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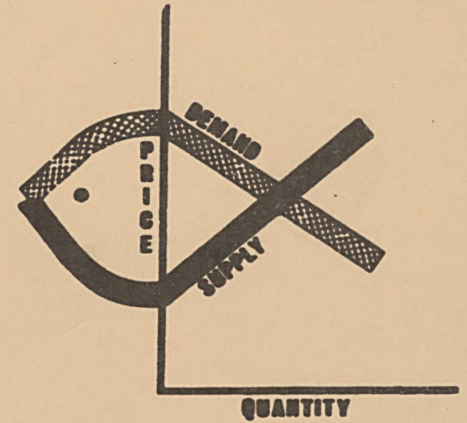
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Final Report

A Study of the Socio-Economic Impact of Changes
in the Harvesting Labor Force in the Alaska

Salmon Fishery
(Contract No. 1-36079)

by

Institute of Social, Economic and Government Research

University of Alaska

Volume I

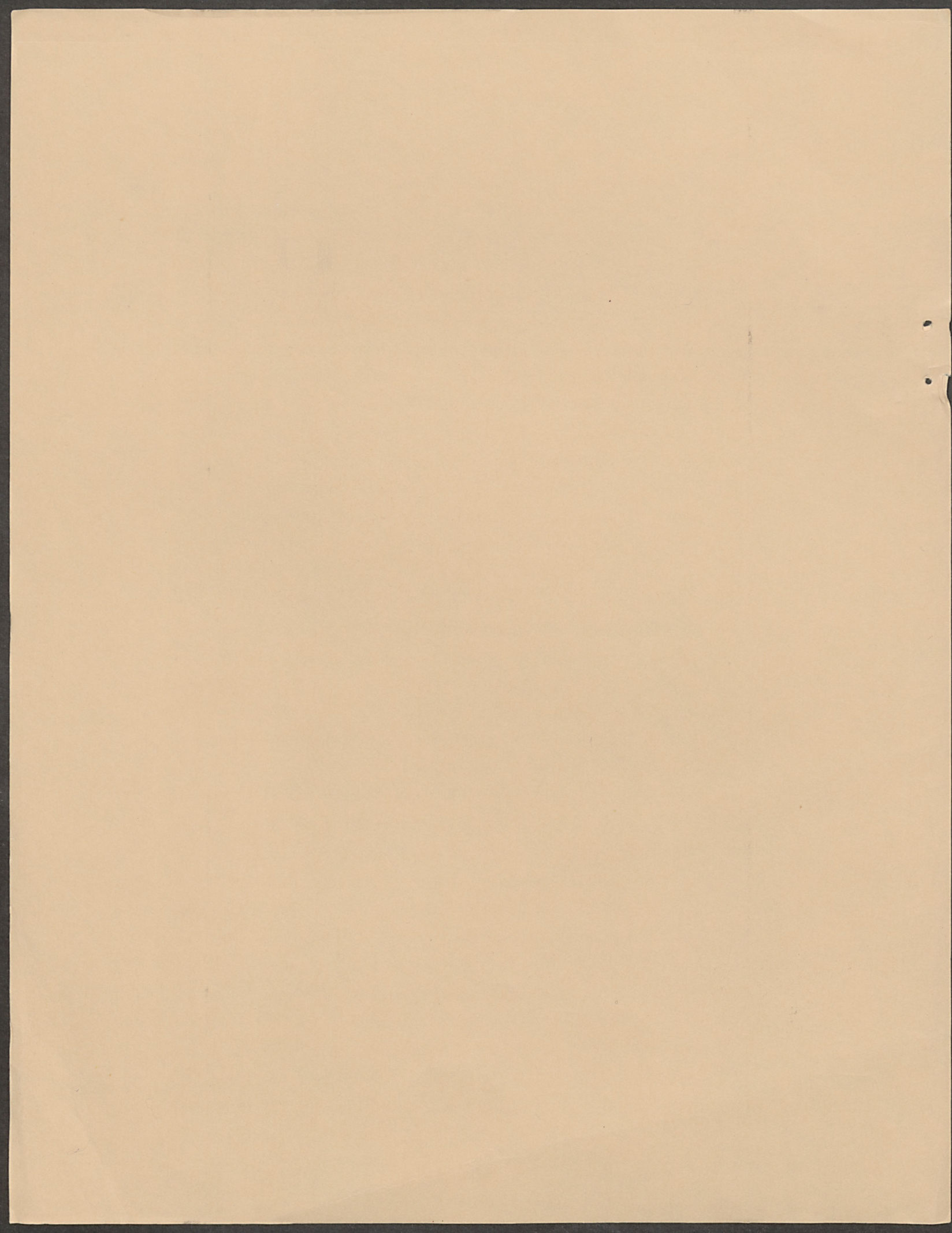
Analysis

December 1972

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NATIONAL MARINE FISHERIES SERVICE
ECONOMIC RESEARCH DIVISION



FINAL REPORT
A STUDY OF THE SOCIO-ECONOMIC IMPACT OF CHANGES IN THE HARVESTING
LABOR FORCE IN THE ALASKA SALMON FISHERY

(Contract No. 1-36079)

Submitted to

Economic Research Laboratory
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
7338 Baltimore Avenue
College Park, Maryland 20740

by

Institute of Social, Economic and Government Research

University of Alaska

VOLUME I

ANALYSIS

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December 1972

CHAPTER I: INTRODUCTION

The need to include socio-economic as well as biological factors in fisheries management planning has long been recognized, but only recently have approaches been proposed which would broaden policy objectives beyond the traditional objective of maintenance of fish stocks. The economic analysis promoting this movement has focused on such basics as construction of yield-effort functions and bio-economic models attempting to measure economic rents. The various proposal proposals arising from such analysis, therefore, have in common the reduction of the number of harvesting units in the fishery as a means of increasing the average output and income per unit (i.e., increasing unit efficiency and maximizing economic returns to the industry) and promoting conservation objectives through controlling resource pressures. The resulting reductions in the number of fishermen in the harvesting labor force or the total income received in fishing communities, however, would involve other economic and social costs which as a practical political matter the resource manager cannot ignore. There is need, therefore, to develop means for including the social and economic costs of labor displacement as well as the economic gains of efficiency resulting from changes in the harvesting labor force of a fishery.

The purpose of this study was to use the Alaska salmon fishery as a means of developing approaches and methodology for determination of a broader range of social and economic impacts of hypothesized changes in resource management philosophy, programs and strategies. It was also to be a demonstration of the manner in which a data base or information system might be developed to support such determinations. The Alaska salmon fishery has been subjected to varying degrees of regulation and management focused primarily upon biological factors of sustained yield with scant formal consideration being given to economic and social factors beyond the institutionalization of economic inefficiency as a conservation approach. The actual practice of management, however, has been a product of a complex of political and economic forces which have been reflected in programs in an irrational manner and generally without formal recognition as being involved. The Alaska salmon

fishery provides a broad field for study of the various effects and impacts, other than biological, of management policy. Furthermore, the Alaska voters in 1972 approved a State constitutional amendment which would permit limiting access to natural resources for conservation and economic reasons. A special committee of the Governor is currently in urgent need of data and guidelines in its consideration of a limited entry policy as the basis of Alaska fisheries management programs. The present study is intended as a first preliminary step toward meeting this need.

Chapter II of this volume is a background discussion necessary to an understanding of the several regional analysis which make up the body of this report. It includes a brief historical review of Alaska salmon harvesting and the present status of this activity, together with references giving fuller treatment of the subject. The biological, economic efficiency, distributive and welfare effects of attempts to manage the salmon harvest are discussed in turn to provide further perspective and technical setting from which the research design of the project emerged. The remainder of the chapter is devoted to an explanation of the research approach used, the data base developed and the characteristics of the six study regions and comparative summary analysis of the basic nature of the regional fisheries products industries and fish harvesting activities. Chapter III through VIII are devoted to the six regional analysis of the study which treat employment in salmon harvesting for the period 1965-1970 in the contexts of the total regional economy and other fisheries activities and in terms of key social and economic characteristics of the salmon fisherman drawn from 1969 and 1970 data.

The major part of the research effort measured in man power and monetary expenditures was devoted to the creation of a data base upon which analysis could be made. Much of this was a pioneering effort tapping certain existing archival sources for the first time. Some expected data eluded us, mistakes were made, and the final results did not fully achieve our initial hopes and aspirations, but a significant data break through was accomplished and many valuable lessons learned. This work not only should be updated on a continuing basis, but the data refined, expanded and otherwise improved as a means of assisting the planning and evaluation of effects of future

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management programs. In its present state it can serve as an immediate base in support of further needed analysis. A second volume is presented, therefore, which includes more detailed tabulations of the statistics generated in the course of this study, discussions of methods used, evaluation of the results (including the blind alley and false starts) and recommendations for further investigation of data development potentials.

This study was funded under a contract with the National Marine Fisheries Service (U.S. Department of Commerce Contract No. 1-36079, The Economic Impact of Change in the Harvesting Labor Force in the Alaska Salmon Fishery) and performed under the general supervision and review of the Economic Research Laboratory.

The sources cited in this text and in Volume II represent an extended acknowledgment of the contribution of operating agencies and their staff members to this research effort. Adequate personal acknowledgement is beyond the scope of this introduction, but some special recognition nonetheless is called for. Sylvia Geraghty and Zona Wenzell of the Alaska Department of Fish and Game gave generously of their time and specialized knowledge in the establishing of a basis for estimating fisheries employment. Mike Rugani of the Alaska Department of Economic Development, in the later stages of the project gave extended technical assistance in the processing and interpretation of social and economic data derived from a variety of sources. Laddene Korhonen, the first and longest suffering of our succession of devoted typists, not only "broke the back" of the statistical typing workload, but demonstrated unusual initiative in the organization and design of format of the tables of the Appendix and the text. Mrs. Korhonen was followed by Sue Dahl, Denise Ganopole and, finally, the regular secretarial staff of ISEGR at College, who carried on her work for shorter periods. The responsibility for any errors or misinterpretation arising from the selection, compilation, computation and interpretation of these series, of course, rests with the authors.

The Alaska Salmon Harvest - The Record

Before the first major European-American contacts (circa 1740) the salmon runs in southeast Alaska supported an estimated 11,800 Tlingit and Haida Indians, one of the heaviest concentrations of aboriginal population on the continent north of Mexico and Central America. The ease and abundance of the harvest provided the material wealth and leisure for elaboration of a culture remarkably rich in art, oral literature and social and legal organization. Salmon runs elsewhere along Alaska's coastline and up the major river systems provided a similar if relatively less important food resource base in support of the remaining estimated 62,900 aboriginal inhabitants and along with availability of other fish and game resources accounted for their settlement along the coast and main river systems. Salmon continues as an important element in the subsistence diets of the present day descendants of Alaska's aboriginal population.

During the Russian period and the initial American occupation some salmon was commercially harvested and salted, but it was not until the invasion of southeast Alaska by the canned salmon industry from California and the Pacific Northwest in 1878 and the subsequent spreading of canneries along the Gulf of Alaska coast and into the rich red salmon runs of Bristol Bay by 1884 that commercial fishing became established as the backbone of the pre-World War II Alaska economy.¹ Salmon catches rose steadily through the 1930's. The annual average for 1905-1914 was 31.7 million fish, 1915-1924 averaged 69.6 million fish, 1925-1934 averaged 73.4 million fish, and 1935-1944 averaged 76.6 million fish.² During 1931-40, the last decade of a predominantly non-defense economy in Alaska, the annual value of out-shipments was composed of 55.1 percent canned salmon, 6.4 percent other fish products, 26.6 percent gold, furs 4.4 percent, other minerals 4.3 percent and miscellaneous 3.2 percent.³

There was a steady decline in the salmon catch of subsequent decades, but in spite of this the harvesting and processing of salmon continues as an important element in Alaska's basic economy. In 1970 Alaska continued to lead all other states in the value of its commercial fisheries

1 Good historical summaries are contained in R.A. Cooley, Politics and Conservation, The Decline of the Alaska Salmon (New York, Harper & Row: 1963), pp.3-68; and J.A. Crutchfield and G. Pontecorvo, The Pacific Salmon Fisheries, A Study of Irrational Conservation (Baltimore: The Johns Hopkins Press, 1969) pp.48-88.

2 Alaska Fisheries Board and Alaska Department of Fisheries, 1950 Annual Report, No. 2, Juneau, Alaska, pp. 48-51

3 J.L. Fisher, External Trade of Alaska, 1931-1940, National Resources Planning Board, Portland Oregon, 1943, pp. 12-20 and Appendix

catch (\$97.5 million). This harvest converted into fish products with a total wholesale market value of \$213.9 million giving commercial fisheries a strong second place in the value ranking of natural resource products in Alaska in 1970. (Crude oil and natural gas with a value of \$256.7 million maintained the first place which it gained for the first time in 1969, and forest products with a total f.o.b. mill value of \$108.0 million ranked third. Other minerals, furs and agricultural products fell far behind these three leaders). The importance of commercial fishing to the local Alaska economy however, is even greater than these gross value comparisons would indicate. The first ranking petroleum production is a capital-intensive industry and in 1970 generated a monthly average employment of 2,640 at all levels of its activities located within Alaska as compared with a twelve month average employment in commercial fisheries of 6,630 (3,130 in fishing and 3,500 in processing). The seasonal peak employment in the petroleum industry was 3,198 as compared with the fisheries industry's peak employment of 22,973 (11,750 in fishing and 11,223 in processing).

Halibut has long made an important contribution to Alaska's commercial fisheries and in the last two decades shellfish harvest and production have experienced rapid growth, but the position of Alaska fisheries within the Nation's fisheries and the State economy has been and continues to be based primarily upon the harvesting and processing of salmon. In 1970 the value of the total salmon catch was \$68.0 million (70% of total fish catch value) and the wholesale value of salmon products \$154.7 million (72% of total value of all fisheries products). Given the magnitude of these values, salmon harvest management is clearly a matter of basic importance to the health of the total Alaska economy.

Unfortunately, the record is not reassuring. Table 1 summarizes annual salmon catch for the period 1930-71 and the annual number of commercial fishing licenses issued. The biological record has been one of failure to control over-exploitation of the resource and to sustain its yield at optimum renewable levels. While the average catch of the 1950's and the 1960's fell to about half the catch of the 1930's and first half of the 1940's, there was a reverse trend in the annual number of licenses issued (from about seven thousand in the 1930's to a level approaching twenty thousand at present) which is an index not only of increased employment but of increased unit costs and declining economic efficiency. These two opposite trends define the present crisis in Alaska salmon management. The causes of the crisis and possibilities

for its cure are to be found within the complexities of the biology, economics and politics of the resource harvesting and the inter-action of these forces.⁴

TABLE 1

Alaska Salmon Catch and Number of Commercial Fishermen

Licenses Issued - 1930-1971

Annual Averages For:	Annual Salmon Catch (Thousands of Pounds)	Number of Commercial Fishermen Licenses Issued
1930-34	487,728	6,793
1935-39	559,223	8,761
1940-44	452,740	7,737
1945-49	380,569	8,931
1950-54	258,357	11,268
1955-59	213,109	11,187
1960-64	256,890	15,482
1965-69	250,222	19,065
<u>Years</u>		
1960	207,101	11,919
61	264,814	14,010
62	277,848	16,405
63	223,063	17,867
64	311,623	17,211
1965	274,344	17,455
66	333,325	19,412
67	138,517	18,172
68	285,272	21,359
69	219,150	18,927
1970	346,465	22,088
71	251,705	20,564

Source: Annual averages for 1930-64 computed from J.A. Crutchfield and G. Pontecorvo, The Pacific Salmon Fisheries (1969), pp.202-204. Annual data for 1960-1971 from Alaska Department of Fish and Game, Alaska Catch and Production, Commercial Fisheries Statistics, (annual).

Managing the Alaska Salmon Harvest -- Biological Effects

The primary concern of salmon management in Alaska has been prevention of over-exploitation of and promotion of the sustained yield of commercially valuable fish stocks. The objective can be simply stated, but the complexity of the basic biological aspects of the actual task are tremendous. Start with geography. The general coastline of Alaska is

4 R.A. Cooley, op.cit. touches on the biological, political and social and presents for the first time in the literature of this fishery the problems explicit in the exploitation of an open access resource but Cooley's work is primarily a study of management as a political process and an analysis of the historical record. J.A. Crutchfield and G. Pontecorvo, op.cit. also discuss the biological and institutional aspects of management from a somewhat different point of view, but their basic contribution and the heart of their analysis is a bio-economic model approach to the study of the efficiency and economic rents implications of management. A political economic treatment which suggests an approach to the study and evaluation of management in terms of objectives (biological, economic and social) actually or intended to be served is given in G. W. Rogers, Alaska in Transition (Baltimore: The Johns Hopkins Press, 1960), pp. 3-16, 271-328.

6,640 miles (54% of the total United States coastline) and the tidal shoreline (including islands, inlets and shoreline to the head of tidewater) is estimated at 47,300 miles.⁵ This coastline fronts on three major oceans (North Pacific Ocean, Bering Sea, Arctic Ocean) and is backed by a variety of land forms and river drainages. This provides the area and environment through which mature Pacific salmon pass and form into schools on their migration to the streams and rivers of their origin where they will spawn and die. For management and statistical purposes this broad geographic range is divided into three regions (southeastern, central and western) and fifteen major areas further subdivided into districts on the basis of location of spawning streams.

Next, the fish. The salmon are classified into five major species. The Alaska red salmon (known as sockeye elsewhere) is commercially the most valued, most of it being canned. The average weights of the 1970 catch of this species varied by management districts, ranging from 5.2 pounds per fish to 6.9 pounds. The king salmon (or Chinook) is the largest species with average 1970 weights ranging between 13.4 pounds in the Petersburg, Wrangell district to 30.3 pounds in the Copper-Bering Rivers and Prince William Sound districts. The 1970 average weight of the coho (or silver) ranged between 6.8 pounds and 8.0 pounds, the pink (or humpback) from 3.1 pounds to 4.1 pounds and the chum from 5.0 pounds to 8.5 pounds.⁶

The past and present managers of the Alaska salmon fisheries have sought to base their programs primarily upon available knowledge and understanding of the catch-survival experience and biological characteristics of the five major species and their many racial variations. In practice, they have had to respond to other considerations, but the complexities of meeting the biological requirement of sound management alone have been tremendous. Each of these five major species have numerous racial variations in accordance with the districts and the individual streams and spawning beds to which they are oriented, not only resulting in differences in size and other physical features but also in the time of year in which the spawning runs take place, the

⁵ U. S. Army Corps of Engineers, National Shoreline Study Inventory Report, Alaska Region, Corps of Engineers, North Pacific Division, Portland, Oregon, August 1971.

⁶ Alaska Department of Fish and Game, 1970 Alaska Catch and Production, Commercial Fisheries Statistics, Leaflet No. 21, Table 2.

length of the runs and the life cycles on which they are based. The problem of acquiring adequate biological knowledge of the Alaska salmon resource, therefore, is not simply a matter of studying five species of fish, but an estimated 10,000 different biological units with little genetic interchange among them. The difficulties of serving the biological objectives are further complicated by forces and events which effect the biological environment but lie outside control of the fisheries managers -- logging in or near spawning streams and beds, industrial and community waste disposal and the unregulated catch of immature salmon on the high seas by foreign fleets.

The magnitude of this task is cited by Crutchfield and Pontecorvo as the basic reason for past management failures. "We have barely touched the edges of the biological knowledge necessary to make even crude estimates of the factors determining the productivity of these units... Viewed in this light, the failure to lay a solid biological groundwork for the regulation of the Alaska salmon fishery is less an indictment of the agencies involved than of nature's perversity in setting up such a complex problem." Because of this, they conclude that "there was no significant degree of conservation in the Alaska salmon industry until the 1950's" and that in spite of rapid increase in our biological knowledge "it is still far from adequate for satisfactory management for most of the Alaska salmon runs, even in a purely physical sense."⁷

Managing the Alaska Salmon Harvest -- Efficiency Effects

Geography and biology are only openers. The economic activity of harvesting the resources introduces a staggering array of additional technical complications into the management task. The only point in managing the resource at all is that it is of value to man and as such is a commercial fishery operating in a nominally competitive economy. Whether the managers are concerned with economics or not, those engaged in the fisheries are. The harvest is accomplished by use of different combinations in each district of a selection from seven major types of fishing gear, each with differing capital investment requirements, degrees of efficiency and effects upon the resource (in order of 1970 catch size these were purse seines, drift gill nets, set gill nets,

⁷ J.A. Crutchfield and G. Pontecorvo, *op.cit.* pp.61,66, Rogers and Cooley place greater emphasis upon political and economic forces as contributing cause of failure. The improvements noted by Crutchfield took place after transfer of management to the State of Alaska.

troll lines, beach seines, traps and fish wheels). The gear is the point of actual (almost physical) contact between management and the economic forces.

In aboriginal times and the unregulated opening period of development of the commercial fishery the normal and most efficient method of harvest was by use of weirs or other barricades at the mouths of rivers and streams or at strategic locations to intercept or block salmon migration along their lower courses. These methods were not only economically efficient, but in the long-run highly destructive of the resource. The earliest management efforts, therefore, were directed toward assuring escapement adequate to sustain the stock by outlawing the use of weirs and barricades and moving other forms of gear away from the mouths of streams. The elaboration of management programs which followed has been based upon regulating length of seasons (including total closure) for each district to provide adequate escapement, but in the absence of authority to control the number of units engaged in the fishery the regulation of catch capability of the fleets has been through imposing degrees of inefficiency (location of effort away from points of maximum density of fish, limitation of length of vessel, size of net mesh, prohibition of use of technological innovations, etc.). This policy reached its most extreme form in the prohibition of the use of power vessels in the Bristol Bay fishery, forcing fishermen to use two-man open sail boats until 1951. The elimination of salmon trap in 1959, the most efficient of the surviving forms of gear, although done in the name of conservation is a somewhat different case than other impositions of inefficiency. The real purpose intended to be served by this act was to promote employment of residents in the fisheries.

