and chum salmon harvests that approach or surpass record harvests of the last twenty-five years. These recent successes, together with continually improving management, enhancement, and rehabilitation programs, suggest that the Cook Inlet salmon resources will tend to increase. Annual harvest weight is projected to increase from 9,224 metric tons (20.4 million pounds) in 1980 to 12,778 metric tons (28.2 million pounds) in 2000, and real harvest value is projected to increase from $18.0 million to $30.5 million (see Table 3.4). The corresponding percentage increases in the weight and real value are 38.5 percent and 70.0 percent (see Table 3.5). The more rapid increase in value is the result of the projected increase in the real exvessel price of salmon. Annual rates of change are summarized in Table 3.6. Due to the excess harvesting capacity that exists today, an increase in the number of boats and/or fishermen is not necessary to harvest the catch projected for 2000, and due to the existence of the limited entry program such increases are not expected to occur. Projections of catch by species and harvesting activity by gear type are presented in Tables 3.7 through 3.10.

An issue which has become critical in Cook Inlet is the allocation of harvestable salmon between commercial and recreational fishermen. Cook Inlet salmon fishermen appear to be more concerned with this issue than any other. The proximity and accessibility of the Cook Inlet salmon resources to Anchorage have resulted in increased political pressure to increase the allocation to recreational fishermen. There is no simple solution to this problem since the resource base is not sufficient to fully satisfy the demands of both user groups. If there are dramatic

TABLE 3.4

PROJECTED HARVESTING ACTIVITY
COOK INLET SALMON FISHERIES, ALL GEAR TYPES
1980-2000

	Catch				Exvessel Price					Catch per Boat	
	Weight		Value		($/Pound)		Number of				
Year	Pounds (millions)	Metric Tons	(millions) Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen	Pounds (1000)	Real Value ($1000)
1980	20.3	9224	18.0	18.0	0.88	0.88	1249	11648	2039	16	14
1981	20,9	9462	19.1	18.1	0.91	0.87	1249	11795	2039	17	14
1982	21.,4	9713	21.1	19.0	0.99	0.89	1249	11950	2039	17	15
1983	22.0	9977	22*8	19.4	1.03	0.88	1249	12113	2039	18	16
1984	22.6	10256	25.0	20.2	1.11	0.89	1249	12285	2039	18	16
1985	23.3	10550	?7.2	20.8	1.17	0.89	1249	12467	2039	19	17
1986	23.S	10652	29,3	21.3	1.25	0.91	1249	12532	2039	19	17
1987	23.7	10757	31.5	21.6	1.33	0.91	1249	12599	2039	19	17
1988	24.0	10867	33.9	22.1	1.42	0.92	1249	12670	2039	19	18
1989	24.2	10982	36.5	22.6	1.51	0.93	1249	12745	2039	19	18
1990	24.5	11102	39.4	23.1	1.61	O*94	1249	12824	2039	20	18
1991	24.8	11229	42.5	23.6	1.72	0.95	1249	12908	2039	20	19
1992	25.0	11362	46,0	24.2	1.83	0.97	1249	12997	2039	20	19
1993	25.4	11503	49.7	24.8	1.96	0.98	1249	13091	2039	20	20
1994	25.7	11652	53.8	25.4	2.09	(3,99	1249	13192	2039	21	20
1995	26.0	11810	58.3	26.1	2.24	1.00	1249	13301	2039	21	21
1996	26.4	11978	63.3	26.9	2.40	1.02	1249	13417	2039	21	22
1997	26.8	12157	68.8	27.7	2.57	1.03	1249	13543	2039	21	22
1998	27.2	1234'?	74.8	28.5	2.75	1.05	1249	13678	2039	22	23
1999	27.7	12556	81.5	29.5	2.95	1.07	1249	13826	2039	22	24
2000	28.2	12778	89.0	30.5	3.16	1.08	1249	13987	2039	23	24

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.5

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET SALMON FISHERIES, ALL GEAR TYPES
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	2.6	0.5	3.3	-2.1	0	1.3	0	2.6	0.5
1982	5.3	5.5	11.5	0.2	0	2.6	0	5*3	5.5
1983	8.2	7.7	17.0	-O*4	0	4.0	0	8.2	7.7
1984	11*2	12.3	25.1	1*O	0	5.5	0	11.2	12.3
1985	14.4	15.7	32.2	1.1	0	7.0	0	14.4	15.7
1986	15.5	18.3	41.2	2.4	0	7.6	0	15.5	18.3
1987	16.6	20.3	50.0	3.1	0	8.2	0	16.6	20.3
1988	17.8	22.9	60.1	4.3	0	8.8	0	17.8	22.9
1989	1.901	25.4	70.5	5.3	0	9.4	0	19.1	25.4
1990	2004	28.3	82.0	6.6	0	10.1	0	20.4	28.3
1991	21.7	31.2	94.2	7*7	0	10.8	0	21.7	31.2
1992	23.2	34.4	11-)7.4	9.1	0	11.6	0	.?3.2	34.4
1993	24.7	37*7	121.5	10*4	o	12.4	o	24.7	37.7
1994	26.3	41*3	136.8	11.9	0	13.3	0	26.3	41.3
1995	28.0	45.2	153.?	13.4	0	14.2	0	28.0	45.2
1996	29.9	49.4	170.9	15.0	0	15.2	o	29.9	49.4
1997	31,8	53.8	190.0	16.7	0	16*3	0	31.8	53.8
1998	33.9	58.7	210.7	18.5	0	17.4	0	33.9	58.7
1999	36.1	63.9	233.0	20.4	0	18.7	0	36.1	63.9
2000	38.5	69.6	257.2	22.4	0	20.1	0	38.5	69.6

TABLE 3.6

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET SALMON FISHERIES, ALL GEAR TYPES
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	2.6	0.5	3.3	-2*1	0	1.3	0	2.6	0.5
1982	2.7	5.0	7.9	2.3	o	1*3	0	2.7	5*O
1983	2.7	2.1	4.9	-0.6	0	1.4	0	2.7	2.1
1984	2.8	4.3	7.0	1*4	0	1.4	0	2“0	4*3
1985	2.9	3.0	5.6	0*1	0	1.5	0	2.9	3.0
1986	1.()	2.3	6.8	1.3	0	0.5	0	1.0	2.3
1987	1.0	1*7	6.2	0.7	0	0.5	0	1.0	1.7
1988	1.0	2.2	6.7	1.2	0	0.6	0	1.0	2.2
1989	1.1	2*O	6.5	0,9	0	0.6	0	1.1	2.0
1990	1.1	2.3	6.7	1*2	0	0.6	0	1*I	2.3
1991	1*1	2.3	6.7	1.1	0	O*7	0	1.1	2.3
1992	1.2	2.4	6.8	1.2	0	0.7	0	1.2	2.4
1993	1.2	2.5	6.8	1*2	0	(-).7	0	1.2	2.5
1994	1.3	2.6	6.9	1.3	0	0.8	0	1.3	2.6
1995	1,4	2.7	6.9	1.4	0	0.8	0	1.4	2.7
1996	1.4	2.9	7.0	1.4	0	0.9	0	1.4	2.9
1997	1.5	3.0	7.1	1.5	0	0.9	0	1*5	3,0
1998	1.6	3*1	7.1	1.5	0	1,.0	0	1.6	3.1
1999	1.7	3.3	7.2	1.6	o	1.1	0	1.7	3.3
?000	1.8	3.5	7.3	1.7	0	1.2	0	1.8	3.5

TABLE 3.7

PROJECTED COOK INLET SALMON CATCH BY SPECIES, 1980-2000
(1 ,000 Pounds)

Year	King	Red	Pink	Silver	Chum	Total
1980	176	8206	4424	1250	6279	20335
1981	176	8346	4695	1356	6288	20860
1982	176	8487	4982	1470	6298	21413
1983	176	8632	5287	1594	6307	21996
1984	176	8778	5611	1729	6317	22611
1985	176	8928	5954	1875	6326	23259
1986	203	8930	6124	1897	6329	23483
1987	?35	8930	6301	1920	6329	23715
1988	2’72	8930	6483	1943	6329	23957
1989	314	8930	6670	1967	6329	24210
1990	363	8930	6863	1991	6329	24476
1991	419	8930	7062	2015	6329	24755
1992	484	8930	7266	2040	6329	25049
1993	559	8930	7476	2065	6329	25359
1994	646	8930	7692	2090	6329	25687
1995	747	8930	7914	2116	6329	26035
1996	863	13930	8143	2141	6329	26406
1997	997	8930	8378	2168	6329	26802
1990	1152	8930	8620	2194	6329	27225
1999	1331	8930	8869	2221	6329	27680
2000	1538	8930	9126	2248	6329	28171

TABLE 3.8

PROJECTED HARVESTING ACTIVITY
COOK INLET PURSE SEINE SALMON FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	2.4	1111	1.3	1.3	0.54	0.54	71	601	284	34	19
1981	2.6	1159	1.5	1”4	0.57	0.54	71	615	284	36	20
1982	2.7	1210	1.6	1.5	0.61	0.55	71	629	284	38	21
1983	2.8	1263	1.8	1*5	0.65	0.55	71	644	284	39	22
1984	2.9	1320	2.0	1.6	0.69	0.56	71	660	284	41	23
1985	3.0	1381	2.2	1.7	0.73	0.56	71	676	284	43	24
1986	3.1	1410	2.4	1.8	0.78	0.56	71	684	284	44	25
1987	3.2	1440	2.6	1.8	0.83	0.s7	71	693	284	45	25
1988	3.2	1470	2.9	1*9	0.88	0.58	71	701	284	46	26
1989	3.3	1502	3*1	1.9	0.94	0.58	71	710	284	47	27
1990	3.4	1535	304	2.0	1.00	0.59	71	719	284	48	28
1991	3.5	1568	3.7	2*1	1.07	0.60	71	728	284	49	29
1992	3,5	1603	4.0	2.1	1.14	0.60	71	738	284	50	30
1993	3.6	1638	4.4	2*2	1.22	0.61	71	740	284	51	31
1994	3.7	1674	4.8	2.3	1*3I	0.62	71	758	284	52	32
1995	3.8	1712	5.3	2.4	1.40	0.63	71	768	284	53	33
1996	3.9	1751	5.8	2.4	1.49	0.63	71	779	284	54	34
1997	3.9	1790	6.3	2.5	1*59	0.64	71	790	284	56	36
1998	4*O	1831	6.9	2.6	1.71	0.65	71	801	284	57	37
1999	4.1	1873	7.5	2.7	1.82	0.66	71	813	284	58	38
2000	4.2	1917	8.2	2.8	1.95	0.67	71	825	284	60	4(3

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.9

PROJECTED HARVESTING ACTIVITY
COOK INLET DRIFT GILL NET SALMON FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real*	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	10.7	4870	10.0	10.0	().94	0.94	577	5327	1154	19	17
1981	10.9	4946	10.6	10.0	0.97	0.92	577	5355	1154	19	17
1982	11.1	5025	11.7	10.5	1.05	0.95	577	5384	1154	19	18
1983	11.03	5107	12.5	10.6	1.11	0.94	577	5415	1154	20	18
1984	11.5	5194	13.6	11.0	1.19	0.96	577	5447	1154	20	19
1985	11.6	5284	14.7	11.2	1.26	0.97	577	5480	1154	20	19
1986	11.7	53(-)3	15.8	11.4	1s35	0.98	577	5487	1154	20	20
1987	11.7	5321	16.9	11.6	1.44	0.99	577	5494	1154	20	20
1988	11.8	534(-J	18.1	11.8	1.54	1.00	577	5500	1154	20	20
1989	11.8	5359	19.4	12.0	1.64	1.01	577	5508	1154	20	21
1990	11.9	5379	20.8	12.2	1.75	1.02	577	5515	1154	21	21
1991	11.9	5400	22.3	12.3	1.87	1.04	577	5522	1154	21	21
1992	12.0	5421	23.9	12.6	2.00	1.05	577	5530	1154	21	22
1993	12.0	5443	25.6	12.8	2.14	1.06	577	5538	1154	21	22
1994	12.1	5466	27.5	13.0	2.28	1.08	577	5547	1154	21	23
1995	12.1	5490	29.6	13.2	2.44	1.09	577	5556	1154	21	23
1996	12.2	5514	31.8	13.5	2.61	1.11	577	5565	1154	21	23
1997	12.2	5540	34.2	13.8	2.80	1.13	577	5574	1154	21	24
1998	12.3	5?67	36.8	14.0	3.00	1.14	577	5584	1154	21	24
1999	12.3	5595	39.6	14.3	3.21	1.16	577	5594	1154	21	25
2000	12.4	5624	42.6	14.6	3*43	1.18	577	5605	1154	21	25

*The real values and prices are in terms of 1980 dollars.

TABLE 3.10

PROJECTED HARVESTING ACTIVITY
COOK INLET SET GILL NET SALMON FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real[1]	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	7.1	3243	6.6	6.6	0.92	0.92	601	5719	601	12	11
1981	7.4	3358	7.0	6.7	0.95	0.90	601	5825	601	12	11
1982	7.7	3479	7*R	7.1	1.02	0.92	601	5936	601	13	12
1983	8.0	3607	8.5	7.2	1.07	0.91	601	6054	601	13	12
1984	8.2	3742	9.4	7.6	1.14	0.92	601	6179	601	14	13
1985	8.6	3885	10.3	7.9	1.20	0.9?	601	6311	601	14	13
1986	8.7	3939	11.1	8.1	1.28	0.93	601	6361	601	14	13
1987	8.8	3996	12.0	/3.2	1.36	(3.94	601	6413	601	15	14
1988	8.9	4057	13.0	8.5	1.45	().95	601	6469	601	15	14
1989	9.1	4121	14.1	8.7	1.55	0.96	601	6528	601	15	14
1990	9.2	4189	15.3	8.9	1.65	0.97	601	6590	601	15	15
1991	9.4	4261	16.6	9.2	1.76	0.98	601	6657	601	16	15
1992	9.6	4339	18.0	9.5	1.88	0.99	601	6729	601	16	16
1993	9.7	4422	19.6	9.8	2.02	1.00	601	6805	601	16	16
1994	9.9	4511	21.5	10*I	2.16	1.02	601	6888	601	17	17
1995	10.2	4608	23.5	10.5	2.31	1.04	601	6977	601	17	17
1996	10.4	4713	25.7	in.9	2.48	1.05	601	7073	601	17	18
1997	10.6	4827	28.3	11.4	2.66	1.07	601	7178	601	18	19
1998	10.9	4951	31.2	11.9	2.86	1.09	601	7293	601	18	20
1999	11.2	5088	34.5	12.5	3.07	1.11	601	7419	601	19	21
2000	11.5	5237	38.2	13.1	3.31	1.13	601	7557	601	19	22

[1] The real values and prices are in terms of 1980 dollars.

reductions in the allocation to commercial fishermen, the projections will tend to overstate the level of harvesting activity that will occur.

Herring

The Cook Inlet herring fishery is primarily a roe herring fishery. The herring fleet is dominated by purse seiners that are principally employed in other fisheries. The season is concentrated in a few days between May and mid June because the roe is of marketable quality for a very brief period. The market conditions which have resulted in roe herring being both fully utilized and the principal herring fishery are expected to exist throughout the forecast period. The average annual catch is projected at 2,919 metric tons (6.4 million pounds) (see Table 3.11). The real harvest value is expected to increase by 21 percent by 2000 (see Table 3.12). The corresponding annual rates of change in harvesting activity are presented in Table 3.13.

Halibut

The Cook Inlet halibut fishery is dominated by a small boat fleet which consists of boats that are often primarily participants in other fisheries and which fish in protected waters. Many of these boats are less than 10.7 meters (35 feet) in length. The season is between May and August. Harvest weight and real harvest value are projected to increase by 76 percent and by 127 percent resulting in a harvest of 448 metric tons (990,000 pounds) and $1.0 million in 2000 (see Tables 3.14 through 3.16).

TABLE 3.11

PROJECTED HARVESTING ACTIVITY
COOK INLET HERRING FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	6.4	2919	1.3	1.3	0.20	0.20	68	428	272	95	19
1981	6.4	2919	1.4	1..3	0.21	0.20	68	428	272	95	19
1982	6.4	2919	1.5	1.3	0.23	0.20	68	428	272	95	19
1983	6.4	2919	1.6	1*3	0,24	0.21	68	428	272	95	19
1984	6.4	2919	1.7	1.3	0.26	0.21	60	428	272	95	20
1985	6.4	2919	1.8	1.3	0.27	0.21	68	428	272	95	20
1986	6.4	2919	1.9	1.4	0.29	0.21	68	428	272	95	20
1987	6.4	2919	2.0	1.4	0.31	0.21	68	428	272	95	20
1988	6.4	2919	2.1	1*4	0.33	0.22	68	428	272	95	20
1989	6.4	2919	2*3	1*4	0.35	0.22	68	428	272	95	21
1990	6.4	2919	2.4	1.4	0.38	0.22	68	42$	272	95	21
1991	6.4	?919	2.6	1.4	0.40	0.22	68	428	272	95	21
1992	6.4	2919	2.-?	1.4	0.43	0.22	68	428	272	95	21
1993	6.4	29]9	2.9	1.5	0.45	0.23	68	428	272	95	21
1994	6.4	2919	3.1	1.5	0.48	0.23	68	428	272	95	22
1995	6.4	2919	3.3	1.5	0.51	0.23	68	428	272	95	22
1996	6.4	2919	3.5	1.5	0.55	0.23	68	428	272	95	22
1997	6.4	2919	3.8	1.5	0.58	0.23	68	428	272	95	22
1998	6.4	2919	4*O	1.5	0.62	0.24	68	428	272	95	22
1999	6.4	2919	4.3	1.5	0.66	0.24	68	428	272	95	23
2000	6.4	2919	4.5	1.6	0.70	0.24	68	428	272	95	23

'The real values and prices are in terms of 1980 dollars.

TABLE 3.12

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET HERRING FISHERY
1981-2000

Year	Catch: Weight	Catch: Real Value	Exvessel Price: Nominal	Exvessel Price: Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Weight	Catch per Boat: Real Value
1981	0	0.9	6.5	0.9	0	0	o	0	O*9
1982	0	1.9	13.4	1.9	0	0	0	0	1.9
1983	0	2.9	20.8	2.9	0	0	0	0	2.9
1984	0	3.8	28.6	3.8	0	0	0	0	3.8
19H5	0	4.8	37.0	4.8	0	0	0	0	4.8
1986	o	5*?I	45,9	5.8	0	0	0	0	5.8
1987	0	6.8	55.4	6.8	0	0	0	0	6.8
1988	0	7.8	65.5	7.8	0	0	0	0	7.8
1989	0	8.9	76.3	8.9	0	0	0	0	8.9
1990	0	9.9	87.7	9.9	0	0	0	0	9.9
1991	0	10*9	99.9	10.9	0	0	0	0	10.9
1992	o	12.0	112.9	12.0	0	0	0	0	12.0
1993	0	13.0	126.7	13.0	0	0	0	0	13,0
1994	0	14.1	141.5	14.1	0	0	0	0	14*1
1995	0	15.2	157.2	15.2	0	o	0	0	15.2
1996	0	16.3	173.9	16.3	0	0	0	0	16.3
1997	0	17*4	191.7	17.4	0	0	0	0	17.4
1998	0	18.5	210.7	18.5	0	0	o	0	18.5
1999	0	19.6	230.9	19.6	0	0	0	0	19.6
2000	0	20.8	25?.4	20.8	0	0	0	0	20.8

TABLE 3.13

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET HERRING FISHERY
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	0.9	6.5	0.9	0	0	0	o	0.9
1982	0	0.9	6*5	0.9	0	0	0	0	0.9
1983	0	0.9	6.5	0.9	0	0	0	0	0.9
1984	0	0.9	6.5	0.9	0	0	0	0	0.9
1985	0	O*9	6.5	0.9	0	0	0	0	0.9
1986	0	0.9	6.5	0.9	o	0	0	0	0.9
1987	0	0.9	6.5	0.9	0	0	0	0	0.9
1988	0	0.9	6.5	0.9	0	0	0	0	0.9
1989	0	0.9	6.5	0.9	0	0	0	0	0.9
1990	0	0.9	6.5	0.9	0	0	0	0	0.9
1991	0	0.9	6.5	0.9	0	0	0	0	0.9
1992	0	0.9	6.5	0.9	0	0	0	0	O*9
1993	0	0.9	6.5	0,9	0	0	0	0	0.9
1994	0	0.9	6.5	0.9	0	0	0	0	0.9
1995	0	0.9	6.5	0.9	0	0	0	0	0.9
1996	0	0.9	6.5	0,9	o	0	0	0	0.9
199?	0	().9	6.5	0.9	0	0	0	0	0.9
1998	0	O*9	6.5	0.9	0	0	o	0	0.9
1999	o	0.9	6.5	0.9	0	0	0	0	0.9
2000	0	0.9	6.5	0.9	0	0	0	0	0.9

TABLE 3.14

PROJECTED HARVESTING ACTIVITY
COOK INLET HALIBUT FISHERY
1980-2000

	Catch				Exvessel Price					Catch per Boat	
	Weight		Value		($/Pound)		Number of				Real
Year	Pounds (millions)	Metric Tons	(millions) Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen	Pounds (1000)	Value ($1000)
1980	0.6	254	0.4	0.4	0.80	0.80	300	1200	300	2	1
1981	0.6	254	0.5	0.5	0.86	0.82	3(-)(-)	1200	300	2	2
1982	0.6	254	0.5	0.5	0.93	0.84	300	1200	300	2	2
1983	0.6	254	0.6	0.5	1.00	0.85	300	1200	300	2	2
1984	0.6	254	0.6	0.5	1.07	0.87	300	1200	300	2	2
1985	0.6	254	0.6	0.5	1.15	0.88	300	1200	300	2	2
1986	0.6	264	0.7	0.5	1.24	0.90	300	1200	300	2	2
1987	0.6	274	0.8	0.6	1.32	0.91	300	1200	300	2	2
1988	0.6	285	0.9	0.6	1.42	0.92	300	1200	300	2	2
1989	0.7	296	1.0	0.6	1.51	0.93	300	1200	300	2	2
1990	0.7	307	1.1	0.6	1*61	0.95	300	1200	300	2	2
1991	0.7	319	1.2	(3.7	1.72	0.96	300	1200	300	2	2
1992	0.7	331	1.3	0.7	1.84	0.97	300	1200	300	2	2
1993	0.8	344	1.5	0.7	1.96	0.90	300	1200	300	3	2
1994	0.$	358	1.6	0.8	2.08	0.98	300	1200	300	3	3
1995	0.8	371	1.8	0.8	2.22	0.99	300	1200	300	3	3
1996	0.9	386	2.0	0.9	2.36	1.00	300	1200	300	3	3
1997	0.9	400	2.2	0.9	2.51	1.01	300	1200	300	3	3
1998	0.9	416	2.4	(-).9	2.67	1.02	300	1200	300	3	3
1999	1*0	432	2.7	1.0	2.83	1.02	300	1200	300	3	3
2000	1.0	448	3.0	100	3001	1.03	300	1200	300	3	3

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.15

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET HALIBUT FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	o	2.3	7.9	2.3	o	0	0	o	2.3
1982	0	4.4	16.3	4*4	0	0	0	0	4,4
1983	0	6.5	25.1	6.5	0	0	0	0	6.5
1984	o	8.4	34*3	8.4	0	o	0	0	8.4
1985	0	10.3	44*1	10*3	0	0	0	0	10.3
1986	3.8	16.4	54.5	12*O	o	cl	0	3.8	16.4
1987	7.8	22.6	65,4	13.7	0	0	0	7.8	22.6
1988	12.0	29.1	76.9	15.3	0	o	0	12.0	29.1
1989	16,3	35.8	89.0	16.8	0	()	0	16.3	35.8
1990	20.8	42.7	101.8	18.2	0	0	0	20.8	42.7
1991	25*4	49.9	115*4	19.5	0	o	0	25.4	49.9
1992	30.3	57*3	129.6	20.8	0	0	0	30.3	57*3
1993	35.3	65.0	144.7	22.0	0	0	0	35*3	65.0
1994	4(-).5	73.0	160.5	23.1	o	0	0	40.5	73.0
1995	45.9	81.2	1.77.3	24.2	0	0	0	45.9	81.2
1996	51.5	89.7	194.9	25.2	0	0	0	51.5	89.7
1997	57.4	98.6	213.5	26.2	0	o	0	57.4	98.6
1998	63.4	107.7	233.2	27.1	0	0	0	63.4	107.7
1999	69.7	117.2	253.9	28.0	0	0	0	69.7	117.2
2000	76.2	127.0	275.8	28.8	0	0	0	76.2	127.0

TABLE 3.16

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET HALIBUT FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	2.3	7.9	2,3	0	0	0	o	2.3
1982	0	2.1	7.7	2*1	0	0	0	0	2.1
1983	0	2.0	7.6	2.0	0	0	0	0	2.0
1984	0	1.8	7.4	1.8	o	0	0	0	1.8
1985	0	1*7	7*3	1.7	0	0	0	0	1.7
1986	3.8	5.5	7.2	1.6	0	0	0	3.8	5.5
1987	3.0	5.4	7*1	1.5	0	0	0	3.8	5*4
1988	3.9	5.3	7.()	1.4	0	0	0	3*9	5.3
1989	3.8	5*2	6.9	1.3	0	0	0	3.8	5.2
1990	3.8	5.1	6.8	1.2	0	0	0	3.8	5.1
1991	3*9	5*O	6.7	1.1	0	0	0	3*9	5.0
1992	3.8	5.0	6.6	1.1	0	0	0	3.8	5.0
1993	3.8	4*9	6,5	1.0	o	0	0	3.8	4.9
1994	3.8	4.8	6.5	0.9	0	()	0	3*8	4.8
1995	3.9	4.8	6.4	0.9	o	d	0	3.9	4.8
1996	3.8	4.7	6.4	0.8	0	0	0	3.8	4.7
1997	3.8	4.7	6.3	0.8	0	0	0	3.8	4.7
1998	3.8	4.6	6.3	(3.7	0	0	0	3*8	4.6
1999	3.8	4.6	6,2	0.7	0	0	0	3.8	4.6
2000	3.8	4.5	6.2	0,6	0	0	0	3.8	4.5

The number of boats in this fishery has ranged from just over 200 to over 350 in recent years. High exvessel prices and limited opportunities in other fisheries are expected to maintain a high level of participation in the small boat halibut fishery.

It should be noted that limited entry is being considered for the halibut fishery at the suggestion of halibut fishermen. At this time, it is not clear what type of limited entry program will be used if one is adopted.

Groundfish

In recent years there have been two distinct groundfish fleets in Cook Inlet, a small boat long line fleet and a large boat trawl fleet. The long line boats are typically less than 13.7 meters (45 feet) in length, have a crew of one, and are active in this fishery between May and September. The average number of landings per boat per year has been less than three; this indicates that the boats and fishermen of the long line fleet are only casual participants and are primarily associated with other fisheries. The trawl fleet has included no more than two or three boats in the last nine years. These boats have typically been shrimp trawlers which ranged in length from under 13.7 meters (45 feet) to over 25.9 meters (85 feet).

As the domestic groundfish industry develops, it is expected that there will continue to be distinct small and large boat f"leets; both fleets may, however, include a variety of gear types. The small boat fishery is expected to remain a casual or supplemental fishery with its participants being principally associated with other fisheries. The projections of the number of boats presented below are of the number of large boats that would be required to take the projected harvest, and the projections of the number of fishermen reflect the crews required by such boats. The actual number of part-time boats and fishermen may therefore be substantial"lly greater; however, since such fishermen and boats will be primarily associated with other fisheries, they are accounted for elsewhere.

The annual groundfish harvest is projected to increase from 12 metric tons (27,000 pounds) in 1980 to 17,820 metric tons (39.3 million pounds) in 2000 and to increase in real value from $3,000 to $4.8 million (see Table 3.17). The associated percentage increases are staggering (see Tables 3.18 and 3.19). In terms of its relative importance, the groundfish catch is expected to increase from 0.06 percent of total Cook Inlet catch in 1980 to 43 percent of the catch by 2000. The relative importance in terms of value is projected to increase from 0.01 percent to 10.4 percent (see Table 3.20). The significant difference between the projected relative importance of the fishery measured by weight and by value is explained by the large exvessel price differential that is expected to exist between the relatively low-valued groundfish and the high-valued traditional species. The relative importance of the groundfish fisheries is also expected to be relatively low in terms of the number of boats, fishermen, or landings. Projections of groundfish catch by species are presented in Table 3.21.

TABLE 3.17

PROJECTED HARVESTING ACTIVITY
COOK INLET GROUNDFISH FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real[1]	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	0.0	12	0.0	0.0	0.12	0.12	0	o	0	3889	480
1981	0.0	1“?	0.0	0.0	0013	0.12	0	0	0	4083	504
1982	0.1	24	0.0	0.0	0.14	0.12	0	1	0	4288	528
1983	0.1	35	0.0	0.0	0.14	0.12	o	1	0	4502	554
1984	0.1	49	0.0	0.0	0.15	0.12	0	1	0	4727	581
1985	0.2	70	0.0	0.0	0.16	0.12	0	2	0	4963	609
1986	0.2	101	0.0	0.0	0.17	0.12	0	2	0	5212	639
1987	0.3	144	0.1	0.0	0.18	0.12	0	3	0	5472	670
1988	0.5	206	0.1	0.1	0.19	0.12	0	4	0	5746	703
1989	0.7	296	0.1	0.1	0.20	0.12	0	5	1	6033	738
199(-)	O*9	427	0.2	0.1	0.21	0.12	0	7	1	6335	774
1991.	1.4	615	0.3	0.2	0.22	0.12	0	10	1	6651	812
1992	2.(-I	888	0.5	0.2	0.23	0.12	o	14	1	6984	852
1993	2.8	1284	0.7	0.3	0.24	0.12	0	19	2	7333	894
1994	4.1	1861	1.1	0.5	0.26	0.12	1	27	3	7700	938
1995	6.0	2700	1.6	0.7	0.27	0.12	1	37	4	8085	985
1996	8.7	3926	2.5	1.1	0.29	0.12	1	51	5	8489	1034
1997	12.6	57115	3.8	1*5	0.30	0.12	1	71	7	8913	1085
1998	18.4	8337	5.9	2.2	0.32	0.12	2	98	10	9359	1140
1999	26.9	12179	9.0	3.3	0.34	0.12	3	137	14	9827	1197
2000	39.3	17820	14.0	4.8	0.36	0.12	4	190	19	10318	1257

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.18

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET GROUNDFISH FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	41.7	41.6	5.4	-0.1	35.0	35.0	35.0	5.0	4.9
1982	101.2	100.7	11.0	-0.2	82.5	82.5	82.5	10.3	10.0
1983	186.1	185.1	17.0	-0.4	147.2	147.2	147.2	15.8	15*3
1984	307.6	305.6	23.3	-O*5	235.3	235.3	?35.3	21.6	21.0
1985	481.5	478.0	29.9	-0.6	355*6	355.6	355.6	27.6	26.9
1986	731.1	725.2	36.9	-0”7	520.1	520.1	520.1	34.(-1	33.1
1987	1089.7	1080.0	44.3	-0.8	745.5	745.5	745.5	40.7	39.6
1988	1606.1	1590.4	52.1	-0.9	1054.[1	1054.8	1054.8	47.7	46.4
1989	2350.8	2325.9	60.3	-1.0	1479.8	1479.8	1479.8	55.1	53.6
1990	3426.6	3387.7	68.9	-1.1	2065.0	2065.0	2065.0	62.9	61.1
1991	4983.3	4923.3	78.1	-1.2	2872.1	2872.1	2872.1	71.0	69,0
1992	7239.9	714$.1	87.7	-1.3	3987.1	3987.1	3987.1	79.6	77.3
1993	10516.2	10377.2	98.0	-1.3	553(-).0	5530.0	5530.0	88.6	86.1
1994	15281.2	15072.4	108.7	-1,4	7668.6	7668.6	7668.6	98.0	95.3
1995	22222.6	21911.7	120.1	-1.4	10637.5	10637.5	1(3637.5	107.9	105.0
]996	32350.7	3189106	132.2	-1.4	14766.0	14766.0	14766.0	118.3	115.2
1997	47152.1	46479.8	144.9	-1.4	20516.0	20516.0	20516,0	129.2	125.9
1998	68817.3	67841.1	158.4	-1.4	28536.6	28536.6	28536.6	140.7	137.3
1999	100577.8	99173.5	172.7	-1.4	39741.6	39741.6	39741.6	152.7	149.2
2000	147207.9	145208.5	187.8	-1.4	55418.8	55418.8	5541.8.8	165.3	161.7

TABLE 3.19

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET GROUNDFISH FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	41*7	41.6	5.4	-0.1	35.0	35.0	35.0	5.()	4.9
1982	42.0	41.8	5.4	-001	35.2	35.2	35.2	5.0	4.9
1983	42.2	42.0	5.4	-0.1	35*4	35.4	35*4	5.0	4.9
1984	42.4	42.3	5.4	-O*1	35.7	35.7	35.7	5.0	4*9
1985	42.7	42.5	5.4	-(-).1	35.9	3s.9	35,9	5.0	4.9
1986	42.9	42.$	5.4	-0.1	36.1	36.1	36.1	5.0	4.9
1987	43.2	43.0	5.4	-0.1	36.3	36.3	36.3	5.0	4.9
1988	43.4	43.3	5.4	-0.1	36.6	36.6	36.6	5.0	4.9
1909	43.6	43.5	5.4	-0.1	36.8.	36.8	36.8	5*O	4.9
1990	43.9	43.8	5.4	-0.1	37.0	37.0	37.0	5.0	4.9
1991	44.1	44.0	5.4	-0.1	37.3	37.3	37.3	5.0	4.9
1992	44.4	44.3	5.4	-0.1	37.5	37.5	37.5	5,0	4.9
1993	44.6	44.6	5.4	-O*1	37.8	37.8	37.8	5,0	4.9
1994	44.9	44.8	5.4	-0.0	38.0	38.0	38,0	5*O	4.9
1995	45.1	45.1	5*5	-0.0	38.2	38.2	38.2	5.0	5.0
1996	45.4	45.3	5.5	-0.0	38.4	38.4	38.4	5.0	5*O
1997	45.6	45.6	5*5	-0.0	38.7	38.7	38*7	5.0	5.0
1998	45.9	45.9	5.5	0.0	38.9	38.9	38.9	5.0	5.0
1999	46.1	46.1	5.5	0.0	39*1	39,1	39.1	5.0	5.0
2000	46.3	46.4	5.5	0.0	39.3	39.3	39.3	5.0	5.(-)

TABLE 3.20

PROJECTED GROUNDFISH HARVESTING ACTIVITY AS A PERCENTAGE OF TOTAL COOK INLET HARVESTING ACTIVITY 1980-2000

Year	Catch Weight	Catch Value	Number of Boats	Number of Fishermen	Number of Landings
1980	0.1	0.0	0.0	0.0	0.0
1981	0.1	0.0	0.0	0.0	0.0
1982	0.1	0.0	0.0	0.0	0.0
1983	0.2	0.0	0.0	0.0	0.0
1984	0.2	0.0	0.0	0.0	0.0
1985	0.3	0.1	0.0	0.0	0.0
1986	0.5	0.1	0.0	0.0	0.0
1987	0.7	0.1	0.0	0.0	0.0
1988	1.0	0.2	0.0	0.0	0.0
1989	1.4	0.2	0.0	0.0	0.0
1990	2.0	0.3	0.0	0.0	0.0
1991	2.8	0.5	0.0	0.0	0.1
1992	3.9	0.7	0.0	0.0	0.1
1993	5.6	1.0	0.0	0.1	0.1
1994	7.8	1.4	0.0	0.1	0.1
1995	10.9	1.9	0.0	0.1	0.2
1996	14.9	2.7	0.1	0.2	0.3
1997	20.2	3.8	0.1	0.2	0.4
1998	26.8	5.4	0.1	0.3	0.5
1999	34.6	7.5	0.1	0.4	0.7
2000	43.4	10.4	0.2	0.6	1.0

TABLE 3.21

PROJECTED COOK INLET GROUNDFISH HARVEST BY SPECIES, 1980-2000

Year	WEIGHT (METRIC TONS)					REAL VALUE ($1,000)				
	Pollock	Pacific Cod	Sablefish	Other	Total	Pollock	Pacific Cod	Sablefish	Other	Total
1980	2	4	0	6	12	0	1	0	2	3
1981	3	5	0	9	17	0	2	0	2	5
1982	5	7	0	12	24	1	2	0	3	7
1983	7	10	0	17	35	1	3	1	5	9
1984	10	13	1	25	49	2	4	1	7	13
1985	16	18	1	35	70	3	5	2	10	19
1986	24	25	2	51	101	4	7	2	14	27
1987	36	33	2	72	144	6	9	4	20	39
1988	55	45	4	103	206	9	12	6	29	56
1989	84	61	6	147	296	14	17	8	41	80
1990	127	82	9	209	427	21	23	13	58	115
1991	193	111	13	298	615	31	31	20	83	165
1992	292	149	20	426	888	48	42	31	119	239
1993	444	202	31	607	1284	72	56	47	169	345
1994	674	273	48	866	1861	110	76	72	242	500
1995	1023	369	73	1235	2700	166	103	111	345	725
1996	1552	499	112	1762	3926	253	139	170	492	1054
1997	2356	674	173	2514	5716	383	188	261	702	1534
1998	3575	911	265	3586	8337	582	254	401	1001	2238
1999	5426	1232	407	5114	12179	883	344	615	1427	3270
2000	8235	1665	625	7295	17820	1341	465	945	2036	4786

King Crab

The Cook Inlet king crab fishery provides an excellent example of the over capitalization that often occurs in an open entry fishery. In an attempt to reduce this problem, the ADF&G prohibits boats that participate in other Alaska king crab fisheries from participating in the Cook Inlet fishery. One result has been that the Cook Inlet king crab fleet consists of smaller boats than many other Alaska fleets. The typical Cook Inlet boats are between 7.6 and 13.7 meters (25 and 45 feet) in length, have a crew of three to four, and participate in the fishery from August through March.

Despite the recent declines in annual harvest, the sustainable yield is thought to be approximately 1,900 metric tons (4.2 million pounds). The annual catch is expected to increase to this level by 1985 and to be maintained at this level through 2000, at which time the real value of the harvest is expected to equal $3.9 million (see Table 3.22). The projected changes in the harvest weight and real value are 14.6 percent and -15.2 percent respectively (see Table 3.23). Table 3.24 contains the corresponding annual rates of change.

Cook Inlet king crab fishermen are concerned with the large number of boats in the fishery, the resulting gear concentration and gear losses, and the decline in resource abundance which might be accelerated by extensive bottom trawling as the groundfish fishery develops.

TABLE 3.22

PROJECTED HARVESTING ACTIVITY
COOK INLET KING CRAB FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions)[1]: Nominal	Catch: Value (millions)[1]: Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real[1] Value ($1000)
1980	3.7	1667	4.4	4.6	1,26	1.26	69	881	242	53	67
1981	3.8	1713	4.5	4.3	1.19	1.13	70	907	243	54	61
1982	3.9	1760	5.1	4.6	1.31	1.18	70	933	245	56	65
1983	4.(-I	1809	5.1	4.4	1.28	1.09	70	960	246	57	62
1984	4,1	1859	5.7	4.6	1.38	1.12	70	988	247	58	65
1985	4.2	1910	5.8	4*5	1.39	1.06	71	1017	248	60	63
1986	4.2	1910	6.2	4.5	1.47	1.07	71	1017	248	59	63
1987	4.2	1910	6.3	4.3	1.50	1.03	71	1017	248	59	61
1988	4.2	1910	6.6	4.3	1.58	1.03	71	1017	249	59	61
1989	4.2	1910	6.8	4.2	1,62	1.00	71	1017	249	59	59
1990	4.2	1910	7.2	4*2	1.70	1.00	71	1017	249	59	59
1991	4.2	1910	7.4	4,1	1.77	0.98	71	1017	249	59	58
1992	4.2	1910	7.8	4.1	1.85	0.97	71	1017	249	59	58
1993	4.2	1910	8.1	4.0	1.93	0.96	71	1017	250	59	57
1994	4.?	1910	8.5	4.0	2.02	0.96	71	1017	250	59	56
1995	4.2	1910	8.9	4.0	2*12	0.95	71	1017	250	59	56
1996	4.2	1910	9.4	4.0	2.?2	0.94	71	1017	250	59	56
1997	4.2	1910	9.8	4.0	2.33	0.94	71	1017	250	59	55
1998	4.2	1910	10.3	3.9	2.46	0.94	72	1017	250	59	55
1999	4.2	1910	10*9	3.9	2.58	0.93	72	1017	250	59	55
2000	4.?	1910	11.5	3.9	2..72	0.93	72	1017	251	59	55

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.23

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET KING CRAB FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1980	0	0	0	0	0	0	0	0	0
1981	2.8	-8.2	-5.7	-10,6	0.5	2.9	0.5	2.3	-8.6
1982	5.6	-1.2	4.1	-6.5	1.0	5*9	1.0	4*6	-2.2
1983	8.5	-5.8	1.9	-13.3	1.4	9.0	1.4	7.0	-7.1
1984	11.5	-1.3	9.7	-11.5	1.8	12.2	1.8	9.6	-3.0
1985	14.6	-3.6	9.9	-15.9	2.2	15.5	2*2	12.1	-5*7
1986	14.6	-3.0	16.7	-15.4	2.4	15.4	2.4	12.0	-5.3
1987	14.6	-6.4	18.8	-18.4	2.5	15.4	2.5	11.8	-8.7
1988	14.6	-6.5	25.1	-18.5	2.6	15.4	2.6	11.7	-8.9
1989	14.6	-8.9	28.7	-20.5	2.7	15.4	2.7	11.6	-11.3
1990	14.6	-9.3	35.2	-20,9	2.8	15.4	2,8	11,5	-11.8
1991	14.6	-11.0	40.0	-22.3	2.9	15.4	2.9	11.4	-13.5
1992	14.6	-11.,4	46.9	-22.7	3.0	15.4	3.0	11.3	-14.0
1993	14.6	-12.6	52.9	-23,7	3.0	1504	3.0	11.2	-15.2
1994	14.6	-13.0	60.5	-24.1	3.1	15.4	3.1	11.2	-15.7
1995	14.6	-13.8	67.8	-24.8	3.2	15.4	3.2	11.1	-16.5
1996	14.6	-14.2	76.4	-25.1	3.2	1s.4	3.2	11.0	-16.8
1997	14.6	-14.7	85.0	-25.6	3.3	15.4	3.3	11.0	-17.4
1998	14.6	-14.9	94.7	-25.7	3.3	15.4	3.3	10.9	-17.6
1999	14.6	-15.1	104.8	-26.0	3.4	15.4	3.4	10.9	-17.9
2000	14.6	-15.2	115.9	-26.0	3.4	15.4	3.4	10.8	-18.0

TABLE 3.24

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET KING CRAB FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1980	0.0	0.0	(-).I-I	0.0	0.0	0.0	0.0	0.0	0.0
1981	2.8	-8.2	-5*7	-10.6	0.5	2.9	0.5	2.3	-8.6
1982	2.8	7.5	10.4	4.6	0.5	2.9	O*5	2.3	7.0
1983	2.8	-4.7	-2.1	-7.2	0.4	2.9	0.4	2.3	-5.1
1984	2.8	4.9	7.7	2.0	0.4	2.9	0.4	2.3	4.4
1985	2.8	-2.4	0*2	-5.0	().4	2.9	0.4	2.4	-2.7
1986	-0.0	0.6	6.2	0.6	0.1	-0.0	O*1	-0.2	0,5
1987	0	-3.5	1.8	-3*5	0.1	0	0.1	-0.1	-3,6
1988	0	-(). 1	5.4	-0.1	0.1	0	0.1	-0.1	-0.2
1989	0	-2.5	2.8	-2.5	0.1	0	0.1	-0.1	-2.6
1990	0	-0.5	5.0	-0.5	0.1	0	0.1	-0.1	-0.5
1991	0	-1.8	3.6	-1.8	0.1	0	0.1	-0.1	-1.9
1992	0	-0.5	4.9	-0.5	0.1	0	0.1	-0.1	-0.6
1993	()	-1.3	4.1	-1.3	0.1	0	0.1	-0.1	-1.4
1994	o	-0.5	5.0	-0.5	0.1	0	0.1	-0.1	-0.6
1995	0	-0.9	4.5	-0.9	0.1	0	0.1	-0.1	-1.0
1996	0	-0.4	5.1	-0.4	0.1	0	0.1	-0.1	-0.4
1997	0	-0.6	4.9	-0.6	0.1	0	0.1	-0.1	-0.6
1998	0	-0.2	5.2	-0.2	0.0	o	0.0	-0.0	-0.3
1999	0	-0.3	5.2	-(-).3	0.0	0	0.0	-0.0	-0.3
2000	0	-()* 1	5.4	-0.1	0.0	0	0.0	-0.0	-(-).1

Tanner Crab

The Cook Inlet Tanner crab fishery is similar to the Kodiak fishery in that its development was promoted by a decline in the local king crab resources. The Tanner crab season is from December through May; there are therefore several months in which the same boats participate in both the king and Tanner crab fisheries. Since many boats participate in both fisheries, it is not surprising that the characteristics of the two fleets are similar. They both have boats that are typically between 7.6 and 13.7 meters (25 and 45 feet) in length and a crew of three to four.

The Cook Inlet Tanner crab resources appear to be fully utilized. Successful management of these resources is expected to allow modest increase in harvest between 1980 and 1985 and an average annual harvest of 2,410 metric tons (5.3 million pounds) during the remainder of the forecast period (see Table 3.25). The annual real harvest value is projected to equal $1.8 million by 2000. The projected percentage changes in harvesting activity are summarized in Tables 3.26 and 3.27. The small (2.6 percent) increase in harvest and favorable market conditions are expected to assure that resource abundance will remain the binding constraint.

Dungeness Crab

The Cook Inlet Dungeness crab fleet consists of boats that typically are 7.9 to 10.7 meters (26 to 35 feet) in length, have a crew of two, and

TABLE 3.25

PROJECTED HARVESTING ACTIVITY
COOK INLET TANNER CRAB FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions)[1]: Nominal	Catch: Value (millions)[1]: Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	5.2	2350	1.9	1.9	O*37	0.37	63	893	222	82	31
1981	5.2	2361	2.6	2.4	0.49	0.46	64	897	222	82	38
1982	5.2	?373	2.4	2.2	0.46	0.42	64	900	223	82	34
1983	5*3	2385	2.7	2.3	().51	0.43	6/t	903	224	82	36
1984	5.3	2397	2.6	2.1	0.50	0.40	64	907	225	82	33
1985	5.3	2409	2.8	2.7	0.53	0.41	64	910	226	82	34
1986	5.3	?410	2.8	2*1	0.54	0.39	64	910	226	82	32
1987	5.3	2410	3.0	2.1	0.57	().39	64	910	226	82	32
1988	5.3	2410	3.1	2.0	0.58	0.37	64	910	225	82	31
1989	5.3	2410	3.2	2.0	0.60	0.37	64	910	225	83	31
1990	5.3	2410	3*3	1.9	0.62	0.36	61}	910	225	83	30
1991	5.3	2410	3.4	1.9	0.65	0.36	64	910	225	83	30
1992	5.3	2410	3.6	1.9	0.67	0.35	64	910	225	83	29
1993	5.3	2410	3*7	1*9	[).70	0.35	64	910	225	83	29
1994	5.3	2410	3.9	1.8	0.73	0.34	64	910	225	83	28
1995	5.3	2410	4.1	1.8	0.76	0.34	64	910	225	83	28
1996	5.3	241O	4.2	1.8	0.80	0.34	64	910	225	83	28
1997	5.3	2410	4.4	1.8	0.84	0.34	64	910	225	83	28
1998	5*3	2410	4.6	1.8	0.87	0.33	64	910	225	83	2$
1999	5.3	2410	4.9	1.8	0.92	0.33	64	910	225	83	27
2000	5.3	2410	5.1	1.8	0.96	0.33	64	910	225	83	27

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.26

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET TANNER CRAB FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Beat	
	W	Real Value	Nominal	Rea l	Boats	Landings	Fishermen	Weight	Real Value
1980	0	0	0	0	0	0	0	0	i-l
1981	().5	25.0	31*3	24.4	0.3	0.4	0.3	0.2	24.6
1982	1.0	12*R	24.3	11.”7	0.7	0.7	0,7	0.3	12.1
1983	1.5	17.7	36.2	16.0	1.1	1.1	1.1	0.4	16,5
1984	2.0	9.9	33.5	7.8	1.5	1.5	1.5	0.5	8,4
1985	2.5	12.1	42.9	9.4	1.9	1.9	1.9	007	10.1
1986	2.6	6.6	43.2	3.9	1.8	1.9	1.8	0.7	4.6
1987	2.6	6.8	51.4	4.1	1.8	1.9	1.8	0.8	4.9
1988	2.6	2.9	53.9	0.3	1.8	1.9	1.8	0.8	1.1
1989	2.6	2.4	61.7	-().2	1.7	109	1.7	. 0.8	0.7
1990	2*6	-0.3	66.0	-2.8	1.7	1.9	1,7	0.9	-2.0
1991	2.6	-1*I	73.8	-3.6	1.7	1.9	1.7	0.9	-2.7
1992	2.6	-3*1	79.6	-5.5	1.6	1.9	1.6	O*9	-4.7
1993	2.6	-3,9	87.9	-6.3	1.6	1.9	1.6	0.9	-5*4
1994	2.6	-5.4	95.3	-7.7	1.6	1.9	1.6	1.0	-6.8
1995	2.6	-601	104.4	-8.4	1.6	1.9	1,6	1.0	-7.5
1996	2.6	-7.1	113.3	-9.5	1.5	1.9	1.5	1.0	-8.5
1997	2.6	-7.7	123.6	-10.0	1.5	109	1.5	1.0	-9.1
1998	2.6	-8.4	134.0	-1(1.7	1.5	1.9	1.5	1.0	-9.8
1999	2.6	-8.9	145.7	-11.1	1.5	1.9	1.5	1.1	-10.2
2000	2.6	-9*3	157.9	-11.6	1.5	1.9	1.5	1.1	-10.7

TABLE 3.27

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET TANNER CRAB FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1980	0.0	0.0	0.0	O*O	0.0	0.0	0.0	0.0	0.0
1981	0.5	25*O	31.3	24.4	0.3	0.4	0.3	O*2	24.6
1982	0.5	-9.8	-5.3	-10.2	0.4	0.4	0.4	0.1	-10.1
1983	0.5	4.3	9.5	3.8	O*4	0.4	0.4	O*1	3.9
1984	0.5	-6.6	-2.0	-7.1	(3.4	0.4	0.4	O*1	-7.0
1985	0.5	2*O	7.1	1.5	0.4	0.4	0.4	0.1	1.6
1986	0.0	-5.0	0.2	-5.0	-0.0	(-).(-l	-0.0	0.1	-5.0
1987	()	0.2	5.7	O*2	-0.0	o	-0.0	0.0	0.2
1988	0	-3.6	1.7	-3.6	-0.0	0	-0.0	0,0	-3.6
1989	0	-0.5	5.0	-0.5	-0.0	0	-0.0	0.0	-0.4
1990	0	-2.7	2.7	-2.7	-0.0	0	-0.0	0.0	-2.7
1991	0	-0.7	4.7	-0.7	-0.0	n	-0.0	0.0	-0.7
1992	0	-2.0	3,4	-2.0	-0.0	0	-0.0	O*O	-2.0
1993	0	-0.8	4.6	-0;8	-0.0	0	-0.0	0.0	-0.8
1994	0	-1.5	3.9	-1.5	-0.0	0	-0.0	0.0	-1.5
1995	0	-0.8	4.7	-0.8	-0.0	0	-0.0	0.0	-(-).7
1996	0	-1.1	4.3	-1.1	-0.0	0	-0.0	0.0	-1.1
1997	0	-0.6	4.8	-0.6	-0.0	0	-0.0	0.0	-0.6
1998	0	-0.8	4.7	-0.8	-O*I-)	0	-0.0	0.0	-0.0
1999	0	-0.5	5.0	-(-).5	-0.0	0	-0.0	0,0	-0.4
2000	0	-0.5	5.0	-0.5	-0.0	0	-0.0	0.()	-0.5

Participate in the Dungeness crab fishery from May through December. The annual harvest has fluctuated significantly in recent years; for example, the catch in 1978 exceeded that of 1977 by a factor of 15. Market conditions have been a principal determinant of the fluctuation in harvest. The favorable markets that resulted in a near-record harvest in 1978 are expected to continue, and it is projected that during the forecast period the average annual harvest will equal the allowable biological catch of 204 metric tons (450,000 pounds). By 2000, the real value of the annual harvest is expected to approach $400,000 (see Table 3.28). This represents a 16 percent increase in real value during the forecast period (see Table 3.29). The corresponding annual rates of change appear in Table 3.30.

Shrimp

There are two shrimp fisheries in Cook Inlet, a trawl fishery and a pot fishery. The trawlers range in length from under 7.6 meters (25 feet) to over 24.4 meters (80 feet), have a crew of three, and participate in the fishery from June through March. Although several times as many boats participate in the pot fishery as in the trawl fishery, the trawl fleet harvests the majority of the annual catch. The pot boats range in length from under 7.6 meters to 13.7 meters (25 feet to 45 feet) but are predominately under 10.7 meters (35 feet). They have a crew of two, and are active throughout the year.

The shrimp fisheries are well developed and have well defined resources that are expected to result in a sustainable annual harvest of 2,540

TABLE 3.28

PROJECTED HARVESTING ACTIVITY
COOK INLET DUNGENESS CRAB FISHERY
1980-2000

	Catch				Exvessel Price					Catch per Boat	
	Weight		Value (millions)[1]		($/Pound)		Number of				Real
Year	Pounds (millions)	Metric Tons	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen	Pounds (1000)	Value ($1000)
1980	n.5	204	0.3	0.3	0.75	0.75	40	591	95	9	7
1981	0.5	204	0.4	0.3	0.80	0.76	48	591	95	9	7
1982	0,5	204	0.4	0.3	0.85	0.77	48	592	96	9	7
1983	0.5	204	0.4	0.3	0,91	0.78	48	592	96	9	7
1984	0.5	204	0.4	0.4	0.97	0.78	48	593	96	9	7
1985	0.5	204	0.5	0.4	1.03	0.79	48	593	96	9	7
1986	0.5	204	0.5	0.4	1.10	0.80	48	594	96	9	7
1987	0.5	204	0.5	0,4	1.17	0.81	48	594	96	9	8
1988	0.5	204	O*6	0.4	1.25	0.81	48	595	96	9	8
1989	005	204	0.6	O*4	1.33	0.82	48	595	96	9	8
1990	0.5	204	0.6	0.4	1.41	0.83	48	596	96	9	8
1991	0.5	204	0.7	0.4	1.50	0.83	40	596	96	9	8
1992	0.5	204	0,7	O*4	1.59	0.84	48	596	96	9	8
1993	0.5	204	0.8	0.4	1.69	0.84	48	597	96	9	8
1994	0.5	204	0.8	0.4	1,79	0.85	48	597	97	9	8
1995	0.5	204	0.9	O*4	1.90	0.85	48	597	97	9	8
1996	0.5	204	0.9	0.4	2.01	0.86	48	598	97	9	8
1997	0.5	204	1.0	(3.4	2.13	0.86	48	598	97	9	8
1998	0.5	204	1.0	0.4	2.26	0.86	48	598	97	9	8
1999	0.5	204	1.1	0.4	2.39	0.86	48	599	97	9	8
2000	0.5	204	1.1.	0.4	2.53	0.87	48	599	97	9	8

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.29

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET DUNGENESS CRAB FISHERY
1981-2000

Year	Catch Weight	Catch Real Value	Exvessel Price Nominal	Exvessel Price Real	Number of Boats	Number of Landings	Number of Fishermen	Catch per Boat Weight	Catch per Boat Real Value
1981	0	1.3	6.8	1.3	0.1	0.1	0.1	-0.1	1.1
1982	0	2.4	14.0	2.4	0.2	0.2	0.2	-0.2	2.2
1983	0	3.5	21.5	3.5	0.3	0*3	0.3	-O*3	3.1
1984	n	4.4	29.4	4.4	0.4	0.4	0.4	-0.4	4.0
1985	0	5.3	37.7	5.3	0.5	O*4	0.5	-O*5	4.8
1986	0	6.5	46.8	6.5	0.6	0.5	0.6	-0.6	5.8
1987	0	7.5	56.4	7.'5	0.7	0.6	0.7	-0.7	6.7
1988	0	8.5	66.5	8.5	0.8	().7	0.8	-0.8	7.6
1909	0	9.4	77.1	9.4	0.9	0.8	0.9	-0.9	8.4
1990	0	10.2	88.2	10.2	1.0	0.9	1*O	-1.0	9.1
1991	0	11.0	100.0	11.0	1.1	0.9	1.1	"-1.0	9.8
1992	0	11.7	112.3	11.7	1.1	180	1*1	-1.1	10,4
1993	0	12.3	125.3	12.3	1.2	1.1	1.2	-1*2	11,0
1994	0	12.9	139.(-)	12.9	1.3	101	1*3	-1.3	11.5
1995	0	13.5	153.4	13.5	1.3	1.2	1.3	-1*3	12*O
1996	0	14.0	168.5	14.0	1.4	102	1.4	-].4	12,5
1997	0	1405	184.5	14.5	1.4	1.3	1.4	-1.4	12.9
1998	0	14*9	2(-)1.3	14.9	1.5	1.3	1.5	-1.5	13.2
1999	0	15.3	218.9	15.3	1.5	1.4	1*5	-1.5	13.6
2000	0	15*7	237.5	15.7	1.6	104	1..6	-1.6	13.9

TABLE 3.3°

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET DUNGENESS CRAB FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	1.3	6.8	1.3	0.1	0.1	0.1	-0.1	1.1
1982	0	1.1	6.7	1.1	0.1	0.1	0.1	-0.1	1.0
1983	0	1.0	6.6	1.0	0.1	0.1	0.1	-0.1	0.9
1984	0	0.9	6.5	0.9	0.1	0.1	0.1	-0.1	0.8
1985	0	0.9	6.4	0.9	0.1	0.1	0.1	-0.1	0.8
1986	0	1.1	6.6	1.1	0.1	0.1	0.1	-0.1	1.0
1987	0	1.0	6.5	1.0	0.1	0.1	0.1	-0.1	0.9
1988	0	0.9	6.4	0.9	0.1	0.1	0.1	-0.1	0.8
1989	0	0.8	6.4	0.8	0.1	0.1	0.1	-0.1	0.7
1990	0	0.8	6.3	0.8	0.1	0.1	0.1	-0.1	0.7
1991	0	0.7	6.2	0.7	0.1	0.1	0.1	-0.1	0.6
1992	0	0.6	6.2	0.6	0.1	0.1	0.1	-0.1	0.6
1993	0	0.6	6.1	0.6	0.1	0.1	0.1	-0.1	0.5
1994	0	0.5	6.1	0.5	0.1	0.1	0.1	-0.1	0.5
1995	0	0.5	6.0	0.5	0.1	0.1	0.1	-0.1	0.4
1996	0	0.5	6.0	0.5	0.1	0.1	0.1	-0.1	0.4
1997	0	0.4	5.9	0.4	0.1	0.0	0.1	-0.1	0.4
1998	0	0.4	5.9	0.4	0.1	0.0	0.1	-0.1	0.3
1999	0	0.3	5.9	0.3	0.0	0.0	0.0	-0.0	0.3
2000	0	0.3	5.8	0.3	0.0	0.0	0.0	-0.0	0.3

metric tons (5.6 million pounds). The market conditions that have resulted in resource abundance being a binding constraint are expected to exist throughout the forecast period and result in an annual real harvest value of over $2 million by 2000 (see Table 3.31); this represents a 27 percent increase in real harvest value during the forecast period (see Table 3.32). The projected annual rates of change in harvesting activity are presented in Table 3.33.

Razor Clams

The Cook Inlet razor clam fishery has been small and sporadic for a number of years. The last large harvest occurred in 1962 when just under 91 metric tons (200,000 pounds) were taken. The fishery was inactive from 1964 through 1970 and in 1974 and 1976. During the five years the fishery was active between 1969 and 1977, the annual harvest averaged less than 11 metric tons (24,000 pounds) and the number of boats in the fishery typically did not exceed three. With the exception of 1972 when a dredge was also used, the hand shovel has been the sole gear type. Although increases in resource abundance, increasingly favorable market conditions, the development of more efficient types of gear, and improved programs for the certification of beaches as a source of clams for human consumption are expected to stimulate renewed activity in this fishery, the razor clam fishery is expected to remain an almost insignificant portion of the Cook Inlet commercial fishing industry.

TABLE 3.31

PROJECTED HARVESTING ACTIVITY
COOK INLET SHRIMP FISHERY
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions)[1]: Nominal	Catch: Value (millions)[1]: Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	5.6	2540	1.7	1.7	0.31	0.31	55	] 474	117	102	32
1981	5.6	2540	1.9	1.8	0.34	0.32	55	1473	117	102	32
1982	5.6	2540	2.0	1.8	0.36	0.33	55	1471	117	102	33
1983	5.6	2540	2.?	1.9	0.39	0.33	55	1470	117	102	34
1984	5.6	?540	2.3	1.9	0.42	O*34	55	1469	117	102	34
1985	5.6	2540	2.5	1.9	0.45	0.34	55	1468	117	102	35
1986	5.6	2540	2,-7	2.0	0.48	0.35	55	1468	117	102	36
1987	5.6	2540	2.9	2.0	0.51	().35	55	1467	117	102	36
1988	5.6	2540	3.1	2.0	0.55	0.36	55	1466	117	102	37
1989	5.6	2540	3.3	2.0	0.59	0.36	55	1466	117	102	37
1990	5.6	2540	3.5	2*1	0.63	0.37	55	]465	117	102	37
1991	5.6	2540	3.-?	2.1	().67	0.37	55	1465	117	102	38
1992	5.6	2540	4.0	2.1	0.71	0.37	55	1464	117	102	38
1993	5.6	2540	4.2	2.1	0.76	0.38	55	1464	117	102	38
1994	5.6	2540	4.5	2.1	0.81	0.38	55	1464	117	102	39
1995	5.6	?540	4.8	2.1	0.86	0.38	55	1463	117	102	39
1996	5.6	254(7	5*1	2.2	0.91	0.39	55	1463	117	102	39
1997	5.6	254(I	5.4	2..?	0.97	0.39	55	1463	117	102	40
199$	5.6	2540	5.7	2.2	1.03	0.39	55	1463	117	102	413
1999	5.6	2540	6.1	2.2	1.09	0.39	55	1462	117	102	40
2000	5.6	2540	6.5	2.2	1.15	0.40	55	1462	117	102	40

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.32

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET-SHRIMP-FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Rea 1	Boats	Landings	Eishermen	Weight	Real Value
1981	0	2.3	7.9	2.3	0	-0.1	0	o	2.3
1982	0	4*5	16.3	4.5	0	-0.2	0	0	4.5
1983	0	6.6	25.1	6.6	c1	-0.3	0	0	6.6
1984	0	8.5	34*4	8.5	o	-0.3	0	0	8.5
1985	0	10.3	44.1	10.3	0	-I-).4	0	0	10.3
1986	0	12.0	54.4	12.0	0	-0.4	0	0	12.0
1987	0	13.6	65.2	13.6	0	-0.5	0	0	13.6
1988	0	15.1	76.6	15,1	0	-0.5	0	0	15.1
1989	0	16.5	88.6	16.5	o	-0.6	0	0	16.5
1990	0	17.8	101.2	17*8	0	-0.6	()	0	17.8
1991	0	19.0	114.5	19.0	0	-0.6	o	0	19.0
199?	0	20.2	128.5	20.2	0	-0.7	0	c1	20.2
1993	0	21.3	143.2	21.3	0	-0.7	0	o	21.3
1994	0	22.3	158.7	22.3	0	-0.7	0	0	22.3
1995	0	23.2	175.0	23.2	0	-0.7	0	0	23.2
1996	0	24.1	192.2	24.1	0	-0.7	0	0	24.1
1997	0	24.9	210.2	24.9	0	-0.8	0	0	24.9
1998	0	25.6	229,2	25.6	0	-0.8	0	0	25.6
1999	0	?6.3	249.3	26.3	0	-0.8	0	0	26.3
2000	n	26.9	270.3	26.9	0	-0.8	0	0	26.9

TABLE 3.33

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET SHRIMP FISHERY
1981-2000

Year	Catch: Weight	Catch: Real Value	Exvessel Price: Nominal	Exvessel Price: Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Weight	Catch per Boat: Real Value
1981	0	2.3	7.9	2.3	0	-0.1	0	0	2.3
1982	0	2.1	7.7	2.1	0	-0.1	0	0	2.1
1983	0	2.0	7.6	2.0	0	-0.1	0	0	2.0
1984	0	1.8	7.4	1.8	0	-0.1	0	0	1.8
1985	0	1.7	7.3	1.7	0	-0.1	0	0	1.7
1986	0	1.5	7.1	1.5	0	-0.1	0	0	1.5
1987	0	1.4	7.0	1.4	0	-0.0	0	0	1.4
1988	0	1.3	6.9	1.3	0	-0.0	0	0	1.3
1989	0	1.2	6.8	1.2	0	-0.0	0	0	1.2
1990	0	1.1	6.7	1.1	0	-0.0	0	0	1.1
1991	0	1.0	6.6	1.0	0	-0.0	0	0	1.0
1992	0	1.0	6.5	1.0	0	-0.0	0	0	1.0
1993	0	0.9	6.4	0.9	0	-0.0	0	0	0.9
1994	0	0.8	6.4	0.8	0	-0.0	0	0	0.8
1995	0	0.8	6.3	0.8	0	-0.0	0	0	0.8
1996	0	0.7	6.2	0.7	0	-0.0	0	0	0.7
1997	0	0.6	6.2	0.6	0	-0.0	0	0	0.6
1998	0	0.6	6.1	0.6	0	-0.0	0	0	0.6
1999	0	0.5	6.1	0.5	0	-0.0	0	0	0.5
2000	0	0.5	6.0	0.5	0	0.0	0	0	0.5

Summation of Harvesting Activity Projections

This section consists of the presentation and analysis of the projections of harvesting activity of the Cook Inlet commercial fishing industry as a whole. The tables presented in this section include summations of projected harvesting activity and projections of the relative importance of each fishery.

Total catch is projected to increase from 19,170 metric tons (42.3 million pounds) in 1980 to 41,030 metric tons (90.5 million pounds) in 2000, and its real value is projected to increase from $28.4 million to $46.2 million (see Table 3.34). The corresponding percentage increases by weight and real value are 114 percent and 63 percent respectively (see Table 3.35). Less significant increases in the number of boats, fishermen, and landings are expected. Projections of the annual rates of change in harvesting activity appear in Table 3.36. Excluding groundfish, catch is expected to increase from 19,158 metric tons (42.2 million pounds) to 23,210 metric tons (51.2 million pounds); and its real value is expected to increase from $28.4 million to $41.4 million (see Table 3.37). This corresponds to a 21.2 percent increase in harvest weight and a 45.8 percent increase in real value (see Table 3.38). The more rapid increase in real value is explained by the 20.3 percent projected increase in the average exvessel price. Table 3.39 contains the corresponding annual rates of change in harvesting activity.

In addition to the significant changes in absolute harvesting activity, there are expected to be notable changes in the relative importance of

TABLE 3.34

PROJECTED HARVESTING ACTIVITY
COOK INLET ALL FISHERIES
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real[1]	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of Boats	Number of Landings	Number of Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	42.3	19170	28.4	28.4	0.67	0.67	1852	17115	3288	23	15
1981	42.9	19471	30.2	28.6	0.70	().67	1853	17291	3290	23	15
1982	43.6	19789	33.1	29.7	0.76	0.68	1853	17475	3292	24	16
1983	44.4	20124	35.3	30.0	0.80	0.68	1854	17668	3294	24	16
1984	45.1	20480	38.4	31.0	0.85	0.69	1855	17871	3296	24	17
1985	46.0	20858	41.3	31.6	0.90	0.69	1855	18086	3298	25	17
1986	46.3	21000	44.?.	32.1	0.95	0.69	1855	18151	3298	25	17
1987	46.6	21159	47.1	32*3	1.01	0.69	1855	18219	3299	25	17
1988	47.1	21342	50.4	32.8	1.07	0.70	1855	18291	3299	25	18
1989	47.5	21558	53.8	33.3	1.13	0.70	1856	18367	3299	26	18
1990	48.1	21820	57.7	33.8	1.20	0.70	1856	18448	3300	26	18
1991	48.8	2?147	61.9	34.4	1.27	0.70	1856	18534	3300	26	19
1992	49,7	22565	66*6	35.0	1*34	0.70	1856	18627	3301	27	19
1993	51.0	23115	71.6	35.7	1.41	0.70	1856	18727	3302	27	19
1994	52.6	23853	77*3	36.5	1.47	0.69	1856	18835	3303	2a	20
1995	54.8	24865	83.7	37.5	1.53	0.68	1857	18954	3304	30	20
1996	57.9	26273	90.9	38.6	1.57	0.67	1857	19084	3305	31	21
1997	62.3	28257	99.2	39.9	1.59	0.64	1857	19230	3307	34	21.
1998	68.5	31086	108.9	41.5	1.59	0.61	1858	19393	3310	37	22
1999	77.5	35150	120.5	43.6	1.55	0.56	1859	19579	3314	42	23
2000	90.5	41(-)30	134."7	46.2	1.49	0.51	1860	19794	3320	49	25

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.35

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
ALL COOK INLET FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	W	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1980	0	0	0	0	0	0	o	0	0
1981	1.6	0.9	4.8	-0.6	0.0	1..0	0.1	1.5	0.9
1982	3.2	4.6	12.8	1.4	(3.1	2.1	0.1	3.2	4.6
1983	5.0	5.9	18.4	0.8	0.1	3.2	0.2	4.9	5.8
1984	6.8	9.2	26,6	2.2	0.1	4.4	0,2	6.7	9.1
1985	8.8	11.3	33*7	2.3	0.2	5.7	0.3	0.6	11.1
1986	9.5	13.0	42.2	3.1	0.2	6.0	0.3	9.4	12,8
1987	10.4	14.0	50.2	3.3	0.2	6.4	0.3	10.2	13.8
1988	11.3	15.7	59.5	3.9	0.2	6.9	0.3	11.1	15.5
1989	12.5	17.2	68.7	4..?	0*2	7.3	0.4	1202	17.0
1990	13.8	19.1	78.8	4.6	0.2	7.8	O*4	13.6	18.9
1991	15.5	21.0	88.8	4.8	0.2	$*3	0.4	15.3	20.8
1992	17.7	23.4	99.3	4.8	0.2,	8.8	0.4	17.5	23.1
1993	20.6	25.9	109.4	4.4	0.2	9,4	0.4	20.3	25.6
1994	?4.4	28.8	119.0	3.5	O*2	10*O	0.5	24.1	?8.5
1995	29.7	32.1	127.3	1.8	0.2	10.7	0.5	29.4	31.8
1996	37.0	36.0	133.7	-0.8	O*3	11.5	0.5	36,7	35.6
1997	47.4	40.6	137.1	-4.6	0.3	12.4	0.6	47.0	40.2
1998	62.2	46.4	136.6	-9.7	0.3	13.3	0.7	61.6	45*9
] 999	83.4	53.5	131.5	-16.3	0.4	14.4	0.8	82.7	52.9
2000	114.0	62.6	121.7	-24.0	0.4	15*FJ	1.0	113*1	62.0

TABLE 3.36

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
ALL COOK INLET FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1980	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1981	1.6	0.9	4.8	-0.6	0.0	1.0	0.1	1.5	0.9
1982	1.6	3.7	7.6	2.0	0.0	1.1	0.1	1.6	3.7
1983	1.7	1*2	4.9	-O*5	0.0	101	0.1	1.7	1.1
1984	1.8	3.2	6.9	1.4	0.0	1*2	0.1	1*7	3.1
1985	1.8	1*9	5.6	0.1	0.0	1.2	O*1	1.8	1.9
1986	(-)*7	1.5	6.3	0.8	().0	0.4	O*O	0.7	1.5
1987	0.8	0.9	5.7	0*1	(-).0	0.4	0.0	0.7	0.9
1988	n.9	1.5	b.?	0.6	0.0	0.4	0.0	0.9	1.5
1989	1.()	1.3	5.8	0.3	0.0	0.4	0.0	1.0	1.3
199(-!	1.2	1.7	6.0	0.4	0.0	0.4	0.0	1.2	1.6
1991	1.5	1.6	5.6	0.1	0.0	0.5	0.0	1.5	1.6
1992	].9	1*9	5.5	0.0	0.0	n.5	0.0	1.9	1.9
1993	2.4	2.0	5.1	-0.4	0.0	0.5	0.0	2.4	2.0
1994	3.2	2.3	4.6	-0.8	0.0	0.6	0.0	3.2	2.3
1995	4.2	2.6	3.8	-1.6	0.0	0.6	0.0	4.2	2.6
1996	5.7	3.0	2.8	-2.6	0.0	0.7	0.0	5.6	2.9
]997	7.6	3.4	1.4	-3.8	0.0	0.8	0.1	7.5	3,4
1998	10.0	4.1	-(-).2	-5.4	0.0	0.8	0.1	10.0	4.0
1999	13.1	4*9	-?.2	-7.3	0.0	1.0	0.1	1300	4.8
2000	16.7	6.0	-4.2	-9,2	0.1	1*1	0.2	16.7	5.9

TABLE 3.37

PROJECTED HARVESTING ACTIVITY
COOK INLET TRADITIONAL FISHERIES
1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions)[1]: Nominal	Catch: Value (millions)[1]: Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	42.2	19158	28.4	28.4	0.67	0.67	1852	17115	3288	23	15
1981	42.9	19454	30.2	28.6	0.70	0.67	1853	17290	3290	23	15
1982	43.6	19764	33.0	29.7	0.76	0.68	1853	17474	3292	24	16
1983	44.3	20089	35.3	30.0	0.80	0.68	1854	17667	3294	24	16
1984	45.0	20430	38.4	31.0	0.85	0.69	1855	171370	3296	24	17
1985	45.8	20788	41.3	31.6	0.90	0.69	11355	18084	3298	25	17
1986	46.1	20900	44.2	32.0	0.96	0.70	1855	18149	3298	25	17
1987	46.3	21015	47.0	32.3	1.01	0.70	1855	18216	3298	25	17
1988	46.6	21136	50.3	32.8	1.08	0.70	1855	18287	3299	25	10
1989	46.9	21261	53.7	33,2	1.15	0.71	1856	18362	3299	25	18
1990	47.2	21393	57.5	33,7	1.22	0.71	1856	18441	3299	25	18
1991	47.5	21532	61.6	34,2	1.30	0.72	1856	18524	3299	26	18
1992	47.8	21677	66.1	34.8	1.38	O*73	1856	18613	3300	26	19
1993	48.1	21831	71*O	35.4	1.47	0.73	1856	18708	3300	26	19
1994	48.5	21993	76.3	36.0	1.57	0.74	1856	18809	3300	26	19
1995	48.9	22165	82.1	36.8	1.68	0.75	1856	18917	3300	26	20
1996	49.3	22347	88.4	37.5	1.79	0.76	1856	19033	3300	27	20
1997	49.7	22541	95,4	38.4	1.92	0.77	1856	19159	3300	27	21
1998	50.2	22749	103.0	39.3	2.05	0.78	1856	19295	3300	27	21
1999	50.6	22971	111.4	4(-),3	2.20	0.80	1856	19442	3301	27	22
2000	51.2	23210	120.7	41.4	2.36	0.81	1856	19603	3301	28	22

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.38

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET TRADITIONAL FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	W	Real Value	Nominal	Rea 1	Boats	Landings	Fishermen	Weight	Real Value
1980	n	0	0	0	0	0	o	0	0
1981	1.5	().9	4.8	-0.6	0.0	1.0	0.1	1.5	0.9
1982	3.2	4.6	12.9	1.4	O*1	2.1	0.1	3.1	4,6
1983	4.9	5.8	18.5	0.9	0.1	3.2	0.2	4.8	5.7
1984	6.6	9.2	26.8	2.4	0.1	4.4	0.2	6.5	9.0
1985	8.5	11*3	34.0	2.5	0.2	5.7	0.3	8.3	11.1
1986	9.1	12.9	42.7	3.5	0.2	6.0	0.3	8.9	12.7
1987	9.7	13.9	51.0	3.8	0.2	6.4	0.3	9.5	13.7
1988	10.3	15.%	60.7	4*7	0.2	6.8	0.3	10.1	15.3
1989	11.0	16.9	70.6	5.3	0.2	7.3	0.3	10.8	16,7
1990	11.7	18.7	81.6	6.3	0.2	7.7	O*3	11.5	18,5
1.991	12.4	20.5	93.2	7.2	0.2	8.2	0.4	12.2	20.2
1992	13.1	22.5	105.9	8.3	0.2	8.8	0.4	12.9	22.3
1993	13.9	24.7	119.4	9.4	0.2	9*3	0.4	1307	24.4
1994	14.8	27.0	134.2	10.7	O*2	9.9	0.4	14.6	26.0
1995	15.7	29.5	150.0	12.0	0.2	10.5	0.4	15.5	29.3
1996	16.6	32.3	167.1	13,4	0.2	11.2	0.4	16.4	32.0
1997	17.7	35.3	185.6	15.0	0.2	11.9	0.4	17.4	35.0
1998	18.7	38.5	205.7	16.6	0.2	12.7	0.4	18.5	38.2
1999	19.9	42*O	227.5	18.4	0.2	13.6	0.4	19.6	41.7
2000	21.2	4508	251.1	20.3	0.2	14*5	0.4	20.9	45.5

TABLE 3.39

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
COOK INLET TRADITIONAL FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1980	0.0	0.0	0.0	0.0	0.0	0.0	O*O	0.0	0.0
1981	195	0.9	4.8	-0.6	0.0	1.0	0,1	1.5	0.9
1982	1.6	3*7	7.7	2*1	0.0	1.1	O*1	1.6	3.7
1983	1.6	1.1	5.0	-0.5	(3.0	1*1	001	1.6	1.1
1984	1.7	3.2	7.0	1.4	0.0	1*2	0,1	1*7	3.1
1985	1.7	1.9	5.7	0.2	0.0	1*2	0.1	1.7	1.9
1986	0.5	1.5	6.5	0.9	0.0	0.4	0,0	0.5	1*5
1987	0.6	0.9	5.8	0.3	0.0	0.4	0.0	0.5	0.9
1988	0.6	1.5	IS*4	0.9	0.0	0.4	O*O	0.6	1.4
1989	0.6	1.2	6.1	0.6	0.0	0.4	0.0	0.6	1.2
1990	0.6	1.6	6.5	0.9	0.0	0.4	0.0	0.6	1.5
1991	0.6	1.5	6.4	0.8	0.0	0.5	0,0	0.6	1.5
1992	0.7	1.7	6.6	1.0	0.0	0.5	0,0	0.7	].7
1993	O*7	1*7	6.6	1.0	0.0	0.5	0,0	0.7	1.7
1994	().7	1.9	6.7	102	0.0	O*5 .	0.0	0.7	1.9
1995	0.8	2.0	6.8	1.2	0.0	0.6	0,0	0.8	2.0
1996	0.8	2*1	6.9	1*3	0.0	0.6	0.0	0.8	2.1
1997	0.9	2.2	6.9	1.4	0.0	C)*7	0.0	0.9	2.2
1998	0.9	2.4	7.0	1.5	0.0	0.7	0.0	0.9	2.4
1,999	1.()	2.5	7.1	1.5	0.0	0.8	0.0	I.*O	2.5
2000	1.0	?.7	7.2	1.6	0.0	0.8	0,0	1.0	2.7

individual fisheries. For example, in 1980, groundfish is projected to account for less than one percent of total harvest weight or value, but by 2000, it is expected to equal 43.4 percent of harvest weight and 10.4 percent of harvest value (see Tables 3.40 and 3.41). The large difference in the importance of groundfish as measured by weight or value is due to the large exvessel price differential between groundfish and the traditional high-valued species such as crab and salmon. As is indicated by the projections in Tables 3.42 through 3.44, the changes in the relative number of boats, fishermen, or landings are not expected to be significant.

Within the traditional fisheries the changes in relative importance are expected to be less dramatic. In terms of pounds harvested, the salmon and halibut fisheries are expected to make minor gains at the expense of the shellfish fisheries (see Table 3.45). In terms of relative value, the salmon and halibut fisheries have minor gains and the other fisheries have minor losses (see Table 3.46). The changes in the relative importance of individual traditional fisheries as measured by the number of boats, fishermen, or landings are insignificant except for the gains by the halibut fishery at the expense of the salmon fishery (see Tables 3.47 through 3.49).

As is mentioned in Chapter II, the summation of the number of landings of fishermen or boats over all fisheries results in double counting since a fisherman or boat is counted once for each fishery which is participated in. The method used to reduce this problem is also discussed in Chapter II; the results of this method are presented in

TABLE 3.40

PERCENTAGE OF CATCH
FOR ALL COOK INLET FISHERIES 1980-2000

Year	Salmon	Hal ibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	48.1	1.3	15.2	8.7	12.3	1.1	13.3	0.1
1981	48.6	1*3	15.0	8.8	12.1	1.0	1300	0.1
1982	49.1	1.3	14.8	8.9	12.0	1.0	12.8	0.1
1983	49.6	1.3	14.5	9.0	11.9	1.0	12.6	0.2
1984	50.1	1.2	14.3	9.1	11,7	1.0	12.4	0.2
1985	50.6	1*2	14.0	9.2	11.5	1.0	12.2	0.3
1986	50.7	1.3	13.9	9.1	11.5	1.0	12.1	0.5
1987	50.8	1.3	13.8	9.0	1104	1*O	12.0	0.7
1988	50.9	1.3	1307	8.9	11.3	1.0	11*9	1.0
1989	50.9	1.4	13.5	8.9	11.2	0.9	11.8	1.4
1990	50.9	1.4	1304	8.8	11.0	0.9	11.6	2.(Y
1991	50.7	1*4	13.2	8.6	10.9	0.9	11.5	2.8
1992	50.4	1.5	12.9	8.5	10.7	009	11.3	3.9
1993	49.8	1.5	12.6	8.3	10.4	0.9	11.0	5.6
1994	48.8	1..5	12.2	8.0	10.1	0.9	10.6	7.8
1995	47.5	1.5	11.7	7.7	9.7	0.8	10.2	10.9
1996	45, b	1.5	11.1	7.3	9.2	0.8	9*7	14*9
1997	43.0	1.4	10.3	6.8	8.5	O*7	9.0	2002
1998	39.7	1.3	9.4	6.1	7.8	0,7	8.2	26.8
1999	35*7	1*2	8.3	5.4	6.9	0.6	7.2	34.6
2000	31.1	1.1	7.1	4.7	5*9	O*5	6.2	43*4

Source: Alaska Sea Grant Program.

TABLE 3.41

PERCENTAGE OF VALUE
FOR ALL COOK INLET FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	63.4	1.6	4.5	16.3	6.8	1.2	6.1	0.0
1981	63.1	1.6	4.5	14.9	8.5	1*2	6.2	0.0
1982	63.9	1.6	4.4	15.4	7.4	1.2	6.1	0.0
1903	64.5	1.6	4.4	14,5	7*6	1*2	6.2	0.0
1984	65.2	1.6	4.3	14.8	6.9	1*1	6.1	0.0
1985	65.9	1.6	4*3	14.1	6.9	1.1	6.1	0.1
1986	66.4	1.6	4.2	14.0	6.4	1.1	6.1	0.1
1987	66.9	1.7	4.3	13,4	6.4	1.1	6*1	0.1
1988	67.4	1.8	4.2	13.2	6.1	1.1	6.1	O*2
1989	67.8	1.8	4.2	12.7	6.0	1.1	6.1	0.2
1990	68.3	1.9	4.2	12.4	5.7	1*1	6.1	0.3
1991	68.7	2.0	4*2	12.0	5.6	1.1	6.0	O*5
1992	69.0	2.0	4.1	11.7	5.4	1*1	6.0	0.7
1993	69.4	2.1	4.1	11.3	5.2	1.1	5,9	1.0
1994	69.6	2.1	4.0	11.0	5.0	1.0	5.8	1.4
1995	69.7	?.2	4.(-)	10.7	4.0	1*O	5.7	1.9
1996	69.6	2.2	3.9	10.3	4.7	1*O	5.6	2.7
1997	69.3	2*2	3.8	9.9	4.5	1.0	5.5	3.8
1998	68.7	2.2	3.7	9.5	4.3	0.9	5.3	5.4
1999	67.7	2.2	3.5	9.0	4.(-I	O*9	5.1	7.5
2000	66.1	2*2	3.4	8.5	3.8	0.8	4.8	10*4

Source: Alaska Sea Grant Program.

TABLE 3.42

PERCENTAGE (IF BOATS
FOR ALL COOK INLET FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	67.4	16.2	3.7	3.7	3.4	2.6	3.0	0.0
1981	67.4	16.2	3*7	3.8	3.4	2.6	3.0	0.0
1982	67.4	16.2	3.7	3.8	3*4	2.6	3.0	0.0
1983	67.4	16.2	3*7	3.8	305	2.6	3.0	0.0
1984	67*3	16.2	3*7	3.8	3.5	2.6	3*O	0.0
1985	67.3	16*2	3.7	3.8	3.5	2.6	3.0	0.0
1986	67.3	16.2	3.7	3.8	3*5	2.6	3*O	0.0
1987	67.3	16.2	3.7	3.8	3.5	2.6	3.0	000
1988	67.3	16.2	3.7	3.8	3.5	2.6	3*O	0.0
1989	67.3	16.2	3.7	3.8	3.5	2.6	3.0	0.0
1 9 9 0	67.3	16.2	3*7	3.0	3*5	2.6	3.0	0.0
1991	67.3	16.2	3.7	3.8	3.5	2.6	3.0	0.0
1992	67.3	16.2	3.7	3.8	3*5	2.6	3.0	0.0
1993	67.3	16.2	397	3.8	3.5	2.6	3.0	0.0
1994	67,3	16*2	3*7	3.8	3.5	2.6	3*O	0.0
1995	67.3	16.2	3.7	3.8	3.5	2 . 6	3.0	0.0
1996	67.3	16.2	3*7	3.8	3.5	2*6	3*O	O*1
1997	67.2	16,2	3*7	3.8	3*5	2.6	3.0	0.1
1998	67.2	16.1	3.7	3.8	3.5	2.6	3.0	0.1
1999	67,2	16.1	3.7	3.8	3.5	2.6	3*O	0.1
2000	67.2	16.1	3.7	3.8	3.5	2.6	3.0	0.2

Source: Alaska Sea Grant Program.

TABLE 3.43

PERCENTAGE OF FISHERMEN
FOR ALL COOK INLET FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	62.0	9.1	8.3	7.4	6.7	2.9	3.6	0.0
1981	62.0	9.1	8.3	7*4	6*8	2.9	3.6	0.0
1982	61.9	9.1	8.3	7.4	6.8	2.9	3.6	0.0
1983	61.9	9.1	8.3	7.5	6.8	2.9	3.6	0.0
1984	61.9	9*1	8.3	7.5	6.8	2.9	3.6	0.0
1985	61.8	9.1	8.2	7.5	6,8	2.9	3.6	0.0
1986	61.8	9.1	8.2	7.5	6.8	2.9	3.6	0.0
1987	61.8	9.1	8.2	7.5	6.8	2.9	3.6	0.0
1988	6108	9*1	8.2	7.5	6.8	2.9	3.6	0.0
1989	61.8	9*1	8.2	7.5	6.8	2.9	3.6	0.0
1990	61.8	9.1	8.2	7.5	6.8	2.9	3.6	0.0
1991	61.8	9*1	8*2	7.6	6.8	2.9	3.6	0.0
1992	61.8	9*1	8.2	7.6	6.8	2.9	3.6	0.0
1993	61.8	9.1	8.2	7.6	6.8	2.9	3.6	0.1
1994	61.7	941	8.2	7.6	6.8	2.9	3.6	0.1
1995	61.7	9.1	8.2	-?.6	6.8	2.9	3.6	0.1
1996	61.7	9.1	8.2	7.6	6.8	2.9	3.6	O*2
1997	41.6	9.1	8.2	7.6	6.8	2.9	3.6	0.2
1998	61*6	9*1	8.2	7.6	6.8	2.9	3.5	0.3
1999	61.5	9.1	8.2	7.6	6.8	2.9	3.5	0.4
2000	61.4	9.0	8.2	7.5	6.8	2.9	3.5	0.6

Source: Alaska Sea Grant Program.

TABLE 3.44

PERCENTAGE OF NUMBER OF LANDINGS
FOR ALL COOK INLET FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	68.1	7.()	2.5	5.1	5.2	3.5	8.6	0.0
1981	68.2	6.9	2.5	5.2	5.2	3.4	8.5	0.0
1982	68.4	6.9	2.4	5.3	5.2	3*4	8.4	0.0
1983	68.6	6.8	2.4	5.4	5.1	3.4	8.3	0.0
1984	68.7	6.7	2.4	5.5	5.1	3.3	8.2	0.0
1985	68.9	6.6	2.4	5.6	5.0	303	8.1	0.0
1986	69.0	6.6	2.4	5.6	5.0	3*3	8.1	0.0
1987	69.2	6.6	2.3	5.6	5.0	3.3	8.1	0.0
1988	69.3	6.6	2.3	5.6	500	3.3	8.0	0.0
1989	69,4	6.5	2.3	5.5	5.0	3.2	8.0	0.0
1990	69.5	6.5	2.3	5.5	4*9	3.2	7*9	O*O
1991	69.6	6.5	2.3	5*5	4.9	3.2	7*9	0.1
1992	69.8	6.4	2.3	5.5	4*9	3.2	7.9	0.1
1993	69.9	6.4	2.3	5.4	4.9	3.2	7.8	0*1
1994	70.0	6.4	2.3	5.4	4.8	3.2	7,8	0.1
1995	70.2	6.3	2.3	5.4	4*8	3.2	7.7	O*2
1996	70.3	6.3	2.2	5.3	4.8	3*1	7.7	O*3
1997	70.4	6.2	2.2	5.3	4.7	3.1	7.6	0.4
1998	70.5	6.2	2.2	5.2	4.7	3.1	7.5	0.5
1999	70.6	6.1	2.2	5.2	4.7	3.1	7.5	0.7
2000	70.7	6.1	2.2	5.1	4.6	3.0	7.4	1*O

Source: Alaska Sea Grant Program.

TABLE 3.45

PERCENTAGE OF CATCH BY WEIGHT
FOR TRADITIONAL COOK INLET FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	48.1	1.3	15.2	8.7	12.3	1.1	13.3
1981	48.6	1.3	15.0	fin	12.1	1.0	13,1
1982	49.1	1.3	14.8	8.9	12.0	100	12.9
1983	49.7	1.3	14.5	9*O	11.9	1.0	12.6
1984	50.2	1.2	14.3	9.1	11*7	1*O	12.4
1985	50.8	1.'?	14.0	9.2	11.6	1.0	12.2
1986	51.0	1.3	14.0	9.1	11.5	1.0	12.2
1987	51.2	1.3	13.9	9.1	11.5	1.0	12.1
1988	51.4	1.3	13.8	9.0	11.4	1.0	12.0
1989	51.7	1.4	13.7	9.0	11.3	1.0	11.9
1990	51.9	1.4	13.6	8.9	11.3	1.0	11.9
1991	52.2	1.5	13.6	8.9	11.2	O*9	11.8
1992	52.4	1.5	13.5	8.8	11.1.	0.9	11.7
1993	5?.7	1,6	13.4	8.7	11.0	0.9	11.6
1994	53.0	1.6	13.3	8.7	11.0	O*9	11,5
1995	53.3	1*7	13.2	8.6	10.9	0.9	11,5
1996	53.6	1.7	1.3.1	8.5	10.8	0.9	1.1.4
1997	53.9	1.8	13.0	8.5	10.7	0.9	11.3
1998	54.3	1.8	12.8	8.4	10.6	0.9	11.2
1999	54.7	1.9	12.7	8.3	10.5	0.9	11*1
2000	55.1	1.9	12.6	8.2	10.4	0.9	10.9

TABLE 3.46

PERCENTAGE OF VALUE
FOR TRADITIONAL COOK INLET FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	63.4	1.6	4.5	16.3	6.8	1.2	6.1
1981	63.1	1.6	4.5	14,9	8.5	1,2	6.2
1982	63.9	1.6	4.4	15,4	7.4	1.2	6.1
1983	64.5	1.6	4.4	14.5	7.6	1.2	6.2
1984	65.2	1.6	4.3	14.8	6.9	1.1	6.1
1985	65.9	1.6	4.3	14.1	6.9	1.1	6.1
1986	66.4	1.6	4.3	14.0	6.4	1.1	6.1
1987	67.0	1.7	4.3	13.4	6.4	1.1	6.1
1988	67.5	1.8	4.'2	13.2	6.1	1.1	6.1
1989	68.0	1.8	4.2	12.7	6.0	1*1	6.1
1990	68.5	1.9	4.2	12.5	5.7	1.1	6.1
1991	69.0	2.0	4.2	12.1	5.6	1.1	6.1
1992	69.5	2.0	4.1	11.8	5.4	1.1	6.0
1993	70.0	2.1	4.1	11.4	5.3	1.1	6.0
1994	70.5	2.2	4.1	11.02	5.1	1.1	5.9
1995	71.1	2*2	4.0	10.9	4.9	1.0	5.8
1996	71.6	2.3	4.0	10.6	4.8	1.0	5.8
1997	7?.1	2.3	3.9	10.3	4.7	1.0	5.7
1998	72.6	2.4	3.9	10.CI	4.5	1.0	5.6
1999	73.2	2.4	3.8	9.8	4*4	1.0	5.5
2000	73.7	2.5	3.8	9.5	4.2	0.9	5.4

TABLE 3.47

PERCENTAGE OF BOATS
FOR TRADITIONAL COOK INLET FISHERIES 1980-2000

-Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	67.4	16.2	3.7	3,7	3.4	2.6	3.0
1981	67.4	16.2	3.7	3.8	3*4	2.6	3.0
1982	67.4	16.2	3*7	3.8	3.4	2.6	3.()
1983	67*4	16.2	3*7	3.8	3,5	2.6	3.0
1984	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1995	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1986	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1987	67*3	16.2	3.7	3.8	3.5	2.6	3.0
1988	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1989	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1990	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1991	67.3	16.2	3.7	3.8	3.5	2*6	3.0
1992	(57.3	16.2	3.7	3.8	3*5	2.6	3.0
1993	67.3	16.2	3.7	3.8	3.5	2*6	3.0
1994	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1995	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1996	67.3	16.2	3.7	3.8	3.5	2.6	3.0
1997	67.3	16.2	3.7	3.9	3.5	2.6	3.()
1998	67.3	16.2	3.7	3*9	3.5	2.6	3.0
1999	6“7.3	16.2	3.7	3.9	3.5	2.6	3.0
2000	67.3	16.2	3.7	3.9	3.5	2.6	3.0

TABLE 3.48

PERCENTAGE OF FISHERMEN
FOR TRADITIONAL COOK INLET FISHERIES 1980-2000

Year	Salmon	Hal i but	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	62.0	9.1	8.3	7.4	6.7	2.9	3.6
1981	62.0	9.1	8.3	7.4	6.8	2,9	3.6
1982	61.9	9.1	8.3	7*4	6.8	2.9	3.6
1983	61.9	9.1	8.3	7.5	6.8	2.9	3.6
1984	61.9	9.1	8.3	7*5	6.8	2.9	3.6
1985	61.8	9.1	8.2	7*5	6.8	2.9	3.6
1986	61.8	9.1	8.2	7*5	6.8	2*9	3.6
1987	61.8	9.1.	8.2	7.5	6.8	2,9	3.6
1988	61.8	9.1	8.2	7.5	6.8	2.9	3,6
1989	61.8	9*1	8.2	7.5	6.8	2.9	3.6
1990	61.8	9.1	8.2	7.5	6.8	2.9	3.6
1991	61.8	9.1	8.2	7*6	6.8	2.9	3.6
1992	61.8	9*1	8.2	7.6	6.8	2.9	3.6
1993	61.8	9.1	8.2	7.6	6.8	2.9	3.6
1994	61.8	9.1	8.2	7.6	6.8	2.9	3,6
1995	61.8	9.1	802	7.6	6.8	2.9	3.6
1996	61.8	9*1	8.2	7.6	6*8	2.9	3.6
1997	61.8	9.1	8.2	7.6	6.8	2.9	3.6
1998	61.8	9.1	8.2	7.6	6.8	2,9	3.6
1999	61.8	9.1	8.2	7.6	6.8	2.9	3.6
2000	61.8	9.1	8.2	7.6	6.8	2.9	3.6

TABLE 3,49

PERCENTAGE OF NUMBER OF LANDINGS
FOR TRADITIONAL COOK INLET FISHERIES 1980-2000

Year	Sal mon	Halibut	Herri no	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	68.1	7*CI	2.5	5.1	5.2	3*5	8.6
1981	68.2	6.9	2.5	5.2	5.2	3*4	8.5
1982	68.4	6.9	2.4	5*3	5.2	3.4	8.4
1983	68.6	6.8	2.4	5.4	5.1	3.4	8.3
1984	68.7	6.7	2.4	5.5	5.1	3.3	8.2
1985	68.9	6.6	2.4	5.6	5.0	303	8.1
1986	69.1	6.6	2,4	5.6	5.0	3*3	8.1
1987	69.2	6.6	2.3	5.6	5.0	3.3	8.1
1988	69.3	6.6	2.3	5.6	5.0	3.3	8.0
1989 ,	69.4	6.'5	2.3	5.5	5.0	3.2	8.0
1990	69*5	6.5	2.3	5.5	4.9	3.2	7.9
1991	69.7	6.5	2.3	5*5	4.9	3.2	7.9
1992	69.8	6*4	2.3	5,5	4.9	3,2	7.9
1993	70.0	6.4	2.3	5.4	4.9	3.2	7.8
1994	70.1	6.4	2.3	5.4	4.8	3.2	7.8
1995	70.3	6.3	2.3	5.4	4.8	3.2	7.7
1996	70.5	6.3	2*2	5.3	4.8	3.1	7.7
1997	70.7	6.3	2*2	5.3	4.8	3.1	7.6
1998	70.9	6.2	2.2	5*3	4.7	3.1	7.6
1999	71.1	6.2	2*2	5.2	4.7	3.1	7.5
2000	71.3	6.1	2.2	5.2	4*4	3.1	7.5

Tables 3.50 and 3.51 which include adjusted and unadjusted projections of the numbers of fishermen and boats that will participate in the harvesting sector of the Cook Inlet commercial fishing industry.

Local Participation

Local participation in the harvesting sector of the commercial fishing industry is demonstrated by the number of commercial fishermen from each community in Cook Inlet (see Table 3.52) and by Commercial Fisheries Entry Commission estimates of the gross earnings of Cook inlet and Anchorage fishermen (see Table 3.53). The measure of local participation in the Cook Inlet fisheries is discussed in Chapter II; the resulting indexes of local effort for three groups of Cook Inlet communities appear in Tables 3.54 through 3.56.

It should be noted that residents of Cook Inlet participate in non-local as well as local fisheries. Tables 3.57 through 3.59 indicate the fisheries for which Cook Inlet residents own gear permits.

In the study area, fishing boats that are large enough to require moorage typically operate out of small boat harbors; therefore, one determinant of a community's involvement in the harvesting sector of the commercial fishing industry is its small boat harbor facility. The following section describes small boat harbor facilities utilized by fishing boats that participate in the Cook Inlet fisheries.

TABLE 3.50

ADJUSTED PROJECTIONS OF THE NUMBER OF FISHERMEN
FOR THE COOK INLET COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES		SHELLFISH FISHERIES		TRADITIONAL FISHERIES		ALL FISHERIES	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	2039	1942	677	431	3288	2373	3288	2373
1981	2039	1942	679	432	3290	2374	3290	2374
1982	2039	1942	681	434	3292	2376	3292	2376
1983	2039	1942	683	435	3294	2377	3294	2377
1984	2039	1942	685	436	3296	2378	3296	2378
1985	2039	1942	687	437	3298	2379	3298	2379
1986	2039	1942	687	438	3298	2380	3298	2380
1987	2039	1942	687	438	3298	2380	3299	2380
1988	2039	1942	688	438	3299	2380	3299	2380
1989	2039	1942	688	438	3299	2380	3299	2381
1990	2039	1942	688	438	3299	2380	3300	2381
1991	2039	1942	688	438	3299	2380	3300	2381
1992	2039	1942	689	439	3300	2380	3301	2382
1993	2039	1942	689	439	3300	2381	3302	2383
1994	2039	1942	689	439	3300	2381	3303	2383
1995	2039	1942	689	439	3300	2381	3304	2384
1996	2039	1942	689	439	3300	2381	3305	2386
1997	2039	1942	689	439	3300	2381	3307	2388
1998	2039	1942	689	439	3300	2381	3310	2391
1999	2039	1942	690	439	3301	2381	3314	2395
2000	2039	1942	690	439	3301	2381	3320	2400

TABLE 3.51

ADJUSTED PROJECTIONS OF THE NUMBER OF BOATS
FOR THE COOK INLET COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES Unadjusted	SALMON FISHERIES Adjusted	SHELLFISH FISHERIES Unadjusted	SHELLFISH FISHERIES Adjusted	TRADITIONAL FISHERIES Unadjusted	TRADITIONAL FISHERIES Adjusted	ALL FISHERIES Unadjusted	ALL FISHERIES Adjusted
1980	1249	1190	235	150	1852	1339	1852	1339
1981	1249	1190	236	150	1853	1340	1853	1340
1982	1249	1190	236	151	1853	1340	1 8 5 3	1340
1983	1249	1190	237	151	1854	1340	1854	1340
1984	1249	1190	238	151	1855	1341	1855	1341
1985	1249	1190	238	152	1855	1341	1855	1341
1986	1249	1190	238	152	1855	1341	1855	1341
1987	1249	1190	238	152	1855	1341	1855	1341
1988	1249	1190	238	152	1855	1341	1855	1341
1989	1249	1190	239	152	1856	1341	1856	1342
1990	1249	1190	239	152	1856	1341	1856	1342
1991	1249	1199	239	152	1856	1342	1856	1342
1992	1249	1190	239	152	1856	1342	1856	1342
1993	1249	1190	239	152	1856	1342	1856	1342
1994	1249	1190	239	152	1856	1342	1856	1342
1995	1249	1190	239	152	1856	1342	1857	1342
1996	1249	1190	?39	152	1856	1342	1857	1343
1997	1249	1190	239	152	1856	1342	1857	1343
1998	1249	1190	239	152	1856	1342	1858	1344
1999	1249	11'30	239	152	1856	1342	1859	1345
2000	1249	1190	239	152	1856	1342	1860	1346

TABLE 3.52

NUMBER OF COMMERCIAL FISHERMEN BY Community[1] 1969-1976

	1969	1970	1971	1972	1973	1974	1975	1976
Anchor Point	26	80	23	40	67	42	59	100
Anchorage	291	538	5?9	517	521	461	562	691
Clam Gulch	10	9	13	14	15	20	17	29
English Bay	12	5	6	10	6	13	9	9
Halibut Cove	3	10	9	8	11	9	12	14
Homer	113	161	174	220	244	268	297	356
Kasilof	12	25	13	16	24	20	24	38
Kenai	85	153	141	161	167	162	150	184
Ninilchik	12	21	22	22	19	27	37	44
Port Graham	18	14	19	18	13	22	22	27
Seldovia	72	72	64	67	79	74	79	88
Soldotna	55	73	80	93	72	70	73	112
Spenard	53	51	25	13	8	7	6	5

Source: Commercial Fisheries Entry Commission, commercial license file.

[1]The number of commercial fishing license applicants listing each community as a home address.

TABLE 3.53

ESTIMATED GROSS EARNINGS OF ANCHORAGE AND
COOK INLET FISHERMEN

Year	Gross Earnings	
	Anchorage	Cook Inlet
1969	$1,271,426	$2,403,116
1970	3,551,093	4,116,779
1971	2,696,717	4,147,804
1972	1,538,851	5,403,972
1973	2,457,273	9,864,552
1974	2,431,768	10,239,372
1975	2,437,106	9,178,935
1976	4,919,600	15,990,043

Source: Alaska Commercial Fisheries Entry Commission,''Distribution of Income from Alaska Fisheries", July, 1978.

TABLE 3.54

LOCAL HARVESTING FACTOR FOR ANCHORAGE AREA, 1976

Cook Inlet:	LPO	TP	P	LPO/TP = P
King crab small boat pots	6	103	.058	
King crab large boat pots	-0-	33	-0-	
Salmon drift gill net	77	596	.129	
Salmon set gill net	265	718	.369	
Salmon purse seine	5	79	.063	

$$P = [(PF/TP) \cdot LPO]/B$$

Statewide:	PF	TP	LPO	B	P
Halibut hand troll	1	43			
Halibut small boat long line	95	1 ,323	12:	85	.108
Halibut large boat long line	256	1,112	59	167	.081
Dungeness crab small boat pots	43	240	6	18	.060
Dungeness crab large boat pots	12	43	-0-	1	-0-
Herring purse seine	129	251	1	66	.008
Herring beach seine		13	-0-		
Herring set gill net	1;;	249	1	3	.146
Herring pound	3	6	-0-		
Herring roe on kelp	407	1,529	77		
Bottomfish hand troll	NA	10	4		
Bottomfish small boat long line	3	66	18	5	.164
Bottomfish large boat long line	8	59	7		
Bottomfish small boat pots	1	7	-0-		
Bottomfish otter trawl	12	40	-0-		
Bottomfish beam trawl	NA	6	-0-		
Shrimp otter trawl	129	218	2	8	.148
Shrimp beam trawl	22	69	1		
Shrimp large boat pots	4	30	1		
Shrimp small boat pots	33	281	32	34	.111
Razor clams shovel	8	174	3		
Razor clams dredge	NA	5	-0-		
Salmon hand troll	1,239	2,746	7	2	1*
Salmon power troll	742	999	5		
Tanner crab small boat pots	166	295	6	47	.072
Tanner crab large boat pots	224	341	2	25	.053
Tanner crab other	NA	1	-0-		

Source: ADF&G and CFEC data files.

*P = 1 when calculated value exceeds 1
P = Estimate of the proportion of fishing effort that is local
LPO = Number of local permit owners
TP = Total number of permits
PF = Number of permits fished
B = Number of boats participating in the fishery

TABLE 3.55

LOCAL HARVESTING FACTOR FOR CENTRAL KENAI PENINSULA AREA, 1976

	LPO	TP	P	LPO/TP = P
Cook Inlet:				
King crab small boat pots	4	103	.039	
King crab large boat pots	1	33	.030	
Salmon drift gill net	196	596	.344	
Salmon set gill net	309	718	.430	
Salmon purse seine	4	79	.051	

p = [(PF/TPO ·]/B

Statewide:	PF	TP	LPO	B	P
Halibut hand troll	1		1		
Halibut small boat long line	95	1,3::	97	85	.082
Halibut large boat long line	256	1,112	52	167	.072
Dungeness crab small boat pots	43	240	5	18	.050
Dungeness crab large boat pots		43	1	1	.280
Herring purse seine	1 X	251	11	66	.086
Herring beach seine	NA	13	1		
Herring set gill net	109	249	16	3	1*
Herring pound	3	6	-0-		
Herring roe on kelp	407	1,529	20		
Bottomfish hand troll	NA	10	-0-		
Bottomfish small boat long line	3	66	4	5	.036
Bottomfish large boat long line	8	59	2		
Bottomfish small boat pots	1	7	1		
Bottomfish otter trawl	12	40	-0-		
Bottomfish beam trawl	NA	6	-0-		
Shrimp otter trawl	129	218	-0-	8	-0-
Shrimp beam trawl	22	69	-0-		
Shrimp large boat pots	4	30	-0-		
Shrimp small boat pots	33	281	13	34	.045
Razor clams shovel	8	174	14		
Razor clams dredge	NA	5	-0-		
Salmon hand troll	1,239	2,746	-0-	2	-0-
Salmon power troll	782	999	1		
Tanner crab small boat pots	166	295	2	47	.024
Tanner crab large boat pots	224	341	2	25	.053
Tanner crab other	NA	1	-0-		

Source: ADF&G and CFEC data files.

*p = 1 when calculated value exceeds 1
P = Estimate of the proportion of fishing effort that is local
LPO = Number of local permit owners
TP = Total number of permits
PF = Number of permits fished
B = Number of boats participating in the fishery

TABLE 3.56

LOCAL HARVESTING FACTOR FOR SOUTHERN KENAI PENINSULA AREA, 1976

Cook Inlet:	LPO	TP	P	LPO/TP = P
King crab small boat pots	62	103	.602	
King crab large boat pots	24	33	.727	
Salmon drift gill net	126	596	.211	
Salmon set gill net	62	718	.086	
Salmon purse seine	52	79	.658	

$$P = [(PF/TP) \cdot LPO]/B$$

Statewide:	PF	TP	LPO	B	P
Halibut hand troll	1	43	5		
Halibut small boat long line	95	1,323	87	85	.073
Halibut large boat long line	256	1,112	72	167	.099
Dungeness crab small boat pots	43	240	37	18	.368
Dungeness crab large boat pots	12	43	3	1	.837
Herring purse seine	129	251	32	66	.249
Herring beach seine		13	-0-		
Herring set gill net	1!;	249	-0-	3	-0-
Herring pound	3	6	-0-		
Herring roe on kelp	407	1,529	102		
Bottomfish hand troll	NA	10	-0-		
Bottomfish small boat long line	3	66	-0-	5	-0-
Bottomfish small boat pots	1	7	-0-		
Bottomfish otter trawl	12	40	1		
Bottomfish beam trawl .	NA	6	-0-		
Shrimp otter trawl	129	218	10	8	.740
Shrimp beam trawl	22	69	-0-		
Shrimp large boat pots	4	30	-0-		
Shrimp small boat pots	33	281	64	34	.221
Razor clams shovel	8	174	5		
Razor clams dredge	NA	5	-0-		
Salmon hand troll	1,239	2,746	1	2	.226
Salmon power troll	742	999	-0-		
Tanner crab small boat pots	166	295	41	47	.491
Tanner crab large boat pots	224	341	30	25	.788
Tanner crab other	NA	1	1		
Bottomfish large boat long line	8	59	1		

Source: ADF&G and CFEC data files.

P = Estimate of the proportion of fishing effort that is local
LPO = Number of local permit owners
TP = Total number of permits
PF = Number of permits fished
B = Number of boats participating in the fishery

TABLE 3.57

ANCHORAGE AREA COMMERCIAL FISHING PERMITS BY COMMUNITY, 1976

Type of Permit (Species, Gear, Mgmt. Area)	Anchorage	Chugiak	Eagle River	Spenard
Halibut, Long Line, Vessel < 5 Net Tons, Statewide	115	2	9	2
Halibut, Long Line, Vessel ≥ 5 Net Tons, Statewide	55	1	1	2
Halibut, Hand Troll, Statewide	9			
Dungeness Crab, Pots, Vessel ≤ 50', Statewide	6			
Black Cod, Long Line, Vessel < 5 Net Tons, Statewide	1			
Black Cod, Long Line, Vessel ≥ 5 Net Tons, Statewide	1			
Razor Clams, Shovel, Statewide	3			
Herring, Purse Seine, Statewide	1			
Herring, Set Gill Net, Statewide			1	
Herring Spawn on Kelp, unspecified Gear, Statewide	75		2	
King Crab, Pots, Vessel ≤ 50', Prince William Sound	6			
King Crab, Pots, Vessel ≤ 50', Cook Inlet	6			
King Crab, Pots, Vessel ≤ 50', Kodiak	1			
King Crab, Pots, Vessel ≤ 50', Southeastern - Yakutat	1			
King Crab, Pots, Vessel > 50', Dutch Harbor	3			
King Crab, Pots, Vessel > 50', Bering Sea	1			
King Crab, Pots, Vessel > 50', Adak	1			
King Crab, Pots, Vessel > 50', Prince William Sound			1	
Bottomfish, Hand Troll, Statewide	4			
Bottomfish, Long Line, Vessel < 5 Net Tons, Statewide	18			
Bottomfish, Long Line, Vessel ≥ 5 Net Tons, Statewide	7			
Shrimp, Otter Trawl, Statewide	2			
Shrimp, Pots, Vessel ≤ 50', Statewide	31		1	
Shrimp, Beam Trawl, Statewide	1			
Salmon, Purse Seine, Kodiak	4			
Salmon, Purse Seine, Chignik	6			

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TABLE 3.57 (CONTINUED)

Type of Permit (Species, Gear, Mgmt. Area)	Anchorage	Chugiak	Eagle River	Spenard
Salmon, Purse Seine, Southeastern	2			
Salmon, Purse Seine, Cook Inlet	5			
Salmon, Purse Seine, Prince William Sound	5			
Salmon, Drift GillN et, Bristol Bay	138		6	
Salmon, Drift Gill Net, Cook Inlet	70		4	
Salmon, Drift Gill Net, Prince William Sound	21			
Salmon, Drift Gill Net, Peninsula-Aleutians	8		1	
Salmon, Drift Gill Net, Southeastern	5			
Salmon, Set Gill Net, Bristol Bay	70		9	
Salmon, Set Gill Net, Cook Inlet	230		20	
Salmon, Set Gill Net, Kodiak	4			
Salmon, Set Gill Net, Kotzebue	1			
Salmon, Set Gill Net, Yakutat	9			
Salmon, Set Gill Net, Upper Yukon	1			
Salmon, Set Gill Net, Prince William Sound	2			
Salmon, Set Gill Net, Peninsula-Aleutians	7		2	
Salmon, Set Gill Net, Kuskokwim	1			
Salmon, Set Gill Net, Lower Yukon	5			
Salmon, Set Gill Net, Norton Sound	1			
Salmon, Hand Troll, Statewide	6		1	
Salmon, Fish Wheel, Upper Yukon	2			
Salmon, Fish Wheel, Statewide				
Salmon, Power Troll, Statewide	5			
Tanner Crab, Pots, Vessel ≤ 50', Statewide	6			
Tanner Crab, Pots, Vessel > 50', Statewide	2			
Number of Permit Owners	786	28	52	15

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TABLE 3.57 (CONTINUED)

Source: Commercial Fisheries Entry Commission Permit Files.

TABLE 3.58

CENTRAL KENAI PENINSULA COMMERCIAL FISHING PERMITS BY COMMUNITY, 1976

Type of Permit (Species, Gear, Mgmt. Area)	Clam Gulch	Kasilof	Kenai	Ninilchik	Soldotna	Sterling
Halibut, Long Line, Vessel < 5 Net Tons, Statewide	10	5	39	13	28	2
Halibut, Long Line, Vessel ≥ 5 Net Tons, Statewide	2	4	26	11	7	2
Halibut, Hand Troll, Statewide				1		
Black Cod, Long Line, Vessel < 5 Net Tons, Statewide					2	
Dungeness Crab, Pots, Vessel ≤ 50', Statewide	1	1	1		2	
Dungeness Crab, Pots, Vessel > 50', Statewide						
Herring, Purse Seine, Statewide		5	3	2		
Herring, Drift Gill Net, Statewide			1			
Herring, Beach Seine, Statewide			1			
Herring, Set Gill Net, Statewide	1	1	13		1	
Herring Spawn on Kelp, Unspecified Gear, Statewide	1	1	3	13	1	1
Bottomfish, Pots, Vessel < 50', Statewide	1					
Bottomfish, Long Line, Vessel < 5 Net Tons, Statewide			2		2	
Bottomfish, Long Line, Vessel ≥ 5 Net Tons, Statewide			2			
Razor Clams, Shovel, Statewide		3	6	2	3	
King Crab, Pots, Vessel ≤ 50', Cook Inlet		2	2			
King Crab, Pots, Vessel > 50', Cook Inlet			1			
King Crab, Pots, Vessel > 50', Dutch Harbor			2			
King Crab, Pots, Vessel > 50', Bering Sea			2			
King Crab, Pots, Vessel > 50', Western Aleutians			1			
Tanner Crab, Pots, Vessel ≤ 50', Statewide		1	1			
Tanner Crab, Pots, Vessel > 50', Statewide						
Shrimp, Pots, Vessel ≤ 50', Statewide	3	1	2	2		
Salmon, Purse Seine, Kodiak		2	1			
Salmon, Purse Seine, Prince William Sound			1	3		
Salmon, Purse Seine, Cook Inlet		1	3			

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TABLE 3.58 (CONTINUED)

Type of Permit (Species, Gear, Mgmt. Area)	Clam Gulch	Kasilof	Kenai	Ninilchik	Soldotna	Sterling
Salmon, Purse Seine, Peninsula-Aleutians			1			
Salmon, Drift Gill Net, Bristol Bay			7		12	1
Salmon, Drift Gill Net, Prince William Sound			1			
Salmon, Drift Gill Net, Peninsula-Aleutains			1			
Salmon, Drift Gill Net, Cook Inlet	13	16	111	20	33	3
Salmon, Set Gill Net, Cook Inlet	17	24	134	48	80	6
Salmon, Set Gill Net, Bristol Bay		2			1	
Salmon, Set Gill Net, Kodiak					2	
Salmon, Set Gill Net, Peninsula-Aleutians			1			
Salmon, Power Troll, Statewide	1					
Number of Permit Owners	30	41	286	78	151	13

Source: Commercial Fisheries Entry Commission Permit Files

TABLE 3.59

SOUTHERN KENAI PENINSULA COMMERCIAL FISHING PERMITS BY COMMUNITY, 1976

Type of Permit (Species, Gear, Mgmt. Area)	Anchor Point	Halibut Cove	Homer	Port Graham	Seldovia
Halibut, Long Line, Vessel < 5 Net Tons, Statewide	37	4	36	4	6
Halibut, Long Line, Vessel ≥ 5 Net Tons, Statewide	15	5	40	2	10
Halibut, Hand Troll, Statewide			5		
Razor Clams, Shovel, Statewide	1		4		
Black Cod, Long Line, Vessel ≥ 5 Net Tons, Statewide					1
Herring, Purse Seine, Statewide	3		24	1	4
Herring, Drift Gill Net, Statewide	?	1			
Herring Spawn on Kelp, Unspecified Gear, Statewide	83		18		1
Bottomfish, Otter Trawl, Statewide		1			
Bottomfish, Long Line, Vessel ≥ 5 Net Tons, Statewide					1
Shrimp, Pots, Vessel ≤ 50', Statewide	30	4	30		
Shrimp, Pots, Vessel > 50', Statewide	4		1		1
Shrimp, Otter Trawl, Statewide		1	9		
Dungeness Crab, Pots, Vessel ≤ 50', Statewide	11	2	22		2
Dungeness Crab, Pots, Vessel > 50', Statewide		1	1		1
Tanner Crab, Pots, Vessel ≤ 50', Statewide	3		21		17
Tanner Crab, Pots, Vessel > 50', Statewide		1	12	2	15
King Crab, Pots, Vessel ≤ 50', Cook Inlet	9	3	33		17
King Crab, Pots, Vessel > 50', Cook Inlet		2	14	2	6
King Crab, Pots, Vessel > 50', Dutch Harbor					4
King Crab, Pots, Vessel > 50', Bering Sea					7
King Crab, Pots, Vessel > 50', Western Aleutians					2
King Crab, Pots, Vessel > 50', Kodiak					1
King Crab, Pots, Vessel > 50', Adak					3

Continued on next page...

TABLE 3.59 (CONTINUED)

Type of Permit (Species, Gear, Mgmt, Area)	Anchor Point	Halibut Cove	Homer	Port Graham	Seldovia
Salmon, Purse Seine, Cook Inlet	3	1	28	8	12
Salmon, Purse Seine, Kodiak	1		8		4
Salmon, Purse Seine, Prince William Sound	2		8		
Salmon, Purse Seine, Chignik					3
Salmon, Drift Gill Net, Cook Inlet	28	9	72	4	13
Salmon, Drift Gill Net, Bristol Bay	1		9		1
Salmon, Drift Gill Net, Peninsula-Aleutians			1		
Salmon, Drift Gill Net, Prince William Sound	12				
Salmon, Set Gill Net, Cook Inlet	23	4	18	4	13
Salmon, Set Gill Net, Bristol Bay			20		1
Salmon, Set Gill Net, Kodiak			1		
Salmon, Set Gill Net, Kotzebue			1		
Salmon, Hand Troll, Statewide			1		
Number of Permit Owners	131	19	235	15	64

Source: Commercial Fisheries Entry Commission Permit Files.

Small Boat Harbors

Anchorage Area.

The City of Anchorage does not maintain a small boat harbor for commercial fishing vessels. Possible explanations of this are that the Cook Inlet area in the vicinity of Anchorage is not a major fishing ground. And, winter freezing of northern Cook Inlet and water depth problems due to heavy silting would greatly reduce the usefulness of a small boat harbor. The fishing boats which operate in upper and central Cook Inlet are generally stored on land between fishing seasons. These boats are primarily participants in the salmon fisheries.

Central Kenai Peninsula Area.

Nearly all commercial fishing boats in the area are used during a few months each summer for salmon fishing, and are idle the remainder of the year. The boats are stored on land between fishing seasons. In the not too distant past when canneries owned most of the boats, they were stored at. the cannery sites. Though almost all salmon boats are now privately owned, the processing plants have generally continued to provide off-season storage for their fishermen. The processing plants also often serve as mooring locations during the fishing season, since Ninilchik is the only community within the area to have a small boat harbor.

The Ninilchik facility is maintained by the state and has only 35 slips. However, during salmon season over 100 fishing vessels crowd into the protected area. Maintaining adequate depth of the facility is an acute problem, and it is often necessary for vessels to plan entrance into or exit from the harbor with the occurrence of high tide.

Even though Ninilchik has the only small boat harbor in the area, there are no plans for public agencies to enlarge the facility or to construct other boat harbors in the area. The extreme seasonal use of a small boat harbor due to the short duration of the salmon fishery and the winter icing situation encountered in north central and northern Cook Inlet make justification of new harbor facilities more difficult. -

Reportedly, a private concern has recently expressed interest in constructing a small boat harbor and extensive related facilities near Kenai. The harbor would supposedly have around 700 slips, with adjoining repair facilities and marine supply outlets catering to the local fishing fleet as well as the large number of pleasure boats that would be attracted. However, information concerning the venture has been very fragmented and largely unsubstantiated and should be viewed cautiously.

Southern Kenai Peninsula Area.

Small boat harbor facilities are more extensive in the Lower Cook Inlet area. Homer and Seldovia both have protected harbors with moorage slips and full-time harbormasters. Commercial fishing in the area is more diversified than along central and northern Kenai Peninsula areas, resulting in substantially more fishing activity throughout the year and the presence of larger vessels than are normally used solely for salmon fishing. Storing fishing vessels on land, which is common among central and northern Cook Inlet salmon fisheries, is not appropriate for vessels which are involved in several fisheries throughout the year.

The Homer small boat harbor currently has reserved stalls for over 400 vessels, usually berthing two boats in each slip. During periods of peak use, several hundred additional vessels are crowded into the facility and tied to transient floats, often with several boats tied side-to-side, or "stacked". Boats sometimes anchor inside the harbor even when regular moorage space is not available in order to be in a protected area. Boats as large as 150 feet long have entered the harbor and maneuvered without special difficulty. However, large boats are sometimes forced to coordinate their arrivals and departures with high tides.

The harbormaster's office is experiencing a growing demand for slips, particularly for pleasure boats. Pleasure boat enthusiasts usually desire slips 7.3 meters (24 feet) or 9.8 meters (32 feet) long. The fishing f"leet is creating a need for additional large slips as fishermen purchase "larger vessels capable of entering several fisheries.

Homer's small boat harbor has a grid which is 30.5 meters by 6.7 meters (100 feet by 22 feet), reportedly the largest in Alaska. Vessels of up to 39.6 meters (130 feet) have used the grid for repairs which otherwise might require a maintenance trip to Seattle.

A proposal to more than double the area of the existing harbor has been submitted to governmental regulatory agencies. New facilities would be directed largely at providing appropriate moorage for large fishing boats. By providing proper facilities for fishing boats, additional small and intermediate slips would become vacant for pleasure craft. Harbor construction and expansion projects often require several years devoted to planning and preparing various studies before construction occurs. Therefore, several more years may pass before Homer's small boat harbor is actually enlarged.

The Seldovia small boat harbor has an 84 boat capacity. Only two sizes of slips are offered: 9.8 meters and 12.8 meters (32 feet and 42 feet). As in most Alaska small boat harbors, there is excess demand for slips at the prevailing prices. Local fishermen are gradually changing to larger vessels which require slips larger than 12.8 meters (42 feet) long, and more pleasure boaters, generally from Anchorage, are requesting slips. Adding to the overcrowding situation is the large number of transient vessels which are sometimes in the harbor as they participate in local fisheries.

About one-half of the harbor area surrounded by the breakwater is actually utilized for vessel moorage. The remainder of the protected area is too shallow for general use without additional dredging. Efforts are being made to initiate a project to develop the unused portion of the harbor, with special emphasis on providing appropriate berthing facilities for the larger fishing boats which range from 79.8 meters (65 feet) to over 30.5 meters (100 feet) in length. It is felt that many of the smaller slips can be vacated for pleasure boat use if appropriate facilities can be constructed for the fishing fleet. It is expected that at least two years will pass before dredging and construction of the proposed facilities begin.

Port Graham does not have a small boat harbor. Local salmon fishermen rely upon the local fish processing firm to remove their salmon boats from the water and store them at the plant site. Local fishermen are involved primarily in the salmon fishery and therefore, do not require harbor facilities necessary for the proper upkeep of larger, more versatile boats.

The availability of harbor facilities or the lack of such facilities is in part explained by the nature of the boats that operate in an area. The following section contains a brief description of the boats that participate in the Cook Inlet fisheries.

Fishing Boats

Anchorage Area.

There is no commercial fishing fleet based in Anchorage, though quite a few fishermen live in the area. Most of the fishing within the area is set gill net salmon fishing, which usually entails the use of a small boat suitable for tending the net close to shore. Boats of this size can be trailered and are easily stored.

Central Kenai Peninsula Area.

Nearly all fishing effort in the area is directed at salmon, and drift gill net and set gill net gear is most commonly used. Drift gillnetters tend to use vessels of about 8.5 to 10.7 meters (28 to 35 feet) in length, and set netters use boats best described as skiffs. The drift net boats have decreased slightly in size in recent years and typically are near the smaller end of the size range. The change to smaller boats is a direct effect of the short fishing periods allowed in the fishery, as speed and maneuverability are essential to utilize the limited fishing time most efficiently, and less fish hold space is needed than formerly. Gasoline engines are preferred over fuel-efficient diesels due to their less docile performance. Seining vessels which operate in the area are often in the 8.5 to 10.7 meter (28 to 35 foot) range and, therefore, are much smaller than many Alaskan seiners.

Southern Kenai Peninsula Area.

The Southern Kenai Peninsula fishing fleet is comprised of many types and sizes of boats. Salmon boats are generally similar to those described in the previous sections concerning fishing boats used in the Anchorage and Central Kenai Peninsula areas, except that larger seiners may be found participating in the southern area. Other local boats range in size from around 12.2 meters (40 feet) to well over 30.5 meters (100 feet). The intermediate size boats tend to fish in the Lower Cook Inlet area and generally avoid totally unprotected waters while harvesting a variety of species. The larger vessels may be found operating in fisheries from Southeast Alaska to the Bering Sea over the course of a year, and concentrate on roe herring, crab, shrimp, and halibut.

PROCESSING

The processing sector of the Cook Inlet commercial fishing industry is described in the following sections which include a documentation of the activity of the processing sector; discussions of processing capacity, the source of fish, the transportation system used, the sources of electric power and water, and employment and wages; and projections of processing plant input requirements.

The species processed in Cook Inlet communities coincide with those that are harvested in the Cook Inlet Management Area. They include salmon, halibut, herring, crab, and shrimp. The importance of each species in terms of the round weight processed is summarized in Tables 3.60 through 3.63. As these tables indicate, the importance of each species varies from area to area and the importance of a particular area varies among species. For example, Table 3.61 demonstrates that salmon and halibut are the dominant species in Anchorage, while in Central Cook Inlet salmon alone dominates processing, and in the Lower Cook Inlet shellfish lead salmon. Table 3.62 demonstrates that the majorities of salmon,

TABLE 3.60

COOK INLET PROCESSING, ROUND WEIGHT PROCESSED BY SPECIES, BY AREA, 1973-1976

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	All
Anchorage								
1973	5893	722	1132	76	0	0	()	7824
1974	7585	433	n	0	0	0	0	8018
1975	8114	383	1537	0	0	0	0	10033
1976	6846	685	149	%4	4	17	6	7731
Central Cook Inlet								
1973	8959	28	46	0	0	0	0	9033
1974	6738	13	667	0	0	0	0	7418
1975	11464	15	62	0	0	0	0	11540
1976	16472	5	785	0	0	0	0	17263
Southern Cook Inlet								
19?3	2390	3	168	5216	4848	221	10472	23317
1974	251	91	254	3844	2096	354	4571	11461
1975	?761	13	294	201.6	2132	4(74	5848	13469
1976	2659	0	236	191.2	988	71	5045	1(-)911
All of Cook Inlet								
1973	17242	’753	1346	5292	4848	221	10472	401”74
1974	14574	537	9’?1	3844	2096	354	4571	26897
1975	22338	411	1893	2016	2132	404	5848	35042
1976	25978	690	1170	1936	992	88	5051	35905

Source: The tables are based on data in the Alaska Department of Fish and Game, Processor Reports with 1978 revisions made by F. L. Orth, J. A. Richardson, and S. M. Pidde in the preparation of Market Structure of the Alaska Seafood Processing Industry, Volume I, University of Alaska, Alaska Sea Grant Program, 78-10, January, 1979.

TABLE 3.61

COOK INLET PROCESSING PERCENT OF AREA ROUND WEIGHT PROCESSED BY SPECIES, 1973-1976

Year	Salmon	Hal i but	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	All
Anchorage								
1973	75.3	9.2	14.5	1.0	0	0	0	100.0
1974	94.6	5.4	0	0	0	o	0	100.0
1975	80.9	3.8	15.3	0	0	0	o	100.0
1976	88.6	8.9	1.9	0.3	O*1	O*2	0.1	100*O
Central Cook Inlet								
1973	99.2	0.3	l-)*5	o	0	0	0	100.0
1974	90.8	0.2	9.0	o	0	0	0	100.0
1975	99*3	0.1	0.5	0	0	0	o	100.0
1976	95.4	0.0	4.5	o	0	o	0	100.0
Southern Cook Inlet								
1973	10.3	0.0	n.7	22.4	20.8	0.9	44.9	100.0
1974	2.?	0.8	2.2	33.5	18.3	3.1	39*9	100.0
1975	20.5	0.1	2.2	15.0	15.8	3.0	43.4	100.0
1976	24.4	n	?*2	17.5	9.1	0.6	46.2	100.0
All of Cook Inlet								
1973	42.9	1.9	3.4	13.2	12.1	0.6	26.1	100.0
1974	54.2	2.0	3*4	14.3	7.8	1.3	17.0	100.0
1975	63.7	1.2	5.4	5.8	6.1	1*2	16.7	100.0
1976	72.4	109	3.3	5.4	2.8	0.2	14.1	100.0

Source: The tables are based on data in the Alaska Department of Fish and Game, Processor Reports with 1978 revisions made by F.-L. Orth, J. A. Richardson, S. M. Pidde, in the preparation of Market Structure of the Alaska Seafood Processing Industry, Volume I, University of Alaska, Alaska Sea Grant Program, 78-10, January, 979.

TABLE 3.62

COOK INLET PROCESSING, PERCENTAGE OF ROUND WEIGHT OF EACH SPECIES PROCESSED IN EACH AREA, 1973-1976

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	All
				Anchorage				
1973	34.?	95.9	84.1	1.4	0	0	0	1905
1974	52.0	80.6	0	0	0	0	0	29.8
1975	36.3	93.2	81*2	o	0	0	0	28.6
1976	26.4	99.2	12.8	1.2	0.4	19.0	0.1	21.5
				Central Cook Inlet				
1973	52.()	3.7	3.4	0	0	()	o	22.5
1974	46.?	2.5	72.4	0	0	0	0	27.6
1975	51.3	3.6	3.3	0	o	0	0	32.9
1976	63.4	0.8	67.1	0	0	0	0	48.1
				Southern Cook Inlet				
1973	13.4	0.4	12.5	98.6	100.0	100.0	100*O	58,0
1974	1.7	16.9	27.6	100.0	100.0	1(-)0.0	100.0	42.6
1975	1?.4	3.2	15.5	100*O	100.0	100.0	100.0	38.4
1976	10.2	0	20.1	98.8	99.6	81.0	99*9	30.4
				All of Cook Inlet				
1973	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1974	10000	100.0	100.0	100.0	100.0	100.0	100*O	100.0
1975	100.0	100.0	100.0	100.0	1(-)0.0	100.0	100.0	100.0
1976	100.0	100.0	100.0	100.0	100.0	100*O	100.0	100.0

Source: The tables are based on data in the Alaska Department of Fish and Game, Processor Reports with 1978 revisions made by F. L. Orth, J. A. Richardson, and S. M. Pidde in the preparation of Market Structure of the Alaska Seafood Processing Industry, Volume I, University of Alaska, laska Sea Grant Program, 78-10, January, 1979.

TABLE 3.63

COOK INLET PROCESSING, PERCENT OF THE TOTAL ROUND WEIGHT PROCESSED IN COOK INLET BY SPECIES AND AREA, 1973-1976

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	All
				Anchorage				
1973	14.7	1.8	2.8	0.2	0	0	0	19.5
1974	28.7	1.6	0	0	0	0	0	29.8
1975	23.2	1.1	4*4	0	0	0	0	28.6
1976	19.1	1.9	().4	0.1	0.0	O*O	0.0	21.5
				Central Cook Inlet				
1973	22.3	0.1	0.1	0	0	o	0	22.5
1974	25.1	0.0	2.5	0	0	0	0	27.6
197s	32.7	0.0	0.2	0	0	0	0	32.9
1976	45.9	0.()	2*2	o	0	0	0	48.1
				Southern Cook Inlet				
1973	5.9	0.0	0.4	13.0	12.1	0.6	26.1	58.0
1974	0.9	0.3	0.9	14.3	7.8	1.3	17*O	42.6
1975	7.9	0.0	0.8	5.8	6.1	1.2	16.7	38.4
1976	7*4	0	0“7	5.3	2.8	0.2	14*1	30.4
				All of Cook Inlet				
1973	42.9	1.9	3.4	13.2	12.1	006	26.1	100*CJ
1974	54.2!	2*O	3.4	14.3	7*8	1.3	17.0	100.0
1975	63.7	1.2	5.4	5*U	6.1	1.2	16.7	100.0
1976	72.4	1.9	3.3	5*4	2.8	0.2	14.1	100.0

Source: The tables are based on data in the Alaska Department of Fish and Game, Processor Reports with 1978 revisions made by F. L. Orth, J. A. Richardson, S. M. Pidde, in the preparation of Market Structure of the Alaska Seafood Processing Industry, Volume I, University of Alaska, Alaska Sea Grant Program, 78-10, January, 1979.

halibut, and shellfish, respectively, are processed in Central Cook Inlet, Anchorage, and the Lower Cook Inlet. Table 3.63 indicates the importance of each species to total Cook Inlet processing.

Sources of Fish for Processing

During the past several years, fresh and frozen products have been replacing canned products in most fisheries. As this has occurred in the salmon fishery, there has been an accompanying change in the source of fish for processing. Much of Alaska's salmon is harvested in remote areas, such as Bristol Bay, where due to both the brief salmon season and the absence of alternative major fisheries the processing season is very short. Canning operations have been viable under such conditions but freezing operations have not been. Improved transportation systems, the desirability of constructing freezing facilities where the operating season can be significantly extended by processing several species or species from various areas, and the desirability of extending the operating seasons of existing freezing facilities, have made it feasible to transport salmon in the round from remote areas to established centers of fresh and frozen processing. The availability of labor and a well developed transportation network have resulted in Anchorage becoming such a center.

Anchorage Area.

Of all the fish processing plants along Cook Inlet, those located in Anchorage are most dependent upon fish from outside the immediate area. Plants operating in Anchorage during the 1978 salmon season reported that from 50-75 percent of their fish were flown in from areas such as Bristol Bay, Norton Sound, and Kotzebue. A number of new firms processed salmon in Anchorage last summer (1979); they were nearly 100 percent dependent upon fish flown in from these areas.

The remainder of the fish processed in Anchorage is from various Cook Inlet areas. Fish from as far away as Homer and Port Graham are trucked to Anchorage to be frozen. Though the quantity of Cook Inlet fish should remain stable, the overall importance of Cook Inlet-caught salmon will decrease as the quantity flown in from other areas continues to grow. Fish landings in Anchorage are rather insignificant.

Other species of fish processed in Anchorage are of relatively minor importance when compared to salmon. Limited quantities of halibut are trucked in from the Homer area, and some of the smaller firms reprocess various species of shellfish, bottomfish, and other less common fish in quantities suitable for local sales. These species are often from outside Cook Inlet.

Central Kenai Peninsula Area.

Processors located within an area from Kenai to Ninilchik relied almost exclusively upon Cook Inlet-caught salmon until 1978. Several firms reported that they first experimented with flown-in fish from other areas at that time and that they intended to obtain more fish in that manner in 1979. Most firms which had not augmented their local landings with flown-in fish planned to do so in 1979. One rather large firm obtained approximately one third of its 1978 pack from Bristol Bay. However, no other plant in the area reported a substantial portion of its pack coming from outside the area that year.

In all likelihood, the prominence of flown-in fish will grow. Most firms are striving to obtain a more consistent supply of fish so that plant operation can be stabilized over an extended period. The supply of locally-landed fish is expected to increase gradually, but its dominance is expected to be reduced as the supply of non-local fish increases more rapidly.

Southern Kenai Peninsula Area.

Processing firms in the Homer, Seldovia, and Port Graham area purchase little fish that has not been caught in the general vicinity by local fishermen. The most usual exceptions are crab caught in the Kodiak area by local fishermen and salmon that is purchased by tenders sent to Chignik. The presence of several local fisheries has helped avoid a need to import fish, especially salmon, from other Alaskan areas as a means of stabilizing processing activity, and the absence of adequate airport facilities limits the ability of processing firms to fly fish into the area. The availability of transportation facilities is an important determinant of an area's potential as a processing center. The transportation facilities utilized by Cook Inlet processing plants are discussed in the following section.

Transportation

Anchorage Area.

Anchorage's involvement with the commercial fishing industry is primarily as a processing center. This role has developed largely because Anchorage serves as the state's major transportation center. The city has a major port, a large airport, lies on the Alaska Railroad line, and is connected by highway with major fishing communities on the Kenai Peninsula.

Most fish processed in Anchorage arrives from remote areas of the state by airplane. Air transport is necessary from these areas because the quality of fish decreases quickly prior to processing. Also, some fish is partially processed and chilled with ice in Anchorage and air freighted to Seattle for further processing. Air freight typically is not used to transport processed fish since it can be transported by less costly, slower methods.

In addit on to fish which is air freighted to Anchorage for processing, raw fish is trucked to Anchorage from the Kenai Peninsula in refrigerated vans. A so, most fish that is processed along the western Kenai Peninsula is trucked to Anchorage in refrigerated vans for transshipment to major markets. The refrigerated vans also provide an extremely important service to the Alaska seafood processing industry by effectively acting as cold storage facilities. Most Alaska freezing plants rely on the vans to provide readily available cold storage space, allowing a continuous flow of product through their permanent freezing facilities.

Most of Alaska's processed fish is transported to major markets by sea. The fish remains inside trailer vans which are loaded onto freight barges or ships, and is most commonly routed to Seattle. The Anchorage port is served by several freight companies which generally welcome backhauls to the Seattle area. Fish processed in Anchorage and most fish processed on the Kenai Peninsula passes through the Port of Anchorage. Anchorage has the only major port in Cook Inlet. This could ultimately be a limiting factor to fisheries expansion in the area, since northern Cook Inlet experiences considerable freezing during the winter.

Central Kenai Peninsula Area.

The highway system and air freight are the most important methods of transportation in the Central Kenai Peninsula area. Growth of the local seafood processing industry appears to be rather dependent upon a growing quantity of salmon flown in from other areas of Alaska. The seafood air cargo arrives at the Kenai airport and is trucked to local plants for processing.

Nearly all of the area's processed fish is trucked to the Anchorage port and is transported by sea to major markets. Refrigerated vans are utilized for the shipment of frozen seafood, and regular vans for canned products. A more complete explanation of the importance of refrigerated vans is included in the preceding section concerning Anchorage area transportation.

The Central Kenai Peninsula area does not have a port which offers regular service by a major freight carrier, nor does it have the necessary facilities to attract such service. Therefore, the area's seafood products will continue reaching market via the Anchorage port.

Southern Kenai Peninsula Area.

The Southern Kenai Peninsula area relies upon the highway system and. marine transportation to sustain the fishing industry. Most processed fish is transported by truck from Homer to Anchorage for routing to Seattle by sea. Seafood from Seldovia processing plants is transported to Homer in vans via the state-operated marine highway system, and then trucked to Anchorage. Processed fish from Port Graham is also transported in vans, but they are picked up by barge at the cannery and transported to Anchorage for transshipment along with other seafood leaving through the port.

There are no extensive port facilities in the Southern Kenai Peninsula area, and therefore, no major sea freight carriers regularly service the area. The City of Homer is the population center of the area, and city officials have proposed a major port construction project on the Homer Spit. Such projects normally entail a number of years to obtain funding, perform studies, and receive proper permission from regulatory agencies. It is likely that at least two or three years will pass before all the requirements are met and co-nstruction may be al"lowed.

Air transportation is not of direct importance to the local fishing industry. The airport facilities in the area are not adequate to accommodate the large scale importation of fish for processing from other areas of Alaska.

Processing Capacity

Anchorage Area

Seafood processing in Anchorage appears to be in the midst of a significant growth period following several years of decline. Large quantities of salmon are being flown to Cook Inlet processors from Bristol Bay and other remote areas which do not have adequate freezing facilities. As freezing becomes more popular and the importance of canning further declines, this trend is expected to strengthen. Therefore, within the past year a number of firms have opened processing facilities in Anchorage to compete for the resource. No significant canning operations are located in Anchorage.

As recently as 1978, only one major fish processing firm operated in Anchorage, as well as a number of smaller firms often involved with specialty items and supplying the local demand of restaurants and individual consumers. However, 18 small and large processing firms operated in Anchorage during the 1979 processing season, and approximately the same number is expected to process fish in 1980.

It was found that in 1978, Anchorage processors could have frozen in excess of 129 metric tons (260,000 pounds) of fish per day (round weight), with salmon and halibut being the predominant species handled, though limitations on raw fish availability generally prevented maximum utilization of facilities. Inclusion of several smaller firms which are rather insignificant when examined individually would increase total capacity by several thousand pounds per day.

Including the new plants, and expansion of established firms, it appears that at least 152 metric tons (335,000 pounds) per day freezing capacity has been added to Anchorage's total capacity for 1979. Along with this, the same firms plan to be able to butcher an additional 136 metric tons (300,000 pounds) or more per day for shipment to Seattle and subsequent freezing. At least one or two of the new firms butcher salmon for transport to Seattle and perform no additional processing except icing the butchered fish.

Combining the capacities of older and newer plants, more than 272 metric tons (600,000 pounds) of salmon or halibut can be frozen in a single day, and depending upon the success of other firms which may operate, freezing capacity may be significantly larger than 272 metric tons (600,000 pounds) per day. An additional 136 metric tons (300,000 pounds) or more of salmon may pass through Anchorage plants for butchering and chilling each day. Therefore, total processing capacity could be over 408 metric tons (900,000 pounds) of salmon per day if the supply of raw fish permits. This capacity may climb to well in excess of 454 metric tons (one million pounds) per day as the operation of newer firms becomes more stable.

In typical years, the seafood firms operating in Anchorage in 1978 processed about 4,083 metric tons (9 million pounds) of salmon and a little over 454 metric tons (1 million pounds) of halibut. Any other species processed in Anchorage, such as roe herring, vary in quantity from year to year and are usually insignificant in quantity compared to salmon and halibut. Yearly processing projections were not available from the new processing firms. However, assuming the new plants will have the same relationships between daily and annual production as established plants, over 9,074 metric tons (20 million pounds) of salmon and halibut may be processed at the new plants annually, for an area total of around 13,612 metric tons (30 million pounds) annually. The rapid increase in capacity which has occurred in recent years indicates that current capacity is typically at most a short-run constraint.

Central Kenai Peninsula Area.

Fish processing firms in the Central Kenai Peninsula area have largely followed the trend within the seafood industry away from canning to freezing, and are currently directing efforts toward expansion of their freezing facilities. Local processors are not expecting substantial increases in Cook Inlet caught fish, but rather, are preparing for an increasing quantity of salmon being flown in from Bristol Bay and other remote areas.

Only 2 firms in the area continue to can significant portions of their annual pack, and both are among the larger plants in the area. Specific information was not available concerning the canning capacity of one firm, but it is estimated that over 227 metric tons (500,000 pounds) (round weight) of salmon can be canned in a single day at the two plants.

The freezing capabilities of plants vary widely, ranging from around 7 metric tons (16,000 pounds) daily to approximately 272 metric tons (600,000 pounds) per day. Freezing capacities vary with different species of fish. Information was provided by seven of the ten known plants in the area, and together created a freezing capacity of 561 metric tons (1,236,000 pounds) per day. The three plants from which information was not obtained are among the area's larger facilities, and with a conservatively estimated freezing capability of 91 metric tons (200,000 pounds) per day each, raise the area's total daily freezing capacity to around 817 metric tons (1.8 million pounds) per day (round weight).

Salmon production data by the same seven plants reveals that around 9,074 metric tons (20 million pounds) (round weight) of salmon are processed each year, including canned products. Estimating annual production at 1,815 metric tons (four million pounds)/year for each of the other three plants, annual area-wide salmon production reaches around 14,519 metric tons (32 million pounds). With a capacity of 817 metric tons per day, the annual production of 14,519 metric tons could be completed in under 20 days. This suggests that there is currently substantial excess processing capacity. The efforts of processors to develop additional sources of fish also suggest that there is excess capacity.

Herring for roe and bait and halibut are the other primary species processed within the area at several plants. However, the amount processed often varies so drastically from year to year at each plant that no meaningful processing capacities or annual production data can be compiled. Firms generally did not know their processing potentials for these species because landings had never been great enough to reach a maximum operating level. Several firms expressed interest in processing additional species such as crab and bottomfish to extend their operating seasons. Quantities of these other species have been rather insignificant thus far.

<u>Southern Kenai Peninsula Area.</u>

Six seafood processing plants are currently active in the communities of Homer, Seldovia, and Port Graham. These plants are generally more diversified than other Cook Inlet plants. Shellfish are of major importance to area processors, whereas plants in Anchorage and near the City of Kenai rely almost totally upon salmon processing. Three plants are on the Homer Spit, two plants are in Seldovia, and one plant is in Port Graham.

Information concerning the plants' processing capabilities and typical annual levels of production is presented in Table 3.64. Nearly all processing performed in the area is by freezing. The Whitney-Fidelgo plant in Port Graham, the major aberration from this practice, cans its entire salmon pack except for a minor portion which is sent to another Whitney-Fidelgo plant for freezing.

The Port Graham facility also processes roe herring, which is another relatively minor non-canned product. The Port Graham plant accounts for a very substantial portion of the area's annual salmon output each year, and a similarly large portion of the area's daily salmon processing capacity.

TABLE 3.64

DAILY PROCESSING CAPACITIES AND TYPICAL ANNUAL PRODUCTION
OF SOUTHERN KENAI PENINSULA FISH PROCESSING PLANTS
(Round Weight in 1,000 Pounds)

Species	Daily Processing Capacity	Typical Annual Production	Annual Production Daily Capacity
Salmon	370[1]	6,800[2]	18.4
Halibut	35[1]	1,100[3]	31.4
Shrimp	77	4,600	59.7
King Crab	295	2,500	8.5
Tanner Crab	285	8,500	29.8
Dungeness Crab	250	1,800	7.2

[1]Does not include fish that are iced and transported to Anchorage to be frozen.

[2]Includes approximately 1.5 million pounds landed in area, which are iced and transported to Anchorage to be frozen.

[3]Includes approximately 600,000 pounds landed in area, which are iced and transported to Anchorage to be frozen.

Source: Personal contact with plant managers.

Annual production data in Table 3.64 was derived by aggregating information that each plant in the" area felt to be representative of a typical year's production. Actual area production during any single season may deviate from table figures due to factors such as management regulations of the resource and natural fluctuations in resource abundance.

Moderate growth in the Southern Kenai Peninsula area fish processing is expected by some firms while others feel that the industry will remain stable. Little or no growth is expected in most of the area's customary fisheries, with bottomfish cautiously regarded as providing the most growth potential. Several projects are underway to expand or upgrade existing processing facilities, but major expansion of the industry within the area will be dependent upon developing new fisheries. The ability to process a year's production in a relatively small number of days (see Table 3.64) suggests that excess capacity exists. The excess capacity is the principal reason plant expansion is not expected in the absence of new fisheries.

Processing Employment

Employment in seafood processing has always been very seasonal in nature, and can be expected to remain so in the absence of a new major year-round fishery which can supply processing plants with ample raw product during periods of reduced activity in the traditional fisheries. For this reason, processing firms tend to hire laborers who are primarily interested in short-term employment. Wages paid by processors are normally rather low by Alaska standards, but long shifts often provide the means to earn a reasonable income over the limited processing seasons.

Students on summer break from high school and college comprise a large portion of the fish processing labor force. These students tend to be a mix of local residents or other Alaska residents and transients from other states who are exploring the state and find a need for short-term employment.

Of less overall importance to processors in most communities, but especially important for non-summer operation of plants, are local residents who work for a variety of reasons. Processing activity is often less hectic for species other than salmon, and some persons who fish commercially or pursue other work during the summer prefer temporary fall, winter, or spring work to supplement their imcomes. Precise information on the composition of the processing labor force is not available. The Alaska Department of Labor recently completed a survey of processing plant employment but the response rate was not adequate enough to allow valid breakdowns by geographic area, and the survey does not provide information concerning the percentage of the labor force who are students.

The availability of labor is not a major problem for most fish processing plants. Though the normal source and type of workers often varies somewhat between communities and by season, the flow of transients, local students, and other local residents who desire work usually provides a sufficient supply of labor. Even during boom times in other industries, such as during the Trans-Alaska oil pipeline project of the mid-1970s, transients are attracted to Alaska in great enough numbers to provide an adequate supply of labor. In rare circumstances, processors along the central and southern areas of the Kenai Peninsula have found it necessary to announce job openings in Anchorage during periods of peak activity; such actions have always resulted in an adequate supply of labor.

Anchorage Area.

Processing firms located in Anchorage tend to specialize primarily in salmon processing, with halibut and herring processing being of secondary importance. For these species, plants generally operate only during the ' spring and summer months. Therefore, students comprise the majority of processing employees. Due to the relatively large population of Anchorage, processors report that most employees are local residents, and that transients form a smaller portion of the work force than in many other Cook Inlet communities.

Alaska Department of Labor statistics indicate that average monthly seafood processing employment in the Anchorage-Matanuska-Susitna Census Divisions increased from 142 in 1975 to 229 in 1978. Since this employment is highly seasonal, the monthly employemnt from June through August is significantly greater. The recent expansion of processing activities in Anchorage will also inflate these figures.

Central Kenai Peninsula Area.

Fish processing employees in the Central Kenai Peninsula area tend to be predominantly local students on summer vacation, and transients who are often non-local students. Intermixed with the students and transients is a much smaller portion of the work force consisting of local housewives and other residents desiring temporary employment. Local nonstudents tend to comprise a greater portion of the work force during the early and late periods of the processing season when students and transients are less numerous in the area.

Based upon information gathered from processing firms in the central Kenai Peninsula area, it appears that in excess of 1,200 persons are employed in the area to process fish during peak periods. Data were gathered from as many firms as possible and employment of at least 900 persons for processing was substantiated. By conservatively estimating employment at plants that did not provide employment data, an additional 300 processing employees are assumed in the area. A reasonable, though less conservative, estimate of employment at the non-reporting plants is 600 employees, indicating actual area processing employment during peak periods is from 1,200 to 1,500 workers, not including office and managerial positions.

Late in May, 1979, the Seward Fisheries processing plant at Ninilchik burned, leaving little more than a landing point for raw fish. The plant would normally have employed in excess of 100 persons during the salmon season. Fish were received at the plant site that summer for subsequent trucking to Seward Fisheries' plants in Homer and Seward. Approximately 25 persons will be necessary to provide this level of service. Initial indications by the company were that the plant probably would be rebuilt before the 1980 processing season. However, Seward Fisheries has more recently decided to maintain the buying station rather than rebuild the facility.

Southern Kenai Peninsula Area.

Fish processing laborers in the-Homer area include a large number of transients, intermixed with local students and other local residents who desire temporary employment. The source of labor changes somewhat on a seasonal basis; students and transients are less numerous while schools are in session and the weather is colder. During this time, more local residents such as housewives and others who have summer work in other occupations tend to staff the processing lines. The importance of transients as processing workers has grown over the past several years, as some firms reported that a much larger portion of their work force was comprised of local residents year-round until about four to five years ago.

Fish processing firms in Seldovia and Port Graham rely heavily upon permanent local residents as laborers. Being accessible only by air and water, few transients pass through, relative to the numbers traveling through most Kenai Peninsula communities. As in many communities, students comprise a large portion of the labor force in the summer during the often hectic salmon season. During the non-summer months, the processing labor force consists almost exclusively of local residents.

In excess of 300 persons are employed when all plants are operating at maximum production levels, not including clerical and managerial positions. Neither processing activity nor processing employment has changed substantially over the past few years. It is expected that processing activity within the area will remain generally stable unless development of the groundfish fishery accelerates.

The data compiled in Tables 3.65 through 3.67 summarize employment statistics for the processing sector of the Cook Inlet commercial fishing industry exclusive of Anchorage. Similar data are not readily available for Anchorage due to the reporting practices of Alaska Department of Labor. The data demonstrate the magnitude and seasonality of employment and income in the food and kindred products industry of the Kenai-Cook Inlet area. Department of Labor statistics indicate that fish processing firms account for over 95 percent of the employment in this industry.

Processing Plant Utilities

Water.

The City of Anchorage provides water to seafood processing plants through its central distribution network. No past instances of restricted processing due to limited availability of water were reported. Indications are that fish processing capacity in Anchorage may continue to expand rapidly during the next few years, and that the present water system can adequately supply the resultant growth in water consumption. Fish processing comprises only a very small portion of Anchorage's total

TABLE 3.65

COOK INLET MONTHLY PROCESSING EMPLOYMENT]970-1978

Employment

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Ott	Nov	Dec
1970	171	190	193	218	364	510	701	661	307	300	302	242
1971	191	212	204	212	286	424	514	560	328	238	226	195
1972	177	173	179	238	285	467	580	621	313	240	265	255
1973	216	207	192	251	285	373	834	037	430	237	277	247
1974	.?59	151	?06	343	413	439	652	756	592	280	229	198
1975	0[2]	0[2]	0[2]	190	407	5(-)3	766	1041	735	270	319	34b
1976	186	236	246	261	47 8	597	952	1137	826	139	119	165
1977	177	151	169	321	399	441	1118	1075	599	111	109	201
1978	89	140	184	310	504	872	826	1270	768	243	183	172

Monthly Employment as a Percentage of Average Monthly Employment

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Ott	Nov	Dec
1970	49.3	54.8	55.7	62.9	105.0	147.2	202.3	190.7	88.6	86.6	87.1	69.8
1971	63.8	7(-).9	68.2	70.9	95.6	141*7	171.8	187.2	109.6	79.6	75.5	65.2
1972	56.0	54.7	56.6	75.3	90.2	147.7	183.5	196.5	99.0	75.9	83.8	80.7
1973	59.1	56.6	52.5	68.7	78.0	102.1	228.2	229.0	117.6	64.8	75.8	67.6
1974	60. $	40,.1	54.7	91.1	109.7	116*6	173.2	200.8	157.2	74.4	60.8	52,6
1975	0[2]	0[2]	0[2]	49.8	106.7	131.9	200.8	272.9	192.7	70.8	83.6	90.7
1976	41.8	53.0	55.3	58.6	107.4	13401	213.9	255.4	185.5	31.2	26.7	37.1
1977	43.6	37.2	41.6	79.1	90.3	108.6	275.4	264.8	147.6	27.3	26.9	49.5
1978	19.2	30.2	39.7	66.9	108.8	188.2	178.2	274.1	165.7	52.4	39.5	37.1

[1] Kenai-Cook Inlet Division Food and Kindred Products. .

[2] Data are not available for the 1st quarter of 1975.

Source: Alaska Department of Labor, Alaska Statistical Quarterly, 1970-1978.

TABLE 3.66

COOK INLET AVERAGE MONTHLY EMPLOYMENT, 1970-1978[1]

Year	Quarter 1st	2nd	3rd	4th	1st-4th
1970	185	364	556	281	347
1971	202	307	467	220	299
1972	176	330	505	253	316
1973	205	303	700	254	365
1974	205	398	667	236	376
1975	0[2]	367	847	312	381
1976	223	445	972	141	44s
1977	166	387	931	140	406
1978	138	562	955	199	463

Average Monthly Employment by Quarter
Divided by Average Monthly Employment for the Year

Year	Quarter 1st	2nd	3rd	4th	1st-4th
1970	53.3	105.0	160.5	81.2	100.0
1971	67.6	102.7	156.2	73.4	100.0
1972	55.8	104.4	159.7	80.1	100.0
1973	56.1	82.9	191.6	69.4	100.0
1974	54.5	105.8	177.1	62.6	100.0
1975	0[2]	96.1	222.2	81.7	100.0
1976	50.0	100.0	218.3	31.7	100.0
1977	40.8	95.3	229.3	34.6	100.0
1978	29.7	121.3	206.0	43.0	100.0

Source: Alaska Department of Labor, Alaska Statistical Quarterly, 1970-1978.

[1]Kenai-Cook Inlet Division Food and Kindred Products.

‘Data are not available for the lst quarter of 1975.

TABLE 3.67

COOK INLET PROCESSING PAYROLLS[1]
1970-1378

Payrol 1

Year	1st Qt.[2]	2nd Qt.	3rd Qt.	4th Qt.	1st-4th Qt.
1970	287382	620416	1034740	455173	2397711
1971	298592	598679	833193	377921	2108385
1972	263912	553972	1020009	364273	2202166
1973	266420	621500	1247069	379528	2514517
1974	304304	738454	1345813	382096	2770667
1975	0[3]	621679	1552816	380590	2555085
1976	308541	769366	256575.?	380031	4023690
1977	372547	842325	2678362	335279	4228513
1978	271038	1005636	3384143	644396	5305213

Percent of Annual Payroll

Year	1st Qt.	2nd Qt.	3rd Qt.	4th Qt.	1st-4th Qt.
1970	12.0	25.9	43.2	19.0	100.0
1971	14.2	28.4	3905	17.?	100.0
1972	12.0	25.2	46.3	16.5	100.0
1973	1006	24.7	49.6	15.1	100.0
1974	11.0	26.7	48.6	13.8	100.0
1975	0[3]	24.3	60.8	14.9	100.0
1976	7.7	19.1	63.8	9.4	100.0
1977	8.8	1?*9	63.3	7.9	10C*O
1978	5.1	19.0	63.8	12.1	100.0

Average Salary (Payroll/Employment)

Year	1st Qt.	2nd Qt.	3rd Qt.	4th Qt.	1st-4th Qt.
1970	1556	1704	1860	1618	6918
1971	1476	1948	1783	1720	7048
1972	1497	1679	2021	1438	6967
1973	1300	2051	1781	1496	6880
1974	1482	1854	2019	1621	7359
1975	0[3]	1696	1833	1221	6699
1976	1386	1728	2641	2695	9039
1977	2249	2177	2878	2389	10417
1978	1969	17?9	3545	3233	11448

Source: Alaska Department of Labor, Alaska Statistical Quarterly, 1970-1978.

[1] Kenai-Cook Inlet Division Food and Kindred Products.

‘Qt. = Quarter.

[3] Data are not available for the 1st quarter of 1975.

water consumption, whereas processing accounts for a large portion of water usage in many small coastal communities. Therefore, increased water consumption by Anchorage fish processors will be supplied as the city responds to the aggregate demands of its many users. "

Seafood processing firms within an area from slightly north of Kenai to the vicinity of Ninilchik rely almost exclusively upon wells for their water supplies. With the possible exception of several processing plants located fairly close to Kenai, most plants are located at too great a distance from a sizable population center to economically utilize a municipal water system. Groundwater is abundant enough to adequately provide all the water processors currently desire, with general consensus that larger water needs can be easily met with additional wells. The City of Kenai is currently considering extending its central water system to nearby processing plants which can be easily reached. However, it is questionable whether the plants will abandon use of their private water systems to utilize the city's system. The ability of the city to offer water for fish processing indicates potential water capacity available for other development if the processors prefer to continue providing their own water.

Seafood processing plants located within the City of Homer, on the Homer Spit, are generally dependent upon the municipal water system for only a portion of their needs, with saltwater wells providing a nearly limitless supplementary source of water for processing. The city's water system is incapable of supplying adequate quantities of water to processing plants during their periods of peak operation due to inadequacy of the city's water reserve and limitations of the water main network. To circumvent this restriction, processing firms utilize fresh water from the city system only when mandated by certain procedures and use saltwater for a large portion of fish processing. Therefore, fish processing has generally not been restricted by the city's water system.