Reviewing the Alaska salmon record in terms of Table 1, Crutchfield and Pontecorvo came to an obvious conclusion. "The facts just cited summarize the gross measures of developments that cannot be regarded as sensible in economic or technological terms. Today, twice as many fishermen, using more capital equipment, are employed in catching about 40 percent as many fish as were taken in the mid-1930's; and parenthetically, the fish are no more difficult to catch in the 1960's than in the 1930's -- quite the contrary."⁸ Increasingly there has been support

⁸ J.A. Crutchfield and G. Pontecorvo, op.cit. p. 60.

among economists and fisheries managers for changes toward more rational (in biological and economic terms) management through limiting entry as a means of decreasing productive factor costs and economic rent dissipation without sacrifice to the scientific biological management of the resource.⁹

As laudatory as this breakthrough in management thinking is, it treats only one additional aspect (efficiency) and may create other problems. The half-way house nature of these proposals has been clearly put in a study of employment in the Maine lobster fishery. "The search for greater efficiency in exploiting this important marine resource has triggered investigations into alternative management strategies that are likely not only to conserve the renewable fishery resource but also optimize the use of other scarce factors such as capital and labor. One such strategy focuses on limiting entry to the resource in order to maximize 'net economic yield.' The doctrine of maximum net economic yield has been stated by Christy and Scott as follows: 'The goal of economic efficiency can be approached by preventing excessive entry into the industry, so that those who fish would be producing the maximum net economic revenue (to be shared by them or appropriated by the public) and so that those who are prevented from participating will be able to produce other goods and services valued by the community.' This doctrine rests on two alternative assumptions: (a) the gain to the industry would be more than sufficient to compensate all those who lost and such compensation would actually be paid; or (b) compensation would not be necessary because society would swiftly and painlessly adjust by transferring those who lost to equally or more attractive jobs elsewhere. It is not difficult to see that these assumptions may be seriously questioned in the real life environment."¹⁰

Managing the Alaska Salmon Harvest - Distribution and Welfare Effects

Going beyond these biological, technical and basic economic factors, there are other economic and social dimensions to the activity of salmon harvesting and the impacts of management programs in the "real life

⁹ For a comprehensive review of the literature, see Francis T. Christy, Jr. and Anthony Scott, The Common Wealth in Ocean Fisheries (Baltimore, The Johns Hopkins Press, 1966.) Application of these approaches and a bio-economic model of Alaska salmon harvesting, is presented in J.A. Crutchfield and G. Pontecorvo, op.cit.

¹⁰ A.M. Hug, et al, "A Study of the Socio-Economic Impact of Changes in the Harvesting Labor Force in the Maine Lobster Industry", Final Report submitted to National Marine Fisheries Service.

environment". The Total harvesting activity is a combination of types of activities which can be classified into subsistence, commercial and sports fishing. The purposes served by each form of fishing, the methods used and the characteristics of those engaged in each have influences on the nature of management problems and in turn are differently effected by management programs. A complex of different types of workers with different characteristics and behavior patterns are engaged in commercial fishing. Because of the highly seasonal nature and the non-Alaska control and/or ownership of most of the final processing factors, the first major classification of the commercial harvesting work force is between resident Alaskans and non-residents. Ethnic and social differences require further classification of resident fishermen by Native (Indian, Eskimo, Aleut) and non-Native fishermen. Both groups overlap in being represented in the hard core of full-time professionals, but each has a different peripheral orientation. The Native fishermen include part-time commercial and subsistence fishermen, while the non-Native group includes moonlighting fishermen from other areas of employment (e.g. school teachers who are unemployed during the summer, homesteaders, etc.) and pleasure craft owners who pay some of their boat expenses and make tax write offs through part-time, weekend or vacation commercial fishing. Each of these and any further classifications that might be made of the workforce represents not only bundles of different characteristics and behavior, but also different special interests seeking to influence management.

As in the case of the five major species of salmon, geographic dimensions of the harvesting activity further modify the major types of fishermen into varied "races" in accordance with conditions within natural and economic areas in which they function. The geographic dimensions of the commercial harvest of salmon extend from Ketchikan (latitude 55 degrees 20.6 minutes, longitude 131 degrees 38.6 minutes) in a 2,000 mile arc northwestward across the Gulf of Alaska into the Aleutian Islands and then northward up the Bering Sea coast in a curve approximately 1,200 miles to Kotzebue Sound (latitude 66 degrees 40 minutes, longitude 162 degrees 38 minutes). As discussed above this vast expanse divides naturally into several regions for management purposes. The differences in the several salmon fisheries, sets of natural environmental characteristics and existence of other fisheries than salmon result in different combinations of harvesting technologies,

composition of total fisheries product outputs and structures of the regional fisheries products industries of which the commercial fishermen are a part. All of this is embraced within total social-economic regional contexts exhibiting different industrial structure, economic welfare performances, rates and directions of change and relations with other regions. Each of these regions within which the commercial fishermen lives as well as works presents a special case.

The individual Alaskan fishing communities within these regions also present a further range of characteristics. They include communities of more than 10,000 persons with relatively broad and varied economic bases (Ketchikan and Juneau) and at other extreme isolated Native villages of a few hundred persons and no alternative economy other than subsistence hunting and fishing and welfare. The cultural, ethnic composition varies greatly as do the forms of local government and the tax bases. Accordingly, the local impacts of fishery management changes in terms of tax revenues and welfare burdens are varied.

In terms of characteristics of the several harvesting workforces and the regional contexts of the resident workforce, management not only has biological and efficiency effects but also distribution effects (who gets what, how much, how and when). The maintenance of fish stocks and the restoration of economic efficiency may be matters of grave concern in Alaska's fisheries management, but most of the popular concern and controversy regarding management has focused on matters of distribution of the shares in the yield of these fisheries. Much of the drive for achieving statehood for Alaska, for example, came from a desire of resident interests in fisheries and other natural resources to receive a greater share of the yield of their harvests. Significantly, the elimination of fish traps (for the most part non-resident owned) the least labor using form of salmon gear and accounting for half or more of the catch in its heyday, was closely identified with the statehood movement, the formulation of the Constitution of the State of Alaska and its ratification and the drafting of the Alaska Statehood Act.

As noted in the introduction to this chapter, the importance of the distributive and welfare effects of management and the political and social dimensions of harvesting and management have been recognized by other investigators and described and analyzed in terms of political

process. Needed is further research in terms of labor, welfare and regional economics and the compilation or generation of data which will identify and measure these impacts of management. It is within this area of management effects and impacts of change that the basic subject of the present study is located.

Approaches to a Research Design

Doing research in the area of this study as compared with research in the biological and economic areas of salmon management is an expedition into an almost virgin wilderness. There is no well defined body of theoretical guidelines ready at hand and tools of analysis must be borrowed, improvized, tested and discarded as the work proceeds. The basic data lies hidden and must be discovered or generated before even the first step of progress can be made. A general research design or strategy is essential, but it must remain flexible until the final report is typed. The salmon biologist may still face a herculean task in providing the basic knowledge required for sound management, but despite the scope and complexity of his subject he is building upon a body of existing knowledge and experience and working within a well established scientific discipline. He has many aids in determining the direction, scope and design of his research and when this is done has appropriate analytical tools and theoretical concepts at hand. Research, or more accurately analysis, by the economist stands in contrast to that of the biologist in that the specific policy issues to which he addresses himself dictate the scope and direction of the selective appeal he will make to facts and the academic tradition in which he has been trained provide guides for stating the premises (more recently called "models") from which conclusions follow. Despite its apparent simplicity and artificiality, such analysis is of assistance to the salmon management agency in demonstrating, for example, that a given output can be produced at a lower expenditure of effort or cost under one method of regulation than another ceteris paribus.

Economic analysis in salmon fisheries by Scott, Crutchfield, Pontecorvo, Cooley, Rogers and others have employed various combinations of a handful of statistical series on catch (pounds or numbers of fish and value to fishermen by species, gear used, area in which landed) and licenses issued to gear and fishermen. Important policy implications have been and can be deduced from this limited range of known facts, however, when the analytical process is informed by long personal

observation and sound intuition (each of the investigators named has devoted long periods of study to the fisheries of the regions in which they live and work) and the conclusions sought relate to specific and determinant policy issues. Crutchfield and Pontecorvo, for example, drew their conclusions on the economic implications of Alaska salmon management as measured by efficiency loss and economic rent dissipation from a relatively simple but imaginative examination of the Bristol Bay catch and drift gear data for the period 1934-59.¹¹ The deductive model developed by Crutchfield and Pontecorvo from only two statistical series adequately served the relatively unambiguous task of demonstrating the economic consequences of open access to resource and irrational (in economic terms) conservation practices and establishing a framework for more effective and efficient measures. It also was limited to serving just those specific purposes.

The research task imposed by the present assignment was the reverse of that normally assumed by traditional economic analysis oriented to specific policy issues. The conclusions sought were not simple or focused but, by the nature of the "real world" in which they were to be studied, were complex and diffuse. The policy decision to introduce limited entry into the salmon management program might quite reasonably be based upon observation of the operations of a simple model using two sets of statistical data, even recognizing this as a far cry from the actual state of human affairs. But the same model or a similar intensively selectively constructed one cannot serve to demonstrate the probably impacts of the policy beyond the two it was designed to register. The range of impacts to be considered and the dimensions of each correspondingly broadens the scope of the analysis and appeal to facts.

The most immediately obvious socio-economic impacts of reductions in the salmon harvesting labor force are the income and employment effects upon the fishermen themselves, those who are displaced and those who survive. Because most of the Alaska salmon fisheries take place in a larger context of other commercial fisheries, consideration must also be given to the effects upon fishermen in other fisheries of the creation of a body of unemployed salmon fishermen. Prediction

¹¹ J.A. Crutchfield and G. Pontecorvo, *op.cit.* pp.11-36, 104-121. The analysis could not be carried beyond 1959 because the series indicating gear in use was terminated at that time, one of the hazards of doing social science research in Alaska. p. 117.

of these impacts requires data not only on the numbers of fishermen, but their social and economic characteristics and behavior and their willingness and/or ability to change these patterns. The total local economy will not only register immediate impacts in the form of changes in income and employment levels and the local governments in tax revenues and public assistance expenditures, but the characteristics of the local economy and government (e.g. availability of alternative employment opportunities, degrees of racial discrimination, existence of effective vocational re-training programs, etc.) will further modify the nature and intensity of the impacts upon the individual fisherman. Prediction of the socio-economic impacts of changes in harvesting labor force, therefore, would require not only knowledge of individual fishermen, their organization into a specific labor force, the place of these in a total regional economy and the larger State and national economies, and so on through a number of other levels of conceptualization, but also of the nature of the regional context and interactions of each of these levels.

In order to bring this task within manageable dimensions, the study of the impacts of limited entry on the Maine lobster fishery introduced the notion of a "target group" of fishermen (i.e. those who could be regarded as candidates for elimination and studied only three selected communities). This sampling approach is appropriate for a fishery which is simple and geographically compact and in which one geographic part can be taken as representative of the whole, but would not be appropriate here. A study of the Bristol Bay salmon fishery would be valuable for that regional fishery, but it would be of limited use as the basis for generalizations covering the total Alaska salmon fishery. Given the complexities and geographic variations discussed in the sections above, it is likewise impractical to treat the Alaska salmon fishery on a consolidated state-wide basis as though it were one homogeneous unit.

The approach decided upon was one of regional analysis, dividing the total state fisheries into manageable geographic entities embracing meaningful combinations of forms and processes of interaction of the variables under study. To recognize this sense of unity and wholeness in each region and its unique character requires broad knowledge of

the over-all background, but the research design does not require collection and presentation of a mass of detail. The approach was a process of elimination of all details which are present in the real world except those which naturally forced their way in and appeared strategic to the purposes being served. This is a less extreme version of the selectivity of traditional economic analysis as discussed above.

Defining the Basic Units of Reality -- Employment Data Sources

The most basic "unit of reality" to be identified and measured was employment in salmon fisheries. In the economic studies cited above, the annual number of commercial fishermen licenses was taken to represent fishing effort or employment and had been used as a basis for computing average production and income per fisherman. The investigators recognized that this did not represent actual effort or employment (although this is not always made explicit in published reports), but an index of the general levels in any year. What does not appear to be fully recognized, however, is that even as index numbers the use of annual licenses are valid only for relatively short periods of time. Changes in management philosophy, programs and regulations have continuously changed the relation of total numbers of licenses issued each year to the actual levels of fishing effort or employment through their effects upon efficiency or labor-intensity of gear and the participants' anticipations of limitation on numbers. As this was one of the phenomena to be studied, it was first necessary to determine the extent to which changes in management influenced relations between licenses and effort.

Table 1 gives the impression of a steady increase in employment and fishing effort. The direction of the general trend can be taken as real, but the license statistics clearly overstate the magnitude. Much of the increase in fisherman licenses prior to 1959 resulted from the reduction in the number of traps and their relative share of the total salmon catch rather than an absolute increase in fishing effort (Table 2). The shift to seines and gillnets to maintain (not necessarily to expand) levels of harvest required more manpower than that required by the traps replaced. In other words, overcapacity was always present but did not become obvious until the efficiency of the trap was literally translated into manpower equivalents. The decline in the number of traps operated before their outlawing (with the exception of those operated by the Metlakatla Indians) was due to a number of factors.

The use of traps cannot be universal, but is appropriate only under certain ideal combinations of fish run and geographic conditions. As the most productive runs upon which traps operated were over-fished, some traps may have been abandoned. Others were eliminated by more stringent conservation controls (spacing of traps, distance from stream mouths, etc.) and Corps of Engineers regulations relating to navigational safety and obstructions. Because traps were tied to canneries and for the most part absentee owned, they had long been the target of resident Alaskans and fishermen using mobile gear and statehood became their nemesis in 1959.¹²

TABLE 2

Alaska Salmon Catch Taken by Traps - 1905-1964

<u>Periods</u>	<u>Average Annual Number Operated</u>	<u>Percentage of Total Salmon Catch</u>
1905-14	n.a.	37.8%
1915-24	406	48.3
1925-34	579	54.1
1935-44	431	41.3
1945-54	367	37.4
1955-58	225	23.4
1959-64	11	1.0

n.a. = data not available

Source: Alaska Department of Fisheries and Alaska Department of Fish and Game annual reports.

The drastic nature of this action resulted in a lag in registering the manpower effect. The jump in the number of licenses issued in 1961 (14,010) over 1960 (11,919) and the annual average for the prior ten years, 1951-60 (11,485) is an indication of the number of new fishermen recruits required to harvest the former trap catch.

Other changes in the numbers of licenses issued reflected attitudes toward licenses themselves and compliance behavior. In the earlier years of the industry the enforcement of regulations was less effective than today because of limited funds and personnel. It is likely that

¹² For a fuller discussion of the trap as gear, means of income allocation between resident and non-resident, and political issues refer to G. W. Rogers, Alaska in Transition, the Southeast Region (Baltimore: The Johns Hopkins Press, 1960) pp.3-16, 105-107; and H.C. Scudder, The Alaska Salmon Trap: Its Evolution, Conflicts and Consequences, Historical Monograph No. 1 (Juneau: Alaska Division of State Libraries, 1970).

more persons fished than were actually licensed to do so, particularly wives and other family workers who assisted the heads of households and did not bother to get licenses. In recent years the reverse is true, the evidence is that more persons are licensed than actually fish. In this study, it was found that the number of fishermen employed during the peak week of highest effort in each year fell significantly below the number of licenses issued. In 1970, for example, the high week employment was estimated as 13,200 persons in all fisheries as compared with 22,088 license issued. The forty percent gap can be accounted for in part by the fact that not all persons who fished during the 1970 season did so during this one week, but there is also evidence that actual or anticipated regulation effecting number of units of gear also caused over-licensing. A 1968 study of the Cook Inlet salmon fishery discovered that only 91.5% of those persons holding licenses actually participated in that fishery. The investigator noted, "Due to the 1968 gear limitation regulation some fishermen registered to fish 1968 with no intention of fishing -- they believed they were protecting their right to fish in future years."¹³ A 1970 investigation of license holders in Bristol Bay similarly found that only 83% of the pre-season registered gear actually participated in that fishery.¹⁴ The practice of licensing children in order to establish grandfather rights in anticipation of future gear limitation regulation was also revealed in a check of the ages of commercial fishing licensees. In 1971 those persons under 20 years of age accounted for twenty percent of all license holders, under 15 years of age eight percent and under 13 years of age four percent.¹⁵ Again, this is a very recent phenomena and undoubtedly explains some of the increases during the 1960's.

In addition to these causes of increased licenses there was, of course, an actual increase in fishing effort and employment throughout the recent history of the fishery. Ease of entry into the fishery was fostered and subsidized by government and private programs during the 1940's and 1950's. Much of the money allocated to Alaska under the Indian Reorganization Act of 1936 and other loan and development programs of the Bureau of Indian Affairs, for example, was used for

¹³ L.B. Flagg, An Economic Survey of the Cook Inlet Salmon Fishery, Informational Leaflet 145, Alaska Department of Fish and Game, June 1, 1970 p. 4.

¹⁴ M. L. Nelson, "1970 Bristol Bay Salmon Catch by Residency," memorandum, Alaska Department of Fish and Game, April 2, 1971, p.2.

¹⁵ "Alaska Commercial License Analysis for 1971", Alaska Department of Fish and Game computer print-out compiled February 6, 1972.

purchase of boats and fishing gear by Natives increasing fishermen and gear in the face of rapidly declining commercial harvests. With the 1951 changes in regulations permitting the use of motor powered vessels in the Bristol Bay fishery, local residents of that region were able to purchase the obsolete sailing boats from canneries and convert them to powered vessels at low cost. In the 1950's, for the first time a significant portion of the fleet was not cannery owned and controlled and the integration of these independents into the fishery was supported by a new resident fishermen's union.¹⁶ Improved transportation systems lowered costs in and increased access to formerly remote fishing areas. The construction of a road system down the Kenai Peninsula, for example, facilitated the entry of part-time and week-end fishermen from the Anchorage area into the Cook Inlet fishery. After World War II there was a great increase in the number of pleasure craft owned by Alaskans. In many cases owners find that buying a commercial license affords a means of meeting some of their operating expenses through sale of excess sports catch or of qualifying for income tax advantages. These sports-commercial fishermen have increased the numbers of licensed commercial fishermen with some effect upon production, but an effect far below that of the true commercial fisherman. Licenses assigned to this group would require some deflationary factor to translate them into equivalent workforce units.

At best licenses issued are a very crude index of actual changes in fishing effort. Furthermore, they do not reflect seasonality nor effects of the regulation of length of open seasons by the managing agency. In this sense they are an overstatement of annual harvesting workforce. At the other extreme the Alaska Department of Labor in their annual estimates of total workforce for the State and workforce areas include estimates of commercial fishermen under self employed nonagricultural workers. These estimates were made on the basis of 1960 and 1970 Census reports of employment in fisheries in April, an off-season month in salmon. The result is a serious understatement of the importance of fisheries employment.

¹⁶ G.W. Rogers, Alaska in Transition (Baltimore: The Johns Hopkins Press, 1960) pp.226-269

G.W. Rogers, Preliminary Economic Survey of Dillingham, Alaska and the Bristol Bay Region, Alaska Rural Development Board, Juneau, Alaska, August 1, 1955.

The first attempt to arrive at monthly fisheries employment was a study by R. Listowski of monthly fish landings by various types of craft and gear for 1965-67.¹⁷ The result was the first realistic picture of the place of the fisherman in the total Alaska economy. The methodology developed in this pioneering work was the basis used in the present study and is fully described in Volume II.

The first data developed for this study related to fish harvesting employment and productivity for the six year period 1965-70. This was done for all species because salmon harvesting should be studied in the context of all fisheries harvesting and the added cost of extracting other species data did not appear too great once the sources were being processed for salmon. The basic sources were Department of Fish and Game print-outs of boat landings per week from fish tickets supplemented by International Pacific Halibut Commission data. A fuller description of these and other data sources discussed below and methods used in making employment estimates is contained in Volume II. Production data by species, gear, month and region was also prepared from these sources in the same format. From these two sets of statistical series (employment and production) harvesting activities could be analyzed not only on an annual basis, but for each month (in the case of Bristol Bay weekly analyses were also made).

Further economic and social characteristics data could have been collected by means of interviews or self-administered questionnaires as was done in the Maine lobster study and a 1968 economic survey of the Cook Inlet salmon fishery. This approach was discarded for several reasons. In addition to the generally recognized technical deficiencies of the social survey as the basis of research, the small size of statistical samples that can be developed from Alaska population groups reduces the validity of this approach. The cost of field surveys is prohibitive because of high costs of travel and time requirements and our past experience with mailed questionnaires has been discouraging. Furthermore, the practical value of one-shot surveys is limited because it gives no basis for determining dynamics of change essential for prediction. The ideal survey would be one involving

¹⁷ Richard Listowski, "Commercial Fishermen Estimates", Economic Analyses, Vol. 1, No. 3, Alaska Department of Labor, May 3, 1971.

regularly repeated observations over long periods of time, but this was not compatible with the contract arrangements of this study.

The approach adapted was to use measures obtained from analysis of government publications or archival records and by means of interpretation and triangulation arrive at indicators of the key characteristics desired. If successful this approach would develop an information system derived from other material collected in the regular course of administering other governmental programs and, therefore, one which could be continually updated. Volume II reviews the sources investigated and evaluates the results obtained. The statistics sought for individual fishermen were indicators of basic characteristics (resident, non-resident, age and sex, income and expenses, numbers of dependents, indicators of mobility, etc.) by region and type of gear fished. The sources investigated were Alaska Department of Revenue 1969 income tax returns, Alaska Department of Labor records of wage and hour dispute settlements between commercial fishing vessel operators and crew members (data on expenses, wage or shares paid, etc.) and a 1970 survey of employment characteristics of rural population (particularly important for data on mobility and social characteristics of persons listing fishing as a principal occupation) and other records of the Department of Fish and Game.