The City of Homer is currently developing plans to enlarge its water supply and to increase the delivery capacity to the Spit area. The system currently can filter and treat up to 3.8 million liters (1 million gallons) of fresh water per day. Approximately 2.3 million liters (600,000 gallons) of fresh water are used per day by the entire community when the fish processing plants are operating at high levels of output. Enlargement of the treatment and filtering facilities to provide approximately 6.4 million liters (1.7 million gallons) per day is planned for completion by 1983. A 2.8 million liter (750,000 gallon) storage tank is planned for the Spit area. The large reserve will provide a buffer for periods when the main serving the Spit cannot adequately fulfill all user demands. The storage tank will also allow the city to maintain a marginal water flow to the Spit during cold weather when still water would normally freeze and damage the main. Until the tank is available for use, Homer will have to continue its practice of discharging fresh, treated water into the bay as necessary to prevent the main from freezing.

Based upon Homer's intentions to upgrade and enlarge its freshwater system and the ability of the seafood processing industry to perform many of its operations by using salt water, it appears unlikely that the availability of water will pose any limitation upon processing activity within the foreseeable future. However, new large water consumers on the Spit could severely stress the capacity of the main feeding the area and eventually mandate a greater delivery capacity to the area.

Seldovia has recently experienced substantial growth for a community of its size, and will soon construct a new 1.9 million liter (500,000 gallon) holding tank to meet a growing demand for water. Occasionally, the city's reservoir freezes and creates a water shortage, which should be alleviated when the tank is available for use. Fish processing activity in Seldovia is gradually expanding, creating a need for water over a larger portion of the year. Barring unexpectedly large and sudden growth of the processing industry, the present water system and new holding tank should adequately meet the demand for water and provide a basis for further expansion when necessary.

The processing firm operating in Port Graham has constructed and maintains its own water supply system. Water is drawn from a nearby stream which is dammed. The water lines from the dam are of only marginal capacity and several holding tanks adjacent to the processing site are utilized when water is consumed at a high rate during peak processing periods.

Electricity.

The City of Anchorage and much of the surrounding area is provided electricity by the Chugach Electric Association (CEA). Natural gas and hydro-power are utilized to operate the firm's generating facilities at various sites. It appears that natural gas will remain abundant and relatively inexpensive in the upper Cook Inlet area for quite a number of years, and several potential hydro generating sites within the CEA service area have been identified. Therefore, CEA should be able to expand its generating capabilities to keep pace with the growing demand for electricity, and maintain rates that are quite low when compared to electricity rates for most Alaska communities.

Fish processing comprises only a very small portion of Anchorage's electricity consumption. Therefore, a greater volume of fish processing in Anchorage adds little to a much larger aggregate demand for electricity that CEA must supply. Processing firms in the area could recall no instances within their pasts when their operations had been restricted due to inadequate electricity availability, including the past several years when the industry has changed its emphasis from canning to electricity-intensive freezing. Due to the present adequacy of electricity supply, and the promising possibilities for expansion of generating facilities, it can be assumed that CEA will continue to fully meet the needs of its consumers and pose no limitations on fish processing or other current uses.

The Homer Electric Association (HEA) provides electricity for much of the Kenai Peninsula. With few exceptions, fish processing firms located along the east bank of Cook Inlet obtain their electricity from HEA. All processing firms contacted responded that ample electricity has been available for their operations, and that occasional transmission equipment malfunctions resulting in power outages have been the only electricity-related problems experienced. It is estimated that fish processing firms consume 10 percent of the electricity HEA distributes, with the actual portion at any one time varying greatly due to the extreme seasonality of fish processing.

HEA purchases electricity under a long-term contract from Chugach Electric Association and does not operate generating facilities of its own. Therefore, HEA's efforts are directed primarily at maintaining an adequate electricity transmission system for its service area. The long-term contract extends through 2008, and ensures HEA the option of purchasing as much electricity as it needs. HEA personnel feel that transmission equipment serving the Kenai area is sufficient to meet demand for about five more years before other than normal maintenance will be necessary to supply a growing demand.

Major new electricity consumers in the HEA service area should not be overly difficult to accommodate. Approximately two to three years are necessary to accomplish major upgrading of the transmission network, an acceptable length of time considering the five year buffer period provided by the present state of the system.

The Homer Electric Association provides electricity to the City of Homer and surrounding communities. HEA's supply capacity and operational framework are discussed in the preceding section concerning electricity for the Central Kenai Peninsula-Kenai area, and should be referred to for further detail. All fish processing plants in the Homer-Homer Spit area purchase electrical power from HEA.

HEA upgraded that portion of its transmission network serving the Homer area in 1979. This resulted in HEA's entire system having a reserve capacity great enough to accommodate expected electricity consumption growth over the next five years. Fish processing firms on the spit reported adequate availability of electricity during peak processing periods, but do occasionally experience power outages which are extremely inconvenient due to the dominance of freezing processes that are electricity-intensive. Upgrading of facilities by HEA will assure continuance of adequate quantities of electricity.

Seldovia is also served by HEA, but maintains a small generating facility for emergency use which served the community prior to purchasing electricity from HEA. Being somewhat isolated from most other Kenai Peninsula communities served by HEA, Seldovia is more difficult to reach with transmission lines. Therefore, increasing transmission capacity to Seldovia is more costly than to most other areas, and more difficult to accomplish. However, the same ample electricity supply HEA offers elsewhere is available to Seldovia if appropriate lines are installed.

Port Graham is not connected to the HEA system. Therefore, any processing firms desiring to operate in the area must provide their own means of generating electricity.

Fish Processing Waste Disposal.

Methods of disposing of processing waste have changed somewhat during recent years. Waste was commonly discharged into local bays adjacent to canneries or dumped close by until environmental concerns mandated new procedures. Currently, some fish processing wastes are disposed of through the Anchorage city sewer system. However, joining a trend which may gradually encompass most of the fish processing industry, much of the solid waste is utilized by a waste reduction plant. Seward Fisheries, in Seward, currently operates the only reduction plant on the Kenai Peninsula, and is striving to develop marketable products from the wastes which will offset operating costs of the plant. Waste material is trucked to the Seward plant from Anchorage. Though trucking the wastes to Seward is quite expensive, it appears to assure processing plants of long-term compliance with environmental protection regulations.

Seafood processing plants in the Kenai area utilize a number of processing waste disposal methods. Many of the plants have solid waste trucked to Seward for use by the Seward Fisheries waste reduction plant, which utilizes the waste to produce a salable product. This practice is most common when herring roe is stripped and the remainder of the carcass is not desired by processors.

The remainder of the waste is most normally disposed of by discharging it into Cook Inlet after having been ground sufficiently, or by burying it at approved sites. Burying waste is a practice more often associated with smaller processing firms.

No seafood processing waste currently enters the Kenai city sewage system. The city has plans to enlarge the service area of its water and sewage systems and could eventually provide some processing waste treatment. However, the processing plants already have adequate disposal methods, and whether they will desire use of city utilities is speculative at this time.

Fish processing firms in Homer rely largely upon grinding and discharging into adjacent waters to dispose of fish processing waste. Though less prevalent than in the Kenai area, dumping at approved landfill sites is also utilized. Herring carcasses stripped of their roe and some other wastes are trucked to the Seward Fisheries reduction plant in Seward. Homer's city sewage disposal system is not utilized for the disposal of fish waste, and no change in this policy is expected. Processing waste from plants in Seldovia and Port Graham is handled in a similar manner, though transporting some wastes to the reduction plant in Seward entails ferrying the trucks hauling waste to Homer for subsequent highway travel. The sewage treatment facility in Seldovia is also used to dispose of fish processing waste.

Projected Processing Activity

The projections of processing plant activity presented in these sections are based on the projected harvest of the Cook Inlet commercial fishing industry discussed in a previous section. The measures of activity are in terms of processing plant input requirements and processing plant payrolls. Due to the great uncertainty that exists with respect to both the rate at which the groundfish industry will develop and the rate at which input requirements per unit of output will change, the input requirements for the traditional species are projected with and without increased processing efficiency and separate projections of the groundfish processing requirements are presented. These projections are for Kenai-Cook Inlet and Anchorage areas.

Traditional Species: Electric Power and Water.

The processing plant usage of electric power and water is expected to increase by 21.2 percent' between 1980 and 2000 if processing plant efficiency does not increase and it is expected to decrease by 19.1 percent during the same period if processing efficiency increases at an annual rate of 2 percent (see Table 3.68). In the former case the annual rate of increase in input usage is not expected to exceed 1.75 percent and in the latter case it is expected to be less than zero.

Traditional Species: Employment and Income.

Without allowing for increased processing efficiency, average monthly employment is expected to increase from 700 in 1980 to 848 in 2000 (see Table 3.69). This represents a 21.2 percent increase in employment for the period as a whole. Allowing for a 2 percent annual increase in efficiency, employment is expected to decrease to 566 by 2000. This is a 19.1 percent decrease. The corresponding income projections are presented in Table 3.70. Annual real income is expected to increase from $9.8 million in 1980 to $14.4 million in 2000 without increased

TABLE 3.68

PROJECTED PERCENTAGE INCREASE IN COOK INLET PROCESSING INPUT REQUIREMENTS 1980-2000

Year	Without Increased Efficiency: Cumulative Change	Without Increased Efficiency: Annual Change	With Increased Efficiency: Cumulative Change	With Increased Efficiency: Annual Change
1980	0	0.0	0	0.0
1981	1.5	1.5	-0.5	-0.5
1982	3.2	1.6	-0.9	-0.4
1983	4.9	1.6	-1.3	-0.4
1984	6.6	1.7	-1.6	-0.3
1985	8.5	1.7	-1.9	-0.3
1986	9.1	0.5	-3.4	-1.5
1987	9.7	0.6	-4.8	-1.5
1988	10.3	0.6	-6.1	-1.4
1989	11.0	0.6	-7.5	-1.4
1990	11.7	0.6	-8.8	-1.4
1991	12.4	0.6	-10.0	-1.4
1992	13.1	0.7	-11.2	-1.3
1993	13.9	0.7	-12.4	-1.3
1994	14.8	0.7	-13.5	-1.3
1995	15.7	0.8	-14.6	-1.2
1996	16.6	0.8	-15.6	-1.2
1997	17.7	0.9	-16.5	-1.1
1998	18.7	0.9	-17.5	-1.1
1999	19.9	1.0	-18.3	-1.0
2000	21.2	1.0	-19.1	-1.0

TABLE 3.69

PROJECTED AVERAGE MONTHLY PROCESSING EMPLOYMENT, COOK INLET, TRADITIONAL FISHERIES
1980-2000

	Without Increased Efficiency			With Increased Efficiency		
Year	Employment	Annual Rate of Change	Cumulative Percentage Change	Employment	Annual Rate of Change	Cumulative Percentage Change
1980	7(-)()	0	0	700	0	0
1981	711	1.5	1.5	697	-0.5	-0.5
1982	722	1.6	3.2	694	-0.4	-0.9
1983	734	1.6	4,9	691	-0*4	-1.3
1984	746	1.7	6.6	689	-0.3	-1.6
1985	760	1.7	8*5	687	-0.3	-1.9
1986	“?64	0.5	9.1	676	-1.5	-3*4
19P7	768	0.6	9.7	667	-1.5	-4.8
1988	772	0.6	10*3	657	-1.4	-6.1
1989	777	(-).6	11.0	648	-1*4	-7.5
199(I	7132	0.6	11.7	639	-1.4	-8.8
1991	787	0.6	12.4	630	-1.4	-10.0
1992	792	().7	13*1.	622	-1.3	-11*2
1993	798	().7	13.9	613	-1.3	-12.4
1994	804	0.7	14.8	606	-1.3	-13.5
1995	810	0.8	15.7	598	-1.2	-14.6
1996	817	0.8	16.6	591	-1.2	-15.6
]997	824	0*9	17.7	584	-1.1	-16.5
1998	831	0.9	18.7	578	-1.1	-17.5
1999	839	1.0	19,9	572	-1.0	-18.3
2000	848	1.0	21.2	566	-1.0	-1901

TABLE 3.70

PROJECTED ANNUAL PROCESSING PLANT PAYROLLS, COOK INLET TRADITIONAL FISHERIES
1980-2000

	Without Increased Efficiency			With Increased Efficiency		
Year	Annual Payroll in Real Dollars[1] (1,000)	Annual Rate of Change	Cumulative Percentage Change	Annual Payroll in Real Dollars (1,000)	Annual Rate of Change	Cumulative Percentage Change
1980	9826	0	o	9826	o	o
1981	10072	2.5	2,5	9871	0.5	0.5
1982	10330	2.6	5.1	9921	0.5	1.0
1983	10599	2.6	7.9	9976	0.6	1.5
1984	10881	2.7	10.7	10037	O*6	2.1
1985	11177	2.7	13.7	10103	0.7	2*8
1986	11343	1*5	15.4	10048	-0.5	2.3
1987	11514	1.5	17.2	9996	-0.5	1.7
1988	11690	1.5	19.0	9945	-0.5	1.2
1989	11871	1.5	20.8	9897	-0.5	0.7
199(-)	12058	1.6	22.7	9852	-0.5	O*3
1991	12251	1.6	24.7	9810	-0.4	-O*2
1992	12451	1.6	26.7	9779	-0.4	-0.6
1993	12657	1.7	28.8	9734	-0.4	-0.9
1994	12872	1.7	31.0	9701	-0.3	-1.3
1995	13096	1.7	33.3	9672	-0.3	-1.6
1996	13329	1.8	35.6	9647	--0.3	-1.8
1997	13572	1.8	38,1	9627	-0.2	-2*O
1998	13827	1.9	40.7	9612	-0.2	-2.2
1999	14095	1.9	43.4	9602	-0.1	-2.3
2000	14376	2.0	46.3	9598	-0.0	-2.3

[1] 1980 is the base year.

efficiency or decrease to $9.6 million with increased efficiency. The associated percentage changes are 46.3 and -2.3, respectively.

The Number of Plants.

Due to the excess capacity which currently exists, the modest growth projected for the traditional Cook Inlet fisheries does not require an increase in the number of fish processing plants.

Groundfish Processing Plant Input Requirements.

The projections of input requirements for processing groundfish are summarized in Table 3.71. The employment and income projections are summarized in Table 3.72; and the employment and income projections for the traditional species and groundfish are summarized in Tables 3.73 and 3.74.

THE FEASIBILITY OF THE PROJECTED GROWTH

The feasibility of the projected growth of the Cook Inlet commercial fishing industry is evaluated in this section in terms of the availability of and the requirements for inputs. The inputs that are considered consist of small boat harbor facilities, port facilities, labor, land, electric power, water, and processing plant facilities.

TABLE 3.71

PROJECTED COOK INLET GROUNDFISH INDUSTRY ACTIVITY, 1980-2000

Year	Catch (Metric Tons)	Number of Plants	Processing Employment (Man Years)	'Land in (Hectares)	Electric Power (Million KWH/year)	Water (Million Gallons/Year)
1980	12.1	0.0	0.1	0.0	0.0	0.1
1981	17.1	0.0	0.2	0.0	0.0	0.1
1982	24.3	0.0	0.2	0.0	0.0	0.1
1983	34.6	0.0	0.3	O*O	0.0	0.2
1984	49.3	0.0	0.5	0.0	0.0	0.2
1985	70.3	0.0	0,6	0.0	0.0	0.4
1986	100.5	0.0	0.9	0.0	0.0	0.5
1987	143.9	0.0	1*2	000	0.0	O*7
1988	206.4	0.0	1.7	0.0	0.0	1.0
1989	296.5	0.0	2.4	0.0	0.0	1.5
1990	426.6	0.0	3.3	0.0	0.0	2.1
1991	(514.9	0.0	4.6	0.0	0.0	3.1
1992	887.9	0.0	6.5	0.0	0.0	4.4
1993	1284.3	0.0	9.1	0.0	0.1	6.4
1994	1860.7	0.0	12.7	0.1	0.1	9.3
1995	2700.4	0.1	18.0	0.1	0.1	13*5
1996	3925.6	0.1	25.3	0.1	0.2	19.6
1997	5716.1	0.1	35.8	0.2	0.3	28.6
1998	8337.0	O*2	50.7	0.2	0.4	41.7
1999	12179.1	0.3	71*9	003	0.6	60.9
2000	178?0.0	0.4	102*2	0.5	0.9	89.1

TABLE 3.72

COOK INLET PROJECTED GROUNDFISH PROCESSING EMPLOYMENT AND PAYROLL, 1980-2000

Year	Average Monthly Employment	Annual Payroll (1,000)		Annual Rate of Change			Cumulative Percentage Change		
		Nominal Dollars	Real Dollars'	Employment	Nominal Payroll	Real Payrol 1	Employment	Nominal Payroll	Real Payrol 1
1980	0	2	2	0	o	0	0	0	o
1981	0	3	2	37.6	46.6	38.9	37,6	46.6	38.9
1982	0	4	3	37*8	46.8	39.1	89.7	115*1	93,3
1983	0	6	5	38.1	47.0	39.4	161.9	216.3	169.4
1984	0	8	7	38.3	47.3	39.6	262.1	365.9	276.1
1985	1	12	9	38.5	47.5	39,8	401.6	587.2	425.8
1986	1	18	13	38.8	47.8	40.1	596.0	915.6	636.5
1987	1	26	18	39.0	48.0	40.3	867.4	1403.3	933,4
1988	2	39	26	39.2	48.3	40.5	1246.8	2129.0	1352.4
1989	2	58	36	39.5	48.5	40.8	1778.3	3210.7	1944.8
1990	3	87	51	39.7	48.8	41.0	2524.1	4825.8	2703.7
1991	5	129	72	39.9	49.0	41*3	3572.3	7241.5	3973.9
1992	6	193	101	40.2	49.3	41.5	5048.0	10860.7	5665.1
1993	9	288	144	40.4	49.6	41.8	7129.1	16292.0	8072.4
1994	13	432	204	40.7	49.8	42.0	10068.8	24456.4	11504.6
1995	18	648	290	40.9	50.1	42.2	14228.0	36749.4	16406.1
1996	25	974	414	41.1	50.3	42.5	20122.2	55288.8	23417.0
1997	36	1467	590	41.4	50.6	42.7	28488.3	83293.5	33461.4
1998	51	2212	844	41.6	50.8	42.9	40381.7	125662.5	47874.1
1999	72	3341	1208	41.8	51.0	43.2	57315.1	189862.9	68586.6
2000	102	5055	173?	42.1	51*3	43.4	81460.8	287291.3	98397.3

[1] 1980 is the base year.

TABLE 3.73

PROJECTED AVERAGE MONTHLY PROCESSING EMPLOYMENT ALL COOK INLET FISHERIES
1980-2000

Year	Without Increased Efficiency			With Increased Efficiency		
	Employment	Annual Rate of Change	Cumulative Percentage Change	Employment	Annual Rate of Change	Cumulative Percentage Change
1980	700	0	0	700	0	0
1981	711	1.6	1.6	697	-0.5	-0.5
1982	722	1.6	3.2	694	-0.4	-0.9
1983	734	1.7	4.9	691	-0.4	-1.3
1984	747	1.7	6.7	689	-0.3	-1.6
1985	760	1.8	8.6	687	-0.3	-1.8
1986	764	0.6	9.2	677	-1.4	-3.3
1987	769	0.6	9.8	668	-1.4	-4.6
1988	774	0.6	10.5	659	-1.4	-5.9
1989	779	0.7	11.3	650	-1.3	-7.2
1990	785	0.7	12.1	642	-1.2	-8.3
1991	791	0.8	13.0	635	-1.2	-9.4
1992	798	0.9	14.0	628	-1.0	-10.3
1993	807	1.0	15.2	622	-0.9	-11.1
1994	816	1.2	16.6	618	-0.7	-11.7
1995	828	1.4	18.2	616	-0.4	-12.0
1996	842	1.7	20.2	616	0.0	-12.0
1997	859	2.1	22.8	620	0.6	-11.4
1998	882	2.6	26.0	629	1.4	-10.2
1999	911	3.3	30.2	644	2.4	-8.1
2000	950	4.3	35.7	668	3.8	-4.5

TABLE 3.74

PROJECTED ANNUAL PROCESSING PLANT PAYROLLS, ALL COOK INLET FISHERIES, 1980-2000

Year	Without Increased Efficiency: Annual Payroll, in Real Dollars (1,000)	Without Increased Efficiency: Annual Rate of Change	Without Increased Efficiency: Cumulative Percentage Change	With Increased Efficiency: Annual Payroll in Real Dollars (1 ,000)	With Increased Efficiency: Annual Rate of Change	With Increased Efficiency: Cumulative Percentage Change
1980	9828	0	o	9828	0	0
1981	10075	2.5	2.5	9873	O*5	0.5
1982	10334	2.6	5.1	9924	0.5	1.0
1983	10604	2.6	7.9	9981	0.6	1.6
1984	10888	2.7	10,8	10043	0.6	2.2
1985	11186	2.7	13.8	10112	0.7	2.9
1986	11356	1.5	15,6	10061	-0.5	2.4
1987	11532	1.6	17.3	10014	-0.5	1.9
1988	11715	1.6	19.2	9971	-0.4	1.5
1989	11907	1.6	21,2	9933	-0.4	1.1
1990	12108	1.7	23.2	9903	-0.3	0.8
1991	12322	1.8	25.4	9881	-0.2	0.5
1992	12552	1.9	27.7	9872	-0.1	0,4
1993	12801	2.0	30.3	9878	0,1	0.5
1994	13077	2.2	33.1	9905	0.3	0.8
1995	13386	2*4	36.2	9962	0.6	1.4
1996	13743	?.7	39*8	10061	1*O	2.4
1997	14162	3.1	44.1	10217	1.6	4.0
1998	14671	3.6	49.3	10456	2.3	6.4
1999	15303	4.3	55*7	10810	3.4	10.0
2000	16109	5.3	63,9	11330	4.8	15.3

[1]1980 is the base year.

Small Boat Harbors.

The small boat harbor facilities available in Cook Inlet and elsewhere in Alaska have not been able to provide the level of service desired by the commercial fishing industry. The harbors are typically overcrowded and the use of such facilities is often limited by inadequate channel depth at other than high tide. Despite these problems which are aggravated by the seasonality of harvesting activity, the commercial fishing industry has, in many instances, exhibited significant growth. This situation is expected to continue in Cook Inlet throughout the forecast period; that is, the small boat harbors will remain inadequate but will not prevent the growth projected in earlier sections. This is in part due to the fact that the projected expansion of the harvesting sector is not expected to be accompanied by more than a very small increase in the number of fishing boats. The development of the groundfish industry within Cook Inlet is not expected to be seriously hampered by the small boat harbor facilities because the activity of this fishery is expected to be centered in the Lower Cook Inlet, and the harbor improvements planned for Homer appear to be adequate with respect to the groundfish projections presented earlier.

Port Facilities.

The current port and transportation facilities appear to be adequate to meet the modest growth in demand that is projected to be placed on them by the commercial fishing industry.

Labor, Electric Power, Water, and Land.

The 21.2 percent increase in demand for processing plant inputs that is projected between 1980 and 2000 in the absence of increased processing efficiency is not expected to constrain the projected development of the commercial fishing industry. These requirements can be met with a moderate annual rate of growth in input availability, or in some instances with no growth, since there is currently an excess supply of inputs. In the presence of a 2 percent annual increase in processing efficiency the input requirements are expected to decrease by just under 20 percent.

Ocean Space Use.

The feasibility of the forecasts will also depend on the success that is achieved in minimizing the ocean space use conflicts that have occurred in Lower Cook Inlet. The nature of the conflicts and efforts to reduce them are discussed in this section.

Fishermen in the Homer area of Cook Inlet have reported fishing gear loss due to other marine traffic for a number of years. Due to the nature of their fishery, crab fishermen appear to sustain the bulk of marine traffic-related gear losses. Crab pots are left unattended in open water for several hours to a few days. The location of each pot is marked with a colorful plastic buoy that is fastened to a pot with a rope. It is difficult for a large commercial vessel to pass through an area that is being fished, without becoming entangled in and cutting ropes running between the buoys and the pots. Once this occurs, it is often impossible to locate and recover the pots.

The value of pot gear falls within a wide range, depending upon size and quality. Dungeness crab fishing requires a relatively small pot of only a few feet in diameter, while king crab pots are often around 0.9 meters (three feet) high with a 2.1 X 2.1 meter (7' X 7') base. Prices reportedly start below $100 per pot and often exceed $500 each for the large king crab pots. A king crab fisherman who uses as few as 50 pots at a time can therefore suffer a substantial loss.

Fishermen and the shipping industry have attempted in the past to establish shipping lanes which large vessels would adhere to and in which fishermen would not place their gear. The major area of controversy is relatively small and of triangular shape in the entrance to Kachemak Bay, with one point of the area extending into the Bay toward Homer Spit. The lanes were established voluntarily, with no legal means of enforcement. The agreement has met with only marginal success, in part because it has not been uncommon for both parties to ignore the agreement. A new effort has recently been mounted to renegotiate voluntary shipping corridors which would be more specifically defined and conscientiously utilized. However, the parties involved indicate that little has been accomplished toward reaching an acceptable agreement.

Two obstacles of particular concern which have hampered voluntary observation of shipping lanes have been identified. Fishermen generally feel that they need to maintain access to all portions of the controversial area because the migrations and distributions of fish stocks are unpredictable, therefore, the shipping corridors may at times pass through prime fishing grounds. From the shipping industry's viewpoint, 'tramp freighters that enter Cook Inlet are often unaware of voluntary shipping corridors, and once a vessel is under way, it is difficult to obtain navigational charts which indicate the special arrangements in a particular area.

Conclusion

It appears that the modest rate of growth projected for the Cook Inlet commercial fishing industry is feasible with respect to the long-term availability of inputs. This does not mean that during the next 20 years, shortages of labor, water, or other inputs will not prevent the level of fishing industry activity from being as high as it might otherwise be. It does mean that the projected growth appears to be feasible despite the occasional shortages that will occur.

As is noted in an earlier section, the projections of the commercial salmon harvest are based on the assumption that the al"location of salmon between sport and commercial fishermen will not change dramatically. The allocation tends to be politically determined andit is not known how either the relative political power of the two user groups or the allocation will change over time. If the allocation is significantly altered in favor of sport fishermen, the Cook Inlet commercial fishing industry as a whole would be affected because of the dominant role of the salmon fishery.

The Shelikof Strait Commercial Fishing Industry

Shelikof Strait is in the Western half of the Kodiak Management Area. The fishermen and boats that participate in the Shelikof Strait fisheries typically participate in other Kodiak fisheries and operate out of the City of Kodiak, not the small communities along Shelikof Strait. With the partial exception of salmon, the Shelikof Strait catch is processed in the City of Kodiak or outside the Kodiak Management Area. The Shelikof Strait commercial fishing industry is therefore an almost nondistinguishable sector of the Kodiak commercial fishing industry. The information that allows a partial identification of the Shelikof industry as a somewhat separate entity is catch information that is reported by statistical area within a management area. Therefore, by defining Shelikof Strait to consist of specific statistical areas within the Kodiak Management Area, Shelikof Strait catch can be identified. For shellfish, Shelikof Strait consists of statistical areas 251, 253, 254, 256, 262, and 291 and for finfish it consists of statistical areas 251, 253-256, and 262 (see Figures 3.2 and 3.3). The number of boats is also reported by statistical area; however, since many boats operate in more than one statistical area during each reporting period, double counting would occur if boats were summed over statistical areas. The Shelikof Strait catch for each fishery is therefore used as a basis for identifying the Kodiak commercial fishing industry activity that is attributable to the Shelikof Strait fisheries. For example, if 40 percent of the Kodiak

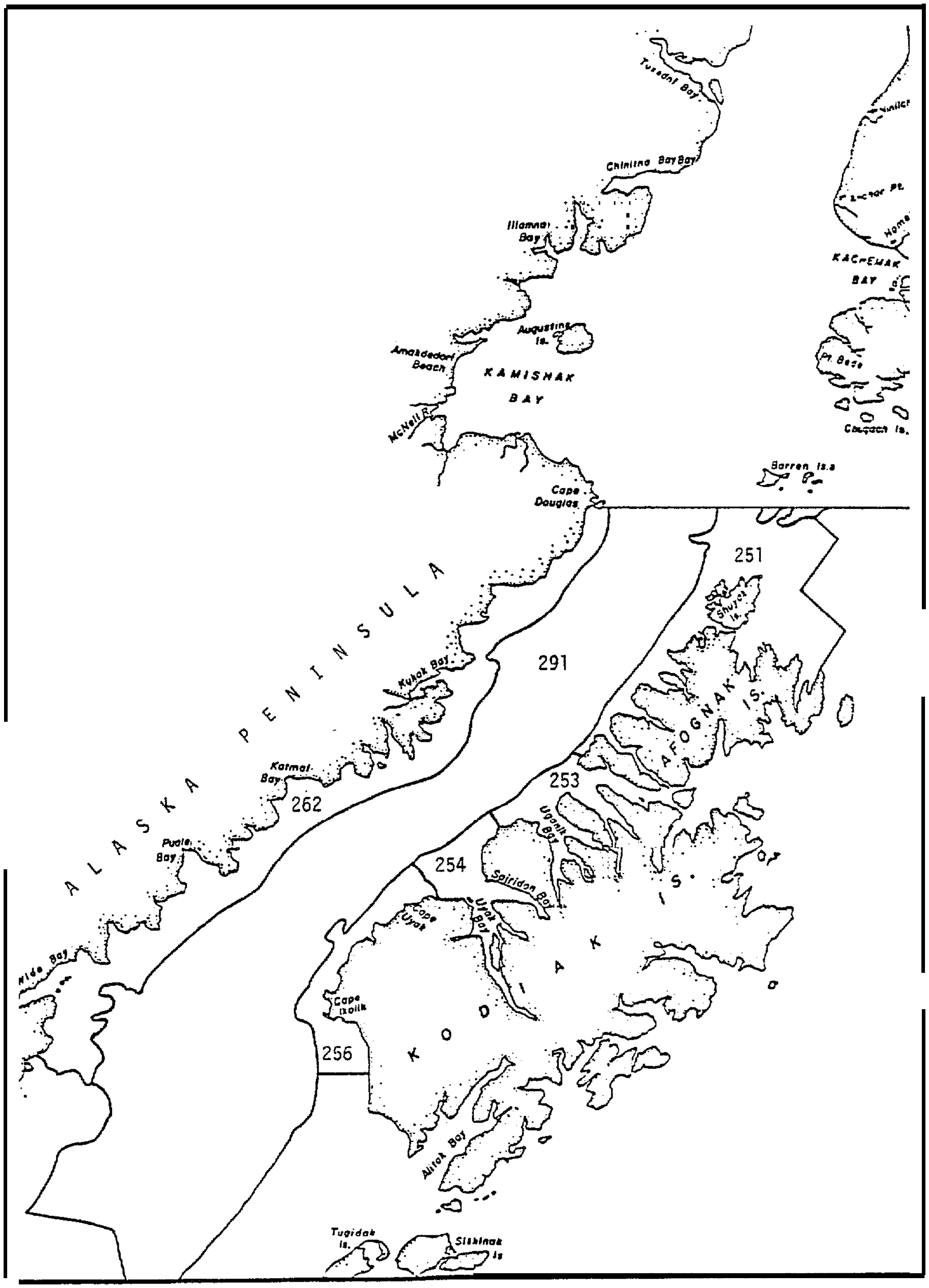

Figure 3.2: Shelikof Strait Shellfish Statistical Areas.

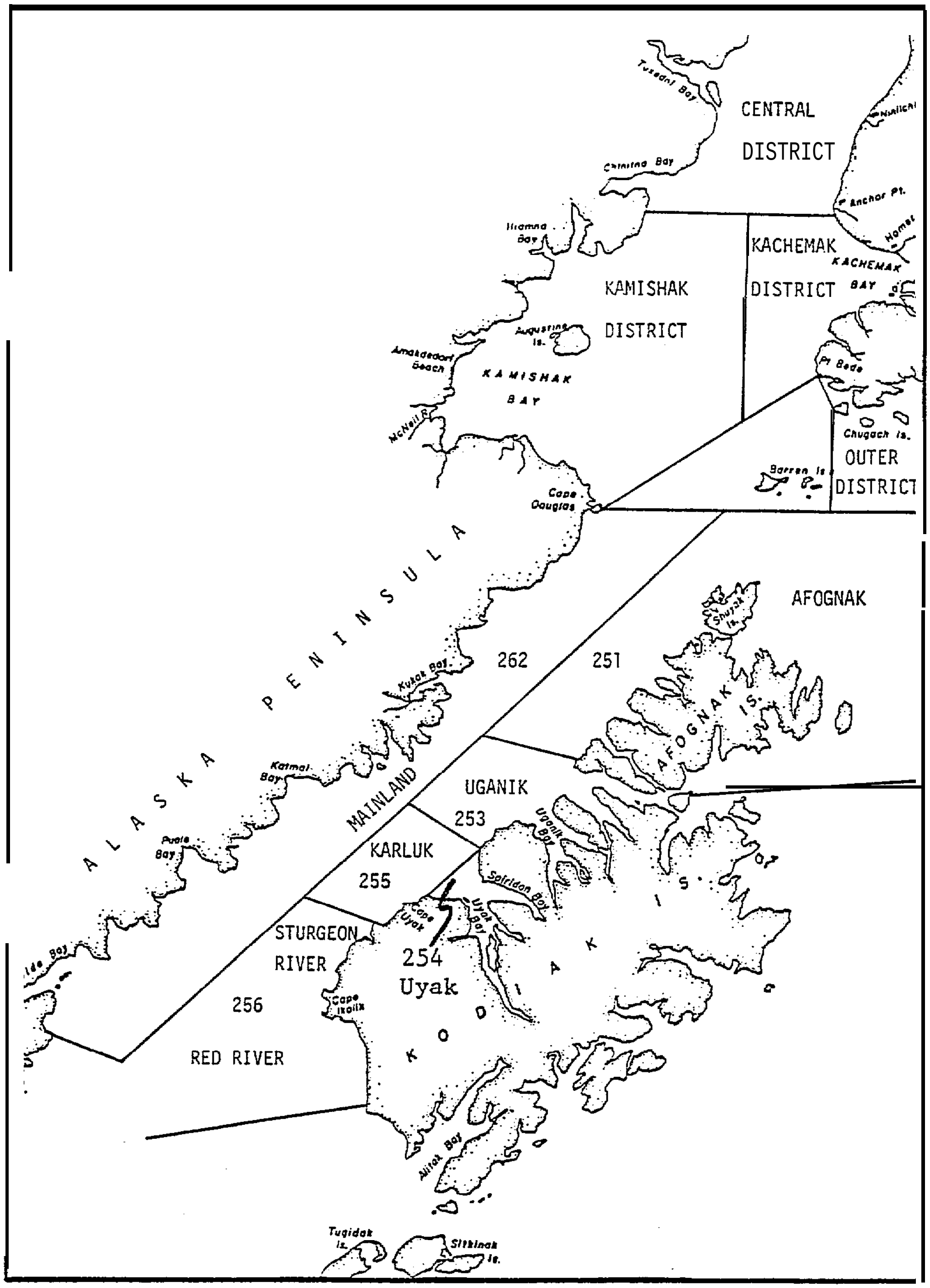

Figure 3.3; Shelikof Strait Finfish Statistical Areas.

Management Area purse seine salmon harvest in 1973 came from Shelikof Strait, it is estimated that 40 percent of the Kodiak purse seiners are associated with the Shelikof fishery in 1973. The historical data reported for Shelikof Strait is based on the relevant Kodiak Management Area data and the proportion catch by fishery by year which was harvested in Shelikof Strait. The mean proportion for 1969-1977 and projections of Kodiak Management activities are used to project Shelikof activities.

The dominant commercial fisheries of Shelikof Strait include salmon, halibut, herring, king crab, Tanner crab, Dungeness crab, and shrimp. The historical importance of each fishery in terms of the weight and value of annual harvests are summarized in Tables 3.75 and 3.76. As indicated in Table 3.77, the Shelikof Strait fishing grounds have been responsible for a significant proportion of the Kodiak Management Area harvest, and consequently the fishing industry activity associated with the Shelikof Strait fishing grounds has been an important source of employment and income in Kodiak Island communities. The following brief description of the projected growth of the industry suggests that the Shelikof Strait commercial fishing industry will be a source of increasing economic activity.

During the next twenty years, increases in the salmon harvest due to improved salmon management, enhancement, and rehabilitation programs, sustained large crab harvests, and increases in the halibut harvest are expected to assure continued development of the traditional fisheries as a whole. Between 1980 and 2000, the annual harvest catch is expected to

TABLE 3.75

SHELIKOF STRAIT CATCH BY WEIGHT BY FISHERY 1969-1976

Catch (1,000 Pounds)

Year	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Herring	Salmon	Total
1969	5100	1649	183	2940	1842	6545	18259
1970	3883	3178	202	2863	595	22855	33576
1971	4362	2546	172	533	542	10140	18295
1972	3093	33$4	278	3076	447	6869	17147
1973	2516	7899	556	4910	1108	3529	20518
1974	6622	3930	195	5529	1558	7229	25063
1975	9052	3341	206	2377	15	8555	23546
1976	5421	6531	63	2099	9	25847	39970
1977	6460	5898	6	5673	473	12138	30648

Percentage of Catch by Fishery

Year	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Herring	Salmon	Total
1969	27.93	9.03	1*OO	16010	10.09	35,85	100.00
1970	11.56	9.47	0.60	8.53	1.77	68.07	100.00
1971	23.84	13.92	0.94	2.91	2.96	55.42	100,00
1972	18.04	19.74	1.62	17.94	2.61	40.06	100.00
1973	12.26	38.50	2.71	23,93	5.40	17.20	100.00
1974	26.42	15.68	0.78	22.06	6.22	28.84	100000
1975	38.44	14.19	0.87	10.10	0.06	36.33	100.00
1976	13.56	16.34	0.16	5.25	0.02	64,67	100.00
1977	21.08	19.24	0.02	18.51	1*54	39.60	100.00

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

TABLE 3.76

SHELIKOF STRAIT CATCH BY VALUE BY FISHERY 1969-1977

Value of catch ($1)

Year	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Herring	Salmon	Total
1969	1377000	148410	27450	117603	36840	916300	2623603
1970	1087240	317800	30300	114528	11900	3199700	4761468
1971	1308600	280060	25800	21320	10840	1622400	3269020
1972	1175340	406080	108420	153800	8940	1373760	3226340
1973	1660560	1421820	305800	392800	88640	1235150	5104770
1974	2913680	825300	91650	552900	77900	2891600	7353030
1975	4073400	567970	123600	190160	750	2994250	7950130
1976	3903120	1306240	19530	209900	720	8787810	14227320
1977	8721405	2536140	1800	794220	75680	5340720	17469965

Percentage of Catch by Fishery

1969	52.49	5.66	1.05	4.48	1.40	34,93	100.00
1970	22.63	6.67	0.64	2.41	0.25	67.20	100*OO
1971	40.03	8.57	0.79	0.65	O*33	49.63	100*OO
1972	36.43	12.59	3.36	4.77	0.28	42.58	100.00
1973	32.53	27.85	5*99	7.69	1*74	24.20	100.00
1974	39.63	11.22	1.25	7.52	1.06	39.33	100.00
1975	51.24	7.14	1.55	2,39	0.01	37.66	100.00
1976	27.43	9018	0,14	1.48	0.01	61.77	100.00
1977	49.92	14.52	0.01	4,55	0.43	30.57	100.00

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

TABLE 3.77

SHELIKOF STRAIT HARVEST AS A PERCENTAGE OF KODIAK MANAGEMENT AREA CATCH 1969-1977

Year	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Herring	Salmon Purse Seine	Salmon Set Gill Net	Salmon Beach Seine
1969	39.86	24.15	3.14	7*11	81.58	9.22	44.16	44.44
1970	32.17	41.23	3.52	4.60	86.86	38.96	58.59	55.23
1971	35.28	34*30	11.77	0.65	95.25	31.02	51.53	41.00
1972	18.93	28.42	13.50	5.27	94.11	31.41	77.77	38.44
1973	17.10	24.99	27.79	6.82	63.86	58,80	69.15	51.67
1974	28.82	15.43	25.97	11.34	88.72	42.95	65.51	21.79
1975	37.56	19.04	32.19	5,08	10.14	57.93	78.81	84.39
1976	30.94	27.86	72.41	4.08	100.00	45.78	53.29	58.60
1977	48.89	28.47	5.31	17.84	68.06	24.30	65.58	57.79

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

increase by 29 percent by weight and by 31 percent in real value. The more rapid increase in value is explained by both the change in harvest mix that is expected (the relatively high valued salmon species will account for an increasing proportion of total catch) and expected increases in real exvessel prices. The quantity of fish processed is expected to increase proportionately with catch, however, due to increases in processing efficiency, processing employment and real income are expected to increase less rapidly. It is projected that processing employment and real income will change by -13.6 percent and 4.3 percent, respectively. Without allowing for increased efficiency, the respective changes would be approximately 29 percent and 56 percent.

The modest growth projected for the traditional fisheries is expected to be substantially augmented by the growth of the groundfish fishery. Including groundfish, the annual harvest weight and real value are projected to increase by 354 percent and 86 percent, respectively between 1980 and 2000. The projections of harvesting activity by fishery on which the preceding summary is based and the projections of processing activity are presented in the following sections.

HARVESTING

Projections of harvesting activity and limited historical data are presented by species or species group in this section. The models used in making these projections are discussed in Chapter II.

Salmon

The commercial salmon fishery has been a dominant fishery in Shelikof Strait since the late 1800s. There are currently three distinct salmon fisheries by gear type; they are the purse seine, set gill net, and beach seine fisheries. The characteristics of each fishery are summarized in Table 3.78.

TABLE 3.78

CHARACTERISTICS OF THE SHELIKOF STRAIT SALMON FISHERIES

	Purse Seine	Set Gill Net	Beach Seine
Season[1]	June-Sept.	July-August	July-August
Typical Boat Size	26-55 feet	under 25 feet	under 25 feet
Average Crew Size	5	2	2
Fishing Grounds	near shore	very near shore	very near shore

[1] Fishing only occurs in prescribed periods each week during the season.

The purse seine fishery is the most important measured in terms of catch, boats, or fishermen, and the beach seine fishery is the least important (see Table 3.79). During the past nine years, the volume and value of the annual salmon harvest ranged from 1,600 metric tons (3.5 million pounds) to 11,724 metric tons (25.8 million pounds) and from $0.9 million to $8.8 million respectively, for all three salmon fisheries; and they ranged from 1,410 metric tons (3.1 million pounds) to 10,044 metric tons (22.1 million pounds) and from $0.7 million to $7.5 million, respectively, for the purse seine fishery. With respect to each salmon fishery of the Kodiak Management Area as a whole, Shelikof Strait catch has varied over time but has not established a measurable trend for the

TABLE 3.79

SHELIKOF STRAIT SALMON FISHERIES BY GEAR TYPE 1969-1977

Purse Seine

Year	Catch: Weight: Pounds m	Catch: Weight: Metric Tons	Catch: Value ($1)	Exvessel Price (¢/Pound)	Number of: Boats	Number of: Fishermen
1969	5121	2323	665730	13	34	172
1970	20200	9163	2828000	14	150	75?
1971	8921	4047	1427360	16	128	639
1972	5635	2556	1127000	20	138	691
1973	3109	1410	1119240	36	179	897
1974	6213	2818	2485200	40	113	565
1975	7225	3277	2456500	34	167	834
1976	22144	10044	752896(I	34	155	776
1977	8310	3769	0	0	84	418

Set Gill Net

Year	Pounds	Metric Tons	Value ($1)	Exvessel Price (¢/Pound)	Boats	Fishermen
1969	1368	621	232560	17	71	142
1970	2354	1068	329560	14	86	172
1971	1096	497	175360	16	68	136
1972	1165	528	233000	20	103	205
1973	398	181	123473	31	82	165
1974	982	445	382980	39	71	143
1975	1157	525	439660	38	92	184
1976	3301	1497	1122170	34	77	155
1977	3435	1558	0	0	94	188

TABLE 3.79 (CONTINUED)

Beach Seine

	Catch				Number of	
	Weight					
Year	Pounds (1,000)	Metric Tons	Value ($1)	Exvessel Price (¢/Pound)	Boats	Fishermen
1969	56	25	8400	15	5	10
1970	301	137	42140	14	7	14
1971	123	56	22140	18	7	13
1972	69	31	13072	19	10	21
1973	22	10	6944	32	7	14
1974	34	15	12240	36	3	6
1975	173	78	64010	37	9	19
1976	402	182	152760	38	11	21
1977	393	178	0	0	14	29
Total, All Gear Types						
1969	6545	2969	916300	14	110	324
1970	22855	10367	3199700	14	244	939
1971	10140	4599	1622400	16	202	788
1972	6869	3116	1373760	20	251	917
1973	3529	1601	1235150	35	269	1076
1974	7229	3279	2891600	40	187	714
1975	8555	3881	2994250	35	268	1037
1976	25847	11724	8787810	34	243	952
1977	12138	5506	5340720	44	192	634

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

period as a whole (see Table 3.77). Annual Shelikof Strait catch, as a percentage of Kodiak catch, has averaged 38 percent in the purse seine fishery, 63 percent in the set gill net fishery, and 50 percent in the beach seine fishery.

In recent years, there have been pink and chum catches that rival or surpass the record catches of the last 45 years. These recent successes, together with cent nually improving management, enhancement, and rehabilitation programs suggest that the Kodiak salmon resources and harvesting activity will tend to increase. Annua' Shelikof catch is projected to increase from 4,840 metric tons (10.7 m'llion pounds) in 1980 to 8,254 metric tons (18.2 million pounds) in 2000. This 70 percent increase in catch by weight is expected to result in a 128 percent increase in real harvest value; real exvessel salmon prices are projected to increase by 34 percent. Increases in the numbers of boats and fishermen participating in the Shelikof Strait salmon fisheries are not necessary since the salmon boats and crews are currently underutilized, and increases are not expected due to the limited entry program which exists in the salmon fisheries. The projections of harvesting activity and the resulting percentage increases during the forecast period are presented in Tables 3.80 through 3.82. Table 3.83 inc" udes projections of catch by species and Tables 3.84 through 3.86 conta' n projections of harvesting activity by gear type.

TABLE 3.80

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT SALMON FISHERY, ALL GEAR TYPES 1980-2000

	Catch				Exvessel Price					Catch per Boat	
	Weight		Value		($/Pound)		Number of				Real
Year	Pounds (millions)	Metric Tons	(millions) , Nominal	Real	Nominal	Real	Boats	Landings	Fishermen	Pounds (1000)	Value m
1990	10.7	4841	6.5	6.5	0.61	0.61	244	3148	901	44	27
1981	11.5	5205	7.4	700	0.65	0.61	244	3282	901.	47	29
1982	12.3	5597	8.5	7.7	0.69	0.62	244	3418	901	51	31
1983	13.3	6019	9.7	8.3	00,3	0.62	244	3556	901	54	34
1984	14.3	6472	11*2	9*CI	0.70	0.63	244	3695	901	58	37
1985	15.3	6960	12.8	9.8	0.83	0.64	244	3833	901	63	40
1986	15.5	7037	13.9	10.1	0.89	0.65	244	3855	901	64	41
1987	15.7	7114	15.0	10.3	0.96	0.66	244	3877	901	64	42
1988	15.9	7192	16..?	10.6	1.02	0.67	244	3899	901	65	43
1989	16.0	7272	17.6	10.9	1.10	0.68	244	3921	901	66	44
1990	16.2	7354	19.1	11.2	1.18	0.69	244	3942	901	66	46
1991	16.4	7437	20.7	11.5	1.26	0.70	244	3964	901	67	47
1992	16.6	7521	22.4	11.8	1.35	0.71	244	3985	901	68	48
1993	16.8	7607	24.3	12.1	1.45	0.72	244	4005	901	69	50
1994	1700	7694	26.4	12.5	1.56	0.73	244	4025	901	69	51
1995	17.2	7703	28.6	12.8	1.67	0.75	244	4(-)45	901	70	53
1996	17*4	7874	31.1	13.2	1.79	0.76	244	4065	901	71	54
1997	17.6	7966	33.8	13.6	1.93	0.77	244	4083	901	72	56
1998	17.8	8060	36.8	14.0	2.07	0*79	244	4102	901	73	57
1999	18.0	8156	40.0	14.5	2.22	0.80	244	4119	901	74	59
2000	18.2	8254	43.5	14.9	2.39	0.82	244	4136	901	75	61

‘The real values and prices are in terms of 1980 do lars.

TABLE 3.81

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT SALMON FISHERY. ALL GEAR TYPES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	7.5	7.4	5*4	-0.1	0	4.2	0	7.5	7.4
1982	15.6	17.3	]2.9	1.5	0	8.6	o	15.6	17.3
1983	24.3	26.8	19.8	2.0	0	13.0	0	24.3	26.8
1984	33.7	38.2	28.0	3.4	0	17.4	0	33*7	38.2
1985	43.8	49.9	36.3	4*3	0	21.8	0	43.8	49.9
1986	45.4	53.9	46.0	5.9	0	22.5	0	45.4	53*9
1987	47.(-)	57.7	56.1	7.3	0	23.2	0	47.0	57.7
1988	48.6	61.9	67.2	9.0	0	23.9	0	48.6	61.9
1989	50.2	66.1	79.0	10.6	0	24.5	0	50.2	66.1
1990	51.9	70.7	91.9	12.4	0	25.2	0	51,.9	70.7
1991	53.6	75.3	105,7	14.1	0	25.9	0	53.6	75.3
1992	55.4	80.3	120.6	16.0	0	26.6	0	55.4	80.3
1993	57.1	85.4	136.6	18.0	0	27.2	0	57.1	85.4
1994	58.9	90.8	154.0	20.0	0	27.9	0	58.9	90.8
1995	60.8	96.3	172.6	22,1	0	28.5	0	60.8	96.3
1996	62.7	102.2	192.7	24.3	0	29,1	0	62.7	102.2
1997	64.6	108.2	214.4	26.5	0	29.7	0	64.6	108.2
1998	66.5	114.5	237.8	28.8	0	30.3	0	66.5	114.5
1999	613.5	121.1	262.9	31.2	0	30.8	0	68.5	121.1
2000	70.5	128.0	290.1	33.7	0	31.4	0	70.5	128.0

TABLE 3.82

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT SALMON FISHERY, ALL GEAR TYPES
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	7.5	7*4	5*4	-001	0	4.2	0	7*5	7.4
1982	7.5	9.2	7.2	1.6	0	4.2	0	7*5	9.2
1983	7.5	8.1	6.1	0.5	0	4.0	0	7.5	8.1
1984	7.5	9.0	6.9	1.3	0	3.9	0	7.5	9.0
1985	7.5	8.5	6.4	0.9	0	3.7	0	7.5	8.5
1906	1.1	2.6	7.1	1.5	0	0.6	0	1.1	2.6
1987	1.1	2.5	6.9	1*3	0	0.6	0	1*1	2.5
1988	101	2.7	7.1	1.6	0	0.6	0	1.1	2.7
1989	1.1	2.6	7.1	105	0	0.6	0	1.1	2.6
1990	1.1	2.7	7.2	1.6	o	0.5	0	1.1	2.7
1991	.1.1	2.7	7.2	1.6	0	0.5	0	1.1	2.7
1992	1.1	2.8	7.3	1.7	0	0.5	0	1.1	2.8
1993	1.1	2.8	7.3	1.7	0	0.5	0	1.1	2.8
1994	1.1	2.9	7.3	1.7	0	0.5	0	1.1	2.9
1995	1.2	2.9	7.3	1.7	0	n.5	0	1.2	2.9
1996	1.2	3*O	7.4	1.8	0	0.5	0	1.2	3.0
1997	1.2	3.0	7.4	1.8	0	0.5	0	1.2	3.0
1998	1.2	3.0	7.4	1.8	0	0,4	0	102	3.0
1999	1.2	3.1	7.5	1.9	0	0.4	0	102	3.1
2000	1.2	3.1	7.5	1.9	0	0.4	0	1.2	3.1

TABLE 3.83

PROJECTED SHELIKOF STRAIT SALMON HARVEST BY SPECIES, 1980-2000

Year	HARVEST WEIGHT (1,000 POUNDS)					
	Kings	Reds	Pinks	Chums	Silvers	Total
1980	4	1133	7767	1700	68	10672
1981	4	1211	8357	1836	68	11475
1982	4	1294	8992	1982	68	12339
1983	4	1383	9676	2139	68	13269
1984	4	1477	10411	2309	68	14269
1985	4	1578	11202	2493	68	15345
1986	4	1633	11304	2505	68	15513
1987	4	1689	11406	2517	68	15683
1988	4	1748	11508	2529	68	15856
1989	4	1809	11612	2541	68	16033
1990	4	1871	11716	2553	68	16212
1991	4	1936	11822	2565	68	16395
1992	4	2003	11928	2578	68	16581
1993	4	2073	12036	2590	68	16770
1994	4	2145	12144	2602	68	16963
1995	4	2219	12253	2615	68	17159
1996	4	2296	12364	2628	68	17359
1997	4	2376	12475	2640	68	17562
1998	4	2458	12587	2653	68	17770
1999	4	2544	12700	2666	68	17981
2000	4	7632	12815	2678	68	18196

TABLE 3.84

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT PURSE SEINE SALMON FISHERY 1980-2000

	Catch				Exvessel Price		Number of			Catch per Boat	
	Weight		Value (millions)[1]		($/Pound)						Real Value
Year	Pounds (millions)	Metric Tons	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen	Pounds (1000)	($1000)
1980	8.9	4040	5.3	5.3	0.59	0.59	138	1861	688	65	38
1981	9.6	4346	6.0	5.7	0.62	0.59	138	1921	688	70	41
1982	10.3	4675	6.9	6.2	0.67	0.60	138	1986	688	75	45
1983	11.1	5028	7.9	6.7	0.71	0.60	138	2056	688	81	49
1984	11.9	5409	9.0	7.3	0.76	0.61	138	2131	688	87	53
1985	12.8	5819	10.4	7.9	0.81	0.62	138	2213	688	93	58
1986	13.(-I	5878	11.2	8.1	0.86	0.63	138	2224	688	94	59
1987	13.1	5939	12.1	8.3	0.92	0.64	138	2236	688	95	60
1988	13.2	6001	13.1	8.5	0.99	0.64	138	2248	688	96	62
1989	13.4	6063	14.2	8.7	1.06	0.65	138	2261	688	97	64
1990	1305	6127	15.3	9.0	1014	0.66	138	2273	688	98	65
1991	13.6	6191	16.6	9.2	1.22	0.68	138	2286	688	99	67
1992	13.8	6257	18.0	9.5	1.30	0.69	138	2299	688	100	69
1993	13.9	6324	]9.5	9.7	1.40	0.70	138	2312	688	101	71
1994	14.1	6392	21.2	10.0	1*5O	0.71	138	2325	688	102	73
1995	14.2	6461	22.9	10.3	1.61	0.72	138	2339	688	104	75
]996	14.4	653]	24.9	10.6	1.73	0.73	138	2353	688	105	77
1997	14.6	6602	27.0	10,9	1.86	0.75	138	2367	688	106	79
1998	14*?	6675	29.3	11.2	1.99	0.76	138	2381	688	107	81
1999	14.9	6748	31.9	1105	2.14	0.77	138	2396	688	108	84
2000	15.0	6823	34.6	11.9	2.30	0.79	138	2411	688	109	86

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.85

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT SET GILL NET SALMON '-FISHERY 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	1.6	730	1.2	1.2	0.74	0.74	97	1234	194	17	12
1981	1.7	784	1.3	1.3	0.77	0.73	97	1304	194	18	13
1982	1.9	842	1.5	1.4	0.83	0.74	97	1373	194	19	14
1983	2.0	,904	1,7	1.5	0.87	0.74	97	1438	194	21	15
1984	2.1	971	2.0	1.6	(-).94	0.76	97	1498	194	22	17
1985	2.3	1043	2.3	1.7	0.99	0.76	97	1551	194	24	18
1986	2.3	1058	2.5	1.8	1.07	0.77	97	1561	194	24	19
1987	2.4	1074	2,7	1.9	1*14	0.78	97	1571	194	24	19
1988	2.4	1090	2.9	1.9	1.22	0.80	97	1580	194	25	20
1989	2.4	1107	3.2	2.0	1.31	0.81	97	1589	194	25	20
1990	2.5	1123	3.5	2.0	1*4O	0.82	97	1597	194	26	21
1991	2.5	1141	3.8	2.1	1.50	0.83	97	1605	194	26	22
1992	2.6	1158	4.1	2*2	1.61	0.85	97	1612	194	26	22
1993	2.6	1177	4.5	2*2	1.73	0.86	97	1619	194	27	23
1994	2.6	1195	4.9	2.3	1.86	0.88	97	1625	194	27	24
1995	2.7	1214	5.3	2.4	1.99	0.89	97	1631	194	28	25
1996	2.7	1234	5.8	2.5	2.14	0.91	97	1636	194	28	25
1997	2.8	1254	6.4	2.6	2.30	0.93	97	1640	194	28	26
1998	2.8	12"74	6.9	2.6	2.47	0.94	97	1643	194	29	27
1999	2.9	1295	7.6	2.7	2.66	0.96	97	1645	194	29	28
2000	2.9	1317	8.3	2.8	2.86	0.98	97	1647	194	30	29

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.86

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT BEACH SEINE SALMON FISHERY 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real[1]	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real[1]	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real[1] Value ($1000)
1980	0.2	71	0.1	I-),1	0.58	0.58	10	54	19	16	9
1981	0.2	76	0.1	0.1	0.61	0.58	10	56	19	18	10
1982	0.2	81	0.1	0.1	0.65	0.58	10	59	19	19	11
1983	0.2	86	O*1	O* I	0.68	0.58	10	62	19	20	12
1984	0.2	92	O*1	0.1	0.73	(').59	10	65	19	21	13
1985	0.2	99	0.2	0.1	0.77	0.59	10	69	19	23	14
1986	0.2	100	0.2	0.1	0.83	0.60	10	70	19	23	14
1987	0.2	101	0.2	0.1	0.88	0.61	10	70	19	23	14
1988	0.2	102	0.2	0.1	0.94	0.61	10	71	19	24	14
1989	0.2	103	0.2	O*1	1.01	0.62	10	72	19	24	15
1990	0.2	104	0.2	0.1	1.08	0.63	10	72	19	24	15
1991	0.2	104	0.3	r).]	1.15	0.64	10	73	19	24	16
1992	0.2	105	0.3	0.2	1.23	0.65	10	73	19	24	16
1993	0.2	106	0.3	0.2	1.32	0.66	10	74	19	25	16
1994	0.2	107	0.3	0.2	1.42	0.67	10	75	19	25	17
1995	0.2	108	0.4	0.2	1..52	0.68	10	75	19	25	17
1996	0.2	109	0.4	0.2	1.63	0.69	10	76	19	25	18
1997	0.2	111	0.4	0.2	1.74	0.70	10	77	19	26	18
1998	0.2	112	0.5	0.2	1.87	0.71	10	78	19	26	18
1999	0.2	113	().5	0.2	2.01	0.73	10	78	19	26	19
2000	0.3	114	0.5	0.2	2.15	0.74	10	79	19	26	19

[1] The real values and prices are in terms of 1980 dollars.

Herring

Shelikof Strait has been an extremely important part of the Kodiak herring fishery. Between 1969 and 1977, the annual Shelikof Strait catch, as a percentage of the total Kodiak catch, ranged from 10 percent to 100 percent and averaged 76 percent (see Table 3.77). In absolute terms, the annual catch varied from 4 metric tons (9,000 pounds) to 707 metric tons (1.6 million pounds) by weight and from a few thousand dollars to $88,000 (see Table 3.87).

There are potentially four distinct herring fisheries in Shelikof Strait; they are the roe herring, bait fish, food fish, and industrial fish fisheries. The industrial fish fishery was dominant during the early to mid-1900s, the roe herring fishery has been dominant since the late 1960s, and the bait fishery has existed for many years as a relatively minor fishery. There is a well-developed roe market in Japan which has become available to Alaska roe products, and as a result of this market opportunity, exvessel prices in the roe fishery have been significantly higher than in other herring fisheries. Therefore, activity has recently been concentrated in the roe fishery even though the resources available to the roe fishery are a relatively small proportion of the total herring resource.

The roe herring fleet is dominated by purse seiners which also participate in the salmon fishery. The seiners are typically from 7.6 to 16.8 meters (25 feet to 55 feet) in length and have a crew of five. Due to the need

TABLE 3.87

SHELIKOF STRAIT HERRING FISHERY
1969-1970

Year	Catch: Weight: Pounds m	Catch: Weight: Metric Tons	Catch: Value ($1)	Price (¢/Pound)	Number of: Boats	Number of: Fishermen
1969	1842	836	36840	2	15	77
1970	595	270	11900	2	13	65
1971	542	- 246	10840	2	10	52
1972	447	203	8940	2	5	24
1973	1108	503	88640	8	11	54
1974	1558	707	77900	5	23	115
1975	15	7	750	5	2	11
1976	9	4	720	8	1	5
1977	473	215	75680	16	8	41

Percentage of Total Shelikof Harvesting Activity

Year	Catch: Weight	Catch: Value	Number of: Boats	Number of: Fishermen
1969	10.09	1.40	7.28	11.72
1970	1.77	0.25	3*95	5.33
1971	2.96	0.33	3.91	5.23
1972	2.61	0.28	1.56	2.19
1973	5.40	1.74	3.09	4.07
1974	6.22	1.06	7,94	10,84
1975	0.06	0.01	0.61	0.84
1976	0.02	0.01	0.29	0.40
1977	1.54	0.43	2.46	3.81

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

to harvest the herring when the roe is at a specific stage of development, the season consists of a very brief but extremely intensive fishing period which occurs between May and June.

Due in part to the difficulty associated with harvesting when the roe is of a marketable quality, the harvests have been well below the harvest guideline of 2,177 metric tons (2,400 short tons). However, the 1979 harvest approached the guideline. The improved harvest in 1979 is explained by the increased fishing effort which is, in turn, explained by favorable exvessel prices. Despite what may continue to be acceptable prices, the difficulty of harvesting herring at the right time is expected to, on average, hold the Kodiak Management Area catch at 1,814 metric tons (2,000 short tons) or about 362 metric tons (400 short tons) below the guideline harvest. The resulting Shelikof harvest is expected to be 1,379 metric tons (1,520 short tons). Although the harvest is not projected to increase between 1980 and 2000, the real value of the harvest is expected to increase by 21 percent. The projection of fishing activity and the resulting percentage increases in activity are presented in Tables 3.88 through 3.90.

Halibut

The Shelikof halibut fishery consists of two distinct fleets: a large boat fleet which is capable of fishing far offshore areas and lands the majority of the catch, and a small boat fleet which fishes inshore areas and includes many boats that are principally participants in the salmon

TABLE 3.88

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT HERRING FISHERY 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions)[1]: Nominal	Catch: Value (millions)[1]: Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds m	Catch per Boat: Real Value ($1000)
1980	3*(-I	1379	006	0.6	0.20	0.20	61	182	182	50	10
1981	3*0	137?	0.6	0.6	0.21	0.20	61	182	182	50	10
1982	3.0	1379	0.7	0.6	0.23	0.20	61	182	182	50	10
1983	3.0	1379	0.7	0.6	0.24	0.21	61	182	182	50	10
1984	3.0	1379	0.8	0.6	0.26	0.21	61	182	182	50	10
1985	3.0	1379	0.8	0.6	0.27	0.21	61	182	182	50	10
1986	3.0	1379	0.9	0.6	0.29	0.21	61	182	182	50	11
1987	3.0	1379	0.9	0.6	0.31	0.21	61	182	182	50	11
1988	3.(-I	1379	1.0	0.7	0.33	0.22	61	182	182	50	11
1989	3.0	1379	1.1	0.7	0.35	0.22	61	182	182	50	11
1?90	3.0	1379	1.1	0.7	0.38	0.22	61	182	182	50	11
1991	3.0	1379	1.2	0.7	0.40	0.22	61	182	182	50	11
1992	30(-)	1379	1.3	0.7	0.43	0.22	61	182	182	50	11
1993	3.0	1379	1.4	0.7	0.45	0.23	61	182	182	50	11
1994	3.0	1379	1.5	0.7	0.48	0.23	61	182	182	50	11
1995	3.0	1379	1.6	0.7	0.51	0.23	61	182	182	50	12
1996	3.0	1379	1.7	0.7	0.55	0.23	61	182	182	50	12
1.997	3.0	1379	1.8	O*7	0.58	0.23	61	182	182	50	12
1998	3.0	1379	1.9	0.7	0.62	0.24	61	182	182	50	12
1999	3.0	1379	2.0	0.7	0.66	0.24	61	182	182	50	12
2000	3.(3	1379	2.1	(-).7	0.70	0.24	61	182	182	50	12

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.89

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT HERRING FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	O*9	6.5	0.9	0	0	0	o	O*9
1982	o	1.9	1304	1.9	0	0	0	0	1.9
1983	0	2.9	20.8	2.9	0	0	0	0	2.9
1984	0	3.8	28.6	3.8	0	o	0	0	3.8
1985	0	4.8	37.0	4.8	0	0	0	0	4.8
1986	0	5.8	45.9	5.8	0	0	0	0	5.8
1987	0	6.8	55*4	6.8	0	0	0	0	6.8
1988	0	7.8	65.5	7.8	0	0	0	0	7.8
1989	0	8.9	76.3	8.9	0	0	0	0	8.9
1990	0	9.9	87.7	9.9	0	0	0	0	9.9
1991	0	10.9	99.9	10.9	0	0	0	0	10*9
1992	0	12.0	112,9	12.0	0	0	0	0	12.0
1993	0	13.0	126.7	13.0	0	0	0	0	13.0
1994	0	14.1	141.5	14.1	0	0	0	0	14.1
1995	0	15.2	157.2	15.2	0	0	0	0	15.2
1996	0	16.3	173.9	16.3	0	0	0	0	16.3
1997	0	17.4	191.7	17.4	0	0	0	0	17.4
1998	0	18.5	210.7	18.5	0	0	0	0	18.5
1999	[)	19.6	230.9	19.6	0	o	0	0	19.6
20(")0	0	20.8	252.4	20.8	0	0	0	0	20.8

TABLE 3.90

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT HERRING FISHERY
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	0.9	6.5	0.9	o	0	o	o	O*9
1982	0	0.9	6.5	0.9	0	n	0	0	0.9
1983	0	0.9	6.5	O*9	0	0	0	o	0.9
1984	0	0.9	6.5	0.9	0	0	0	0	O*9
1985	0	0.9	6.5	O*9	0	0	0	o	0.9
1986	0	0.9	6.5	0.9	0	0	0	0	0.9
1987	c1	O*9	6.5	0.9	0	0	0	0	().9
1988	()	0.9	6.5	(3.9	0	0	0	0	0.9
1989	o	0.9	6.5	0.9	0	0	0	0	0.9
1990	0	0.9	6.5	0.9	0	0	0	0	I-)*9
1991	0	0.9	6.5	0.9	0	c1	0	0	0.9
1992	o	0.9	6.5	0.9	0	0	0	0	0.9
1993	0	0.9	6.5	0.9	0	0	0	0	O*9
1994	0	0.9	6.5	0.9	0	0	0	0	(-).9
1995	0	0.9	6.5	O*9	o	o	0	0	0.9
1996	0	0.9	6.5	0.9	0	0	0	0	0.9
1997	0	0.9	6.5	O*9	0	0	0	0	0.9
1998	0	O*9	6.5	0.9	0	o	0	0	0.9
1999	0	0.9	6.5	0.9	0	0	0	0	0.9
2000	0	0.9	6.5	0.9	0	0	0	0	0,9

or other fisheries. The boats of the large boat fleet are usually over 15.2 meters (50 feet) in length and would include a large number of non-Kodiak boats since this fleet is very mobile and fishes throughout the Gulf of Alaska and/or the Bering Sea. In the small boat fleet, boat lengths range from under 7.6 meters to 21.3 meters (25 feet to 70 feet), but are predominantly less than 10.7 meters (35 feet). The casual or supplemental nature of participation by the small boat fleet is indicated by the fact that the average number of landings per year per boat has been less than four. For both fleets, the season consists of three to four separate fishing periods between May and September.

A characteristic of halibut fisheries that is of particular importance with respect to conflicts with other vessels is the type of gear used. Halibut fishermen use long line gear which can exceed 4.8 kilometers (three miles) in length. The long line with hooks set at fixed in tervals has an anchored buoy at each end and is left unattended for several hours. Despite the expansive area covered by this gear, only the buoyed ends are exposed to normal marine traffic since the remainder of the gear is deep enough that a vessel can usually pass over it safely. The exception would be vessels that are pulling trawls or seismographic equipment and other vessels with lines or equipment which extend well below the surface.

The halibut harvests are expected to be held below current levels through the mid 1980s as the International Pacific Halibut Commission (IPHC) maintains relatively low quotas in the Gulf of Alaska in an attempt to rebuild the halibut resources in that area. The management efforts are expected to be successful. The high exvessel price for halibut and the excess harvesting and processing capacity that exist will tend to maintain resource abundance or the resulting quotas as the binding constraint on the fishery.

The projected levels of harvesting activity and the resulting percentage increases during the forecast period are summarized in Tables 3.91 through 3.93. The projections of catch are for both the small and large boat fleets, but since the boats and fishermen of the small boat fleet are primarily participants in other fisheries, the projected numbers of landings, boats, and fishermen are for the large boat fleet alone.

Two additional comments are warranted by recent or possible changes in the halibut fishery. The first, the gradual phasing out of Canadian boats in the Gulf of Alaska, will tend to have only a minor effect on the distribution of Area 3 halibut landings since the presence of Canadian boats does not appear to have affected the historical ratio of landings in a community to Area 3 catch. The second change is more critical and cannot be readily incorporated in the projections. The incidental catch of halibut by trawlers has long been an unresolved problem. Foreign trawlers have caught large quantities of halibut as incidental catch while targeting on groundfish and have been required to throw the halibut back into the water. This is not an ideal solution since much of the incidental catch does not survive, but it decreases the incentive for foreign trawlers to accidently catch halibut. As the

TABLE 3.91

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT HALIBUT FISHERY 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions)[1]: Nominal	Catch: Value (millions)[1]: Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	1.5	699	1.2	1.?	0.80	0.80	4?	1(56	250	37	30
1981	1.5	699	1.3	1.3	0.86	0.82	42	166	25o	37	30
1982	1*5	699	1.4	1.3	0.93	0.84	42	166	250	37	31
1983	1.5	499	1.5	103	1.00	0.85	42	166	250	37	32
1984	1*5	699	1..7	1.3	1*O7	0.07	42	166	250	37	32
1985	1.6	725	1.8	1.4	1.15	0.88	43	173	259	37	33
1986	1.7	753	2.1	1.5	1.24	0.90	45	160	269	37	33
1987	].7	782	2.3	1.6	1.32	0.91	47	186	280	37	34
1988	1.8	812	2.5	1.7	1.42	0.92	48	194	290	37	34
1989	1.9	844	2.8	1.7	1.51	0.93	50	201	302	37	35
1990	1*9	876	3.1	1.8	1.61	0.95	52	209	313	37	35
1991	2.0	910	3.5	1.9	1.72	0.96	54	217	325	37	35
1992	2.1	945	3.8	2.0	1.84	0.97	56	225	338	37	36
1993	2*?	981	4..?	2.1	1.96	0.98	58	234	351	37	36
1994	2.2	1019	4.7	2.2	2.08	0.98	61	243	36'4	37	36
1995	2.3	1058	5.2	2.3	2.22	0.99	63	252	378	37	37
1996	2.4	1099	5.7	?.4	2.36	1.00	65	262	393	37	37
1997	2.5	1141	6.3	2*5	2.51	1.01	68	272	408	37	37
1998	2.6	1185	7.0	2.7	2.67	1.02	71	283	424	37	38
1999	2.7	1231	7.7	2.8	2.83	1.02	73	293	440	37	38
2000	2.8	1278	8.5	2.9	3.01	1.03	76	305	457	37	38

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.92

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT HALIBUT FISHERY
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	2.3	7.9	2.3	0	o	0	o	2.3
1982	0	4.4	16.3	4*4	0	0	0	0	4.4
1983	0	6.5	25.1	6.5	o	o	0	o	6.5
1984	0	8.4	34.3	8.4	0	0	0	0	8.4
1985	3.9	14.5	44.1	10.3	3.9	3.9	3.8	0.0	10”3
1986	7.8	20.8	54.5	12.0	7.8	7.8	7.8	0.0	12.0
1987	12.0	27.3	65*4	13*7	12.0	12.0	12.0	0.0	13.7
1988	16.3	34.1	76,9	15.3	16.3	16.3	16.3	0.0	15*3
1989	20.8	41.0	89.0	16.8	20.8	20.8	20.8	0.0	16.8
1990	25.4	48.2	101.8	18.2	25.4	25.4	25.4	0.0	18.2
1991	30.3	55.7	115.4	19.5	30.3	30.3	30.3	0	19.5
1992	35.3	63.4	129.6	20.8	35.3	35.3	35.3	0,0	20.8
1993	40.5	71.4	144.7	22.0	40.5	40.5	40.5	0.0	22.0
1994	45*9	79*6	160.5	23.1	45.9	45,9	45.9	0.0	23.1
1995	51.5	88.2	177.3	24.2	51.5	51.5	51.5	0.0	24.2
1996	57.4	97.0	194*9	25.2	57*4	57*4	57.4	0.0	25.2
1997	63.4	106.2	213.5	26.2	63.4	63,4	63.4	0.0	26.2
1998	69*7	115*7	233.2	27.1	69.7	69.7	69.7	0.0	27.1
1999	76.2	125.5	253.9	28.0	76.2	76.2	76.2	0.0	28.0
2000	83.0	135.7	275.8	28.8	83.0	83.0	83.0	O*O	28.8

TABLE 3.93

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT HALIBUT FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	2.3	7.9	2.3	o	0	o	o	2.3
1982	0	201	7.7	2.1	0	o	0	0	2*1
1983	0	2.0	7.6	2.0	0	0	0	0	2.0
1984	0	1.8	7.4	1.8	0	0	0	0	1.8
1985	3.9	5.6	7.3	1.7	3.9	3.9	3.8	0.0	1.7
1986	3.8	5.5	7.2	1.6	3.8	3.8	3.8	0	1.6
1987	3.8	5.4	7.1	1*5	3.8	3.8	3.9	0	1.5
1988	3.9	5.3	7.0	1*4	3.9	3*9	3*9	0	1.4
1989	3.8	5*2	6.9	1*3	3.8	3.8	3.9	0	1.3
1990	3.8	501	6.8	102	3.8	3.8	3.8	0	1*2
1991	3.8	5.0	6.7	1.1	3.9	3.9	3.8	-0.0	1.1
1992	3*8	5.0	6.6	1.1	3.8	3.8	3.8	0.0	1.1
1993	3.8	4.9	6.5	1.0	3.8	3.8	3.8	0	1*O
1994	3,9	4.8	6*5	0*9	3.8	3.8	3.9	0.0	0.9
1995	3.8	4.8	6.4	0.9	3.0	3.8	3.8	-0.0	0.9
1996	3.8	4.7	6.4	0.8	3.8	3.8	3,8	0.0	0.8
1997	3.9	4.7	6.3	0.8	3.9	3.9	3.9	0	0.8
1998	3.9	4.6	6.3	0.7	3.9	3.9	3.9	-O*O	0.7
1999	3.9	4.6	6.2	0.7	3.0	3.8	3.8	0.0	0.7
2000	3.8	4.5	6.2	0,6	3.8	3.8	3.8	0	0.6

domestic groundfish industry develops and the incidental catch becomes predominantly domestic, the IPHC and NPFMC will no doubt be forced to find a better solution to the problem of incidental halibut catch. One possibility is that the costs associated with limiting the incidental catch will be found to exceed the benefits, and it will be decided that the long line halibut fishery is not viable in light of multi-fishery management objectives. The management entities have not really confronted these issues, and it is therefore not known how the problems will be resolved. In the absence of such knowledge, the issue is noted but not incorporated in the halibut fishery projections.

King Crab

The Shelikof Strait king crab fishery has been a productive sector of both the Kodiak king crab fishery and the Shelikof Strait commercial fisheries. Between 1969 and 1977, the annual catch has ranged from 1,141 metric tons (2.5 million pounds) to 4,106 metric tons (9.1 million pounds) by weight and from $1.1 million to $8.7 million by value (see Table 3.94). As a proportion of the total Kodiak king crab catch, the Shelikof catch has ranged from 17 percent to just under 50 percent and has averaged 32 percent with no measurable secular trend (see Table 3.77).

The fishery's resources and markets are well established and have resulted in resource abundance being the binding constraint on catch. The decline in the exvessel price from over $1.60 per pound at the end of the 1978-

TABLE 3.94

SHELIKOF STRAIT KING CRAB FISHERY
1969-1977

Year	Catch: Weight: Pounds (1,000)	Catch: Weight: Metric Tons	Catch: Value ($1)	Price (¢/Pound)	Number of: Boats	Number of: Fishermen
1969	5100	2313	1377000	27	56	169
1970	3883	1761	1087240	28	37	111
1971	4362	1979	1308600	30	33	9a
1972	3093	1403	1175340	38	19	57
1973	2516	1141	1660560	66	23	69
1974	6622	3004	2913680	44	46	139
1975	9052	4106	4073400	45	64	192
1976	5421	2459	3903120	72	60	179
1977	6460	2930	8721405	135	91	273

Percentage of Total Shelikof Harvesting Activity

Year	Catch: Weight	Catch: Value	Number of: Boats	Number of: Fishermen
1969	?7.93	52.49	26.40	25.50
1970	11.56	22.83	11.20	9.07
1971	23.84	40.03	12.26	9.82
1972	18.04	36.43	6.26	5.28
1973	12.26	32.53	6.56	5.19
1974	26.42	39.63	15*96	13.09
1975	38.44	51.24	17.59	14.50
1976	13.56	27.43	17.60	14.45
1977	21.08	49,92	27.36	25,44

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

79 season to under $1.00 in the early stages of the 1979-80 season demonstrates both that large changes in market conditions can occur without removing the constraint imposed by resource abundance and that exvessel prices can decrease as rapidly as they have increased.

The average crew size in the king crab fishery is three, and although the boats range in length from under 7.6 meters (25 feet) to over 38.1 meters (125 feet), the boats are typically over 15.2 meters (50 feet) in length and are capable of operating far offshore. In recent years, the season has been from September through January. During the remainder of the year, many king crab fishermen and boats participate in other fisheries. The larger boats tend to participate in king crab fisheries in other areas, other crab fisheries in Kodiak and other areas, and in the salmon and herring fisheries as tenders. The smaller king crab boats include many purse seiners that participate in the salmon and herring fisheries; they also include boats that are active in other shellfish fisheries.

The king crab harvest is expected to equal the sustainable yield by 1980 and on average be maintained at that level throughout the forecast period. The nominal exvessel price is not expected to keep pace with the Consumer Price Index, therefore the annual real harvest value is projected to decrease by 26 percent between 1980 and 2000. The projections are summarized in Tables 3.95 through 3.97.