Establishing Boundaries of Homogeneity -- the Study Regions

Going beyond the collection of available employment and other social and economic data on fishermen, a regional classification was necessary as a basis for organization of the data for analysis. This classification also provided the basis for analysis of the total socioeconomic context in which the fishermen lived and worked, the external forces determining or influencing their behavior and completed the preliminary analytical framework needed for the final analysis and prediction of the impacts of changes in the harvesting labor force. These classifications established the general boundaries of analytical homogeneity. The economic and social statements and analysis of this study are made in terms of a system of six regions (Figure 1). The number and shape of these units are dictated by two sets of considerations. The first was functional. In keeping with the purpose of the study, the regions had to be small enough to embrace reasonably homogeneous and inter-related geographic, natural resources, social and economic areas but large enough to include forces of localized

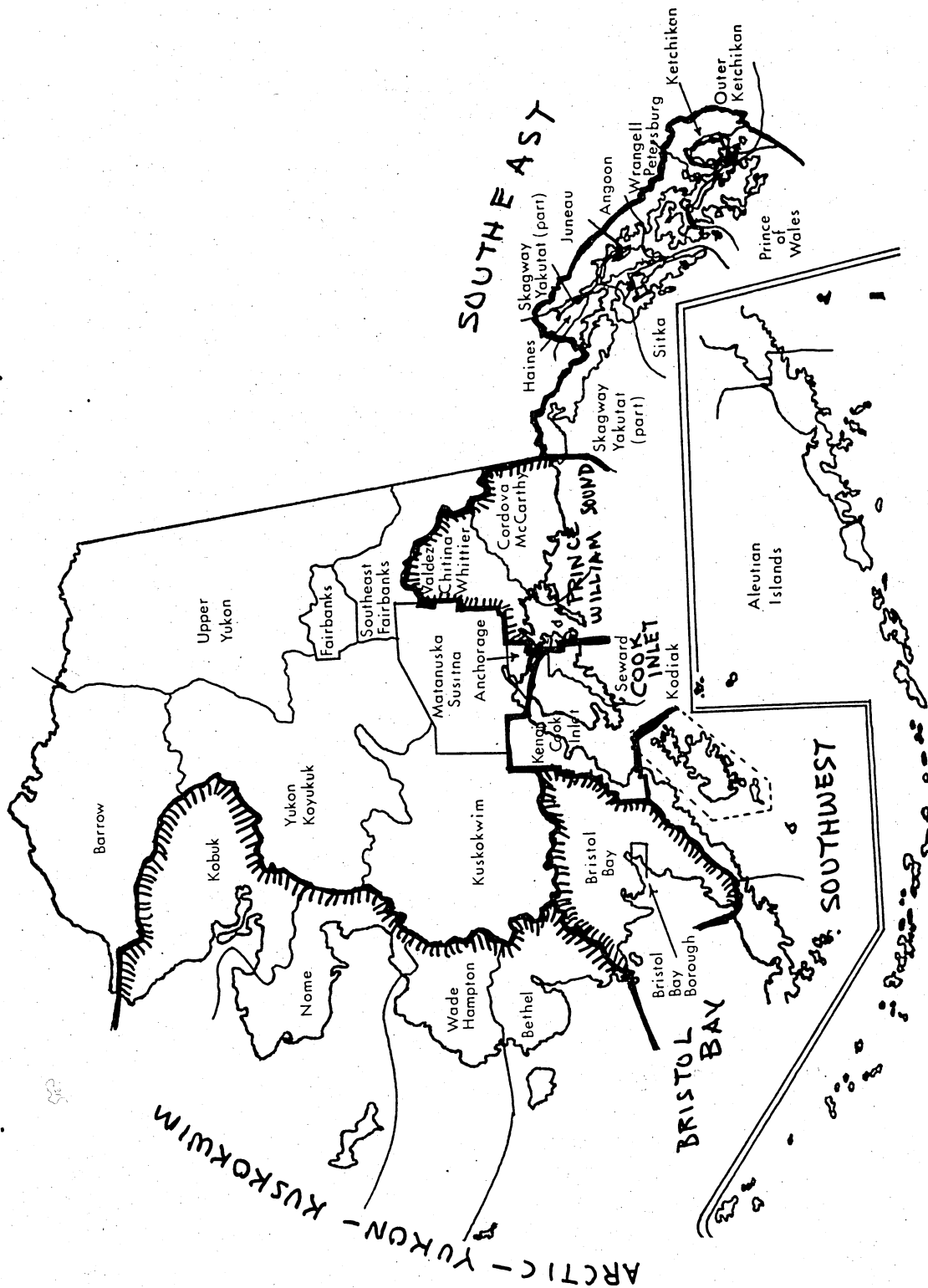


FIGURE 1 -- STUDY REGIONS AND 1970 CENSUS DIVISIONS

interchange and expansion and the immediate or short-run geographic and vocational mobility of salmon fishermen. The second set of considerations reflected the more narrowly practical necessity of definition using existing administrative and statistical units available from public agencies engaged in fisheries management and research and the collection of economic and social data. The six study regions are listed in Table 3 and described in terms of management regions and areas of the Alaska Department of Fish and Game, census divisions of the U. S. Bureau of the Census, and workforce areas of the Alaska Department of Labor, three of the principal sources of statistical data.

Unavoidably a degree of arbitrary judgement was involved in establishing these units. A case could be made, for example, for including the Alaska Department of Fish and Game's Kodiak area with the study's Cook Inlet region or the Resurrection Bay area with the study's Prince William Sound region on evidence of similarities in the mix of fishing activities by species or the overlapping of waters fished and salmon runs harvested. One reason for the decision to set up the Cook Inlet region (the combination of the Cook Inlet and the Resurrection Bay management areas) as a separate unit, for example, was to facilitate study and speculation on the effects upon fishermen of the existence of a developed road system serving most of the region and connecting it with the major urban center of the State. Similar considerations, other than those related directly to the fish resources, were involved in the other regional decisions. There is one exception to the attempt to define regional economies which fully embrace the identified salmon regions. In the case of the Bering Sea-Arctic Ocean region a minor portion of the commercial catch is by fish wheels located as far up river as the Fairbanks vicinity, but the "economic" region was arbitrarily limited to those census divisions which front on the seacoast.

The study regions were established primarily to serve analytical convenience in consideration of the characteristics and behavior of commercial fishermen, but have obvious limitations. Although designed to provide a basis for reasonable generalization, in common with all generalizations these are not free from exceptions. Resident Alaska fishermen, for example, generally can be classified regionally, but there will always be some individual fishermen who move from one region to another between annual seasons or even within seasons.

TABLE 3
COMMERCIAL FISHERMEN STUDY REGIONS

<u>Study Regions</u>	<u>Alaska Department Fish and Game Management Regions or Areas</u>	<u>U.S. Bureau Census 1970 Divisions</u>	<u>Alaska Department of Labor 1970 Workforce Areas</u>
1. Southeastern	Southeastern Region	Skagway-Yakutat Division Juneau Division Sitka Division Angoon Division Wrangell-Petersburg Division Prince of Wales Division Ketchikan Division Outer Ketchikan Division	Lynn Canal-Icy Straits Juneau Sitka Wrangell-Petersburg Prince of Wales Ketchikan
2. Prince William Sound	Copper-Bering Rivers Area Prince William Sound Area	Cordova-McCarthy Division Valdez-Chitina-Whittier Division	Cordova-McCarthy Valdez-Chitina-Whittier
3. Cook Inlet	Cook Inlet Area Resurrection Bay Area	Kenai-Cook Inlet Division Seward Division	Kenai-Cook Inlet Seward
4. Southwestern	Kodiak Area Chignik Area South Peninsula Area Aleutian Islands Area North Peninsula Area	Kodiak Division Aleutian Islands Division	Kodiak Aleutian Islands
5. Bristol Bay	Bristol Bay Area	Bristol Bay Division Bristol Bay Borough Division	Bristol Bay
6. Arctic-Yukon-Kuskokwim	Arctic-Yukon-Kuskokwim Area	Kobuk Division Nome Division Wade Hampton Division Bethel Division	Kobuk Nome Wade Hampton Bethel

This is particularly true of the halibut fishery, the workforce in Alaska waters or the highseas off Alaska being recruited from all parts of Alaska and the Pacific Northwest including Canada. For salmon fishermen, however, in general the regional units account for most, if not all, of such mobility.

To provide focus and general identity, data was collected for each region to provide descriptions in terms of geographic and locational characteristics and communications and contact with other Alaska and outside regions. Selected demographic, social and economic characteristics of the population were tabulated from the 1960 and 1970 census and population trends analyzed from 1880 through 1970 census. A first attempt at analysis of the regional economies was to describe them in terms of compilations of value of products, construction and trade payrolls, government spending, etc. within each region. Data was found to be limited and unreliable, however, and this was abandoned. There are other limitations to this approach, furthermore, even if measures of these gross values were available. They might be useful in giving an impression of the region's economic importance, but they would not accurately represent the local economy itself. Much of the total value of production and defense spending escapes the resident economy in the form of profits, interest, equipment and supplies purchased outside the region, transport costs and wages paid to non-resident seasonal workers. A more representative calculus of the structure and functioning of the regional economy can be made from a compilation of employment data. These data are not classified by residence, however, and still include seasonal workers who regularly migrate to Alaska for fishing and food processing during the summer. Tabulations were made in each region of total workforce, unemployment and employment by major industrial classification for calendar years 1965 and 1970 by months.

The total commercial fishing industry is briefly analyzed in each case to indicate the degree to which transference of productive factors has taken or might take place between fisheries. Volume of fish harvested, and value to fishermen and pounds and value of completed products by species and type of product are used to indicate the composition and structure of the total industry.

The data relating to the numbers, characteristics and behavior of the fishermen organized by these six regional units also take on differing patterns of homogeneity and can be studied in their "natural" context or socio-economic environments. From these regional organizations of data on the fishermen and their environment, a start can be made on gaining insights into the probable impacts of changes in management policy effecting numbers engaged in the harvesting of salmon.

The remaining tables in this section summarize and compare selected key characteristics of each of the regions during 1970. The relative industrial composition of the total employed workforce of each region exhibits varying patterns with commercial fishing playing different roles in each. (Table 4) These data reflect twelve-month average employment for the total year, not the peak of seasonal employment which would assign a much greater importance to commercial fishing. In spite of this, 20.5 percent of the annual average employment in the Bristol Bay region is fishing and another 30.9 percent "other commodity producing industries" which here is primarily the processing of fish products. Although of relative less importance within the total economies of other regions, fishing nonetheless plays significant roles in all of them.

During the high month of July (the peak month in the majority of cases) salmon harvesting comprised all or virtually all of the fisheries employment in four regions (Prince William Sound, Cook Inlet, Bristol Bay and Arctic-Yukon-Kuskokwim); but on a twelve month basis in only two regions (Bristol Bay and Arctic-Yukon-Kuskokwim). This reflected the less seasonal patterns of shellfish and other fish harvesting and the tendency for these activities to slack off during the height of the salmon harvest. Most of the "other fish" employment in the first four regions is accounted for by halibut fisheries and king crab is the principal component of the shellfish harvest which accounted for more than half of the commercial fisheries employment in the southwestern region (Table 5).

The relative species composition of the catch value to fishermen corresponds approximately with the relative twelve month average fishermen employment patterns in each region (with a slight upward increase compared to employment in the relative position of value of salmon and other fish and a drop in shellfish). Cook Inlet is the only exception because of the distortions introduced by the

heavy landings of the Gulf halibut fleets at Seward (Table 6). Within the salmon fishery significant regional variation also is present in the employment by type of gear (Table 7). This reflects the natural physical characteristics of each region (e.g. the southeastern archipelago, Cook Inlet embayment, etc.) and the nature of each fish run. Trolling accounted for a quarter of salmon employment in July 1970 in the southeast region, but except for a very minor use of this gear in the Prince William Sound region was absent elsewhere. Purse seines were the most important source of employment in three regions (southeastern, Prince William Sound and southwest) and drift and set gillnets in three regions (Cook Inlet, Bristol Bay and Arctic-Yukon-Kuskokwim).

TABLE 4

Industrial Composition of Study Regions, Total
Employed Workforce, Calendar Year 1970

Study Region	Commercial Fishing	Other Commodity Producing Industries	Government ^a	Distributive Industries ^b	Unclassified Employment ^c
	(Percent of Total Employment ^d)				
South-eastern	4.9	20.7	37.5	30.0	6.9
Prince William Sound	11.4	16.6	37.0	23.2	11.8
Cook Inlet	5.0	31.6	20.4	28.4	14.6
South-western	9.5	14.3	61.0	12.2	3.0
Bristol Bay	20.5	30.9	34.5	9.2	4.9
Arctic-Yukon-Kuskokwim	3.9	10.4	54.0	28.3	3.4

- a Includes members of armed forces
 b Transportation, communications, utilities, trade (wholesale, retail), finance, real estate, insurance, services.
 c Self-employed and non-paid family workers other than agriculture and fishing.
 d Based on twelve month averages for year

SOURCE: Alaska Department of Labor.

TABLE 5

Commercial Fishing Employment by Study Regions
and General Species, July and Twelve Month Average
1970

Study Region	J U L Y 1 9 7 0			TWELVE MONTH AVERAGE CALENDAR YEAR 1970		
	Salmon	Other Fish	Shellfish	Salmon	Other Fish	Shellfish
South eastern % total	2,950 88.9	300 9.0	70 2.1	748 75.2	158 15.9	89 8.9
Prince William Sound % total	746 99.7	2 ^a 0.3	--- ---	176 85.8	1 ^a 0.5	28 13.7
Cook Inlet % Total	1,446 93.2	93 ^a 6.0	12 0.8	186 65.0	30 ^a 10.5	70 24.5
South- western % total	2,274 80.6	245 ^a 8.7	303 10.7	343 37.7	79 ^a 8.7	488 53.6
Bristol Bay % total	2,980 100	--- ---	--- ---	450 99.1	4 0.9	--- ---
Arctic- Yukon- Kuskokwim % total	430 100	--- ---	--- ---	144 98.0	3 2.0	--- ---

a Includes estimated allocation of Central Region halibut employment to study regions on basis of relative value of halibut catch landed.

TABLE 6

Catch Value^a to Fishermen by Study Regions and General Species, Calendar Year 1970

<u>Study Region</u>	<u>Salmon</u>	<u>Halibut</u>	<u>Other Fish</u> ^b	<u>Shellfish</u>	<u>Total</u>
Southeast	\$15,284	\$3,764	\$ 316	\$ 635	\$19,998
% total	76.4	18.8	1.6	3.2	100
Prince William Sound	5,187	20	86	266	5,559
% total	93.3	.4	1.5	4.8	100
Cook Inlet	3,534	1,300	2	1,482	6,318
% total	55.9	20.6	----	23.5	100
Southwest	15,743	3,433	41	18,142	37,358
% total	42.1	9.2	0.1	48.6	100
Bristol Bay	27,029	----	20	----	27,049
% total	99.9	----	0.1	----	100
Arctic-Yukon-Kuskokwim	1,199	----	15	----	1,214
% total	98.8	----	1.2	----	100

a) Thousands of dollars

b) Herring, herring eggs, sablefish, trout, bottom fish, other fish.

SOURCE: Alaska Department of Fish and Game, 1970 Alaska Catch and Production, Statistical Leaflet No. 21.

TABLE 7

Salmon Fishermen Employed by Study Regions and Gear, July 1970

<u>Study Region</u>	<u>Purse Seine</u>	<u>Drift Gillnet</u>	<u>Set Gillnet</u>	<u>Troll</u>	<u>Total</u>
Southeastern	1,782	321	101	744	2,954 ^a
% total	60.3	10.9	3.4	25.2	100
Prince William Sound	580	148	16	2	746
% total	77.8	19.8	2.1	0.3	100
Cook Inlet	188	940	318	----	1,446
% total	13.0	65.0	22.0	----	100
Southwest	1,830	92	234	----	2,166 ^b
% total	84.5	4.2	10.8	----	100
Bristol Bay	----	2,126	859	----	2,985
% total	----	71.2	28.8	----	100
Arctic-Yukon-Kuskokwim	----	156	269	----	429 ^c
% total	----	36.4	62.7	----	100

a) total includes 6 employed on traps.

b) total includes 10 employed on beach seines.

c) total includes 4 employed on fish wheels.

These tables present only a few very generalized characteristics of the six study regions for one year in time, but this should be sufficient demonstration of the reasons for using this approach. When dynamic factors of change over longer periods are introduced the regional contrasts become even more marked. A brief comparison of the Bristol Bay and Cook Inlet regions will serve as illustration.

Bristol Bay has an economy based primarily upon the harvesting and canning of salmon with limited exploitation of other fisheries, with only minor and intermittent mining activities and some defense. The region is isolated and remote from other Alaskan regional centers of settlement and economic activity. The principal salmon fishery has remained relatively constant and unchanged since the post World War II period, subject only to fluctuations in the runs.

Cook Inlet is a region which has been in a state of dynamic change since World War II, first in the expansion of the inter-connected highway system which has broken down the former isolation of the lower Inlet area in which the major part of the fisheries activities are concentrated. During the 1960's in the upper and mid-Inlet areas major oil and gas developments drastically changed the regional economy from the former simple fish products economy. The fisheries also have been undergoing rapid diversification both in products and species harvested and are in a state of transition in contrast to the relatively static state of the Bristol Bay. Given these differences in regional settings and dynamics, the impacts of changes in the harvesting forces will be quite different. A reduction in the salmon harvesting force in Bristol Bay (which accounts for a quarter of total employed workforce) would be immediately translated into a major increase in regional unemployment and welfare costs because of the lack of alternative employments within the region and means of easy exit. In the absence of a major and highly effective population relocation program, this condition would continue and worsen extending into an indefinite future. The immediate impact in Cook Inlet, however, would be a relatively lower increase in the region's unemployment and welfare costs due to the lesser importance of salmon fishing in total workforce and the presence of alternative employment in other fisheries and expanding oil and gas and distributive industries, and existence of roads for easy exit from the region into adjoining areas affording even broader employment horizons. With relatively modest vocational retraining and

relocation programs, economic and socially adverse longer-run effects could be reduced further.

The sequence in which the six regions are presented in the remaining chapters will not follow any logical geographic ordering, such as the northwestward progression used in the above tables, but will follow a sequence approximating order of complexity. The first region will be Bristol Bay because this is the region with the least complicated economic structure and in which salmon fishing is the dominant employment activity. Understanding of the impacts of changes in salmon harvesting workforce in this simplified case will provide insights of value in analysis of the more complex settings of this activity in other regions. The Arctic-Yukon-Kuskokwim is likewise a simple case, but the activity is scattered and on a much smaller scale and will be studied primarily for its own sake. The Prince William Sound and Southwest regions, in that order, represent the additions of other fisheries of increasing relative importance and variety and slightly more complicated total economies. Cook Inlet puts salmon fisheries into a context not only of a varied total fisheries industry but a total economy clearly dominated by other than fisheries activities and a region with developed land transportation and communication systems not found in the first four regions above. The Southeastern region is the most complex of all the cases studied. Not only is the total regional economy larger and more complicated than those of the other five regions, but the greatest diversity of types of gear and fishermen are engaged in the salmon fishery. The format for each regional chapter is similar to facilitate comparison.

CHAPTER III: THE BRISTOL BAY REGION

Past Development and Population

Bristol Bay is a major indentation in the southern Bering Sea coast of Alaska. The region includes the drainages of the Togiak, Wood, Nushagak, Kvichak, Alagnak and Naknek Rivers and the north side of the Alaska Peninsula to Port Heiden and for this analysis is confined to that area embraced by the Bristol Bay Borough (King Salmon, Naknek and South Naknek) and the surrounding 1970 Bristol Bay Census Division (Figure 2). In aboriginal times it was inhabited by four major Eskimo tribes living on salmon, sea mammals and upriver land mammals. Fisheries and fur resources have been the source of income and employment in the region from the beginning of "historic time" until the present with the addition of some defense and other government spending. The Wood and Nushagak Rivers were prodigious breeding grounds for beaver, mink and muskrat and the fur trade was the first source of outside contact and commercial development.

The first salmon cannery was erected near the Moravian mission at Carmel in 1884 followed by the rapid multiplication of plant and gear engaged in the harvesting and canning of the salmon runs of the Bay. Until recently, this commercial exploitation of the region's principal resource supported little permanent local economic activity. Initially the total shore work force was made up of Chinese transported by sailing ships from San Francisco each season along with cannery supplies and returned with the canned salmon pack. Fishermen were Italians and Scandinavians from California and the Pacific Northwest. Some residents began to become involved in the 1920's and after. A special 1939 study of employment and income in the region's salmon fisheries reported that of 8,227 employed in the industry at that date 496 were Natives and 1,387 non-Native residents of Alaska. No indication was given of how many of these last were residents of the region.⁷ Fifteen years later another

⁷ Reported in Ward T. Bower, Alaska Fishery and Fur-Seal Industries in 1939, Bureau of Fisheries Administrative Report No. 40, U.S. Department of the Interior, 1941, pp. 142-145. This also indicated that 84% of wage payments to non-residents were made outside Alaska.

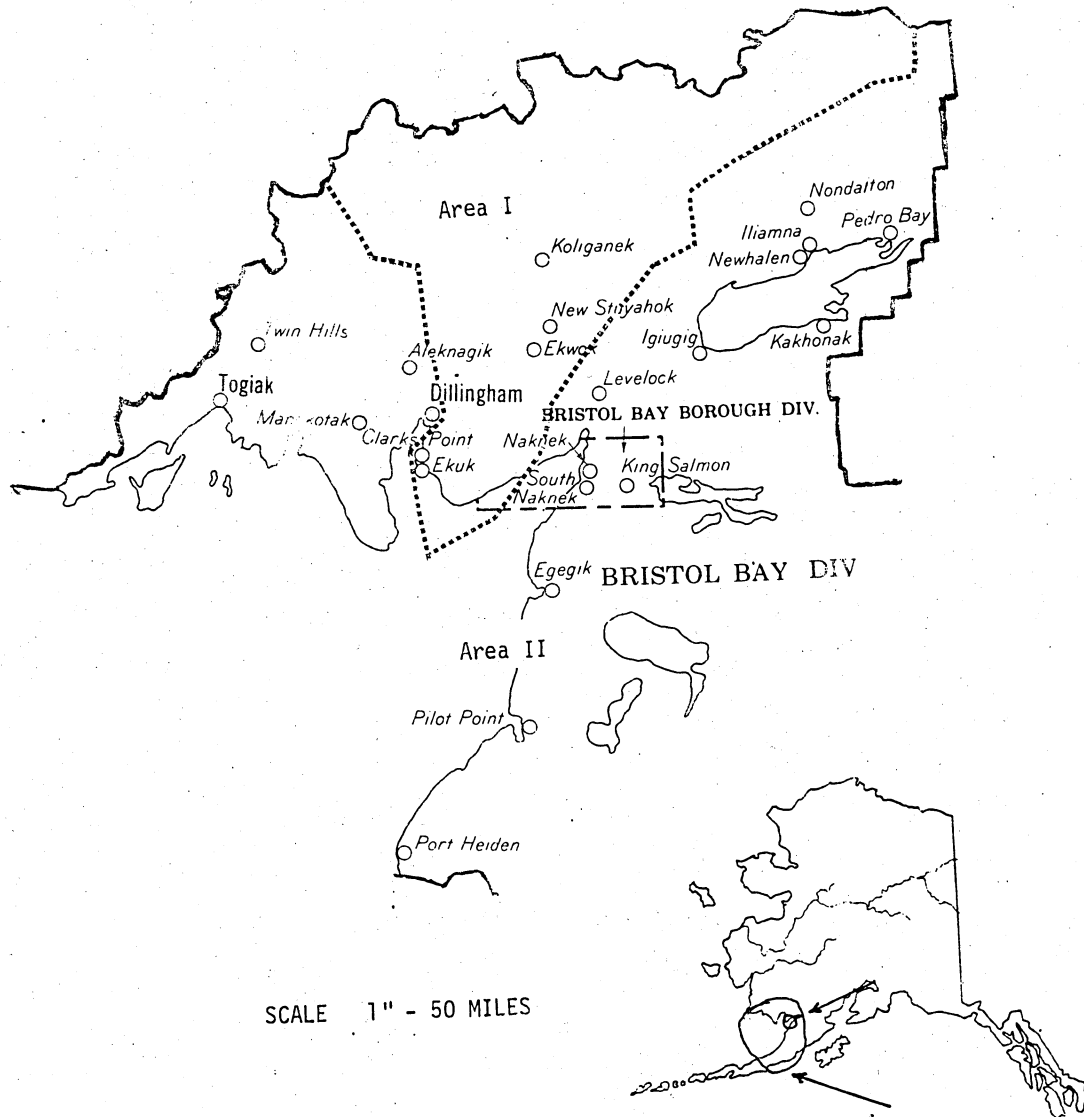


FIGURE 2 -- BRISTOL BAY REGION

report stated "of a total of about 6,000 men presently employed in the fishing industry in the Bristol Bay area, 4,000 are brought in from the United States; 1,000 are recruited from other parts of the Territory; and only 1,000 are provided locally."⁸

Other marine resources are abundantly present in the region, but exploitation of these has been minimal because of the remoteness of the region from markets and sources of supply. Tourism and outdoor recreation potential remain underdeveloped. Fur harvests today are minor in importance. There are some indications of mineral potential, but development has been minor and sporadic with some petroleum exploration during the last decade. The advent of World War II brought the establishment of permanent defense base at King Salmon near Naknek and temporary smaller stations elsewhere. For the most part, the residents of the region have continued to follow a subsistence existence supplemented by cash income employment in commercial salmon fishing and welfare. None of these developments brought any change in the basic transportation systems of the region beyond defense stimulated improvement in air service and some minor road extensions. Plans are being implemented to eventually provide a ferry connections across Cook Inlet and a road across the Alaska Peninsula and patterns of trade have shifted from Seattle to Anchorage, but for the present and immediate future the region remains an isolated and remote part of the State.

Given this history, the region's population registered only modest change (Table 8). The drop from the 1880 count of 4,010 persons to the 1920 count of 2,015 persons can be accounted for in part by the impact of outside diseases including the post-World War I influenza epidemic, and the subsequent rise reflects the increasing effectiveness of public health programs in keeping people alive. The jump between 1939 and 1950 represents the outside population introduced by World War II, the manning of the first defense station in the region and the "backing out" of Aleuts from the Aleutian Islands by the Pacific War and the military reservations of the post-war period.

⁸ Southwestern Alaska, Interim Report No. 5, Corps of Engineers, January 20, 1954, page 35.

TABLE 8

BRISTOL BAY REGION^a - POPULATION DISTRIBUTION, 1880-1970

	Circa 1740	1880	1890	Jun. 1, 1900	Dec. 31, 1909	Jan. 1, 1920	Oct. 1, 1929	Oct. 1, 1939	Apr. 1, 1950	Apr. 1, 1960	Apr. 1, 1970
TOTAL REGION	2,400	2,679	2,726	3,490 ^b	2,271	2,015	2,198	1,992	2,756	4,024	4,632
<u>Kvichak Bay - Port Heidon Area</u>											
Bristol Bay Borough Area ^c	-	-	-	-	-	-	-	-	100	322	403
Ring Salmon AFS	-	-	-	-	-	-	-	-	100	322	403
Other Places	-	192	93	431	150	111	173	306	274	618	744
Remainder of District	-	-	-	-	-	-	-	-	-	72	-
Other Defense Stations	-	-	-	-	-	-	-	-	-	72	-
Other Places	-	684	765	1,269 ^b	550	489	378	294	378	414	496
Sub-Total	500	876	858	1,700	700	600	551	600	752	1,426	1,643
<u>Nushagak Bay-Togiak Bay</u>											
Dillingham and vicinity	-	432	802	850	279	274	367	489	799	652	1,151
Other places	-	1,000 ^d	904	650	1,021	851	922	504	837	1,335	1,354
Sub-Total	1,500	1,432	1,706	1,500	1,300	1,125	1,289	993	1,636	1,987	2,505
<u>Illiamna District</u>											
Nondalton AFS	-	-	-	-	-	-	-	-	-	145	-
Other places	400	371	162	200	271	290	358	399	368	466	484

a Earlier data adjusted to represent same area as Bristol Bay Borough Census Division and Bristol Bay Census Division in 1970 Census.

b Probably includes seasonal summer population and workforce.

c Does not appear until 1970 Census. Earlier population located in same geographic area.

d 1880 census reported 2,331 persons in this area. Oswalt considers this to be a gross over-count, however, and suggests 1,000 as being closer to the actual population (Oswalt, op. cit., p. 9). Other references consulted support this view.

SOURCE: J. W. Swanton, The Indian Tribes of North America (1952); W.H. Oswalt, Alaska Eskimos (1967); U.S. Bureau of the Census, 1880-1970.

The increase in the remaining two decades is accounted for by increased defense staffing, government programs and a dramatic rise in the rate of net natural increase in Native population.⁹ Although there has been a significant increase in non-Native population over the last two decades, the Native population still dominates. In the last pre-World War II census (1939) Native population represented 70% of total population and in 1970 it had declined to 64%. General social and economic characteristics of the region's population indicated low average income levels and workforce participation (Table 9). Between 1960 and 1970 "real" income fell and the percentage of families below the Alaska "poverty line" rose from 31% in 1959 to 39% in 1969. The infant mortality rate dropped from the 1960 level of 70.1 deaths per 1,000 live births to 29.4 in 1970, but remains among the highest in the state.

The Bristol Bay Regional Economy

Aside from defense and other government spending, the regional economy is virtually a single product economy. Several types of fisheries products are now produced within the region, but the total value is still dominated by canned salmon. Of the total \$48.7 million value of all 1970 fish products output, the canned salmon pack alone accounted for \$46 million with red salmon accounting for 94% of this value. Bristol Bay produced 37% of the total state value of canned salmon. Much of this value leaves Alaska, however, in the form of payments to non-resident workers, profits, purchase of supplies and equipment, etc. The total structure and functioning of the regional economy can be best studied from annual employment data (including the regular seasonal non-resident workers) summarized in Table 10 for the period 1961-1970 and in terms of monthly data for 1965 and 1970 in Tables 11 and 12. The economy is very simple and may be classified for analytical purposes into an elementary disaggregated economic base model consisting of a basic or exogenous

⁹ George W. Rogers, "Alaska Native Population Trends and Vital Statistics, 1950-1985," ISEGR Research Note, November 1971, University of Alaska, Fairbanks.
Dorothy C. Jones, "Changes in Population Structure in the Aleutian Islands," ISEGR Research Note, December 1970, University of Alaska, Fairbanks.

 TABLE 9
 BRISTOL BAY REGION - GENERAL SOCIAL AND ECONOMIC CHARACTERISTICS OF
 POPULATION 1960 - 1970 39 A

	April 1, 1960	April 1, 1970
<u>TOTAL POPULATION</u>	4,024	4,632
% of increase 1960-70		15.1%
<u>Race</u>		
Native	2,534	2,949
Non-Native	1,490	1,683
-- percent Native	63.0%	53.7%
<u>Sex</u>		
Male	2,404	2,632
Female	1,620	2,000
-- males per 100 females	148.4	131.6
<u>Age</u>		
Under 18 years	1,783	2,182
Over 65 years	96	131
-- percent under 18 over 65	46.7%	49.9%
<u>Family Income and Poverty Status^a</u>		
Median income, all families with incomes (Deflated by BLS Consumer Price Index, 1957-59 = 100)	\$ 5,955 (5,776)	\$ 7,284 (5,384)
Percent of families with:		
-- Income less than poverty level	21.1%	29.5%
-- Income less than 75% poverty level	14.6	23.7
-- Income less than 125% poverty level	30.8	39.0
-- Income <u>more</u> than 125% poverty level	69.2	61.0
<u>Educational Attainment (persons 25 years and over):</u>		
Median years complete:		
-- males	8.7	9.7
-- females	5.2	7.3
Percentage high school graduates:		
-- males	34.1	45.6
-- females	26.1	33.4
<u>Infant Mortality Rates, Calendar Years (deaths under 1 year of age per 1,000 live births)</u>	70.1	29.4
<u>Employment Status</u>		
Armed Forces	536	439
Civilian Labor Force	654	882
(Unemployed)	(145)	(133)
Ratio Non-workers	2.373	2.506
<u>Weeks Worked in 1969</u>		
Percentage male population 16 years and over:		
--- 50-52 weeks		39.1%
--- 27-49 weeks		15.7
--- 26 weeks or less		37.2
--- did not work		8.0
Percentage females population 16 years and over:		
--- 50-52 weeks		12.4
--- 27-49 weeks		10.3
--- 26 weeks or less		40.1
--- did not work		37.2

^a Excludes inmates of institutions, members of Armed Forces, college students in dorms and unrelated individuals under 14 years. 1970 poverty level for all families = \$3,388. For 1960 poverty level for all families = \$3,000.

TABLE A-11
Bristol Bay Region
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Labor Mobility of Males^b

Percentage of males 30-49 years old in 1970:

-- non-worker 1965, non-worker 1970	30.1%
-- non-worker 1965, worker 1970	6.5
-- worker 1965, worker 1970	57.0
-- worker 1965, non-worker 1970	6.4

^b "Worker" includes members of armed forces.

Source: U.S. Bureau of the Census 1970: PC(1)-C3, Alaska; 1960: PC(1)-3C, Alaska.
Infant mortality data from Alaska Department of Health and Social Services.

TABLE 10

BRISTOL BAY REGION -- POPULATION, EMPLOYMENT BY INDUSTRY -- 1961-1970

	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
	(twelve month averages)									
Total Population	4.155	4.264	4.370	4.453	4.392	4.467	4.622	4.605	4.625	4.632
Total Employment	2.072	1.845	1.850	1.847	2.050	2.078	1.906	1.962	2.125	2.230
Participation rate (%)	49.9	43.3	42.3	41.5	46.7	46.5	41.2	42.6	45.9	48.1
Government										
Federal -- military [a]	540	540	540	540	410	430	530	480	470	400
civilian	150	170	180	185	190	179	167	166	146	160
State and Local	80	80	90	90	100	130	150	174	190	210
Sub-total	<u>770</u>	<u>790</u>	<u>810</u>	<u>815</u>	<u>700</u>	<u>739</u>	<u>847</u>	<u>820</u>	<u>806</u>	<u>770</u>
Commodity Producing Industries										
Fishing [b]	500	430	400	420	440	500	410	440	490	450
Food processing	525	370	382	334	620	515	371	395	505	680
Other [c]	15	20	20	20	20	25	15	30	30	20
Sub-total	<u>1,040</u>	<u>820</u>	<u>802</u>	<u>774</u>	<u>1,080</u>	<u>1,040</u>	<u>796</u>	<u>865</u>	<u>1,025</u>	<u>1,150</u>
Distributive Industries										
Transportation, Communica- tions, utilities	65	67	68	73	90	94	95	113	117	110
Trade	39	34	28	24	30	28	30	35	42	50
Services and other	28	24	22	31	30	27	38	29	25	40
Sub-total	<u>132</u>	<u>125</u>	<u>118</u>	<u>128</u>	<u>150</u>	<u>149</u>	<u>163</u>	<u>177</u>	<u>184</u>	<u>200</u>
Unclassified Employment [d]	130	110	120	130	120	150	100	100	110	110

- [a] Military personnel stationed in area as of July 1 (Alaska Command).
 [b] Includes self-employed and family workers engaged in fishing (commercial).
 [c] Mining, construction and other manufacturing combined to avoid disclosure in sources.
 [d] Other self-employed and family workers estimated by the Alaska Department of Labor.
 Does not include persons engaged in subsistence hunting and fishing.

TABLE 11 - BRISTOL BAY REGION

TOTAL EMPLOYED WORKFORCE BY INDUSTRY & MONTH, 1970

(Rounded to the nearest ten)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	1,060	1,060	1,080	1,250	1,700	4,880	7,770	2,660	1,640	1,200	1,170	1,170	2,220
TOTAL CIVILIAN EMPLOYMENT	660	660	680	850	1,300	4,480	7,370	2,220	1,240	800	770	770	1,820
GOVERNMENT													
Fed - Military [a	400	400	400	400	400	400	400	400	400	400	400	400	400
- Civilian	150	140	150	130	120	140	250	250	260	110	120	120	160
State & Local	180	190	190	200	200	210	200	200	210	220	220	220	210
SUBTOTAL	730	730	740	730	720	750	850	850	870	730	740	740	770
COMMODITY-PRODUCING INDUSTRIES													
Agriculture [b													
Commercial Fishing					80	2,240	2,980	150					
Mining (includes oil & gas)										10	10	10	
Contract Construction										210	180	170	680
Food Processing	110	110	120	270	580	1,470	3,320	1,260	410				
Other Manufacturing													
SUBTOTAL	110	110	120	270	660	3,710	6,300	1,410	410	220	180	180	1,140
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	100	100	100	100	130	140	140	130	130	100	100	90	110
Trade	50	50	40	40	50	50	30	40	80	40	40	50	50
Finance, Ins. & Real Estate				30	20	30	40	30	30	30	30	30	20
Services [c	10	10	20	20	20	30	60	30	20	20	20	20	20
SUBTOTAL	160	160	160	190	220	250	270	230	260	190	190	190	200

TABLE 11 -Bristol Bay, Total Employed Workforce, 1970
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	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Workers [d	60	60	60	60	100	170	350	170	100	60	60	60	110
Commercial Fishermen Participation as Per Cent of Total Employment	.0	.0	.0	.0	4.7	45.9	38.4	5.6	.0	.0	.0	.0	20.7
Commercial Fishermen Participation as Per Cent of Total Civilian Employment	.0	.0	.0	.0	6.2	50.0	40.4	6.8	.0	.0	.0	.0	25.3

- [a Military personnel stationed in State as of April 1 - (Alaska Command).
 [b Includes self-employed, unpaid family workers and wage agricultural workers.
 [c Includes domestics.
 [d Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually.
 Commercial fishing employment from study of commercial fisheries employment by G. W. Rogers, R. Listowski and J. Brakel for U. S. Department of
 Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

TABLE 12 - BRISTOL BAY REGION
 TOTAL EMPLOYED WORKFORCE BY INDUSTRY & MONTH, 1965

(Rounded to the nearest ten)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	820	850	850	920	1,360	4,780	7,510	2,730	1,320	1,280	1,120	1,050	2,050
TOTAL CIVILIAN EMPLOYMENT	410	440	440	510	950	4,370	7,100	2,320	910	870	710	640	1,640
GOVERNMENT													
Fed - Military [a	410	410	410	410	410	410	410	410	410	410	410	410	410
- Civilian	180	170	180	180	180	200	190	200	200	190	190	200	190
State & Local	60	90	90	80	90	110	140	140	100	90	100	90	100
SUBTOTAL	650	670	680	670	680	710	740	750	710	690	700	700	700
COMMODITY-PRODUCING INDUSTRIES													
Agriculture [b													
Commercial Fishing					10	2,050	3,180	30					
Mining (includes oil & gas)										10			
Contract Construct.	10						10	20	50	50	50	10	20
Food Processing	10	20	10	50	420	1,600	2,970	1,510	290	300	180	150	620
Other Manufact.													
SUBTOTAL	20	20	10	50	430	3,650	6,160	1,560	340	360	230	160	1,080
DISTRIVUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	80	80	80	100	90	100	110	100	100	80	70	80	90
Trade	20	30	30	30	30	30	30	30	40	30	30	30	30
Finance, Ins. & Real Estate						10	10	10	10				
Services [c	10	10	10	20	30	50	80	60	40	30	20	20	30
SUBTOTAL	110	120	120	150	150	190	230	200	190	140	120	130	150

TABLE 12 - Bristol Bay, Total Employed Workforce, 1965
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Workers [d]	40	40	40	50	100	230	380	220	80	90	70	60	120
Commercial Fishermen Participation as Per Cent of Total Employment	.0	.0	.0	.0	.7	42.9	42.3	1.1	.0	.0	.0	.0	21.5
Commercial Fishermen Participation as Per Cent of Total Civilian Employment	.0	.0	.0	.0	1.1	46.9	44.8	1.3	.0	.0	.0	.0	26.8

[a] Military personnel stationed in State as of April 1 - (Alaska Command).

[b] Includes self-employed, unpaid family workers and wage agricultural workers.

[c] Includes domestics.

[d] Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G. W. Rogers, R. Listowski and J. Brakel for U. S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

sector composed of commodity production including fishing and fish processing, construction and a minor federal government element (primarily defense related) and a non-basic or endogenous sector composed of distributive industries and state and local government in support of seasonal and resident population and basic sector activities.

Not reflected in such an employment model, however, are the continuing importance of subsistence activities and transfer payments. Census data indicates that 8% of family cash income received in 1969 was in the form of transfer payments and that an overall increase in income of 12% would be required to bring all families at least to the "threshold of poverty" (Table 13). It can be assumed that this deficit was made up in part, at least, by non-cash subsistence activities.

The impact of employment on population change is reduced as residents have these alternative sources of continued support in periods of reduced employment. These have also in the past held population in the region in spite of adverse economic conditions. Aside from changes in military population, annual civilian out-migration for the period between the 1960 and 1970 census has been minor, averaging 29 persons per year. The general rate of population growth has declined not because of out-migration, but because of a decline in net natural increase (excess of births over deaths) which fell from 131 in the calendar year 1960 to 107 in 1966 and 63 in 1969 reflecting significant reductions in birth rates.

Population and employment trends have exhibited quite different and unrelated patterns during the last decade. With the exception of small decreases in total population in 1964 and 1965 directly attributable to reduction in military personnel, total population increased each year while total employment fluctuated slightly around the two thousand level.

No consistent relationship is demonstrated between the basic and non-basic sectors of the economy. Employment in commodity producing industries peaked in 1961, 1965, 1966, 1969 and 1970 and slumped in the other years, while federal employment dropped from slightly above seven hundred during the first half of the decade and

TABLE 13

BRISTOL BAY REGION - RESIDENT CASH INCOME BY TYPE 1969

<u>Type of Income</u>	<u>Number</u>	<u>Mean Income</u>	<u>Total Income for Group & Class</u>
<u>Families with Income, 1969</u>			
Wage or Salary	663	\$ 7,601	\$ 5,039,485
Self-employed, non-farm income	313	3,454	1,080,978
Self-employed farm	24	1,487	35,679
Social Security	99	1,221	120,879
Public Assistance Welfare	128	1,159	148,352
Other ^a	122	1,760	214,741
<u>Total all sources:</u>	765	\$ 8,680	\$ 6,640,104
(Families with income deficits) ^b	(298)	(\$ 2,728)	(\$ 812,968)
<u>Unrelated Individuals</u>			
All sources	648 ^c	\$ 4,701	\$ 3,046,242
(Individuals with income deficits)	(96)	(\$ 1,630)	(\$ 156,445)

a For this region "other income" is primarily unemployment insurance benefits, workmens compensation payments, annuities, pensions, etc.

b Income deficit is the difference between total income of families and unrelated individuals below the poverty line and their respective poverty thresholds (i.e., the amount of money required to raise income to thresholds at the poverty levels).

c Military in this region totals 439.

SOURCE: Compiled from U. S. Bureau of the Census 1970, General Social and Economic Characteristics, Alaska. Report PC(1)-C3, Table 124, Bristol Bay Census Division and Bristol Bay Borough Census Division.

then dropped to annual levels around six hundred from 1965 on with the exception of 1967. Within the non-basic sector retail trade, services and miscellaneous remained fairly constant in absolute terms rising slightly in 1970 while transportation rose steadily and significantly as did state and local government. These last two industrial elements rose in response to exogenous forces, transportation reflecting both government and petroleum exploratory travel and state and local government the availability of federal and state funds for an increasing array of economic development and social services programs. The general conclusion to be drawn concerning the regional economy is that it is stagnant and highly dependent upon outside subsidy and local subsistence activities for survival.

The Bristol Bay Commercial Fisheries and Fish Processing Industry¹⁰

The history of the Bristol Bay salmon fishery has followed the pattern of boom, bust and modest recovery typical of all Alaska fishing regions. From an annual average catch of four million fish for 1893-1900 the harvest rose to an average of 12 million for 1900-04 and with cyclical fluctuations to an annual average of 19 million fish for 1934-38. After that peak there was a downward trend, but as the result of research and improved management programs in the 1950's the annual catch for the decade of the 1960's recovered to nine million fish. The historical development and structure of the fisheries and processing industry reflect the fact that Bristol Bay

¹⁰ Principal sources for this discussion include:

Alaska Department of Fish and Game, Alaska Catch and Production, Commercial Fisheries Statistics (annual).

George W. Rogers, Preliminary Economic Survey of Dillingham, Alaska and the Bristol Bay Region, (memo.) Alaska Rural Development Board, Juneau, Alaska, August 1, 1955.

R.A. Cooley, Politics and Conservation, the Decline of the Alaska Salmon, (New York: Harper & Row, 1963).