TABLE 3.95

PROJECTED. HARVESTING ACTIVITY
SHELIKOF STRAIT KING CRAB FISHERY 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real[1]	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real[1] Value ($1000)
1980	9.6	4355	12.1	12.1	1.26	1.26	64	501	193	149	188
1981	9.6	4355	11.4	10.8	1.19	1.13	64	501	193	149	168
1982	9.6	4355	1,2.6	11.3	1.31	1.18	64	501	193	149	176
1983	9.6	4355	12.3	10.5	1.28	1.09	64	501	193	149	163
1984	9.6	4355	]3.3	10.7	1.38	1.12	64	501	193	149	167
1985	9.6	4355	13.3	10.2	1.39	1.06	64	501	193	149	158
1986	9.6	4355	14.1	10.2	1.47	1.07	64	501	193	149	159
1987	9.6	4355	14.4	9.9	1.50	1*O3	64	501	193	149	154
1988	9.6	4355	15*2	9.9	1.58	1.03	64	501	193	149	154
1989	9.6	4355	15.6	9.6	1.62	1.00	64	501	193	149	150
1990	9.6	4355	16.4	9.6	1*7O	1.00	64	501	193	149	149
1991	9.6	4355	17.0	9.4	1.77	0.98	64	501	193	149	146
1992	9.6	4355	17.8	9*4	1.85	0.97	64	501	193	149	146
1993	9.6	4355	18.5	9.2	1.93	0.96	64	501	193	149	144
1994	9.6	4355	19.4	9.2	2.02	0.96	64	501	193	149	143
1995	9.6	4355	20.3	9*1	2.12	0.95	64	501	193	149	142
1996	9.6	4355	21.4	9.1	2.22	0.94	64	501	193	149	141
1997	9.6	4355	22.4	9.0	2.33	0.94	64	501	193	149	140
1998	9.6	4355	23.6	9.0	2.46	0.94	64	501	193	149	140
1999	9.6	4355	24.8	9.0	2.58	0.93	64	501	193	149	139
2000	9.6	4355	26.1	9.0	2.72	0.93	64	501	193	149	139

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.96

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT KING CRAB FISHERY
1981-2000

Year	Catch Weight	Catch Real Value	Exvessel Price Nominal	Exvessel Price Real	Number of Boats	Number of Landings	Number of Fishermen	Catch per Boat Weight	Catch per Boat Real Value
1981	0	-lob	-5.7	-10.6	0	0	o	o	-10.6
1982	o	-6.5	4.1	-6.5	o	0	0	0	-6.5
1983	0	-13.3	1.9	-13.3	0	0	0	0	-13.3
1984	()	-11.5	9.7	-11.5	0	0	0	0	-11.5
1985	0	-15.9	9.9	-15.9	o	0	0	o	-15*9
1986	o	-15.4	16.7	-15.4	0	0	0	0	-15.4
1987	0	-18.4	18.8	-18.4	0	0	0	0	018.4
1988	0	-18.5	25.1	-18.5	0	0	0	0	-18.5
1989	0	-20.5	28.7	-20.5	0	0	0	0	-20.5
1990	0	-20.9	35.2	-20.9	0	0	0	0	-20.9
1991	0	-22.3	40.0	-22.3	0	0	0	0	-22.3
1992	0	-22.7	46.9	-22.7	0	o	0	0	-22.7
1993	0	-23.7	52.9	-23.7	0	0	0	0	-23.7
1994	0	-24.1	60.5	-24.1	0	0	0	o	-24.1
1995	0	-24.8	67.8	-24.8	0	0	0	0	-24.8
1996	0	-25.1	76.4	-25.1	0	0	0	0	-25.1
1997	0	-25,6	85.0	-25.6	0	0	0	0	-25.6
1998	0	-25.7	94.7	-25.7	0	[illegible]	0	0	-25.7
1999	0	-26.0	104.8	-26.0	0	0	0	0	-26.0
2000	0	-26.0	115.9	-26.0	0	0	0	0	-26.0

TABLE 3.97

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT KING CRAB FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	-10.6	-5.7	-10.6	o	0	0	o	-10.6
1982	0	4.6	10.4	4.6	0	0	0	0	4.6
1983	n	-7.2	-2.1	-7.2	0	0	0	0	-7.2
1984	0	2.0	7.7	2*O	0	o	0	0	2.0
1985	0	-5.0	0,2	-5.0	0	0	0	0	-5*O
1986	0	0.6	6.2	0.6	0	0	0	0	0.6
1987	0	-3.5	1.8	-3.5	0	0	0	0	-3.5
1988	n	-0.1	5.4	-0.1	o	o	0	0	-0.1
1989	0	-2.5	2.8	-2.5	0	0	0	0	-2.5
1990	0	-(.-).5	5.0	-0.5	0	0	0	o	-0.5
1991	0	-1.8	3.6	-1.8	0	0	0	0	-1.8
1992	o	-0.5	4*9	-0.5	0	o	0	0	-0.5
1993	0	-1.3	4.1	-1*3	0	0	0	0	-1.3
1994	0	-0.5	5.0	-0.5	0	0	0	0	-0.5
1995	0	-0.9	4*5	-(3.9	0	0	0	0	-0.9
1996	0	-*.4	5.1	-0.4	0	0	0	0	-0.4
1997	cl	-0.6	4.9	-0.6	0	0	0	0	-0.6
1998	0	-0.2	5.2	-0.2	0	0	0	0	-0.2
1999	0	-O*3	5.2	‘0.3	0	0	0	0	-0.3
2(-)00	0	-0.1	5.4	-0.1	0	o	0	0	-0.1

The pot gear used in the king crab and other crab fisheries is fixed gear that is left unattended; therefore, it is subject to losses to marine traffic, including trawlers. The gear consists of a pot that is placed on the ocean floor and connected to a buoy which marks its location. The pots are placed at varying intervals along a course that may be determined by the contour of the sea floor. If a buoy is ripped from a pot, the pot is very difficult to locate and recover. The exposed part of the gear, the buoy, provides a very small target for marine traffic; but since the buoys are often difficult to spot visually or with radar and since pots often are placed in heavy concentrations, gear losses to marine traffic are not infrequent. A typical crab fisherman loses several pots per year, but often the cause of each loss is not known.

Tanner Crab

During the last nine years, the Shelikof Strait Tanner crab fishery has had annual catches ranging from 748 metric tons (1.6 million pounds) to 3,583 metric tons (7.9 million pounds) with the value of catch varying from $0.1 million to $2.5 million (see Table 3.98). Although the Shelikof catch has varied from 15.5 percent to 41.3 percent of the total Kodiak area catch (see Table 3.77), this percentage has not exhibited a measurable secular trend from 1969 through 1977. The average, 27 percent, is therefore an appropriate measure of the expected relative importance of the Shelikof Tanner crab fishery.

TABLE 3.98

SHELIKOF STRAIT TANNER CRAB FISHERY
1969-1977

Year	Catch: Weight: Pounds (1,000)	Catch: Weight: Metric Tons	Catch: Value ($1)	Price ($/Pound)	Number of: Boats	Number of: Fishermen
1969	1649	748	148410	9	28	83
1970	3.178	1442	317800	10	34	101
1971	2546	1155	280060	11	19	57
1972	3384	1535	406080	12	19	58
1973	7899	3583	1421820	18	31	93
1974	3930	1783	825300	21	19	57
1975	3341	1515	567970	17	20	60
1976	6531	2963	1306240	20	30	89
1977	5898	2675	2536140	43	29	87

Percentage of Total Shelikof Harvesting Activity

Year	Catch: Weight	Catch: Value	Number of: Boats	Number of: Fishermen
1969	9.03	5.66	13*O5	12.60
1970	9.47	6.67	10.24	8.29
1971	13.92	8.57	7.05	5.65
1972	19.74	12.59	6.39	5.39
1973	38.50	27.85	8.81	4.97
1974	15.68	11.22	6.53	5.35
1975	14.19	7*14	5.51	4.54
1976	16.34	9.18	8,78	7.21
1977	19.24	14.52	8.74	8.12

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

In recent years the Tanner crab season has begun in January as the king crab season is ending and has extended into April or May. Many crab fishermen and boats participate in both fisheries; the characteristics of the two fleets are therefore similar. The Tanner crab boats range in length from under 10.7 meters (35 feet) to over 38.1 meters (125 feet), but are typically between 15.2 and 35.1 meters (50 and 115 feet), on average have a crew of three, and are capable of fishing far offshore.

Although the Tanner crab fishery is younger than the king crab fishery, it is also a relatively mature fishery with resources and markets that are well developed and defined and which, in the absence of unforeseen major changes in the biological or market environments, are expected to result in an average annual harvest of 3,429 metric tons (7.6 million pounds) during the forecast period. The market conditions are expected to be sufficiently favorable to maintain resource abundance as the binding constraint on fishery activity, despite the projected 12 percent decline in the real exvessel price. The projections are summarized in Tables 3.99 through 3.101.

Dungeness Crab

The Dungeness crab fishery of Shelikof Strait has been less important than the other crab fisheries in terms of pounds harvested or with respect to the Kodiak harvest. Between 1969 and 1977, the annual Shelikof harvest ranged from 2.7 metric tons (6,000 pounds) to 252 metric tons (556,000 pounds) by weight and from $1800 to $306,000 by value (see

TABLE 3.99

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT TANNER CRAB FISHERY 1980-2000

	Catch				Exvessel Price					Catch per Boat	
	Weight		Value		($/Pound)		Number of				Real
Year	Pounds (millions)	Metric Tons	(millions) Nominal	Real[1]	Nominal	Real[1]	Boats	Landings	Fishermen	Pounds (1000)	Value ($1000)
1980	7.6	3429	2.8	2.8	0.37	0.37	34	322	102	222	83
1981	7.6	3429	3.7	3.5	0.49	0.46	34	322	102	222	103
1982	7.6	3429	3*5	3.2	0.46	0.42	34	322	102	222	93
1983	7.6	3429	3.8	3.3	0.51	0.43	34	322	102	222	96
1984	7.6	34?9	3.8	3.0	0.50	0.40	3/+	322	102	222	89
1985	7*6	3429	4.0	3.1	O*53	0.41	34	322	102	222	91
1986	7.6	3429	4.0	2.9	0.54	0.39	34	322	102	222	86
1987	7.6	3429	4.3	2.9	0.57	0.39	34	322	102	222	86
1988	7.6	3429	4.3	2.8	0.58	0.37	34	322	102	222	83
1989	7.6	3429	4.6	2.8	0.60	0.37	34	322	102	222	83
1990	7.6	3429	4*7	2.7	0.62	0.36	34	322	102	222	81
1991	7.6	3429	4.9	2.7	0.65	0.36	31+	322	102	222	80
1992	7.6	342?	5.1	2.7	0.67	().35	34	322	102	222	78
1993	7.6	3429	5.3	2.6	0.70	0.35	34	322	102	222	78
1994	7.6	3429	5.5	2.6	0.”73	0.34	34	322	102	222	77
1995	7.6	3429	5.8	2.6	0.76	0.34	34	322	102	222	76
1996	7.6	3429	6.0	2.6	0.80	0.34	34	322	102	222	75
1997	7.6	3429	6.3	2.5	0.84	0.34	34	3?2	102	222	75
1998	7.6	3429	6.6	2.5	0.87	0.33	34	322	102	222	74
1999	7.6	3429	6.9	2.5	0.92	().33	34	3?2	102	222	74
2000	7.6	3429	7.3	2.5	0.96	0.33	34	322	102	222	73

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.100

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT TANNER CRAB FISHERY
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	24.4	31.3	24.4	o	0	0	o	24.4
1982	0	11.7	24.3	11.7	0	0	0	0	11.7
1983	cl	16.0	36.2	16.0	o	0	0	0	16,0
1984	0	7.8	33*5	7.8	0	0	0	0	7.8
1985	0	9*4	42.9	9.4	0	0	0	0	9.4
1906	0	3.9	43.2	3.9	0	0	0	0	3.9
1987	0	4*1	51*4	4.1	0	0	0	0	4*1
1988	0	0.3	53*9	0.3	0	o	0	0	0.3
1989	0	-0.2	61.7	-0.2	0	0	0	0	-0.2
1990	0	-2.8	66.0	-2.8	0	0	0	0	w-2.8
1991	0	-3.6	73.8	-3.6	0	o	0	0	-3.6
1992	0	-5.5	79.6	-5.5	0	()	0	0	-5.5
1993	0	-6.3	87.9	-6.3	0	0	0	0	-6.3
1994	0	-7*7	95.3	-7.7	0	0	0	0	-7.7
1995	0	-8.4	104.4	-8.4	0	0	0	0	-8.4
1996	0	-9.5	113*3	-9.5	0	0	0	0	-9.5
1997	0	-10.0	123.6	-10.0	0	cl	0	0	-10.0
1998	0	-10.7	134.0	-10,7	0	0	0	0	-10.7
1999	0	-11.1	145.7	-11,1	0	0	0	0	-11.1
2000	0	-11.6	157.9	-11.6	0	0	0	0	-11.6

TABLE 3.101

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT TANNER CRAB FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	()	, 24.4	31.3	24.4	0	0	0	o	24,4
1982	0	-10.2	-5.3	-10.2	0	0	0	0	-10,2
1983	0	3.8	9.5	3.8	0	()	0	0	3.8
1984	0	-7*1	-2.0	-7.1	o	0	0	0	-7.1
1985	0	1.5	7.1	1.5	0	0	0	0	1.5
1986	0	-5.0	0.2	-5.0	o	0	0	0	-5.0
1987	o	0.2	5*7	0.2	0	f-l	0	o	0.2
1988	0	-3.6	1.7	-3*6	0	o	0	0	-3.6
1989	0	-0.5	5.0	-0.5	0	0	0	0	-0.5
1990	0	-7*7	2.7	-2.7	o	0	0	0	-2,7
1991	()	-O*7	4*7	-0.7	0	0	0	0	-0.7
1992	o	-2.0	3.4	-2.0	0	0	0	0	-2.0
1993	0	-0.8	4.6	-0.8	0	0	0	o	-0.8
1994	0	-1.5	3.9	-1.5	0	0	0	0	-1.5
1995	0	-0.8	4.7	-0.8	0	0	0	0	-0.8
1996	0	-1.1	4*3	-1.1	0	0	0	0	-1.1
1997	o	-0.6	4.8	-0.6	0	0	0	0	-0.6
1998	0	-0.8	4.7	-0.8	0	0	0	0	-0.8
1999	0	-0.5	5.0	-0.5	0	0	0	0	-0.5
2000	0	-0.5	5.0	-0.5	0	0	0	0	-0.5

Table 3.102). During this period, Shelikof catch as a proportion of Kodiak catch varied from 3.1 percent to 72.4 percent, but did not exhibit a secular trend (see Table 3.77). The average annual proportion was 22 percent.

The Shelikof Strait Dungeness crab fishery is typically dominated by boats and fishermen that are primarily participants in other fisheries. Many of the smaller vessels are principally salmon/herring purse seiners and many of the larger boats are principally king and Tanner crab boats. These boats and their crews participate in the Dungeness crab fishery to supplement the income earned in these other fisheries. Since the fleet includes purse seiners as well as the large crab boats, it has a larger concentration of boats under 16.8 meters (55 feet) than do the other shellfish fleets. The average crew size is two and one half, and the season extends from May through December.

Activity in this fishery has typically been constrained by market conditions, not resource abundance. The principal constraints have been the relative strengths of other fisheries. The exvessel price is greatly influenced by the strength of the West Coast Dungeness crab fishery. When the California, Oregon, and Washington fisheries have large harvests, there is little demand for Alaska Dungeness crab, and the exvessel price is too low to attract many vessels to the Shelikof Dungeness crab fishery. The strength of other Alaska fisheries is also important since many participants in the Dungeness crab fishery are primarily associated with

TABLE 3,102

SHELIKOF STRAIT DUNGENESS CRAB FISHERY
1969-1977

Year	Catch: Weight: Pounds m	Catch: Weight: Metric Tons	Catch: Value ($1)	Price (t/Pound)	Number of: Boats	Number of: Fishermen
1969	183	83	27450	1.5	1	2
1970	202	92	30300	15	1	2
1971	172	78	25800	15	3	6
1972	278	126	108420	39	5	9
1973	556	252	305800	55	13	25
1974	195	88	91650	47	6	12
1975	206	93	123600	60	5	10
1976	63	29	19530	31	3	6
1977	6	3	1800	30	0	0

Percentage of Total Shelikof Harvesting Activity

Year	Catch: Weight	Catch: Value	Number of: Boats	Number of: Fishermen
1969	1.00	1.05	0.56	0.36
1970	0,60	0.64	0.36	0.20
1971	0.94	0.79	1.06	0.56
1972	1.62	3.36	1.56	0*88
1973	2.71	5.99	3.55	1.88
1974	0.78	1.25	2.05	1.12
1975	0.87	1.55	1.33	0.73
1976	0.16	0.14	0.85	0.47
1977	0.02	0.01	0.03	0.02

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

other fisheries and are active in the Dungeness crab fishery only when the other fisheries are closed or are not sufficiently productive.

Based on the expectations that the competing shellfish fisheries will not exhibit growth during the forecast period and that the demand for crab will continue to increase, the market conditions that have constrained the Dungeness crab fishery are expected to be gradually eliminated; catch is projected to approach the allowable biological catch of 200 metric tons (440,000 pounds). The projections are presented in Tables 3.103 through 3.105.

Shrimp

The She"likof Strait shrimp fishery is similar to the Dungeness crab fishery in that it is a relatively minor fishery in comparison to the Kodiak shrimp fishery as a whole or other Shelikof Strait fisheries. From 1969 through 1977, annual harvest ranged from 242 metric tons (0.5 million pounds) to 2,573 metric tons (5.7 million pounds) by weight and from $21,300 to $794,200 (see Table 3.106). During this period, Shelikof catch varied from 0.6 percent to 17.8 percent of the Kodiak shrimp catch (see Table 3.77) without a measurable secular trend.

The Shelikof Strait shrimp fishery is participated in by fishermen and boats that are active in other Kodiak fisheries. They are typically double otter trawlers which are between 16.8 and 25.9 meters (55 and 85 feet) in length, have a crew of three, are capable of operating far

TABLE 3.103

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT DUNGENESS CRAB FISHERY 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real[1]	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	O*2	71	0.1	0.1	0.75	0.75	3	20	8	51	39
1981	O*2	75	0.1	0.1	0.80	0.76	3	22	8	51	39
1982	0.2	79	0.1	().1	0.85	0.77	3	24	8	52	40
1983	O*2	83	0.2	0.1	0.91	0.78	4	25	9	52	40
1984	0.2	87	0.2	I')*2	0.97	0.78	4	27	9	52	41
1985	0.2	92	0*2	0.2	1.03	0.79	4	29	10	53	42
1986	0.2	97	0.2	0.2	1.10	0.80	4	31	10	54	43
1987	0.2	102	0.3	0.2	1.17	0.81	4	32	10	55	44
1988	(-).2	108	0.3	0.2	1.25	0.81	4	34	11	56	45
1989	0.2	113	0.3	0.2	1.33	0.02	4	36	11	57	47
1990	0.3	119	0.4	0.2	1.41	0.83	5	37	11	58	48
1991	0.3	126	0.4	0.2	1.50	0.83	5	39	12	59	49
1992	0.3	132	0.5	9.?	1.59	0.84	5	40	12	61	51
1993	O*3	139	0.5	0.3	1.69	0.84	5	42	12	62	52
1994	O*3	147	().6	0.3	1.79	0.85	5	44	13	64	54
1995	0.3	154	0.6	0.3	1.90	0.85	5	45	13	65	56
1996	0.4	162	0*7	0.3	2.01	0.86	5	47	13	67	57
1997	0.4	171	0.8	0.3	2.13	0.86	5	48	14	69	59
1998	0.4	180	0.9	0.3	2.26	0.86	6	50	14	71	61
1999	(-).4	190	1.0	0.4	2.39	0.86	6	52	14	73	63
2000	0.4	200	1.1	0.4	2.53	0.87	6	54	15	75	65

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.104

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT DUNGENESS CRAB FISHERY
1981-2000

Year	Catch Weight	Catch Real Value	Exvessel Price Nominal	Exvessel Price Real	Number of Boats	Number of Landings	Number of Fishermen	Catch per Boat Weight	Catch per Boat Real Value
1981	5*3	6.6	6.8	1.3	5.4	9.5	5.4	-0.1	1.1
1982	10.9	13.5	14.0	2.4	10.7	18.7	10.7	0.2	2.6
1983	16.7	20.8	21.5	3.5	15.8	27.7	15.8	0.8	4*3
1984	22.9	28.4	29.4	4.4	20.0	36.6	20.8	1.8	6.3
1985	29.4	36.3	37.7	5.3	25.7	45.2	25.7	3*0	8.5
1986	36.3	45.1	46.8	6,5	30.4	53.7	30.4	4.5	11.2
1987	43*5	54.3	56.4	7.5	35.1	62.1	35.1	6.2	14.2
1988	51*1	63.9	66.5	8.5	39.7	70.4	39*7	8.2	17.3
1989	59.1	74.0	77.1	9.4	44.2	78.6	44.2	10.3	20.7
1990	67.5	84.6	88.2	10.2	4/3.7	86.7	48.7	12.7	24.2
1991	76.4	95.7	100.0	11.0	53*1	94*7	53.1	15.2	2?.9
1992	85.7	107.4	112.3	11.7	57.5	102.8	57.5	18.0	31.7
1993	95.6	119.7	125.3	12.3	61.8	110.8	61.8	20.9	35.8
1994	105.9	132.6	139.0	12.9	66.1	118.9	66.1	24.0	40.0
1995	116.8	146.1	153.4	13.5	70.5	127.0	70.5	27.2	44*4
1996	128.3	160.3	168.5	14.0	74.8	135.1	74.8	30.6	48.9
1997	140.4	175.2	184.5	14.5	79.1	143.3	79.1	34.2	53.6
1998	153.1	190.9	201.3	14.9	83.5	151.6	83*5	37*9	58.5
19?9	166.5	207.3	218.9	15.3	87.9	160.1	87.9	41.8	63.5
2000	180.6	224.6	2.37.5	15.7	92.4	168.6	92.4	45.9	68.7

TABLE 3.105

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT DUNGENESS CRAB FISHERY
1981-2000

	Catch		Exvessel Price		Number of			Catch per Boat	
Year	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	5*3	. 6.6	6.8	1.3	5.4	9.5	5.4	-O*1	1.1
1982	5.3	6.5	6.7	1*1	5*O	8.4	5.0	0.3	1.4
1983	5.3	6.4	6.6	1.0	4.6	7.6	4.6	0.6	1.7
1984	5.3	6.3	6.5	0.9	4.3	6.9	4.3	0.9	1.9
1985	5.3	6.2	6.4	0.9	4.0	6.3	4.0	1.2	2.1
1986	5.3	6.4	6.6	1.1	3.8	5.9	3.8	1.4	2.5
1987	503	6.3	6.5	1.0	3.6	5*5	3.6	1.7	2.6
1988	5.3	6.2	6.4	0.9	3*4	5.1	3.4	1.8	2.8
1989	5.3	6.2	6.4	0.8	3.2	4*8	3.2	2*O	2.8
1990	5.3	6.1	6.3	0.8	3.1	4.5	301	2.1	2.9
1991	5.3	6.0	6.2	0,7	3.0	4.3	3,0	2.3	3.0
1992	5.3	6.0	6.2	0.6	2.9	4.1	2.9	2.4	3.0
1993	5*3	5.9	6.1	0.6	2.8	440	2.8	2,5	3*1
1994	5*3	5.9	6.1	0.5	2.7	3.8	2.7	2.6	3.1
1995	5.3	5.8	6.0	0.5	2,6	3.7	2.6	2.6	3.1
1996	5.3	5*R	6.0	O*5	2.5	3.6	2.5	2.7	3.2
1997	5.3	5.7	5.9	0.4	2.5	3*5	2.5	2.7	3.2
1998	5.3	5.7	5.9	0.4	2.4	3*4	2.4	2.8	3.2
1999	5.3	5.7	5.9	003	2.4	3.4	2.4	2.8	3.2
2000	5.3	5.6	5.8	0.3	2.4	3.3	2.4	2.9	3.2

TABLE 3.106

SHELIKOF STRAIT SHRIMP FISHERY
1969-1977

Year	Catch: Weight: Pounds (1,000)	Catch: Weight: Metric Tons	Catch: Value ($1)	Price (f/Pound)	Number of: Boats	Number of: Fishermen
1969	2940	1334	117603	4	2	6
1970	2863	1299	114528	4	2	5
1971	533	242	21320	4	0	1
1972	3076	1395	153800	5	3	10
1973	4910	2227	392800	8	5	16
1974	5529	2508	552900	10	9	27
1975	237,7	1078	190160	8	4	11
1976	2099	952	209900	10	3	9
1977	5673	2573	794220	14	12	37

Percentage of Total Shelikof Harvesting Activity

Year	Catch: Weight	Catch: Value	Number of: Boats	Number of: Fishermen
1969	16.10	4,48	0.87	0.84
1970	8.53	2.41	0.46	O*37
1971	2,91	0.65	0.12	0.09
1972	17*94	4.77	1.13	0.96
1973	23.93	7.69	1.55	1.23
1974	22.06	7.52	3.04	2.49
1975	10.10	2.39	1.04	0.85
1976	5.25	1.48	0.87	0.71
1977	18.51	4*55	3,70	3.44

These data presented in this table are based on data obtained from Alaska Department of Fish and Game and Commercial Fisheries Entry Commission data files.

offshore, and are active in the Shelikof fishery on a sporadic basis throughout the year.

The most important concern in this fishery is the dramatic decline in resource abundance which occurred in 1978 and is expected to continue. Overfishing, predation, and climatic changes are possible explanations of the decline. The belief that overfishing is partially responsible will result in harvest guidelines that are a lower proportion of the estimated stock. Favorable market conditions, together with the decreased harvest guidelines, have resulted in resource abundance being the binding constraint on harvesting activity, and it is expected to remain so. A partial recovery is expected during the forecast period with the annual harvest reaching 635 metric tons (1.4 million pounds) by 1990 and being maintained at that level through 2000 (see Table 3.107). Due to increase in the annual harvest and the real exvessel price, the real value of the catch is expected to increase by over 150 percent between 1980 and 2000. Projected cumulative and annual rates of change in harvesting activity appear in Tables 3.108 and 3.109.

Razor Clam

The razor clam fishing has been relatively inactive in recent years; since 1974 no more than 3 boats have participated in the fishery. Although stocks and market conditions may encourage the redevelopment of this fishery, it is expected to remain an almost insignificant sector of the Shelikof Strait fishing industry.

TABLE 3.107

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT SHRIMP FISHERY 1980-2000

	Catch				Exvessel Price ($/Pound)		Number of			Catch per Boat	
	Weight		Value (millions)[1]								
Year	Pounds (millions)	Metric Tons	Nominal	Real[1]	Nominal	Real	Boats	Landings	Fishermen	Pounds (1000)	Real Value ($1000)
1980	0.7	318	0.2	0.2	(),24	0.24	1	14	2	870	205
1981	0.7	318	0.2	0.2	0.25	0.24	1	14	2	870	210
1982	0.7	318	0.2	0.2	0.27	0.25	1	14	2	870	214
1983	()*7	318	0.2	0.2	0.29	0.25	1	14	2	870	219
1984	0.7	318	0.2	0.2	0.32	0.26	1	14	2	870	223
1985	0.7	318	0.2	0.2	0.34	0.26	1	14	2	870	226
1986	0.7	318	0.3	0.2	0.36	0.26	1	14	2	870	230
1987	()*7	318	0.3	0.2	O*39	0.27	1	14	2	870	233
1988	0.7	318	0.3	0.2	0.42	0.27	1	14	2	870	236
1989	0.7	318	0.3	0.2	0.44	0.27	1	14	2	870	239
1990	1.4	635	0.7	0.4	0047	0.28	2	27	4	870	242
1991	1.4	635	0.7	0.4	0.51	0.28	2	27	4	870	244
1992	1.4	635	0.8	0.4	0.54	0.28	2	27	4	870	247
1993	1.4	635	0.8	0.4	(.-).57	0.29	2	27	4	870	249
1994	1.4	635	(-).9	0.4	0.61	0.29	2	27	4	870	251
1995	1.4	635	0.9	0.4	0.65	0.29	2	27	4	870	253
1996	1.4	635	1.0	O*4	0.69	0.29	2	27	4	870	254
1997	1*4	635	1.0	0.4	0.73	0.29	2	27	4	870	256
1998	1.4	635	1.1	(-).4	0.78	0.30	2	27	4	870	258
1999	1.4	635	1.2	0.4	0.82	0.30	2	27	4	870	259
2000	1.4	635	1*2	0.4	0.87	0.30	2	27	4	870	260

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.108

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT SHRIMP FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	d	2.3	7.9	2.3	o	0	0	o	2*3
1982	0	4.5	16.3	4*5	0	0	0	o	4.5
1983	0	6.6	25.1	6.6	0	n	0	0	6.6
1984	o	8.5	34.4	8.5	0	0	0	0	8.5
1985	0	10.3	44.1	10,3	0	0	0	0	10*3
1986	0	12.0	54.4	12.0	0	0	0	o	12,0
1987	0	13.6	65.2	13.6	0	0	0	0	13.6
1988	0	15.1	76.6	15.1	0	0	0	0	15.1
1989	0	16.5	88.6	16.5	0	0	0	0	16.5
1990	100.0	135.6	1(-)1.2	17.8	100.0	100.0	100.0	0.0	17.8
1991	100.0	138.1	114.5	19.0	100.0	100.0	100.0	0.0	19*O
1992	100.0	140.4	128.5	20.2	100,0	100.0	100.0	0.0	20.2
1993	100.0	142.5	143.2	21.3	100.0	100*O	100.0	0.0	21.3
1994	100.0	1.44.5	158.7	22.3	100.0	100.0	100.0	0.0	22.3
1995	100.0	146.4	175.0	23.2	100*O	100.0	100.0	0.0	23.2
1996	100.0	148.1	192.2	24.1	100.0	100,0	100.0	0.0	24.1
1997	100.0	149.7	210.2	24.9	100.0	100.0	100.0	0.0	24.9
1998	100.0	151.2	229.2	25.6	100.0	100.0	100.0	O*O	25.6
1999	100.0	152.6	249.3	26.3	100.0	100.0	100.0	0.0	26.3
2000	100.0	153.8	270.3	26.9	100.0	100.0	100.0	0.0	26.9

TABLE 3.109

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT SHRIMP FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	0	2.3	7.9	2.3	0	0	0	0	2.3
1982	0	2.1	7.7	2.1	0	0	0	0	2.1
1983	0	2.0	7.6	2.0	0	0	0	0	2.0
1984	0	1.8	7.4	1.8	0	0	0	0	1.8
1985	0	1.7	7.3	1.7	0	0	0	0	1.7
1986	0	1.5	7.1	1.5	0	0	0	0	1.5
1987	0	1.4	7.0	1.4	0	0	0	0	1.4
1988	0	1.3	6.9	1.3	0	0	0	0	1.3
1989	0	1.2	6.8	1.2	0	0	0	0	1.2
1990	100.0	102.3	6.7	1.1	100.0	100.0	100.0	0.0	1.1
1991	0	1.0	6.6	1.0	0	0	0	0	1.0
1992	0	1.0	6.5	1.0	0	0	0	0	1.0
1993	0	0.9	6.4	0.9	0	0	0	0	0.9
1994	0	0.8	6.4	0.8	0	0	0	0	0.8
1995	0	0.8	6.3	0.8	0	0	0	0	0.8
1996	0	0.7	6.2	0.7	0	0	0	0	0.7
1997	0	0.6	6.2	0.6	0	0	0	0	0.6
1998	0	0.6	6.1	0.6	0	0	0	0	0.6
1999	0	0.5	6.1	0.5	0	0	0	0	0.5
2000	0	0.5	6.0	0.5	0	0	0	0	0.5

Groundfish

The fishing grounds of Shelikof Strait are expected to yield large quantities of groundfish once the domestic fishery develops. When the fishery is fully utilized it is projected to be among the dominant fisheries of Shelikof Strait. Annual harvest weight is projected to increase from 33 metric tons (74,000 pounds) in 1980 to 49,183 metric tons (108 million pounds) in 2000; and annual real harvest value is projected to increase from $90,000 to $38.5 million (see Table 3.110). The corresponding cumulative and annual rates of growth are summarized in Tables 3.111 and 3.112. The dramatic growth that is projected for this fishery will result in a significant change in the relative importance of this fishery. In 1980, groundfish are expected to account for less than 1 percent of either the Shelikof Strait commercial harvest weight or value; however, by 2000 groundfish are projected to account for over 70 percent of the harvest weight and 30 percent of the harvest value (see Table 3.113). In terms of other measures of harvesting activity, the groundfish fishery is expected to be less dominant. Table 3.114 contains harvest projections by species.

Summation of Harvesting Activity Projections

This section consists of the presentation and analysis of the projections of harvesting activity of the Shelikof Strait commercial fishing industry as a whole. The tables presented in this section include summations of projected harvesting activity and projections of the relative importance of each fishery.

TABLE 3.110

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT GROUNDFISH FISHERY 1980-2000

	Catch				Exvessel Price ($/Pound)		Number of			Catch per Boat	
	Weight		Value (millions)								
Year	Pounds (millions)	Metric Tons	Nominal	Real	Nominal	Real[1]	Boats	Landings	Fishermen	Pounds (1000)	Real Value[1]
1980	091	33	0.0	O*O	0.12	0.12	0	1	0	3889	480
1981	0.1	47'	0.0	0.0	0*13	0.12	0	1	0	4083	504
1982	0.1	67	0.0	0.0	0014	0.12	o	2	0	4288	528
1983	0.2	96	0.0	0.0	0.14	O*12	0	2	0	4502	554
1984	0.3	136	0.0	0.0	0*15	0.12	o	3	0	4727	581
1985	0.4	194	0.1	0.1	0.16	0.1?	0	4	0	4963	609
1986	0.6	277	0.1	0.1	0.17	0.12	o	6	1	5212	639
1987	0.9	397	0.2	0.1	0.18	0.12	0	8	1	5472	670
1988	1.3	570	0.2	0.2	0.19	0. 1.2	0	11	1	5746	703
1989	1.8	818	0.4	0.2	0.20	0.12	0	15	1	6033	738
1990	2.6	1177	0.5	0.3	0.21	0.12	0	20	2	6335	774
1991	3.7	1697	0.8	0.5	0.22	0.12	1	28	3	6651	812
1992	5.4	2451	1.3	0.7	0.23	0.12	1	39	4	6984	852
1993	7.$	3545	1*9	1.0	0.24	0.12	1	53	5	7333	894
1994	11.3	5135	2*9	1.4	0.26	0.12	1	74	7	7700	93a
1995	16.4	7453	4.5	2.0	0.27	0.12	2	102	10	8085	985
1996	23.9	10835	6.9	2.9	0.29	0.12	3	141	14	8489	1034
1997	34.8	15777	10.5	4.2	0.30	0.12	4	195	20	8913	1085
1998	50.7	23010	16.2	6.2	0.32	0.12	5	271	27	9359	1140
1999	74.1	33614	25.0	9.0	0.34	0.12	8	377	38	9827	1197
2000	108.4	49183	38*5	13.2	0.36	0.12	11	525	53	10318	1257

[1] The real values and prices are in terms of 1980 dollars.

TABLE 3.111

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT GROUNDFISH FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	W	Real Value
1981	41.7	41.6	5.4	-0.1	35.0	35.0	35.0	5.0	4.9
1982	10102	100.7	11.0	-0.2	82.5	82.5	82.5	10.2	10.0
1983	186.1	185.1	17*O	-0.4	147.2	147.2	147.2	15.8	15.3
1984	307.6	305.6	23.3	-0.5	235.3	235.3	235.3	21.6	21.0
1985	481.5	478.0	29,9	-0.6	355.6	355.6	355.6	27,6	26.9
1986	731.1	725.2	36.9	-0.7	520,1	520.1	520.1	34*O	33.1
1987	1089.7	1080.0	44.3	-0.8	745.5	745.5	745.5	40.7	39.6
1988	1606.1	1590.4	52.1	-0.9	1054.8	1054.8	1054.8	47.7	46.4
1989	2350.8	2325.9	60.3	-1.0	1479.8	1479.8	1479.8	55.1	53.6
1990	3426.6	3387.7	68.9	-1.1	2065.0	2065.0	2065.0	62.9	61.1
1991	4983.3	4123,3	78.1	-1.2	2872.1	2872.1	2872.1	71.0	69.0
1992	7239*9	7148.1	87.7	-1.3	3987.1	3987.1	3987.1	79.6	77.3
1993	10516.2	10377.2	98.0	-1.3	5530.0	5530.0	5530.0	88.6	86.1
1994	15281.2	15072.4	108.7	-1.4	7668.6	7668.6	7668.6	98,0	95.3
1995	22222.6	2191,1.7	12001	-1.4	10637.5	10637.5	10637.5	107,9	105.0
1996	3?350.7	31891.6	132.2	-1.4	14766.0	14766.0	14766.0	118.3	115.2
1997	47152.1	46479.8	144.9	-1.4	20516.0	20516.0	20516.0	129.2	125.9
1998	68817.3	67841.1	158.4	-1.4	28536.6	20536.6	28536.6	140.7	137.3
1999	100577.8	99173.5	172.7	-1*4	39741.6	39741,6	39741.6	152.7	149.2
2000	147207.9	145208.5	187.8	-1.4	55418.8	55418.8	55418.8	165.3	161.7

TABLE 3.112

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT GROUNDFISH FISHERY
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	41.7	41.6	5.4	-0.1	35.0	35.0	35.0	5.0	4.9
1982	42.0	41.[?	5.4	-0.1	35.2	35.2	35.2	5.0	4.9
1983	42.2	42.0	5.4	-0.1	35.4	35.4	35.4	5.0	4.9
1984	42.4	42.3	5.4	-0.1	35.7	35.7	35.7	5.0	4.9
1985	42.7	4?.5	5.4	-0.1	35,9	35.9	3509	5.0	4.9
1986	42.9	42.8	5.4	-0.1	36.1	36.1	36.1	5.0	4.9
1987	43.2	43.0	5.4	-001	36.3	36.3	36.3	5.0	4.9
1988	43.4	43.3	5,4	-001	36.6	36.6	36.6	5*O	4.9
1989	43.6	43.5	5.4	-0.1	36.8	36.8	36.8	5.0	4.9
1990	43.9	43.0	5.4	-0.1	37.0	37.0	37.0	5.0	4.9
1991	44.1	44.0	5.4	-0.1	37*3	3703	37.3	5.0	4.9
1992	44.4	44.3	5.4	-0.1	37.5	37.5	37.5	5,0	4.9
1993	44.6	44.6	5.4	-0.1	37.8	37.8	37.8	5.0	4.9
1994	44.9	44.8	5.4	-0.0	38.0	38.0	38.0	5.0	4.9
1995	45.1	45.1	5.5	-0.0	38.2	38.2	38.2	5*O	5.0
1996	45.4	45.3	5.5	-0.0	38.4	38.4	38.4	5.0	5.0
1997	45.6	45.6	5.5	-0*0	38.7	38.7	38.7	5.0	5.0
1998	45.9	45.9	5.5	0.0	38.9	3809	38*9	5.0	5*O
1999	46.1	46.1	5.5	0.0	39.1	39*1	39.1	5.0	5.0
2000	46.3	46.4	5*5	0.0	39.3	39.3	39*3	5.0	5.0

TABLE 3.113

PROJECTED GROUNDFISH HARVESTING ACTIVITY
AS A PERCENTAGE OF TOTAL SHELIKOF STRAIT HARVESTING ACTIVITY
1980-2000

Year	Catch		Number of		
	Weight	Value	Boats	Fishermen	Landings
1980	0.2	0.0	0.0	0.0	0.0
1981	0.3	0.1	0.0	0.0	0.0
1982	0.4	0.1	0.0	0.0	0.0
1983	0.6	0.1	0.0	0.0	0.0
1984	0.8	0.1	0.0	0.0	0.1
1985	1.1	0.2	0.0	0.0	0.1
1986	1.6	0.3	0.0	0.0	0.1
1987	2.2	0.4	0.0	0.0	0.2
1988	3.1	0.6	0.0	0.1	0.2
1989	4.4	0.8	0.1	0.1	0.3
1990	6.1	1.2	0.1	0.1	0.4
1991	8.5	1.7	0.1	0.2	0.5
1992	11.8	2.4	0.2	0.2	0.7
1993	16.1	3.4	0.2	0.3	1.0
1994	21.6	4.7	0.3	0.4	1.4
1995	28.4	6.6	0.4	0.6	1.9
1996	36.4	9.2	0.6	0.8	2.5
1997	45.3	12.7	0.8	1.1	3.5
1998	54.5	17.2	1.1	1.5	4.7
1999	63.4	23.0	1.5	2.0	6.4
2000	71.6	30.0	2.1	2.8	8.7

TABLE 3.114

PROJECTED SHELIKOF STRAIT GROUNDFISH HARVEST BY SPECIES, 1980-2000

	WEIGHT (METRIC TONS)					REAL VALUE ($1,000)				
Year	Pollock	Pacific Cod	Sablefish	Other	Total	Pollock	Pacific Cod	Sablefish	Other	Total
1980	5	,11	0	17	33	1	3	0	5	9
1981	8	15	0	24	47	1	4	1	7	13
1982	12	20	1	34	67	2	6	1	9	18
1983	19	27	1	48	96	3	8	2	1,3	26
1984	29	37	2	69	136	5	10	3	19	37
1985	44	50	3	98	194	7	14	4	27	53
1986	66	68	4	140	277	11	19	6	39	75
1987	100	91	7	199	397	16	2.6	10	56	107
1988	152	124	10	284	570	25	34	15	79	154
1989	231	167	15	405	818	38	47	23	113	221
1990	350	226	24	578	1177	57	63	36	161	317
1991	532	305	36	824	1697	87	85	55	230	457
1992	807	412	56	1175	2451	1.31	115	84	328	659
1993	1225	558	86	1676	3545	199	156	130	468	953
1994	1860	754	132	2391	5135	303	210	199	667	1379
1995	2822	1019	202	3410	7453	460	284	306	952	2001
1996	4284	1377	310	4864	10835	697	3$4	469	1358	2908
1997	6501	1861	477	6938	15777	1058	519	720	1936	4235
1998	9867	2515	732	9896	23010	1606	702	1106	2762	6177
1999	14’975	3400	1123	14116	33614	2438	949	1698	3940	9025
2000	?2729	4595	1725	20134	49183	3700	1283	2608	5620	13210

Annual harvest weight for all Shelikof Strait fisheries is projected to increase from 15,124 metric tons (33.3 million pounds) in 1980 to 68,713 metric tons (151.5 million pounds) in 2000; and annual real harvest value is projected to increase from $23.6 million to $44.0 million (see Table 3.115). The corresponding cumulative and annual rates of change appear in Tables 3.116 and 3.117. The projected growth which is due to rapid expansion of the groundfish fishery and moderate growth in the traditional fisheries results in major changes in the relative importance of various fisheries (see Tables 3.118 through 3.122).

Total annual catch for the traditional fisheries is projected to increase from 15,090 metric tons (33.3 million pounds) in 1980 to 19,530 metric tons (43.1 million pounds) in 2000, and its real value is projected to increase from $23.6 million to $30.8 million (see Table 3.123). The resulting percentage increases by weight and real value respectively are 29 and 31 percent (see Table 3.124). Real harvest value is projected to increase more rapidly than harvest weight due to an increase in the industry-wide real exvessel price that is expected to occur as the higher-valued traditional species become a larger proportion of catch and as real exvessel prices in many fisheries increase. The number of boats and fishermen are expected to increase less rapidly than catch. Annual rates of change in harvesting activity appear in Table 3.125.

In addition to the projected changes in absolute levels of harvesting activity, there are some significant projected changes in relative levels of activity among the fisheries. The most notable are the significant increases in the relative importance of the salmon fisheries

TABLE 3.115

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT ALL FISHERIES 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions)[1]: Nominal	Catch: Value (millions)[1]: Real	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	33.3	15124	23.6	23.6	0.71	0.71	449	4354	1638	74	53
1981	34.2	15506	24.8	23.5	0.73	0.69	449	4490	1638	76	52
1982	35.1	15922	27.1	24.4	0.77	0.69	449	4628	1639	78	54
1983	36.1	16376	28.6	24.3	().79	0.67	449	4769	1639	80	54
1984	37.2	16875	31.1	25.1	0.84	0.68	449	4910	1640	83	56
1985	38.5	1745.?	33.3	25.5	0.87	0.66	451	5058	1650	85	57
1986	38.9	17644	35.6	25.8	0.91	0. 66	453	5090	1660	86	57
1987	39.4	17876	37.6	25.8	0.95	0.66	455	5122	1671	87	57
1988	40.0	18162	40.1	26.1	1.00	0.65	457	5156	1682	88	57
1989	40.8	18528	42.6	26.3	1.04	0.64	459	5191	1694	89	57
1990	42.6	19324	45.9	26.9	1.08	0.63	462	5241	1709	92	5$
1991	44.0	19967	49.1	27.3	1.12	0.62	464	5279	1722	95	59
1992	46.0	20847	5.?.9	27.8	1.15	0.60	467	5321	1736	98	60
1993	48.7	22070	57.0	28.4	1.17	0.58	4(59	5366	1751	104	61
1994	52.5	23793	61.8	29.2	1.18	0.56	472	5417	1767	111	62
19'95	57.9	?6247	67.5	30.2	1017	0.52	475	5476	1784	122	64
1996	65.6	29768	74.4	31.6	1.13	0.48	47$	5546	1803	137	66
1997	76.8	34853	83.0	33.4	1.08	()*43	482	5631	1824	159	69
1998	93.1	42234	94.0	35.8	1.01	0.38	486	5737	1847	191	74
1999	116.8	52989	108.5	39.2	0.93	0.34	491	5074	1875	238	80
2000	151.5	68713	128.4	44.0	0.85	0.29	497	6052	1907	305	88

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.116

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT ALL FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	2.5	. -003	2.6	-2.7	0,0	3.1	O*(I	2.5	-0.3
1982	5.3	303	9.2	-1.9	0.1	6.3	0.1	5.2	3.2
1983	8.3	3.2	11.9	-4.7	0.1	9*5	O*1	8,2	3*1
1984	11.6	6.5	18.2	-4.6	0.2	12.8	O*1	11.4	6.3
1905	15.4	8.1	22.4	-6.3	0,5	16.2	0,7	14.8	7.5
1986	16."7	9*3	29.2	-6,3	1*O	16.9	1.4	15.6	8.3
1987	18.2	9.4	34.7	-7.4	1.4	17.7	2.0	16.6	7.9
1988	20.1	10.7	41.5	-7.8	1.8	18.4	2.7	17*9	8.7
1989	22.5	11.5	47*4	-9*O	2.3	19.2	3*5	19.8	9.0
199(-)	27.8	14.0	52.4	-10.8	3.0	20.4	4*4	24.1	10.7
1991	32.0	15.5	57.7	-12.5	3.5	21.3	5.2	27.6	11.6
]992	37.8	17.8	62.5	-14.5	4.0	22.2	6.0	32.5	13.3
1993	45.9	20.4	65.4	-17.5	4.6	23,3	6.9	39.5	15*1
1994	57.3	23.8	66.6	-21.3	5.2	24.4	7.9	49.5	17.7
1995	73.5	28.1	64.8	-26,2	5.9	25.0	8.9	63.9	21*O
1996	96.8	33*Q	60.2	-32.0	6.6	27.4	10.1	84.6	25,6
1997	13004	41.5	52.5	-38.6	7.5	29.3	11.4	114.4	31.6
1998	179.2	51.9	42.6	-45.6	8,4	31.8	12,8	157.6	40.1
1999	250.4	66.3	31.2	-52.5	9.5	34.9	14.5	219.9	51.8
?000	354.3	86.5	19.8	-59.0	10.8	39.0	16.4	309.9	68.2

TABLE 3.117

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT ALL FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	2.5	-0.3	2.6	-2.7	0.0	3.1	0.0	2,5	-0.3
1982	?.7	3.6	6.4	0.9	0.0	3.1	0.0	2.6	3,5
1983	2.9	-o* 1	?.5	-2.9	0.0	3.0	0.0	2.8	-0.1
1984	3.0	3.2	5*7	0.2	0.0	3.0	0.0	3.0	3.2
1985	3.4	1.5	3*6	-1.8	0.4	3*0	0.6	300	1*1
1986	1.1	1,1	5.5	0.0	0.4	0.6	0.6	0.7	O*7
1987	1.3	0.1	4.2	-1.2	0.4	0.6	0.7	0.9	-0.3
1988	1.6	1*2	5.1	-0.4	0.4	0.7	0.7	1.2	0.7
1989	2.0	0.7	4.2	-1.3	0.5	0.7	0.7	1.6	O*3
1990	4.3	2.2	3.4	-2.0	007	1.0	0.9	3.6	1.5
1991	3.3	1.4	3.5	-1.9	0.5	0.7	0.0	2.8	0.9
1992	4.4	2.0	3,0	-2.3	0.5	0.8	0,8	3.9	1.4
1993	5.9	2.2	1.8	-3.5	0.6	0.9	0,9	5*3	1.6
1994	7.8	2.9	0.7	-4.6	0.6	1*0	0.9	7.2	2.3
1995	10.3	3.5	-1.0	-6.2	0.6	101	1,0	9.6	2.8
]996	13.4	4.5	-2.8	-7.9	0.7	1.3	1.1	12.6	3.8
1997	17.1	5.7	-4.8	-9.7	0.8	105	1.2	16.2	4.9
1998	21*2	7.4	-6.5	-11.4	0.9	1.9	1.3	2001	6.4
1999	25.5	9.5	-8.0	-12.8	1.0	2.4	1.5	24.2	8,3
2000	29.7	12.2	-8.8	-13*5	1.2	3.0	1.7	28.1	10.8

TABLE 3.118

PERCENTAGE OF CATCH BY WEIGHT
FOR ALL' SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	32.0 .	4.6	9*1	28.8	22.7	005	2.1	C)*2
1981	33*6	4.5	8.9	28.1	2?.1	0.5	2.0	0.3
1982	35.2	4.4	8.7	27.3	21*5	005	2.(I	0,4
1983	36.H	4.3	8.4	26.6	20.9	()*5	1.9	0.6
1984	38.4	4.1	8.2	25.8	20.3	O*5	1*9	0.8
1985	39*9	4*2	7.9	25.0	19.6	0,5	1.8	1.1
1986	39,9	4.3	7.8	24.7	19.4	0.5	1.8	1,6
1987	39.8	4.4	7.7	24.4	19.2	0.6	1.8	2.2
1988	39.6	4.5	7.6	24.0	18.9	0.6	1.7	3.1
1989	39.3	4.6	7.4	23.5	18.5	0.6	1.7	4.4
1990	38.1	4.5	7.1	22.5	17.7	0.6	3*3	6.1
1991	37,2	4.6	6.9	21.8	17.2	0.6	3.2	8.5
1992	36,1	4.5	6.6	20,9	16*4	0.6	3.0	11.8
1993	34.5	4*4	6.2	19.7	15.5	0.6	2.9	16*1
1994	32,3	4.3	5.8	18.3	14.4	0.6	2.7	21.6
1995	29.7	4.0	5*3	16.6	13.1	0.6	2.4	28.4
1996	26.5	3.7	4.6	14.6	11.5	O*5	2.1	36.4
1997	22.9	3.3	4.0	12.5	9*8	0.5	1.8	45.3
1998	19.1	2.8	3.3	10.3	8.1	0.4	1.5	54,5
1999	15.4	2.3	2.6	8.2	6.5	0.4	1*2	63.4
2000	12.0	1.9	2.0	6.3	5.0	O*3	0.9	71.6

TABLE 3.119

PERCENTAGE OF VALUE
FOR ALL SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	27.7	5.2	2.6	51.3	12.0	0.5	0.7	0.0
1981	29.8	5.4	2.6	46.0	14.9	0.5	0.7	0*1
1982	31.5	5*3	2.5	46.4	12.9	0.5	0.7	0.1
1983	34.0	5.4	2.6	43.1	13.5	0.6	0.7	0.1
1984	35.9	5.3	2.5	42.6	12*1	0.6	0.7	0.1
1985	38.4	5.5	2.5	39.9	12.1	0.6	0.7	0*2
1986	39.0	5.8	2.5	39.7	· 11.4	0.7	0.7	0.3
1987	39.9	6.1	2.5	38.3	11.4	0.7	0.7	0.4
1988	40.5	6.3	2.5	37.8	10.8	0.7	0.7	0.6
1989	41.3	6.6	2.5	36.6	10.7	0.8	0.7	0.8
1990	4105	6.8	2.5	35.6	10.2	0.8	1.4	1.2
1991	42.0	7.0	2.5	34.5	10.0	0.8	1.4	1.7
1992	42.4	7.2	2.4	33.6	9*6	0.9	1.4	2.4
1993	42.7	7.4	2.4	32.5	9.3	O*9	1.4	3.4
1994	42.7	7.6	2.4	31.4	8.9	0.9	1.4	4*7
1995	42.4	7.7	2.3	30.1	8*6	1.0	1.3	6.6
1996	41.8	7*7	2.2	28.7	8.1	1*O	1.3	9.2
1997	40.8	7*6	2.1	27.0	7.6	1.0	1.2	12.7
1998	39.1	7.4	2.0	25.1	7.0	1.0	1.2	17.2
1999	36.8	7.1	1.9	22.8	6.4	0.9	1*1	23.0
2000	33.9	6.6	1.7	20.4	5.7	0.9	1.0	30.0

TABLE 3.120

PERCENTAGE OF BOATS
FOR ALL SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Hal i but	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	54.4	9.3	13.6	14.3	7.6	0.7	0.2	0.0
1981	54*4	9*3	13.5	14*3	7.6	0.7	0.2	0.0
1982	54.4	9.3	13.5	14.3	7.6	O*8	O*2	(-).0
1983	54.3	9.3	13.5	14.3	7.6	0.8	0.2	0.0
1984	54.3	9.3	13.5	14.3	7.6	0.8	O*2	0.0
1985	54.1	9*6	13.5	14.2	7.5	0.8	0.2	0.0
1986	53*9	9.9	13.4	14.2	7.5	0.9	0.2	0.0
1987	53.7	10.2	13.4	14.1	7.5	0.9	0.2	0.0
1.9 88	53.4	10.6	13.3	14.1	7*4	0.9	0.2	0.0
1989	53.2	11.0	13.2	14.0	7.4	1.0	O*2	O*1
1990	52.8	11*3	13.2	13.9	7*4	1.0	0.3	0.1
1991	52.6	11*7	13.1	13.8	7,3	1.0	O*3	0.1
1992	52.3	12.1	13*0	13*R	7.3	100	0.3	0.2
1993	52.0	12.5	13.0	13.7	7.2	1*1	0.3	0.2
1994	51.7	12*9	12.9	13.6	7,2	1.1	O*3	0.3
1995	51.4	13.3	12.8	13.5	7.2	1.1	0.3	0.4
1996	51.0	13.7	12.7	13.4	7.1	1*1	0.3	0.6
1997	50.6	14.1	12.6	13.3	7.1	1.1	0.3	0.8
1998	50.2	14.5	12.5	13.2	7,0	1.1	0.3	1.1
1999	49.7	14.9	12.4	13.1	6.9	1.2	0.3	1.5
2000	49.1	15.3	12.2	12.9	6.8	1.2	0,3	2.1

TABLE 3.121

PERCENTAGE OF FISHERMEN
FOR ALL SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Hal i but	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	55.0	15.2	11.1	11.8	6.2	(-).5	0.1	0.0
1981	55.0	15.2	11.1	11.8	6.2	0.5	0.1	0.0
1982	55.0	15.2	11.1	11.8	6.2	0.5	0*1	0.0
1983	55.0	15.2	11.1	11.8	6.2	0.5	0.1	0.0
1984	54.9	15.2	11*1	11.8	6.2	0.6	0.1	Of)
1985	54.6	15.7	11.1	11.7	6.2	0.6	0.1	0.0
1986	54.3	16.2	11.0	11.6	6.1	0.6	0.1	0.0
19P?	53.9	16*7	1(-).9	11.5	6.1	0.6	0.1	O*O
1988	53.5	1793	10.8	11*5	6.1	0.6	0.1	0.1
1989	53.2	17.8	10.8	11.4	6.0	0.6	0.1	0.1
19913	52.7	18.3	10.7	11..3	6.0	O*7	O*3	0.1
1991	52.3	18.9	10.6	11.2	5.9	O*7	O*2	0.2
1992	51.9	19*5	10.5	11.1	5.9	007	0.2	0.2
1993	51*4	20.0	10.4	11.0	5.8	0.7	0.2	().3
1994	51.0	20.6	1(-).3	10.9	5.8	0.7	0.2	0.4
1995	50.5	21.2	10.2	10.8	5.7	0.7	0.2	0.6
1996	5(-).0	21.8	10*1	10.7	5.7	0.7	0.2	0.8
1997	49.4	22.4	10.0	10.6	5.6	0.7	O*2	1.1
1998	48.8	22.9	9.9	10.4	5.5	0.8	0.2	1.5
1999	48.1	23.5	9.7	10.3	5.4	0.8	0.2	2.0
2000	47.2	24.0	9.6	10.1,	5.4	0.8	0.2	2.8

TABLE 3.122

PERCENTAGE OF NUMBER OF LANDINGS
FOR ALL SHELIKSTRAIT FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	Groundfish
1980	72.3	3.8	4.2	11.5	7.4	0.5	0.3	0.0
1981	73.1	3.″?	4.1	11.2	"7.2	0.5	0.3	0.0
1982	73.9	3.6	3.9	10.8	6.9	0.5	0.3	0.0
1983	74.6	3.5	3.8	10.5	6.7	O*5	0.3	0.0
1984	75.3	3.4	3.7	10*2	6.5	0.6	0.3	0.1
1985	75.8	3.4	3.6	9.9	6.4	0.6	0.3	0.1
]986	75.7	3.5	3.6	9*8	6.3	0.6	003	0.1
1987	75*7	3.6	3.6	9.8	6.3	0.6	0.3	0.2
1988	75.6	3.8	3.5	9.7	6.2	0.7	0.3	0.2
1989	75.5	3.9	3.5	9.6	6.2	().7	0.3	0.3
1990	75.2	400	3.5	9.6	6.1	047	0.5	0.4
1991	75.1	4.1	3.5	9.5	6.1	0.7	O*5	0.5
1992	74*9	4.2	3.4	9.4	6.0	0.8	0,5	0.7
1993	74.6	4.4	3*4	903	6.0	0.8	O*5	1*0
1994	74.3	4.5	3.4	9.2	5.9	0.8	0.5	1.4
1995	73.9	4.6	3.3	9.1	5.9	0.8	0.5	1.9
1996	73.3	4.7	3.3	9.(-)	5.8	0.8	O*5	2.5
1997	72. S	4.8	3.2	8.9	5.7	O*9	0.5	3.5
1998	71.5	4.9	3.2	8.7	5.6	0.9	0.5	4.7
1999	70.1	5.0	3.1	8.5	5.5	0.9	0,5	6.4
2000	68.3	5.0	3.0	8.3	5.3	0.9	0.5	8.7

TABLE 3.123

PROJECTED HARVESTING ACTIVITY
SHELIKOF STRAIT TRADITIONAL FISHERIES 1980-2000

Year	Catch: Weight: Pounds (millions)	Catch: Weight: Metric Tons	Catch: Value (millions): Nominal	Catch: Value (millions): Real[1]	Exvessel Price ($/Pound): Nominal	Exvessel Price ($/Pound): Real	Number of: Boats	Number of: Landings	Number of: Fishermen	Catch per Boat: Pounds (1000)	Catch per Boat: Real Value ($1000)
1980	33.3	15091	23.6	23.6	0.71	0.71	449	4353	1638	74	53
1981	34.1	15459	24.8	23.5	0.73	0.69	449	4488	1638	76	52
1982	35.0	15855	27.1	24.4	0.78	0.70	449	4626	1638	78	54
1983	35.9	16281	28.6	24.3	0.80	0.68	449	4766	1639	80	54
1984	36.9	16739	31.1	25.1	0.84	0.68	449	4907	1639	82	56
1985	38.0	17258	33*3	25.5	0.87	0.67	451	5053	1649	84	56
1986	38.3	17367	35.5	25.7	0.93	0.67	453	5084	1660	85	57
]987	38.5	17478	37.4	25.7	0.97	0.67	455	5114	1670	85	57
1988	38.8	17593	39.9	26.()	1.03	0.67	457	5145	1681	85	57
1989	39.0	17710	42.3	26.1	1.08	0.67	459	5176	1693	85	57
1990	40.0	18147	45.4	26.6	1.13	0.66	462	5220	1707	87	58
1991	4n.3	18270	48.3	26.8	1.20	0.67	464	5251	1719	87	58
1992	40.6	18396	51.6	27.1	1.27	0.67	466	5282	1732	07	58
1993	40.8	18525	55.1	27.5	1.35	0.67	468	5313	1746	87	59
1994	41.1	18658	58.9	27.8	1.43	0.68	471	5344	1759	87	59
1995	41.4	18794	63.0	28.2	1.52	0.68	473	5375	1774	88	60
1996	41.7	18933	67.6	28.7	1.62	0.69	476	5405	1789	88	60
1997	42.1	19076	72.4	?9.2	1.72	0.69	478	5436	1804	88	61
1998	42.4	19224	77.8	29.7	1.84	0.70	481	5466	1820	88	62
1999	42.7	19375	83.5	30.2	1.96	0.71	484	5497	1837	88	62
2000	43.1	19530	89.8	30,8	2.09	0.72	487	5526	1854	88	63

[1]The real values and prices are in terms of 1980 dollars.

TABLE 3.124

PROJECTED CUMULATIVE PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT TRADITIONAL FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	2.4	-0.3	2.7	-2.7	0.0	3*1	0.0	2.4	-0.3
1982	501	3.2	9.4	-1*7	0.1	6.3	0.0	5.0	3.2
1983	7*9	3.1	12.2	-4,4	O*I	9.5	0*1	7.8	3.0
1984	10*9	6.4	18.8	-4.1	0.1	12.7	0.1	10.8	6.2
1985	14.4	7.9	23.3	-5.6	0.5	16.1	0.7	13.8	7.4
1986	15.1	9.0	30.6	-5.2	0.9	16.8	1.3	14.0	8.0
1987	15.8	9.0	36.9	-5.9	1.4	17.5	2.0	14.3	7.6
1988	16.6	10.1	45.0	-5.5	1.8	18.2	2.7	14.5	8.2
1989	17.4	10.6	52.6	-5.7	2.2	18.9	3.4	14.8	8.2
1990	20.3	12.7	60.0	-6.3	2.9	19*9	4.2	16.9	9.5
1991	21.1	13.6	69.1	-6.1	3.3	20.6	500	17*1	9.9
1992	21.9	15.0	79,4	-5.6	3.8	21.3	5.8	17.4	10.8
1993	22.8	16.4	90.1	-5.2	4.4	22.1	6.6	17.6	11*5
1994	23.6	18.0	102.0	-4.5	4.9	22*8	7.4	17.9	12.5
1995	24.5	19*7	114.6	-3*9	5.4	23.5	8.3	18.1	13.5
1996	25.5	21.6	128.3	-3.1	6.()	24.2	9.2	18.4	14.7
1997	26.4	23.6	142.9	-2.2	6.6	24.9	10.2	18.6	15.9
1998	27.4	25.8	158.8	-143	7.2	25.6	11.1	18.8	17.3
1999	28.4	28*1	175.9	-0,3	7.8	26.3	12.2	19.0	18.7
2000	29.4	30.5	194.3	0.9	8.5	27,0	13.2	19.3	20.3

TABLE 3.125

PROJECTED ANNUAL PERCENTAGE CHANGE IN HARVESTING ACTIVITY
SHELIKOF STRAIT TRADITIONAL FISHERIES
1981-2000

Year	Catch		Exvessel Price		Number of			Catch per Boat	
	Weight	Real Value	Nominal	Real	Boats	Landings	Fishermen	Weight	Real Value
1981	2.4	-().3	2.7	--2.7	0.0	3.1	0.0	2.4	-0.3
1982	2.6	3*5	6.5	1.0	0.0	3.1	0.0	2.5	3.5
1983	2.7	-0.1	2.6	-2.8	O*O	3.0	0.0	2*7	-0.2
1984	2.8	3.2	5.9	0.3	0.0	3*O	0.0	2.8	3,1
1985	3.1	1..5	3.8	-1.6	0.4	3.0	0,6	2.7	1.1
1986	0.6	1.0	5.9	0.4	0.4	0.6	0.6	0.2	0.6
1987	0.6	-0.0	4.8	-0.7	O*4	0.6	0.6	0.2	'-0.4
1988	0.7	1.0	5.9	0.4	0.4	0.6	0.7	0.2	0.6
1989	0.7	0.5	5.3	-O*2	0.4	0.6	0.7	0.2	0.0
1990	2.5	1.8	4.9	-0.6	0.6	O*9	0.8	1*8	1.2
1991	0.7	0.8	5.7	0.2	0.5	0.6	0.7	O*2	0,4
1992	0.7	1.3	6.1	0.6	0,5	0.6	0.7	0.2	0.8
1993	0.7	1.2	.5.0	0.4	0.5	0.6	0.8	0.2	0.7
1994	0.7	1.4	6.2	0.7	0.5	0.6	0.8	0.2	0.9
1995	0.7	1.4	6.2	0.7	0.5	0.6	0.8	0.2	0.9
1996	0.7	1.6	6.4	0.8	0.5	0.6	0.8	O*2	1.1
1997	0.8	1.6	6,4	0.9	0.6	0.6	0.9	0.2	1*1
1998	0.8	1.8	6.5	1.0	0.6	0.6	0.9	0.2	1.2
1999	0.8	1.8	6*6	1.0	0.6	0.6	0.9	O*2	1.2
2000	0.8	1*9	6.7	1.1	0.6	0.5	0.9	0.2	1.3

measured in terms of the weight or value of catch (see Tables 3.126 and 3.127). The projected changes in the relative number of boats, landings, or fishermen among the traditional fisheries are minor (see Tables 3.128 through 3.130).

As is mentioned in Chapter II, the summation of the number of fishermen or boats over all fisheries results in double counting since a fisherman or boat is counted once for each fishery which is participated in. The method used to reduce this problem is discussed in Chapter II; the results of this adjustment to reduce double counting are presented in Tables 3.131 and 3.132. These tables include adjusted and unadjusted projections of the numbers of boats and fishermen participating in the harvesting sector of the Shelikof Strait commercial fishing industry.

Local Participation

Local participation in the harvesting sector of the commercial fishing industry is demonstrated by the number of commercial fishermen from each community in Shelikof Strait (see Table 3.133) and by Commercial Fisheries Entry Commission estimates of the gross earnings of Kodiak Island fishermen (see Table 3.134). The measure of local participation in the Shelikof Strait fisheries is discussed in Chapter II; Tables 3.135 and 3.136 present the resulting local harvesting effort factors for Shelikof Strait and Kodiak. Table 3.137 contains gear permit data for individual communities of Shelikof Strait.

TABLE 3.126

PERCENTAGE OF CATCH BY WEIGHT
FOR TRADITIONAL SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	32.1	4.6	9.1	28.9	22.7	0.5	2.1
1981	33.7	4.5	8.9	28.2	22.2	0.5	2.1
1982	35.3	4.4	8.7	?7.5	21.6	O*5	2.0
1983	37.0	4.3	8.5	26.7	21.1	().5	2.0
1984	38.7	4.2	8.2	26.0	20.5	0.5	109
1985	40.3	4.2	8.0	25.2	19”9	0.5	1.8
1986	40.5	4*3	7.9	25.1	1907	0.6	1.8
1987	40.7	4.5	7.9	24.9	19.6	0.6	1.8
1988	40.9	4.6	7./3	24.8	19.5	0.6	1.8
1989	41.1	4.8	7.8	24.6	19.4	0.6	1.8
1990	40.5	4.8	7.6	24.0	18.9	0.7	3.5
1991	40.7	5.0	7.5	23.8	18.8	0.7	3.5
1992	40.9	5.1	7.5	23.7	]8.6	0.7	3.5
1993	41.1	5.3	7.4	23.5	18.5	0.8	3.4
1994	41,2	5.5	7.4	23.3	18.4	0.8	3.4
1995	41.4	5.6	7.3	23.2	18.2	0.8	3.4
1996	41.6	5.8	7.3	23.0	18.1	0.9	3.4
1997	41.8	6.0	7.2	22.$	18.0	0.9	3.3
1998	41.9	6.2	7.2	22.7	17.8	0.9	3.3
1999	42.1	6.4	7,1	22.5	17.7	1*O	3*3
2000	42.3	6.5	7.1	22.3	17.6	1.0	3.3

TABLE 3.127

PERCENTAGE OF VALUE
FOR TRADITIONAL SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	27.7	5.2	2.6	51.3	12.0	0.5	0.7
1981	29.8	5.4	2.6	46.0	14.9	O*5	O*7
1982	31.5	5*3	2.5	46.5	13.0	0.5	0.7
1983	34.1	5.4	2.6	43.2	1305	0.6	0.7
1984	36.0	5.3	2.5	42.7	12*1	0.6	0.7
1985	38.5	5.5	2.5	40.0	12.1	().6	0.7
1986	39.1	5.8	2.5	39.8	1.1.4	0.7	(-).7
1987	40.1	6.1	2.5	3a.4	11.4	0.7	0.7
1988	4(-).7	6.4	2.5	38.0	10.9	0.7	0.7
1989	41.6	6.7	2.5	36.9	10.8	O*8	0.7
1990	42.0	6.9	2.5	36.0	1(-).3	0.8	1.5
1991	42.8	7.2	2.5	35.1	10.2	0.9	1*5
1992	43.4	7*4	2.5	34*5	9.0	O*9	1.5
1993	44.1	7.7	2.5	33*6	9.6	0.9	1.5
1994	44.8	-?.9	2.5	3300	9.4	1.0	1.4
1995	45.4	8.2	2.5	32.2	9.2	1.0	1.4
1996	46.1	8.5	2.5	31.6	8.9	1.1	1.4
1997	46.7	8.7	2.4	30.9	8.7	1.1	1*4
1998	47.3	9.0	2.4	30.3	U*5	1*2	1*4
1999	47.8	9.2	2,4	29.7	8.3	1.2	1.4
2000	48.4	9.4	2.4	29.1	8.1	1.2	1.4

TABLE 3.128

PERCENTAGE OF BOATS
FOR TRADITIONAL SHELIKOF STRAIT FISHERIES 1930-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	54.4	9.3	13.6	14.3	7.6	0.7	0.2
1981	54.4	9.3	13.5	14.3	7.6	0.7	0.2
1982	54.4	9.3	13.5	14.3	7.6	0.8	0.2
1983	54.3	9.3	13.5	14.3	7.6	0.8	0,2
1984	54.3	9.3	13*5	14.3	7.6	0,8	0.2
]985	54.1	9.6	13.5	14.3	7.5	0.8	O * 2
1986	53.9	9.9	13.4	14.2	7.5	O*9	0.2
1987	53.7	10.3	13.4	14.1	7.5	O*9	0.2
1988	53.5	10.6	1.3.3	14.1	7.4	0.9	0.2
1989	53.2	11.0	13.3	14.0	7.4	1.0	O*2
1990	52.9	11.3	13.2	13.9	7.4	1*O	0.3
1991	5?.6	11.7	13*1	13.9	7.3	1.0	0,3
1992	52.4	12.1	13.1	13.8	7.3	1.0	0.3
1993	52.1	12.5	13*0	13.7	7.3	191	0.3
1994	51.9	12.9	12.9	13.7	7.2	1*1	0.3
1995	51.6	13.3	12.9	13.6	7.2	1.1	0.3
1996	51.3	13.8	12.8	13.5	7.2	1.1	0.3
1997	51.0	14.2	12.7	13*4	7.1	1.1	O*3
1998	50.7	14.7	12.6	13.4	7.1	1*2	0.3
1999	50.4	15.2	12*6	13*3	7.0	1*2	0.3
2000	50.1	15.6	12.5	13.2	7.0	1.2	0.3

TABLE 3.129

PERCENTAGE OF FISHERMEN
FOR TRADITIONAL SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	55.0	15.2	11.1	1'1.8	6.2	().5	0.1
1981	55.()	15.2	11.1	11.8	6.2	0.5	0.1
1982	55.0	15.2	11.1	11.8	6.2	0.5	0.1
1983	55.0	15.2	11.1	11.8	6.2	0.5	0.1
1984	55.0	15.2	11.1	11.8	6.2	0.6	(-)*1
1985	54.6	15.7	11.1	11.7	6.2	0.6	O*1
1986	54*3	16.2	11.0	11.6	6.1	0.6	0.1
1987	53*9	16,7	10.9	11.5	6.1	0.6	0.1
1988	53.6	17.3	10.8	11.5	6.1	0.6	0.1
1989	53,2	17.8	10.8	11.4	6.0	0.6	0.1
1990	52.8	18.4	10.7	11.3	6.0	().7	0.3
1991	52.4	in.9	10.6	11*2	5.9	0.7	0.2
1992	52.0	19.5	10.5	11.1	5*9	0.7	0.2
1993	51.6	20.1	10.4	11.0	5.8	0.7	0.2
1994	51.2	20.7	10.4	11.0	5.8	0.7	0.2
1995	50.8	21.3	10.3	10.9	5.8	O*7	0.2
1996	5(-)*4	22.0	10.2	10.8	5.7	O*7	0.2
1997	49.9	22.6	1001	10.7	5.7	0.8	0.2
1998	49.5	23.3	10.0	10.6	5.6	0.8	0.2
1999	49.0	24.0	9.9	10.5	5.6	0.8	0.2
2000	48.6	24.7	9,8	10.4	5.5	0.8	0.2

TABLE 3.130

PERCENTAGE OF NUMBEROF LANDINGS
FOR TRADITIONAL SHELIKOF STRAIT FISHERIES 1980-2000

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp
1980	72.3	3.8	4.2	11*5	7*4	O*S	0.3
1981	73.1	3.7	4.1	11.2	7.2	0.5	003
1982	73.9	3.6	3.9	10.8	6.9	0.5	0.3
1983	74.6	3.5	3.8	10.5	6.7	0.5	0.3
1984	75.3	3*4	3,7	10.2	6.6	0.6	0.3
1985	75.9	3*4	3.6	9.9	6.4	0.6	0.3
1986	75.8	3.5	3.6	9.9	6.3	0.6	0.3
1987	75.8	3.6	3.6	9.8	6.3	0.6	0.3
1988	75.8	3.8	3,5	9.7	6.2	O*7	0.3
1989	75.8	3.9	3*5	9*7	6.2	0.7	0.3
1990	75. S	4.0	3.5	9.6	6.2	O*7	0.5
1991	75.5	4.1	3.5	9.5	6.1	0.7	0.5
1992	75.4	4*3	3.5	9.5	6.1	0.8	0.5
1993	75.4	4.4	3*4	9.4	6.1	0.8	0.5
1994	"75.3	4.5	3*4	9.4	6.0	0.8	0.5
1995	75.3	4.7	3.4	9.3	6.0	0.8	0.5
1996	75.2	4.8	3.4	9.3	5.9	0.9	0.5
1997	75.1.	5.0	3.4	9.2	5.9	0.9	0.5
1998	75.0	5.2	3.3	9.2	5.9	0.9	0.5
1999	74.9	5.3	3.3'	9.1	5.8	0.9	0.5
2000	74.8	5.5	3.3	9.1	5.8	1*O	0.5

TABLE 3.131

ADJUSTED PROJECTIONS OF THE NUMBER OF BOATS
FOR THE SHELIKOF STRAIT COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES Unadjusted	SALMON FISHERIES Adjusted	SHELLFISH FISHERIES Unadjusted	SHELLFISH FISHERIES Adjusted	TRADITIONAL FISHERIES Unadjusted	TRADITIONAL FISHERIES Adjusted
1980	244.1	241.7	102.1	71.4	448.6	354.7
1981	244.1	241.7	102.3	71.5	448.8	354.8
1982	244.1	241.7	102.5	7].7	449.0	354.9
1983	244,]	241.7	102.6	71.8	449.1	355.1
19$4	244, 1	241.7	102.8	71.9	449.3	355.2
1985	244.1	241.7	102.9	72.0	451.0	356.9
1986	244.1.	?41.7	103.1	72.1	452.8	358.6
1987	244.1	241.7	103.2	72.2	454,7	360.5
1988	244.1	241.7	103.4	72.3	456.6	362.4
1989	244.1	241.7	103.5	72.4	458.6	364.3
1990	244.1	241.7	104*4	73.0	461.5	366.9
1991	244.1	241.7	104.6	73*1	463.7	369.0
1992	244.1	241.7	104.7	73.2	465.9	371,2
1993	244*1	?41."7	104.8	73.3	468.2	373*4
1994	244.1	241.7	105.0	73.4	470.6	375.8
1995	244.1	241,7	105.1	73.5	473.0	378.2
1996	244.1	241.7	105.2	73.6	475.6	380.7
1997	244.1	?41.7	105.4	73.7	478.3	383.4
1998	244.1	241.7	105.5	73.8	481,0	386.1
1999	244.1	241.7	105.6	73.9	483.9	388.9
2000	244.1	241.7	105.8	74.0	486.8	391.8

TABLE 3.132

ADJUSTED PROJECTIONS OF THE NUMBER OF FISHERMEN
FOR THE SHELIKOF STRAIT COMMERCIAL FISHING INDUSTRY 1980-2000

Year	SALMON FISHERIES		SHELLFISH FISHERIES		TRADITIONAL FISHERIES	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
1980	900.8	891.9	304.6	213.0	1637.6	1354.7
1981	900.8	891.9	305.0	213.3	1638.0	1355.0
1982	900.8	891.9	305.5	213.6	1638.4	1355.3
1983	900.8	891.9	305.8	213.9	1638.9	1355.5
1984	9(-)(-).8	891.9	306.2	214.1	1639.2	1355.8
1985	900.8	891.9	306.6	214.4	1649.2	1365.7
1986	900.8	891.9	307.0	214.7	1659.5	1375.9
1987	900.8	891.9	307.3	214.9	1670.2	1386.5
1988	900.8	891.9	307.7	215.1	1681.4	1397.5
1989	900.8	891.9	308.0	215.4	1692.9	1409.0
1990	900.8	891.9	310.5	217.1	1707.0	1422.3
1991	90(-).8	891.9	310.8	217.4	1719.4	1434.6
1992	900.8	891.9	31102	217.6	1732.2	1447.4
1993	900.8	891.9	311.5	217.8	1745.6	1460.6
1994	900.8	891.9	311.8	218.1	1759.4	1474.3
1995	900.8	891.9	312.1	218.3	1773.8	1488.6
1996	900.8	891.9	312.5	218.5	1788.7	1503.4
1997	900.8	891.9	312.8	218.7	1804.1	1518.8
1998	900.8	891.9	313.1	219.0	1820.2	1534.7
1999	900.8	891.9	313*5	219.2	1836.8	1551.2
2000	900.8	89].9	313.8	219.4	1854.1	1568.4

TABLE 3.133

NUMBER OF COMMERCIAL FISHERMEN BY COMMUNITY[1], 1969-1976

	1969	1970	1971	1972	1973	1974	1975	1976
Kodiak	631	783	789	755	817	901	843	1,120
Larsen Bay	24	29	22	21	22	26	35	32
Port Bailey	0	0	0	2	0	3	4	2
Port Wakefield	2	0	1	1	1	1	0	0
Port Williams	0	0	0	1	0	1	2	2
Uganik Bay	1	0	1	1	0	0	0	1
Uyak Bay	0	0	0	1	0	1	0	1
Zachav Bay	0	0	0	0	0	0	0	1

Source: Commercial Fisheries Entry Commission, commercial license file.

[1]The number of commercial fishing license applicants listing each community as a home address.

TABLE 3.134

ESTIMATED GROSS EARNINGS OF KODIAK FISHERMEN 1969 - 1976

YEAR	NUMBER OF GEAR OPERATORS	ESTIMATED GROSS EARNINGS
1969	502	$10,912,000
1970	511	11,825,000
1971	420	9,135,000
1972	521	12,120,000
1973	526	23,427,000
1974	531	24,554,000
1975	526	18,529,000
1976	629	38,817,000

Source: Alaska Commercial Fisheries Entry Commission, Distribution of Income from Alaska Fisheries, July, 1978.

TABLE 3.135

LOCAL HARVESTING FACTOF? FOR SHELIKOF STRAIT AREA, 1976

Kodiak:	LPO	TP	P	P = I PO/TP
Herring, purse seine	1	NA		
Herring, set gill net	-0-	NA		
King crab, small boat pots	-0-	169	-0-	
King crab, large boat pots	-0-	180	-0-	
Salmon, purse seine	11	394	.043	
Salmon, beach seine	9	23	.391	
Salmon, set gill net	17	187	.091	

P = [(PF/TP) . LPO]/B

Statewide	PF	TP	LPO	B	P
Halibut, hand troll	1	43	-0-		
Halibut, small boat long line	95	1,323	4	133	.002
Halibut, large boat lone line	256	1,112	5	43	.027
Dungeness crab, small boat pots	43	240	-0-	1	-0-
Dungeness crab, large boat pots	12	43	-0-	3	-0-
Herring, pound		6	-0-		
Herring, purse seine	12;	251	-0-	1	-0-
Herring, beach seine	NA	13	-0-		
Herring, drift gill net			-0-		
Herring, set gill net	109	249	-0-		
Herring, roe on kelp	407	1,529	-0-		
Bottomfish, hand troll	NA	10	-0-		
Bottomfish, small boat long line	3	66	-0-	15	-0-
Bottomfish, large boat long line	8	59	-0-	6	-0-
Bottomfish, otter trawl	12	40	-0-	29	-0-
Bottomfish, beam trawl	NA	6	-0-		
Bottomfish, small boat pots	1	7	-0-	2	-0-
Shrimp, otter trawl	129	218	-0-	67	-0-
Shrimp, beam trawl	22	69	-0-	10	-0-
Shrimp, small boat pots	33	281	-0-		
Shrimp, large boat pots	4	30	-0-		
Razor clams, shovel	8	174	-0-		
Razor clams, dredge	NA	5	-0-		
Salmon, hand troll	1,239	2,746	-0-		
Salmon, power troll	742	999	-0-		
Tanner crab, small boat pots	166	295	-0-	32	-0-
Tanner crab, large boat pots	224	341	-0-	75	-0-
Scallops, dredge	NA	NA	-0-	1	

Source: ADF&G and CFEC data files.