J.A. Crutchfield and G. Pontecorvo, The Pacific Salmon Fisheries, A Study in Irrational Conservation, (Baltimore: The Johns Hopkins Press, 1969), pp. 104-122.

was and still is the most remote and isolated of Alaska's major fishing areas. The number of firms engaged has been relatively small and their ownership or control extended from fishing vessels and gear through shore plants, and included transport systems to and from the region. In effect, there existed a very strict form of limited entry imposed by the cannery operators. They imported only as many workers and fishermen as they estimated would be needed and purchased fish from independent resident fishermen on a strictly controlled basis. With a labor force reservoir of Orientals and European immigrants in California, it was easier and more economical to assemble harvesting, transporting and processing crews outside Alaska rather than attempt to recruit and train the scattered Native population. As late as 1939 of all wages and other payments made in this fishery 77% were made to non-residents, 84% of these being paid outside Alaska after return to their home bases.

The harvesting technology was simple. Fish traps had been eliminated by 1923 and the dominant gear was the drift gillnet, each unit consisting of an open, double ended sailing boat operated by two fishermen and owned by the canneries. Set nets accounted for not more than ten percent of the total catch. Prior to World War II fisheries management policy prohibited the use of motors in fishing vessels and required them to fish off shore, thus enforcing inefficiency on harvesting activities as a conservation measure. Prior to the 1940's all the catch was canned. With the continuing decline in fish runs following the peak catches of the 1930's the industry consolidated into about half a dozen firms with entry of new firms limited.

World War II had important impacts on the fishery. The number of fishermen was drastically curtailed as a result of war manpower restrictions and the intensification of fishing effort encouraged by price inflation and relaxation of regulation. This resulted in abnormally high catch per unit of effort in the period 1942-45. The war-induced labor shortage also turned the industry for the first time to the use of resident labor in substantial numbers. An intensive recruitment and transportation program supported by the Bureau of Indian Affairs in cooperation with industry

drew Native Alaskans into the labor force from as far north as Point Hope and as far east as Minto.

Although attempts were made after World War II to revert to the practice of importing most of the labor force, the creation of an independently owned fishing fleet, the formation of a resident union and other institutional forces prevented this. Management policy changes were an underlying cause of this basic shift in employment patterns. The relaxation of regulations during the war period to permit the use of motor powered auxiliary vessels in the fishery (to tow sail boats to and from the grounds, etc.) ultimately led to the complete removal of this restriction. The shift of boats from sail to power was accomplished over a period of years; in 1951 of the 717 boats fishing only 86 had converted to power, but by 1954 of the 712 fishing 697 were powered. Initially this was accomplished by converting the open sailing boats to power with progressive replacement by specially designed and built power craft. The canneries in disposing of these now obsolete boats provided the basis for creation of a resident fishing fleet. In 1952 there were only twenty independently owned boats fishing in the Bay, but by 1955 the number had been increased to 150.

Table 14 summarizes the total salmon catch and value to fishermen for 1960-1970. The catch is dominated by the sockeye salmon which accounted for 86% of the total for the period and imposed its particular biological cycle on the pattern of the total catch over time. The introduction of some freezer capacity into the region during and after the War (initially infrequent visits from floating freezers), air lift of fresh fish to Anchorage and other outside markets, Japanese demand for salmon and herring eggs, and sporadic attempts to market bottom and lake fish have added more variety to the list of products from the region, but the values of these have remained low (Table 15).

The Commercial Fisherman -- Employment and Productivity

Although there were minor catches of other species than salmon in the 1965-70 period of this study, for all practical purposes it can be assumed that there are only salmon fishermen in the Bristol

TABLE 14
BRISTOL BAY REGION -- COMMERCIAL CATCH AND VALUE TO
FISHERMEN -- 1960-1971

Year	Commercial Catch			
	Salmon		Other Fish	
	Pounds	Value	Pounds	Value
1960	78,712,574	\$14,253,471		
1961	77,052,410	12,643,634		
1962	35,463,811	5,770,382		
1963	18,369,937	3,168,970		
1964	41,533,243	7,351,301		
1965	112,715,000	23,775,885		
1966	68,884,072	11,807,385	21,499	n.a.
1967	33,363,905	5,817,149	275,026	n.a.
1968	26,485,303	5,595,575	232,243	n.a.
1969	46,827,723	10,811,624		
1970	116,440,704	27,028,586	82,146	20,294
1971	64,652,815	16,040,319	51,795	5,180

n.a. = data not available

SOURCE: Alaska Department of Fish and Game records.

TABLE 15
BRISTOL BAY REGION - 1970 FISH PRODUCTS AND WHOLESAL VALUE
BY SPECIES AND TYPE OF PRODUCT

	<u>Pounds prepared for market</u>	<u>Wholesale value to Processor</u>	<u>Wholesale value per pound</u>
<u>SALMON</u>			
Fresh	170,193	\$ 151,229	\$.89
Frozen	4,921,675	2,030,153	.41
Cured	251,767	162,646	.65
Canned	58,219,392	45,915,431	.79
Roe	<u>1,759,969</u>	<u>1,826,026</u>	<u>1.04</u>
Total Salmon	65,322,726	\$ 50,085,485	\$.77
<u>OTHER FISH</u>			
Cured Herring	6,860	\$ 1,509	\$.22
Herring eggs on kelp	<u>33,520</u>	<u>13,408</u>	<u>.40</u>
Total Other Fish	40,380	\$ 14,917	\$.37
TOTAL ALL FISH PRODUCTS	65,363,106	\$ 50,100,402	\$.77

SOURCE: Alaska Department of Fish and Game

Bay region. The commercial catch of other fish takes place in the off-season for salmon and is so small and irregular that it can be treated as a minor side-line rather than a major vocation supporting a specialized body of fishermen such as halibut and shellfish fishermen in the other regions. Fishing employment by type of gear and month is presented in the Statistical Appendix for each year and summarized for the six year period in Table 16. The monthly figure represents average weekly employment during the entire month, not the peak employment or total number of individuals engaged at a key date during the month. As discussed in Chapter II, therefore, it differs from other analysis based upon total number of licenses issued in being an indicator of time effort (man-months) and is comparable to "monthly employment" as used in other labor studies.

For the six year period of the study, 95% of the total annual man-months of employment were in the months of June and July, when the main red salmon runs materialize. On a weekly basis this concentration would be even more dramatic. Except for very minor catch of other species of lesser commercial value in May and extending into August, this is the total extent of annual employment for most fishermen. The cyclical pattern of total annual man-months of employment exhibits peaks in the even numbered years and lows in the odd numbered years. The range of fluctuation in the drift net fishery was from 13% above the six month average in 1966 to 13% below in the low year 1969 (a strike which delayed the opening of this season contributed to this low). The percentage range of fluctuation was greater for the smaller number of set net man-months.

Most discussions of comparative productivity have been based upon annual catch data and total number of licenses issued each year. As noted in Chapter II, this may be useful as a very crude first approximation to a study of productivity, but there are many more dimensions to the subject and such analysis can also lead to unrealistic conclusions. This study has attempted to explore for the period 1965 through 1970 the manner in which productivity of fisheries employment varied with the form of gear used, the major cyclical patterns of the fish runs, seasonal patterns within each year and residency of fishermen.

TABLE 16

BRISTOL BAY REGION -- MONTHLY COMMERCIAL SALMON FISHING EMPLOYMENT
BY GEAR -- 1965-1970

<u>Gear and Year</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>Man-months Total</u>
	(weekly average per month)					
<u>1965</u>						
Drift	5	1,424	2,098	24		3,551
Set		625	1,085	5		1,715
<u>1966</u>						
Drift		1,382	2,534	226	14	4,160
Set		580	1,122	88	2	1,792
<u>1967</u>						
Drift	10	1,434	1,758	180	26	3,410
Set		532	798	72		1,402
<u>1968</u>						
Drift	26	1,504	1,996	278	32	3,836
Set		495	755	135	18	1,403
<u>1969</u>						
Drift	30	838[a	2,102	202	26	3,198
Set		175[a	715	110	8	1,008
<u>1970</u>						
Drift	20	1,712	2,126	86		3,944
Set	5	530	859	65		1,459
<u>Six Year Average</u>						
Drift	15	1,382	2,102	166	16	3,683
Set	1	490	889	79	5	1,463

[a Start of 1969 season delayed by strike.

The most important gear in Bristol Bay in terms of employment, harvest and efficiency is the drift gill net. All three aspects are reflected in the observation that for the six year period of this study, set nets accounted for 28.4% of the total man-months expended in fisheries employment, but only 8.7% of the total catch (Tables 16 and 17). The range in fluctuations in annual production about the six month average was somewhat smaller for set nets than for drift nets in spite of the greater amount of capital investment required in drift net operation. Relating the catch data to effort (man-months) dramatically compares the relative productive (output per man-month) of the two forms of gear. For the six-year period drift nets yielded more than four times the catch of set nets per man-month expended (Table 18). The impact of the red salmon cycle resulted in a wide variation in annual productivity per man-month for both forms of gear. The productivity of drift nets in the high year 1965, for example, was more than five times that of the same form of gear in 1968.

The annual seasonal pattern of employment was noted in Table 16, above. The seasonal productivity pattern is similarly marked (Table 19). Not only is the catch in months other than June and July minor, the effort required is considerably greater.

A study of wage and employment conditions in 1939 (the last "normal" pre-World War II season) and a preliminary report of a 1970 survey of gear fished by residency provide two bench marks for understanding the different behavior of resident and non-resident fishermen.¹¹ Data from these sources are compared in Table 20. The major change over time was the increase in the number of resident fishermen (from 1,312 in 1939 to 3,174 in 1970) as compared with the increase in non-residents (from 1,357 to 1,732). Another major change only indirectly noted is the shift from cannery fishermen toward independent fishermen. On the other hand, the most important "constant" has been the substantially higher catch per non-resident

¹¹ Ward T. Bower, Alaska Fishery and Fur-Seal Industries, 1939, Report No. 40 (1941), U.S. Department of the Interior, pp. 142-145.

Michael L. Nelson, "1970 Bristol Bay Salmon Catch by Residency," Memorandum, Alaska Department of Fish and Game, April 2, 1971.

TABLE 17

BRISTOL BAY REGION -- COMMERCIAL SALMON CATCH BY TYPE OF GEAR --
1965-1970

<u>Year</u>	<u>Drift gill nets</u>	<u>Set gill nets</u>	<u>Total Catch</u>	<u>% set gill nets</u>
	(number of fish)			
1965	22,745,237	1,942,246	24,737,533	.7.9
1966	10,914,416	1,347,287	12,261,703	11.0
1967	4,483,167	496,023	4,979,190	10.0
1968	4,757,789	531,784	5,289,573	10.1
1969	6,342,541	820,300	7,162,841	11.5
1970	20,544,588	1,505,936	22,050,524	6.8
Six year average	11,639,623	1,107,271	12,746,894	8.7

SOURCE: Statistical Appendix E

TABLE 18

BRISTOL BAY REGION -- COMMERCIAL SALMON FISHING EFFORT PRODUCTION
RETURN -- 1965-1970

<u>Year and Gear</u>	<u>Total Man-months of Employment</u>	<u>Number of Fish per Man-months [a</u>
Drift Nets		
1965	3,551	6,419
1966	4,160	2,624
1967	3,410	1,314
1968	3,836	1,240
1969	3,198	1,983
1970	3,944	5,209
Six year average	3,683	3.162
Set Nets		
1965	1,715	1,133
1966	1,792	752
1967	1,402	354
1968	1,403	389
1969	1,008	814
1970	1,459	1,032
Six year average	1,463	757

[a Total annual catch divided by total man-months of employment.

SOURCE: Statistical Appendix C and E

TABLE 19

BRISTOL BAY REGION -- MONTHLY COMMERCIAL FISHING EMPLOYMENT AND
CATCH BY GEAR, SIX YEAR AVERAGES --
1965-1970

<u>Gear</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
<u>Employment</u> (weekly average per month)					
Drift gillnet	15	1,382	2,102	166	16
Set gillnet		490	889	79	5
Total	15	1,872	3,091	245	21
<u>Catch</u> (thousands of fish)					
Drift gillnet	1	4,288	7,239	105	7
Set gillnet		282	784	38	1
Total	1	4,570	8,023	143	8
<u>Productivity</u> (thousand fish per man-month)					
Drift gillnet	0.07	3.10	3.44	0.63	0.44
Set gillnet		0.58	0.88	0.48	0.20
Total	0.07	2.44	2.60	0.58	0.38

SOURCE: Statistical Appendix C and E

TABLE 20

BRISTOL BAY REGION -- COMMERCIAL SALMON FISHING EMPLOYMENT AND
CATCH BY RESIDENCY -- 1939 AND 1970

	1939 [a]	1970
<u>Total Number of Fishermen</u>		
Resident fishermen		
Independent fishermen	94 [b]	n.a.
Cannery fishermen		
Native	378	n.a.
White	840 [c]	n.a.
Sub-total	<u>1,312</u>	<u>3,174</u> [d]
Non-resident fishermen	<u>1,357</u>	<u>1,732</u> [d]
TOTAL	<u>2,669</u>	<u>4,906</u> [d]
<u>Thousands of Salmon Caught</u>		
Resident fishermen	3,801	10,160
Non-Resident fishermen	<u>10,597</u>	<u>11,891</u>
TOTAL	14,398	22,051
<u>Average Number of Salmon per Fisherman</u>		
Resident fishermen	2,897	3,201
Non-resident fishermen	<u>7,809</u>	<u>6,866</u>
TOTAL	5,394	4,495

[a] Original data include employment on north side of Alaska Peninsula. These activities accounted for 5.2% of total commercial salmon pack. Catch and employment data reduced by percentage.

[b] Independent fishermen sold fish to canneries. All other employed by canneries. Assume all independents were resident Alaskans.

[c] Probably resident Alaskans from outside Bay.

[d] Employment estimated from gear data at two persons per drift gillnet and 2.5 persons per set gillnet.

SOURCES: 1939: Special study of wage and employment conditions in Alaska salmon industry by Alaska Planning Council, published in Ward T. Bower, Alaska Fishery and Fur-Seal Industries, 1939, U.S. Dept. Int., Administrative Report No. 40 (1941), pp. 142-145.

1970: From analysis of gear license and fish ticket records, Michael L. Nelson, "1970 Bristol Bay Salmon Catch by Residency," Alaska Department of Fish and Game, April 2, 1971.

fisherman (2.7 times the resident catch in 1939 and 2.1 times the resident catch in 1970).

A number of reasons have been advanced for this difference in the performance of the resident and non-resident fishermen. Some are institutional in that the non-resident fishermen traditionally and to a degree today, has been in a favored position in relation to the purchasers of the fish catch, the canneries. At different times and in varying combinations this relationship has taken the form of direct employment, subsidies of gear and boats, and preferential fish purchasing. Type of gear used is another factor. The 1970 study of licenses indicates that 90% of the non-residents were licensed for drift net fishing, the most productive of the two forms of gear used, and only 63% of the residents were so licensed.

The area biologist who conducted the study suggested that the differences in total production per fisherman were also due to behavior and attitudes.

"Most of the non-resident fishermen are high-liners, that is, they consistently make large catches and are able to do so due to better gear and boats than possessed by many resident fishermen. A non-resident who comes all the way up from outside is going to fish pretty hard. Many of these fishermen have fished Bristol Bay for many years. On the other hand, there are about three major groups of resident fishermen: (1) the high-liner, who consistently make good catches and can and do compete with the non-resident; (2) the part-time or weekend fishermen who cannot compete. Most of these vacation fishermen use either skiffs and/or older gear and vessels which cannot compete with the larger mobile high-liner fleet; (3) the last group of resident fishermen are the upriver native fishermen -- they largely cannot compete due to inadequate vessels. . . . Further, these upriver fishermen have an entirely different approach to fishing as a livelihood. They normally catch just what they need to get through the next season. I've seen lots of cases here on the Nushagak where they go back up-river after red season with 5 to 8,000 fish, and if they had stayed for pink season could have caught another 5,000 to 15,000 fish."¹²

An explanation can be advanced for the reported behavior and attitude of the Native fishermen in the desire or the necessity of this group of residents to continue their traditional subsistence economies. Fishing may provide their principal cash input, but subsistence fishing and hunting upriver or on the lakes still

¹² Nelson, op. cit., page 2.

account for an important part of the family diet. These are fishermen who not only sell fish, but eat fish. Furthermore, housing and other community facilities are not available to them on the Bay nor are there winter activities which would attract or hold them.

A 1971 area biologist's report to the Juneau office of the Alaska Department of Fish and Game describes the present Bristol Bay subsistence fishery in general terms.

"Salmon subsistence catches for personal use and dog food consumption have been recorded since 1963 in Bristol Bay. This subsistence fishery is primarily centered around the Naknek-Kvichak and Nushagak drainages where local inhabitants, especially outlying villagers, are still dependent on salmon for winter dog food and augmentation to their own diets. Salmon subsistence catches in the two major drainages approach 130,000 to 170,000 fish annually.

"In the Togiak district, the only other area where considerable subsistence fishing takes place, main reliance is placed on sea-run char, which apparently winter in the Togiak River. From interviews with knowledgeable persons in the Togiak area, it is conservatively estimated that over 100,000 char are harvested annually from the Togiak River with small mesh gill nets between September and May. It is further estimated that between 5,000 to 10,000 salmon of all species are taken for subsistence purposes, almost all of which originate from the Togiak River drainage.

"Considerable winter fishing takes place through the ice in all districts of Bristol Bay. Winter catches consist primarily of arctic char, white fish, pike, burbot and some rainbow and grayling. However, the large area involved and the sporadic fishing efforts have precluded efforts to monitor these catches.

"The 1971 subsistence salmon catch was over 120,000 fish of all species for the Naknek-Kvichak and Nushagak districts. Since 1963, the average subsistence salmon harvest for the two major districts has averaged 133,000 fish of all species, with over 58% coming from the Naknek-Kvichak area."¹³

The annual records for the two districts surveyed indicate a relatively stable production of salmon for subsistence. Four years varied between 4.0% to 5.6% of the average, three from 8.8% to 9.0%, one 11.4%, and one 23.5%. The annual fluctuations from the average were only directionally related to the fluctuations in the commercial catch (above or below average, but not approaching the magnitude of commercial variation) indicating that subsistence fishing is primarily a function of resident need rather than amount of fish available.

¹³ Alaska Department of Fish and Game 1971 unpublished office records.

Data on subsistence fisheries, unfortunately, is fragmentary and probably largely based upon "informed opinion" rather than actual counts, as the quoted material above suggests. What data is available does indicate, however, that this activity is not an insignificant one in a number of ways. Although the subsistence catch does not enter the market economy, it does have an important economic value to those who engage in it. In the absence of this subsistence fishing, substitutes for the fish supplied would have to come from cash purchases requiring either increased wage employment (which is not present in the region) or welfare payments. Subsistence catch, therefore, must be taken into account in any general discussion of relative productivity or economic importance of different groups of fishermen. As a minimum the amount of the subsistence catch should be added to any commercial catch by these people in making comparisons of relative productivity of other resident and non-resident fishermen.

Given the marked seasonal nature of the salmon fishery, the presence of the subsistence fishermen also has an important economic value to the commercial fishery. These people are engaged in fishing for their own use in any case. The fact that they usually participate in only the peak of the commercial red salmon harvest, as the area biologist noted above, means that the manpower and gear of the subsistence fishermen is employed when it is most needed and is withdrawn in those portions of the run requiring less input. In their absence their contribution to the commercial harvest would have to be made by additional full-time commercial gear which would be seasonally redundant except at the peak.

The Commercial Fisherman -- Income and Other Socio-Economic
Characteristics

The Alaska Department of Fish and Game annually publishes statistics on "value of catch to fishermen" by species, gear and area. The values are estimates arrived at by applying average or representative prices paid (per fish or pound for each species, etc.) to the relevant catch data. These series have been frequently used in compiling analysis of regional gross products and are an important income component in the U.S. Department of Commerce's annual estimates of personal income received by residents of the State of Alaska. They also have been used as indices of changes in relative levels of fishermen's earnings by dividing by the number of licenses issued annually to arrive at an estimate of gross income per fisherman or unit of gear.

Table 21 makes a similar calculation, but instead of licenses issued uses total man-months expended each year to arrive at an average value per man-month or a measure of return per unit of effort expended rather than return per person or unit of gear. Two high cycles of reds were present in the six year period boosting the average value of catch to drift netters to more than six thousand dollars per man-month for the first and last years of the period, but even in the off-years of 1967 and 1968 the gross value return would probably be more rewarding than returns for a comparable period of work in alternative employments. The costs of entering the fishery (investment in gear and vessels) and operating costs greatly modify such a conclusion, of course, but awareness of the number of dollars received at the time of sale (costs are considered much later) and the continuing expectation that another big year will be coming, probably accounts for the tenacity of the Bristol Bay fisherman. The value per man-month for set netters was only a fraction of that for drift netters, but capital costs are low and this occupation is less demanding, being essentially a part-time activity often engaged in by members of the fishermen's families and in combination with drift net and/or subsistence fishing.

TABLE 21

BRISTOL BAY REGION -- COMMERCIAL SALMON FISHING EFFORT TO VALUE RETURN
1965-1970

<u>Year</u>	<u>Value to Fishermen per Man-Month [a]</u>	
	<u>Drift Gill Nets</u>	<u>Set Gill Nets</u>
1965	\$6,169	\$1,089
1966	2,527	724
1967	1,535	414
1968	1,312	401
1969	2,992	1,228
1970	6,385	1,265
Six year average	4,171	998

[a Value allocated to gear on basis of number of fish caught.
Assumes same price paid for drift and set net fish.

SOURCE: Tables 14 and 18

Some indication of changes in value of catch to resident and non-resident fishermen can be gained from the 1939 and 1970 studies referred to in the previous discussion of productivity. The 1939 value data represents wages paid to cannery fishermen only. The number of independents and size of their catch was minor, and the fish price probably was closely related to the wage paid per fish. The 1970 value data is estimated from catch and average prices as indicated in Table 22. The "value" is comparable for the two years only as an indicator of the gross return to fishermen

for the total season's work. The differential between value to these two groups of fishermen is in part accounted for by productivity for the season. In 1939 the statistics by indicating that the wages paid to residents per fish caught were almost twice those paid to non-residents suggests that the difference may have also reflected operating and living costs assumed by the canneries for non-residents.