P = Estimate of the proportion of fishing effort that is local
LPO = Number of local permit owners
TP = Total number of permits
PF = Number of permits fished
B = Number of boats participating in the fishery

TABLE 3.136

LOCAL HARVESTING FACTOR FOR KODIAK, 1976

Kodiak:	LPO	TP	P	P = LPO/TP
Herring, purse seine	-0-	NA		
Herring, set gillnet	-0-	NA		
King crab, small boat pots	108	169	.639	
King crab, large boat pots	101	180	.561	
Salmon, purse seine	194	394	.492	
Salmon, beach seine	11		.478	
Salmon, set gillnet	?16	1;?	.620	

P = [(PF/TP) . LPO]/B

Statewide	PF	TP	LPO	B	P
Halibut, hand troll	1	43	-0-		
Halibut, small boat longline	95	1,323	103	133	.056
Halibut, large boat longline	256	1,112	43	43	.230
Sablefish, large boat longline	NA	NA	-0-		
Dungeness crab, small boat pots	43	240	7	1	1.0*
Dungeness crab, large boat pots	12	43	13	3	1.0*
Herring, pound	3	6	-0-		
Herring, purse seine	129	251	27	1	1.0*
Herring, beach seine	NA	13	-0-		
Herring, drift gillnet			1		
Herring, set gillnet	109	249	3		
Herring, roe on kelp	407	1,529	9		
Bottomfish, hand troll	NA	10	-0-		
Bottomfish, small boat longline	3	66	2	15	.006
Bottomfish, large boat longline	8	59	3	6	.068
Bottomfish, otter trawl	12	40	16	29	.166
Bottomfish, beam trawl	NA	6	-0-		
Bottomfish, small boat pots	1	7	-0-		0
Bottomfish, other			1	-;-	
Shrimp, otter trawl	129	218	86	67	.760
Shrimp, beam trawl	22	69	23	10	.733
Shrimp, small boat pots	33	281	7		
Shrimp, large boat pots	4	30	8		
Razor clams, shovel	8	174	8		
Razor clams, dredge	NA	5	-0-		
Razor clams, other			-0-		
Salmon, hand troll	1,239	2,746	2		
Salmon, power troll	742	999	2		
Tanner crab, small boat pots	166	295	62	32	1.0*
Tanner crab, large boat pots	224	341	92	75	.806
Scallops, dredge	NA	NA	-0-	1	

*P = 1 when calculated value exceeds 1
P = Estimate of the proportion of fishing effort that is local
LPO = Number of local permit owners
TP = Total number of permits
PF = Number of permits fished
B = Number of boats participating in the fishery

Source: ADF&G and CFEC data files

TABLE 3.137

SHELIKOF STRAIT AREA COMMERCIAL FISHING PERMITS, BY COMMUNITY, 1976

Type of Permit (Species, Gear, Mgmt. Area)	Karluk	Larsen Bay	Port William
Salmon, Purse Seine, Kodiak	9	7	1
Salmon, Beach Seine, Kodiak	5	3	1
Salmon, Set Gill Net, Kodiak		12	5
Salmon, Drift Gill Net, Bristol Bay		1	
Herring, Purse Seine, Statewide	1		
Halibut, Long Line, Vessel < 5 Net Tons, Statewide	1	3	
Halibut, Long Line, Vessel ≥ 5 Net Tons, Statewide	3	2	
Number of Permit Owners	13	22	6

Source: Commercial Fisheries Entry Commission Permit Files.

In the study area, fishing boats that are large enough to require moorage facilities typically operate out of small boat harbors; therefore, one determinant of a community's involvement in the harvesting sector of the commercial fishing industry is its small boat harbor activity. The following section describes small boat harbor facilities utilized by the fishing boats that participate in the Shelikof Strait fisheries.

Small Boat Harbors

Shelikof Strait Area.

There are no regular small boat harbor facilities in the Shelikof Strait area. The City of Kodiak maintains the only formal small boat harbor within the general area, and is the base of many vessels fishing between the Alaska Peninsula and Kodiak Island.

City of Kodiak.

The Kodiak small boat harbor contains stalls for 226 assigned vessels and additional space for transient vessels. In 1977, nearly 1,400 vessels registered to use the harbor on a permanent or transient basis, and 372 vessels were on a waiting list for permanent moorage. Over-crowding of the facility is believed to hamper overall growth of the Kodiak commercial fishing industry and it creates an extremely dangerous fire hazard since, due to the crowding, one vessel cannot be quickly separated from others.

A new harbor is planned in Dog Bay at Near Island, very near the present harbor. It will be about five times larger than the present harbor and contain at least 500 slips. Special efforts will be directed at developing adequate storage and staging areas needed by the larger, more versatile vessels which are becoming increasingly common in Alaska's fishing fleet. The present harbor facility will be maintained and operated in conjunction with the new harbor. Construction of the new harbor will begin in 1980 and be completed in two years if this project is not further delayed by funding and design problems.

The availability of small harbor facilities or the lack of such facilities is, in part, explained by the nature of the boats which operate in an area. The following section contains a brief description of the boats that participated in the Shelikof Strait fisheries.

Fishing Boats

Several types and sizes of fishing boats are found working in the Shelikof Strait-Kodiak area. Salmon harvested within the area are caught by seines or set gill nets. Set gill nets and beach seines can be adequately tended with a skiff, whereas purse seining requires a seaworthy vessel that can withstand the adverse weather conditions often encountered in Shelikof Strait. Seiners up to the Alaska limit of 17.7 meters (58 feet) fish in the area, and boats of 4.9 to 10.7 meters (16 to 35 feet) long are used by gill netters and beach seiners.

Crab and shrimp boats fishing in Shelikof Strait range from 11.6 to 39.o meters (38 to 128 feet) in length, and average around 23.2 to 26.2 meters (76 to 86 feet). The larger boats are capable of fishing throughout Alaskan waters, and therefore the larger fishing vessels within the area at any time may represent many communities.

PROCESSING

Although a variety of species have been processed in Shelikof Strait communities, in the most recent years (1976-1979) processing has been limited to salmon. The Shelikof Strait harvest that is not processed in these communities is principally processed in the City of Kodiak. The processing activity in Shelikof Strait communities in 1973 through 1976 is summarized in Table 3.138.

Source of Fish for Processing

Shelikof Strait Area.

Most salmon processed by the plants along Kodiak Island's west side are harvested in the Shelikof Strait area. These plants do not process other species. One plant reported that a small portion of its pack is imported from Bristol Bay, but plants are not expected to increase their reliance on non-locally caught salmon. Many species of fish are harvested in the Shelikof Strait area, and one cannery plans to add freezing capacity and enter into the crab and halibut markets.

TABLE 3.138

SHELIKOF STRAIT PROCESSING, ROUND WEIGHT PROCESSED BY SPECIES, 1973-1976

Year	Salmon	Halibut	Herring	King Crab	Tanner Crab	Dungeness Crab	Shrimp	All
	Round Weight (1,000 Pounds)							
1973	13'97	429	950	740	2196	38	o	5750
1974	2 7 7	168	450	48	Cl	0	12	955
1975	5405	375	15	0	0	0	29	5825
1976	16173	421	0	388	0	0	6	16988
	Percentage of Round Weight							
1973	24,3	7.5	16.5	12*9	38.2	0.7	0	100.0
1974	29*0	17.6	47.1	5.0	0	()	1.2	100.0
1975	92.8	6.4	0.3	0	0	0	0.5	100.0
1976	95.2	2.5	0	2.3	0	0	0.0	100*O

Source: The tables are based on data in the Alaska Department of Fish and Game, Processor Reports with 1978 revisions made by F. L. Orth, J. A. Richardson, S. M. Pidde, in the preparation of Market Structure of the Alaska Seafood Processing Industry, Volume I, University of Alaska, Alaska Sea Grant Program, 78-10, January, 1979.

City of Kodiak.

The City of Kodiak is Alaska’s second largest fishing port in terms of value landed and owes much of its growth to the abundance of fish in local waters. Salmon, shrimp, crab, halibut, and herring, along with other less important species of fish, comprise an extremely diversified local fishery. Fish from other areas of Alaska is also processed in Kodiak. Kodiak-based fishing vessels range over much of the state’s fishing grounds and often deliver to Kodiak processors rather than plants near. the fishing area when they return to Kodiak during fishing period closures.

Shellfish from the Bering Sea and Aleutian chain accounted for a large portion of Kodiak’s processing growth in the early 1970s. Since that time, a number of processing firms have located plants nearer to the more westerly fishing grounds and less of this fish is now delivered to Kodiak. Landings in Kodiak from the western area are now generally limited to those vessels which deliver their last load of a fishing period to Kodiak processors.

Transportation of Processed Fish

Shelikof Strait Area.

Processed fish is transported from the processors to the Seattle area for further marketing distribution. Barges call at the processors and collect truck vans which contain canned salmon. Refrigerated vans are utilized for frozen products. Although most seafood from the Kodiak Island area and western Alaska is sent to Seattle via the City of Kodiak port, some is shipped directly from Kodiak and Unalaska/Dutch Harbor to Japan.

<u>City of Kodiak.</u>

The City of Kodiak has experienced a sizable growth in its port commerce during recent years, due largely to the fishing industry (see Table 3.139). Service to the port has recently become more frequent and additional firms have expressed an interest in providing cargo service to the port. Sealand Freight Services transports the major portion of cargo that passes through the port, but American President Lines (APL) has recently begun calling at the port regularly and provides containerized freight service similar to Sealand's. Both Sealand and APL provide direct shipping of fish products to Japan.

The port facility, which includes three docks, is in relatively good condition since nearly everything was rebuilt following the 1964 earthquake. Pier 1 is used primarily by the state ferry (which calls regularly) and by Chevron to deliver petroleum supplies to the community. Piers 2 and 3 are each 109.8 meters (360 feet) long and serve as the major cargo docks. Pier 3 has a crane designed specifically for containerized freight and therefore is most often used. Perhaps the most noticeable deficiency of the port is its lack of storage and staging area. Additional space has been procured outside of town on which to park overflow truck vans.

TABLE 3.139

PORT USAGE
KODIAK, MASKA, 1960 - 1976[1]

Year	Total Cargo[2] Short Tons	FISH AND FISH PRODUCTS Short Tons	% of Total Cargo	No. of Vessels Using Port[3]
1960	38,289	9,807	25.6	826
1961	39,623	14,830	37.4	1,709
1962	80,267	16,817	21.0	936
1963	73,775	20,861	28.3	1,652
1964	62,285	15,455	24.8	1,461
1965	127,584	23,552	18.5	NA
1966	212,675	58,041	27.3	NA
1967	133,247	36,647	27.5	NA
1968	109,645	24,316	22.2	NA
1969	115,863	20,453	17.7	1,914
1970	124,479	42,128	33.8	3,994
1971	148,444	49,833	33.6	2,699
1972	192,963	48,433	25.1	1,606
1973	236,612	99,952	42.2	8,317
1974	217,024	86,960	40.1	4,379
1975	329,639	104,433	31.7	1,885
1976	388,125	178,122	45.9	321

Source: Department of the Army Corps of Engineers, Waterborne Commerce of the United States, Annual issues, 1960-1976.

1 Includes all waterborne cargo entering and leaving the port.
2 Includes raw fish and any other fish product form entering and leaving the port.
3 Includes commercial fishing vessels, except 1976.

The present facilities are adequate for the port's current level of commerce, and no specific plans have been developed for enlarging or up-grading the facility. However, possible methods of expansion have been discussed and informally investigated to avoid lengthy delays if expansion is eventually necessary. At this time, filling the area between piers 2 and 3 and connecting them to create a single 457.5 meter (1,400 foot) dock appears to be the most probable means of expansion.

Processing Capacity

Shelikof Strait Area.

Only two processing plants are known to be operating on the west side of Kodiak Island. A number of plants have operated along Shelikof Strait over the years, but due to obsolescence, fires, changing processing methods, and other factors, relatively little processing is performed in the area anymore. The plants which are operating are located in Larsen Bay and Uganik Bay.

Both firms process salmon exclusively, and the entire output of both plants is in the canned form. The plants are able to process nearly 317.6 metric tons (700,000 pounds) of fish daily when the machinery works well and enough fish are available to sustain peak operating levels. Operating at this rate, 9,525 metric tons (21 million pounds) of salmon can be processed in 30 days. This level of production is 75 percent greater than the current annual production of 5,445 metric tons (12 million pounds). Since the salmon harvest is projected to increase by 70 percent by the year 2000, it appears that adequate capacity is available.

No recent increase in processing capacity was reported by either plant. However, one firm revealed intentions to add freezing equipment to its present plant. The capacity of the freezing facilities to be installed was not available. The firm hopes to utilize its freezing capability to enter into crab and halibut processing.

City of Kodiak.

Historically there has been excess processing capacity in Kodiak except during peak harvest years. Due to fluctuations in catch from year to year and the relatively short periods during which fish are often received, processing plants typically experience periods of peak operation which are usually offset by intervals of little activity. Many persons within the fishing industry feel that development of the Alaska groundfish fishery will provide processing firms an opportunity to operate more consistently and reduce underutilization of their equipment. The data presented in Table 3.140 indicate that processing capacity should not constrain harvesting or processing activity.

TABLE 3.140

CURRENT PROCESSING CAPACITY AND FORECASTED HARVEST

Species	Current Daily Processing Capacity (pounds/day)	Forecasted Harvest for 2000	Days Required to Process the Year 2000 Harvest with Current Capacity
Salmon	1,890,000	44,667,000	23.6
King Crab	1,390,000	30,000,000	21.6
Tanner Crab	1,490,000	28,000,000	18.8
Shrimp	1,010,000	20,000,000	19.8
Halibut	500,000	8,050,000	16.1

Processing Employment

Shelikof Strait Area.

Processing plants in the area operate very intensely for a short period each summer and stand idle the remainder of the year. It is difficult to find enough local workers who desire such short-term employment, and the labor supply at Larsen Bay and Ugan· k Bay is limited in size. Therefore, both plants import the major· ty of their crews from other Alaskan communities or from the Pacific Northwest. One plant recruits students primarily from the University of Alaska, Fairbanks, to work along with local residents and students. The other firm relies heavily upon students recruited from the Seattle area. Together, the plants employ around 265 processing workers, and estimate that around 85 percent of these laborers are recruited from outside the local communities.

Employment and income data are not readily available for the Shelikof Strait commercial fishing industry. However, based on employment and income data for the food and kindred products industry for the Kodiak area and the proportion of the Kodiak Management Area harvest that comes from Shelikof Strait, rough estimates of processing employment and wages resulting from the Shelikof harvest data can be generated. The data summarized in Tables 3.141 through 3.143 were so generated using annual harvest data. Department of Labor statistics indicate that in the Kodiak area over 90 percent of the employment in the food and kindred products industry is attributable to seafood processing plants.

TABLE 3.141

SHELIKOF STRAIT MONTHLY PROCESSING EMPLOYMENT[1] 1970-1977

Employment

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Ott	Nov	Dec
1970	89	72	127	98	133	204	302	258	134	104	94	110
1971	79	71	77	43	87	125	149	147	110	90	71	66
1972	72	45	5/,	7(-J	119	175	213	227	138	126	108	108
1973	195	173	168	171	206	263	260	271	217	191	209	181
1974	228	229	256	257	225	254	275	306	300	266	246	205
1975	140	184	118	178	255	225	317	356	340	308	274	206
1976	245	292	287	310	342	426	469	581	518	513	412	361
1977	346	400	345	295	272	470	584	598	538	509	432	306

Monthly Employment as a Percentage of Average Monthly Employment

Year	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Ott	Nov	Dec
1970	61.7	50.3	88.6	68.0	92.7	141.9	210.1	179.4	93.1	72.2	65.6	76.4
1971	84.8	75.9	83.3	46.5	94.1	135.1	160.6	158.4	110.1	96.4	76.2	70.7
1972	59.6	37.3	44.7	57.8	98.1	143.8	175.7	186.6	114.0	103.7	89.3	89.3
1973	93.5	83.0	80.3	82.1	98.6	126.1	124.4	129.9	104.0	91.7	99.9	86.6
1974	89.9	90.1	100.9	101.1	88.7	100.1	108.2	120.6	118.1	104.8	96.8	80.8
1975	57.7	76.1	48.7	73.7	105.7	92.9	131.3	147.1	140.8	127.4	113.4	85.1
1976	61.8	73.8	72.4	78.2	86.3	107.5	118.3	146.5	130.7	129.5	104.0	91.0
1977	81.5	94.?	81.4	69.4	64.0	110.8	137.5	140.8	126.8	119.9	101.7	72.1

[1] Based on Kodiak Division Food and Kindred Products.

Source: Alaska Department of Labor, Alaska Statistical Quarterly, 1970-1978.

TABLE 3.142

SHELIKOF STRAIT AVERAGE MONTHLY EMPLOYMENT, 1970-1977[1]

Year	Quarter 1st	2nd	3rd	4th	1st-4th
1970	96	145	231	103	144
1971	76	85	135	75	93
1972	57	121	193	114	121
1973	179	213	249	194	209
1974	238	245	294	239	254
1975	1,47	219	338	262	242
1976	275	359	5?.3	429	396
1977	364	346	573	416	424

Average Monthly Employment by Quarter
Divided by Average Monthly Employment for the Year

Year	Quarter 1st	2nd	3rd	4th	1st-4th
1970	66.9	100.9	160.9	71.4	100.0
1971	81.3	91.9	145.7	81.1	100.0
1972	47.2	99.9	158.8	94.1	100.0
1973	85.6	102.2	119.4	92.7	100.0
1974	93.6	96.6	115.6	94.1	100.0
1975	60.9	90.8	139.8	108.6	10000
1976	69.3	90.6	131.8	108.2	100.0
1977	85.7	81.4	135.0	97.9	100.0

Source: Alaska Department of Labor, Alaska Statistical Quarterly, 1970-1978.

[1] Based on data for the Kodiak Division, Food and Kindred Product Data.

TABLE 3.143

SHELIKOF STRAIT PROCESSING PAYROLLS[1]
1970-1977

Payrol 1

Year	1st Qt.[2]	2nd Qt.	3rd Qt.	4th Qt.	1st-4th Qt.
1970	135614	226821	477069	208277	1047782
1971	123850	163526	299035	137727	724138
1972	93319	218234	410531	215356	937440
1973	280843	432146	560113	421936	1695037
1974	480048	597014	867352	663694	2608108
1975	499996	520667	1002526	716664	273?852
1976	764985	1099271	1752304	1234480	4851040
1977	996240	1075155	2055615	1152163	5279172

Percent of Annual Payroll

Year	1st Qt.	2nd Qt.	3rd Qt.	4th Qt.	1st-4th Qt.
1970	12.9	21.6	45.5	19.9	100.0
1971	17.1	22.4	41.3	19.0	100.0
1972	10.0	23.3	43.8	23.0	100*O
1973	16.6	25.5	33.0	24.9	100.0
1974	18.4	22.9	33.3	25.4	100.CJ
1975	18.2	19.0	36.6	26.2	100.0
1976	15.8	22.7	36.1	25.4	100.0
1977	18.9	20.4	38.9	21.8	100.0

Average Salary (Payroll/Employment)

Year	1st Qt.	2nd Qt.	3rd Qt.	4th Qt.	1st-4th Qt.
1970	1411	1564	2063	2029	7289
1971	1639	1915	2209	1828	77Q4
1972	1630	1800	2130	1885	7724
1973	1571	2024	2246	2179	8118
1974	2020	2434	2955	2778	10274
1975	3400	2373	2968	2730	11337
1976	2783	3060	3353	2879	12238
1977	2740	3112	3586	2772	12436

Source: Alaska Department of Labor, Alaska Statistical Quarterly, 1970-1978.

[1] Based on data for the Kodiak Division, Food and Kindred Product Data.

‘Qt. = Quarter.

Processing Plant Utilities

Shelikof Strait Area.

Fish processing plants operating on the west side of Kodiak Island are self-sufficient in terms of utilities, as the local communities do not have central systems. Electricity is generated by individual plants, and water is drawn from nearby streams. One plant draws water from a small reservoir created by damming a stream. Adequate quantities of water are available for processing purposes, and electric generating capacity can be altered rather quickly by the individual plants.

Processing waste is disposed of by grinding and discharging into the bay adjacent to a plant or dumping in deep water. Both methods are acceptable under Environmental Protection Agency (EPA) regulations, and there is currently no indication that the EPA will alter its stance.

City of Kodiak.

The community of Kodiak receives its electricity from a diesel-powered generating plant operated by Kodiak Electric Association (KEA). The plant has a nameplate capacity of almost 25 megawatts, but due to the deterioration of the equipment with age it has a realistic capacity of around 20-22 megawatts when all equipment is working properly. With allowances for normal maintenance downtime, only-18 megawatts can be sustained for prolonged periods.

Fish processing has accounted for a significant portion of the community's total power consumption for many years, but its portion of the total has slowly decreased over the past decade. This has occurred in spite of the change by processors to freezing fish rather than canning, indicating that the remainder of the community has increased its consumption at an even faster pace.

KEA has a major hydroelectric project planned at Terror Lake that will add 30 megawatts to the system's capacity upon completion. The project is in the advanced planning stage and could be completed late in 1983 at the earliest. However, progress was recently stopped due to a decision by the U.S. Fish and Wildlife Service that the project may adversely affect brown bears. KEA presently has no contingency plan for substantially enlarging its generating capacity if the hydro project is not allowed, and will be forced to maintain its costly diesel generating system.

Kodiak's water system is comprised of several lakes and reservoirs with a total capacity of around 1.1 billion liters (300 million gallons). The system is currently used to its practical capacity and can be severely stressed under winter freezing and summer drought conditions.

A small dam on Monashka Creek creates a reservoir which provides some of the community's water. The city desires to construct a much larger dam on the creek very near the present dam to create a 1.9 billion liter (500 million gallon) reservoir. The new reservoir would allow the city to discontinue use of smaller, less efficient water sources. The design of the dam will accommodate enlargement to eventually store 26.5 billion liters (7 billion gallons) of water if ever needed.

Before the new dam can be constructed, permission must be obtained from the Native corporation which controls the dam site. Negotiations have not yet obtained this permission, but indications are that the project will probably be allowed. If Kodiak is not allowed to construct the dam, enlargement of the currently-used reservoirs appears to be the most likely alternative.

Fish processors in Kodiak rely upon a local reduction plant, Bio-Dry, Inc., for disposal of processing waste. Bio-Dry collects processing waste from local seafood plants and produces products such as livestock feed additives and fertilizers. To ensure a continued method of disposing of waste, the fish processing firms subsidize Bio-Dry whenever its earnings fall below a previously agreed-to level. Use of this system eliminates the need for processors to discharge waste into the local bay or to use the city's sewage treatment system to dispose of processing waste. Also, operation of the reduction plant assures continued compliance with Environmental Protection Agency (EPA) regulations.

Projected Processing Activity

The projections of processing plant activity presented in these sections are based on the projected harvest of the Shelikof Strait commercial fishing industry discussed in a previous section. The measures of activity are in terms of processing plant input requirements and processing plant payrolls. Due to the great uncertainty that exists with respect to both the rate at which the groundfish industry will develop and the rate at which input requirements per unit of output will change, the input requirements for the traditional species are projected with and without increased processing efficiency and separate projections of the groundfish processing requirements are presented.

Traditional Species, Electric Power and Water.

In the absence of increased processing efficiency, processing plant usage of electric power and water is projected to increase by 29.4 percent between 1980 and 2000, and the highest annual rate of growth in usage is not expected to exceed 3.1 percent (see Table 3.144). Assuming a 2 percent annual increase in processing efficiency, processing plant usage of electric power and water is expected to decrease by 13.6 percent during the forcast period, and the annual rate of growth is expected to generally be less than zero and not to exceed 1.0 percent.

Traditional Species, Employment and Income.

Average monthly employment in Kodiak area processing plants resulting from Shelikof Strait harvesting activity is projected to increase from 424 in 1980 to approximately 550 in 2000 if processing efficiency does not increase or to decrease to 366 if processing efficiency increases by 2 percent a year (see Table 3.145). The corresponding changes for the period as a whole are 29.4 percent and -13.6 percent. Annual real payrolls or income are projected to increase from $6.5 million in 1980

TABLE 3.144

PROJECTED PERCENTAGE INCREASE IN SHELIKOF STRAIT PROCESSING INPUT REQUIREMENTS
1980-2000

Year	Without Increased Efficiency		With Increased Efficiency	
	Cumulative Change	Annual Change	Cumulative Change	Annual Change
1980	0	0.0	0	0.0
1981	2.4	2.4	0.4	0.4
1982	501.	2.6	0.9	O*5
1983	7.9	2.7	1.5	0.6
1984	10.9	2*8	2.3	0.8
1985	14.4	3.1	3*4	1.0
1986	15.1	0.6	1.9	-1.4
1987	15.8	(3.6	n.5	-1.4
1988	16.6	0.7	-0.8	-1.4
1989	17*4	0.7	-2.2	-1.3
1990	20.3	2.5	-1.7	0.4
1991	21.1	().7	-3.1	-1.3
1992	?1.9	0.7	-4.3	-1.3
1993	22.8	0.7	-5.6	-1.3
1994	23.6	0.7	-6.8	-1*3
1995	24.5	0.7	-8.0	-1.3
1996	25.5	0.7	-9.2	--1*3
1997	26.4	0.8	-10.3	-1.3
1998	27.4	0.8	-11.4	-1*2
1999	28.4	0.8	-1?*5	-1.2
2000	29.4	0.8	-13.6	-102

TABLE 3.145

PROJECTED AVERAGE MONTHLY PROCESSING EMPLOYMENT, SHELIKOF STRAIT TRADITIONAL FISHERIES 1980-2000

	Without Increased Efficiency			With Increased Efficiency		
Year	Employment	Annual Rate of Change	Cumulative Percentage Change	Employment	Annual Rate of Change	Cumulative Percentage Change
1980	424	0	0	424	0	0
1981	436	2.4	2.4	426	0.4	0.4
1982	445	2.6	5.1	428	0.5	0.9
1983	457	2.7	7.9	431	0.6	1.5
1984	470	2.8	10.9	434	0.8	2.3
1985	485	3.1	14.4	438	1.0	3.4
1986	488	0.6	15.1	432	-1.4	1.9
1987	491	0.6	15.8	426	-1.4	0.5
1988	494	0.7	16.6	421	-1.4	-0.8
1989	498	0.7	17.4	415	-1.3	-2.2
1990	510	2.5	20.3	417	0.4	-1.7
1991	513	0.7	21.1	411	-1.3	-3.1
1992	517	0.7	21.9	406	-1.3	-4.3
1993	520	0.7	22.8	400	-1.3	-5.6
1994	524	0.7	23.6	395	-1.3	-6.8
1995	528	0.7	24.5	390	-1.3	-8.0
1996	532	0.7	25.5	385	-1.3	-9.2
1997	536	0.8	26.4	380	-1.3	-10.3
1998	540	0.8	27.4	375	-1.2	-11.4
1999	544	0.8	28.4	371	-1.2	-12.5
2000	549	0.8	29.4	366	-1.2	-13.6

to 10.1 million or $6.8 million in 2000 depending on whether processing efficiency is assumed to remain constant or increase. The corresponding percentage changes for the period as a whole are 56.3 percent and 4.3 percent respectively (see Table 3.146).

Traditional Species, Number of Plants and Land.

The excess capacity which exists for many processing plants will permit the projected level of processing activity to occur without either increasing the number of plants or the amount of land that is used.

Groundfish Processing Plant Input Requirements.

The projections of input requirements for processing groundfish are summarized in Table 3.147. The employment and income projections are summarized in Table 3.148; and the employment and income projections for the traditional species and groundfish are summarized in Tables 3.149 and 3.150.

THE FEASIBILITY OF THE PROJECTED GROWTH

The feasibility of the projected growth of the Shelikof Strait commercial fishing industry is evaluated in this section with respect to the potential limitation set by the availability of inputs. The inputs considered are: small boat harbors, port facilities, labor, electric power, water, land, and processing plant facilities.

TABLE 3.146

PROJECTED ANNUAL PROCESSING PLANT PAYROLLS, SHELIKOF STRAIT TRADITIONAL FISHERIES, 1980-2000

Year	Without Increased Efficiency: Annual Payroll in Real Dollars[1] (1,000)	Without Increased Efficiency: Annual Rate of Change	Without Increased Efficiency: Cumulative Percentage Change	With Increased Efficiency: Annual Payroll in Real Dollars (1 ,000)	With Increased Efficiency: Annual Rate of Change	With Increased Efficiency: Cumulative Percentage Change
1980	6484	()	0	6484	0	0
1981	6705	3.4	3.4	6571	1.3	1.3
1982	6942	3.5	7.1	6667	1.5	2.8
1983	7196	3.7	11.0	6773	1.6	4.5
1984	7468	3.8	15.2	6889	1.7	6.2
1985	7773	401	19.9	7026	2.0	8.4
1986	7896	1.6	21.8	6995	-0.4	7,9
1987	8023	1.6	23.7	6965	-0.4	7*4
1988	8151	1.6	25.7	6935	-0,4	7.0
1989	8283	1.6	27.8	6906	-0.4	6.5
1990	8568	3.4	32.1	7001	1.4	8.0
1991	8708	1..6	34.3	6973	-0.4	7.5
1992	8851	1.6	36.5	6946	-0.4	7.1
1993	8998	1.7	38.8	6920	-0,4	6.7
1994	9148	1.7	41.1	6895	-0.4	6.3
1995	9302	1.7	43.5	6870	-0.3	6.0
1996	9460	1.7	45.9	6$47	-0.3	5.6
1997	9622	1.7	48.4	6825	-0.3	5.3
1998	9788	1.7	51*O	6804	-0.3	4.9
1999	9959	1*7	53*6	6784	-0.3	4.6
2000	101.34	1.8	56.3	6765	-0.3	4.3

[1] 1980 is the base year.

TABLE 3.147

PROJECTED SHELIKOF STRAIT GROUNDFISH INDUSTRY ACTIVITY, 1980-2000

Year	(Metric Tons)	Number of Plants	Processing Employment (Man Years)	Land in (Hectares)	Electric Power (Mil 1 ion KWH/year)	Water (Million 'Gal ions/Year)
1980	33.4	0.0	()*3	0.0	0.0	0.2
1981	47.3	0.0	0*5	0.0	0.0	0.2
1982	67.2	0.0	0*7	0.0	0.0	0.3
1983	95.5	0.0	0.9	0.0	O*CI	0.5
1984	136.1	0.0	1.3	0.0	0.0	0.7
1985	194.2	0.0	1*7	0.0	0.0	1.0
1986	277.5	0.0	2.4	0.0	0.0	1.4
1987	397.2	0.0	3*3	0.0	0.0	2.0
1988	569.6	0.0	4.7	0.0	0.0	2.8
1989	818.3	0.0	6.5	0.0	0.0	4.1
1990	1177.5	0.0	9.1	0.0	0.1	5.9
1?91	1697.2	0.0	12.7	0.0	0.1	8.5
1992	2450.6	0.1	17.8	0.1	0.1	12.3
1993	3544.6	0.1	25.0	0.1	0.2	17.7
1994	5135.5	0.1	35.2	0.1	0.3	25,7
1995	7453.1	0.2	49.6	0.2	0.4	37.3
1996	1(--)83406	0.2	69.9	0.3	0.5	54. ?
1997	15776.6	0.4	98.9	0.4	0.8	78.9
1998	?3010.1	0.5	140.0	0.6	1.2	115*1
1999	33614.3	0.8	198.6	0.9	1.7	168.1
2000	49183.2	1.1	282.1	1.4	2.5	245.9

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TABLE 3.148

SHELIKOF STRAIT, PROJECTED GROUNDFISH PROCESSING EMPLOYMENT AND PAYROLL
1980-2000

Year	Average Monthly Employment	Annual Payroll (1,000) Nominal Dollars	Annual Payroll (1,000) Real Dollars[1]	Annual Rate of Change Employment	Annual Rate of Change Nominal Payroll	Annual Rate of Change Real Payroll[1]	Cumulative Percentage Change Employment	Cumulative Percentage Change Nominal Payroll	Cumulative Percentage Change Real Payroll[1]
1980	0	5	5	0	0	n	0	0	0
1981	0	7	7	37.6	46.6	38.9	37.6	46.6	38.9
1982	1	10	9	37.8	46.8	39.1	89.7	115.1	93*3
1983	1	15	13	38.1	47.0	39.4	161.9	216.3	169.4
1984	1	23	18	38.3	47.3	39.6	262.1	365.9	276.1
1985	?	33	26	38.5	47.5	39.8	401.6	587.2	425.8
1986	2	49	36	38.8	47.8	40.1	596.0	915.6	636.5
1987	3	73	50	39.0	48.0	40.3	867.4	1403.3	933.4
1988	5	108	71	39.2	413.3	40.5	1246.8	2129.0	1352,4
1989	6	161	99	39.5	48.5	40.8	1778.3	3210.7	1944.8
1990	9	239	140	39.7	48.8	41.0	2524.1	4825.8	2783.7
1991	13	356	198	39.9	49.()	41*3	3572.3	7241.5	3973.9
]992	]8	532	280	40.2	49.3	41.5	5048.0	10860.7	5665.1
1993	.25	796	397	40.4	49.6	41.8	7129.1	16292.0	8072.4
1994	35	1192	563	40.7	49.8	42.0	10068.8	24456.4	11504.6
1995	50	1789	801	40.9	5001	42.2	14228.0	36749.4	164(36.1
1996	70	2689	1142	41.1	50.3	42.5	20122.2	55288.8	23417.0
1997	99	4048	1629	41.4	50.6	42.7	28488.3	83293.5	33461.4
1998	140	6105	2329	41*6	50.8	42.9	40381.7	125662.5	47874.1
1999	199	9.222	3334	41.8	51.0	43.2	57315.1	189862.9	68586.6
2000	282	13952	4782	42.1	51.3	43.4	81460.8	287291.3	98397.3

‘1980 is the base year.

TABLE 3.149

PROJECTED AVERAGE MONTHLY PROCESSING EMPLOYMENT ALL SHELIKOF STRAIT FISHERIES
1980-2000

	Without Increased Efficiency			With Increased Efficiency		
Year	Employment	Annual Rate of Change	Cumulative Percentage Change	Employment	Annual Rate of Change	Cumulative Percentage Change
1980	424	0	0	424	0	0
1981	435	2.5	2.5	426	0.4	0.4
1982	446	2.6	5.1	428	0.6	1.0
1983	458	2.7	8.0	431	0.7	1.7
1984	472	2.9	11.1	435	0.8	2.5
1985	487	3.2	14.7	440	1.2	3.7
1986	490	0.8	15.6	435	-1.2	2.4
1987	494	0.8	16.5	430	-1.1	1.3
1988	499	0.9	17.6	425	-1.0	0.2
1989	504	1.0	18.8	421	-0.9	-0.7
1990	519	2.9	22.3	426	1.0	0.3
1991	526	1.4	24.0	424	-0.5	-0.1
1992	535	1.6	26.0	423	-0.1	-0.2
1993	545	2.0	28.5	425	0.4	0.2
1994	559	2.5	31.8	430	1.2	1.4
1995	578	3.3	36.1	440	2.2	3.6
1996	602	4.2	41.8	455	3.5	7.2
1997	635	5.5	49.6	479	5.3	12.9
1998	680	7.1	60.3	515	7.6	21.5
1999	743	9.2	75.1	569	10.5	34.2
2000	831	11.8	95.8	648	13.9	52.8

TABLE 3.150

PROJECTED ANNUAL PROCESSING PLANT PAYROLLS. ALL SHELIKOF STRAIT FISHERIES.
1980-2000

	Without Increased Efficiency			With Increased Efficiency		
Year	Annual Payroll, in Real Dollars[1] (1,000)	Annual Rate of Change	Cumulative Percentage Change	Annual Payroll in Real Dollars (1,000)	Annual Rate of Change	Cumulative Percentage Change
1980	6489	0	0	6489	0	0
1981	6712	3.4	3.4	6578	1.4	1.4
1982	6951	3.6	7.1	6676	1.5	2.9
1903	7209	3.7	11.1	6786	1.6	4*6
1?04	7487	3.9	15.4	6907	1.8	6.4
1985	7799	4.2	20.2	7052	2.1	8.7
1986	7932	1*7	22.2	7031	-0.3	8.4
1987	8073	1.8	24.4	7015	-0.2	8.1
1988	8222	1.8	26.7	7005	-0.1	8.0
1989	8383	2.0	29.2	"?(-)05	0.0	8.0
1990	8708	3.9	34,2	7141	1.9	10.1
1991	8906	2.3	37.3	7171	0.4	10*5
1992	9131	2.5	4(-).7	7226	0.8	11.4
1993	9395	2.9	44.8	7316	1.3	12.8
1994	97],2	3.4	49.7	7458	1.9	14.9
1995	10104	4.0	55*7	7672	2.9	18.2
1996	10602	4.9	63*4	7989	4.1	23.1
1997	11252	6.1	73.4	8455	5.8	30.3
1998	12117	7.7	86.7	9133	8.0	40.8
1999	13293	9.7	104.9	10119	10.8	55.9
2000	14915	12.2	129.9	11547	14.1	78.0

[1] 1980 is the base year.

Small Boat Harbors

The fishing boats that participate in the Shelikof Strait fisheries primarily operate out of the Kodiak small boat harbor. The Kodiak small boat harbor has been used well beyond its design capacity for a number of years. The inadequacy of this facility is demonstrated by the long waiting lists for permanent slips, the frequent rafting of vessels, and the inability of very large fishing vessels to use the small boat harbor. The City of Kodiak is pursuing development programs for two additional small boat harbor facilities. The projected increases in harvesting activity of the traditional fisheries can occur without a significant increase in the number of boats using the Kodiak small boat harbor; therefore, it is believed that the projected growth of traditional fisheries can occur given the existing facility. However, the projected growth of the groundfish industry would be constrained if new facilities are not made available.

Port Facility

The Shelikof harvest is principally either landed in Kodiak for processing or landed in Shelikof Strait communities for processing and then shipped to Seattle through Kodiak. The Port of Kodiak is therefore of particular importance to the Shelikof Strait commercial fishing industry. Technical Report Number 37 indicates that the Kodiak port facilities are operating near capacity and that the capacity of the existing facilities will be inadequate by the early 1980s. The report does not indicate how or if port capacity will be increased. Inadequate port facilities could adversely affect the growth of the traditional fisheries and the development of the groundfish fishery. However, since the commercial fishing industry is the mainstay of the Kodiak economy, and since Kodiak has been identified as an area for the State of Alaska to concentrate groundfish development efforts, it is believed that adequate port facilities will be available.

Labor, Electric Power, and Water

The commercial fishing industry's requirements for inputs are expected either to increase at a modest rate or to decrease during the forecast period. The plans of the City of Kodiak to increase the availability of water and electric power, the ability of Shelikof Strait processing plants to increase their own supplies of water and electric power, and the expected growth of the labor force appear to be more than sufficient to allow the moderate growth projected for the traditional sectors of the Shelikof commercial fishing industry. The growth resulting from the development of the groundfish industry is expected to occur at a moderate rate until the development of the industry is well underway. There should therefore be adequate time to assure that the input requirements for full development are available.

Processing Facilities and Land

Since the projected growth for the traditional fisheries can occur without increasing either the number of plants or the amount of land used, and since the Shelikof Strait groundfish industry is not expected to require more than one new plant, the availability of processing facilities and land is not expected to constrain the projected growth.

Conclusion

The conclusion is that the long-term growth that is projected for the Shelikof Strait commercial fishing industry appears to be feasible with respect to the long-term availability of inputs. This does not mean that during the next twenty years, temporary shortages of labor or water or other inputs will not prevent the level of activity of the fishing industry from being as high as it might otherwise be. What it means is that the long-term growth projected for the industry appears to be feasible despite the occasional shortages that will occur.

The Feasibility of the Projected
Growth of the Cook Inlet and Shelikof Strait
Commercial Fishing Industries With Respect to
OCS Activity Associated With Lease Sales
Preceding Lease Sale Number 60

The commercial fishing industries in the study area will be impacted by OCS activity associated with Lease Sales Number CI and Number 46. Lease Sale Number CI has already taken place and has to date resulted in exploration activities in the Lower Cook Inlet. It is expected to primarily affect the Cook Inlet commercial fishing industry. Lease Sale Number 46, which will result in OCS activities in the Gulf of Alaska east of Kodiak Island, was scheduled to occur prior to Lease Sale Number 60. Lease Sale Number 46 is expected to be primarily affected by Shelikof Strait fisheries, not Cook Inlet fisheries.

It should be noted both that the following discussion of the potential impacts of Lease Sale Number CI and Lease Sale Number 46 is limited to the sources of impacts that are considered for Lease Sale Number 60 in the next chapter, and that the discussion is in qualitative-terms because the data required to quantify potential impacts do not exist. The nature of the impact analysis that is possible and the sources of its limitations are more fully discussed in Chapter I.

LEASE SALE NUMBER CI AND THE COOK INLET COMMERCIAL FISHING INDUSTRY

The nature of the OCS activities projected for the mean find case of Lease Sale Number CI is summarized in Table 3.151, projections of the potential employment and population impacts for Central and Southern Cook Inlet are in Table 3.152, and projections of OCS ocean space use with respect to offshore drilling rights and platforms and OCS vessel traffic are presented in Table 3.153. These projections of OCS activity are used as a basis for determining the feasibility of the commercial fishing industry scenarios presented in previous sections.

The nature of the onshore impacts is principally determined by the employment and population impacts of OCS activity. The data presented in Table 3.152 indicate that OCS activity resulting from Lease Sale Number CI will at most result in Central Cook Inlet employment and population being 7.2 percent and 6.5 percent higher than they otherwise would be. These data also indicate that the annual rates of growth of employment and population are not expected to be greatly affected by the OCS activity associated with Lease Sale Number CI. The rates of change of employment and population are expected to range from 2.2 to 2.5 percent in the absence of such activity and from 0.0 to 4.9 in its presence. As is indicated by the data contained in Table 3.152, the

TABLE 3.151

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF KENAI AND HOMER
MEDIUM FIND SCENARIO
LOWER COOK INLET - SALE CI

Phase, Task and Area of Operations	Kenai	Homer
EXPLORATION		
Survey		
Offshore		
Geophysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys on tracts in Lower Cook Inlet outside the Kenai-Lower Cook Inlet coastal area.
Onshore		
Service Base	N/A	Advance service base providing resupply and communications for vessels surveying the Lower Cook Inlet.
Rigs		
Offshore		
Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells on the tracts in Lower Cook Inlet outside the Kenai-Lower Cook Inlet coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the tracts in Lower Cook Inlet.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the tracts in Lower Cook Inlet.

TABLE 3.151 (continued)

Onshore Service Base	Existing permanent shore base supplying rigs and boats in Lower Cook Inlet with tubular materials, fuel, water, mud, cement, food and other cargo.	Advance shore base supply rigs and boats in Lower Cook Inlet and with fuel, water, mud, cement, food and other cargo.
Air Transportation	N/A	Helicopter service from Homer Airport transporting offshore personnel and small volume, light weight freight to and from rigs in Lower Cook Inlet.
Construction	N/A	Minor construction of an advance service base.
DEVELOPMENT		
Platform Installation and Pipe Laying		
Offshore Platform Installation [area of operation]	N/A	Locating, installing and commissioning platforms in Lower Cook Inlet.
Pipeline Construction [area of operation]	N/A	Laying and burying subsea gathering and trunk lines.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Two-thirds of the efforts in platform installation and pipe laying will be provided from the Kenai area.	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. One-third of the effort in platform installation and pipe laying will be provided from Homer.
Onshore Service Base	Shore base supplying boats and platforms with tubular materials, fuel, water, food and other cargo. Two-thirds of the total effort for platform installation and pipe laying will be from the Kenai area.	Shore base supply boats and platforms with tubular materials, fuel, water, food and other cargo. One-third of the total effort for platform installation and pipe laying will be provided from Homer.

TABLE 3.151 (continued)

Air Transportation	N/A	Helicopter service at Homer Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges in Lower Cook Inlet.
Construction	Coating of all pipe used in subsea gathering and trunk pipelines. Constructing onshore oil and gas pipelines from Anchor Point to Nikiski. Fifty percent of the effort from the Kenai area.	Construction onshore oil and gas pipelines from Anchor Point to Nikiski. Fifty percent of the effort from the Homer area.
<u>Platforms</u>		
Offshore		
Development Drilling [area of operation]	N/A	Development drilling on platforms in the Lower Cook Inlet.
Marine Transportation [port area]	Supply boats transporting materials to platforms in Lower Cook Inlet.	Supply boats transporting materials to platforms in Lower Cook Inlet.
Onshore		
Service base	Shore base supplying boats and platforms with tubular materials, fuel, water, mud, cement, food and other cargo. Two-thirds of the effort will be provided from Nikiski.	Shore base supplying boats and platforms with fuel, water, mud, cement, food and other cargo. One-third of the effort will be provided from Homer.
Air Transportation	N/A	Helicopter service at Homer Airport transporting offshore personnel and small volume, light weight freight to platforms in Lower Cook Inlet.
PRODUCTION		
<u>Platforms</u>		
Offshore		
Platform Operations [area of operation]	N/A	Operating platforms with workovers and well stimulation in. Lower Cook Inlet.

TABLE 3.151 (continued)

Marine Transportation [port area]	Supply boats transporting materials to platforms in Lower Cook Inlet.	N/A
Ohshore Service Base	Shore base supply boats and platforms in the Lower Cook Inlet with tubular materials, fuel, water, mud, cement, food and other cargo.	N/A
Air Transportation	N/A	Helicopter service at Homer Airport transporting offshore personnel and small volume, light weight freight to platforms in the Lower Cook Inlet.
Oil Terminal and LNG Plant Operations	The use of existing facilities in the Kenai area is assumed.	N/A

Source: Alaska Consultants, Inc. June 1979.

TABLE 3.152

PROJECTED IMPACTS ON POPULATION AND EMPLOYMENT LEASE SALE NUMBER CI, MEAN FIND CASE 1981-2000

Central Cook Inlet

Year	Employment			Population			Percentage Change due to OCS Activity		Annual Rate of Growth			
									Employment		Population	
	Non OCS	OCS	Total	Non Ocs	OCS	Total	Employ-ment	Popu-lation	Non OCS	Total	Non Ocs	Total
1980	5180	45	5225	14504	112	14616	0.9	0.8	0	o	o	0
198]	5296	45	5341	14828	112	14940	0.8	0.8	2..2	2.2	2.2	2.2
1982	5416	45	5461	15165	112	15277	0.8	0.7	2.3	2*2	2.3	2.3
1983	5541	45	5586	15515	112	15627	0.8	O*7	2.3	2.3	2.3	2.3
1984	5668	71	5739	15870	177	16047	1.3	1.1	2.3	2.7	2.3	2.7
1985	5798	129	5927	16234	322	16556	2.2	200	2.3	3*3	2.3	3.2
1986	5934	285	6219	16615	712	17327	4.8	4*3	2.3	4.9	2.3	4.7
1987	6072	340	6412	17002	850	17852	5.6	5.0	2.3	3.1	2.3	3.0
1988	621.1	450	6661	17391	1125	18516	7.2	6.5	2.3	3*9	2.3	3.7
1989	6356	304	6660	17797	760	18557	4.8	403	2.3	-0*0	2.3	0.2
199(-I	6508	308	6816	18222	770	18992	4.7	4.2	2.4	2.3	2.4	2.3
1991	6660	268	6928	18648	670	19318	4.0	3.6	2.3	1.6	2.3	1.7
1992	6816	284	7100	19085	710	19795	4.2	3.7	2.3	2.5	2.3	2.5
1993	6977	284	7261	19536	710	20246	4.1	3.6	2.4	2.3	2.4	2.3
1994	7149	284	7433	20017	710	20727	4.0	3.5	2.5	2.4	2,5	2.4
1995	7318	284	7602	20490	710	21200	3.9	3.5	2.4	2.3	2.4	2.3
1996	7497	284	7781	20992	710	21702	3.8	3.4	2.4	2.4	2.4	2.4
1997	7672	239	7911	21482	597	22079	3.1	2.8	2.3	1.7	2.3	1.7
1998	7859	199	8058	22005	498	22503	2.5	2.3	2.4	1.9	2.4	1.9
1999	8050	0	8050	22540	0	22540	0	0	2.4	-0.1	2.4	0.2
2000	8246	n	8246	23088	0	23088	0	0	2.4	2.4	2.4	2.4

TABLE 3.152 (continued)

Southern Cook Inlet

Year	Employment			Population			Percentage Change due-to OCS Activity		Annual Rate of Growth			
									Employment		Population	
	Non Ocs	OCS	Total	Non OCS	OCS	Total	Employ-ment	Popu-lation	Non Ocs	Total	Non OCS	Total
1980	1697	49	1746	5091	122	5213	2.9	2.4	0	0	0	0
1981	1769	49	1818	5307	122	5429	2.8	2.3	4.2	4.1	4.2	4.1
1982	1852	49	1901	5556	122	5678	2.6	2.2	4.7	4.6	4.7	4.6
1983	1932	48	1980	5796	120	5916	2.5	2.1	4.3	4.2	4.3	4.2
1984	2017	56	2073	6051	140	6191	2.8	2.3	4.4	4.7	4.4	4.6
1985	2108	116	2224	6324	292	6616	5.5	4.6	4.5	7.3	4.5	6.9
1986	2204	255	?459	6612	63?	7249	11.6	9.6	4.6	10.6	4.6	9.6
1987	2295	321	2616	6885	803	7688	14.0	11.7	4.1	6.4	4.1	6.1
1988	2399	407	2806	7197	1017	8214	17.0	14.1	4.5	7.3	4.5	6.8
1989	2506	264	2770	7518	660	8178	10.5	8.8	4.5	-1.3	4.5	-0.4
1990	2621	278	2899	7863	695	8558	10.6	8.8	4.6	4.7	4.6	4.6
19s'1	2703	228	2931	8109	630	8739	8*4	7.8	3.1	1.1	3.1	2.1
1992	2791	244	3035	8373	610	8983	8.7	7.3	3.3	3.5	3.3	2.8
1993	2883	244	3127	8649	610	9259	8.5	7.1	3.3	3.0	3.3	3.1
1994	2978	244	3222	8934	610	9544	8.2	6.8	3.3	3.0	3.3	3.1
1995	3076	244	3320	9228	610	9838	7.9	6.6	3.3	3.0	3.3	3.1
1996	3179	?44	3423	9537	610	10147	7.7	6.4	3.3	3.1	3.3	3.1
1997	3282	211	3493	9846	527	10373	6.4	5.4	3.2	2.0	3.2	2.2
1998	3392	174	3566	10176	436	10612	5.1	4.3	3.4	2.1	3.4	2.3
1999	3501	0	3501	10503	0	10503	0	0	3.2	-1.8	3.2	-1.0
2000	3619	0	3619	10857	0	10857	0	0	3.4	3.4	3.4	3.4

TABLE 3.153

PROJECTED OFFSHORE OCS ACTIVITY,
MEAN FIND CASE,
LEASE SALE NUMBER CI

Maximum Number of:	
Exploration Rigs	2
Production Platforms	3
Supply Boats, Round-trips/month	
from Nikiski	86
from Homer	41
Supply Boat Berths	
Nikiski	3
Homer	2
Oil Tanker Traffic, Round-trip/year from Nikiski and Drift River	240
LNG Ship Traffic, Round-trip/year from Upper Cook Inlet	75
Incoming Barges	
Nikiski	5
Homer	2
Incoming Tankers from Supply Fuel for OCS Activities out of Homer	3
Barge Operations in Support of Pipe Laying Operations from Nikiski	15

Source: Peter Eakland and Associates, 1979.

projected employment and population impacts for southern Cook Inlet are less moderate. For example, in 1988 employment and population are expected to be 17.0 percent and 14.1 percent higher in the presence of OCS activity. Employment and population are expected to change at an annual rate of from 3.1 percent to 4.7 percent in the absence of OCS activity and from -1.8 percent to 10.6 percent in the presence of OCS activity resulting from Lease Sale Number CI. However, the projected employment and population impacts for Central and Southern Cook Inlet are in most years not expected to be substantial enough to significantly impact the commercial fishing industry through the competition for labor and services generated by OCS activities.

With the possible exception of the service boat berthing requirements for Homer, the OCS ocean space use resulting from Lease Sale Number CI is not expected to significantly affect the commercial fishing industry. "Under no conditions can the traffic predicted...for Cook Inletand Gulf of Alaska water be considered anything but light to moderate. The traffic and risk of collision due to congestion is so slight as to make estimates of traffic capacity almost meaningless despite the present user conflict in Kachemak Bay" (ERCO, 1978). The user conflict in Kachemak Bay is discussed in an earlier section. The existing berthing facilities in Homer that are adequate for supply boats are outside the small boat harbor; they consist of the City pier. The Alaska Marine Highway System has preferential berthing privileges at the pier which also serves fish processing plants, local petroleum product distributors, the Coast Guard, and fishing vessels that cannot be served by the small boat harbor due to their size or overcrowding in the small boat harbor. If preferential privileges were also extended to supply boats, it would become more difficult for the large fishing vessels and other vessels that cannot use the small boat harbor to operate out of Homer in the absence of alternative berthing facilities.

LEASE SALE NUMBER 46 AND THE SHELIKOF STRAIT COMMERCIAL FISHING INDUSTRY

The offshore OCS activity associated with Lease Sale Number 46 will be east and south of Kodiak Island, not in Shelikof Strait. The impacts of the offshore activity will therefore be limited to the small boat harbor and port facilities of the City of Kodiak and the ocean space in the immediate area since both industries are expected to, in part, operate out of Kodiak. The onshore impacts are also expected to be concentrated in Kodiak.

The summary of the expected impact of Lease Sale Number 46 on the Kodiak commercial fishing industry that is presented in Technical Report Number 30, Northern and Western Gulf of Alaska Petroleum Development Analysis, is therefore indicative of how the Shelikof commercial fishing industry may potentially be impacted by Lease Sale Number 46. The relevant portions of that report are as follow:

- The OCS labor requirements are minimal and are not expected to adversely affect the fishing industry.

- It is believed that with the exception of port facility services, the availability of services will increase sufficiently to meet the demands of both industries. The competition for port facility services during the exploration phase can adversely affect the fishing industry.

The nature of the OCS activities and the potential employment and population impacts upon which this summary are based are presented in Tables 3.154 and 3.155.

TABLE 3.154

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT AMONG THE COASTAL AREAS OF SEWARD AND KODIAK MEAN PROBABILITY RESOURCE LEVEL SCENARIO LEASE SALE NUMBER 46

Phase, Task and Area of Operations	Seward	Kodiak
EXPLORATION		
Survey		
Offshore Geophysical and Geological Sruveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys on Albatross Basin outside the Kodiak coastal area.
Onshore Service Base	Temporary and later permanent service base providing resupply, communications and a point for crew rotation for vessels surveying Albatross Basin.	N/A
Rigs		
Offshore Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross Basin.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs on the Albatross Basin.

TABLE 3.154 (continued)

Onshore Service Base	Shore base supplying rigs and boats on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.	N/A
Air Transportation	N/A	Helicopter service from Kodiak Airport transporting offshore personnel and small volume, light weight freight to and from rigs on the Albatross Basin.
Construction	N/A	Constructing a permanent service base.
DEVELOPMENT		
<u>Platform Installation</u>		
Offshore Platform Installation [area of operation]	N/A	Locating, installing and commissioning platforms on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Seward.	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. Half of the vessels for the total WGA platform installation will be provided from Kodiak.
Onshore Service Base	Shore base supplying boats and platforms with tubular materials, fuel, water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Seward.	Shore base supply boats and platforms with tubular materials, fuel water, food and other cargo. Half of the total effort for platform installation in the WGA will be provided from Kodiak.

TABLE 3.154 (continued)

Air Transportation	N/A	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges on the Albatross Basin.
<u>Pl atforms</u>		
Offshore		
Development Drilling [area of operation]	N/A	Development drilling on platforms on the Albatross Basin outside the Kodiak coastal area.
Marine Transportation [port area]	Supply boats transporting materials to platforms on the Albatross Basin.	Supply boats transporting materials to platforms on the Albatross Basin.
Ons here		
Service Base	Shord base supplying boats and platforms on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supply boats and platforms on Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation	N/A	Helicopter service at Kodiak Airport transporting offshore personnel and small volume, light weight freight to platforms on Albatross Basin.
PRODUCTION		
<u>Platforms</u>		
Offshore		
Platform Operations [area of operation]	N/A	Operating platforms with workovers and well stimulation on Albatross Basin.
MarineTrasnportation [port area]	N/A	Supply boats transporting materials to platforms on the Albatross Basin.

TABLE 3.154 (continued)

Onshore Service Base	N/A	Shore base supplying boats and platforms on the Albatross Basin with tubular materials, fuel, water, mud, cement, food and other cargo.

Source: Alaska Consultants, Inc. April 1979.

TABLE 3.155

LEASE SALE NUMBER 46
KODIAK POPULATION AND EMPLOYMENT PROJECTIONS,
A COMPARISON OF THE BASE CASE AND THE MEAN FIND CASE

Year	Population		Employment		Change from the Base Case			
					Absolute Change		Percentage in	
	Base Case	Mean Case	Base Case	Mean Case	Population	Employment	Population	employment
1981	7782	7.804	6694	6705	22	11	0.28	0.16
1982	8317	8339	7028	7039	22	11	0.26	0.16
1983	8876	8888	7377	7383	12	6	0.14	0.08
1984	9500	10063	7765	7812	563	47	5*93	0.61
1985	10046	10112	8100	8133	66	33	0,66	0.41
1986	10498	10596	8373	8422	98	49	0.93	0,59
1987	10887	10967	8609	8649	80	40	0.73	0,46
1988	11268	11378	8840	8895	110	55	0.98	0,62
1989	11496	11558	R982	9013	62	31	0.54	0.35
1990	11791	11853	9163	9194	62	31	0.53	0,34
1991	12170	12232	9331	9362	62	31	0.51	0.33
1992	1 2 7 4 3	12810	9610	9648	67	38	0“53	O*4O
1993	13149	13225	9789	9827	76	38	0.58	0.39
1994	13517	13593	9944	9982	76	38	0.56	0.38
1995	13879	13955	10094	10132	76	38	0.55	0.38
1996	14159	14235	10196	10234	76	38	0.54	0.37
1997	14449	14525	10302	10340	76	38	O*53	O*37
1998	14660	14736	10363	10401	76	38	0.52	0,37
1999	15052	15122	10524	10559	70	35	0.47	0.33
2000	15344	15344	10628	10628	0	0	0	0

The projections of employment and population were prepared by Alaska Consultants, Inc.

IV. POTENTIAL IMPACTS OF ALTERNATIVE LEVELS OF OCS DEVELOPMENT

Competition between the commercial fishing and OCS petroleum industries for labor, ocean space use, and the services provided by the infrastructures of coastal communities can impact the development of a commercial fishing industry. The objective of this chapter is to analyze the potential impacts on the commercial fishing industries of Cook Inlet and Shelikof Strait that may result from alternative hypothesized levels of OCS activity pursuant to Lease Sale Number 60. The method used to meet this objective is as follows:

- The characteristics of the hypothesized OCS activity and the projected impacts on the population, employment, and infrastructure of the coastal communities as presented in other studies program reports are summarized.

- Past experiences of interactions between the offshore oil and commercial fishing industries and economic analysis are used to identify potential impacts.

- The hypothesized characteristics of the development of the commercial fishing and OCS industries are compared in light of past experiences to determine the types of impacts that may occur.

The impacts that are considered are those on:

- Catch by species by weight and value.
- Level of fishing effort (number of vessels by type, employment, and income).
- Level of processing effort (number of plants by type, employment and income).
- Local participation in harvesting and processing.
- Fish markets.
- Capacity, suitability and location of local ports, harbors, processing plants, fleets, and public services.
- Siting and public service requirements of commercial harbors and onshore processing plants.
- Areas of conflict in ocean and harbor space use.
- Frequency and seasonality of ocean space and harbor use.
- Conflicts between recreational and commercial fishing activities.

- Organization of the commercial fishing industry and current economic and political trends of significance to the industry.

As is noted in Chapter I, there are serious limitations on the degree to which quantitative projections of impact can be made. For this reason, the discussion of potential impacts is typically discussed in qualitative rather than quantitative terms.

The Hypothesized Characteristics of OCS Development

In order to analyze the potential impact of OCS development, it is necessary to know what the characteristics of the OCS industry, the commercial fishing industries, and the coastal communities are expected to be. The projected characteristics of the commercial fishing industries of the study area are presented in Chapter III. The projected characteristics of OCS development and of the coastal communities as described in other SESP reports are summarized in this section and subsequent sections by OCS development scenario. The reports from which the summaries are drawn were written in preparation of the following SESP reports:

- Technical Report Number 42
  Lower Cook Inlet
  Petroleum Development Scenarios
  Economic and Demographic Analysis

- Technical Report Number 43
  Lower Cook Inlet and Shelikof Strait
  Petroleum Development Scenarios

- Technical Report Number 45
  Lower Cook Inlet
  Petroleum Development Scenarios
  Transportation System Analysis

- Technical Report Number 46
  Lower Cook Inlet
  Petroleum Development Scenarios
  Local Socioeconomic Systems Analysis

These reports describe the hypothesized OCS activity and project the potential impacts that alternative levels of OCS development may have on the environments in which the commercial fisheries operate. These reports, therefore, provide information which serves as a basis for the analysis of the potential impacts on the fishing industries.

The three alternative levels of OCS development to be considered will be referred to as the low, mean, and high find cases. They are generated from the 95 percent, mean, and 5 percent probability resource level scenarios, respectively. The low find case encompasses the OCS development that is expected to occur if the actual level of the recoverable resources is found to be no greater than that which is thought to have a 95 percent probability of existing. Similarly, the high find case encompasses the

OCS development that is expected to occur if the actual level of the recoverable resources is found to equal that which is thought to have, at most, a 5 percent probability of existing. The mean find case is associated with a statistical mean level of recoverable resources.

LOW FIND CASE, 95 PERCENT PROBABILITY RESOURCE SCENARIO

The low find" case is also the exploration only case, since the level of recoverable resources that has at least a 95 percent probability of existing is not expected to be sufficient to warrant field development. Under the 95 percent scenario, exploration begins in 1981 and ends in 1983, and no OCS activity is expected to occur beyond 1983. The hypothesized exploration activities are outlined in Table 4.1.

MEAN FIND CASE, MEAN PROBABILITY RESOURCE SCENARIO

The mean find case is hypothesized to begin with exploration activity that results in the discovery of two economically viable oil fields, one in Lower Cook Inlet approximately 16 kilometers (10 miles) northwest of English Bay (Figure 4.1) and one in northern Shelikof Strait approximately 33 kilometers (20 miles) east of Afognak Island (Figure 4.2). The oil from the Lower Cook Inlet field is expected to be transported from the field to Drift River using a short spur pipeline which connects with a trunk pipeline constructed to serve fields associated with Lease Sale Number CI. The Shelikof Strait oil will be transported by a pipeline from the field to a marine terminal to be constructed on the west coast of Afognak Island.

TABLE 4.1

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF KENAI, HOMER AND AFOGNAK ISLAND
EXPLORATION ONLY SCENARIO
LOWER COOK INLET

Phase, Task and Area of Operations	Kenai	Homer	Afognak Island
EXPLORATION			
Survey			
Offshore Geophysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Survey vessels conducting geophysical and geological surveys in Shelikof Strait outside the Kenai-Cook Inlet coastal area.
Onshore Service Base	N/A	Temporary (advance) service base providing resupply and communications for vessels surveying in Lower Cook Inlet and Shelikof Strait.	N/A
Rigs			
Offshore Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Rigs drilling exploration wells in Shelikof Strait outside the Kenai-Cook Inlet coastal area.

TABLE 4.1 (continued)

Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs in Lower Cook Inlet and Shelikof Strait.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs in Lower Cook Inlet and Shelikof Strait.	N/A
Onshore Service Base	Shore base supplying rigs to boats in Lower Cook Inlet and Shelikof Strait with tubular materials, fuel, water, mud, cement, food and other cargo.	Shore base supplying rigs and boats in Lower Cook Inlet and Shelikof Strait with fuel, water, mud, cement, food and other cargo.	
Air Transportation	N/A	Helicopter service from Homer Airport transporting offshore personnel and small volume, light weight freight to and from rigs in Lower Cook Inlet and Shelikof Strait.	N/A

Source: Alaska Consultants, Inc. June 1979.

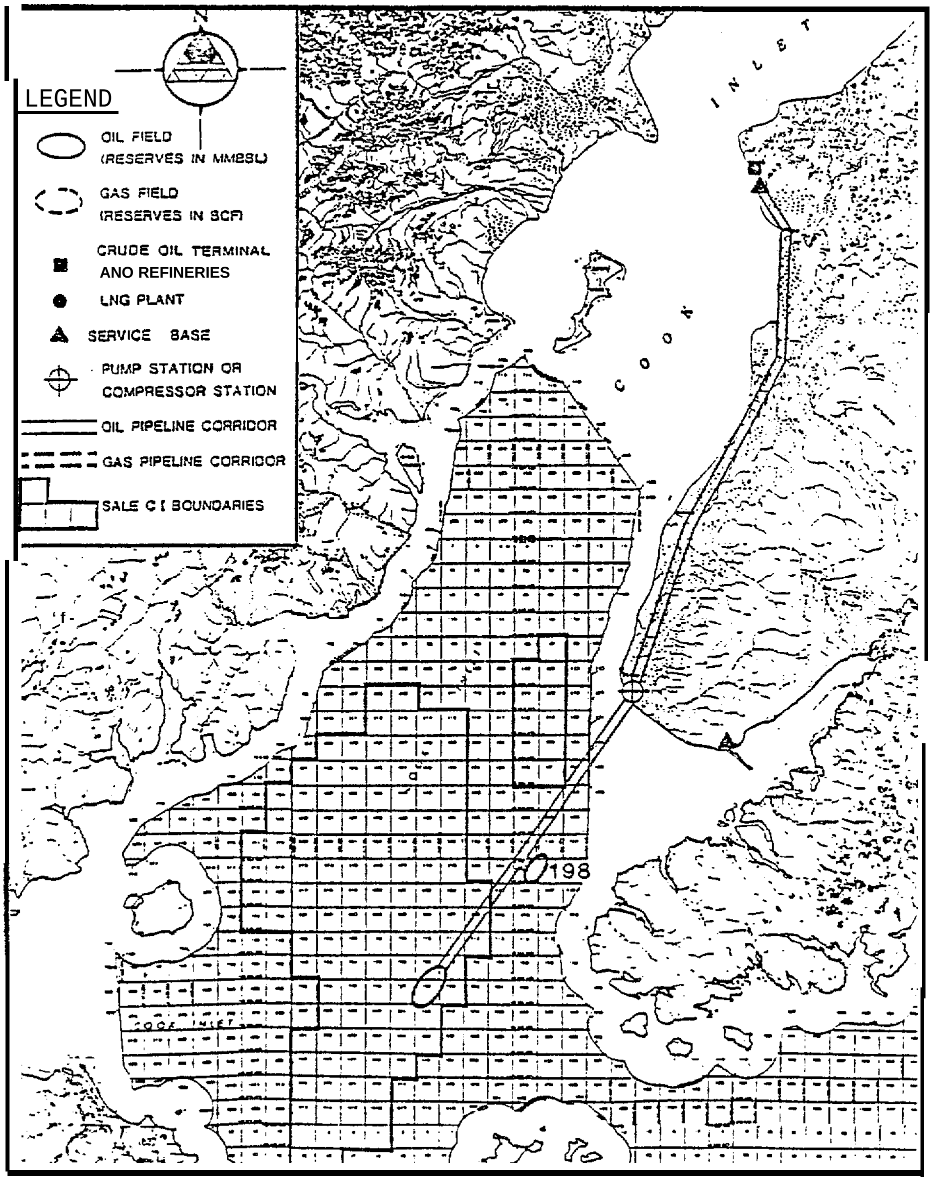


Figure 4.1 : Lower Cook Inlet Medium Find Scenario Field and Shore Facility Locations.

Source: Dames and Moore, 1979. Technical Report No. 43, Alaska OCS Socioeconomic Studies Program.

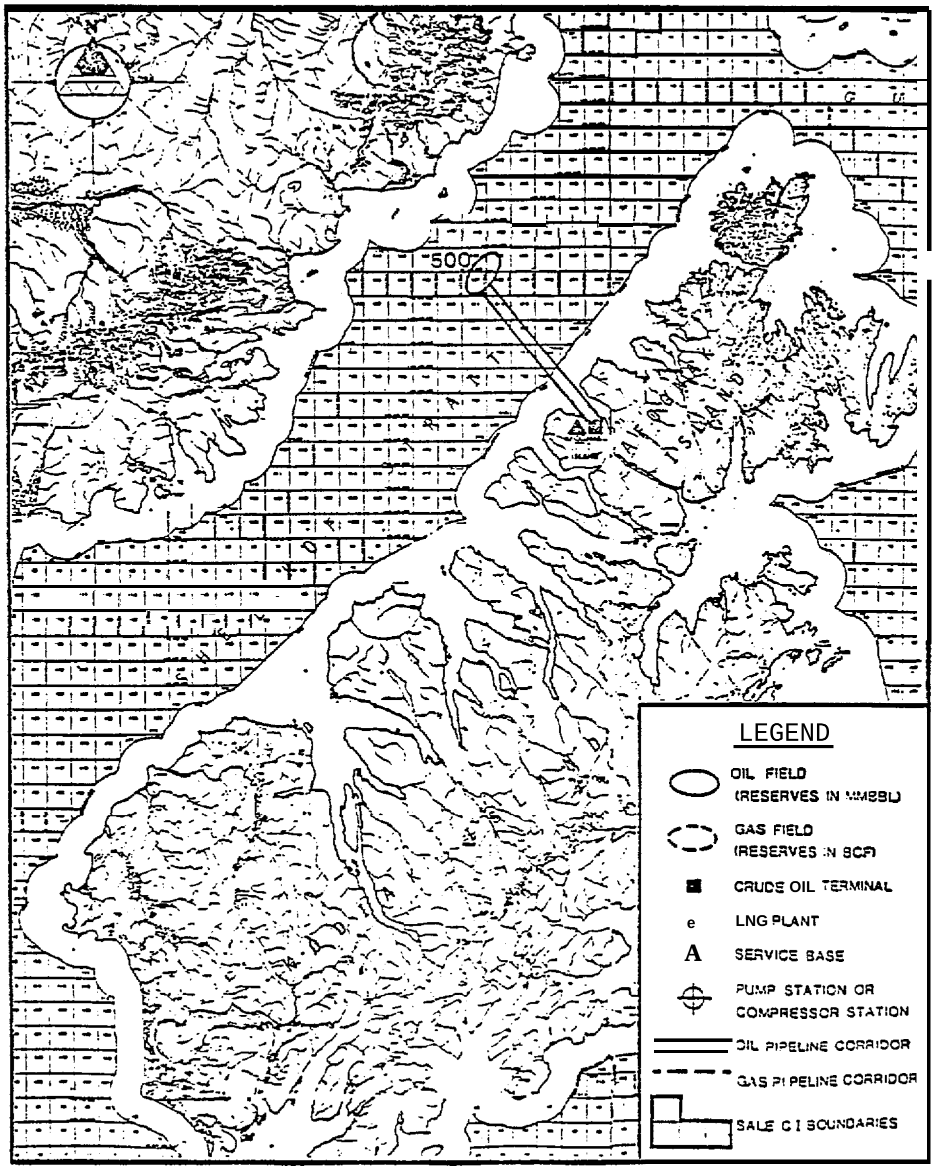


Figure 4.2: Shelikof Strait Medium Find Scenario Field and Shore Facility Locations.

Source: Dames and Moore, 1979. Technical Report No. 43, Alaska OCS Socioeconomic Studies Program.

Exploration, which is scheduled to begin in 198"l and end in 1984, is expected to be supported from a main base in Nikiski and a forward base in Homer with perhaps additional support from Kodiak. Development activities are expected to begin in 1986 and continue through 1990. They are expected to include the construction of one platform in each field, a crude oil terminal and a supply base on Afognak Island, and the aforementioned pipelines. Nikiski is expected to be the main support base for development operations, with Homer serving as a forward support base for the ferrying of workers and light supplies, and with the Afognak base providing support in Shelikof Strait beginning in 1985. The production phase of OCS operations is scheduled to extend from 1988 to beyond 2000. The OCS activities associated with each phase of operations are outlined in Table 4.2.

HIGH FIND CASE, 5 PERCENT PROBABILITY RESOURCE SCENARIO

The high find case assumes that the exploration phase, which begins in 1981 and continues through 1985, results in four commercial oil discoveries and two gas discoveries. The two Lower Cook Inlet oil fields are assumed to be north of Anchor Point and toward the western shore of the Inlet; the Cook Inlet gas field is assumed to be just north of the oil fields, but nearer the center of the Inlet (Figure 4.3). The two Shelikof Strait oil fields are assumed to be west of Afognak Island and the gas field is assumed to be north of the oil fields (Figure 4.4). Exploration support is expected to be provided mainly from Nikiski with only aerial support and light supply support from Homer.

TABLE 4.2

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF KENAI, HOMER AND AFOGNAK ISLAND
MEDIUM FIND SCENARIO
LOWER COOK INLET

Phase, Task and Area of Operations	Kenai	Homer	Afognak Island
EXPLORATION			
Survey			
Offshore Geohpysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Survey vessels conducting geophysical and geological surveys in Shelikof Strait outside the Kenai-Cook Inlet coastal area.
Onshore Service Base	N/A	Temporary (advance) service base providing resupply and communications for vessels surveying in Lower Cook Inlet and Shelikof Strait.	N/A
Rigs			
Offshore Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Rigs drilling exploration wells in Shelikof Strait outside the Kenai-Cook Inlet coastal area.

TABLE 4.2 (continued)

Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs to Lower Cook Inlet and Shelikof Strait.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs in Lower Cook Inlet and Shelikof Strait.	N/A
Onshore Service Base	Existing shore base supplying rigs and boats in Lower Cook Inlet and Shelikof Strait with tubular materials, fuel, water, mud, cement, food and other cargo.	Advance shore base supplying rigs and boats in Lower Cook Inlet with fuel, water, mud, cement, food and other cargo.	N/A
Air Transportation	N/A	Helicopter service from Homer Airport transporting offshore personnel and small volume, light weight freight to and from rigs in Lower Cook Inlet and Shelikof Strait.	N/A
Construction	N/A	N/A	Constructing a permanent service base on Afognak Island.
DEVELOPMENT			
<u>Platform Installation and Offshore Pipeline Construction</u>			
Offshore Platform Installation [area of operation]	N/A	Locating, installing and commissioning a platform in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Locating, installing and commissioning a platform in Shelikof Strait outside the Kenai-Cook Inlet coastal area.

TABLE 4.2 (continued)

Pipeline Construction [area of operations]	N/A	Laying and burying a short subsea oil trunk line to an existing subsea oil line in the Lower Cook Inlet.	Laying and burying a subsea oil pipeline from Shelikof Strait platform to Afognak Island.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to a platform, lay barge and bury barge in Lower Cook Inlet. Two-thirds of this effort will be provided from the Kenai area.	Supply/anchor/tug boats transporting materials to a platform, lay barge and bury barge in Lower Cook Inlet. One-third of this effort will be provided from Homer.	Supply/anchor/tug boats transporting materials to a platform, lay barge, and bury barge in Shelikof Strait
Onshore Service Base	Shore base supplying boats, a platform, lay barge and bury barge with tubular materials, fuel, water, food and other cargo. Two-thirds of this effort for platform installation and pipeline construction in Lower Cook Inlet will be provided from the Kenai area.	Shore base supplying boats, a platform, lay barge and bury barge with fuel, water, food and other cargo. One-third of this effort for platform installation and pipeline construction in Lower Cook Inlet will be provided from Homer.	Shore base supply boats, a platform, lay barge and bury barge with tubular materials, fuel, water, food and other cargo. The total effort for platform installation and pipeline construction in Shelikof Strait will be provided from Afognak Island.
Air Transportation	N/A	Helicopter service at Homer Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges in Lower Cook Inlet and Shelikof Strait.	N/A
Construction	Coating of all pipe used in subsea pipelines in the Kenai area.	N/A	Constructing onshore pipeline and oil terminal on Afognak Island.

TABLE 4.2 (continued)

Platforms			
Offshore Development Drilling [area of operation]	N/A	Development drilling on platforms in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Development drilling on Shelikof Strait outside the Kenai-Cook Inlet coastal area.
Marine Transportation [port area]	Supply boats transporting materials to a platform in Lower Cook Inlet.	Supply boats transporting materials to a platform in Lower Cook Inlet.	Supply boats transporting materials to a platform in Shelikof Strait.
Onshore Service Base	Shore base supplying boats and a platform in Lower Cook Inlet with tubular materials, fuel, water, mud, cement, food and other cargo. Two-thirds of this effort provided from the Kenai area.	Shore base supplying boats and a platform in Lower Cook Inlet with fuel, water, mud, cement, food and other cargo. One-third of this effort provided from Homer.	Shore base supplying boats and platforms in Shelikof Strait with tubular materials, fuel, water, mud, cement, food and other cargo.
Air Transportation	N/A	Helicopter service at Homer Airport transporting offshore personnel and small volume, lightweight freight to platforms in Lower Cook Inlet and Shelikof Strait.	N/A
PRODUCTION			
Platforms			
Offshore Platform Operations [area of operation]	N/A	Operating platform with periodic workovers and well stimulation in Lower Cook Inlet.	Operating platform with workovers and well stimulation in Shelikof Strait.

TABLE 4.2 (continued)

Marine Transportation [port area]	Supply boats transporting materials to a platform in Lower Cook Inlet. All of this effort in the Lower Cook Inlet will be provided from the Kenai area.	N/A	Supply boats transporting materials to a platform in Shelikof Strait.
Onshore Service Base	Shore base providing all of the effort in supplying boats and a platform in Lower Cook Inlet with tubular materials, fuel, water, mud, cement, food and other cargo.	N/A	Shore base supplying boats and a platform in Shelikof Strait with tubular materials, fuel, water, mud, cement, food and other cargo. Afognak Island service base employees assumed to be rotated through Homer.
Oil Terminal Operations	The use of existing facilities in the Nikiski area is assumed.	N/A	Operating oil terminal storage and shipping oil from the Shelikof Strait field. Afognak oil terminal employees assumed to be rotated through Homer.

Source: Alaska Consultants, Inc. June 1979.

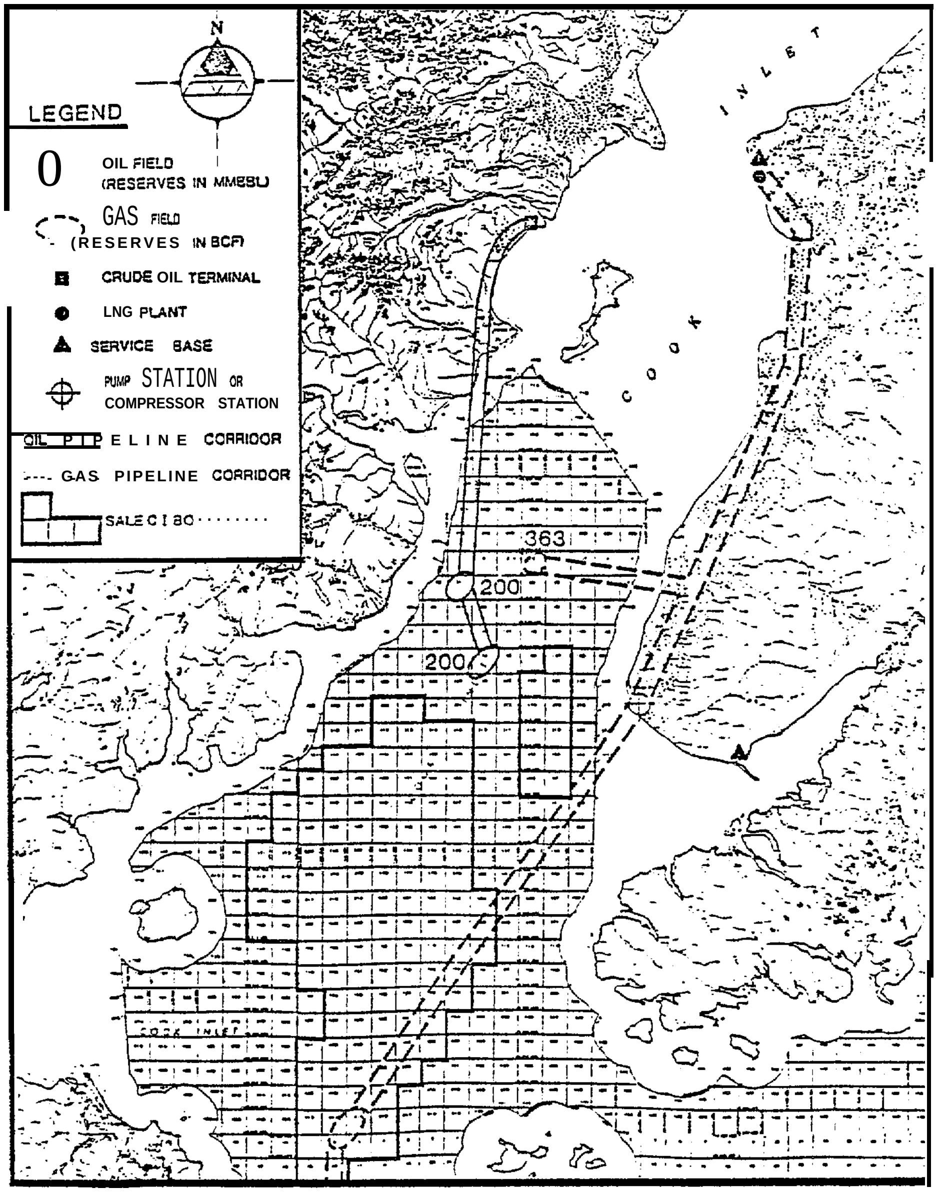


Figure 4.3: Lower Cook Inlet High Find Scenario Field and Shore Facility Locations.