The great increase in average value in 1970 over 1939 is accounted for in part by inflation, but even when deflated to a "real" value the difference is still very large. Table 20 indicates an increase in the productivity of resident fishermen between 1939 and 1970 (due to the shift of residents from set to the more efficient drift gear during the 1950's) which might account for a further contribution toward increased value, but there also appeared to be a corresponding decline in non-resident fishermen productivity (due to the greater difficulty in catching smaller salmon runs). The major part of the difference can undoubtedly be explained in terms of the means of payment used as the basis of each set of estimates. The 1939 value is based upon wages paid to fishermen by the canneries (the value of fish sold by independents is not included) while the 1970 value is based upon the average price paid for each type of salmon (species and gear). The wage payment is for labor while the fish price includes the costs of the boat and gear as well as the labor of the fishermen. Typically the revenue received by a drift gillnet operating unit is split into three approximately equal payments made to the boat, the captain (usually also the owner of the boat) and the puller. The 1970 values, therefore, should be reduced

TABLE 22
 BRISTOL BAY REGION -- COMMERCIAL SALMON FISHING EMPLOYMENT --
 VALUE OF CATCH TO FISHERMEN BY RESIDENCY --
 1939 and 1970

	<u>1939</u>	<u>1970</u>
<u>Total Number of Fishermen:</u>		
Residents		
Native	378	n.a.
White	840	n.a.
Sub-Total	<u>1,218</u>	<u>3,174</u>
Non-residents	<u>1,357</u>	<u>1,732</u>
TOTAL	2,575 [a]	4,906
<u>Value of Catch to Fishermen (wages paid and/or sales):</u>		
Residents		
Native	\$ 303,784	n.a.
White	628,537	n.a.
Sub-Total	<u>\$ 932,321</u>	<u>\$12,453,147</u>
Non-residents	<u>1,443,485</u>	<u>14,575,439</u>
TOTAL	\$2,375,806	\$27,028,586
<u>Average Value of Catch per Fisherman:</u>		
Residents		
Native	\$ 804	n.a.
White	748	n.a.
Sub-Total	<u>\$ 765</u>	<u>\$3,923</u>
Non-residents	<u>1,064</u>	<u>8,415</u>
TOTAL	\$ 923	\$5,509
<u>Average "Real" Value per Fisherman [b]:</u>		
Residents		
Native	\$1,660	n.a.
White	1,545	n.a.
Sub-Total	<u>1,580</u>	<u>\$2,678</u>
Non-Residents	<u>2,197</u>	<u>6,220</u>
TOTAL	\$1,906	\$4,072

[a] Independent fishermen excluded in 1939 because data not available on amount paid by canneries. 1939 includes data on wage fishermen. 1970 includes data on all fishermen.

[b] Deflator used, U.S. Consumer Price Index, Bureau of Labor Statistics, \$1957-59=100

SOURCE: Same as Table 18

by one-third (the approximate boat share) to arrive at a rough estimate of labor value of the catch, the basis of the 1939 estimates. The differences between the two sets of values, therefore, are accounted for by price and cost inflation, changes in fisherman productivity and changes in ownership of vessels and gear.

This discussion points out the limitations of utilizing gross value data for analysis of the income dimensions of the fisheries beyond the determination of general trends in levels of income. Further insight into the meaning of the statistics in relation to income received by fishermen can be gained by analysis of other sources of income indicators.

The attempt made in this study to collect actual income data for the year 1969 from Alaska Department of Revenue records yielded income data for a sample of 455 resident and 319 non-resident Bristol Bay drift gillnet vessel operators (this would be captain-owners of such gear, not individual crew members). The vessel operators' average gross receipts from fishing for the sample of non-residents was \$4,660 and for residents was \$3,871. This represents the boat and captain's share in each case. Taxable income from all Alaska sources (net income or loss from fishing after deducting expenses from receipts and income from all other Alaska sources) for non-resident vessel operators was \$2,149, or 46% of the average gross receipts from fishing. Non-resident vessel operators normally do not engage in other activities in Alaska outside the fishing season, and if they do so when they return to their home states this is not reflected in their Alaska income tax returns. This second income figure for non-residents, therefore, can be assumed to approximate the average captain's share of receipts and by reference the other crew member's share. The comparable taxable income figure for resident operators, on the other hand, is larger than the gross from fishing as it includes all off-season income from other sources.

On the assumption that the average gross fishing receipts per vessel operator is divided equally into a boat and a captain's share, the average net return per resident fishermen in the sample of vessels covered is calculated at \$1,936 for 1969 as compared with

the non-resident net return of \$2,149. These averages can be compared with averages computed in the usual manner from "value of catch to fishermen" estimates. Taking 1969 high week drift net employment in Bristol Bay (3,590 persons) as the total number of persons engaged in harvesting salmon with that gear, and deducting one-third of the "value of catch to fishermen" as attributable to the boat share, this source of data yields an estimated average net return to drift net fishermen of \$1,777 as compared with \$2,149 for the Department of Revenue sample of non-resident and \$1,936 for the sample of resident drift net fishermen. The difference between estimates from these sources could be attributable to variation in estimating bases in each. It appears more likely, however, that the total data from fish ticket sources counts all fishermen including weekend and vacation fishermen who only earn a relatively small annual income from fishing as well as those commercial fishermen who through accident or other bad fortune suffered losses and did not file income tax returns. In other words, the source of each sample (all fishermen making landings of fish or only those filing an Alaskan income tax return) introduces a strong bias.

Variations in earnings by residency and type of gear are only two of the many dimensions of income allocations. Table 23 summarizes the Alaska Department of Revenue income data for the 1969 sample of vessel operators by age and residency. For both residents and non-residents the age patterns of earnings are similar with the highest average gross fishing receipts in the 30-49 years age groups. The distribution of numbers of operators among the age groups differed slightly, with 38% of the non-resident sample being 50 years and older as compared with 23.3% of the resident sample. Income allocations by other characteristics (size of family, etc.) are also available from this source, but were not tabulated at this writing.

A third source of income as well as other socio-economic characteristics of the two samples should be clearly understood. In the case of the Department of Revenue data "fisherman" means fishing vessel operator (as discussed fully above) while the Department of Labor data makes no distinction between vessel operators, crew

TABLE 23

BRISTOL BAY REGION - SALMON GILL NET VESSEL OPERATORS' INCOME BY RESIDENCE AND AGE - 1969

Age Group	Residents				Non-residents			
	Number	%	All Alaska Sources ^a	Gross Fishing receipts ^b	Number	%	All Alaska Sources ^a	Gross Fishing receipts ^b
Under 19 yrs.	32	7.0	\$ 1,816	\$ 2,307	8	2.5	\$ 1,671	\$ 2,519
20-29	82	18.0	5,009	3,461	32	10.0	2,509	3,609
30-39	134	29.4	6,673	4,519	53	16.6	2,719	5,010
40-49	102	22.4	5,720	4,095	105	32.9	1,588	5,562
50-59	64	14.1	4,173	3,432	72	22.6	2,622	4,338
60-69	34	7.5	3,377	3,896	42	13.2	1,918	4,008
70-79	4	.9	3,172 ^c	3,608 ^c	2	.6	1,663 ^c	2,952 ^c
80-89	-	-			-	-		
90 & over	-	-			1	.3		
Age not known	3	.7			4	1.3		
TOTAL	455	100.0	\$ 5,190	\$ 3,871	319	100.0	\$ 2,149	\$ 4,660

a Adjusted gross income, line 15a, Alaska Individual Income Tax Return, Form DR-600. Includes net profit (loss) from fishing, business, wages, salaries, etc. earned within Alaska.

b "Total gross receipts from sale of all fishing products sold in Alaska and the receipts from fishery products caught in Alaska waters but sold outside of Alaska" Line 4, Alaska Individual Income Tax Return Schedule DRF-1, "Information Schedule on Fishermen".

c Combined to avoid disclosure

members, set netters, etc. "Resident" in the Revenue data means resident of the State of Alaska while in the Labor data it means resident of the Bristol Bay region only. Furthermore, by reason of the dominantly Native composition of the region's village population (the primary objective of the survey was to discover the labor force potential of the rural Native population), the Labor data can be interpreted as representing Native fishermen characteristics. The Revenue sample were all males, while of the 195 in the Labor sample 151 were males and 44 females (family workers or members of husband and wife crews). A comparison of the age classification of both samples indicates similar age distributions. The statistics from the two sources were not organized by the same age groups, but an approximate comparison can be made. 54.4% of the Revenue sample was under 40 years of age and 50.3% of the Labor sample under 36 years of age. 69.8% of the Revenue sample was between 20 and 49 years of age and 60.8% of the Labor sample between 22 and 40 years of age.

The Alaska Department of Labor survey income data was received in answer to the question "How much did you earn in the last twelve months?" As the survey was made in the Spring of 1970, the referenced 12 months, therefore, would be in 1969 and comparable to both the Census income data and the Department of Revenue data used in this study. No separation was made of fishing income, however, and only income from all sources can be compared. Table 24 indicates that earnings distributions for the two samples differed somewhat. As compared with 60% of the resident fishermen, 47.4% of the resident vessel operators earned less than \$3,000 for 1969 from all sources. On the other hand, 29.7% of the vessel operators earned more than \$6,000 as compared with 19.5% of the fishermen. The difference in earnings is probably accountable for in large part by the inclusion of set netters in the Labor sample, and their assumed exclusion from the Revenue sample.

Fishing was listed as the primary or "most important occupation" by 58.5% of the sample, 15.8% listed service, clerical and professional (teaching) as their primary occupation, 3.6% food processing and the remaining 22.1% various manual trades (Table 25).

TABLE 24
BRISTOL BAY -- RESIDENT SALMON GILLNET FISHERMEN -- 1969 INCOME
FROM ALL SOURCES

Vessel Operators' Income, Alaska Individual Net Income Tax Survey [a]			Fishermen's Income, Alaska Department of Labor Survey [b]		
Annual Income	Number	%	Annual Income	Number	%
Loss	15				
Under \$1,000	69				
\$1,000-\$1,999	67				
\$2,000-\$2,999	65				
Sub-Total	216	47.4	Under \$2,999	117	60.0
\$3,000-\$3,999	49				
\$4,000-\$5,999	55				
Sub-Total	104	22.9	\$3,000-\$5,999	40	20.5
\$6,000-\$7,999	38				
\$8,000-\$9,999	23		\$6,000-\$8,999	23	
\$10,000-\$12,999	27		\$9,000 & over	15	
\$13,000-\$15,999	15				
\$16,000 & over	32				
Sub-Total	135	29.7		38	19.5
TOTAL	455	100.0		195	100.0

[a] Adjusted gross income, all sources, line 15a, DR 600

[b] Response to question "How much did you earn in the last twelve months?" All sources. Survey made in Spring 1970, therefore, referenced 12 months in 1969. Sample includes all persons who listed fishing as a regular "important occupation."

SOURCE: Statistical Appendix F

TABLE 25

BRISTOL BAY REGION - RESIDENT FISHERMEN BY PRIMARY OCCUPATION - 1970

Occupational Groups	Total Sample		Occupation of Employed		Primary Occupation of Unemployed	
	Number	(%)	Number	(%)	Number	(%)
Professional, technical, managerial	9	4.6	9	25.0	-	-
Clerical, sales	3	1.5	2	5.6	1	.6
Services	19	9.7	9	25.0	10	6.3
Fishing	114	58.5	3	8.3	111	69.8
Processing	7	3.6	1	2.8	6	3.8
Machine trades	6	3.1	-	-	6	3.8
Bench work	-	-	-	-	-	-
Structural work	28	14.4	10	27.7	18	11.3
Miscellaneous ^a	7	3.6	2	5.6	5	3.1
Not identified	2	1.0	-	-	2	1.3
Total	195	100.0	36	100.0	159	100.0
%		100.0		18.5		81.5

a Mainly transportation.

SOURCE: Alaska Department of Labor, Applicants
Characteristics Bank, 1970.

Only 36 persons or 18.5% of the sample were gainfully employed at the time of the survey and of these, 20 were working in white collar occupations (professional, technical, managerial, clerical, sales and services). These employed persons probably represent the weekend or vacation fishermen resident in the region. Education levels were low (Table 26), 58.5% having less than an elementary education and only 16.4% having graduated from high school or equivalent. This low educational attainment level was more marked among the older fishermen, 81.4% of those above 35 years of age having less than a full elementary education and only 5.1% having completed 12 or more years of education. Of the males in the sample, 27.8% had no legal dependents, 13.2% had one or two and 58.9% had three or more dependents (Table 27). Females were asked how many children they had at home and answers indicated that 9.1% had none, 36.4% had one or two and 54.5% had three or more.

Educational attainment and number of dependents had an influence on the relative mobility of the sample (Table 27), but for the total sample only 18% indicated willingness to move from the region on a permanent basis. A temporary move for more training, however, was more appealing and 56.4% indicated willingness to move for this purpose. Of this last group, none wanted further training in fishing, the most desired vocations being machine trades and structural work (Table 28).

In summary, of the resident fishermen sampled from this source, 58% considered commercial fishing their only or most important occupation, 81% were unemployed at the time of the survey, 60% earned less than \$3,000 in 1969 from all sources, and only 24% had no dependents. These findings are further confirmed in the 1970 census report of economic and social characteristics of the region's total population (Table 9). Despite this depressing summary, only 18% of those surveyed indicated that they would consider moving permanently from the region if offered employment, although slightly more would consider temporary employment outside the region or would move temporarily for training.

TABLE 26

BRISTOL BAY REGION - RESIDENT FISHERMEN BY AGE, SEX, EDUCATION 1970

Total	A G E G R O U P S						65 and over
	16-17	18-21	22-35	36-49	50-65	(N U M B E R S)	
<u>Total</u>	<u>195</u>	<u>3</u>	<u>13</u>	<u>82</u>	<u>56</u>	<u>33</u>	<u>8</u>
-Male	151	2	11	64	44	22	8
-Female	44	1	2	18	12	11	-
(Median age: 35 years)							
<u>Educational Level (Years Completed)</u>							
1 - 4	77	-	1	12	35	21	8
5 - 6	25	-	1	13	8	3	-
7	12	-	-	8	2	2	-
8	22	-	-	14	5	3	-
9 -11	27	3	7	12	4	1	-
12	27	-	4	19	2	2	-
13 -15	4	-	-	3	-	1	-
16 & over	1	-	-	1	-	-	-
(percentage)							
<u>Total</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
-Male	77.4	66.7	84.6	78.0	78.6	66.7	100.0
-Female	22.6	33.3	15.4	22.0	21.4	33.3	-
<u>Educational Level</u>							
1 - 4	39.5	-	7.7	14.6	62.5	63.6	100.0
5 - 6	12.8	-	7.7	15.9	14.3	9.1	-
7	6.2	-	-	9.8	3.6	6.1	-
8	11.3	-	-	17.1	8.9	9.1	-
9 -11	13.8	100.0	53.8	14.6	7.1	3.0	-
12	13.8	-	30.8	23.1	3.6	6.1	-
13 -15	2.1	-	-	3.7	-	3.0	-
16 & over	0.5	-	-	1.2	-	-	-
<u>AGE</u>	<u>100.0</u>	<u>1.5</u>	<u>6.7</u>	<u>42.1</u>	<u>28.7</u>	<u>16.9</u>	<u>4.1</u>

SOURCE: Alaska Department of Labor, Applicants Characteristics Bank, 1970.

TABLE 27

BRISTOL BAY REGION - RESIDENT FISHERMEN, MOBILITY BY FAMILY SIZE
AND EDUCATION 1970

	<u>Total</u>	<u>Move for work</u>		<u>Move for training</u>		
		<u>Permanent</u> Number (%)	<u>Temporary</u> Number (%)	<u>Number</u>	<u>(%)</u>	
<u>Males</u>						
Number of Legal dependents						
- None	42	11 (26.2)	27 (64.3)	34	(81.0)	
- 2 or less	20	4 (20.0)	9 (45.0)	10	(50.0)	
- 3 or more	89	14 (15.7)	40 (44.9)	47	(52.8)	
Total	151	29 (19.2)	76 (50.3)	91	(60.3)	
<u>Females</u>						
Number of children at home						
- None	4	2 (50.0)	2 (50.0)	2	(80.0)	
- 2 or less	16	3 (18.8)	3 (18.8)	4	(25.0)	
- 3 or more	24	1 (4.2)	8 (33.3)	13	(54.2)	
Total	44	6 (13.6)	13 (29.5)	19	(43.2)	
<u>Years of Education</u>						
1-8	136	20 (14.7)	62 (45.6)	67	(49.3)	
9-11	27	5 (18.5)	17 (63.0)	19	(70.4)	
12	27	9 (33.3)	10 (34.5)	22	(81.5)	
13-15	4	1 (25.0)	-	2	(50.0)	
16 or more	1	-	-	-	-	
Total	195	35 (17.9)	89 (45.6)	110	(56.4)	

SOURCE: Alaska Department of Labor, Applicants
Characteristics Bank, 1970.

TABLE 28
BRISTOL BAY REGION - RESIDENT FISHERMEN BY OCCUPATIONAL EXPERIENCE
AND TRAINING - 1970

	<u>Reported Experience^a</u>	<u>Available for work without training^b</u>	<u>Past Training Received</u>	<u>Training Desired</u>	<u>Willing to move for train.</u>
Professional, tech., managerial	12	5	9	9	8
Clerical, sales	5	2	1	11	10
Services	28	22	9	25	22
Fishing	198	158	1	1	-
Processing	17	13	1	1	1
Machine trades	10	9	17	48	45
Bench work	2	1	1	2	2
Structural work	51	42	12	36	35
Miscellaneous ^c	15	12	10	23	22
basic education	-	-	-	4	3
Total	338	264	61	160	148

a As many as three occupations could be reported by any one individual. The 338 occupations listed above were reported by the 195 individuals in the sample. This applies to other data as well.

b Question asked: "Are you available for work?" Respondent might answer negatively if already satisfactorily employed, could not work or did not wish to work.

c Mainly transportation occupations.

SOURCE: Alaska Department of Labor, Applicants Characteristics Bank, 1970.

Implications for Limited Entry

The most persuasive analysis made of the limited entry implications of the Bristol Bay salmon case is that by Crutchfield and Pontecorvo in their 1969 study of Pacific salmon management as "irrational conservation." Because it has had an important influence on Alaska thinking concerning limited entry, it must be commented upon here in some detail. The analysis based upon the period 1934-59 begins with the determination of a scale of relative efficiency:

The prime requirement is that a base period be available from which relative efficiency in the fishery at other times may be measured; hence, a period in which amounts of inputs, location of fishing effort, and the rate of fishing approximate those that would yield maximum efficiency in the fishery. The years 1942 and 1943 provide an approximation of such a base for analysis of the Bristol Bay fishery. In those years Bristol Bay was in a war zone, and transportation to and from the Bay was extremely difficult. ... The impact of the restriction on entry and permission to fish closer inshore is reflected in the very sharp increase in yields per unit of input during this base period. If we assume, first, that the yields per unit of input obtained in 1942 and 1943 represent an approximation of maximum efficiency ... it becomes possible to measure the yield in other years in terms of the 1942-43 base and to develop an index or scale of relative efficiency.¹⁴

From this scale of relative efficiency the calculation of the amount of economic rent dissipated each season is made as follows:

The gross earnings of the factors used in each year are known. These are simply the price of fish times the number caught (Bristol Bay fishermen are paid on a per fish basis) or total gross revenue of the fleet. We also know for each year the efficiency, relative to the 1942-43 base, of the fishing fleet. The index of efficiency makes it possible to estimate, on the basis of 1942-43 yields, the minimum quantity of inputs needed to harvest the number of fish actually caught in any given year. Given the number of units actually required in terms of 1942-43 efficiency yields and the assumption of opportunity factor incomes, the difference between the gross earnings of the entire fleet in any year and the gross earnings that would have been required if this fleet had been limited in number and operating at the 1942-43 level, provides a measure of the potential rent. ... The gross earnings ... (that) were not actually necessary to catch the given year's landings represent the amount of the rent lost in that year.¹⁵

The calculated dollar cost of this inefficiency during the period 1955-59 is impressive. "Without any allowance for increased productivity, annual unadjusted money payments to redundant inputs was \$2,777,000, or almost 64 percent of the actual value of the fishery. If we recalculate the data to allow for an estimated 50 percent change (increase) in

¹⁴J. A. Crutchfield and G. Pontecorvo, The Pacific Salmon Fisheries, A Study of Irrational Conservation, (Baltimore: The Johns Hopkins Press, 1969), page 113.

¹⁵Ibid., pp. 113-114.

productivity, the rent dissipated rises to \$3,506,000 per year (or 81 percent of the value of the fishery).¹⁶ The obvious conclusion to be drawn if this analysis is accepted is that maximum efficiency in this fishery can be approximated by simply eliminating all units of gear beyond the number required to harvest the catch at the 1942-43 efficiency ratio. An unstated requirement to accomplish this end, however, is that the price of fish paid to the surviving fishermen also be reduced by 81 percent!

The Crutchfield-Pontecorvo analysis is a very useful demonstration of the need for management reform, but it has very serious shortcomings as a model or guide to actual policy programs of limited entry based on the objective of maximizing economic efficiency. Aside from the very practical political unreality of expecting fishermen to agree to price cuts, the authors in a brief discussion of "qualifications to the basic argument" at the end of their chapter at least enumerate some of the purely analytical shortcomings, although on balance they conclude that their resulting "estimates of potential rent are conservative" and that if all adjustments were made the potential net yield would "exceed the estimates outlined above." The authors first question the adequacy of their 1942-43 base period by noting: "Apart from the reduction in fishing units, the most important change was to allow fishermen to operate closer inshore than had been the case under ordinary conditions."¹⁷ Beyond drawing this fact to the reader's attention, however, they do not discuss its implications further and do not reflect its probable impact in their analysis and in the conclusion that their calculations of dissipated rents are conservative.

A very strong case could be made attributing the impressive rise in relative efficiency in 1942 and 1943 not to limited entry, but primarily to the fact that war time relaxation of management allowed fishing closer inshore (thus cutting down travel time to and from the grounds) and closer to the mouths of the rivers where the salmon schools are at their maximum density before moving up-river (thus increasing the number of fish taken in each haul). In terms of productivity of effort, an experienced crew with the most technically advanced equipment but required to fish on the high seas or

¹⁶Ibid., page 117. The increased productivity factor is the authors' estimate of the efficiency impact of changing from the sailboats of the base period to powered craft.