Source: Dames and Moore, 1979. Technical Report No. 43, Alaska OCS Socioeconomic Study Program.

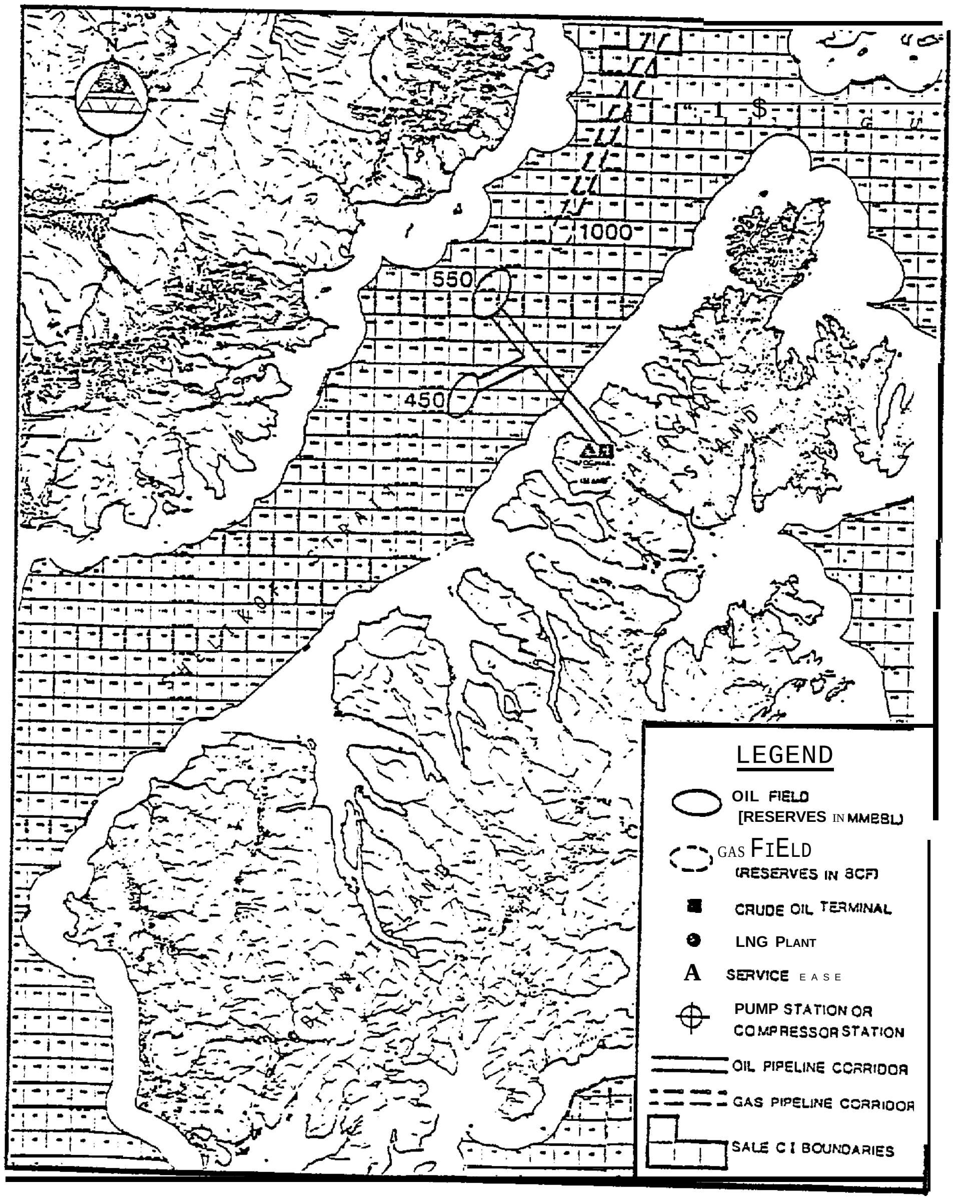


Figure 4.4: Shelikof Strait High Find Scenario Field and Shore Facility Locations.

Source: Dames and Moore, 1979. Technical Report No. 43, Alaska OCS Socioeconomic Studies Program.

The development phase is assumed to begin in 1986 and end in 1989. This phase will include the construction of a trunk pipeline from the Lower Cook Inlet oil fields to Drift River, a spur pipeline which will transport gas from the Shelikof Strait gas field to a Lower Cook Inlet trunk pipeline that will take Lease Sale Number CI and Lease Sale Number 60 gas to Nikiski, one production platform in each gas or oil field, and a crude oil terminal and a forward service base on the west coast of Afognak Island. The trunk pipeline from the Lower Cook Inlet gas fields is assumed to be built as a result of Lease Sale Number CI, not Lease Sale Number 60. Nikiski is expected to continue as the main support base but to be supplemented in Shelikof Strait operations by the forward base to be built on Afognak Island. The production phase is assumed to last from 1988 to beyond 2000. An outline of the nature of the OCS activities for the three phases of OCS operations is presented in Table 4.3.

Using Past Interactions Between the Offshore Petroleum and Commercial Fishing Industries and Economic Analyses to Identify Potential Impacts

In the following sections, past experiences of interactions between the offshore petroleum and commercial fishing industries and economic analyses are used to identify the impacts that may result as these two industries compete for labor, ocean space use, and services of the infrastructure of the coastal communities.

TABLE 4.3

ASSUMPTIONS FOR THE DISTRIBUTION OF EMPLOYMENT
AMONG THE COASTAL AREAS OF KENAI, HOMER AND AFOGNAK ISLAND
HIGH FIND SCENARIO
LOWER COOK INLET

Phase, Task and Area of Operations	Kenai	Homer	Afognak Island
EXPLORATION			
Survey			
Offshore			
Geophysical and Geological Surveying [area of operation]	N/A	Survey vessels conducting geophysical and geological surveys in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Survey vessels conducting geophysical and geological surveys in Shelikof Strait outside the Kenai-Cook Inlet coastal area.
Onshore			
Service Base	N/A	Temporary (advance) service base providing resupply and communications for vessels surveying in Lower Cook Inlet and Shelikof Strait.	N/A
Rigs			
Offshore			
Exploration Well Drilling [area of operation]	N/A	Rigs drilling exploration wells in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Rigs drilling exploration wells in Shelikof Strait outside the Kenai-Cook Inlet coastal area.

TABLE 4.3 (continued)

Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and towing rigs in Lower Cook Inlet and Shelikof Strait.	Supply/anchor/tug boats transporting materials to rigs, moving rig anchors and , towing rigs in Lower Cook Inlet and Shelikof Strait.	N/A
Onshore Service Base	Existing permanent shore base supplying rigs and boats in Lower Cook Inlet and Shelikof Strait with tubular materials, fuel, water, mud, cement, food and other cargo.	Advance shore base supplying rigs and boats in Lower Cook Inlet and Shelikof Strait with fuel, water, mud, cement, food and other cargo,	N/A
Air Transportation	N/A	Helicopter service from Homer Airport transporting offshore personnel and small volume, light weight freight to and from rigs in Lower Cook Inlet and Shelikof Strait.	N/A
Construction	N/A	N/A	Constructing a permanent service base on Afognak Island.
DEVELOPMENT			
Platform Installation and Offshore Pipeline Construction			
Offshore Platform Installation [area of operation]	N/A	Locating, installing and commissioning platforms in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Locating, installing and commissioning platforms in Shelikof Strait outside the Kenai-Cook Inlet coastal area.

TABLE 4.3 (continued)

Pipeline Construction [area of operations]	N/A	Laying and burying subsea oil gathering and trunk line to the western shore of Cook Inlet (Drift River) and a subsea gas trunk line to the eastern shore to connect to an existing onshore line near Happy Valley.	Laying and burying subsea gathering and trunk line to the western shore of Afognak Island and a subsea gas trunk pipeline to an existing Lower Cook Inlet subsea gas line.
Marine Transportation [port area]	Supply/anchor/tug boats transporting materials to platforms, lay barges, and bury barges. Two-thirds of the effort in platform installation and pipe laying and burying in Lower Cook Inlet will be provided from the Kenai area.	Supply/anchor/tug boats transporting materials to platforms, lay barges and bury barges. One-third of the effort in platform installation and pipe laying and burying in Lower Cook Inlet will be provided from Homer.	Supply/anchor/tug boats transporting materials to platforms, lay barges, and bury barges. All of the vessels for the Shelikof Strait platform installation and pipe laying and burying will be provided from Afognak Island.
Onshore Service Base	Shore base supplying boats, platforms, lay barges and bury barges with tubular materials, fuel, water, food and other cargo. Two-thirds of the total effort for platform installation and pipeline construction in Lower Cook Inlet will be provided from the Kenai area.	Shore base supplying boats, platforms, lay barges with fuel, water, food and other cargo. One-third of the total effort for platform installation and pipeline construction in Lower Cook Inlet will be provided from Homer.	Shore base supplying boats, platforms, lay barges and bury barges with tubular materials, fuel, water, food and other cargo. The total effort for platform installation and pipeline constriction in Shelikof Strait will be provided from Afognak Island.

TABLE 4.3 (continued)

Air transportation	N/A	Helicopter service at Homer Airport transporting offshore personnel and small volume, light weight freight to platforms in Lower Cook Inlet and Shelikof Strait.	N/A
PRODUCTION			
Platforms			
Offshore			
Platform Operations [area of operation]	N/A	Operating platforms with periodic workovers and well stimulation in Lower Cook Inlet.	Operating platforms with workovers and well stimulation in Shelikof Strait.
Marine Transportation [port area]	Supply boats transporting materials to platforms in Lower Cook Inlet. All of this effort will be provided . from the Kenai area.	N/A	Supply boats transporting materials to platforms in Shelikof Strait.
Onshore			
Service Base	Shore base providing all of the effort in supplying boats and platforms in Lower Cook Inlet with tubular materials, fuel, water, mud, cement, food other cargo.	N/A	Shore base on Afognak Island supplying boats and platforms in Shelikof Strait with tubular materials, fuel, water, mud, cement, food and other cargo. Afognak Island service base employees assumed to be rotated through Homer.

TABLE 4.3 (continued)

Air Transportation	N/A	Helicopter service at Homer Airport transporting offshore personnel and small volume, light weight freight to platforms, lay barges and bury barges in Lower Cook Inlet and Shelikof Strait.	N/A
Construction	Coating of all pipe used in subsea gathering and trunk pipelines in the Kenai area.	Constructing onshore pipelines on oil pipeline to the Drift River terminal and a gas pipeline to an existing onshore line thence to Nikiski.	Constructing onshore pipeline and oil terminal on Afognak Island.
<u>Platforms</u>			
Offshore			
Development Drilling [area of operation]	N/A	Development drilling on platforms in Lower Cook Inlet outside the Kenai-Cook Inlet coastal area.	Development drilling on platforms in Shelikof Strait outside the Keai-Cook Inlet coastal area.
Marine Transportation [port area]	Supply boats transporting materials to platforms in Lower Cook Inlet.	Supply boats transporting materials to platforms in Lower Cook Inlet.	Supply boats transporting materials to platforms in Shelikof Strait.
Onshore			
Service Base	Shore base supplying boats and platforms in Lower Cook Inlet with tubular materials, food, water, mud, cement, food and other cargo. Two-thirds of the effort in this area provided from the Kenai area.	Shore base supplying boats and platforms in Lower Cook Inlet with fuel, water, mud, cement, food and other cargo. One-third of the effort in this area provided from Homer.	Shore base supplying boats and platforms in Shelikof Strait with tubular materials, fuel, water, mud, cement, food and other cargo.

TABLE 4.3 (continued)

Oil Terminal and LNG Plant Operations	The use of existing facilities in the Nikiski area is assumed.	N/A	Operating oil terminal storing and shipping oil from the Shelikof Strait fields. Afognak Island oil terminal employees assumed to be rotated through Homer.

Source: Alaska Consultants, Inc. June 1979.

COMPETITION FOR LABOR

The commercial fishing industry is a large employer in the study area, and its labor requirements are projected to increase as the traditional fisheries continue to expand and as a domestic groundfish industry develops. The question to be addressed in this section is, can the labor requirements of the commercial fishing industry be met as the OCS industry develops and becomes a major employer? The answer to this question will be determined by a number of factors including:

- the skill requirements of both industries
- wage differentials between the industries
- the hiring practices of both industries
- the sources of labor that are available to each industry
- the effects of OCS activity on the supply of labor in each community.

Skill Requirements

Differences in skill requirements tend to limit the competition for labor between two industries; an analysis of the skill requirements of the two industries can, therefore, be used to begin to determine for which types of labor the industries will compete. Typically, the skill requirements are sufficiently different to limit competition. For example, the offshore OCS operations require highly specialized labor, and the OCS supply boats are manned by licensed officers and crews with seaman's papers. Conversely, the seafood processing requires a large number of unskilled workers, and fishing boats are typically manned by individuals who are not licensed officers or do not have seaman's papers. Therefore, the offshore labor requirements of the OCS industry tend not to compete with either the harvesting or processing labor requirements of the fishing industry.

The OCS requirements for onshore labor, particularly for construction projects, can, however, compete directly with the labor requirements of the fishing industry since the skill requirements for many onshore jobs are minimal and can be met by many of those who are employed in the fishing industry. In terms of skill requirements, the OCS industry can also compete with the fishing industry for more skilled workers such as foremen and mechanics.

Wage Differentials

For the types of labor for which there is direct competition between the two industries, the effect of the competition on the fishing industry's ability to meet its labor requirements will be affected by the wage differential between the two industries. For example, the hourly wage in seafood processing is expected to be substantially below the hourly wage in construction; therefore, to the extent that both can utilize unskilled labor, the onshore construction projects can provide effective and, therefore, potentially adverse competition. Conversely, the equivalent of an hourly wage in the harvesting sector is expected to exceed the hourly construction wage; therefore, the OCS construction labor requirements are not expected to effectively compete with harvesting labor requirements although many fishermen are aptly qualified to work in construction.

Hiring Practices

The hiring practices of an industry also influence the degree to which it provides effective competition for particular types of labor. The hiring practices of the OCS industry will tend to limit the competition for labor. The industry consists of oil companies and service companies that participate in petroleum development on a global scale. As the activity of the industry begins in a new area, petroleum industry workers from other areas are brought in; therefore, the points of entry into the industry are typically not a new area of industry activity. A major exception to this hiring practice would include hiring for large onshore construction projects. For such projects, a large number of workers who are new to-the industry are employed. This does not, however, mean that such workers will be hired locally. If local hiring halls of the construction unions do not exist or are not used, the large construction labor requirements may less effectively compete with the labor requirements of the fishing industry. The use of non-local hiring halls limits, but does not eliminate, access to local residents.

The hiring practices in the fishing industry will also tend to reduce the effective competition for labor between the two industries. For example, crews are typically hired in the home port of a fishing boat or its skipper; therefore, non-local boats do not draw heavily on the local labor force. The hiring of some processing plant employees also occurs in part at distant locations. For example, processing plants recruit students on college campuses in Alaska and in the Pacific Northwest and recruit nonstudents from the Seattle and Anchorage areas. Effective competition will also be reduced by the use of family members to crew fishing boats. Family crew members have close ties to a fishery and in many cases are too young to be employed elsewhere or have little interest in alternative employment opportunities.

Source of Labor

The source of labor and hiring practices are closely related; they both affect the effectiveness of the competition for labor generated by the OCS industry by differentiating between the labor pools from which each industry hires. The analysis presented under hiring practices is, therefore, applicable to this section. A factor which is more appropriately discussed in this section is the nature of employment in the two industries and, thus, the type of the worker each attracts.

Many individuals are attracted to the fishing industry because being a fisherman results in a lifestyle that could not otherwise be enjoyed. To the extent that fishermen are tied to the non-monetary rewards of that lifestyle, they are not part of the labor pool in which other industries readily compete.

A distinction can be drawn between the part of the unskilled labor force utilized by fish processing plants and that utilized on OCS onshore construction projects. Seafood processing plants have had a much higher propensity to hire women, students, minorities, and transients than have construction contractors; therefore, the major source of labor in seafood processing has not been considered part of the labor pool for construction. This is no doubt explained by the preferences of these employees as well as those of prospective employers; that is, those who work in processing plants may do so in part because they prefer such employment to construction employment and in part because the employment opportunities in construction may be limited due to the desire of contractors to hire from their traditional labor pools. To the degree that some processing plant workers remain in a distinct labor pool, the labor competition of the OCS industry will be less effective in attracting the labor which has traditionally been available to processing plants.

An additional aspect of the source of labor that determines the impact of labor competition is the size of the labor pool the fishing industry can utilize. If an almost inexhaustible source of labor is available, the labor requirements of the-fishing industry can be met despite large OCS labor requirements. For the traditional summer fisheries, the seafood processing sector of the industry has had access to such a labor pool . The large differential between the minimum and Alaska seafood processing wage and the high seasonal unemployment rates in the United States have resulted in an almost unlimited supply of seasonal workers in Alaska processing plants.

The harvesting sector of the industry also has access to a very large labor pool of prospective fishermen who are attracted to Alaska fisheries. This is demonstrated by the large number of letters fishing boat owners receive from such individuals and the ability of a competent skipper to turn such individuals into productive fishermen during one season.

Effects of OCS Activity on the Supply of Labor

The OCS labor requirements can adversely or beneficially impact the fishing industry. If the increase in labor demand due to OCS activity is greater than the increase in labor supply due to OCS activity, less labor is available for the fishing industry and the impact is detrimental. However, if the OCS activity results in the labor supply increasing more rapidly than demand, more labor is available for the fishing industry and the impact is-beneficial.

In the preceding sections, economic analysis is used to delineate factors that will tend to determine the impact of competition for labor. The proceeding sections provide additional insight into the nature of potential impacts by reviewing the impacts that have occurred in the past.

Cook Inlet 1961-1968

The petroleum development which occurred in the Lower Cook Inlet between 1961 and 1968 provides an opportunity to measure the extent to which such competition existed and affected the processing sector of the commercial fishing industry. The experience in Cook Inlet is particularly useful in measuring the potential impact of high levels of OCS onshore employment because the development there was at first exclusively on-shore and included the construction of several oil and gas processing plants.

The Cook Inlet and Alaska oil boom began with the Swanson River strike of 1957. Onshore production began in 1959 and offshore production began in 1965. Between 1961 and 1968 the petroleum development activities included: (1) the exploration for and/or development of six oil fields and 15 natural gas fields; (2) the construction of an 82-mile gas pipeline to connect the Kenai field with the Anchorage area; construction began in 1969; (3) the construction of marine terminal facilities at Port Nikiski, completed in 1961; (4) the construction of the Standard Oil Companyts refinery in 1962 and 1963; (5) the construction of offshore platforms, the first being completed in 1964; (6) the construction of pipelines connecting the offshore fields with on-shore facilities; (7) the construction of the Collier Carbon and Chemical Corp. ammonia plant, and the Collier Carbon and Chemical Corp. and Japan Gas-Chemical Co. urea plant; (8) the initiation of construction of the Phillips Petroleum Co. and Marathon Oil Co. liquified natural gas plant and the Alaskan Oil and Refining Co. refinery; and (9) the construction in 1961 of a 42 mile pipeline from Granite Point to the Drift River marine terminal and storage facilities which were completed the same year. This brief overview of the development which occurred between 1961 and 1968 is based on material in A Social and Economic Impact Study of Off-Shore Petroleum and Natural Gas Development in Alaska.

Employment data are not available for fish processing or the petroleum industry, but are available for groupings of industries which are dominated by one or the other. Employment related to the petroleum industry dominated mining and construction employment during the 1960s and fish processing was the principal source of employment in manufacturing. The employment in the former two sectors is, therefore, used as a proxy for employment in the petroleum industry, including petroleum-related construction. And manufacturing employment, minus an estimate of employment in the manufacturing of petroleum products, is used to represent fish processing employment.

A quick review of the employment, work force, and salmon harvest statistics presented in Table 4.4 indicates that the rate of increase in the labor force was sufficient to meet the growing employment requirements of the petroleum industry without adversely affecting employment in manufacturing. A more rigorous demonstration of the lack of an adverse effect is provided by the results of the following regression equations:

4.1 EM= 91.45 - 0.00156 CIS + 0.00312 RCS + 0.159 EC
t-statistics (-0.34) (2.00) (3.07) R^2 = 0.829 D-W = 1.51

4.2 EM = 65.60- 0.00242 CIS + 0.00348 RCS + 0.102 EMC
t-statistics (-0.56) (2.36) (3.48) R^2 =0.858 D-W = 1.09

4.3 EM= -95.61 - 0.00355 CIS + 0.00342 RCS + 0.0612 WF
t-statistics (-0.95) (2.84) (4.32) R^2 = 0.899 D-W = 2.37

where

EM = third quarter employment in manufacturing, excluding petroleum products; this is predominantly fish processing;

CIS = Cook Inlet salmon harvest in 1,000 pounds;

RCS = rest of Central Alaska salmon harvest;

EC = third quarter construction employment;

EMC = third quarter mining and construction employment;

WF = third quarter total civilian work force; the employment and work force statistics are for the Kenai - Cook Inlet labor market.

Equations 4.1 and 4.2 are used'to test the hypothesis that "increases in construction employment or increases in construction and mining employment, respectively, were at the expense of fish processing employment. The coefficients of EC and EMC are not, however, negative; they are significant

TABLE 4.4

UPPER COOK INLET COMMERCIAL FISHING AND PETROLEUM INDUSTRY STATISTICS 1961-1968

	Employment[1] (number of persons)						Salmon Catch (1,000 lbs)	
Year	Mining	Construction	Mining & Construction	Manufacturing Excluding Petroleum Products*	Total Employment	Working Force	Cook Inlet	Remainder of Central Alaska
1961	156	68	224	227	2,585	2,838	11,692	65,263
1962	219	149	368	286	3,477	3,724	34,133	110,709
1963	150	154	304	348	3,307	3,664	11,544	81,711
1964	233	182	415	511	3,551	3,807	25,140	121,249
1965	255	479	734	331	4,175	4,462	14,119	59,109
1966	458	582	1,040	447	5,160	5,537	27,393	89,252
1967	1,122	1,266	2,388	426	6,362	6,768	14,616	33,023
1968	1,183	1,800	2,983	544	7,985	8,136	29,004	82,823

[1] Third quarter employment July - August.

[2] Manufacturing employment minus the employment at the Standard Oil Company refinery, the latter was provided by a representative-of the Standard Oil Company.

Sources: Catch and Production, ADF&G 1961-1968
Statistical Quarterly and Workforce Estimates by Area, Employment and Security Division, Alaska Department of Labor 1961-1968

and positive which indicates that the hypothesis can be rejected with a high degree of confidence. The results of equation 4.3 provide an explanation of why the increased petroleum employment was not detrimental to fish processing. The coefficient of WF is positive and highly significant indicating that manufacturing (fish processing) employment increased as the work force increased. The increases in work force were primarily due to increased petroleum industry employment.

Commercial fishing industry sources associated with fish processing on the Kenai Peninsula during the period under investigation have also indicated that the supply of labor for processing plants was not adversely affected by the petroleum industry. Two individuals who held management positions in Kenai fish processing plants during the period of the Kenai " oil boom provided the following assessment of the impacts of the labor requirements of the petroleum industry. Petroleum industry activity did not adversely affect the supply of labor for fish processing because the fish processing labor force was dominated by students and women, for whom the petroleum industry offered limited employment opportunities, and because many of the petroleum related jobs were taken by people who were attracted to the area by the petroleum industry. Skilled workers in the fish processing plants were not hired away by the petroleum industry, which in part may have been due to the petroleum industry's desire to be a good neighbor and cause as little conflict with existing industries as possible. Fish processing wages did not increase significantly as a result of the petroleum industry's demand for labor. This is no doubt due to the fact that these two industries drew from distinct labor pools.

The North Slope

The petroleum development activities associated with Prudhoe Bay provide another opportunity to determine whether the labor force can increase rapidly enough to meet the volatile labor requirements of the petroleum industry, without decreasing the quantity of labor available to other industries. As the data in Table 4.5 indicate, there was a dramatic increase in construction and total employment in 1974. Much of this was due to the large construction projects associated with the development of the Prudhoe Bay oil field.

TABLE 4.5

ALASKA EMPLOYMENT AND WORK FORCE STATISTICS 1970 - 1977

Year	Contract Construction Employment	Total Civilian Employment	Total Civilian Work Force	Unemploy-ment	Unemployment Rate Alaska	Unemployment Rate U.S.
1970	6,893 -	99,000	109,000	10,000	9.1	4.9
1971	7,443	104,000	116,000	12,000	10.6	5.9
1972	7,893	110,000	123,000	13,000	10.6	5.6
1973	7,838	116,000	130,000	14,000	10.8	4.9
1974	14,066	134,000	149,000	15,000	10.2	5.6
1975	25,876	165,000	180,000	15,000	8.2	8.5
1976	30,233	176,000	195,000	19,000	9.7	7.7
1977	19,546	132,000	150,000	18,000	12.2	7.0

Sources: Alaska Department of Labor Statistical Quarterly 1970-1977, Federal Reserve Bank of San Francisco, Western Economic Indicators, November/December 1978.

Although the construction of the Trans Alaska Pipeline, the production facilities at Prudhoe Bay, and the marine terminal and storage facilities at Valdez directly and indirectly generated phenomenal increases in employment, the increases in employment were more than matched by increases in the size of the work force. The unemployment rate was lower during the peak years of construction (1975 and 1976) than it had been in the previous four years, but it remained high by U.S. standards and the number of unemployed actually increased.

The data for both Cook Inlet and the North Slope suggest that large increases in the demand for labor due to petroleum development activity can be more than met by increases in the work force. This does not imply that increased employment opportunities in the petroleum industry have not caused shortages in the supply of specific types of labor, but it does suggest that the total supply of labor tends to increase more rapidly than the total demand. There will, therefore, tend to be an excess supply of workers who are, at least temporarily, part of the pool of unskilled labor, and this is the major source of labor for fish processing.

North Sea

The experience of Scotland's commercial fishing industry, relative to petroleum development in the North Sea, can be used to determine the extent to which the large labor requirements of the petroleum industry can adversely affect the fishing industry. In this section, the Scottish experience, as outlined by John Sevy in Technical Report Number 28, is so used.

The Scottish experience reaffirms the belief stated previously that, to the extent that labor requirements of the petroleum industry adversely affect the commercial fishing industry, it is the processing sector, not the harvesting sector, that is affected. Sevy cites several references to the impact of petroleum development on fish processing employment. A brief summary of these citations and their applicability to the Gulf of Alaska is as follows. George Hunter has noted a decline in fish processing employment on the Shetland Islands, which he attributes to the higher job security offered by oil-related firms. Whether fish processing workers are paid an hourly wage, as they are in Alaska, or on a piece rate basis as Sevy indicates they are in Shetland, the irregularity of landings and resulting irregularity in hours worked per week or month does decrease income and job security. However, in Alaska the peak season for fish processing, and the period in which income and job security are the highest for fish processing workers are during the summer; so when the OCS demand for construction workers is at its height, there will typically be high job security in fish processing. The lack of job security in fish processing may, therefore, be less important in Alaska than Hunter suggests it was in Shetland. The seasonality of fish processing employment in Alaska and the degree of job security can be measured by dividing monthly employment by the average monthly employment for a year as a whole. When this is done using 1978 food processing employment data, the quotient for October through May ranges from 0.58 to 0.91 and the quotient for June through September ranges from 1.23 to 1.89. The implication is that fish processing employment is highly, although not exclusively, concentrated in the summer months. Hunter does not qualify the reduction in fish processing employment due to petroleum development, and Sevy provides a possible explanation why he does not; British employment statistics do not distinguish between fish processing and meat processing and the harvesting sector of the commercial fishing industry had been declining. It is, therefore, difficult to measure the decline in fish processing employment and even more difficult to determine what part of the decline was due to petroleum development.

Mackay agrees with Hunter that any adverse effects of the increased competition for labor have been concentrated on fish processing, not harvesting; he notes that less than 0.3 percent of the Shetland fishermen have taken employment directly related to the petroleum industry. Mackay indicates that the competition for labor is not only concentrated in fish processing, but within fish processing it has been focused on the skilled workers such as machine maintenance personnel. The competition for unskilled workers has had less effect because the unskilled employment in fish processing is female-intensive. The unskilled labor in Alaska fish processing can be characterized as highly transient and female-intensive; therefore, skilled fish processing workers are perhaps also more likely to be poached in Alaska, as Mackay suggests they are in the Shetlands. However, the access that most Alaska processors have to pools of skilled labor in the Pacific Northwest and the rest of the country should reduce the adverse affects of competition for skilled labor. It should be noted that Scottish fish processing plants had access to skilled labor in that there was high unemployment of both skilled and unskilled labor throughout much of Scotland; however, Scottish plants were apparently much less accustomed to accessing distant pools of labor than are Alaskan plants which are often managed from the Seattle area.

Mackay and Marr report that competition for labor was also concentrated on skilled labor in the Peterhead area. Steel indicates that, excluding fishermen, commercial fishing industry employment decreased by 20 percent in the Peterhead area between 1972 and 1976, but that only a negligible change occurred in Shetland. He does not, however, allocate the change to particular causes.

Perhaps what is best documented about impacts on the commercial fishing industry of the competition for labor generated by petroleum industry activity, as well as the other interactions between the petroleum and commercial fishing industries, is that the impacts and/or interactions are not well documented.

Commercial Fishing Industry Activities Potentially Affected by Competition for Labor

The preceding sections present an analysis of the factors which determine the extent to which competition for labor can be a source of impacts and an analysis of historical examples of competition for labor generated by the petroleum industry. The commercial fishing industry activities that can be affected by the competition for labor are the topic of this section.

The supply of labor available to the commercial fishing industry may increase, decrease, or not change as a result of OCS labor requirements. If it does not change, competition for labor is not a source of impacts, The impacts will tend to be favorable if it increases and detrimental if it decreases. Each case is examined below.

If OCS activities decrease the supply of labor available to the commercial fishing industry, the price of labor will increase; therefore costs will increase and activities constrained by market conditions will tend to decrease, These activities would typically include all processing activities and harvesting activities in fisheries for which quotas or local processing activities are binding constraints. The ability of the commercial fishing industry to respond to a decrease in the supply of labor is directly related to both the industry's ability to prepare for it and its duration. If there is little time to attempt to secure alternative sources of labor or to adopt labor-saving processing methods, the response will tend to be minimal, and the decreases in industry activity may be significant. The same will be true if the OCS impact on the price of labor is expected to be only temporary because the cost of responding may not be warranted by a temporary increase in the price of labor. In the extreme case, higher labor prices would make processing activities unprofitable, and processing activities would cease in the short run and perhaps also in the long run. It should be noted that an important determinant of the supply of labor is the availability of housing. OCS activities can decrease the supply of labor by hiring workers who were traditionally employed in the commercial fishing industry or by increasing the price of housing and thereby effectively reducing the housing available to the processing plant labor force.

OCS labor requirements are expected to primarily affect harvesting sector activities through their effects on processing activities. An increase in the price of labor which decreases processing activity will decrease the demand for fish and therefore tend to decrease exvessel prices; or in the extreme case, the termination of processing activities will eliminate the traditional market for fish. If harvesting activity is not constrained by market conditions, exvessel prices can decrease without decreasing fishing effort; income will of course decrease. If processing activities cease, alternative markets can be developed, but again the ability to respond is dependent on the time available and the duration of time for which an alternative market is necessary. For example, if local processing plants are expected to cease operations for only one season, the feasibility of developing a new market that will completely replace the traditional one is much less than if the existing processors are expected to permanently cease operations. However, the ability to fly fish out of a community for processing elsewhere greatly increases the probability of developing alternative markets on a temporary or permanent basis.

OCS labor requirements can increase the supply of labor available to the commercial fishing industry by attracting more labor to coastal communities than is required by the direct and indirect OCS labor requirements or by increasing population and thus increasing the number of secondary workers who are available. Such an impact would be particularly beneficial to fisheries which do not occur during the summer months in which sufficient numbers of transients are typically available to adequately supplement resident labor forces. An increase in the supply of labor would eliminate one barrier to extending the processing season in an area. In many instances, the availability of labor is not, however, the only binding constraint on the length of the processing season; therefore, an increase in the supply of labor may not be enough to significantly affect the level of harvesting or processing activity.

COMPETITION FOR OCEAN SPACE

The use of ocean space by the OCS industry will prevent fishing in some areas and will make fishing more costly in others. The objective of this section is to discuss the characteristics of the OCS industry use of ocean space that lead to this conclusion, the nature of these costs, and how these costs may potentially impact a fishery.

Offshore structures such as drilling and production platforms will prevent fishing in some areas, however, unless the number of such structures is extremely large, the proportion of a fishing ground that is lost due to such structures will be insignificant. For example, a platform with a diameter of 60.98 meters (200 feet) and a 500 meter (1,640 foot) safety buffer preempt 89 hectares (220 acres) of ocean space (Olsen, 1977, pp. 226). And unless the target species is sedentary or attracted to such structures, the decrease in catch will be less than proportional to the loss in fishing areas. The species under consideration are not sedentary. There is not sufficient biological information to determine the extent to which various species will be attracted to each structure.

In addition to preempting an area within a fishing ground, an offshore structure can also increase the cost of fishing in the remaining areas.

The increased costs can occur because the structure prevents the most efficient use of the remainder of the fishing ground or because of navigational hazards posed by the structure. The former can occur in a fishery which utilizes non-fixed gear such as trawls or long-lines. The latter can occur despite the fact that the positions of such structures are reported in Notices to Mariners and despite the fact that their presence is discernible from some distance by day or night. The cost associated with the navigational hazards such structures pose appears to be quite low; Coast Guard accident data indicate that collisions with such structures are infrequent, even in areas where there are a large number of such structures. This cost may, in fact, be offset by the navigational aid that such structures provide.

Submarine pipelines will preempt fishing grounds if fishing is prohibited in sections of the pipeline corridor. They will tend to make fishing more costly in the portion of the corridor in which fishing is permitted unless the pipe is buried and remains buried and no debris is left on the seafloor after the pipe laying and burying operations. Past experiences indicate that neither condition will be met; therefore, submarine pipelines are expected to increase the cost of harvesting activities.

Additional fishing costs would include gear losses and associated fishing time losses due to undersea obstacles associated with the pipeline, the cost associated with less efficient fishing patterns in non-fixed gear fisheries resulting from the position of the pipeline, and other costs incurred in avoiding pipeline-related gear losses. The avoidance costs would include the cost of additional onboard electronics that will allow a vessel to more readily avoid gear losses along the pipeline corridor. It would also include the additional cost of fishing in a less productive area if the pipeline corridor is through a highly productive fishing area and, to avoid gear losses, less productive areas must be fished.

It is not known how a submarine pipeline will affect biological relationships in each fishery; therefore, any discussion of a pipeline attracting fish and thus concentrating them in an area in which they can easily be caught, or not caught at all, is highly speculative. The same is true for other offshore structures.

Vessel traffic generated by OCS activity will also use areas of ocean space within fishing grounds. These vessels include supply boats, exploration rigs, survey vessels, barges used in the construction of submarine pipelines, barges and-tankers used to deliver the materials needed for OCS operations, production platforms prior to installation, tankers and LNG ships that will deliver the Gulf of Alaska oil and gas to markets elsewhere in the United States, and additional commercial traffic resulting from the population impacts of OCS activities. This additional vessel traffic will increase the cost of fishing. These costs will include the costs of gear losses and collisions that occur because of OCS generated marine traffic, and the costs incurred by fishermen in attempting to reduce the probability of such gear losses and collisions. The latter can include the cost of additional navigation equipment and the cost associated with having such marine traffic determine the areas fished.

Coast Guard marine accident data indicate that the number of collisions between fishing boats and the OCS generated marine traffic will probably be very small. Fishing vessels have been fairly successful in avoiding each other and other marine traffic in Alaska, and in areas where the volume of traffic is much greater and more concentrated than it is expected to be in the study area during this century. The sophisticated navigation equipment on many fishing boats and vessels associated with OCS activity, good seamanship, and good fortune greatly reduce, but do not eliminate, the probability of collisions.

East Coast fishermen report that they bear the cost of collision and gear loss avoidance; they indicate that supply boats, which comprise the bulk of the OCS marine traffic, often ignore the right-of-way of fishing boats, run through fishing grounds on automatic pilot, and consider it the fishermen's fault when fishermen do not do what the supply boat tells them to do (National Fisherman, October, 1975, p. B.3). Even under more ideal conditions, gear losses are expected to occur. The potential for gear loss is greater for fixed gear fisheries than for non-fixed gear fisheries, since fixed gear such as crab pots and long lines are left unattended.

There are two gear loss problems associated with fixed and unattended gear; its presence is marked by a buoy that is much more difficult to observe visually or on radar than a fishing boat and, when it is lost, the cause of the loss is not known. Therefore, it is difficult for a fisherman to gain compensation for his gear losses. The crab and shrimp pot fishermen are more susceptible to gear losses than are halibut 1 ong-liners because the concentration of pot gear in some areas greatly increases the probability of gear losses when any OCS marine traff' c enters the area. The necessity to completely avoid an area of pot gear to avoid gear losses is evidenced by the successful efforts of West Coast crab fishermen and tug boat operators to all but eliminate what were once substantial" gear losses. This was accomplished by identifying routes that the tugs and barges could use to avoid areas of heavy pot concentrations. Hal·but longline gear, which can extend for several miles and is marked only at the buoyed ends, is more vulnerable to vessels that have an exceptional draft or are dragging gear. Survey vessels are among those for which such gear provides a large but unobservable target. *

Non-fixed gear such as trawls, purse seines, and dredges is continuously monitored by and is in the relative proximity of the fishing boat; therefore, gear losses to marine traffic are more readily avoided than for fixed gear. However, the size of the gear and the lack of maneuverability of a vessel using such gear can result in gear losses to marine traffic under adverse conditions. The greatest source of gear losses to non-fixed gear is, however, expected to result not from marine traffic but from debris that results from marine traffic and other submarine obstacles that result from OCS activity.

Debris on the seafloor has been a problem in areas of offshore petroleum development despite prohibitions on intentional dumping and despite regulations requiring that the location of unintentional dumpings be reported. Evidence from the North Sea, Upper Cook Inlet, and the Gulf of Mexico suggests that the OCS debris problem can be reduced but not eliminated. Therefore, gear losses will occur because of debris that results from OCS operations and the cost of such losses, in many cases, will be borne by the fishermen because in many instances it is difficult to determine whether it was, in fact, OCS debris that caused the loss.

The ability of a single undersea obstacle to continuously result in gear losses is demonstrated by a well-head in the Santa Barbara Channel, which claimed the gear of five or more vessels over a period of several years before it was removed (National Fisherman, January, 1979, p. 38). There are several factors which make even known undersea obstacles hazardous. Fishermen may consider information on undersea obstacles to be proprietary, once they have found it at their own expense (in terms of gear loss and lost fishing time). Also, the exact location of such an obstacle may be difficult to determine, even after gear is lost, and information that the Coast Guard provides on the location of known obstacles is not in a form most readily usable by fishermen. The last problem existed in the Santa'Barbara Channel because fishermen used loran A or C for navigation, but the location of obstacles as provided by the Coast Guard was in terms of latitude and longitude. An additional problem was that oil companies used the Lambert Grid system, which is different from the systems used by either the fishermen or the Coast Guard (National Fisherman, January, 1979).

If OCS uses of ocean space increase the cost of fishing, and if the fishermen cannot typically be compensated by the OCS industry because of the physical, legal, and theoretical difficulties associated with identifying the party responsible or the magnitude of the increased costs, the relevant question is, how will the increased costs affect harvesting activity? The answer to this question is less obvious than it is relevant.

If the binding constraint on harvesting activity is resource abundance and the subsequent quota, there is a margin within which costs can increase without causing harvesting activity to decline. In such a fishery, the sole effect of a cost increase within that margin would be a decrease in net income to the fishermen and/or boat owner. If entry into such a fishery is limited, the additional fishing costs would tend to reduce the value of the limited entry permit; in this case the burden of increased fishing costs is borne by those who own permits at the time when it is generally recognized that the cost of fishing will be higher due to OCS operations. New entrants into the fishery would not bear the higher costs if the price of the entry permit accurately reflects the increases in fishing cost that will result from such operations. It should also be noted that the margin within which costs can increase without reducing harvesting activity will tend to be larger for the limited entry fisheries, since much of the adjustment can occur through a decrease in the price of the limited entry permit.

Since costs and productivity vary among boats in any one fishery, the margins within which costs can increase without affecting harvesting vary. The least efficient boats will be the first to decrease harvesting effort, and as they do so, the harvesting activity of the more efficient boats will tend to increase as long as resource abundance remains the binding constraint for the fishery as a whole. In this case, the number of boats and fishermen participating in a fishery will be reduced but catch will not change, and the net income of fishermen and/or boat owners may increase. If the increase in costs due to OCS operation is less than the decrease in cost that occurs as fishing effort becomes concentrated among the more efficient boats and fishermen, net income will increase.

If market conditions impose the binding constraint, an increase in fishing costs will result in a decrease in harvesting effort unless ex-vessel prices are increased to compensate fishermen for the additional costs. However, since seafood products are quite mobile between areas and, therefore, tend to compete interregionally prior to processing, and since processed forms from different regions compete in the same markets, large exvessel price differentials are not possible. Small exvessel price differentials are possible and may be sufficient to compensate fishermen for increased costs.

If exvessel prices are not increased to compensate fishermen, harvesting activity will decrease. The least efficient boats would be the first to reduce their effort and, as they do so, the effort of the remaining boats may increase as the resources per boat increase. It is therefore possible, however unlikely, that the total harvest will not decrease.

It should be noted that replacing the activity of less efficient boats with increased activity among the more efficient boats is beneficial in that it tends to decrease the total cost of the harvest exclusive of gear loss costs; however, it reduces the number of fishermen who are employed in a specific fishery. The decrease in employment is an adverse effect to the extent that unemployed fishermen cannot readily find alternative employment.

If total harvest does decrease as a result of the increase in fishing cost caused by OCS operations, processing activity in the local community will also tend to decrease unless the decrease in harvest is matched by a decrease in sales to non-local processors, or unless the decrease in the harvest available to local processors can be offset by increased imports of fish from other areas.

The conclusions are as follows:

- OCS uses of ocean space will increase the cost of fishing in the areas of joint use.
- The increase in fishing costs may be minimal and not decrease harvesting effort.
- A decrease in harvesting effort may be possible without decreasing catch.
- If catch decreases, local processing activity need not, but probably will, decrease.

COMPETITION FOR THE SERVICES OF THE INFRASTRUCTURE

The OCS industry requirements for the services of the infrastructure of the coastal communities will be substantial. If these requirements cannot be met without decreasing the services that would otherwise be available to and used by the commercial fishing industry, OCS operations will adversely affect the fishing industry. However, there are economies of scale associated with such services; if the OCS operations result in increases in the supply of these services that meet the OCS requirements, and also increase the supply and/or quality of the services available to the commercial fishing industry, the effect is beneficial. The services that are considered in this report are water, electric power, and port and harbor facilities.

Although the impact of competition for these services will depend upon the rates at which the supply of and demand for each service increase in each community, the general characteristics of the service requirements of the two industries, and past experiences of OCS and fishing industry competition for services, provide scme general guidance in determining what the impacts may be. The remainder of this section summarizes information from such experiences in the Upper Cook Inlet and the North Sea, and addresses the characteristics of the requirements. The summary of the Cook Inlet experience is based on information provided by two individuals who have held management positions in the Cook Inlet fish processing industry since the beginning of the Upper Cook Inlet oil boom. The summary of the North Sea experience is based on material presented by Sevy in Technical Report Number 28.

It was reported that Upper Cook Inlet petroleum development did not adversely affect the supply of public services to the commercial fishing industry. A beneficial impact on the infrastructure, although not on the supply of public services, was said to be the establishment of businesses which existed to provide specialized services to the petroleum industry but which were also used by the fishing industry. Examples of such businesses or services would include underwater welding and marine electronics repair.

For the services for which the two industries will tend to compete, the impact will be determined by the rates of increase in the supply of and demand for these services as a result of OCS operations, and by the ability of the fishing industry to find alternative inputs if the changes in supply and demand are adverse. For other services, the characteristics and/or practices of the two industries will reduce or eliminate competition. The ability of the fishing industry to adapt when confronted with a lack of services and the factors that reduce competition are discussed below.

The commercial fishing industry has demonstrated a remarkable ability to survive and make do when "required" services are not available. An example of this is the fishing industry that continues to expand in Dutch Harbor/Unalaska despite the fact that adequate water, electric power, and port or harbor facilities are not provided by the community. When such services were not provided, the fishing industry has been capable of providing its own sources of services. Processing plants use diesel generators to produce their own electric power; and since many communities also use this high-cost method, the cost differential of generating their own electric power is minimal. Wells can often be drilled when the municipal water system is inadequate, and freighters with self-contained cargo handling equipment can be used when only minimal port facilities are available. The height to which self-sufficiency can be taken is demonstrated by the completely self-contained processing barges which have recently been built. The barges can receive fish on the fishing grounds directly from fishing boats, process the fish using workers who are hired for the duration of the season and who live onboard, and load the processed fish directly onto ships or barges bound for markets in Seattle or Japan.

The characteristics of the water and electric power required by the two industries are quite similar; therefore their requirements will tend to be competitive. However, their requirements for port and harbor facilities are sufficiently diverse to greatly reduce the effective competition of the OCS service requirements. The small boat harbors that provide moorage facilities for most commercial fishing boats in the study area are not designed to accommodate vessels as large as the smallest OCS vessels; these vessels will therefore not compete for moorage in the small boat harbors. However, there are two reasons why competition for moorage space will occur outside the small boat harbors until OCS vessels use only facilities that are built for their exclusive use. The reasons are that the small boat harbors are not large enough to provide moorage for all the fishing boats seeking it, nor are they large enough to service the larger fishing boats that are becoming more numerous. These vessels tie up wherever possible and, in many cases, temporarily use the facilities that will be used by OCS vessels before their own facilities are available.

The desire of the OCS industry to have facilities dedicated to OCS vessels in order to assure that the facilities are available when required, once it becomes apparent that a community will be the site of field development support activities, will eliminate the competition between fishing boats and OCS boats for moorage space. However, this may also preclude the benefit to be had from development of a harbor facility that could both serve the OCS industry and provide better service to the fishing industry than is currently available from the small boat harbors. The OCS harbor requirements could provide the impetus necessary for construction of a more adequate facility. It should be noted that the larger fishing boats are quite similar in dimension to OCS supply boats, in fact, the Alaska fishing fleet includes several vessels that were originally OCS supply boats or were built using the basic design of such boats.

This section has completed the review of past experiences of the interaction between the commercial fishing and OCS industries and the general analysis of the potential impacts OCS operations may have on a commercial fishing industry. In the following section, this information is used, together with the material presented in the first section of this chapter, to discuss the area- and scenario-specific impacts that may occur.

Potential Impacts

The nature of the potential impacts is sufficiently similar for each resource scenario and each commercial fishing industry that they can most efficiently be discussed together by source of impact. The discussion of the potential impacts due respectively to the competition for labor, ocean space use, and infrastructure services is followed by a summary of potential impacts by scenario by commercial fishing industry.

COMPETITION FOR LABOR

The preceding analysis of potential impacts of the competition for labor includes a discussion of a number of factors that will tend to moderate this competition and perhaps result in beneficial impacts. These factors, together with the projected magnitude of the OCS labor requirements, excluding direct labor requirements for OCS onshore construction projects, and other salient local factors are combined in this section to determine the potential effects of this competition for each resource scenario and each community. The labor requirements for the onshore construction projects are expected to have a minor effect on the fishing industry because the construction work force is assumed to primarily consist of transient workers who will be housed in onsite construction camps, and because the projects are sufficiently large to attract enough labor to an area so that the fishing industry employees which are lost can be replaced with new arrivals. The assumption that construction workers will primarily consist of transients is used in other SESP reports. It is a critical assumption because construction and fish processing use large amounts of relatively unskilled labor and because the wage in construction is expected to be significantly higher than that in fish processing. Therefore, if the construction workers are not primarily transients and if the construction projects do not attract enough labor to an area to meet the construction labor requirements, construction employment would be expected to occur at the expense of processing employment. The experiences of the oil boom in the Upper Cook Inlet and the Trans-Alaska Pipeline cited in an earlier section indicate that large construction projects tend to attract more labor than is required directly or indirectly by such projects.

Low Find Case

The projected increases in employment in Central and Southern Cook Inlet resulting from Lease Sale Number 60 are minimal and predominantly in highly skilled areas; therefore, the impact on the fishing industry is expected to be negligible (see Tables 4.6 and 4.7).

Mean Find Case.

The mean find case OCS labor requirements in Central Cook Inlet are not expected to have a significant impact on the commercial fishing industry centered in this area. With the exception of a few years, the OCS labor requirements are not substantial and/or they are almost matched by projected increases in population, indicating that the supply of labor will increase to meet the OCS labor requirements (see Table 4.8). The rates of growth of employment for the base case and mean find case are typically less than 1 percent different and in no year is the difference greater than 2 percent. The largest difference between the base case and mean case employment levels is 4.7 percent.

TABLE 4.6

CENTRAL COOK INLET, PROJECTED IMPACTS ON POPULATION AND EMPLOYMENT
LEASE SALE NUMBER 60, LOW FIND CASE 1980-2000

	Employment			Population			Percentage Change due to OCS Activity		Annual Rate of Growth: Employment		Annual Rate of Growth: Population	
Year	Non OCS	OCS	Total	Non Ocs	OCS	Total	Employ-ment	Popu-lation	Non Ocs	Total	Non OCS	Total
1980	52?5	o	5225	14616	0	14616	0	0	0	0	0	0
1981	5341	68	5409	14940	170	15110	1.3	1.1	2.2	3.5	2.2	3.4
1982	5461	89	5550	15277	222	15499	1,6	1.5	2.2	2.6	2.3	2.6
1983	5586	20	5606	15627	50	15677	0.4	0.3	2.3	1.0	2.3	1*1
1984	5739	0	5739	16047	0	16(-)47	0	0	2.7	2.4	2.7	2.4
1985	5927	0	5927	16556	0	16556	0	0	3.3	3.3	3.2	3.2
1986	6219	0	6219	17327	0	17327	0	0	4.9	4.9	4.7	4.7
1987	6412	0	6412	17852	0	17852	0	0	3.1	3.1	3.0	3.0
1988	6661	n	6661	18516	0	18516	0	0	3.9	3.9	3.7	3*7
1989	666(I	0	6660	18557	0	18557	0	0	-0.0	-0.0	0.2	0.2
1990	6816	0	6816	18992	o	18992	0	0	2.3	2.3	2.3	2.3
1991	6928	0	6928	19318	0	19318	0	0	1.6	1.6	1.7	1.7
1992	7100	0	7100	19795	0	19795	0	0	2.5	2.5	2,5	2.5
1993	7261	0	7261	20246	0	20246	0	0	2.3	2,3	2.3	2.3
1994	7433	0	7433	20727	0	20727	0	0	2.4	2.4	2,4	2.4
1995	7602	0	7602	21200	0	21200	0	0	2.3	2.3	2,3	2.3
1996	7781	0	7781	21702	0	21702	0	o	2.4	2.4	2.4	2.4
1997	7911	0	7911	22079	0	22079	0	0	1.7	1.7	1.7	1.7
1998	8058	0	8058	22503	0	22503	o	0	1.9	1*9	1.9	1.9
1999	8050	0	8050	22540	0	22540	0	o	-0.1	-0.1	O*2	0.2
2000	8246	n	8246	23088	0	23088	0	0	2.4	2.4	2,4	2.4

TABLE 4.7

SOUTHERN COOK INLET, PROJECTED IMPACTS ON POPULATION AND EMPLOYMENT
LEASE SALE NUMBER 60, LOW FIND CASE 1980-2000

	Employment			Population			Percentage Change due-to OCS Activity		Annual Rate of Growth: Employment		Annual Rate of Growth: Population	
Year	Non OCS	Ocs	Total	Non Ocs	OCS	Total	Employ-ment	Popu-lation	Non OCS	Total	Non OCS	Total
1980	1746	0	1746	5213	0	5213	0	0	0	0	0	0
1981	1818	72	1890	5429	180	5609	4.0	3.3	4.1	8.2	4.1	7.6
1982	1901	99	2000	5678	247	5925	5.2	4,4	4.6	5.8	4.6	5.6
1983	1980	19	199'3	5916	48	5964	1.0	0.8	4.2	-0.1	4.2	O * 7
1984	2073	n	2073	6191	0	6191	0	0	4.7	3*7	4.6	3.8
1985	2224	0	2224	6616	0	6616	0	0	7.3	7.3	6.9	6.9
1986	2459	0	2459	7249	0	7249	0	0	10.6	10.6	9.6	9.6
1987	2616	0	2616	7688	0	7688	0	0	6.4	6.4	6.1	6.1
1988	2806	0	2806	8214	[]	8214	0	0	7.3	7.3	6.8	6.8
1989	2770	0	2770	8178	0	8178	0	0	-1*3	-1.3	-0.4	-0.4
1990	2899	0	2899	8558	0	8558	0	0	4.7	4.7	4.6	4.6
1991	2931	0	2931	8739	0	8739	0	0	1.1	1*1	2.1	2.1
1992	3035	0	3035	8983	0	8983	0	0	3.5	3.5	2.8	2.8
1993	3127	()	3127	9259	0	'3259	0	0	3.0	3.0	3.1	3.1
1994	3?22	0	3222	9544	0	9544	0	0	3.0	3.(3	3.1	3,1
1995	3320	0	3320	9838	0	9838	0	0	3.0	3.0	3.1	3.1
1996	3423	o	3423	10147	0	10147	0	0	3.1	3.1	3.1	3.1
1997	3493	0	3493	10373	0	10373	0	0	2.0	2.0	2.2	2.2
1998	3566	0	3566	10612	0	10612	0	0	?.1	2.1	2.3	2.3
1999	3501	0	3501	105(-)3	0	10503	0	0	-1,8	-1.%	-1.(-I	-1.0
2000	3619	0	3619	10857	0	10857	0	0	3.4	3.4	3*4	3.4

TABLE 4.8

CENTRAL COOK INLET, PROJECTED IMPACTS ON POPULATION AND EMPLOYMENT
LEASE SALE NUMBER 60, MEAN FIND CASE 1S80-2000

	Employment			Population			Percentage Change due-to OCS Activity		Annual Rate of Growth Employment		Annual Rate of Growth Population	
Year	Non Ocs	Ocs	Total	Non OCS	OCS	Total	Employ-ment	Popu-lation	Non Ocs	Total	non Ocs	Total
1980	5225	0	5225	14616	o	14616	0	0	0	0	0	0
1981	5341	6 8	5409	14940	170	15110	1.3	1.1	2.2	3.5	2.2	3.4
1982	5461	89	5550	15277	222	15499	1.6	1.5	2.2	2.6	2.3	2.6
1983	5586	89	5675	15627	222	15849	1.6	1.4	2.3	2.3	2.3	2.3
1984	5739	60	5799	16047	150	16197	1*O	0.9	2.7	2,2	2.7	2.2
1985	5927	4	5931	16556	105	16661	0.1	0.6	3.3	2.3	3,2	2.9
1986	6219	126	6345	17327	315	17642	2.0	1.8	4.9	7.(-)	4.7	5.9
1987	6412	195	6607	17852	488	18340	3.0	2.7	3.1	4.1	3.0	4.0
1988	6661	217	6878	18516	543	19059	3.3	2.9	3.9	4.1	3.7	3.9
1989	6660	314	6974	18557	785	19342	4.7	4.2	-0.0	1.4	0.2	1.5
1990	6816	314	7130	18992	785	19777	4.6	4*1	2.3	2.2	2.3	2.2
1991	6928	277	7200	19318	680	19998	3.9	3.5	1.6	1.0	1.7	1.1
1992	7100	182	7282	19795	455	20250	2.6	2.3	2.5	1.1	2.5	1.3
1993	7261	234	“?495	20246	585	20831	3.2	2.9	2.3	2.9	2.3	2.9
1994	7433	234	7667	20727	585	21312	3.1	2.8	2.4	2.3	2.4	2.3
1995	7602	234	7836	21200	585	21785	3.1	2.8	2.3	2.2	2.3	2.2
1996	7781	234	8015	?1.7(-)2	585	22287	3.0	2.7	2.4	2.3	2.4	2.3
1997	7911	234	8145	22079	585	22664	3.0	2.6	1.7	1.6	1*7	1.7
1998	8058	234	8292	22503	585	23088	2.9	2.6	1.9	1.0	1.9	1.9
1999	8050	234	8284	22540	585	23125	2.9	2.6	-0.1	-0,1	0.2	0.2
2000	8246	234	/3480	23088	585	23673	2.8	2.5	2.4	2.4	2.4	2.4

The mean case OCS labor requirements in Southern Cook Inlet are roughly equivalent to those in Central Cook Inlet in absolute terms; however, in relative terms they are significantly higher since base case employment is much lower in the Southern Cook Inlet. The difference between the rates of employment growth for the base and mean find cases exceeds 4 percent in 1986 but is often less than 1 percent (see Table 4.9). The difference between the base case and mean find case levels of employment approaches 11 percent in 1989 and typically exceeds 6 percent. The Lease Sale Number 60 labor requirements are substantial enough in a number of years that fish processing plants would be expected to have difficulty meeting their labor requirements if the population and labor force were not expected to increase almost as rapidly as employment. Similar rates of growth of employment and population are, however, expected (see Table 4.9).

High Find Case.

Prior to 1987, the Central Cook Inlet high find case employment projections are less than 2.1 percent greater than the base case projections. After 1987, the difference is as high as 11.5 percent but it is typically from 6 to 8 percent (see Table 4.10). The high find case employment differential does not, however, result in vastly different rates of growth; the differences in the rates of growth never exceed 3.1 percent and are generally less than 1 percent. The factors that will tend to diminish the adverse impacts that OCS labor requirements may have on fish processing activities in Central Cook Inlet are discussed below.

TABLE 4.9

SOUTHERN COOK INLET, PROJECTED IMPACTS ON POPULATION AND EMPLOYMENT
LEASE SALE NUMBER 60, MEAN FIND CASE 1980-2000

	Employment			Population			Percentage Change due-to OCS Activity		Annual Rate of Growth: Employment		Annual Rate of Growth: Population	
Year	Non OCS	Ocs	Total	Non OCS	OCS	Total	Employ-ment	Popu-lation	Non Ocs	Total	Non Ocs	Total
1980	1746	0	1746	5213	0	5213	0	0	0	0	0	0
1981	1818	72	1890	5429	180	5609	4.0	3.3	4.1	8.2	4.1	7.6
1982	1901	99	2000	5678	247	59?5	5.2	4.4	4.6	5.8	4.6	5.6
1983	1980	99	2079	5916	247	6163	5.0	4.2	4.2	309	4.2	4.0
1984	2073	64	2137	6191	160	6351	3.1	2.6	4.7	2.8	4.6	3.1
1985	2224	4	2228	6616	1.0	6626	0.2	0.2	7.3	4.3	6.9	4.3
1986	2459	112	2571	7249	280	7529	4.6	3.9	10.6	1504	9.6	13.6
1987	2616	187	2803	7688	468	8156	7.1	6.1	6.4	9.0	6.1	8.3
1988	2806	215	3021	8214	537	8751	7.7	6.5	7.3	7.8	6.8	7*3
19.%9	2770	303	3073	8178	75/3	8936	10.9	9.3	-1.3	1*7	-0,4	2.1
1990	2899	303	3202	8558	758	9316	10.5	8.9	4.7	4.2	4.6	4.3
1991	2931	276	3207	8739	690	9429	9.4	7.9	1.1	0.2	2.1	1.2
1992	3035	187	3?22	8983	468	9451	6.2	5.2	3.5	0.5	2*B	0.2
1993	3127	22R	3355	9259	570	9829	7.3	6.2	3.0	4.1	3.1	4.0
1994	3222	228	3450	9544	570	10114	7.1	6.0	3.0	2.8	3.1	2.9
1995	3320	228	3548	9838	570	104(-)8	6.9	5.8	3.0	2.8	3.1	2.9
1996	3423	228	3651	10147	570	10717	6.7	5.6	3.1	2.9	3.1	3.0
1997	3493	228	3721	10373	570	10943	6.5	5.5	2.0	1*9	2.2	2.1
1998	3566	228	3794	10612	570	11182	6.4	5.4	2*1	2*O	2.3	?,2
1999	3501	228	3729	10503	570	11073	6.5	5.4	-1.8	-1.7	-1.0	-1*O
2000	3619	228	3847	10857	570	11427	6.3	5.3	3.4	3.2	3.4	3.2

TABLE 4.10

CENTRAL COOK INLET, PROJECTED IMPACTS ON POPULATION AND EMPLOYMENT
LEASE SALE NUMBER 60, HIGH FIND CASE 1980-2000

	Employment			Population			Percentage Change due to OCS Activity		Annual Rate of Growth			
									Employment		Population	
Year	Non OCS	Ocs	Total	Non Ocs	OCS	Total	Employ-ment	Popu-1 ati on-	Non Ocs	Total	Non Ocs	Total
1980	5225	n	5225	14616	0	14616	0	0	0	0	cl	0
1981	5341	6 6	5407	14940	165	151(-)5	1*2	1.1	2*2	3.5	2.2	3*3
1982	5461	112	5573	15277	280	15557	2.1	1.8	2.2	3.1	2.3	3.0
1983	5586	112	5698	15627	280	15907	2.0	1.8	2.3	2.2	2.3	2.2
1984	5739	112	5851	16(-)47	280	16327	2*O	1*7	2.7	2.7	2.7	2.6
1985	5927	109	6036	16556	272	16828	1.8	1.6	3*3	3.2	3.2	3.1
1986	6?19	126	6345	17327	314	17641	2*O	1.8	4.9	5,1	4.7	4.8
1987	6412	307	67s9	17852	-167	18619	4.8	4.3	3.1	5.9	3.0	5.5
1988	6661	524	7185	18516	1310	19826	7.9	7*1	3.9	6.9	3,7	6.5
1989	6660	746	7406	18557	1865	29422	1102	10*1	-0.0	3.1	0.2	3*O
1990	6816	784	7600	18992	1960	20952	11.5	10*3	2.3	2.6	2.3	2.6
1991	6928	714	7642	19318	1785	21103	10.3	9.2	1.6	0.6	1.7	0.7
1992	7100	602	7702	19795	1505	21300	8.5	7.6	2.5	0.8	2.5	0.9
1993	7261	604	7865	20246	1510	21756	8.3	7.5	2.3	2.1	2.3	2*1
1994	7433	632	8065	20727	1580	223o7	8.5	‘1.6	2,4	2.5	2.4	2.5
1995	7602	658	8260	21?(-)()	1645	22845	8.7	7.8	2.3	2.4	2.3	2.4
1996	7781	658	8439	21702	1645	23347	8.5	7*6	2.4	2.2	2.4	2.2
1997	7911	609	8520	22079	1522	23601	7,7	6.9	1.7	1.0	1.7	1.1
1998	8058	572.	9630	22503	1430	23933	7.1	6.4	1.9	1.3	1.9	1.4
1999	8050	546	8596	22540	1365	23905	6.8	6.1	-0.1	-0.4	0.2	-0*1
2000	8246	492	8738	23088	1230	24318	6.0	5.3	2.4	1.7	2.4	1*7

The large differences between the base case and high find case employment projections, with respect to either the level of employment or the rate of change in employment, do not occur until the later stages of the development phase and the early stage of the production phase. Therefore, there is sufficient time between the discovery of commercially viable fields and the larger increases in OCS labor requirements to allow communities and the OCS and commercial fishing industries to effectively plan to respond to the OCS labor requirements. The ready access that the Cook Inlet commercial fishing industry has to the large labor force in Anchorage will also diminish any adverse impact of the OCS-generated competition for labor. Finally, the nature of the OCS labor force will diminish any adverse impact. During the period in which the OCS labor requirements are expected to cause the greatest impact on employment, the OCS labor force will consist primarily of crews that are rotated from the onshore facilities on Afognak Island, production platforms, and supply boats to places of residence on the Kenai Peninsula. These crews are expected to consist primarily of head of households and are therefore part of the primary labor force of an area, not part of the secondary labor force which consists of spouses and children who work to supplement the income generated by the head of the household. The latter section of the total labor force is a principal source of labor for fish processing plants. Therefore, since the OCS industry will not significantly use the latter sector of the labor force, any adverse impacts will be diminished; and since the OCS use of the former sector of the labor force will increase the population and the supply of secondary workers, the OCS labor requirements are expected to increase the supply of labor available to fish processing plants. Data included in Table 4.10

indicate that population is expected to increase as rapidly as employment. The importance of a large secondary labor force and the ability of fish processing plants to compete very successfully for such labor in an expanding economy is demonstrated by the recent growth in fish processing in the Anchorage area.

The high find case employment impact projections for Southern Cook Inlet are similar to those for Central Cook Inlet in absolute terms, but are significantly higher with respect to base case employment. The difference between the projected employment levels of the base case and high find case ranges from 4 percent at the beginning of exploration activities, to 26.9 percent at the beginning of the production phase, and back down to 13.3 percent by 2000 (see Table 4.11). The difference in the rates of growth of base case and high find case employment ranges from less than zero to approximately 7 percent. The OCS labor requirements appear to be sufficient to adversely affect the supply of labor to the commercial fishing industry if it were not for the mitigating factors discussed above. The projected increase in population and the secondary labor force is a mitigating factor which may benefit the commercial fishing industry. The presence of a larger year-round labor force is of particular importance in the development of a groundfish industry.

The commercial fishing industry of Shelikof Strait is not expected to be measurably affected by the OCS labor requirements of the high find case or the other cases. The fish processing which occurs on Shelikof Strait relies almost exclusively on labor which is recruited from elsewhere in Alaska or the United States. The processing activity which

TABLE 4.11

SOUTHERN COOK INLET, PROJECTED IMPACTS ON POPULATION AND EMPLOYMENT
LEASE SALE NUMBER 60, HIGH FIND CASE 1980-2000

Year	Employment			Population			Percentage Change clue to OCS Activity		Annual Rate of Growth: Employment		Annual Rate of Growth: Population	
	Non Ocs	OCS	Total	Non OCS	Ocs	Total	Employ-ment	Popu-lation	Non Ocs	Total	Non Ocs	Total
1980	1746	0	1746	5213	0	5213	0	0	0	0	0	0
1981	1818	73	1891	5429	183	5612	4.0	3.4	4.1	8.3	4.1	7.7
1982	1901	1?(-I	2021	5678	300	5978	6.3	5.3	4,6	6.9	4.6	6.5
1983	1980	120	2100	5916	300	6216	6.1	5.1	4,2	3.9	4,2	4.0
1984	2073	120	2193	6191	300	6491	5.8	4.8	4.7	4.4	4.6	4.4
1985	2224	114	2338	6616	285	6901	5.1	4*3	7.3	6*6	6.9	6.3
1986	2459	116	2575	7?49	290	7539	4.7	4*O	10.6	10*1	9.6	9.2
1987	2616	300	?916	7688	750	8438	11.5	9.8	6.4	13.2	6.1	11.9
1988	2806	503	3309	8214	1258	9472	17.9	15.3	7.3	13.5	6.8	12.3
1989	2?70	7/,4	3514	8178	1860	10038	?6.9	22.7	-1.3	6.2	-0.4	6.0
1990	2899	75Q	3658	8558	1898	10456	26.2	22.2	4.7	4.1	4.6	4.2
1991	2931	697	3628	8739	1742	10481	23.8	19.9	1.1	-0.8	2.1	0.2
1992	3035	595	3630	8983	1487	10470	19.6	16.6	3.5	0.1	2.8	-0.1
1993	3127	585	3712	9259	1462	107?1	18.7	15.8	3.0	2.3	3.1	?.4
1994	3222	613	3835	9544	1532	11076	19.0	16.1	3.0	3.3	3.1	3,3
1995	3320	639	3959	9838	1597	11435	19.2	16,2	3*O	3.2	3*1	3.2
1996	3423	639	4062	10147	1597	11744	18.7	15.7	3.1	2.6	3.1	2.7
]997	3493	602	4095	10373	1505	11$7$3	17.2	14*5	2.0	0.8	2.2	1.1
1998	3566	569	4135	10612	1423	12035	16.0	13.4	2.1	1.0	2.3	1.3
1999	3501	540	4041	10503	1350	11853	15.4	12.9	-1.8	-2.3	-1.0	-1*5
2000	3619	482	4101	10857	1205	12062	13.3	11*1	3.4	1*5	3.4	1.8

occurs in the City of Kodiak, as the result of the Shelikof Strait harvest, is not expected to be affected by the OCS labor requirements of Lease Sale Number 60 because the impacts on employment in the City of Kodiak are assumed in the petroleum development scenarios to be negligible.

COMPETITION FOR OCEAN SPACE USE

Area-specific information about the nature and location of ocean space use by the commercial fishing and OCS industries is presented in this section. It is used, together with the previously presented analysis of the competition for ocean space, to determine the potential impact of OCS use of ocean space.

The extent to which OCS uses of ocean space will increase fishing costs in a particular fishery will depend on the extent to which the fishing grounds of each fishery are used for OCS operations and on the nature of the fishing and OCS operations in areas of joint use. All of the fisheries considered in this report will compete with the OCS industry for ocean space because principal fishing grounds of each fishery are included in areas identified for OCS use.

The degree of joint use, however, varies by fisheries and by OCS petroleum scenario. After a brief discussion of the projected levels of OCS ocean space use, the potential conflicts are discussed by gear type since gear type is a major determinant of potential conflicts. The projected levels of OCS ocean space use resulting from each of the three petroleum scenarios are summarized in Tables 4.12 through 4.14. It should be

Table 4.12

PROJECTED INCREMENTAL OFFSHORE OCS ACTIVITY,
LOW FIND CASE
LEASE SALE NUMBER 60

Maximum Number of:	
Exploration Rigs	
Lower Cook Inlet	2
Shelikof Strait	2
Production Platforms	0
Supply Boats, Round-trip/month	
from Nikiski	32
from Homer	16
from Shelikof Strait	24
Supply Boat Berths	
Nikiski and Homer	0
Shelikof Strait	1
Oil Tanker Traffic, Round-trip/year	0
LNG Ship Traffic, Round-trip/year	0
Incoming Barges/year	
Nikiski	2
Homer	1
Incoming Tankers/year to Supply OCS Fuel Requirements	
Homer	2
Inboard Barges/year Pipe Laying Operations	0

Source: Peter Eakland and Associates, 1979.

Table 4.13

PROJECTED INCREMENTAL OFFSHORE OCS ACTIVITY,
MEAN FIND CASE,
LEASE SALE NUMBER 60

Maximum Number of:	
. Exploration Rigs	
Lower Cook Inlet	2
Shelikof Strait	2
Production Platforms	
Lower Cook Inlet	1
Shelikof Strait	1
Supply Boats, Round-trip/month	
from Nikiski	15
from Homer	10
from Afognak	83
Supply Boat Berths	
Nikiski	0
Homer	0
Afognak	3
Oil Tanker Traffic, Round-trip/ year	
from Drift River	43
from Afognak	76
LNG Ship Traffic, Round-trip/ year	0
Incoming Barges/year	
Nikiski	3
Homer	2
Afognak	3
Incoming Tankers/year to Supply OCS Fuel Requirements	
Homer	2
Afognak	4
Inboard Barges/year Pipe Laying Operations	
Nikiski	1
Afognak	1

Source: Peter Eakland and Associates, 1979.

Table 4.14

PROJECTED INCREMENTAL OFFSHORE OCS ACTIVITY,
HIGH FIND CASE,
LEASE SALE NUMBER 60

Maximum Number of:	
Exploration Rigs	
Lower Cook Inlet	2
Shelikof Strait	3
Production Platforms	
Lower Cook Inlet	3
Shelikof Strait	3
Supply Boats, Round-trip/month	
from Nikiski	99
from Homer	48
from Afognak	151
Supply Boat Berths	
Nikiski	0
Homer	0
Afognak	3
Oil Tanker Traffic, Round-trip/year	
from Drift River	20
from Afognak	146
LNG Ship Traffic, Round-trip/year	0
Incoming Barges/year	
Nikiski	5
Homer	1
Afognak	7
Incoming Tankers/year to Supply OCS Fuel Requirements	
Homer	3
Afognak	9
Outboard Barges/year, Pipe Laying Operations	
Nikiski	15

Source: Peter Eakland and Associates, 1979.

noted that these projections are of the incremental levels of OCS ocean space use resulting from Lease Sale Number 60; that is, they are projections of the additional ocean use due to that 'lease sale and do not include OCS ocean space use generated by other lease sales, such as, Lease Sale Number CI or Lease Sale Number 46 or previous lease sales in Upper Cook Inlet. It should also be noted that although the maximum level of a category of ocean space use may not differ among scenarios, the number of years in which the maximum level of use is attained will tend to vary directly with the assumed level of recoverable resources.

The projected levels of ocean space use for the low find case are negligible; and although some conflicts including gear losses will occur, the magnitude of the conflicts are expected to be minimal for the commercial fishing industry as a whole. This assumes that reasonable efforts will be taken to insure that those who jointly use ocean space are aware of the nature of the OCS and fishing operations which occur in areas of joint use. However, due to the tendency of individual fishermen to have large proportions of their gear exposed in a concentrated area, the gear losses of an individual fisherman may be substantial in terms of his normal operating expenses or income. The projected levels of OCS ocean space use for the mean find case and the high find case are high relative to the ocean space use of the low find case; but with respect to current levels of ocean space use in many areas of the country or with respect to the capacity of the relevant ocean space, the mean and high find case use levels are very moderate. For example, it has been estimated that a drilling platform preempts approximately 89 hectares (220 acres) of ocean space (Olsen, 1977, p. 226). The six platforms assumed in the high find case would therefore preempt approximately 534 hectares (1,320 acres) of the ocean space in Lease Sale Number 60. This is an insignificant proportion of the lease sale area. An exception to this would be the berthing requirements for supply boats in Homer; this is an issue that is addressed in a subsequent section. Even though an insignificant portion of-the lease sale area will be preempted by OCS activities and the capacity of the ocean space in the lease sale area will not be approached, ocean space use conflicts are expected to occur. The potential conflicts are discussed below.

The areas of joint ocean space use for the longline halibut fleet are depicted in Figure 4.5, and the types of OCS ocean space use projected for the halibut grounds are summarized in Table 4.15. The longline gear is particularly susceptible to losses to OCS survey vessels and other OCS vessels that tow underwater gear or are of great draft. Gear losses are expected to occur and fishing costs are expected to increase. However, since the binding constraint in the hailbut fishery is stock abundance, marginal increases in fishing costs are not expected to adversely affect harvesting effort.

The crab fisheries use pot gear which is left unattended. The high concentration of the gear in some areas results in a very high" probability that gear losses will occur if other vessels enter these areas. Figures 4.6 through 4.8 depict the areas of joint ocean space use for the principal king, Tanner, and Dungeness fisheries. The types of OCS ocean space use

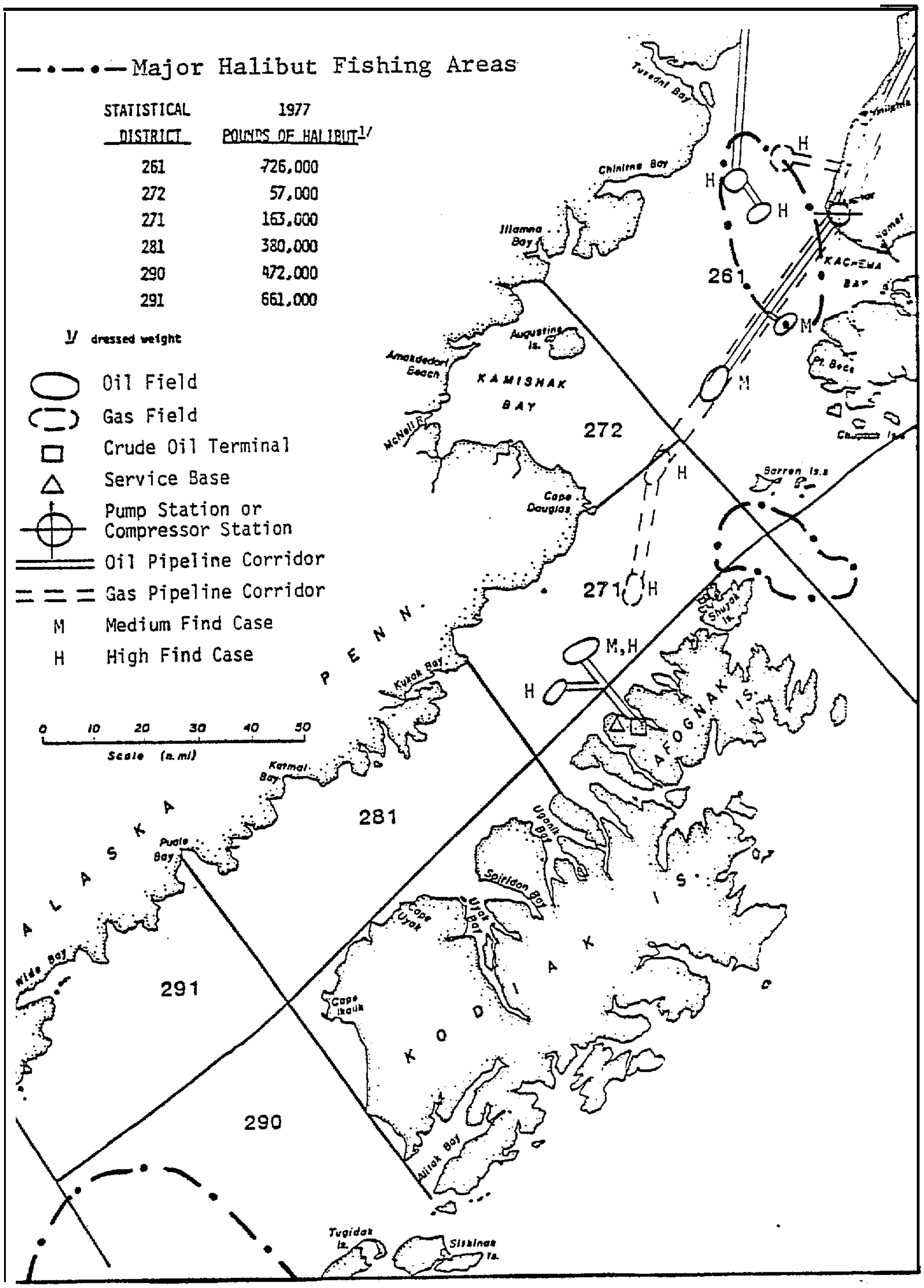


Figure 4.5: Major halibut fishing grounds, International Pacific Halibut Commission commercial fishing statistical districts, and OCS ocean space use in Lower Cook Inlet and Shelikof Strait.

TABLE 4.15

TYPE OF OCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT
HALIBUT FISHING GROUNDS

	Cook Inlet	Shelikof Strait
Survey Vessels	L,M,H,	L,M,H
Supply Boats.	L,M,H	L,M,H
Exploratory Drilling Rigs	L,M,H	L,M,H
Production Platforms	L,M,H	L,M,H
Pipeline Corridor	L,M,H	L,M,H
Barges	L,M,H	L,M,H
Tankers	L,M,H	L,M,H
Moorage	L,M,H	L,M,H

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean, or high find case, respectively.