¹⁷Ibid., page 120.

far off-shore would be no match for an inexperienced crew with primitive gear who are permitted to fish at the mouth of a creek or even up the creek. Of the factors of limited entry and location of effort which should qualify the application of the 1942-43 base period as a measure of economic efficiency, therefore, it would appear that the most important is the second. If it had been given proper weight in the analysis, in fact, the argument that number of units of gear was the key to promotion of economic efficiency would not be supportable.

A further qualification which they do reflect in their analysis is the significant increase in gear productivity since the base period. During 1942-43 the gear used was still the grossly inefficient two-man, double-ended open sailing boats and nets and hauling techniques were far less efficient than those in use in 1955-59. The use of powered vessels after 1951 dramatically improved the technical or potential efficiency of the individual harvesting units. Not mentioned in the discussion is the further base-period inefficiency factor attributable to the fact that war time man-power and travel restrictions not only limited number of participants, but also reduced experienced non-resident participation. During World War II the industry and BIA cooperated in recruitment of Natives from all over Alaska to meet the fish harvesting work force needs, not because they were necessarily fishermen (many from inland villages had no previous fishing experience), but because they represented a significant under-utilized labor pool not requiring overseas transportation. As a consequence not only were these "ideal" years a time of lower harvesting unit technical efficiency (gear and fishermen) than in the periods following, but also in comparison with the past periods when the labor force was dominated by experienced fishermen.

In addition to questions of the adequacy of the base period as a measure of optimum efficiency (and the further questions raised here as to the appropriate weight to be given to adjustments), the authors also note that, "The calculation is made more difficult, even under the most favorable circumstances, by the pronounced (and variable) peaking of the Bristol Bay runs." They conclude, however, that the 1942-43 capacity was probably above the optimum required (i.e. not as efficient as it might have been) because of this and that their estimates are conservative. How they arrived at this conclusion is explained in a footnote in their preceding analysis. The calculations in the text are made on the basis of total annual catch, total annual number of units engaged and total annual gross revenues for the entire

fleet. The footnote states that as a check on these calculations similar ones were made from data on yield per boat per day for 1947-57. As noted for monthly data in Table 19, above, there was a marked seasonal variation in yield. The authors suggest that this demonstrates that even fewer boats were needed. "If we take the highs, that is those days when the boats were landing at or close to the peak number of fish, we also have a rough measure of minimum required capacity of the fleet. These yields divided into the total catch should give us a measure of the number of boats required to land the entire catch and this measure should be consistent with the measure we have derived in the calculation given previously." (Italics added.)¹⁸ The ideal minimum capacity relative to catch, therefore, is that achieved at the peak of the run which means that the number of units would have to be limited not on an annual basis, but on a daily basis relative to the number of fish available for harvest at each day in the run. To achieve such a result would require not only perfect and immediate knowledge of the size and pattern of the salmon runs, but also perfect mobility of labor and gear. More basically, this qualification of their main argument contains the implied assumption that a fisherman should be able to catch as many fish with a given output of effort at any time as he can at the seasonal peak of the biggest run of the cycle.

What is being discussed is a further important determinant of relative efficiency of harvest. Although they recognized the existence of marked variability of "peaking" of the runs, their analysis does not reflect its limited entry implications. Given both the seasonal variations in runs (indicated in Tables 16 and 19 above and Statistical Appendix E) and the cyclical variations (indicated in Table 14 and the Statistical Appendix tables) the entire concept of economic efficiency implied in this analysis is questionable. Even if the biologists perfect their ability to predict, the seasonal pattern of each annual run would mean that a degree of over-capacity in the form of unused or under-utilized units of gear and manpower is inevitable in the fishery except at the very peak of the run.

The elimination of this "excess" capacity would do no more to promote true economic efficiency than would the objective of improving the flow of motor

¹⁸Ibid., footnote, page 114.

traffic into a city be served by a bridge designed to accommodate the average daily traffic flow on the grounds that a bridge to accommodate the rush hour traffic would be redundant most of the day. Before World War II the Alaska salmon canning industry exercised virtual total control over entry into harvesting and as they were motivated by the economic aims of maximizing their profits, could be counted on to keep capacity at or close to the efficient optimum. The actual number of harvesting units would have reflected over-capacity as measured by the 1942-43 scale because the plans had to accommodate both seasonal fluctuations and cyclical uncertainty. The observation of the area management biologist quoted above, that Native fishermen could be more productive if they stayed with the fishing for the entire season, can also be seen to be economically incorrect. By participating primarily in the peak period of the run only, the up-river Natives actually minimize this hidden element of economic inefficiency by reducing the presence of seasonal over-capacity. Even the part-time vacation or weekend fisherman serves an economic function similar to the practice of employment of women and children in harvesting in non-mechanized agricultural societies.

The purpose of this discussion is to emphasize that relative efficiency in the Bristol Bay salmon fishery is not a function of one factor, but many. Only four major factors have been covered here: the number of units of manpower and gear employed in relation to the size of the catch, the technical or potential productivity of the harvesting units, the location of the fishing effort in relation to point of delivery of harvest and the highest concentration of the number of fish in the run prior to going upstream and the marked variation in the availability of fish over time (seasonally within any given year and annually within a "normal" run cycle). In the "real world" all these factors and others operate simultaneously. The first three are subject to direct management manipulation and the fourth can be accommodated to the degree that predictive and projective techniques permit.

It also should be understood that the primary purpose of the Crutchfield-Pontecorvo analysis was not necessarily to establish limited entry regulation on the basis suggested by their calculations, but to call for the reform of what they consider to be "irrational conservationism" based upon the deliberate enforcement of harvesting inefficiency. To make their point they focused on

only one of the determinants of relative efficiency to calculate a hypothetical or illustrative "economic rent dissipation." To repeat the observation made above, the result of the argument is an impressive demonstration for the need for management reform, but not a guide to the actual form this should take.

The economist's case for limited entry may be made on the grounds that it would maximize efficiency, but the debate of the issue among fishermen, the industry, and the management agencies is more concerned with the distributive effects of such regulation. It was noted earlier in this section that implied in the Crutchfield-Pontecorvo calculation of economic rent dissipation in the Bristol Bay fishery was the unstated assumption that although the productivity of the surviving fishermen would be increased, their incomes would not be increased, the dollar savings attributable to greater efficiency in the harvest being passed on to the processors, marketers and consumers. This clearly illustrates that in application an approach arrived at by simplification through abstraction cannot be similarly restricted in its effect. In this case, maximization of economic efficiency through limited entry has the important attendant effect of a major redistribution of income.

Maximization of economic efficiency, furthermore, is not the basis upon which the policy has gained support in Alaska. A recent analysis of the politics of Bristol Bay fisheries management sums up the real issues involved. "The contending interests involved in limited entry may be classified in many significant ways, but the most basic struggle is likely to remain the traditional one of residents versus non-residents."¹⁹ Faced with the spectacularly poor 1972 salmon run, the president of the Bristol Bay Native Corporation gave the Alaska version of the limited entry case a more forceful statement. "As this disastrous fishing season draws to a dreary close, many of our local resident fishermen will be standing by, watching outsiders earning a living at their doorstep. ... Is there anything we can do to provide better protection for the resident fishermen of Bristol Bay, who must fish their waters along with so many others who leave right after the fishing season? Can't we make more jobs available to local people so that they can earn money close to where they live?"²⁰

¹⁹T. A. Morehouse and J. Hession, "Politics and Management: The Problem of Limited Entry," Alaska Fisheries Policy, ISEGR Report No. 33, September 1972, page 323. This source also presents a good analysis and review of attempts to limit entry in Bristol Bay in 1968, pp. 306-321.

²⁰Anchorage Daily News, July 21, 1972, "Bristol Bay's Bleak Outlook."

The political analysis of the Bristol Bay fisheries management case referred to above draws the following general conclusions of the subject. "Limited entry, per se, is no panacea. Just as economists and others may say that it makes little sense to conserve a resource for its own sake, so it can be suggested that it makes little sense to make a fishery more efficient solely for efficiency's sake. If the objective is not simply to maximize production, but to maximize economic returns from production, then how are these returns to be distributed? What part to fishermen, to processors, to distributors, to consumers? What part to the economy as a whole or to the national and state treasuries? If the objective is to improve the social and economic situation of a more limited number of fishermen, then who shall be favored and with what justification? On the other hand, when there is unemployment, slow economic growth, and labor immobility (especially acute problems for Alaska Natives), then spreading the highest possible catches among the largest number of fishermen may be the answer. As has been observed elsewhere, 'if a physical harvest which is constant over time can indeed provide opportunity incomes for even greater numbers of fishermen, perhaps the existing organization of this resource is truly a wonderful innovation!'" ²¹

²¹T. A. Morehouse and J. Hession, op. cit. page 322. The present report and the analysis presented in Chapter III, above, were completed before receipt of the anthology of fisheries policy essays from which the quotation is taken. The reader is referred to this source for further discussions, in particular the introductory essay by Arlon R. Tussing, pp. 1-11, which more fully reviews the points covered in the concluding section here.

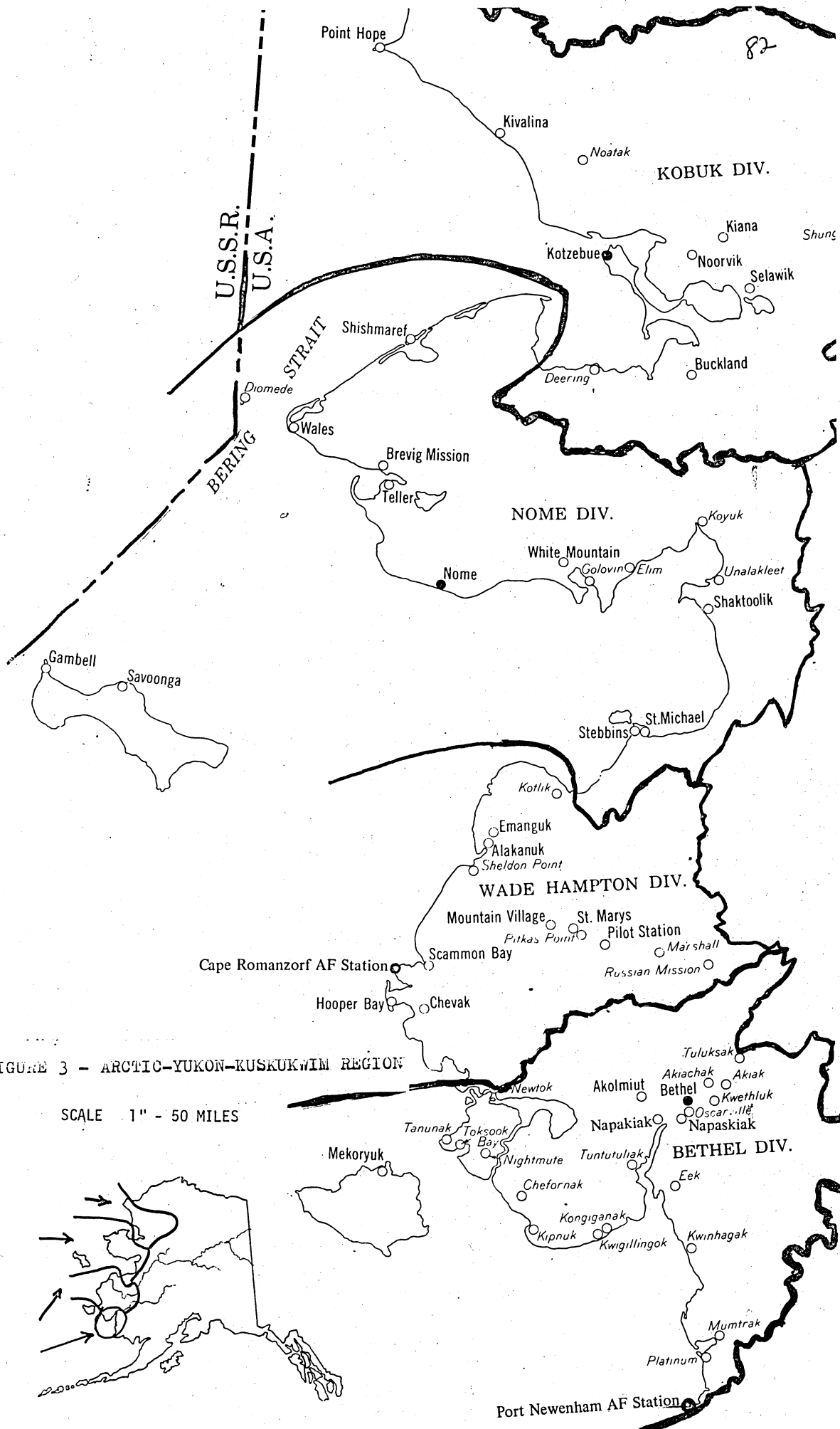
CHAPTER IV: THE ARCTIC-YUKON-KUSKOKWIM REGION

Past Development and Population

The Arctic-Yukon-Kuskokwim region of this study is not so much a natural region as a series of unrelated local areas having in common an essentially arctic climate, vegetation, and habitat. Except for the upriver parts of each of these separate areas, the land and the location of most human habitation and activity is beyond the limit of trees with tundra and alpine vegetation prevailing. The mainland coastline extends from Cape Lisburne at its northernmost point (latitude 68 degrees 53 minutes) to Cape Newenham at its southernmost point (latitude 58 degrees 39 minutes) and includes the land areas embraced by the drainages of the Noatak and Kobuk Rivers, the Seward Peninsula, the Yukon Delta, and the drainage of the Kuskokwim River. It also includes the islands of Little Diomedea, King, St. Lawrence, St. Matthew, and Nunivak. For purposes of this study it is defined as the combination of the Kobuk, Nome, Wade Hampton, and Kuskokwim 1970 Census Divisions (Figure 3), with a combined total land area of 141,278 square miles.

In aboriginal times the study region was inhabited by an estimated 17,900 Eskimos supporting themselves by fishing, hunting, and gathering activities on the sea and along the seacoast and the river systems. Although some contacts with outside forces were made in the period of initial Russian exploration and fur trade, the first of these major impacts came in response to market demands for whale oil, baleen (for corset stays) and "ivory" during the early and middle decades of the nineteenth century. The whale and walrus resources of the Bering Sea and Arctic Ocean, the two principal resources upon which human survival depended, were seriously depleted. The 1847-53 invasion of whalers from New England extended through the Bering Strait and into the Arctic Ocean and in addition to severe depletion of marine resources, the wintering whalers introduced alcohol and diseases for which the Native population had no natural resistance. In an attempt to halt the downward trends in population, Sheldon Jackson introduced reindeer herding to the region in 1890.

The second major period of outside impact came during the period when gold stampedes to the Klondike and the interior of Alaska brought prospectors to the mouth of the Yukon River and establishment of river



steamboat services. These activities eventually led to the discovery in 1898 of gold in the sands of beaches on the Seward Peninsula. This brought a large influx of outside population to this part of the region as other mineral explorations and gold development progressed. Gold production by dredging continued as a major activity after the turn of the century and disappeared following World War II.

The third major impact was registered by World War II, again the focus being on Nome this time as a principal link in the supply of aircraft and supplies to Russia. The postwar period saw some activity in the development, modifying, and discarding of Air Force stations and an abortive attempt by the Atomic Energy Commission to use the Cape Thompson area as a demonstration and testing grounds. Most recently there has been interest in other minerals in the region, particularly copper on the Kobuk and tin on the Seward Peninsula, and broader interest in resource potentials generated by the North Slope petroleum discoveries and development activities just beyond the region's boundaries.

The course of these economic changes as registered in population are summarized in Table 29. The drop in population due to disastrous effects of the initial outside contacts is indicated in the fall of the population from an estimated 17,900 circa 1740 to 10,087 in the census of 1880. The major increases of nonindigenous population are concentrated on the Seward Peninsula, principally in the city of Nome, and for the census enumerations of June 1, 1900, and December 31, 1909. The reversal of the downward trends in Native population through introduction of public health and other social services accounts for the modest continuing increases from 1920 on with military and other populations introducing very minor fluctuations in this basic trend.

This is one of the most sparsely populated regions of the state, the 1970 census reporting a population density of only 1.5 persons per 100 square miles. Of the total population of 21,867 persons, 30.2 percent were located in three places (Kotzebue - 1,696; Nome - 2,488; Bethel - 2,416). Table 30 summarizes general social and economic characteristics of the 1960 and 1970 populations. Growth between 1960 and 1970 was modest and population remained dominantly Native (87 percent), the dependent age groups increased (from 54 to 55 percent), educational attainment continued low (median years completed - six years), and the ratio of nonworkers to workers increased

TABLE 29

ARCTIC-YUKON-KUSKOKWIM REGION^a - TOTAL POPULATION DISTRIBUTION, 1740-1970

	Circa 1740	1880	1890	Jun. 1, 1900	Dec. 31, 1909	Jan. 1, 1920	Oct. 1, 1929	Oct. 1, 1939	Apr. 1, 1950	Apr. 1, 1960	Apr. 1, 1970
TOTAL REGION	17,900	10,087	10,647	24,150	15,108	11,705	12,249	14,075	14,686	18,316	21,867
Kotzebue Sound-Chukchi											
Sea	2,200	1,306	1,500*	1,600*	1,800*	1,900	2,023	2,666	2,598	3,560	4,434
Kotzebue (Kikiktak)		200	200	200	193	230	291	372	623	1,200	1,696
Air Force Station										90	95
Other Places		1,106	1,300	1,400	1,607	1,670	1,732	2,294	1,975	2,270	2,643
Bering Strait-Seward											
Peninsula	1,800	836	1,400	1,100	1,007	733	904	1,083	907	919	825
Seward Peninsula	1,500	696	1,100	800	798	495	595	746	754	765	741
Air Force Station (Tin City)										125	
Little Diomedé Island	100	40	100	100	90	101	139	129	103	88	84
King Island	200	100	200	200	119	137	170	208	50	66	
Norton Sound - Seward											
Peninsula	1,200	457	516	13,700	4,853	1,974	2,247	2,696	3,112	2,976	3,115
City of Nome				12,488	2,600	852	1,213	1,559	1,876	2,316	2,488
Other Places	1,200	457	516	1,212	2,253	1,122	1,034	1,137	1,236	660	627
Norton Sound Highlands	1,600	395	452	1,400	1,200	943	936	776	968	1,250	1,073
Ufilakleet		100	175	241	247	285	261	329	469	574	434
St. Michael		109	101	857	565	497	147	142	157	205	207
Air Force Station										103	
Other Places		186	176	302	388	161	528	305	342	471	432
St. Lawrence Island	600	500	267	300	293	304	389	505	558	946	736
Air Force Station (North-east Cape)										288	
Other Places	600	500	267	300	293	304	389	505	558	658	736
Yukon Lowlands	2,500	2,792	2,400	2,300	2,228	2,278	2,206	2,441	2,443	3,128	3,917
Air Force Station									(5)	(94)	(96)
Kuskokwim Lowlands	7,600	3,401	3,739	3,550	3,600	3,384	3,353	3,683	3,895	5,295	7,518
Bethel			20	100	110	221	278	376	651	1,258	2,416
Air Force Station										125	88
Other Places	7,600	3,401	3,719	3,450	3,490	3,163	3,075	3,307	3,244	3,912	5,014
Nunivak Island	400	400	373	200	127	189	191	225	205	242	249

a Earlier data adjusted to represent same area as Kobuk, Nome, Wade Hampton, and Bethel Census Divisions in 1970 Census.

* Estimated from total Arctic data

SOURCE: J. W. Swanton, The Indian Tribes of North America (1952); W. H. Oswalt, Alaska Eskimos (1967), U. S. Bureau of the Census reports 1880 through 1970.

TABLE 30
 ARCTIC-YUKON-KUSKOKWIM REGION - GENERAL SOCIAL AND ECONOMIC CHARACTERISTIC
 OF POPULATION 1960 and 1970

	April 1, 1960	April 1, 1970
<u>TOTAL POPULATION</u>	18,316	21,679
percent increase 1960-1970		18.4%
<u>RACE</u>		
Native	15,727	18,771
Non-Native	2,589	2,908
Percent Native	85.9%	86.6%
<u>SEX</u>		
Male	9,931	11,433
Female	8,385	10,246
--Males per 100 females	118.4	111.6
<u>AGE</u>		
Under 18 years	9,312	11,302
Over 65 years	584	717
--Percent under 18 and over 65	54.0%	55.4%
<u>Family Income and Poverty Status^a</u>		
Median income, all families with income:	\$ 2,387	\$ 5,398
Percent of families with:		
--income less than poverty level	61.0%	47.0%
--income less than 75% poverty level	51.4	34.0
--income less than 125% poverty level	67.7	54.8
--income <u>more</u> than 125% poverty level	32.3	45.2
<u>Educational Attainment (Persons 25 years old and over):</u>		
Median years completed:		
--males	5.4	6.0
--females	4.5	5.6
Percentage high school graduates		
--males	18.5%	23.4%
--females	12.7	19.5
<u>Infant Mortality Rates, Calendar Years (Deaths under 1 year of age per 1,000 live births)</u>	95.6	25.9
<u>Employment Status</u>		
Armed Forces	790	520
Civilian Labor Force	3,228	4,027
--(Unemployed)	(799)	(561)
--Ratio non-workers	3.558	3.768
<u>Weeks Worked in 1969</u>		
Percent of all males 16 yrs. and over:		
50-52 weeks	23.9%	
27-49 weeks	13.4	
26 weeks or less	47.3	
did not work	15.4	
Percent of all females 16 yrs. and over:		
50-52 weeks	10.0%	
27-49 weeks	11.4	
26 weeks or less	25.3	
Did not work	53.3	

TABLE 30
 Bering Sea - Arctic Ocean Region
 Page 2

Labor Mobility for Males^b

Percentage of males 30-49 yrs. old in 1970	
--non-worker 1965, non-worker 1970	29.6%
--non-worker 1965, worker 1970	17.4
--worker 1965, worker, 1970	33.7
--worker 1965, non-worker 1970	19.4

a Excludes inmates of institutions, members of Armed Forces, college students in dorms, unrelated individuals under 14 years. 1970 poverty line for all families = \$3,388. Poverty line 1960 for all families = \$3,000.

b "Worker" includes members of Armed Forces.