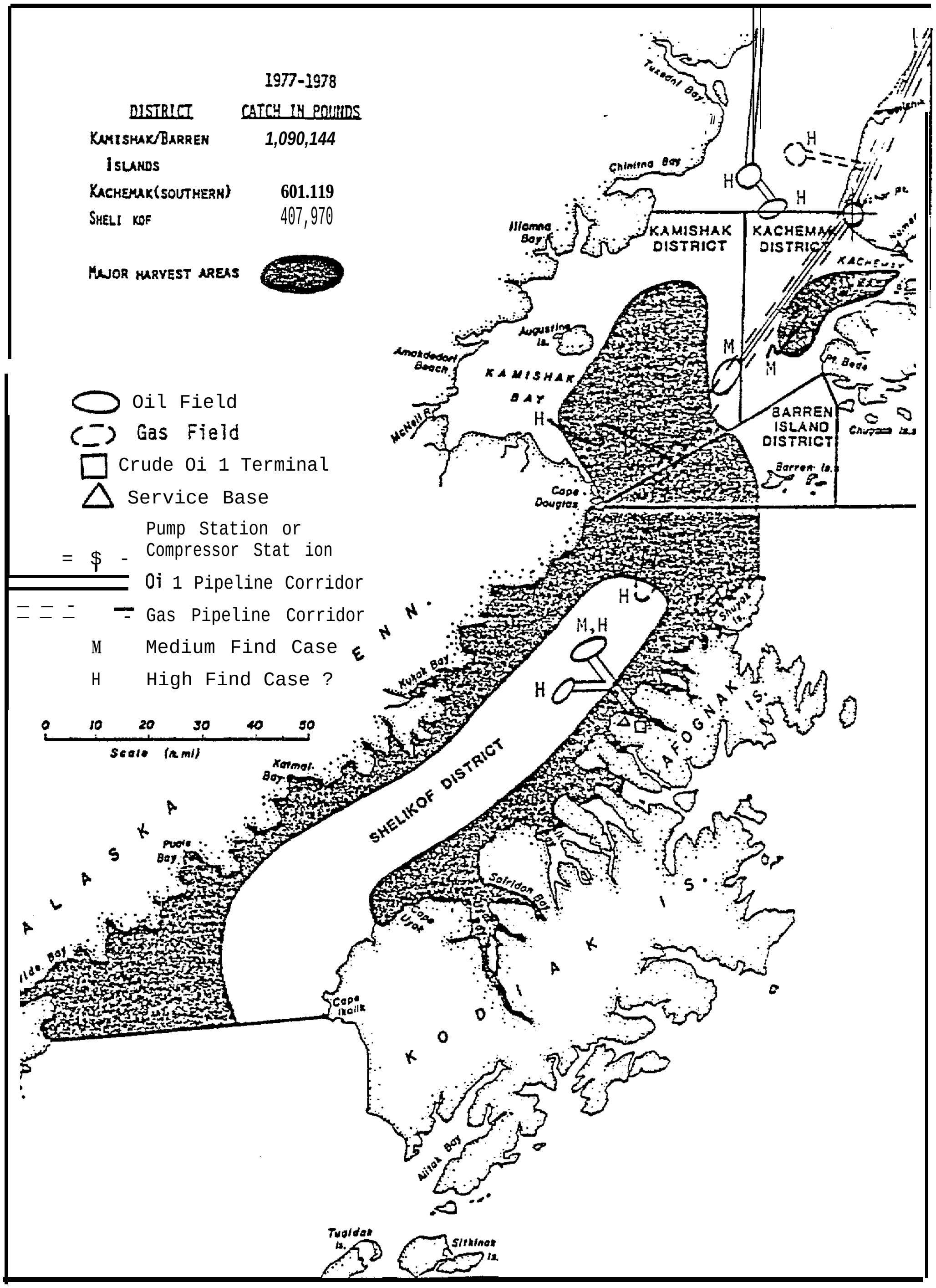


Figure 4.6: Major king crab fishing grounds, commercial fishing districts, and OCS ocean-space use in Lower Cook Inlet and Shelikof Strait.

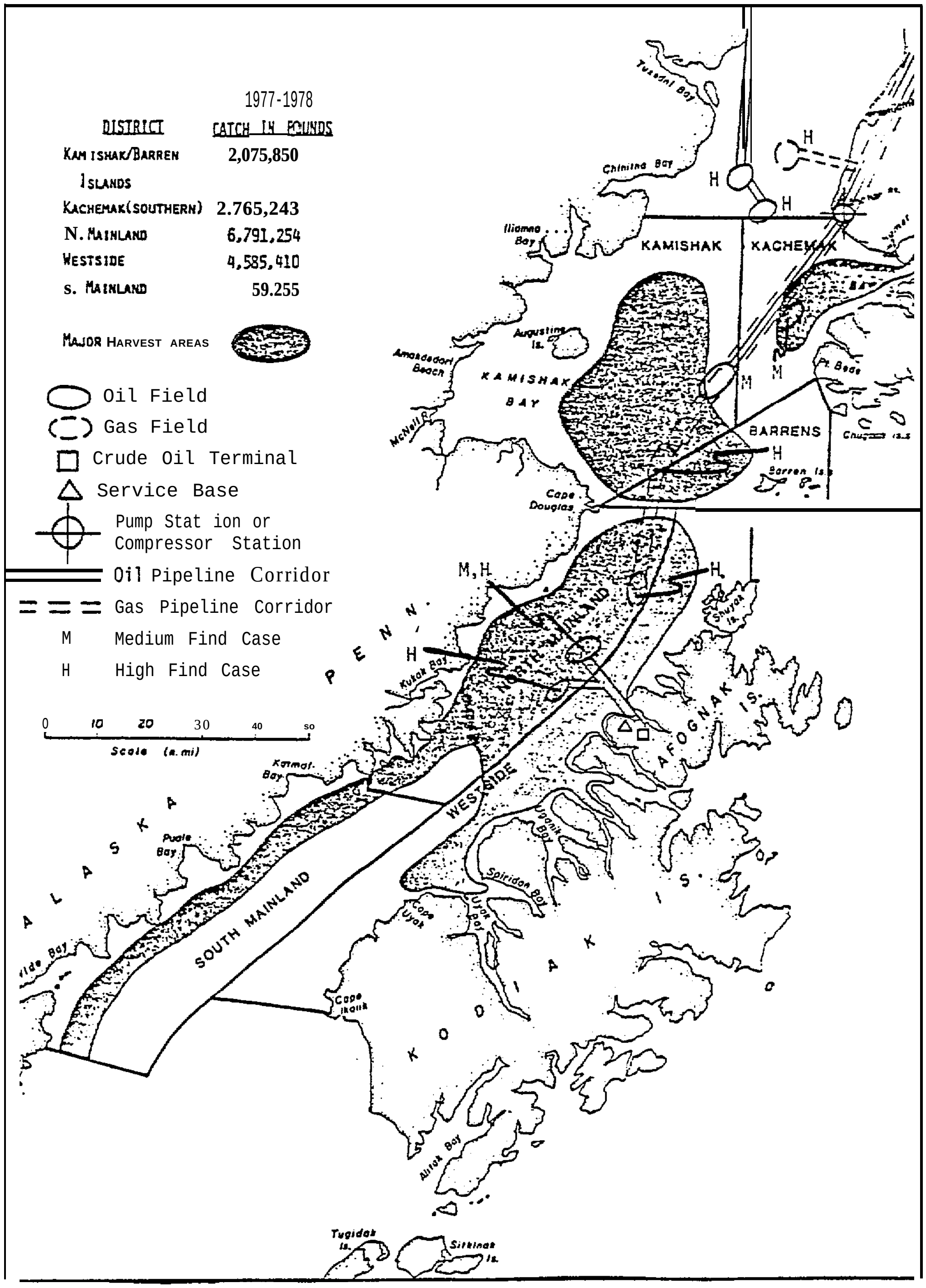


Figure 4.7 : Major Tanner crab fishing grounds, commercial fishing districts, and OCS ocean space use in Lower Cook Inlet and Shelikof Strait.

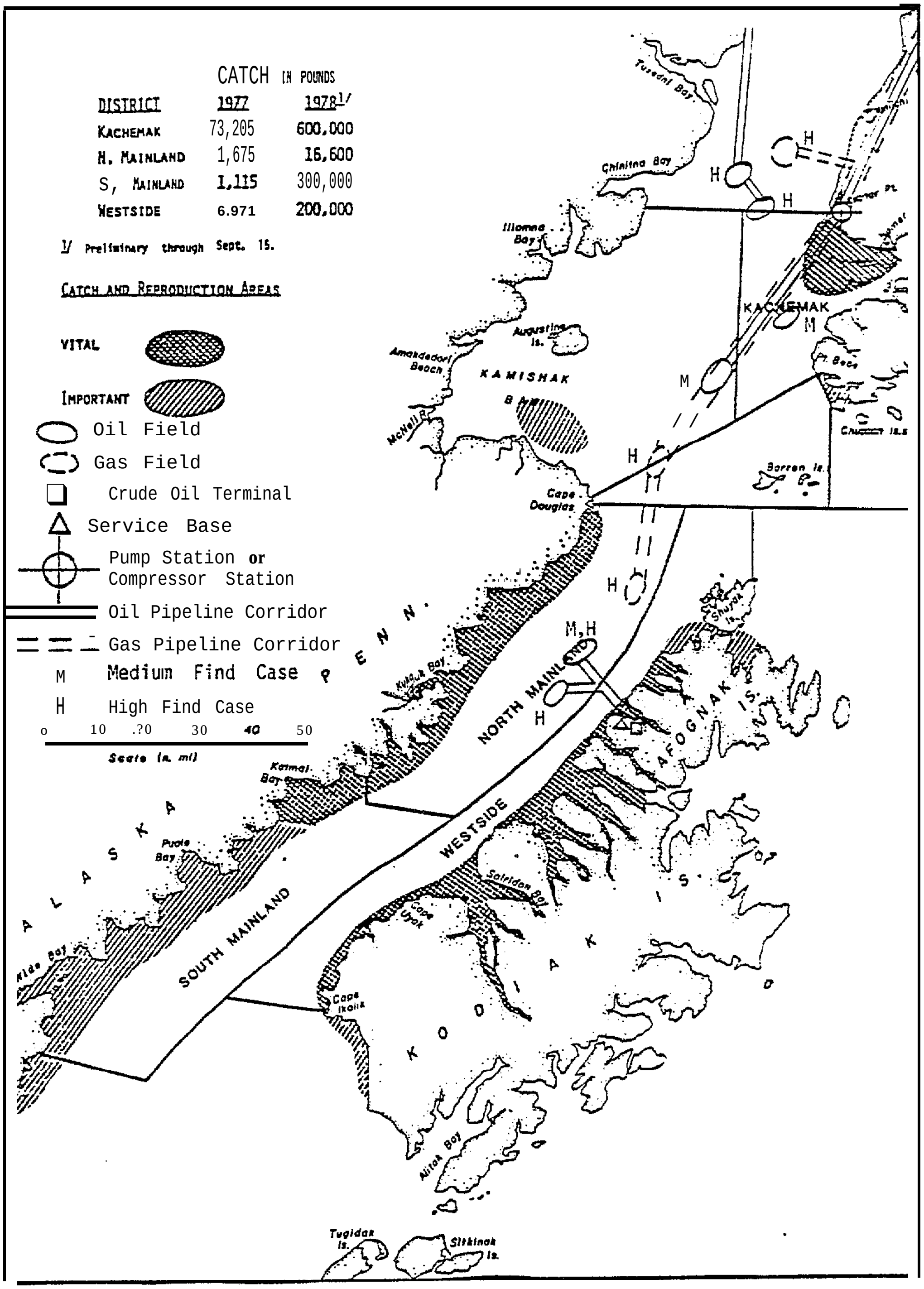


Figure 4.8 : Major Dungeness crab fishing grounds, commercial fishing districts, and OCS ocean space use in Lower Cook Inlet and Shelikof Strait.

that are expected in the king, Tanner, and Dungeness fishing grounds of Cook Inlet and Shelikof Strait are summarized in Tables 4.16 through 4.18. The areas and magnitude of joint use are sufficiently large that gear losses are expected to occur in these areas. With the exception of the Dungeness crab fisheries, the binding constraint on these fisheries is resource abundance; therefore, the increases in fishing costs that result from OCS offshore operations may have a relatively minor impact on harvesting effort although they will adversely affect the income of fishermen and boat owners. The increased fishing costs are expected to decrease harvesting effort including catch in the dungeness crab fisheries which is constrained by market conditions.

Although both trawl and pot gear are used in the shrimp fisheries of Cook Inlet and Shelikof Strait, the latter gear type is used by a small proportion of the shrimp boats and accounts for a minor part of the total catch. Fixed OCS offshore structures, in particular pipelines, and debris are expected to be the principal OCS related causes of gear loss to shrimp trawlers. The areas of joint use for the shrimp fisheries are depicted in Figure 4.9 and the expected types of OCS ocean space use on the shrimp grounds are summarized in Table 4.19. Shrimp harvesting activity has been constrained by resource abundance, not market conditions; therefore, the increases in fishing cost resulting from OCS ocean space use are not expected to significantly affect the level of harvesting activity.

The groundfish grounds of Cook Inlet and Shelikof Strait encompass much of the potential areas of OCS offshore operations. The development of

TABLE 4.16

TYPE OF OCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT
KING CRAB FISHING GROUNDS

	Cook Inlet	Shelikof Strait
Survey Vessels	L,M,H	L,M,H
Supply Boats	L,M,H	L,M,H
Exploratory Drilling Rigs	L,M,H	L,M,H
Production Platforms	M	
Pipeline Corridor	M,H	M,H
Barges	M, H	M,H
Tankers	M,H	M,H
Moorage		L,M,H

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean, or high find case, respectively.

TABLE 4.17

TYPE OFOCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT TANNER CRAB FISHING GROUNDS

	Cook Inlet	Shelikof Strait
Survey Vessels	L,M,H	L,M,H
Supply Boats	L,M,H	L,M,H
Exploratory Drilling Rigs	L,M,H	L,M,H
Production Platforms	M	M,H
Pipeline Corridor	M	M,H
Barges	L,M,H	M,H
Tankers	M,H	M,H
Moorage		L,M,H

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean, or high find case, respectively.

TABLE 4.18

TYPE OF OCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT
DUNGENESS CRAB FISHING GROUNDS

	Cook Inlet	Shelikof Strait
Survey Vessels		
Supply Boats	L,M,H	L,M,H
Exploratory Drilling Rigs		
Production Platforms		
Pipeline Corridor		M,H
Barges	L,M,H	M,H
Tankers		
Moorage		L,M,H

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean, or high find case, respectively.

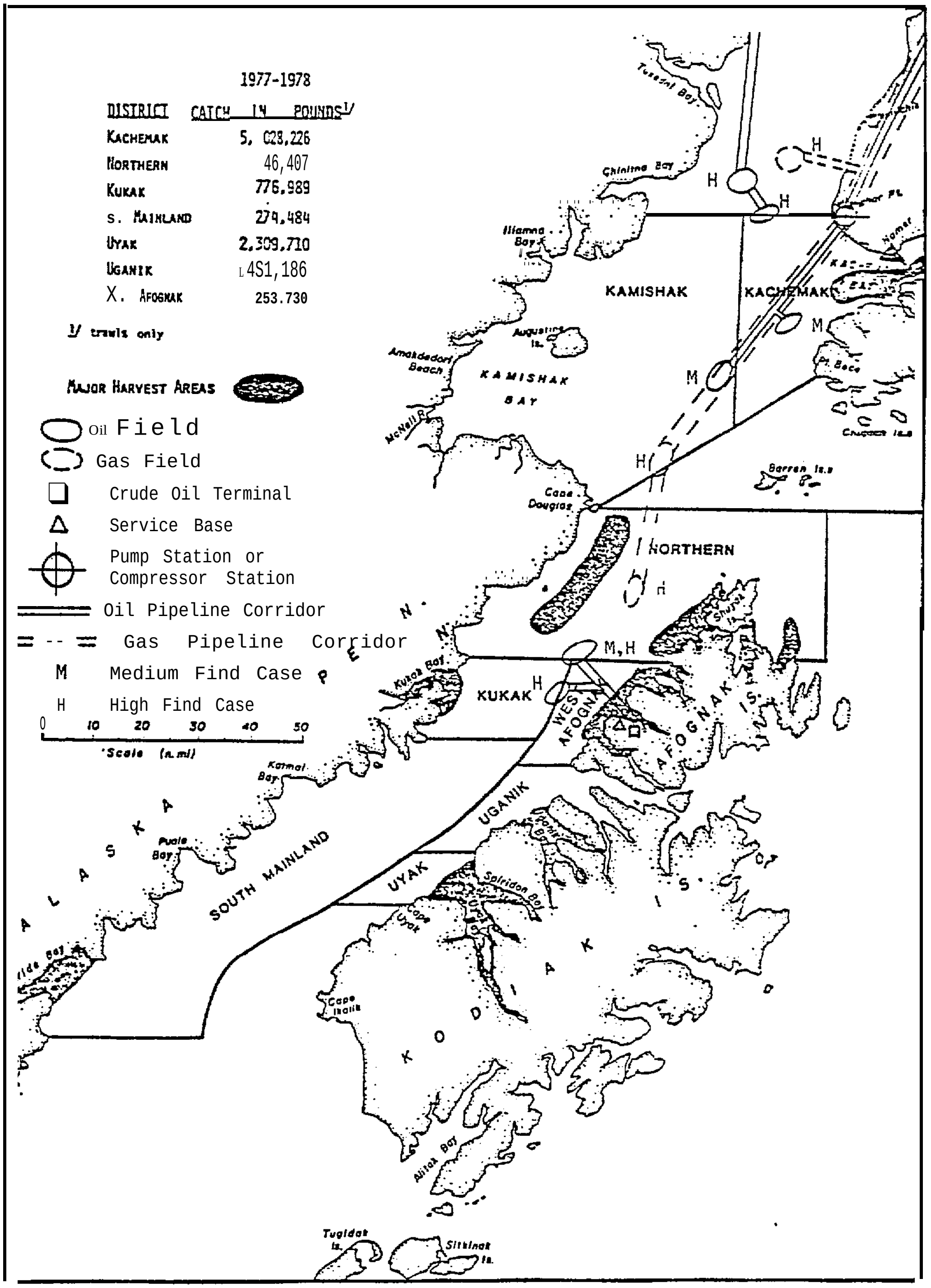


Figure 4.9: Major shrimp fishing grounds, commercial fishing districts, and OCS ocean space use in Lower Cook Inlet and Shelikof Strait.

TABLE 4.19

TYPE OF OCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT
SHRIMP FISHING GROUNDS

	Cook Inlet	Shelikof Strait
Survey Vessels	L,M,H	L,M,H
Supply Boats	L,M,H	L,M,H
Exploratory Drilling Rigs	L,M,H	L,M,H
Production Platforms		M
Pipeline Corridor		M,H
Barges	L,M,H	L,M,H
Tankers		
Moorage		L,M,H

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean, or high find case, respectively.

the groundfish fishery will be constrained by market conditions; therefore, significant increases in fishing costs resulting from OCS activities would adversely affect the development of this fishery. The increases in fishing costs are, however, with the possible exception of those due to gear losses to OCS debris, expected to be minimal for two reasons. The groundfish grounds are so expansive that the areas of highest potential losses can be avoided without significantly affecting catch; and by the time the domestic fishery has fully developed, OCS ocean space use will consist primarily of tanker traffic in well established lanes. The groundfish fleet will be particularly susceptible to gear losses to offshore structures and debris since it will predominantly consist of trawlers. It should be noted that gear losses by large trawlers can result in damage to pipelines as well as to fishing gear.

A variety of gear types are used in the salmon and herring fisheries of Cook Inlet and Shelikof Strait. Set net and beach seine gear are used so close to shore that the OCS use of ocean space that may impact these fisheries is limited to pipeline corridors near the point of landfall. If the pipe is buried, the potential conflict would be limited to the construction period. Whether or not it is buried, only a few fishing sites need be lost per landfall. The loss of one salmon set net site would have an insignificant impact on the fishery as a whole since there are approximately 100 set net sites on Shelikof Strait and 600 in Cook Inlet. However, the impact on an individual fisherman would be substantial because property rights have been established for many set gill net sites in the study area, and alternative sites may not be readily available. The average annual real harvest value per site is expected to exceed $20,000 in Cook Inlet by the year 2000 and to approach

$30,000 on Shelikof Strait. The mean and high find case pipelines to Afognak Island will impact both the salmon and herring fisheries (see Figures 4.10 and 4.11). The high find case pipeline from the Lower Cook Inlet gas field to the Kenai Peninsula would affect the salmon fishery.

The drift gill net and purse seine fisheries are active further from shore than the set net and beach seine fisheries and are therefore susceptible to conflicts generated by a variety of OCS ocean space uses. The OCS users of ocean space that may adversely affect the salmon and herring fisheries are summarized in Tables 4.20 and 4.21. The areas and magnitude of joint use are sufficiently high that conflicts are expected to occur; however, since resource abundance constrains harvesting activity in the salmon fisheries, the small increase in fishing cost which is expected may not have a measurable effect on fishing effort. The net income of fishermen and boat owners is expected to decrease marginally for the fishery as a whole; the decreases in income may, however, be substantial for specific individuals. Similar impacts are expected in the herring fishery since similar gear types are used. Any differences in impacts that do occur are expected to be caused by the intensiveness of the herring fishery. The activity of the herring fisheries are highly concentrated geographically and chronologically. The geographical concentration will result in fewer areas of joint use but a greater probability of conflict in areas of joint use. The chronological concentration is expected to do the same with respect to time. Resource abundance is expected to constrain the herring fishery once the market stabilizes after the dramatic decline in exvessel prices which occurred in 1980.

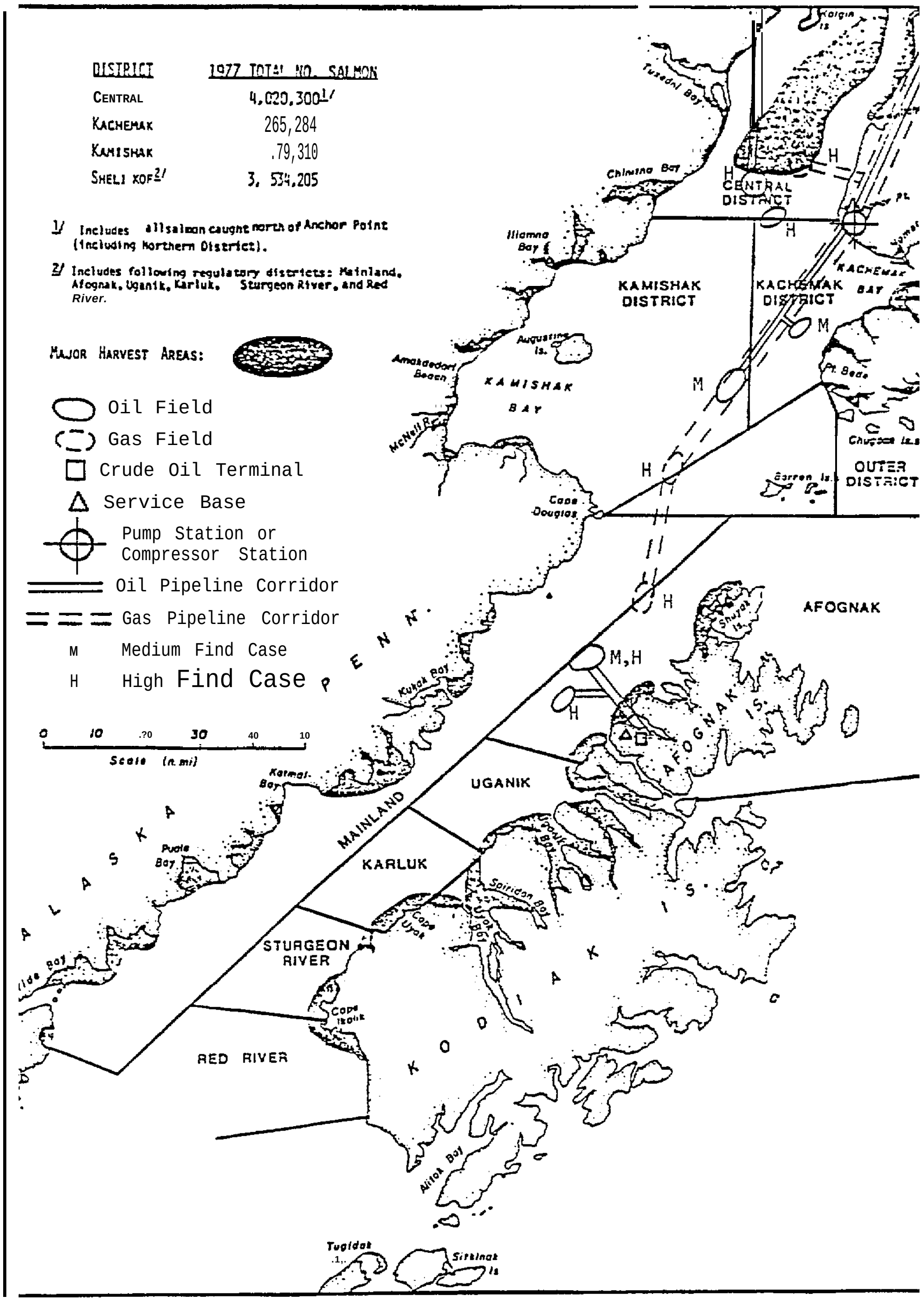


Figure 4.10: Major salmon fishing grounds, commercial fishing districts, and OCS ocean space use in Lower Cook Inlet and Shelikof Strait.

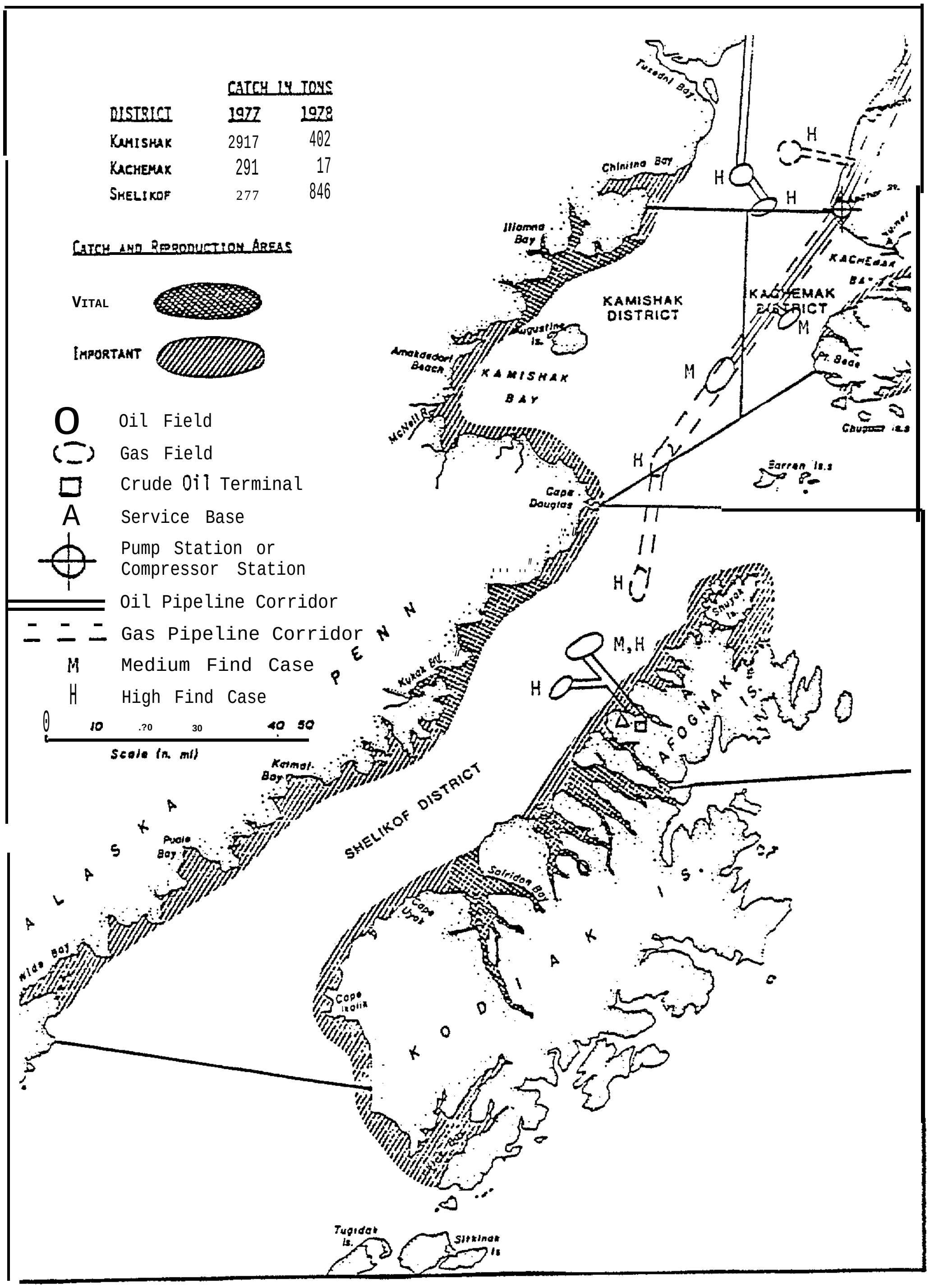


Figure 4.11: Major herring fishing grounds, commercial fishing districts, and OCS ocean space use in Lower Cook Inlet and Shelikof Strait.

TABLE 4.20

TYPE OF OCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT SALMON FISHING GROUNDS

	Cook Inlet	Shelikof Strait -
Survey Vessels	L,M,H	
Supply Boats	L,M,H	M,H
Exploratory Drilling Rigs	L,M,H	
Production Platforms	H	
Pipeline Corridor	H	M,H
Barges	L,M,H	M,H
Tankers	M,H	
Moorage	L	L,M,H

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean , or high find case, respectively.

TABLE 4.21

TYPE OF OCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT
HERRING FISHING GROUNDS

	Cook Inlet	Shelikof Strait
Survey Vessels	L,M,H	L,M,H
Supply Boats	L,M,H	L,M,H
Exploratory Drilling Rigs		
Production Platforms		
Pipeline Corridor	H	M,H
Barges	H	M,H
Tankers		
Moorage		L,M,H

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean, or high find case, respectively.

The razor clam fisheries in Cook Inlet and Shelikof Strait have been almost exclusively hand shovel fisheries. Dredges have been used in a few instances but with limited success. The hand shovel fishery occurs on the beach at low tide and a dredge fishery would occur either on the beach or very close to it. The location of the clam fishery, therefore, severly limits the types of OCS ocean space use that can potentially impact the fishery. The sole use that can directly impact harvesting efforts is the use of beach and near shore areas for a pipeline corridor (see Table 4.22). The razor clam beaches depicted in Figure 4.12 indicate that such an impact could occur as the result of the high find case pipeline from the Lower Cook Inlet gas field to the Kenai Peninsula. Such a pipeline would cross an important but not critical claming area. The impact is not expected to be significant. The razor clam fishery is constrained by market and regulatory conditions more than by resource abundance. The potential impacts of OCS activity are expected to be insignificant relative to these constraints.

Gear losses are expected to be a major part of the increase in fishing costs in areas in which the two industries will compete for ocean space. Although the magnitude of the gear losses resulting from OCS operations cannot be determined, current gear losses in absolute terms or in terms of total fishing costs are of interest. CFEC data indicate that in the mid-1970s, the average gear loss of vessels participating in Alaska shellfish fisheries was approximately $8,400 per vessel. This was about 13 percent of the total value of the gear used by these vessels or about 17 percent of the fishing costs excluding labor costs. These gear loss estimates include the cost of gear itself and do not include the cost

TABLE 4.22

TYPE OF OCS OCEAN SPACE USE IN COOK INLET AND SHELIKOF STRAIT
RAZOR CLAM FISHING GROUNDS

	Cook Inlet	Shelikof Strait
Survey Vessels		
Supply Boats		
Exploratory Drilling Rigs		
Production Platforms		
Pipeline Corridor		
Barges		
Tankers		
Moorage		

The presence of the letter L, M, or H indicates that a particular type of ocean space use is expected in the low, mean, or high find case, respectively.

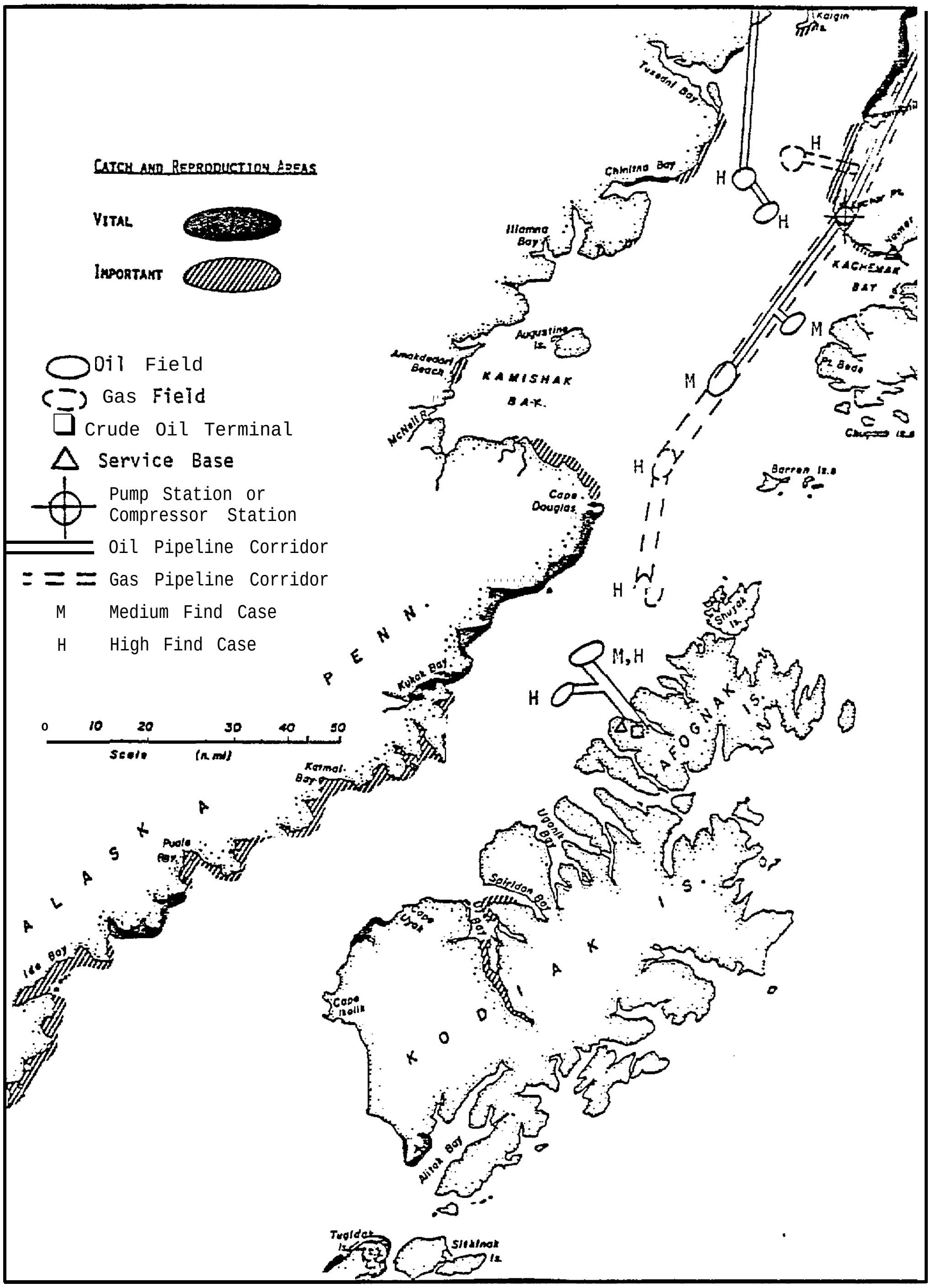


Figure 4.12: Distribution of known razor clam populations, and OCS ocean space use in Lower Cook Inlet and Shelikof Strait.

associated with lost fishing time. Gear losses due solely to OCS operations are typically expected to be less than gear losses due to other factors.

Another aspect of the increased fishing cost is the cost associated with collisions between fishing vessels and OCS vessels or structures. It is not possible to determine the magnitude of these costs, but there are reasons for expecting it to be minor for the fishing industry as a whole. The probability of a collision increases as the volume of traffic increases, and OCS and fishing operations are expected to significantly increase the volume of marine traffic in the study area. However, as is indicated in the Studies Program Transportation reports, the volume of traffic is expected to be insignificant compared to the capacity of the system; therefore, the projected increase in traffic is not expected to measurably increase the probability of a collision.

Fishing vessel accident data indicate, for the United States as a whole, collisions account for approximately 18 percent of fishing boat accidents and 45 percent of the collisions result from neglecting the rules of the road. The implication is that additional vessel traffic will not substantially increase the cost of vessel accidents, particularly if more attention is paid to the rules of the road.

COMPETITION FOR INFRASTRUCTURE SERVICES

The OCS industry will increase the demand for water, electric power, and moorage facilities. The potential impacts of the increased demand are considered in this section.

Water and Electric Power

There are a number of factors that will tend to prevent the OCS demand for water and electric power from adversely affecting the commercial fishing industry; they are as follow: the commercial fishing industry's demand for water and electric power is not expected to increase substantially during the forecast period; fish processing plants can in many cases provide their own sources of electric power and water; the OCS induced increases in the domestic demand for water are expected to reflect the increase in population and not to occur until late enough in the development phase to allow for planning; and there is currently excess capacity or planned increases in the supply of electric power and water in the impacted communities. Possible short-term exceptions would include the availability of water in Homer and Seldovia during the winter months. The capacities of these delivery systems can be decreased by sub-freezing temperatures. The OCS operations on Afognak Island will be self-sufficient in terms of water and electric power since these operations will occur in what is now an undeveloped area.

Port and Harbor Facilities

The limited port facilities that exist on the Kenai Peninsula are not major access points for the transportation of seafood products. With few exceptions, these products are trucked to Anchorage for shipment to Japan or the Seattle area. The OCS activities are not expected to significantly impact the port of Anchorage.

The OCS use of port facilities that may impact the fishing industry is expected to include the berthing of supply boats in Homer. The facilities that would be suitable for such boats are currently used on a space available basis by fishing boats that cannot be accommodated in the small boat harbor. This would include fishing boats that are too large to use the small boat harbor and other boats when the harbor is overcrowded. This problem will be eliminated when the plans to expand the small boat harbor are realized.

Small boat harbors are the principal source of moorage for fishing boats participating in Cook Inlet and Shelikof Strait fisheries. The small boat harbors in the study area are not of sufficient size and depth to accommodate OCS support vessels. Such vessels are therefore not expected to compete with fishing boats for facilities within small boat harbors. As is mentioned above, the competition for moorage will be limited to facilities outside the small boat harbors.

Summary of Potential Impacts

This section briefly summarizes the potential impacts of OCS oil and gas operations by scenario and by commercial fishing industry.

LOW FIND CASE

Cook Inlet

- OCS labor requirements which are minimal and primarily for highly skilled labor are not expected to measurably affect the Cook Inlet commercial fishing industry.

- OCS industry uses of ocean space are not expected to either preempt a sufficient proportion of the commercial fishing grounds or to increase marine traffic sufficiently to have a measurable impact on the fishing industry as a whole; however, the impacts on a small number of specific participants in the fishing industry may be significant.

- With the exception of moorage space, OCS requirements for the services of the study area's infrastructure are not expected to affect the commercial fishing industry. The competition for moorage outside small boat harbors will be one of several factors which may hinder the development of the commercial fishing industry.

Shelikof Strait

- The assumed nature of OCS operations and sites of onshore support facilities will not result in OCS labor requirements competing with those of the Shelikof Strait commercial fishing industry.

- The impacts resulting from OCS industry uses of ocean space are expected to be negligible for the fishing industry as a whole. However, the impacts, such as gear losses, may be large for individual participants in the fishery; and due to the difficulty associated with determining the cause of such losses, the loss will typically be borne by the individual who suffers the loss.

- The assumed nature and siting of OCS operations will prevent them from competing for the infrastructure utilized by the Shelikof Strait commercial fishing industry.

MEAN FIND CASE

Cook Inlet

- OCS labor requirements for the mean find case are large enough to reduce the ability of the commercial fishing industry to meet its projected labor requirements; however, the proximity of a large labor force in Anchorage and increases in population which are projected to parallel increases in employment, should prevent the competition for labor from adversely affecting the commercial fishing industry. The increase in population and the resulting increase in the size of the year-round secondary labor force may, in fact, enhance the development potential of the industry.

- The magnitude of OCS ocean space use and the resulting increases in fishing costs will be greater in the mean find case; but the impacts are only expected to be significant for selected individuals, not for the industry as a whole.

- OCS requirements for electric power and water are not . expected to affect the quantities of those utilities available to the commercial fishing industry. The adverse affects of the competition for moorage will tend to be similar to those of the low find case and will be eliminated once dedicated facilities are constructed for OCS vessels during the development phase.

<u>Shelikof Strait</u>

- Although the OCS industry labor requirements are substantial in the mean find case, the locations of both onshore OCS industry activities and the labor pools from which labor requirements will be met will prevent OCS-generated competition for labor from being a source of impacts for the Shelikof Strait commercial fishing industry.

- OCS ocean space uses are not expected to significantly affect the commercial fishing industry as a whole; however, individual participants in the fishery may be severely impacted.

- The location of the OCS onshore facility will prevent the OCS industry from competing with the Shelikof Strait commercial fishing industry for electric power and water or for port and harbor facilities.

HIGH FIND CASE

Cook Inlet

- OCS labor requirements are large enough to adversely affect the ability of the commercial fishing industry to meet its labor requirements if it were not for a number of mitigating factors. This is particularly true in the southern part of the Kenai Peninsula where OCS activity will result in inure dramatic increases in employment and population.

- OCS uses of ocean space and the infrastructure of Cook Inlet communities will be greatest in the high find case; however, the nature of the impacts are expected to be similar to those of the mean find case.

Shelikof Strait

o Although the magnitude of OCS activities is higher in the high find case than in the mean find case, the nature of those activities are similar between cases; therefore, the impacts are expected to be similar.

The limitations of the impact analysis presented in this report are summarized in Chapter II. The reader is urged to read or reread the appropriate sections of Chapter II to be aware of the limitations. In particular, it should be noted that the potential impacts either resulting from chronic or major oil spills or resulting from other major ecological changes linked to OCS industry activities are not considered.

APPENDIX A

Exvessel Price Models and Data

Number of Boats and/or Landings Models

King Salmon Exvessel Price Modeland Data

ORDINARY LEAST SQUARES

DEPENDENT VARIABLE: PK

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	(-)*196993	0.145117	1.35748
CSK	-0.105193E-01	0.127058E-01	-0.8.?7915
FK	0.124722	0.835901E-01	1.49207
PCO	0.858668	0.915827E-01	9.37588

LOG OF LIKELIHOOD FUNCTION = *24,147$3*
R-SQUARED = 0.9438
DURBIN-WATSON STATISTIC(ADJ. FOR 0. GAPS) = 2.2323
SUM OF SQUARED RESIDUALS = 0.457867E-01
STANDARD ERROR OF THE REGRESSION = 0.617702E-01
SUM OF RESIDUALS = 0.111759E-07
NUMBER OF OBSERVATIONS = 16.
MEAN OF DEPENDENT VARIABLE · 0.455371
F-STATISTIC(3., 12.) = 67.1450

PLOT OF ACTUAL(*) AND FITTED(+) VALUES

ID	ACTUAL	FITTED	RESIDUAL
1961	0.2626	0.2775	-0.149E-01
1962	0.3088	0.3050	0.386E-02
1963	0.3413	0.2769	0.644E-01
1964	0.3166	0.2601	0.565E-01
1965	0.2769	0.3207	-0.438E-01
1966	0.3154	0.3294	-0.141E-01
1967	0.2665	0.3273	-0.608E-01
1968	0.3437	0.3309	0.128E-01
1969	0.3262	0.3629	-0.366E-01
1970	0.4360	0.3823	0.537E-01
1971	0.3916	0.3290	0.626E-01
1972	0.3742	0.5221	-0.148 0
1973	0.8837	0.8788	0.496E-02
1974	0.7476	0.7529	-0.535E-02
1975	0.7473	0.7217	0.256E-01
1976	0.9474	0.9086	0.388E-01

	EPK	CSK	FK	EPCO
1961	0.262637	8.54060	0.158159	0.175429
1962	0.308844	8.73859	0.182054	0.206374
1963	0.341316	9.16053	0.234885	0.171139
1964	0.316583	11.5670	0.304395	0.170949
1965	0.276935	11.0086	0.220171	0.246936
1966	0.315361	9.35009	0.267146	0.229960
1967	0.266515	11.6323	0.258496	0.256694
1968	0.343698	11.2457	0.261529	0.255701
1969	0.326232	10.7465	0.325651	0.277522
1970	0.436040	11.5466	0.427653	0.295161
1971	0.391611	11.9719	0.374122	0.246098
1972	0.374152	9.97290	0.498645	0.428307
1973	0.883747	8.91693	0.990770	0.759345
1974	0.747567	9.29003	0.580627	0.676901
1975	0.747293	7.16547	0.895684	0.568759
1976	0.947399	8.91553	0.247654	0.901926
1977	0.	0.	0.	0.
1978	0.	0.	0.	0.
1979	0.	0.	0.	0.
1980	1.08969	10.0000	0.247650	1.12616
1981	1.14228	10.1398	0.247650	1.18912
1982	1.19891	10.2815	0.247650	1.25681
1983	1.25988	10.4252	0.247650	1.32957
1984	1.32551	10.5710	0.247650	1.40780
1985	1.39617	10.7187	0.247650	1.49190
1986	1.47223	10.8686	0.247650	1.58231
1987	1.55409	11.0205	0.247650	1.67950
1988	1.64219	11.1745	0.247650	1.78400
1989	1.73701	11.3307	0.247650	1.89633
1990	1.83904	11.4891	0.247650	2.01710
1991	1.94883	11.6497	0.247650	2.14693
1992	2.06697	11.8126	0.247650	2.28650
1993	2.19408	11.9777	0.247650	2.43655
1994	2.33083	12.1451	0.247650	2.59787
1995	2.47795	12.3149	0.247650	2.77129
1996	2.63623	12.4870	0.247650	2.95772
1997	2.80649	12.6616	0.247650	3.15815
1998	2.98965	12.8386	0.247650	3.37362
1999	3.18666	13.0180	0.247650	3.60526
2000	3.39858	13.2000	0.247650	3.85429
	1	2	3	4

Source: ADF&G, Catch and Production Leaflets.

EPK = Alaska king salmon exvessel price.
CSK = Alaska king salmon harvest (million pounds).
FK = CSK/Alaska canned king salmon pack (in 1,000 48-pound cases).
EPCO = Alaska coho salmon exvessel price.

Pink Salmon Exvessel Price Model and Data

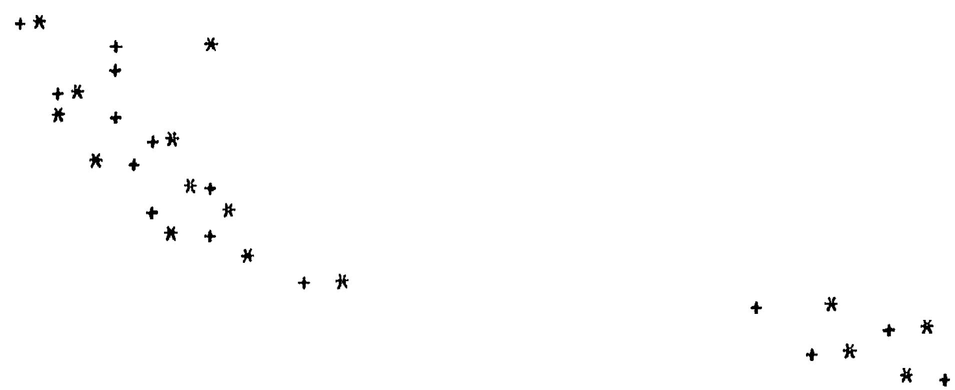
ORDINARY LEAST SQUARES

DEPENDENT VARIABLE: PP

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	0.601168	0.161672	3.71845
CSP	-0.797302E-04	0.177276E-03	-0.449752
FP	-3.70245	1.09813	-3.37158
CPIJ	0.177983	0.306575E-01	5.80552
EXCHJ	-0.838583E-03	0.405757E-03	-2.06671

LOG OF LIKELIHOOD FUNCTION = 39.8197
R-SQUARED = 0.9497
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) = 1.8919
SUM OF SQUARED RESIDUALS = 0.645599E-02
STANDARD ERROR OF THE REGRESSION = 0.242262E-01
SUM OF RESIDUALS = 0.651926E-08
NUMBER OF OBSERVATIONS = 16.
MEAN OF DEPENDENT VARIABLE = 00180910
F-STATISTIC(4., 11.) = 51.9640

ID	ACTUAL	FITTED	RESIDUAL
1961	0.9769E-01	0.9134E-01	0.635E-02
1962	0.1417	0.1196	0.220E-01
1963	(-).1157	0.1154	0.294E-03
1964	0.1058	0.1043	0.155E-02
1965	0.1026	0.1157	-0.130E-01
1966	0.1357	0.1293	0.640E-02
1967	0.1124	0.1205	-0.810E-02
1968	0.1380	0.1437	-0.565E-02
1969	0.1483	0.1274	0.209E-01
1970	0.1322	0.1419	-0.974E-02
1971	0.1567	0.2219	-0.652E-01
1972	0.1815	0.1725	0.898E-02
1973	0.3187	0.2982	0.205E-01
1974	0.3459	0.3316	0.143E-01
1975	0.3213	0.3128	0.845E-02
1976	0.3405	0.3486	-0.808E-02



Historical and Forecasted Data

	EPP	CSP	FP	CPIJ	EXCHJ
1961	0.976921E-01	103.537	.823687E-01	0.600000	361.800
1962	0.141656	143.279	0.762932E-01	0.640000	359.600
1963	0.115670	125.117	0.796926E-01	0.690000	362.000
1964	0.105829	162.281	0.841704E-01	0.720000	358.300
1965	0.102630	74.8730	0.847939E-01	0.770000	360.900
1966	0.135652	162.866	0.807867E-01	0.810000	362.500
1967	0.112444	28.8221	0.876050E-01	0.840000	361.900
1968	0.138031	148.446	0.816534E-01	0.880000	357.700
1969	0.148269	105.967	0.893483E-01	0.930000	357.800
1970	0.132202	117.718	0.885761E-01	1.00000	357.600
1971	0.156711	86.2598	0.802416E-01	1.06000	314.800
1972	0.181460	59.9689	0.994509E-01	1.11000	302.000
1973	0.318668	36.6102	0.772366E-01	1.24000	280.000
1974	0.345907	40.0720	0.778097E-01	1.54000	301.000
1975	0.321264	49.9702	.903621E-01	1.72000	305.200
1976	0.340479	102.419	0.900783E-01	1.88000	292.800
1977	0.	0.	0.	2.04000	240.000
1978	0.	0.	0.	2.11000	194.600
1979	0.	0.	0.	2.16000	248.800
1980	0.478955	96.8000	0.900000E-01	2.32200	232.000
1981	0.509787	98.8434	0.900000E-01	2.49615	232.000
1982	0.542941	100.930	0.900000E-01	2.68336	232.000
1983	0.578591	103.060	0.900000E-01	2.88461	232.000
1984	0.616923	105.236	0.900000E-01	3.10096	232.000
1985	0.658140	107.457	0.900000E-01	3.33353	232.000
1986	0.702457	109.726	0.900000E-01	3.58355	232.000
1987	0.750108	112.042	0.900000E-01	3.85231	232.000
1988	0.801343	114.407	0.900000E-01	4.14124	232.000
1989	0.856431	116.822	0.900000E-01	4.45183	232.000
1990	0.915660	119.288	0.900000E-01	4.78571	232.000
1991	0.979342	121.806	0.900000E-01	5.14464	232.000
1992	1.04781	124.377	0.900000E-01	5.53049	232.000
1993	1.12143	127.003	0.900000E-01	5.94528	232.000
1994	1.20058	129.684	0.900000E-01	6.39117	232.000
1995	1.28567	132.421	0.900000E-01	6.87051	232.000
1996	1.37716	135.216	0.900000E-01	7.38580	232.000
1997	1.47552	138.071	0.900000E-01	7.93974	232.000
1998	1.58128	140.985	0.900000E-01	8.53522	232.000
1999	1.69497	143.961	0.900000E-01	9.17536	232.000
2000	1.81721	147.000	0.900000E-01	9.86351	232.000
	1	2	3	4	5

Source: ADF&G, Catch and Production Leaflets.

EPP = Alaska pink salmon exvessel price.
CSP = Alaska pink salmon harvest (million pounds).
FP = CSP/Alaska canned pink salmon pack in 1,000 48-pound cases).
CPIJ = Japanese consumer price index.
EXCHJ = Exchange rate (yen per dollar).

Red Salmon Exvessel Price Model and Data

COCHRANE-ORCUTT ITERATIVE TECHNIQUE

DEPENDENT VARIABLE: PR

MEAN OF DEPENDENT VARIABLE = 0.321123

ITERATION	RHO
1	-0.718252
2	-0.727456
3	-0.727843

FINAL VALUE OF RHO = -0.727843
NO. OF ITERATIONS = 3

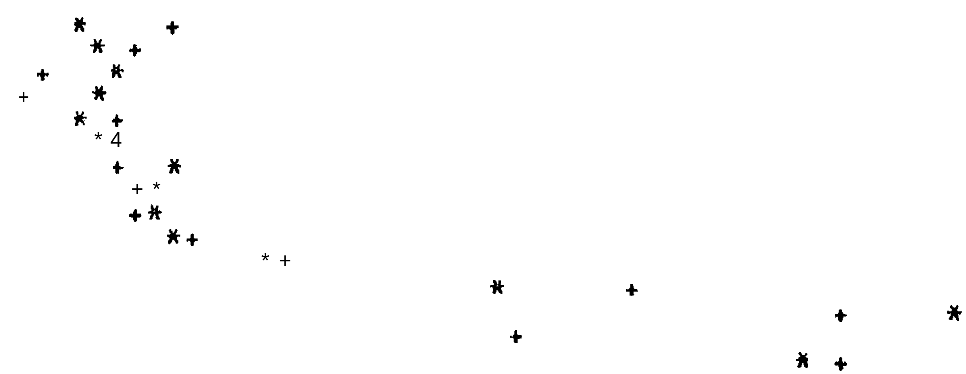
STANDARD ERROR OF RHO = 0.177058
T-STATISTIC FOR RHO = -4.110750

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	0.793710E-01	0.760733E-01	1.04335
CSR	0.101714E-03	0.241302E-03	0.421524
FR	-0.750468	1.03553	-0.724721
PP	1.57416	0.893688E-01	17.6142

LOG OF LIKELIHOOD FUNCTION = 29.7281
R-SQUARED = 0.9490
DURBIN-WATSON STATIST (ADJ. FOR 0. GAPS) = 2.1365
SUM OF SQUARED RESIDUICS = 0.166796E-01
STANDARD ERROR OF THE REGRESSION = 0.389400E-01
SUM OF RESIDUALS = -0.113733E-04
NUMBER OF OBSERVATIONS = 15.
MEAN OF DEPENDENT VARIABLE = 0.321123
F-STATISTIC(3., 11.) = 68.2267

PLOT OF ACTUAL (*I ANDFITTED(+) VALUES

ID	ACTUAL	FITTED	RESIDUAL
1962	0*2102	0.2573	-0.471E-01
1963	0.2156	0.2424	-0.268E-01
1964	0.2262	0.1906	0.357E-01
1965	0.2169	0.1772	0.397E-01
1966	0.2128	0.2339	-0.212E-01
1967	().2217	0.2272	-0.549E-02
1968	0.2613	0.2297	0.316E-01
1969	0.2516	0.2367	0.149E-01
1970	0.2470	0.2351	0.119E-01
1971	0.2618	0.2681	-0.637E-02
1972	0.3139	0.3214	-0.745E-02
1973	0.4348	0.5059	-0.711E-01
1974	0.6859	0.6245	0.615E-01
1975	0.4496	0.4478	0.171E-02
1976	0.6076	0.6191	-0.114E-01



Historical and Forecasted Data

	EPR	CSR	FR	EPP
1961	0.184178	45.2295	0.735363E-01	0.976921E-01
1962	0.210216	52.9464	0.705952E-01	0.141656
1963	0.215589	35.4557	0.734072E-01	0.115670
1964	0.226237	54.1319	0.757090E-01	0.105829
1965	0.216865	142.034	0.735547E-01	0.102630
1966	0.212756	92.7667	0.749933E-01	0.135652
1967	0.221678	53.5217	0.784776E-01	0.112444
1968	0.261275	48.6958	0.776648E-01	0.138031
1969	0.251572	71.7348	0.936486E-01	0.148269
1970	0.246992	150.812	0.884529E-01	0.132202
1971	0.261764	87.2877	0.787795E-01	0.156711
1972	0.313938	41.9835	0.774604E-01	0.181460
1973	0.434824	35.2481	0.102169	0.318668
1974	0.685947	32.2465	0.744722E-01	0.3459()'7
1975	0.449552	42.8483	0.774834E-01	0.321264
1976	0.607636	75.6894	0.845691E-01	0.340479
1977	0.	0.	0.	0.
1978	0.	0.	0.	0.
1979	0.	0.	0.	0.
1980	0.[10(-)000	70.0000	0.846000E-01	0.478955
1981	0.808839	71.2596	0.846000E-01	0.509787
1982	0.890145	72.5418	0.846000E-01	0.542941
1983	0.925299	73.8471	0.846000E-01	0.578591
1984	1.00113	75.1759	0.846000E-01	0.616923
1985	1.05497	76.5286	0.846000E-01	0.658140
1986	1.13301	77.9056	0.846000E-01	0.702457
1987	1.20224	79.3074	0.846000E-01	0.750108
1988	1.20735	80.7344	0.846000E-01	0.801343
1989	1.37108	82.[illegible]	0.846000E-01	0.856431
1990	1.46675	83.6660	0.846000E-01	0.915660
1991	1.56548	85.1715	0.846000E-01	0.979342
1992	1.61463	86.7040	0.846000E-01	1.04781
1993	1.78979	88.2641	0.846000E-01	1.12143
1994	1.91519	89.8523	0.846000E-01	1.20058
1995	2.04884	91.4691	0.846000E-01	1.28567
1996	2.19336	93.1150	0.846000E-01	1.37716
1997	2.34813	94.7905	0.846000E-01	1.47552
1998	2.51495	96.4961	0.846000E-01	1.58128
1999	2.693S'8	98.2324	0.846000E-01	1.6949?
2000	2.08667	100.000	0.846000E-01	1.81721
	1	2	3	4

Source: ADF&G, Catch and Production Leaflets.

EPR = Alaska red salmon exvessel price.
CSR = Alaska red salmon harvest (million Pounds).
FR = CSR/Alaska canned red salmon pack (in 1,000 48-pound cases).
EPP = Alaska pink salmon exvessel price.

ORD1NAR% LEAST SQUARES

DFPENDFNT VARIABLF: Pet{

RIGHT-HAND VARIABLE	FSTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	-0.883137E-01	0.319896E-01	-2,"76070
CSCH	-0.434912E-04	0.351542E-03	-0s123715
FCH	0.414126	0.339379	1.270?5
PP	1.22676	0.756496E-01	16.2163

LOG OF LIKELIHOOD FUNCTION = 44.5?13
R-SQUARED == 0.9837
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) =
SUM OF SQUARED RESIDUALS = 0.358694E-02 2.3999
STANDARD ERROR OF THE REGRESSION = 0.172891E-01
SUM OF RESIDUALS = 0.139698E-07
NUMBER OF OBSERVATIONS = 16.
MEAN OF DEPENDENT VARIABLE = 0s175256
F-STATISTIC(3., 12.) = 241.881

PLOT OF ACTUAL(*) AND FITTED(+) VALUES

ID	ACTUAL	FITTED		RESIDUAL
1961	0.8344E-01	0.6598E-01	+ *	0.175E-01
1962	0.8382E-01	0.1175	* +	-0.336E-01
1963	0.8522E-01	0.8622E-01	+	-0.100E-02
1964	0.7489E-01	0.7625E-01	*+	-0.136E-02
1965	0.8123E-01	0.7698E-01	+	0.424E-02
1966	0.1095	0.1128	+	-0.332E-02
1967	0.9781E-01	0.8653E-01	+ *	0.113E-01
1968	0.1255	0.1153	+ *	(-I.10IE-01
1969	0.1295	0.1373	*+	-0.784E-02
1970	0.1214	0.1216	+	-0.225E-03
1971	0.1377	0.1392	+	-0.149E-02
1972	0.1839	().1861	+	-0.227E-02
1973	0.3861	(-).3541	+ *	0.320E-01
1974	0.3759	0.3825	*+	-0.658E-02
1975	0.3384	0.3645	* +	-0.260E-01
1976	0.3898	0.3811	+*	0.868E-02

Historical and Forecasted Data

	EPCH	CSCH	FCH	EPP
1961	0.834377E-01	46.1209	0.880170E-01	0.976921E-01
1962	0.838154E-01	57.6526	0.833129E-01	0.141656
1963	0.852220E-01	35.7484	0.825598E-01	0.115670
1964	0.748857E-01	62.6898	0.904615E-01	0.105829
1965	0.812253E-01	29.2625	0.981965E-01	0.102630
1966	0.109483	52.2296	0.892813E-01	0.13565?
1967	0.978107E-01	31.5183	0.924290E-01	0.112444
1968	0.125464	55.9162	0.887559E-01	0.138031
1969	0.129451	22.6685	0.107945	0.148269
1970	0.121418	54.4905	0.121090	0.132202
1971	O*I3771O	54.7263	0.909075E-01	0.156711
1972	0.183877	64.8235	0.132023	0.181460
1973	0.386126	45.8808	0.12'3242	0.318668
1974	(3.375944	37.1742	().116170	0.345907
1975	0.338443	32.0605	0.145070	0.321264
1976	0.389780	47.6752	0.129905	0.340479
1977	0.	0.	0.	0.
1978	0.	0.	0.	0.
1979	0.	0.	0.	0.
1980	0.551097	45.7000	0. 1 30(')00	0.478955
1981	0.588867	46.9560	o * 13000(-)	0.509787
1982	0.629483	48.2466	o .130000	0,542941
1983	0.673159	49.5727	0. 130000	().578591
1984	0.720124	50.9351	0. 130000	0.616923
1985	0.770626	52.3.351	0. 1300(-)0	0.658140
1986	0.824930	53.7735	o .130000	0.702457
1987	0.883322	55.2514	0.130000	0.750108
1988	0.946109	56.7700	0. 130(300	0.801343
1989	1.01362	58.3303	o .130000	0.856431
1990	1.08621	59.9335	o .130000	0.915660
1991	1.16426	61,5807	0.130000	0.979342
1992	1.24818	63.,?732	0. 130(-)00	1.04781
1993	1.33842	65.0123	o .130000	1.12143
1994	1.43543	66.7991	0.130000	1.20058
1995	1..53975	68.6351	0. 13000(-)	1.28567
1996	1.65190	70.5215	0. 130000	1037716
1997	1.77248	"72.4597	0. 130(200	1.47552
1998	1.90213	74.4512	0.130000	1.58128
1999	2,04152	76,4975	0. 130000	1.69497
2000	2.19138	78.6000	0. 130000	1.81721
	1	2	3	4

Source: ADF&G, Catch and Production Leaflets.

EPCH = Alaska chum salmon exvessel price.
CSCH = Alaska chum salmon harvest (million pounds).
FCH = CSCH/Alaska canned chum salmon pack (in 1,000 48-pound cases).
EPP = Alaska pink salmon exvessel price.

Coho Salmon Exvessel Price Model and Data

ORDINARY LEAST SQUARES

DEPENDENT VARIABLE: PCO

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	-0.287310	0.801768E-01	-3.58345
CSCO	0.510178E-02	0.356752E-02	1.43007
FCO	1.09070	0.220788	4.940(-)5
PP	2.03552	0.165670	12.2866

LOG OF LIKELIHOOD FUNCTION = 28.8796
R-SQUARED = 0.9685
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) = 1,6657
SUM OF SQUARED RESIDUALS = 0.253433E-01
STANDARD ERROR OF THE REGRESSION = 0.459558E-01
SUM OF RESIDUALS = -0.447035E-07
NUMBER OF OBSERVATIONS = 16.
MEAN OF DEPENDENT VARIABLE = 0.3667(')0
F-STATISTIC(3., 12.) = 123.121

P L O T OF ACTUAL(*) AND FITTED(+) VALUES

ID	ACTUAL	FITTED	PLOT	RESIDUAL
1961	o.1754	(-).1211	+ *	0.544E-01
i962	0.2064	0.2369	* +	-0.305E-01
1963	0.1711	0.1853	*+	-0.142E-01
1964	0.1709	0.1735	+	-0.257E-02
1965	0.2469	0.1952	+ *	0.517E-01
1966	n.2300	0.2212	+*	0.873E-02
1967	0.2567	0.2232	+ *	0.335E-01
1968	0,2557	0,2995	* +	-0.438E-01
1969	0.2775	0.3684	* +	-0.909E-01
1970	0.2952	0.2873	+*	0.782E-02
1971	0.2461	0.2407	+	0.537E-02
1972	0.4283	0.4387	*+	-0,104E-01
1973	0.7593	0.7468	+*	0.125E-01
1974	0.6769	0.7192	* +	-0.423E-01
1975	0.5688	0.5785	*+	-0.978E-02
1976	0.9019	0.8315	+ *	0.704E-01

Historical and Forecasted Data

	EPCO	CSCO	FCO	EPP
1961	(3.175429	11.3858	0.138851	0.976921 E-01
1962	0.206374	15.3215	0.144542	0.141656
1963	0.171139	17.5812	0.135?40	0.115670
1964	0.170949	20.9539	0.126993	0.105829
1965	0.246936	17.6660	0.168248	00102630
1966	0.229960	16.1129	0.137717	0.135652
1967	0.256694	1300221	0.197304	0.112444
1968	0.255701	?0.96/34	0.182334	0.138031
1969	0.277522	8.03357	0.286913	0.148269
1970	0.295161	11.8980	0.22449(3	0.132202
1971	0.246098	11.4594	0.138065	0.156711
1972	OS428307	13.0348	0.266015	0.181460
1973	0.759345	9.83684	0.307401	0.318668
1974	0.676901	12.8202	0.217291	0.345907
1975	0.568759	7.74503	0.158062	0.321264
1976	0.901926	11.1589	0.338150	0.340479
1977	0.	0.	0.	0.
1978	0.	0.	0*	0.
1979	0.	0.	0.	0.
1980	1.12616	13.7000	0.338000	0.478955
1981	1.18912	13.7389	0.338000	0.509787
1982	1.25681	13.7780	0.338000	0.542941
1983	1.32957	13.8171	0.338000	0.578591
1984	1.40780	13.8564	0.338(300	0.616923
1985	1.49190	13.8958	0.338000	0.658140
1986	1.58231	13.9353	0.338000	().702457
1987	1.67950	13.9749	0.338000	0.750108
1988	1.78400	14,0146	0.338000	().801343
1989	1.89633	14.0544	0.338000	(-).856431
1990	2.01710	14.0943	0.338000	0.915660
1991	2.14693	14.1344	0.338000	0.979342
1992	2.28650	14.1745	0.338000	1.04781
1993	2.43655	14.2148	0.338000	1.12143
1994	2.59787	14.2552	0.338000	1.20058
1995	?.77129	14.2957	0.33/3000	1.28567
1996	2.95772	14.3363	0.338000	1.37716
1997	3015815	14.3771	0.338000	1.47552
1998	3.37362	14.4179	0.338000	1.58128
1999	3.60526	14.4589	0.338000	1.69497
2000	3,85429	14.5000	0.338000	1.81721
	1	2	3	4

Source: ADF&G, catch and Production Leaflets.

EPCO = Alaska coho salmon exvessel price.
CSCO = Alaska coho salmon harvest (million pounds),
FCO = CSCO/Alaska canned coho salmon pack (in 1,000 48-pound cases).
EPP = Alaska pink salmon exvessel price.

ORDINARY LEAST SQUARES

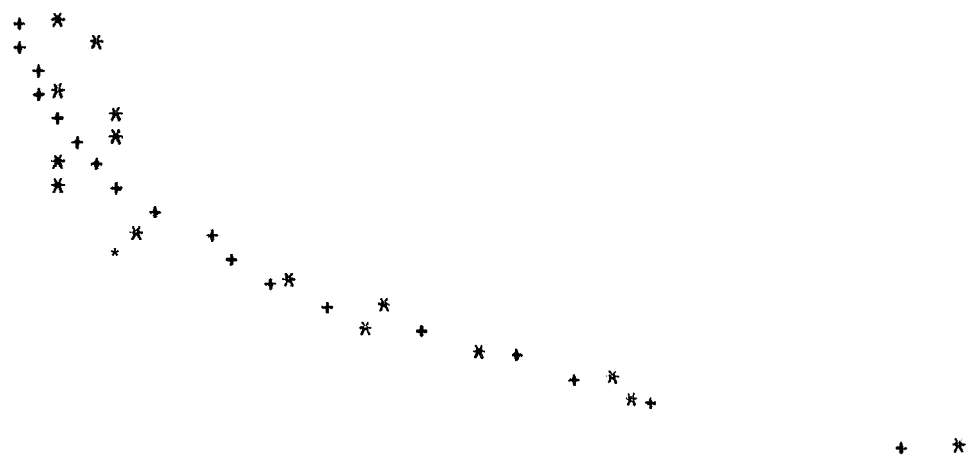
DEPENDENT VARIABLE: PHAL

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	-0.867567	0.751461E-01	-11.5451
CPI	1.18639	0.560539E-01	21.1653

LOG OF LIKELIHOODFUNCTION = 19.0553
R-SQUARED = 0.9634
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) = 1.*4147
SUM OF SQUARED RESIDUALS = 0.149679
STANDARD ERROR OF THE REGRESSION = 0.938331E-01
SUM OF RESIDUALS = 0.167638E-06
NUMBER OF OBSERVATIONS = 19.
MEAN OF DEPENDENT VARIABLE = 0.656263
F-STATISTIC(1., 17.) = 447.969

PLOT OF ACTUAL(*) AND FITTED(+) VALUES

ID	ACTUAL	FITTED	RESIDUAL
1961	0.2570	(-).1943	0.627E-01
1962	0.3280	0.2085	0.120
1963	0.2360	().2227	0.133E-01
1964	0.2670	().2358	0.312E-01
1965	0.350(-)	0.2500	().100E 00
1966	0.3560	0.2915	0.645E-01
1967	0.2560	0.3188	-0.628E-01
1968	0.2710	0.3746	-0.104
1969	0.4120	().4292	-0.172E-01
1970	0.3920	0.5122	-0.120
1971	0.3680	0.5668	-0.199
1972	0.6420	0.6225	0.195E-01
1973	0.8340	().7()56	0.128
1974	0.7850	0.8847	-0.997E-01
1975	0.9750	1.050	-0.746E-01
1976	1.220	1.160	0.600E-01
1977	1.260	1.285	-0.246E-01
1978	1.450	1.451	-0.648E-03
1979	1.810	1.707	0.103



Historical and Forecasted Data

Year	EPHAL	CPI
1961	0.257000	0.895000
1962	0.328000	0.907000
1963	0.236000	0.919000
1964	0.267000	0.930000
1965	0.350000	0.942000
1966	0.356000	0.977000
1967	0.256000	1.00000
1968	0.271000	1.04700
1969	0.412000	1.09300
1970	0.392000	1.16300
1971	0.368000	1.20900
1972	0.642000	1.25600
1973	0.834000	1.32600
1974	0.785000	1.47700
1975	0.975000	1.61600
1976	1.22000	1.70900
1977	1.26000	1.81400
1978	1.45000	1.95400
1979	1.81000	2.17000
1980	1.97978	2.40000
1981	2.13638	2.53200
1982	2.30160	2.67126
1983	2.47591	2.81818
1984	2.65980	2.97318
1985	2.85380	3.13670
1986	3.05848	3.30922
1987	3.27441	3.49123
1988	3.50222	3.68325
1989	3.74256	3.88583
1990	3.99611	4.09955
1991	4.26362	4.32502
1992	4.54583	4.56290
1993	4.84357	4.81386
1994	5.15768	5.07862
1995	5.48907	5.35794
1996	5.83868	5.65263
1997	6.20753	5.96352
1998	6.59666	6.29152
1999	7.00719	6.63755
2000	7.44030	7.00262
	1	2

Source: ADF&G, Catch and Production Leaflets.

EPHAL = Alaska halibut exvessel price Dollars/pound).
CPI = U.S. Consumer Price Index.

COCHRANE -ORCUTT ITERATIVE TECHNIQUE

DEPENDENT VARIABLE: PKC

MEAN OF DEPENDENT VARIABLE = 0.4180(-)0

ITERATION	RHO
1	-().789486
2	-().798476
3	-0.798932

FINAL VALUE OF RHO = -0.798932
NO. OF ITERATIONS = 3

STANDARD ERROR OF RHO = 0.141757
T-STATISTIC FOR RHO = -5.635943

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	3.42098	0.152781	22.3914
S	-0.5141(-)5	0.290595E-01	-17.6915
LKC	-0.436571E-06	0.212562E-06	-2.05385
EXCHJ	-0.910514F-02	0.339992E-03	-26.7804
CPIJ	0.201634	0.350256E-01	5.75676
FKC	-0.417775E-05	0.100247E-05	-4.16744

LOG OF LIKELIHOOD FUNCTION = 37.4801
R-SQUARED = 0.9941
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) = 2.5703
SUM OF SQUARED RESIDUALS = 0.163756E-01
STANDARD ERROR OF THE REGRESSION = 0.369410E-01
SUM OF RESIDUALS = 0.745151E-05
NUMBER OF OBSERVATIONS = 18.
MEAN OF DEPENDENT VARIABLE · 0.418000
F-STATISTIC(5., 12.) = 405.829

*

PLOT OF ACTUAL * AND FITTED(+ VALUES

ID	ACTUAL	FITTED		RESIDUAL
1962	0.1000	0.1440	*+	-0.440E-01
1963	0.9600E-01	0.8342E-01	+	0.126E-01
1964	0.9400E-01	0.8216E-01	+	0.118E-01
1965	0.9700E-01	0.1181	*+	-0.211E-01
1966	0.9800E-01	0.1048	+	-0.675E-02
1967	0.1170	0.1318	*+	-0.148E-01
1968	0.2670	0.2201	+ *	0.469E-01
1969	0.2710	0.2230	+*	0.480E-01
1970	0.2530	0.2997	*+	-0.467E-01
1971	0.2700	0.2386	+*	0.314E-01
1972	0.2940	0.2756	+*	0.184E-01
1973	0.5820	0.5963	*+	-0.143E-01
1974	0.4110	0.4135	+	-0.253E-02
1975	0.3920	0.4428	* +	-0.508E-01
1976	0.6480	0.6058	+*	0.422E-01
1977	1.009	1.030	*+	-0.212E-01
1978	1.590	1.571	+*	0.189E-01
1979	0.9350	0.9432	+	-0.817E-02

R-SQUARED IN TERMS OF CHANGES = 0.9845

Historical and Forecasted Data

	EPKC	S	LKC	EXCHJ	CPIJ	FKC
1961	0.900000E-01	[illegible]	43412.0	361.800	.600000	[illegible]
1962	0.100000	[illegible]	52782.0	359.600	.640000	[illegible]
1963	0.960000E-01	[illegible]	78740.0	362.000	.690000	[illegible]
1964	0.940000E-01	[illegible]	86721.0	358.300	.720000	[illegible]
1965	0.970000E-01	[illegible]	131671.	360.900	.770000	[illegible]
1966	0.980000E-01	[illegible]	159202.	362.500	.810000	[illegible]
1967	0.117000	0.	127723.	361.900	.840000	[illegible]
1968	0.267000	0.	81905.0	357.700	.880000	[illegible]
1969	0.271000	0.	57730.0	357.800	.930000	[illegible]
1970	0.253000	0.	52061.0	357.600	1.00000	[illegible]
1971	0.270000	.00000	70703.0	314.800	1.06000	[illegible]
1972	0.294000	.00000	74427.0	302.000	1.11000	[illegible]
1973	0.582000	.00000	76824.0	280.000	1.24000	[illegible]
1974	0.411000	.00000	95214.0	301.000	1.54000	[illegible]
1975	0.392000	.00000	97629.0	305.200	1.72000	1.00000
1976	0.648000	.00000	105899.	292.800	1.88000	1.00000
1977	1.00900	.00000	99575.0	240.000	2.04000	1.00000
1978	1.59000	1.00000	122925.	194.600	2.11000	1.00000
1979	0.935000	1.00000	154389.	248.800	2.16000	1.00000
1980	1.26115	1.00000	140000.	232.000	2.32200	1.00000
1981	1.18902	1.00000	140000.	232.000	2.49615	1.00000
1982	1.31245	1.00000	140000.	232.000	2.68336	1.00000
1983	1.28457	1.00000	140000.	232.000	2.88461	1.00000
1984	1.38289	1.00000	140000.	232.000	3.10096	1.00000
1985	1.38609	1.00000	140000.	232.000	3.33353	1.00000
1986	1.47141	1.00000	140000.	232.000	3.58355	1.00000
1987	1.49771	1.00000	140000.	232.000	3.85231	1.00000
1988	1.57825	1.00000	140000.	232.000	4.14124	1.00000
1989	1.62307	1.00000	140000.	232.000	4.45183	1.00000
1990	1.70462	1.00000	140000.	232.000	4.78571	1.00000
1991	1.76563	1.00000	140000.	232.000	5.14464	1.00000
1992	1.85251	1.00000	140000.	232.000	5.53049	1.00000
1993	1.92889	1.00000	140000.	232.000	5.94528	1.00000
1994	2.02459	1.00000	140000.	232.000	6.39117	1.00000
1995	2.11661	1.00000	140000.	232.000	6.87051	1.00000
1996	2.22421	1.00000	140000.	232.000	7.38580	1.00000
1997	2.33295	1.00000	140000.	232.000	7.93974	1.00000
1998	2.45538	1.00000	140000.	232.000	8.53522	1.00000
1999	2.58257	1.00000	140000.	232.000	9.17536	1.00000
2000	2.72283	1.00000	140000.	232.000	9.86351	1.00000
	1	2	3	4	5	6

Source: ADF&G, Catch and Production Leaflets.

EPKC = Alaska king crab exvessel price (Dollars/pound).
S = Dummy Variable
LKC = Domestic Alaska king crab harvest (1,000 pounds).
EXCHJ = Exchange rate (Yen/Dollar).
CPIJ = Japanese Consumer Price Index.
FKC = Foreign Alaska king crab harvest (1,000 pounds).

Tanner Crab Exvessel Price Model and Data

ORDINARY LEAST SQUARES

DEPENDENT VARIABLE: PTC

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	0.387633E-01	0.274888E-01	1.41015
PKCL	0.358159	0.391732E-01	9.14295

LOG OF LIKELIHOOD FUNCTION = 16.8130
R-SQUARED = 0.9127
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) = 1.3617
SUM OF SQUARED RESIDUALS = 0.202847E-01
STANDARD ERROR OF THE REGRESSION = 0.503546E-01
SUM OF RESIDUALS = -0.270084E-07
NUMBER OF OBSERVATIONS = 10.
MEAN OF DEPENDENT VARIABLE = 0.243630
F-STATISTIC(1., 8.) = 83.5935

ESTIMATE OF VARIANCE-COVARIANCE MATRIX OF ESTIMATED COEFFICIENTS

	C	PKCL
C	0.755636E-03	-0.877757E-03
PKCL	-0.877757E-03	0.153454E-02
	1	2

PLOT OF ACTUAL(*) AND FITTED + VALUES

ID	ACTUAL	FITTED	RESIDUAL
1970	0.9800E-01	0.1358	-0.378E-01
1971	0.1060	0.1294	-0.234E-01
1972	0.1238	0.1355	-0.117E-01
1973	0.1743	0.1441	0.302E-01
1974	0.2042	0.2472	-0.430E-01
1975	0.1498	0.1860	-0.362E-01
1976	0.2001	0.1792	0.209E-01
1977	0.3601	0.2709	0.892E-01
1978	0.4590	0.4001	0.589E-01
1979	0.5610	0.6082	-0.472E-01

Historical and Forecasted Data

	EPTC	EPKCL
1970	0.980000E-01	0.271000
1971	0.106000	0.253000
1972	0.123800	0.270000
1973	0.174300	0.294000
1974	0.204200	0.582000
1975	0.149800	0.411000
1976	0.200100	0.392000
1977	0.360100	0.648000
1978	0.459000	1.00900
1979	0.561000	1.59000
1980	0.373642	0.935000
1981	0.490456	1.26115
1982	0.464621	1.18902
1983	0.508829	1.31245
1984	0.498845	1.28457
1985	0.534057	1.38289
1986	0.535203	1.38609
1987	0.565761	1.47141
1988	0.575182	1.49771
1989	0.604027	1.57825
1990	0.620081	1.62307
1991	0.649288	1.70462
1992	0.671139	1.76563
1993	0.702255	1.85251
1994	0.729612	1.92889
1995	0.763888	2.02459
1996	0.796847	2.11661
1997	0.835384	2.22421
1998	0.874329	2.33295
1999	0.918178	2.45538
2000	0.963732	2.58257
	1	2

Source: ADF&G, Catch and Production Leaflets.

EPTC = Alaska Tanner crab exvessel price (Dollars/pound).
EPKCL = Alaska king crab exvessel price of the previous calendar year.

Dungeness Crab Exvessel Price Model and Data

ORDINARY LEAST SQUARES

DEPENDENT VARIABLE: PDUNG

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	-0.500785E-01	0.316582	-0.158185
AKLDUNG	-0.782113E-05	0.443644E-05	-1.76293
OLD	-0.550995E-05	0.868180E-06	-6.34655
RW	-0.921858E-01	0.891527E-01	-1.03402
RY	0.427427E-03	0.207824E-03	2.05668
CPI	0.444714	0.117840	3.77389

LOG OF LIKELIHOOD FUNCTION = 32.0473
R-SQUARED = 0.9701
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) = 1.7690
SUM OF SQUARED RESIDUALS = 0.122431E-01
STANDARD ERROR OF THE REGRESSION = 0.368828E-01
SUM OF RESIDUALS = 0.600703E-07
NUMBER OF OBSERVATIONS = 15.
MEAN OF DEPENDENT VARIABLE = 0.222000
F-STATISTIC(5., 9.) = 5/3.4555

PLOT OF ACTUAL(*) AND FITTED(+) VALUES

ID	ACTUAL	FITTED	PLOT	RESIDUAL
1961	0.1000	0.4446E-01	+ *	0.555E-01
19.s2	0.1100	0.1101	+	-0.147E-03
1963	0.11(70	n.1355	* +	-o.255E-01
1964	0.1200	0.1402	* +	-o*202E-01
1965	0.1100	0.1414	* +	-o.314E-01
1966	0.1200	().1278	*+	-0.784E-02
1967	0.1300	n.1075	+ *	0.225E-01
1968	().1300	0.1061	+ *	0.239E-01
1969	0.1400	0.1519	*+	-0.119E-01
1970	0.1500	0.1334	+*	0.166E-01
1971	0.1600	0.2246	* +	-0.646E-01
1972	(-).3600	0.3442	+*	0.158E-01
1973	0.5300	0.5044	+ *	o*256E-01
1974	0.5200	0.5036	+ *	0.164E-01
1975	0.5400	0.5548	*+	-0.148E-01

Histor·cal and Forecasted Data

	EPDC	AKLDUNG	OLD	RW	RY	CPI
1961	0.100000	4592.00	28107.0	3.41899	473.743	0.895000
1962	0.110000	8990.00	14374.0	3.35171	503.859	0.907000
1963	0.110000	12084.0	12779.0	3.06855	525.571	0.919000
1964	0.120000	12709.0	12709.0	3.17204	558.065	0.930000
1965	0.110000	8895.00	20018.0	3.30149	600.849	0.942000
1966	0.120000	5053.00	34665.0	3.23439	636.643	0.977000
1967	0.130000	11598.0	30831.0	3.33000	656.000	1.00000
1968	0.130000	13242.0	36728.0	3.19962	681.948	1.04700
1969	0.140000	11304.0	36751.0	3.18390	702.653	1.09300
1970	0.150000	9696.00	48813.0	3.06105	686.156	1.16300
1971	0.160000	3749.00	38930.0	3.49876	709.677	1.20900
1972	0.360000	5448.00	21469.0	3.55096	757.962	1.25600
1973	0.530000	6423.00	5701.00	3.22021	803.167	1.32600
1974	0.520000	3818.00	12249.0	3.62898	769.127	1.47700
1975	0.540000	3034.00	12970.0	3.68812	751.856	1.61600
1976	0.	0.	0.	3.44061	795.787	1.70900
1977	0.	0.	0.	3.67696	841.235	1.81400
1978	0.	0.	0.	3.42375	882.293	1.95400
1979	0.	0.	0.	3.05991	886.636	2.17000
1980	0.984892	3198.00	17331.0	3.28245	914.211	2.40000
1981	1.05206	3527.00	17331.0	3.29489	942.732	2.53200
1982	1.12258	3890.00	17331.0	3.30738	972.143	2.67126
1983	1.19659	4290.00	17331.0	3.31992	1002.47	2.81818
1984	1.27428	4731.00	17331.0	3.33251	1033.75	2.97318
1985	1.35595	5200.00	17331.0	3.34515	1066.00	3.13670
1986	1.44572	5200.00	17331.0	3.35783	1099.26	3.30922
1987	1.54015	5200.00	17331.0	3.37056	1133.55	3.49123
1988	1.63948	5200.00	17331.0	3.38334	1168.91	3.68325
1989	1.74397	5200.00	17331.0	3.39617	1205.38	3.88583
1990	1.85390	5200.00	17331.0	3.40904	1242.99	4.09955
1991	1.96956	5200.00	17331.0	3.42197	1281.77	4.32502
1992	2.09124	5200.00	17331.0	3.43494	1321.76	4.56290
1993	2.21927	5200.00	17331.0	3.44797	1362.99	4.81386
1994	2.35398	5200.00	17331.0	3.46104	1405.51	5.07862
1995	2.49574	5200.00	17331.0	3.47416	1449.36	5.35794
1996	2.64490	5200.00	17331.0	3.48734	1494.58	5.65263
1997	2.80187	5200.00	17331.0	3.50056	1541.21	5.96352
1998	2.96706	5200.00	17331.0	3.51383	1589.29	6.29152
1999	3.14091	5200.00	17331.0	3.52715	1638.87	6.63755
2000	3.32388	5200.00	17331.0	3.54053	1690.00	7.00262
	1	2	3	4	5	6

Source: ADF&G, Catch and Product·on Leaflets.

EPDC = Alaska Dungeness crab exvessel price (Dollars/pound).
AKLDUNG = Alaska Dungeness crab harvest (1,000 pounds).
ULD = Oregon, California, and Washington Dungeness crab harvest (1,000 pounds).

RW = Real wage, Alaska seafood processing.
RY = Real national income.
CPI = U.S. Consumer Price Index.

ORDINARY LEAST SQUARES

DEPENDENT VARIABLE: PSHR

RIGHT-HAND VARIABLE	ESTIMATED COEFFICIENT	STANDARD ERROR	T-STATISTIC
C	-().239599	0.767313E-01	-3.12256
AKLSHR	-0.527879E-06	0.145074E-06	-3.63868
RN	0.494155E-01	0.235463E-01	2.09865
CPI	0.138732	0.130361E-01	10.6421

LOGOF LIKELIHOOD FUNCTION = 53.0007
R-SQUARED = 0.9022
DURBIN-WATSON STATISTIC (ADJ. FOR 0. GAPS) = 2.2436
SUM OF SQUARED RESIDUALS = 0.420087E-02
STANDARD ERROR OF THE REGRESSION = 0.167349E-01
SUM OF RESIDUALS = 0.116415E-07
NUMBER OF OBSERVATIONS = 19.
MEAN OF DEPENDENT VARIABLE = 0.708947E-01
F-STATISTIC(3., 15.) = 46.1415

PLOT OF ACTUAL(*) AND FITTED(+) VALUES

ID	ACTUAL	FITTED	PLOT	RESIDUAL
1961	0.4000E-01	0.4508E-01	*+	-0.508E-02
1962	0.4300E-01	0.4291E-01	+	0.862E-04
1963	0.4000E-01	0.3154E-01	+ *	0.846E-02
1964	0.4000E-01	0.4209E-01	+	-0.209E-02
1965	0.4500E-01	0.4535E-01	+	-0.353E-03
1966	0.4600E-01	0.4089E-01	+ *	0.511E-02
1967	004100E-01	0.4161E-01	+	-0.615E-03
1968	0.5500E-01	0.4155E-01	+ *	0.134E-01
1969	0.4000E-01	0.4411E-01	*+	-0.411E-02
1970	0.4000E-01	0.3381E-01	+ *	0.619E-02
1971	00410CE-01	0.5093E-01	* +	-0.993E-02
197?	0.5400E-01	0.6587E-01	* +	-0.119E-01
1973	0.3300E-01	0.4016E-01	* +	-0.716E-02
1974	().1020	0.8723E-01	+ *	0.148E-01
1975	0.8000E-01	0.1146	* +	-0.346E-01
1976	0.9000E-01	0.9959E-01	* +	-0.959E-02
1977	0.1760	0.1320	+ *	0.440E-01
1978	0.1650	0.1620	+*	0.304E-02
1979	0.1760	0.1857	* +	-0.970E-02

Historical and Forecasted Data

	EPSH	AKLSHR	I'?W	CPI
1961	n.400000E-01	15981.0	3.41899	0.895000
1962	00430000 E-01	16943.0	3.35171	0,907000
1963	0.400000E-01	15127.0	3,(36855	0.919000
1964	0.400000E-01	7727.00	3.17204	o.930000
1965	0.450000E-01	16819.0	3.30149	0.942000
1966	0.460000E-01	?8193.0	3.23439	0.9770(30
1967	0.41OOI9(3E-(-)1	41813.0	3.33(300	1.00000
1968	0.550000E-01	42077.0	3.19962	1.04700
1969	0.400000E-01	47851.0	3.18390	1.09300
1970	0.400000E-01	74256.0	3.06105	1.16300
1971	0.41OOI3OE-O1	94891.0	3.49876	1.20900
1972	0.540000E-01	83830.0	3.55096	1.25600
1973	0.330000E-01	119964.	3.22021	1.32600
1974	o* 102000	108741.	3.62898	1.47700
1975	0.800000E-01	98984.0	3.68812	1.61600
1976	0.900000E-01	128682.	3.44061	1.70900
1977	o*176000	116995.	3.67696	1.81400
1978	0.165000	73327.0	3.42375	1,95400
1979	0.176000	51(-)59.(3	3.05991	2.17000
1900	0*235714	37600.0	3.28245	2.40000
1981	0.254445	37972*O	3.29489	?.53200
1982	0.274162	38389.0	3.30738	2.67126
1983	0.294918	38855.0	3.31992	2.81818
1984	0.316767	39378.0	3.33251	2.97318
1985	0.339769	39963.0	3.3451.5	3.13670
1986	0.363983	40619.()	3.35783	3.30922
1987	00389475	41353.0	3.37056	3.49123
1988	0.416312	42175.0	3.38334	3.68325
1989	0.444563	43097.0	3.39617	3.88583
1990	0.474305	44128.0	3.40904	4.09955
1991	00505614	45284.0	3.42197	4.32502
1992	0.538573	46578.0	3.43494	4.56290
1993	0.573268	48027.0	3*44797	4.81386
1994	0.609788	49650*(1	3.46104	5.07862
1995	0.648227	51469*O	3.47416	5.35794
1996	0.688686	53504.()	3.48734	5.65263
1997	o*731267	55785.0	3.50056	5.96352
1998	0.776078	58339.0	3.51383	6.29152
1999	0.823232	61200.0	3.52715	6.63755
2000	00872847	64404.0	3.54053	7.00262
	1	2	3	4

Source: ADF&G, Catch and Production Leaflets.

EPSH = Alaska shrimp exvessel price (Dollars/pound),
AKLSHR = Alaska shrimp harvest (1,000 pounds),
RW = Real wage, Alaska seafood processing,
CPI . = U.S. Consumer Price Index

Number of Boats and/or Landings Models
Kodiak/Shelikof Strait

SALMON

Purse Seine

$L = -2{,}262 + 0.090\,C + 13.96\,B$

t-statistics (8.23) (3.46) $R^2 = 0.953$

Beach Seine

$L = -14.28 + 0.027\,C + 0.00029\,C^2 + 4.49\,B$

t-statistics (0.21) (1.74) (3.82) $R^2 = 0.965$

Set Gill Net

$L = -588 + 1.37\,C \quad 0.000147\,C^2$

t-statistics (3.79) (-2.85) $R^2 = 0.842$

HALIBUT

c = 0.40 C3

B = C/37 (where 37 is catch per vessel in 1977)

L = 4B

HERRING

L = 3B

3 = mean number of landings per boat 1974-1976

KING CRAB

$B = 222 - 4{,}125 \times 10^{6}\ C^{-2} - 14{,}948 \times ?0^{6}\ CL^{-2}$

t-statistics (-?,00) (-3.70) $R^2 = 0.896$

$L = 2{,}696 + 0.0331\ C + 6.97\ B + 820 \times 10^{6}\ Y^{-3}$

t-statistics (7.67) (15.1) (10.6) $R^2 = 0.991$

TANNER CRAB

$B = 40.9 + 0.00225\ C + 0.000791\ CL$

t-statistics (3.83) (1.40) $R^2 = 0.892$

$L = -2{,}296 + 0.0382\ C + 5.00\ B + 784 \times 10^{6}\ Y^{-3}$

t-statistics (6.51) (3.51) (4.72) $R^2 = 0.981$

DUNGENESS CRAB

$B = 1.71 + 0.00375\ C - 10.57\ RP^{-1} + 668{,}000\ KC^{-1}$

t-statistics (3.29) (-4.58) (3.44) $R^2 = 0.917$

$L = -68 + 0.010\ C + 10.93\ B$

t-statistics (1.11) (7.02) $R^2 = 0.958$

SHRIMP

$B = C/(\text{mean } C/B)$

$L = C/(\text{mean } C/L)$

	Otter Trawl	Beam Trawl
1969-1976 mean C/B .	41.2	127.5
1969-1976 mean C/L	6.0	13.7

Cook Inlet

SALMON

Purse Seine

$L = -151 + 0.126\ C + 6.256\ B$

t-statistics (3.08) (1.41) $R^2 = .80$

Drift Gill Net

$L = -1{,}858 + 0.167\ C + 9.346\ B$

t-statistics (1.56) (1.87) $R^2 = .71$

Set Gill Net

$L = 4{,}068 + 0.418\ C - 2.225\ B$

t-statistics (1.98) (0.46) $R^2 = .52$

HALIBUT

$C = 0.30\ C3$

B = C/37 (where 37 is catch in 1,000 pounds per vessel in 1977)

L = 46

HERRING

$L = 6.3\ B$

6.3 = Mean number of landings per boat 1974-1976

KING CRAB

B = 66.177 + 0.0015 c 29.794 (l/Y)

t-statistics (0.232) (-1.72) R^2 = 0.52

L = 49.883 + 0.253 C

t-statistics (3.61) R^2 = 0.68

TANNER CRAB

B= 6.781 -I- 0.0108 C + 9.475 (l/Y)

t-statistics (6.62) (0.62) R^2 = 0.94

L + 228.720 -i- 0.128 C

t-statistics (4.35) R^2 = 0.76

DUNGENESS CRAB

B = 39.224 + 0.021 c 0.806 (1/RP)

t-statistics (1.21) (-2.53) R^2 = 0.71

L = -111.996 -I- 0.401 c + 10.951 B

t-statistics (4.63) (8.45) R^2 = 0.98

POT SHRIMP

B = 10.422 + 0.0615 C

t-statistics (4.01) R^2 = 0.73

L = 52.919 + 1.732 C

t-statistics (14.00) R^2 = 0.97

TRAWL SHRIMP

$$L = -141.730 + 0.101\ C + 231.368\ (1/Y)$$

t-statistics (4.38) (2.25) $R^2 = 0.81$

Where:

B = Number of boats

L = Number of landings

C = Annual catch in 1,000 pounds

C3 = Annual halibut catch in Area 3

CL = Catch per landing in 1,000 pounds

Y = Year (e.g., 1980)

RF = Real exvessel price

KC = King crab catch in 1,000 pounds

APPENDIX B

Conflicts Among Commercial Fisheries, Recreational Fisheries and Nonfishing Marine Traffic

Fishing Vessel Accidents

Alaska Marine Oil Spills

Processing Plant Siting Requirements

Market Environment

Conflicts Among Commercial Fisheries, Recreational Fisheries and NonFishing Marine Traffic

The conflicts among commercial fisheries, recreational fisheries, and nonfishing marine traffic have, except in a few notable instances, been relatively minor and have therefore not tended to constrain the development of the commercial fishing industry in Alaska. The following sections provide an overview of the nature of these conflicts.

COFIPETITION FOR SMALL BOAT HARBORS

The demand for small boat harbors in Alaska has increased more rapidly than the supply; this combined with a reluctance to use the price mechanism to allocate the scarce harbor space has resulted in a shortage of harbor space in many coastal communities. The commercial fisheries compete with each other and with other small boat harbor users (primarily recreational boaters) for the limited harbor space that is available. The term "small boat harbor" is perhaps a bit misleading; in Alaska the harbor facilities designed principally for fishing and recreational boats are referred to as small boat harbors although they may serve vessels over 40 meters (131 feet) in length. Harbor masters have demonstrated a great deal of imagination and dexterity in their handling of the overcrowding problem, and it would appear that the competition for harbor space has typically not hindered the development of a commercial fishery. There are, of course, limits on what can be done with a given harbor facility; this in part explains the harbor improvement plans underway in many communities.

COMPETITION FOR FISHERY RESOURCES

In Alaska the pr·ncipal competition for fishery resources occurs in the salmon fisheries where commerical fishermen using various gear types compete w·th each other and with recreational and subsistence fishermen for the l·mited amounts of harvestable salmon. The competition and the resulting conflicts between gear types (e.g., purse seine, drift gill net, set gill net, beach seine, and troll) are in many cases limited by allocating different areas and/or periods to d·fferent gear types. The competition between commercial and recreation" fishermen and the resulting conflicts are greatest in the areas which are most accessible to the one large metropo·itan area of the state, Anchorage. In most other areas, recreational ·ishing is insignificant compared to commercial fishing and/or targets on species that are of less importance to commercial fisheries; therefore, the competition and the conflicts have been minimal. As the population of Alaska and/or regions of Alaska increase and as recreational fishing increases in terms of both size of catch and areas fished, the conflicts between commercial and recreational fishing will increase. In the fisheries other than salmon, there is generally little competition among commercial fishermen using different types of gear.

When the conflicts among commercial fishermen and/or recreational fishermen have arisen, the Alaska Board of Fisheries has often set policies to assign the resource to one user group. Such policies limit the physical if not the political conflicts between user groups. An example of such a policy is Policy #7727FB; see Exhibit B.1.

EXHIBIT B.1

Policy' #77-27-FB

COMPREHENSIVE MANAGEMENT POLICY
FOR THE UPPER COOK INLET

The dramatically increasing population of the Cook Inlet area has resulted in increasing competition between recreational and commercial fishermen for the Cook Inlet salmon stocks. Concurrently, urbanization and associated road construction has increased recreational angler effort and may adversely affect fisheries habitat. As a result the Board of Fisheries has determined that a policy must now be determined for the long-term management of the Cook Inlet salmon stocks. This policy should rest upon the following considerations:

1. The ultimate management goal for the Cook Inlet stocks must be their protection and, where feasible, rehabilitation and enhancement. To achieve this biological goal, priorities must be set among beneficial uses of the resource.

2. The commercial fishing industry in Cook Inlet is a valuable long-term asset of this state and must be protected, while recognizing the legitimate claims of the non-commercial user.

3. Of the salmon stocks in Cook Inlet, the king and silver salmon are the target species for recreational anglers while the chum, pink, and red salmon are the predominant commercial fishery.

4. User groups should know what the management plan for salmon stocks will be in order that they can plan their use consistent with that plan. Thus, commercial fishermen must know if they are harvesting stocks which in the long-term will be managed primarily for recreational consumption so that they may plan appropriately. Conversely, as recreational demands increase the recreational user must be aware of what stocks will be managed primarily for commercial harvest in order that he not become overly dependent on these fish for recreational purposes.

5. Various agencies should be aware of the long-term management plan so that salmon management needs will be considered when making decisions in areas such as land use planning and highway construction.

6. It is imperative that the Department of Fish and Game receive long-range direction in management of these stocks rather than being called upon to respond to annually changing Board directives. Within the Department, divisions such as F.R.E.D., must receive such long-term direction.

Therefore, the Board establishes priorities on the following Cook Inlet stocks north of Anchor Point. In so doing it is not the Board's intent to establish exclusive uses of salmon stocks; rather its purpose is to define the primary beneficial use of the stock while permitting secondary uses of the stock to the extent it is consistent with the requirements " of the primary user group.

1. Stocks which normally move in Cook-Inlet to spawning areas prior to June 30, shall be managed primarily as a non-commercial resource.

2. Stocks which normally move in Cook Inlet after June 30, shall be managed primarily as a non-recreational resource until August 15; however existing recreational target fish shall only be harvested incidental to the non-recreational use; thereafter stocks moving to spawning areas on the Kenai Peninsula shall be managed primarily as a non-commercial resource. Other stocks shall continue to be managed primarily as a non-recreational resource.

3. "The Susitna coho, the Kenai king, and the Kenai coho runs cannot be separated from other stocks which are being managed primarily as non-recreational resources; however, efforts shall be made, consistent with the primary management goal, to minimize the non-recreational catch of these stocks.

Nicholas G. Szabo, Chairman
Alaska Board of Fisheries

ADOPTED: December 13, 1977

VOTED: 5-0

COMPETITION FOR OCEAN SPACE

A third source of conflict for commerical fisheries is the competition for ocean space in which to develop and/or harvest fishery resources. When two or more fisheries compete for the same ocean space, gear conflicts can cause gear losses and/or affect the abundance of other fishery resources. Gear loss conflicts are most likely to occur when fixed gear (e.g., crab or shrimp pots, and halibut long line gear) and nonfixed gear (e.g., trawl or dredge) are used in the same area at the same time. The timing and location of fisheries has tended to limit this type of conflict; but as the groundfish fishery, which will be primarily a trawl fishery, develops in the areas of ocean space used by the traditional fisheries, the potential for gear loss conflicts will increase.

Examples of gear conflicts which affect stock abundance in other fisheries include the following:

- destruction of juvenile king crab by scallop dredge
- incidental catch of a species that is the target species of another fishery (e.g., halibut and perch)
- destruction of juveniles by trawls

An additional source of conflict of ocean space use is that the species targeted on by some fisheries are food for other species, for example, the harvest of salmon, a predator of herring will depend to some degree on the harvest of herring. All else being equal, there will tend to be an inverse relationship between the salmon and herring harvest. The gear conflicts other than gear losses will also tend to increase as the groundfish fishery develops, with the major conflict being the incidental catch of halibut in groundfish trawl gear.

In addition to the competition for ocean space among commercial fisheries, there is also competition between commercial fisheries and other users of ocean space (e.g., vessels engaged in marine commerce). The potential Impacts on commercial fisheries of this competition are the costs associated with collisions and gear losses. These costs include the costs of actual losses as well as the costs incurred in attempting to reduce actual losses. Due to the relatively small amount of nonfishery marine traffic in most areas of Alaska, the costs associated with this type of conflict have not been significant. Exceptions to this occur in Cook Inlet and Prince William Sound, where freighter and tanker traffic has been sufficiently heavy that attempts have been made to restrict such marine traffic to designated areas or lanes. The establishment of sea lanes through fishing grounds has, however, proved to be a difficult task in Cook Inlet. The fishermen favor a single narrow lane for other users so a small amount of fishing area is lost, while the marine transport users favor more and broader lanes to reduce the probability of congestion and/or collisions. Sea lanes which have been established in Prince William Sound have substantially reduced gear losses and associated conflicts. The potential for conflict will increase in Alaska as its marine transportation system grows and as more distant fisheries (e.g. groundfish) develop. The extent to which the conflict will remain concentrated in Cook Inlet will depend on the rates of growth of the various regions of Alaska and the ability of the ports of Seward, Whittier, or Valdez to compete with the Port of Anchorage for marine commerce.

Fishing Vessel Accidents*

Approximately 25,000 fishing vessels of five net tons or larger are currently documented with the U.S. Coast Guard (USCG). It is estimated that nearly four times that number of fishing vessels are less than five net tons and registered by individual states. These smaller boats accounted for only five percent of the casualty incidents recorded by the USCG during-the 1972-1977 fiscal year period and, therefore, comprose a minor portion of the data utilized for analysis of fishing vessel casualties.

There has been a 51 percent increase in the number of American fishing vessels over the past 12 years. Along with this growth of the fishing fleet has been a 53 percent increase in the number of fishing vessel casualties (Figure B.I). The U.S. Coast Guard separates vessel casualties into five categories: operational collisions; grounding; explosion/fire; flooding/foundering/capsizing; and material failure. No particular type of casualty clearly predominated throughout the 1972-1977 period, but grounding and flooding/foundering/capsizing were the most prevalent casualties during the latter years of the period (Figure B.2). Each of the five categories experienced at least some net growth from 1972 to 1977, with large annual fluctuations in the occurrence of any particular type of casualty being quite common.

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*Data used in this section refers to fiscal year 1972-1977 period, and includes U.S. Coast Guard documented fishing vessels which are five net tons or larger.

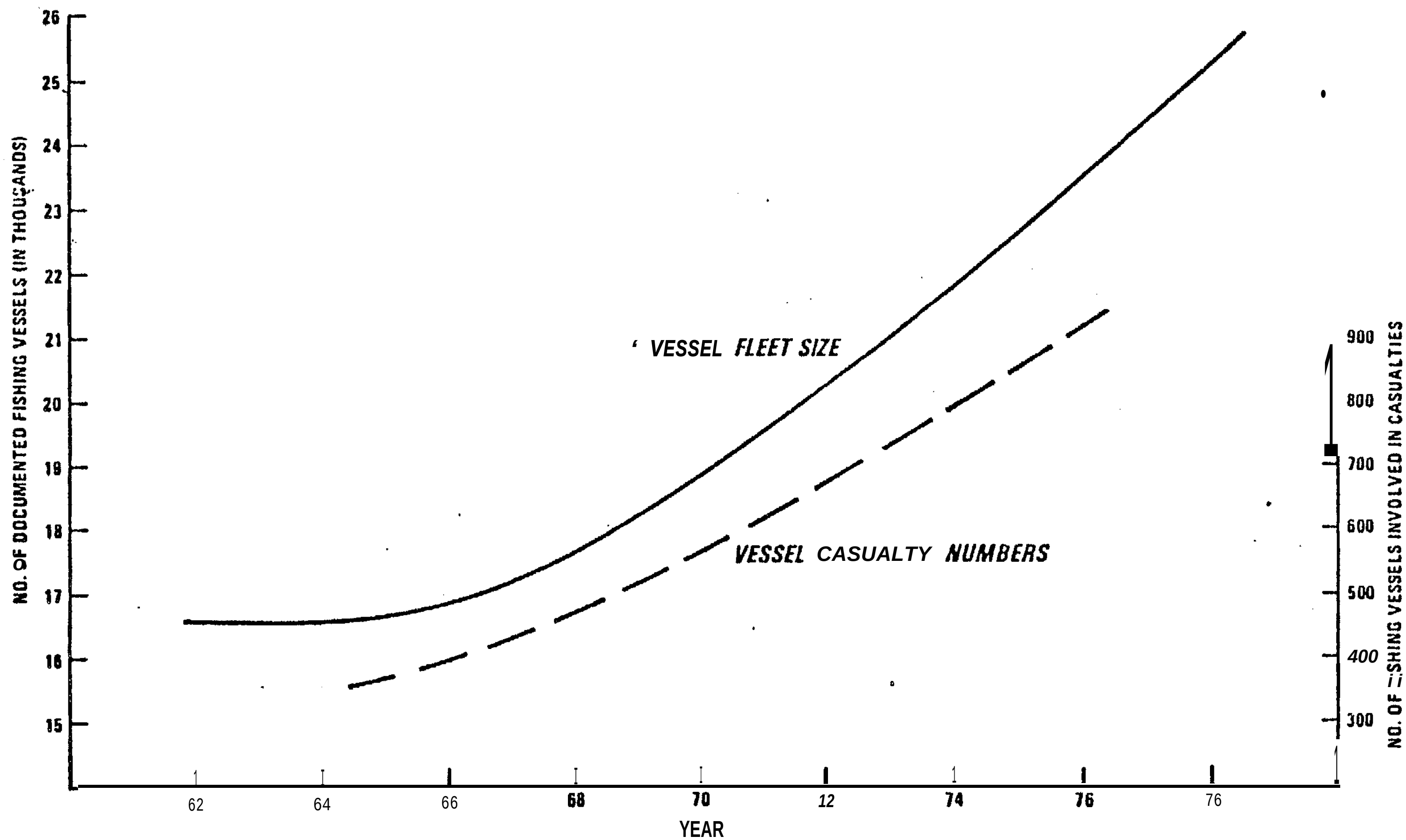

Figure B.1: Growth of the Documented Fishing Fleet & Growth of Fishing Vessels Reporting Casualties

Source: Ecker, Commander William J., <u>Safety Analysis of Fishing Vessel Casualties,</u> U.S. Coast Guard. 1978.

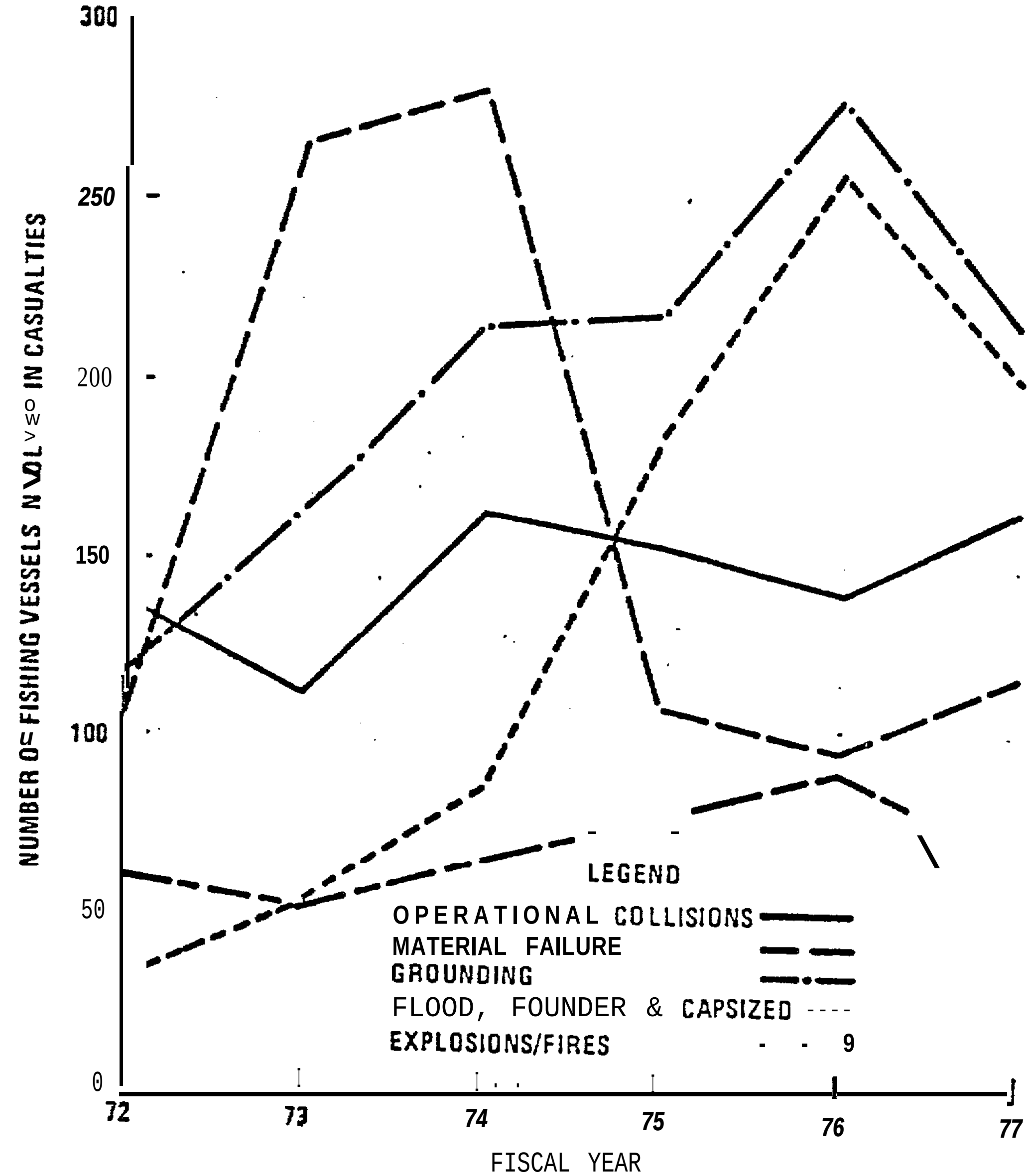

Figure B.2: Fishing Vessel Casualties
No. of vessels involved in specific type casualties by fiscal year.

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

Nearly 13 percent of the United States' documented fishing vessels are located in Alaska (Table B.1). Additionally, many vessels migrate to Alaska from other states, particularly Washington, to participate in various fisheries throughout the year, and effectively increase the percentage of fishing vessels that actually operate in Alaskan waters. Though only 13 percent of America's fishing vessels were registered in Alaska, 24 percent of the fishing vessel-related deaths and 20 percent of fishing vessel losses occurred in Alaska (Table B.2), attesting to the harsh conditions that vessels are subjected to and the danger faced by anyone who experiences emergency survival in Alaska's cold waters.

Flooding/Foundering/Capsizing (F/F/C) and grounding rated first and second respectively as causes of fishing vessel casualties in Alaska, in terms of number of deaths as well as number of vessels lost (Table B.2). This compares very closely with the ranking of casualty causes for the entire United States (Table B.3). The specific causes of F/F/C and grounding are presented in Tables 6.4 and B.5. However, the information in Tables B.4 and B.5 is comprised of incidents from all portions of the United States, and it is very likely that adverse weather conditions were involved in a higher proportion of Alaskan casualties than in other parts of the country. -Personnel fault was most commonly named as the cause of F/F/C and grounding, with inattention and navigational problems being most prevalent. Explosion/fire, material failure, and operational collisions are the remaining categories of fishing vessel casualties in Alaska, in order of frequency, with specific causes listed in Tables B.6 B.7, and B.8. Operational collisions are attributed to personnel fault nearly half of the time, while explosion/fire and material failure are more commonly the result of equipment failure.

TABLE B.1

U.S. FISHING VESSEL FLEET GEOGRAPHIC GROUPINGS - SELECTED AREAS

Area	Num. Vess.	Percent of Fleet	
New England Maine, Mass., R.I., Corm.	1,723	6.8%	32.1% Atlantic Coast
Middle Atlantic - North NY, NJ, Penn., Del.	828	3.3%	
Middle Atlantic - South MD, VA, Wash DC, NC, SC	3,729	14.7%	
Southern Atlantic Gee., Fla., Virg. Is., Puerto Rico	1,856	7.3%	
Gulf Fla., Ala., Miss., LA, Texas	6,065	24.0%	24.0% Gulf Coast
Southern California San Diego, Los Angeles	1,075	4.3%	41.7% Pacific Coast
Northern California SF, Eureka	1,881	7.4%	
Pacific Northwest Oregon, Wash.	4,410	17.4%	
Alaska	3,196	12.6%	

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard, 1978. USCG Documentation Records (vessels of 5 net tons or more).

TABLE B.2

SPECIFIC LOCATION* COMPARISON

Location	Operational Collisions		Grounding		Explosion/ Fire		Flood/ Found/Cap.		Material Failure		Total	
	Deaths	Vess. Lost	Deaths	Vess. Lost	Deaths	Vess. Lost	Deaths	Vess. Lost	Deaths	Vess. Lost	Deaths	Vess. Lost
Maine		1		3		2	16	6	1		17	12
Massachusetts	4	3		5	1	7	11	21		8	16	44
Rhode Island				2		1	6	8		4	6	15
Corm, NY, NJ	1	1		3		4	10	12		10	11	30
Del. Bay		1		1			1	3			1	5
Del, MD, VA coast						1	1	2			1	3
Chesapeake Bay	4	6		3	3		17	12	6	5	30	26
North Carolina			4	3	3	8	4	7		2	11	20
South Carolina		1		9		2	1	5		5	1	22
Georgia		2		6		13	1	6	2	1	3	28
Florida East		4	1	8	3	9	4	15	5	5	13	41
Florida West	2	5		11		10	5	11	5	7	12	44
Alabama		2		4	3	9	1	4		1	4	20
Mississippi		2		1			4	2		2	4	9
Louisiana	1	9		5		10	1	8	6	2	8	34
Texas		25	1	32		16	11	16	1	19	13	108
Southern Calif.		4		26		14	10	27		10	10	81
Northern Calif.	4	10	1	10	2	8	8	22	8	10	23	60
Pacific Northwest	3	7	3	15	4	28	11	34	7	14	28	98
Alaska	5	8	13	45	4	38	36	59	8	21	66	171
TOTAL	24	91	23	192	23	180	159	280	49	128	278	871
Alaska, % of total	20.8	8.8	56.5	23.4	17.4	21.1	22.6	21.1	16.3	16.4	23.7	19.6

*All locations not included.

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard, 1978.

TABLE B.3

CASUALTY TYPE AND SERIOUSNESS OF CONSEQUENCES, FISHING VESSEL CASUALTIES FY 72 - 77

Selected Casualty Type	Casualty Freq. Num. Vessels	Casualty Freq. Ranking	Casualty Deaths Num. Vessels/ Num. Deaths	Casualty Deaths Ranking	Vessels Lost Num. Vessels	Vessels Lost Ranking
Grounding	**1,221**	1	19/29'	3	218	2
Material Failure	**980**	**2**	36/63	2	158	4
Operational Collisions	**880**	**3**	14/24	4	114	5
Flooding, Foundering, & Capsizing	**819**	**4**	121/238	1	397	1
Explosion/Fire	**412**	**5**	16/20	5	215	3
All Others	542		23/40		72	

Source: Ecker, Commander William J., Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard, 1978.

TABLE B.4

PRIMARY CAUSES

Casualty type: Flooding/foundering/capsizing
Casualty period: FY 72 thru 77

PRIMARY CAUSES	PERCENT
1. Personnel Fault	17.6
a. carelessness/inattention (18.8%)	
b. improper securing of vessel (13.9%)	
c. poor seamanship (9.0%)	
d. misjudge effects of current, wind, etc. (6.3%)	
2. Storms, Heavy Weather	15.3
a. large swell across bar (37.6%)	
b. structural failure (11.2%)	
c. gale force winds (8.8%)	
d. hurricane winds (4.8%)	
e. cargo shift (3.2%)	
f. ice (2.4%)	
3. Equipment Failure	14.9
a. drainage system (27.0%)	
b. electrical (8.2%)	
c. other (48.4%)	
4. Structural Failure	10.7
a. wasted plates & internals (53.4%)	
5. Striking Submerged Object	7.0
6. Unseaworthy	5.1
a. failure of wood hull (54.8%)	
b. failure of steel hull (14.3%)	
c. unsuitable for route (16.7%)	
7. Improper Maint. - Failure of Wood Hull	2.9
8. Exact Cause Unknown	24.5
a. progressive flooding (28.4%)	
b. questionable stability (10.4%)	
c. vandalism (8.0%)	
d. improper mooring (7.0%)	

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

TABLE B.5

PRIMARY CAUSES & CONTRIBUTING FACTORS

Casualty type: Grounding
Casualty period: FY 72 thru 77

PRIMARY CAUSES	PERCENT
1. Personnel Fault a. navigation - failed to ascertain position (43.6%) b. carelessness/inattention (11.3%) c. misjudge wind/current (11.1%) d. poor seamanship (4.3%) e. lack of Local Knowledge (4.3%) f. failed to determine height of tide (2.0%)	62.3
2. Equipment Failure	11.9
3. Heavy Weather, Storms, Currents	10
4. Depth Less Than Charted	9.4
5. Other Causes	6.4

CONTRIBUTING FACTORS FREQUENTLY MENTIONED

1. Restricted Maneuvering in Channel
2. Heavy Weather
3. Unusual Currents
4. Equipment Failure - Main Propulsion, Steering Gear, Rudder, Propeller Loss
5. Congested Area
6. Lack of Proper Lookout

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

TABLE B.6

PRIMARY CAUSES & CONTRIBUTING FACTORS

Casualty Type: Explosion/Fire
Casualty Period: FY 72 thru 76

PRIMARY CAUSES	PERCENT
1. Equipment Failure a. electrical (38.4%) b. fuel oil system (14.5%) c. ventilation (5.0%)	38.6
2. Engine Room Fires	20.6
3. Fire From Undetermined Sources	14.8
4. Personnel Fault a. improper safety precautions (54.3%) b. carelessness (30.4%)	11.2
5. Unknown	6.7

CONTRIBUTING FACTORS FREQUENTLY MENTIONED

1. Diesel and Gasoline Engines
2. Electrical - Wiring
3. Gas/Oil Heaters
4. Galley Equipment - Ovens & Ranges
5. Ventilation Systems
6. Yard Repairs

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

TABLE B.7

PRIMARY CAUSES

Casualty type: Material Failure
Casualty period: FY 72 thru 77

PRIMARY CAUSE	PERCENT
1. Failure of On-Board Equipment a. electrical (9.3%) b. fuel oil system (6.1%) c. lube oil system (5.7%) d. salt water system (3.8%) e. fresh water system (3.5%) f. hydraulic (3.0%) g. hull drainage (1.5%)	74,8
2. Structural Failure - No Personnel Fault a. wasted plates/rotted hull (58.6%)	8.9
3. Unseaworthy a. failure of wood planking (81%)	4.3
4. Storms, Heavy Weather	2.9
5. Personnel Fault	2.4
6. Unknown	4.5

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

TABLE B.8

PRIMARY CAUSES & CONTRIBUTING FACTORS

Casualty type: Operational Collisions
Casualty period: FY 72 thru 77

PRIMARY CAUSES	PERCENT
1. Personnel Fault a. rules of road (44.8%) b. improper lookout (22.6%) c. carelessness/inattention (6.2%) d. misjudge wind/current (4.8%) e. poor seamanship (2.1%)	47.7
2. Presence of a Submerged Object	9.8
3. Equipment Failure	3.6
4. Fault Other Vessel	28.4
5. Other Causes	i0.5

CONTRIBUTING FACTORS FREQUENTLY MENTIONED

1. Restricted Maneuvering in Channel
2. Congested Area
3. Lookout not Alert
4. Poor Visibility
5. Currents & Tides
6. Weather, Generally

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

Though operational collisions are not the most prevalent vessel casualty in Alaska, this type of incident is of special interest in respect to increased marine traffic which may occur due to petroleum development in an area. Collisions in which vessels are meeting involve the most fishing vessels, followed by collisions with submerged objects (Table B.9). The frequency of vessel meeting collisions involving fishing vessels increased steadily throughout the study period of 1972-1977, while the frequency of other types of collisions showed little gain or sizable. decreases;

Table B.10 reports the frequency of fishing vessel casualties according to the fishing activity at the time of the incident. U.S. Coast Guard documentation records indicate that approximately one-third of American fishing vessels participated in the shrimp fishery during the study period, and a similar number fished for salmon. An additional five percent were involved in the crab fisheries and the remainder of the American fishing fleet pursued other species of fish. However, it must be remembered that many vessels participated in more than one fishery. Forty-nine percent of the vessels lost and 34 percent of the fishermen killed were involved with shrimping, while only eight percent of the vessels lost and 11 percent of the fishermen killed were fishing for salmon. Six percent of the vessels lost and nine percent of the deaths were related to crabbing. Specific data were not available to indicate the proportion of accidents which were attributable to Alaska, nor the proportion of boats in each fishery. However, since Alaska is the top producer of crab and salmon, and has a very substantial shrimp fishery, it can be assumed that data concerning Alaska would indicate that

TABLE B.9

Trend Chart by Year
OPERATIONAL COLLISIONS - INCIDENTS & VESSEL INVOLVEMENT

	VESSEL MEETING			VESSEL CROSSING			COLLISION-VESSEL OVERTAKING			COLLISION-VESSEL ANCHORED OR MOORED			COLLISION-SUBMERGED OBJECT		TOTAL-OPERATIONAL COLLISIONS		
	Num Incid	Num Fish-ing Vess	Num Mult-iple Fish Vess Incid	Num Incid	Num Fish Vess	Num Mult-iple Fish Vess Incid	Num Incid	Num Fish Vess	Num Mult-iple Fish Vess Incid	Num Incid	Num Fish Vess	Num Mult-iple Fish Vess Incid	Num Incid	Num Fish Vess	Num Incid	Num Fish Vess	Num Mult-iple Fish Vess Incid
1972	16	26	9	18	26	8	12	16	4	21	35	12	35	36	102	139	34
1973	21	26	5	15	18	3	8	10	2	17	27	10	30	31	91	112	21
1974	26	35	9	17	26	9	10	13	3	33	50	15	42	42	138	166	36
1975	23	35	12	22	31	8	15	21	6	27	49	15	19	19	106	155	41
1976	33	41	8	8	12	4	12	15	3	26	47	16	27	27	106	142	31
1977	55	85	30	4	7	3	6	6	0	26	41	13	27	27	118	166	46
TOTALS	174	248	73	84	120	35	63	81	18	150	249	81	180	182	661	880	209

Source: Ecker, Commander William J., A Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

TABLE B.10

SPECIFIC FISHING ACTIVITY[1]

VESSEL ACTIVITY/ CONFIGURATION	NUM LOST VESSELS	% OF TOTAL	NUM PERSONS KILLED	% OF TOTAL
Shrimping[2]	294	49	59	34
Ground fishing	124	21	18	10
Salmon[2]	48	8	20	11
Tuna	36	6	15	8
Oystering	11	2	5	3
King crab[2]	26	4	11	6
Crab[2]	12	2	5	3
Menhaden	1	<1	3	2
Lobster	25	4	20	11
Clam	13	2	12	7
Scallop	4	<1		
Halibut[2]	5	1	3	2
Snapper/grouper	4	<1	5	3
Total	603		176	

[1]Where specifically noted on casualty report.

[2]Fisheries of substantial importance in Alaska.

Source: Ecker, Commander William J., Safety Analysis of Fishing Vessel Casualties, U.S. Coast Guard. 1978.

crabbing and shrimping are relatively hazardous, and that salmon fishermen face less danger.

Alaska Marine Oil Spills

Information concerning Alaska marine oil spills from 1973 through 1977 was obtained from data contained in the Pollution Incident Reporting System (PIRS), a system maintained at U.S. Coast Guard Headquarters in Washington, D. C. All Alaska marine-related oil spills recorded by the PIRS were examined in an attempt to expose any trends or occurrences which may be related to Alaska's increasing volume of marine traffic, and to its growing petroleum industry. With the exception of more spills being reported in recent years, which was fully expected based upon increasing marine activity, it appears that there was no-substantial change in the types of spills occurring throughout the data period.

Inspection of Tables B.11 through B.18 quickly verifies that oil spills are extremely diversified in quantity, source, cause, and even material spilled. Spills of 1,000 gallons or greater are presented individually in Tables B.11 through B.15, but many more spills of only one to five gallons were recorded by the Coast Guard, and the remainder lie between these extremes. Of particular interest may be the fact that in 1975, 1976 and 1977, the occurrence of spills in excess of 1,000 gallons actually declined by over one-third relative to 1973 and 1974 levels. Also, it is notable that in most years, a single spill has accounted for around three-fourths of the total recorded petroleum pollution in Alaska waters.

Light diesel fuel is the most common pollutant involving large spills (Table B.16). Light diesel is used extensively in Alaska, providing

TABLE B.11

1973 ALASKA MARINE OIL SPILLS ≥ 1,000 GALLONS

Material	Quantity (gallons)	Source	Cause
Light Diesel	196,182	Tankship 10,000-19,999 gross tons	Hull Rupture or Leak
Unidentified Heavy Oil	5,000	Onshore industrial plant or processing facility	Tank Rupture or Leak
Heavy Diesel	2,500	Onshore industrial plant or processing facility	Intentional discharge
Light Diesel	1,500	Onshore Non-transportation-related facility	Valve Failure
Light Diesel	8,000	Miscellaneous	Pipe Rupture or Leak
Light Diesel	3,700	Other vessel	Equipment Failure
Light Diesel	7,980	Tugboat or towboat	Tank Rupture or Leak
Other Oil	4,200	Onshore fueling	Intentional discharge
Light Diesel	1,500	Fishing vessel	Tank Rupture or Leak
Light Diesel	6,500	Other vessel	Structural Failure
Light Diesel	4,500	Tank barge 1,000-9,999 gross tons	Tank Rupture or Leak
Light Diesel	22,500	Miscellaneous	Pipe Rupture or Leak
Natural Occurrence	9,200	Natural source	Natural Phenomenon
Light Diesel	3,800	Miscellaneous	Tank Overflow
Total	277,062 gallons		

Largest single oil spill: 196,182 gallons
Average quantity spilled: 19,790 gallons
Average quantity spilled excluding largest spill: 6,222 gallons

All 1973 Alaska Marine Oil Spills (all quantities):

Number: 133
Total quantity: 281,506 gallons
Average quantity per spill: 2,117 gallons
Number of fishing vessel oil spills: 36
Average quantity per fishing vessel oil spill: 51 gallons

Source: United States Coast Guard Pollution Incident Reporting System data.

TABLE B.12

1974 ALASKA MARINE OIL SPILLS ≥ 1,000 GALLONS

Material	Quantity	Source	Cause
Light diesel	19,000	Land transportation facility	**Personnel error**
Light diesel	6,000	Tugboat or towboat	**Hull rupture or leak**
Jet Fuel	5,000	Miscellaneous	**Equipment failure**
Light diesel	5,200	Other vessel	**Tank rupture or leak**
Light diesel	40,000	Onshore non-transportation-related facility	**Pipe rupture or leak**
Light diesel	33,000	Onshore non-transportation-related facility	**Pipe rupture or leak**
Light crude oil	1,050	Offshore bulk cargo transfer	**Improper equipment handling or operation**
Light diesel	7,000	Miscellaneous	**Structural failure**
Light diesel	10,000	Onshore fueling	**Tank rupture or leak**
Light diesel	2,500	Land transportation facility	**Value failure**
Light diesel	33,000	Miscellaneous	**Tank overflow**
Gasoline	5,800	Unknown type of source	**Unknown cause**
Light diesel	1,200	Onshore non-transportation-related facility	**Pipe rupture or leak**
Light diesel	3,200	Onshore bulk cargo transfer	Transportation Pipeline rupture or leak
Light diesel	1,600	Highway vehicle liquid bulk	Natural or chronic phenomenon
Total	173,550 gallons		

Largest single oil spill: 40,000 gals. Average quantity spilled: 11,570 gals.
Average quantity spilled excluding largest spill: 9,539 gals.

All 1974 Alaska Marine Oil spills (all quantities):
Number: 153 Total quantity: 181,409 gals. Average quantity per spill: 1,186 gals.
Number of fishing vessel oil spills: 24
Average quantity per fishing vessel oil spill: 71 gals.

Source: United States Coast Guard Pollution Incident Reporting System data.

TABLE 6.13

1975 ALASKA MARINE OIL SPILLS ≥ 1,000 GALLONS

Material	Quantity	Source	Cause
Light diesel	1,100	Highway vehicle liquid bulk	Natural or chronic phenomenon
Heavy diesel	5,000	Fishing vessel	Hull rupture or leak
Light diesel	1,000	Miscellaneous	Unknown causes
Jet fuel	1,500	Onshore bulk storage facility	Equipment failure
Light diesel	2,000	Highway vehicle liquid bulk	Personnel error
Light diesel	65,000	Onshore pipeline	Pipeline rupture or leak
Gasoline	300,000	Onshore fueling	Tank rupture or leak
Total	375,600 gallons		

Largest single oil spill: 300,000 gallons
Average quantity spilled: 53,657 gallons
Average quantity spilled excluding largest spill: 12,600 gallons

All 1975 Alaska Marine Oil Spills (all quantities):

Number: 136
Total quantity: 380,275 gals.
Average quantity per spill: 2,796 gals.
Number of fishing vessel oil spills: 30
Average quantity per fishing vessel oil spill: 201 gals.

Source: United States Coast Guard Pollution Incident Reporting System data.

TABLE B.14

1976 ALASKA MARINE OIL SPILLS ≥ 1,000 GALLONS

Material	Quantity	Source	Cause
Heavy diesel	40,000	Onshore bulk storage facility	Transportation pipeline rupture or leak
Jet fuel	9,000	Rail vehicle liquid bulk	Railroad accident
Light crude oil	2,000	Onshore oil or gas production facility	Hose rupture or leak
Gasoline	1,500	Aircraft	Aircraft accident
Mixture of two or more petroleum products	2,000	Offshore production facility	Equipment failure
Light diesel	2,000	Onshore bulk storage facility	Tank rupture or leak
Light diesel	1,000	Fishing vessel	Tank rupture or leak
Light diesel	1,000	Railway fueling facility	Improper equipment handling or operation
Jet fuel	395,670	Tankship 10,000-19,999 gross tons	Hull rupture or leak
Light diesel	4,000	Highway vehicle liquid bulk	Highway accident
Light diesel	9,000	Onshore non-transportation-related facility	Improper equipment handling or operation
Total	467,170		

Largest single oil spill: 395,670 gals. Average quantity spilled: 42,470 gals.
Average quantity spilled excluding largest spill: 7,150 gals.

All 1976 Alaska Marine Oil Spills (all quantities):

Number: 234 Total Quantity: 475,820 gals. Average Quantity per Spill: 2,033 gals.
Number of fishing vessel oil spills: 48
Average quantity per fishing vessel oil spill: 75 gals.

Source: United States Coast Guard Pollution Incident Reporting System data.

TABLE B.15

1977 ALASKA MARINE OIL SPILL $\geq$ 1,000 GALLONS

Material	Quantity	Source	Cause
Jet fuel	10,192	Onshore bulk storage facility	Pipe rupture or leak
Light diesel	72,280	Fishing vessel	Hull rupture or leak
Light diesel	1,000	Fishing vessel	Hull rupture or leak
Heavy diesel	8,000	Fishing vessel	Hull rupture or leak
Light diesel	1,000	Onshore bulk cargo transfer	Personnel error
Light diesel	10,000	Onshore industrial plant or processing facility	Highway accident
Light diesel	8,000	Fishing vessel	Hull rupture or leak
Light diesel	2,600	Onshore non-transportation-related facility	Tank overflow
Unidentified light oil	1,600	Onshore bulk storage facility	Pipe rupture or leak
Total	114,672		

Largest single oil spill: 72,280 gals.
Average quantity spilled: 12,741 gals.
Average quantity spilled excluding-largest spill: 5,299 gals.

All 1977 Alaska Marine Oil Spills (all quantities): *

Number 229
Total quantity: 123,633 gals.
Average quantity per spill: 540 gals.
Number of fishing vessel oil spills: 56
Average quantity per fishing vessel spill: 1,600 gals.

Source: United States Coast Guard Pollution Incident Reporting System data.

TABLE B.16

NUMBER OF ALASKA MARINE OIL SPILLS ≥ 1,000 GALLONS, BY MATERIAL SPILLED 1973-1977

Number of Incidents

Material Spilled	1973	1974	1975	1976	1977
Light Crude Oil		1		1	
Gasoline		1	1	1	
Jet Fuel		1	1	2	1
Light Diesel Fuel	10	12	4	5	6
Heavy Diesel Fuel	1		1	1	1
Mixture of Two or More Petroleum Products				1	
Unidentified Light Oil					
Unidentified Heavy Oil	1				
Other Oil	1				
Natural Occurrence	1				
Total	14	15	7	11	9

Source: United States Coast Guard Pollution Incident Reporting System data.

TABLE B.17

NUMBER OF ALASKA MARINE OIL SPILLS ≥ 1,000 GALLONS, BY CAUSE 1973-1977

Cause of Oil Spill	1973	1974	1975	1976	1977
Structural Failure or Loss					
Hull-Rupture or Leak	1	1	1	1	4
Tank Rupture or Leak	4	2	1	2	
Transportation Pipeline Rupture or Leak		1		1	
Other Structural Failure	1	1			
Equipment Failure					
Pipe Rupture or Leak	2	3	1		2
Hose Rupture or Leak				1	
Valve Failure	1	1			
Other Equipment Failure	1	1	1	1	
Personnel Error (Unintentional Discharge)					
Tank Overflow	1	1			1
Improper Equipment Handling or Operation		1		2	
Other Personnel Error					
Intentional Discharge	2				
Other Transportation Casualty					
Railroad Accident				1	
Highway Accident				1	1
Aircraft Accident				1	
Natural or Chronic Phenomenon	1	1	1		
Unknown Causes		1	1		
Total	14	15	7	11	9

Source: United States Coast Guard Pollution Incident Reporting System data.

TABLE B.18

NUMBER OF ALASKA MARINE OIL SPILLS ≥ 1,000 GALLONS, BY SOURCE OF SPILL 1973-1977

Source of Oil Spill	1973	1974	1975	1976	1977
Other Vessel	2	1			
Tankship 10,000-19,999 gross tons	1				
Tank Barge 1,000-9,999 gross tons	1				
Tugboat or Towboat	1	1			
Fishing Vessel	1		1	1	4
Onshore Bulk Cargo Transfer		1			1
Onshore Fueling	1	1	1		
Offshore Bulk Cargo Transfer		1			
Rail Vehicle Liquid Bulk				1	
Highway Vehicle Liquid Bulk		1	2	1	
Aircraft				1	
Other Land Transportation Facility		2			
Railway Fueling Facility				1	
Onshore Pipeline					
Other Onshore Non-Transportation-Related Facility	1			1	1
Onshore Bulk Storage Facility				2	2
Onshore Industrial Plant or Processing Facility	2				1
Onshore Oil or Gas Production Facility				1	
Offshore Production Facility				1	
Miscellaneous - or Natural Source	4	3	1		
Unknown Type of Source		1			
Total	14	15	7	11	9

Source: United States Coast Guard Pollution Incident Reporting System data.

power in a large portion of the boats and to produce electricity in most communities outside the Anchorage-Cook Inlet area. Therefore, many opportunities exist for diesel spills when large quantities are being loaded onto or unloaded from bulk supply vessels, and whenever a diesel-powered boat experiences problems which allow fuel to escape. Discarded waste oils and lubricating oils account for a sizable portion of small spills of several gallons or less. These incidents often occur within or near small boat harbors, and are often associated with the performance of minor boat maintenance. However, harbormasters have reported that the occurrence of such spills is decreasing due to stricter prevention measures and better cooperation by boat operators who are becoming increasingly aware of environmental concerns.

The causes of oil spills and the sources of the pollutants cover a wide range (Tables B.17 and B.18). In many cases, rather large quantities of oil were lost in shore-based operations such as refueling and fuel tank overflow. Large shore-based spills far outnumbered large nonshore-based spills which were often attributable to hull rupture or leak or tank rupture or leak. Smaller oil spills often involve the intentional discharge of waste oils, or losses in which rather moderate amounts of lubricating oils, hydraulic fluids, or engine fuels escape unintentionally. Frequently personnel Frequently personnel error or equipment malfunction is the primary cause of small spills.

The number of fishing vessels involved with oil spills increased between 1973 and 1977. The proportion of total spills attributable to fishing vessels fluctuated from approximately 15 percent to 24 percent of all spills, but it did not exhibit a secular trend. Most fishing vessel incidents involved diesel fuel, lubricating oils or hydraulic oils or waste oil, and only rarely were spills larger than a few hundred gallons.

Very little information was available concerning the affect the oil spills had upon the environment. Beginning with 1977 data, some oil spills were recorded with an assessment of their environmental impact. Prior to 1977, a damage assessment was not included. Many 1977 spills did not include assessments, however, and none of the spills of 1,000 gallons or more were assessed. All spills of which the degree of impact was evaluated received a rating of "potential" or "negligible", except for one spill rated "slight". Depending upon the location of the spill, the resources most likely to be affected by the spills were boats and fish.

Processing Plant Siting Requirements

Fish processors have a number of criteria that must be met when choosing a site for a land-based plant. Oftentimes sites are chosen in close proximity to population centers so as to utilize already existing amenities. Other times, plants are located in quite remote areas to maintain closeness to the fishing grounds, and must be completely self-sufficient. However, the particular needs are met and almost all plants, processing nearly any species of fish, have similar basic needs.

Adequate and suitable land must be available in a desirable location. Various processors have indicated that around 0.8 hectares (two acres) of land is adequate for a fairly large plant, but an additional 1.2 or 1.6 hectares (three or four acres) of open storage area would be very desirable. Additional space would allow storage of container vans away from the plant, greatly reducing congestion. Also, many fishermen do not have adequate storage facilities for their gear, especially the large crab pots, and safe storage of their gear is a service which many plants try to extend to regular customers when space allows.

A plant must have a means of obtaining the raw fish for processing. This normally necessitates the location of the plant where facilities can be constructed for off-loading of fishing vessels. Fishing boats often have a draft of around 2.4 m (8 feet), but drafts in excess of 3.7 m (12 feet) when loaded are no longer rare. Also, the current trend toward larger, multi-purpose vessels must be considered to insure usefulness of the facilities well into the future. Some plants presently receive considerable portions of their fish by air freight or truck. This suggests that with ingenuity, sites that at first appear inappropriate for fish processing facilities and are located away from the shore may actually prove adequate and more readily available.

Electricity and fresh water are indispensable for the operation of a fish processing plant. Both must be readily available to supply the plant at peak usage levels. Fish processing is usually seasonal, and a plant's entire pack for the year may be produced in a few short weeks during which the lines run nearly full time. Vast amounts of water are needed at various points along the processing lines, with cleaning accounting for the largest consumption. Electricity powers most of the machinery along the processing lines and must be provided by a reliable source, as any delays in processing fish can result in considerable quality loss. Some plants opt to generate their own electricity, often due to having no other source available. The use of electricity has grown more critical to the fish processing industry with the growing prevalence of freezing, because freezing consumes much more electricity than the canning process it is replacing.

Due to increasingly stringent environmental protection regulations, plants must provide adequate means of industrial waste disposal. More leniency is exercised in remote areas where several plants are not grouped together. Particular EPA waste disposal requirements for any potential plant site could noticeably alter construction and operating costs.

Nodes of transportation available for servicing the plant site are a critical consideration. Most Alaskan fisheries products are eventually transported to the Seattle area by freighter or barge in container vans for further processing and distribution. Plants must be serviced regularly and with such frequency to assure a supply of vans for loading so freezing and warehousing facilities do not become overburdened, thus resulting in a production bottleneck.

Many other factors, such as availability of labor and certain economic factors, enter into the choice of a fish processing plant site. However, unless essential physical criteria are first met by a site, further investigation is unnecessary.

Market Environment

This section contains a description of the market environment in which the commercial fishing industry is expected to operate during the remainder of this century. It includes assumptions concerning the structure of the fishery industry, the availability of inputs and the rate of technical progress.

FINANCING PROGRAMS AVAILABLE TO COMMERCIAL FISHING VENTURES

Besides commercial bank financing, there are eight other programs available for financing fishing operations as well as a capital construction fund program available through the National Marine Fisheries Service (NMFS). In addition, Alaska Fisheries Development Corporation has been granted a block of SK funds through NMFS to help mitigate risk in the development of the bottomfish fishery in the waters off Alaska. A brief description of each of these programs will now be given.

The Federal Farm Credit System offers lending programs to fishermen through the Bank for Cooperatives and Production Credit Associations.

Bank for Cooperatives (BC), as its name implies, requires *bona fide* cooperative organizations to qualify for loans. BC provides a full range of credit services requiring 40 percent equity at money market rates with a margin of .5 to 1.0 percent.

The Production Credit Association (PCA) extends short and intermediate credit services to individual borrowers. Maximum term is seven years with a three-year extension possibility. PCA requires a 50 percent equity on loans for used vessels.

The Alaska Commercial Fishing Loan Act (A.S. 16.10.300 - A.S. 16.10.370) provides for loan funds available to individual fishermen through the Alaska Department of Commerce and Economic Development. Loans are available up to $150,000 at an interest rate not to exceed seven percent for a term of up to 15 years.

The Alaska Small Business Loan Program extends credit to resident individuals (one year) or corporations (head-quartered in Alaska) engaging in small business operations. The loan ceiling is $300,000, with 25 percent equity at 8.0 percent interest for up to 15 years.

The Fishing Vessel Obligation Guarantee program is administered by the National Marine Fisheries Service and provides loans for construction, reconstruction or overhaul of vessels over 4.5 MT (five net tons) in weight. Gear integrally a part of an operating vessel, is included. The loan will cover up to 75 percent of cost and fishermen pay a .75 percent charge on the outstanding balance. Conditional fisheries in Alaska (salmon and crab) are not eligible. The Farm Credit System and NMFS have reached an agreement whereby the vessel loan guarantee could be used with PCA loans.

Under moratorium since 1973 is another NMFS "loan program, the Fisheries Loan Fund. Authorized by the Fish and Wildlife Act of 1956 as amended, the Fund made secured loans up to $40,000 at eight percent interest for a maximum term of 14 years if the applicant had no other source of funding. Alaska fishermen still had $91,000 in loans outstanding as of October 1977. Draft legislation was under development as of the same date to revive the Loan Fund as a more comprehensive fisheries development financing program.

NMFS also administers a Fishing Vessel Capital Construction Fund (CCF). The CCF allows fishermen to save taxable income for construction, reconstruction or (under limited circumstances) acquisition of fishing vessels by deferring federal tax payments on program accounts. This, in effect, constitutes an interest-free loan from the government.

The Community Economic Development Corporation (nonprofit) extends credit at low interest rates to rural Native fisheries development businesses who are otherwise not considered creditworthy by other institutions. The Corporation is funded by a grant from the Office of Economic Development, Community Service Administration.

Commercial banking institutions also provide vessel financing for up to 75 percent of construction costs or 60 percent on used vessel acquisition. Financing duration is seven to ten years at a current interest rate of between 11.0 and 11.5 percent.

Alaska Fisheries Development Corporation has been chosen to receive federal SK funds administered through the National Marine Fisheries Service for Technical Assistance, demonstration projects and scientific stock assessment work on groundfish in Alaska waters.

Representatives of the Federal Intermediate Credit Bank and the NMFS Financial Assistance Division indicate that capital is currently seeking investment opportunities in the Alaskan and Pacific Northwest fishing industry. Much of the current boat construction is being financed by surplus cash flow from within the industry. The Capital Construction Fund is a common vehicle for accomplishing this internal financing.

The current capital market situation is in marked contrast to the situation of ten years ago when the internal return on investment and surplus cash flow was somewhat below that of agriculture and other natural resource based industries.[1] It might be assumed that capital will be available to meet growth needs of the industry for loans of 15 years or less at the prevailing interest rates. Several financial experts concur in this assumption.

A probable explanation of the increased availability of financing for fishing vessels is the change in property rights to fishery resources that has occurred in the past few years. Both the Fisheries Conservation and Management Act and the implementation of the limited entry programs in Alaska have done much to increase fishermen's rights to particular resources and thus to increase their ability to borrow investment funds. The former gives domestic fishermen the exclusive right to resources within the 200 mile zone as soon as they are prepared to harvest them and the latter gives those who receive the limited number of gear permits the exclusive right to commercially harvest Alaska salmon and/or herring.

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[1] Smith, Frederick J., September, 1971. "Economic Condition of Selected Pacific Northwest Seafood Firms," Experiment Station Bulletin Special Report No. 27, Oregon State University.

NEW BOATS

The major capital good required for the growth of the Gulf of Alaska fishing industry will be boats capable of harvesting groundfish and pelagic species. The ability of domestic boat yards to meet the annual demand for new boats to be used in the traditional Alaska fisheries has been well established; and since the demand for such boats is not expected to exceed that of the past few years it is believed that the growth of the traditional fisheries will not be constrained by boat yard capacity.

However, the ability of the U.S. boatbuilding industry to produce trawlers in excess of 27.4 meters (90 feet) LOA in adequate numbers is uncertain. Five major boat builders--Marco, Seattle, Washington; Martinac, Tacoma, Washington; Bender, Mobile, Alabama; and Desco and St. Augustine Trawlers--were questioned regarding their capacity and plans for capacity expansion.

Four of the five were optimistic that they could meet the increasing need. One (Martinac) was constricted on space and expansion of capacity would be a major undertaking.

The combined current capacity of these five yards is in excess of 30 boats over 27.4 meters (90 feet) in length, per year and Martinac estimates the industry could build 150 new boats per year in the 27.4-36.6 meter (90-120 foot) class with present facilities. Although Alaska will not be the only source of demand for new vessels it is expected to be the major source since for the remainder of the U.S., the existing fleets are capable of harvesting the entire allowable catch inside the 200 mile zone including current foreign allocations (Keen, 1978).

If the present facilities prove inadequate there are three potential sources of additional boat building capacity. The yards that have traditionally built fishing boats could expand their capacity; the ability of these yards to expand capacity is demonstrated by the over 300 percent increase in capacity of the Hillstrom Shipbuilding Company in Coos Bay, Oregon during the past year and the expansion of the Patti Boatbuilding Industries boat yard in Pensacola, Florida to allow the construction of steel fishing vessels. Both yards are currently building vessels of 26 to 42 meters (85-135 feet) for Alaska fisheries, (Fishing News International, April 1979). Foreign vessels and foreign shipbuilding capacity could be made available to U.S. fisheries through a change in the Jones Act; such a change might become politics'lly feasible if the U.S. yards could not meet the demand for new vessels. And finally, boat yards that have not built fishing boats could begin to do so. Examples of such boat yards would include those that are currently building boats under Navy contracts and those currently building offshore oil supply boats. The ability of the latter to build fishing boats is demonstrated both by a supply boat yard, which recent"ly constructed a modified revision of its standard supply boat to be used as a catcher/processor in the Alaska crab fisheries and by the conversion of a supply boat for the use in the same fisheries (National Fisherman, March, 1979). The ability of non-fishing boat yards to serve the fishing industry is further evidenced by the Foss Shipyard in Seattle which until last year concentrated on the maintenance of the Foss tug boat fleet. The Foss yard does not now build fishing boats but it converts boats into fishing boats (National Fisherman, July 1978).

To determine whether boat yard capacity will tend to constrain the development of the Alaska groundfish fishery it is necessary to speculate about the probable rate of growth of the fishery as well as about boat yard capacity. The Alaska groundfish fleet is expected to consist of over 400 vessels by 2000 but the growth of the fleet is not expected to exceed 25 boats per year until the mid-1990s. The largest addition to the fleet is expected to be over 100 boats and is projected to occur in 1999. It is believed that the ability of boat yards to increase the supply of new vessels and the nature of the projected growth of the Alaska groundfish fleet will prevent boat yard capacity from constraining the projected long-term development of the groundfish fishery and/or the projected long-term growth of the traditional fisheries. This does not mean that a prospective boat owner will be able to walk into any boat yard and expect to have work on the boat begun immediately, rather it means that the prospective boat owner can find a boat yard that can build the desired boat within one to two years.

PROCESSING EQUIPMENT

A large proportion of domestically used seafood processing equipment is purchased from foreign manufacturers. These manufacturers have demonstrated considerable resilience and flexibility in the past. Although foreign manufacturers of processing equipment were not interviewed directly, there are indications that their ability to manufacture and supply processing equipment will match the industry's needs for the next 20 years.

Perhaps a more significant factor is the existence of a large agricultural food processing equipment manufacturing capability in the U.S. Several of these U.S. firms have experimented with the production of seafood processing equipment but have been unable to compete with the foreign manufacturers--not because of lack of capacity, but because of lack of experience with the product.

One expert felt that the major bottleneck in seafood processing would be the ability of the domestic manufacturing industry to understand the difference between "peeling potatoes" and "skinning a pollock."[2] In the absence of mergers or joint ventures, any equipment manufacture domestically will have to go through a development period already completed by foreign manufactured equipment.

Another problem will be the inclination (or lack thereof) of processors to employ a technical expert in their plants. The present approach is to get by with a "shade tree" mechanic who barely keeps the equipment operating. Performance of processing equipment will suffer until this

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[2]Personal communication with John Peters, Food Technologist, University of Washington.

approach is changed.[3] In general, it does not appear that capital goods manufacturing capacity will be a significant deterrent to fishery development in Alaska.

LABOR

With respect to the supply of labor, the commercial fishing industry is in a relatively favorable position because its current labor requirements are primarily for seasonal and unskilled labor. Due to both the relatively high wages unskilled workers currently receive in the commercial fishing industry and the high unemployment rate for seasonal and unskilled labor in the U.S., there is, for all practical purposes, an unlimited supply of unskilled labor during the summer months. The industry wage is expected to remain above the minimum wage and high rate of unemployment for unskilled labor in the U.S. is expected to continue, therefore it is assumed that sufficient labor will be available during the summer months to meet the requirements for unskilled labor both on fishing vessels and in fish processing plants. The availability of unskilled labor for fishing boats is further demonstrated by boat owners' reports of receiving several letters a week from individuals seeking employment on a fishing boat.

However, the supplies of skilled skippers and year round labor are limited. The spotty record of success of domestic skippers entering new fisheries (e.g. hake and pollock in the Pacific Northwest) suggests that upon entering a new fishery, it takes time for a skipper to learn how to

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'Personal communication with Bob Price, Food Technologist, University of California at Davis.

use gear, find fish, and generally become proficient. But once a new fishery begins to develop, the crews of the boats in the developing fishery provide a potential source of new skippers. For example, if out of a crew of five, including the skipper, one crew member is capable of becoming skipper the following year, the number of skippers can increase by 100 percent a year. The rate of development projected for the groundfish fleet would require this to happen in about one out of every four crews.

The availability of adequate year round labor is dependent to a significant degree on the availability of low income housing. Typically there is insufficient low income housing in the Alaska fishing communities of the Gulf of Alaska to meet the current demand and unless substantial increases in housing occur the development of a year round fishery with onshore processing dependent on a permanent labor force will be limited. The development of a year round groundfish fishery may, however, be possible in the absence of housing adequate for a permanent work force. The problem of an inadequate local labor force due to the absence of adequate housing can be reduced by increasing the amount of processing which occurs aboard fishing boats and by using self contained floating processors to reduce the local labor requirement, and/or by rotating a work force in and out of an area to reduce the housing requirements. The State of Alaska is also aware of the housing problem and is at least considering possible remedies.

Whether or not the availability of skippers and/or the size of the permanent local force hinder the development of the commercial fishing industry will depend on both the rate at which the industry and its labor requirements expand and the extent to which the expansion can be planned for. This is, of course, true for the other inputs. If the development is steady and thus the input requirements become predictable, the increases in requirements can effectively be planned for and fewer bottlenecks will occur. The development of the groundfish industry is expected to be gradual enough that it can be well planned.

TECHNOLOGY

Predicting technological breakthroughs in the fishing industry is risky at best. Attempting such a prediction for 20years into the future is a blind plunge into uncertainty.

After consulting with nine technology experts, a rather clear historical pattern emerges. The domestic industry has usually taken up to 20 years to adopt available technology. For example, mid-water trawling techniques have been well developed for 20 years, yet domestic fishermen are only now beginning to adopt this technique. Net transducers have been available for 20 years, but not generally used by domestic fishermen until very recently. Exceptions are notable because they are so rare (i.e., the much publicized power block).

There are, however, factors at work that may tend to change the role the U.S. fisheries have had as followers and slow adopters of harvesting and processing technology. The increased property rights of domestic fishermen to U.S. fishery resources and the opportunities for more assured sources of fish for processors due to the FCMA and the Alaska limited entry and resource enhancement programs have decreased the uncertainty historically associated with the commercial fishing industry and thus have increased the incentive for innovation and/or more rapid adoption of available technology. Although major changes in harvesting and processing methods will perhaps be more possible in the future than they were in the past, it is not possible to predict what the timing and/or nature of such changes will be; it is, therefore, assumed that due to technical progress, the gradual replacement of labor with capital and economies of scale and regularity of operations, output per unit of labor will increase by two percent a year and that no techno-logical breakthroughs that would radically transform harvesting or processing methods will occur.

TRANSPORTATION

As the Alaska commercial fishing industry has grown and expanded into new fisheries and as the industry's demand for transportation has increased, it has become increasingly apparent that adequate transportation to obtain needed supplies and to move processed fish products to markets is critical to the development of the industry. This section briefly discusses the dominant characteristics of the transportati,on system used by the commercial fishing industry and considers the transportation system's potential for providing the increased services that would be required by the expansion of traditional fisheries and the development of an Alaska groundfish industry.

Generally, Alaska fish processing plants do not have large storage capacity, therefore transportation services for processed products are required at frequent intervals. Most Alaska seafood products are shipped in refrigerated truck-trailer vans that are loaded aboard seagoing freighters for reprocessing in the Seattle area or Japan. The direct containerized shipments to Japan began in the Spring of 1979 and are expected to become increasingly important. The vessels serving Alaska from the Seattle area are typically capable of carrying 6,208 metric tons (13.7 million pounds) of processed fish. This capacity figure is based on a freighter carrying 365 vans from 35 to 40 feet in length and holding 35,000 to 40,000 pounds of processed fish and is typical of the Sealand freighters serving Alaska from Seattle. The direct containerized shipments to Japan were initiated by Sealand and American President Lines (APL). Kodiak and Unalaska/Dutch Harbor will be the initial ports of call and will be serviced by each company approximately once every three weeks. The three week schedule can be provided by one vessel allowing for delays due to maintenance, bad weather, and other circumstances that might prevent one vessel from providing more frequent service. The Sealand freighter serving the direct Alaska-Japan route is smaller than those that typically service Alaska from Seattle; it has a capacity of approximately 2720 metric tons (6 million pounds), (i. e., 172 vans of 35 feet in length); however by mid 1979 Sealand expects to replace this freighter with one capable of transporting 4,445 metric tons (9.8 million pounds), (i.e., 280 35-foot vans). APL has indicated that it will use a smaller freighter capable of carrying 60 vans to service its Alaska-Japan route.

APL's plans to provide direct service from Kodiak to Japan have temporarily been complicated by Sealand's long term contract for preferential use of the containerized cargo pier and equipment in the port of Kodiak.

The ability of the transportation system to respond to growth in the commercial fishing industry is demonstrated by the interest several freight companies have shown in providing service to Kodiak and comments by a Sealand representative indicating that the service to any port can rapidly be increased by contracting the services of available freight vessels. The need for increased cargo handling equipment and docking facilities is minimized by the use of onboard cranes.

The industry's demand for transportation services will continue to increase due to enhancement and/or management programs for the traditional fisheries and the expansion of the industry into new fisheries. However, as the following model indicates even a facility capable of loading or unloading only one vessel at a time has a very large freight handling capacity. Industry sources indicate that a vessel can be unloaded and/or loaded in one day; therefore assuming freighters with a capacity of 6,200 metric tons (13.7 million pounds), 2,253,000 metric tons (5 billion pounds) of freight could annually go through a port facility capable of handling one vessel at a time. Allowing for days lost due to bad weather, breakdowns, and days in which the port facility is occupied by vessels that are not servicing the commercial fishing industry, perhaps 200 days per year would be available to the industry; in that case, 1,240,000 metric tons (2.7 billion pounds) of processed fish products could be handled a year. This capacity is in excess of the processed fish products that are expected to be shipped out of Alaska in any one year before the end of this century; the foregoing analysis therefore suggests that the transportation system can rapidly respond to the increases in fish processing that are expected to occur by the year 2000.

For the Alaska commerical fishing industry, air freight is the only viable transport alternative. However, due to both the cost advantages of shipping by sea and the good storage characteristics of frozen fish products, air transportation is used almost exclusively to serve the markets for fresh fish products. At the present time fresh fish products account for a relatively small part of Alaska seafood production. The availability of airports capable of handling jet transports, the current underutilization of these airports, and the excess capacity in the air transport industry should allow a rapid response to increases in the demand for air transportation services.

Many factors will determine whether the transportation systems will be adequate for the expected growth in the commercial fishing industry. The growth of both the commercial fishing industry and other industries such as agriculture and mineral extraction and the resulting growth in the rest of the economy will generate increased economic activity that may compete for the available transportation services and/or provide the impetus for improved transportation services for all users. Since economies of scale exist in transportation, the latter effect will tend to dominate in the long run, and the short run transportation bottlenecks that occur will not tend to limit the long run development of the industry.

MARKET ARRANGEMENTS

Research at Oregon State University indicates that traditional market arrangements and the resulting distribution of risk between the harvester and processor may be a major deterrent to fishery growth in Alaska.[4]

In investing in the exploitation of a new fishery the boat owner retains a high degree of flexibility. He can switch from fishery to fishery in Alaska depending upon relative profitability. He can also fish in other geographic locations and deliver wherever he wants.

The processor, however, must make an investment in inflexible and fixed-in-place processing capability and in market development. The market development investment may be as risky as the capital facilities. If the market development effort succeeds, the initial investor must compete successfully with other entrants to reap the benefits of that initial investment. If the effort fails, the initial investor is the sole bearer of the total development cost.

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[4]Martin, John B. 1978. "An Evaluation of the Economic Feasibility of Pollock Processing in Southeast Alaska." MS Thesis, Oregon State University.

Fishery development in Alaska may, therefore, be constrained until market arrangements between harvester and processor are modified to more equally distribute the risks and benefits of investing in a new fishery. Delivery contracts between harvesters and processors provide one way of doing this.

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