SOURCE: U. S. Bureau of the Census 1970: PC(1)-C3, Alaska; 1960: PC(1)-C3, Alaska. Infant mortality data from the Alaska Department of Health and Social Services. Data not corrected for undercount of 188.

(from 3 - 6 to 3 - 8). The median income of all families with income more than doubled (in unadjusted current dollars) and the percent of families with income less than 125 percent of national poverty levels declined from 67 to 55 percent. Major progress was registered in reduction of infant mortality rates, but the 1970 rates continued among the highest in the state.

The Regional Economy

Subsistence activities continue to be the major economic activity of most of the region's population. Fish, seal, and waterfowl are the most important wildlife resources with moose, caribou, and reindeer being available in upland areas.¹ The cash economy is strongly government oriented and employment is dominantly non-Native. The 1970 census revealed that only 36.6 percent of the total population 16 years and over were employed of which 63.1 percent were government employees (including defense) and 2.6 percent were construction industry employees (primarily government contract work). A 1967 BIA employment survey of the Kuskokwim-Yukon delta region reported that only 5.4 percent of the Native population 16 years and over was permanently employed and 8.8 percent temporarily or seasonally employed (including outside the region).²

The industrial composition and seasonal patterns of the cash economy are reflected in total employed workforce data for 1970 and 1965 (Tables 31 and 32). Government employment (including military) accounted for 59.1 percent of the total employed workforce in 1965 and 54.0 percent in 1970. Commercial fishing and food processing (primarily fish) increased from 5.6 percent of total employed workforce and 7.0 percent of employed civilian workforce in 1965 to 9.6 percent and 10.8 percent, respectively, in 1970. Agricultural employment (including reindeer herding) is more related to subsistence activities in the region; mining and contract construction were of minor importance. Distributive industries are related to and supportive of the government and commodity-producing sectors.

¹A six-year survey of diet of residents of nine villages in this study's region indicated that local food sources accounted for 38.1 percent of the total calorie intake and 35.3 percent of the total protein intake of the population, the balance coming from the school lunch program and imported foods. C. A. Heller and E. M. Scott, The Alaska Dietary Survey, 1956-1961, Arctic Health Research Center, Anchorage, pp. 35, 39. For a fuller description of present day "environmental livelihood patterns" and "food quest activities" refer to Federal Field Committee for Development Planning in Alaska, Alaska Natives and the Land, October, 1968, pp. 144-195.

²Report quoted in Federal Field Committee for Development Planning in Alaska, A Subregional Economic Analysis of Alaska, August, 1968, page 271.

TABLE 31 - ARCTIC-YUKON-KUSKOKWIM REGION
TOTAL EMPLOYED WORKFORCE BY INDUSTRY & MONTH, 1970

(Rounded to the nearest ten)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	3,250	3,210	3,150	3,200	3,370	4,870	4,480	4,850	4,310	4,140	3,720	3,600	3,850
TOTAL CIVILIAN EMPLOYMENT	2,830	2,790	2,730	2,780	2,950	4,450	4,060	4,430	3,890	3,720	3,300	3,180	3,430
GOVERNMENT													
Fed - Military [a]	420	420	420	420	420	420	420	420	420	420	420	420	420
- Civilian	990	1,000	1,000	1,010	950	870	780	780	830	1,020	1,000	980	940
State & Local	590	610	590	580	600	780	830	850	880	770	790	770	720
SUBTOTAL	2,000	2,030	2,010	2,010	1,970	2,070	2,030	2,050	2,130	2,210	2,210	2,170	2,080
COMMODITY-PRODUCING INDUSTRIES													
Agriculture [b]	20	20	20	30	30	30	30	30	40	30	30	30	30
Commercial Fishing					10	720	430	550	40				150
Mining (includes oil & Gas)	10	10	10	50	60	80	90	90	70	80	50	50	50
Contract Construct.	110	40	40	40	50	60	110	150	200	150	100	80	90
Food Processing	160	140	90	40	110	520	440	410	280	190	150	130	220
Other Manufact.		10	10	10	10		10	10	10	10			10
SUBTOTAL	300	220	170	170	270	1,410	1,110	1,240	640	460	330	290	550
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	140	140	150	270	300	390	410	420	460	320	240	250	290
Trade	320	330	320	290	340	450	460	620	560	550	400	370	420
Finance, Ins. & Real Estate	20	20	20	20	20	20	20	20	20	20	20	20	20
Services [c]	360	360	370	330	350	390	300	340	340	420	380	370	360
SUBTOTAL	840	850	860	910	1,010	1,250	1,190	1,400	1,380	1,310	1,040	1,010	1,090

TABLE 31 - Arctic-Yukon-Kuskokwim, Total Employed Workforce, 1970
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Workers [d]	110	110	110	110	120	140	150	160	160	160	140	130	130
Commercial Fishermen Participation as Per Cent of Total Employment	.0	.0	.0	.0	.3	14.8	9.6	11.3	.9	.0	.0	.0	3.9
Commercial Fishermen Participation as Per Cent of Total Civilian Employment	.0	.0	.0	.0	.3	16.2	10.6	12.4	1.0	.0	.0	.0	4.4

[a Military personnel stationed in State as of April 1 - (Alaska Command).

[b Includes self-employed, unpaid family workers and wage agricultural workers.

[c Includes domestics.

[d Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G. W. Rogers, R. Listowski and J. Brakel for U. S. Department of Commerce. All others from Alaska Department of Labor; Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

TABLE 32 -- ARCTIC-YUKON-KUSKOKWIM REGION
 TOTAL EMPLOYED WORKFORCE BY INDUSTRY & MONTH, 1965
 (Rounded to the nearest tens)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average	
TOTAL EMPLOYMENT	2,600	2,750	2,580	2,740	2,970	4,210	4,160	4,570	4,290	3,650	3,120	3,150	3,400	
TOTAL CIVILIAN EMPLOYMENT	1,920	2,070	1,900	2,060	2,280	3,530	3,480	3,890	3,610	2,970	2,440	2,470	2,720	
GOVERNMENT														
Fed - Military [a]	680	680	680	680	690	680	680	680	680	680	680	680	680	680
- Civilian	730	710	700	670	660	680	740	840	870	780	740	730	740	
State & Local	320	500	330	340	340	410	500	1,140	1,080	710	670	710	590	
SUBTOTAL	1,730	1,890	1,710	1,690	1,690	1,770	1,920	2,660	2,630	2,170	2,090	2,120	2,010	
COMMODITY-PRODUCING INDUSTRIES														
Agriculture [b]	20	20	20	30	30	30	30	30	40	30	30	30	30	
Commercial Fishing -						620	140	100					70	
Mining (includes oil & gas)	10	10	10	40	50	60	60	70	60	60	40	40	40	
Contract Construct.	50	50	60	90	120	150	290	260	190	140	40	30	120	
Food Processing	20	10		10	80	140	350	160	90	80	50	40	90	
Other Manufact.	10	10	10	10	10	10	10	10	10			10	10	
SUBTOTAL	110	100	100	180	290	1,010	880	630	390	310	160	150	360	
DISTRIBUTIVE INDUSTRIES														
Trans. Comm. & Public Utilities	160	160	160	180	250	430	430	410	410	320	200	200	270	
Trade	260	260	260	310	310	490	350	320	330	350	260	300	320	
Finance, Ins. & Real Estate	10	20	20	20	20	20	20	20	20	20	20	20	20	
Services [c]	210	200	210	230	260	300	340	340	330	320	260	240	270	
SUBTOTAL	640	640	650	740	840	1,240	1,140	1,090	1,090	1,010	740	760	880	

TABLE 32 -- Arctic-Yukon-Kuskokwim, Total Employed Workforce, 1965
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Workers [d]	120	120	120	130	150	190	220	190	180	160	130	120	150
Commercial Fishermen Participation as Per Cent of Total Employment	.0	.0	.0	.0	.0	14.7	3.4	2.2	.0	.0	.0	.0	2.1
Commercial Fishermen Participation as Per Cent of Total Civilian Employment	.0	.0	.0	.0	.0	17.6	4.0	2.6	.0	.0	.0	.0	2.6

- [a] Military personnel stationed in State as of April 1 - (Alaska Command).
 [b] Includes self-employed, unpaid family workers and wage agricultural workers.
 [c] Includes domestics.
 [d] Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G. W. Rogers, R. Listowski and J. Brakel for U. S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

An economic analysis of the two parts of this region in 1968 did not indicate a very promising future for either growth or diversification.

"Bluntly put, the lower Yukon-Kuskokwim region has no apparent base for economic growth. It has a rapidly growing population without local employment prospects and generally without the cultural, educational, or skill prerequisites for successful out-migration. In the foreseeable future, outside of the growth of a moderate-size fisheries industry, any growth of opportunity either for employment or for enterprise in the region will result directly from government action. ... The population and potential labor force of Region V (part of which is the remainder of the Arctic-Yukon-Kuskokwim region of this study is expected to continue to increase rapidly and there is little prospect for this increase to be absorbed by local employment opportunities. In addition, the new entrants (and non-entrants) to the labor force will not generally have the education or acculturation for successful out-migration. The only certain sources of growth are, in general, government, social services, tourism, and arctic research, each of which will make some contribution to the income and employment of the Native people. There are, however, possibilities for spectacular developments in the mineral industries, but the assured economic impact of mineral activity is limited to a continuing growth of exploration."³

Under the terms of the 1971 Alaska Native Claims Settlement Act, three Native regional corporations organized within the study region will be receiving a total of \$362 million in annual installments paid from federal and state funds over a period estimated to 1991 and the regional corporations and incorporated villages will receive substantial land and natural resource allotments.⁴ The availability of flows of potential investment capital and the change in land and resource ownership patterns within the region could provide the base for economic developments not otherwise possible under normal private development investment.

Commercial and Subsistence Fisheries and Fish Processing

Runs of all major species of Pacific salmon are found in the study region, kings and chums being the largest in number. There have been minor

³Ibid., pp. 280, 341.

⁴Robert R. Nathan Associates, Implementing the Alaska Native Claims Settlement Act, prepared for the Alaska Native Foundation, April, 1972, pp. 223, 279.

commercial harvests in the past, but it was not until the decade of the 1960's that substantial expansion took place. The total commercial catch for the region has increased from 1.7 million pounds in 1960 to 8.5 million pounds in 1971, and the value of the catch to fishermen rose from \$0.4 million in 1961 to \$1.3 million in 1971 (Table 33). The areas of the commercial catch are classified into four management districts, the Yukon district being the most important over the period 1961-1971 (average annual value to fishermen \$484,610), the Kuskokwim experiencing the greatest growth (value to fishermen rising from \$75,100 in 1962 to \$362,470 in 1970), and Norton Sound and Kotzebue Sound districts having smaller and fluctuating annual catch values (Table 33-A). For the 1970 season, 60.3 percent of the salmon products sold were in frozen form, 16.3 percent fresh, 10.4 percent cured, 10.6 percent canned, and 2.4 percent roe. Herring and other fish products were insignificant (Table 34). As compared with the Bristol Bay region, the Arctic-Yukon-Kuskokwim region has a huge river system drainage area (four times that of Bristol Bay), but relatively small value of commercial fisheries to fishermen (4.4 percent of that for Bristol Bay) and value of products (7.1 percent of Bristol Bay).

Until recently, the subsistence catch of salmon was greater than the commercial harvest, accounting for 80.8 percent of the total salmon taken in 1960 and dropping to 35.1 percent in 1971 (Table 35). The commercial and subsistence composition of harvests varies significantly by districts, subsistence accounting for 82.5 percent of the Kuskokwim salmon harvest in 1966 and only 27.8 percent of the Norton Sound district harvest (Table 36). An interesting trend has been the continuing drop in subsistence catch from over eight hundred thousand fish in mid-decade to 470,787 in 1971. A probable cause of this change is the rapid adaptation of snowmobiles to replace dog teams in Eskimo villages throughout the North. A study of the impact of snowmobiles on the village of Noatak between the winter of 1960-1961 and 1967-1968 concluded that this "is the single most important item of western technology introduced into the culture of the Noatak Eskimos. Only the rifle may have caused as many changes in Eskimo culture." Over the period of the study the dog population dropped by half and most of the survivors were only retained as a form of insurance. The most obvious changes were in subsistence patterns. As most of the salmon was harvested for rations for working dogs, there has been a decline in time and energy devoted to this harvest. "The

TABLE 33
 ARCTIC-YUKON-KUSKOKWIM REGION
 COMMERCIAL CATCH AND VALUE TO FISHERMEN
 1960-1971

Year	Salmon		Other Fish	
	Pounds	Value	Pounds	Value
1960	1,707,462 [a	n.a.		
1961	4,314,050 [a	\$ 437,000		
1962	6,409,315	588,300		
1963	4,647,435	475,040		
1964	5,166,900	523,090		
1965	3,984,000	672,733		
1966	4,372,219	634,966	28,582	n.a.
1967	5,511,020	817,785	12,765	n.a.
1968	6,598,683	935,070	40,803	n.a.
1969	7,003,350	1,140,539	158,226	\$19,061
1970	8,708,558	1,199,310	101,058	14,960
1971	8,547,864	1,336,594	79,839	22,559

n.a. = data not available

[a Estimated from number of fish by species

SOURCE: Alaska Department of Fish and Game annual area management reports.

TABLE 33-A

ARCTIC-YUKON-KUSKOKWIM REGION,
COMMERCIAL CATCH VALUE TO FISHERMEN BY DISTRICTS

	<u>Kuskokwim</u>	<u>Yukon</u>	<u>Norton Sound</u>	<u>Kotzebue Sound</u>	<u>Total</u>
1961	n.a.	\$437,000	n.a.	--	\$ 437,000
1962	\$ 75,100	361,900	\$105,800	\$ 45,500	588,300
1963	n.a.	412,300	104,000	9,140	525,440 ^{/a}
1964	83,030	354,400	51,000	34,660	523,090
1965	90,950	542,300	21,483	18,000	672,733
1966	87,466	454,500	68,000	25,000	634,966
1967	138,647	606,400	44,038	28,700	817,785
1968	290,370	535,000	63,700	46,000	935,070
1969	297,233	519,200	95,297	71,000	982,730 ^{/a}
1970	362,470	623,100	99,019	186,000	1,270,589 ^{/a}

n.a. - data not available

^{/a} Total of separate districts differs from total reported in Table 33 for entire region; reasons for differences not known.

SOURCE: Alaska Department of Fish and Game, annual area management reports

TABLE 34

Arctic-Yukon-Kuskokwim Region -1970 FISH PRODUCTS AND WHOLESAL

VALUE BY SPECIES AND TYPE OF PRODUCT

	<u>Pounds Prepared for market</u>	<u>Wholesale Value to Processor</u>	<u>Wholesale Value per pound</u>
<u>SALMON</u>			
Fresh	1,066,698	\$ 507,466	\$.48
Frozen	3,942,716	1,610,294	.41
Cured	679,139	609,963	.90
Canned	690,288	515,990	.75
Roe	<u>162,244</u>	<u>173,165</u>	<u>1.07</u>
Total Salmon	6,541,085	\$ 3,416,878	\$.52
<u>OTHER FISH</u>			
Herring	1,345	2,085	1.55
Other Fish	<u>19,089</u>	<u>3,228</u>	<u>.17</u>
Total Other Fish	20,434	\$ 5,313	\$.26
Total All Fish Products	6,561,519	\$ 3,422,191	\$.52

SOURCE: Alaska Department of Fish and Game

TABLE 35
 ARCTIC-YUKON-KUSKOKWIM REGION
 COMMERCIAL AND SUBSISTENCE SALMON HARVEST ^{/a}
 1960-1971

<u>Year</u>	<u>Commercial Catch</u>	<u>Subsistence Catch</u>	<u>Total Catch</u>	<u>% Subsistence</u>
1960	84,707	356,524	441,231	80.8
1961	316,901	645,732	962,633	67.1
1962	628,250	656,364	1,284,614	51.1
1963	445,482	660,855	1,106,337	59.7
1964	410,845	811,969	1,222,814	66.4
1965	265,577	845,747	1,111,324	76.1
1966	369,016	537,502	906,518	59.3
1967	391,177	682,138	1,073,315	63.6
1968	640,760	596,132	1,236,892	48.2
1969	772,659	592,328	1,364,987	43.4
1970	1,005,089	668,434	1,673,523	39.9
1971	869,760	470,787	1,340,547	35.1

^{/a} Number of whole fish

SOURCE: Alaska Department of Fish and Game, annual area management reports.

villagers will continue to net salmon for their own use and for sale but not in the quantities previously taken. Additionally, some families may remain in jobs in Kotzebue or elsewhere later in the fall because it is no longer necessary to return to the village to secure dog food. Use of the snowmobile will also increase the availability of caribou.^{/5} With appropriate local variations, this story is being repeated throughout the region and it is at present in a critical period of transition in use of its salmon resources.

The fishery resource in this region is neither large nor divergent enough to permit a large-scale commercial processing enterprise to operate at profit in any given area, although the lower Yukon area does support some canning and freezing facilities.^{/6} The average annual catch of all salmon species for commercial and subsistence purposes in the total region was 1.1 million fish for the period 1960-1971 (Table 35). The largest 1966 district subtotal (the Yukon district at 412,227) cannot match the processing volume of one large salmon cannery; and the commercial catch there was only 183,974, or about four or five percent of the handling volume of a typical large cannery (Table 36).

It is estimated that the construction cost of a plant in the region would be one-fourth to one-half higher than in parts of Alaska southeast of the Alaska Peninsula; utilities and other operating expenses would be comparably higher. In the absence of local processing facilities, commercial utilization of the resource has been both incomplete and inefficient. Only the best quality fish of the high value species (kings and silvers) have been able to bear the cost of air shipment to Anchorage and Fairbanks. This mode of operation has, among other things, precluded the region from producing its own permanent pool of trained labor, local management capability, and organizational know-how, all of which are needed for the growth of industry. Under these conditions, this region's salmon fisheries have remained a high-risk as well as high-cost operation, and the operating

^{/5}Edwin S. Hall, Jr., "The Iron Dog in Northern Alaska," in Pilot, Not Commander, Essays in Memory of Diamond Jenness (Edited by Pat and Jim Lotz), St. Paul University, Ottawa, 1971, pp. 237-254.

^{/6}Yutaka J. Okamoto is to be credited with the analysis of commercial fisheries development potential in the remainder of this section. This is slightly a revised and updated version of the report published in the Federal Field Committee for Development Planning in Alaska, A Sub-regional Economic Analysis of Alaska, August, 1968, pp. 275-278, 337-338.

TABLE 36

ARCTIC-YUKON-KUSKOKWIM REGION -- COMMERCIAL AND SUBSISTENCE SALMON HARVEST BY DISTRICTS AND SPECIES -- 1966

	<u>Kings</u>	<u>Reds</u>	<u>Cohos</u>	<u>Pinks</u>	<u>Chums</u>	<u>Total</u>	<u>%</u>
Kuskokwim:							
Commercial	25,545		22,985			48,530	17.5
Subsistence	49,290				180,054	229,344	82.5
	<u>74,835</u>		<u>22,985</u>		<u>180,054</u>	<u>277,874</u>	<u>100.0</u>
Kanektok:							
Commercial	278	1,123		268	2,610	4,279	100.0
Subsistence							
	<u>278</u>	<u>1,123</u>		<u>268</u>	<u>2,610</u>	<u>4,279</u>	<u>100.0</u>
Yukon:							
Commercial	93,316		19,254		71,405	183,975	44.4
Subsistence	14,017			369	215,867	230,253	55.6
	<u>107,332</u>		<u>19,254</u>	<u>369</u>	<u>287,272</u>	<u>414,228</u>	<u>100.0</u>
Norton Sound:							
Commercial	1,553	14	5,755	12,909	80,245	100,476	72.2
Subsistence	269		2,210	14,325	21,873	38,677	27.8
	<u>1,822</u>	<u>14</u>	<u>7,965</u>	<u>27,234</u>	<u>102,118</u>	<u>139,153</u>	<u>100.0</u>
Kotzebue Sound:							
Commercial					31,756	31,756	44.7
Subsistence					39,228	39,228	55.3
					<u>70,984</u>	<u>70,984</u>	<u>100.0</u>
TOTAL REGION:							
Commercial	120,692	1,137	47,994	13,177	186,016	369,016	40.7
Subsistence	63,576		2,210	14,694	457,022	537,502	59.3
	<u>184,268</u>	<u>1,137</u>	<u>50,204</u>	<u>27,871</u>	<u>643,038</u>	<u>906,518</u>	<u>100.0</u>

SOURCE: Alaska Department of Fish and Game as published in Federal Field Committee for Development Planning in Alaska. A Sub-regional Economic Analysis of Alaska, 1968.

inefficiency has been long subsidized by the region's fishermen in the form of fish prices below the state's average. In 1971 the average price paid per pound was \$0.156 as compared with the statewide average of \$0.205 for all species.

There are in the region, in addition to salmon, a number of salt-water, freshwater, and anadromous species of lower unit value, including whitefish, sheefish, arctic char, herring, and bottom fish. In none of these species, however, are the prospective catch volumes sufficient to sustain local processing facilities, nor is the present price at the point of processing or consumption outside the region high enough to bear the cost of air transport.

All these circumstances indicate that efficient utilization of the region's fisheries resource requires processing and storage facilities mainly built around the salmon catch but handling all species. Any plant(s) must be of sufficient scale to pool the catch to the point where low-cost surface transportation can be utilized. There is little indication that the small-scale fish buyers, who operate on a thin margin at high risk, will be able to develop other fisheries which are bound to be less profitable than salmon.

Additional constraints on commercial fisheries development arise from the heavy use of fish products (even the highest value species) for subsistence, from the sacrifice of time and effort required in subsistence pursuits, and from the additional cash inputs required by fishermen to engage in commercial fishing. On the other hand, a large proportion of the subsistence catch has been dried for dog food, and, as discussed above, the replacement of sled dogs with snow machines will free part of this quantity for sale. As also noted, the cash flow from the Alaska Native land settlements will probably assist in financing those interested in becoming commercial fishermen.

The 1967 summer fishing season witnessed the establishment of a fisheries cooperative by seven commercial fishermen in Bethel. They fished for their own cooperative, processed their catch in the co-op's name, and marketed the end products, frozen dressed salmon, by themselves. The enterprise turned out a modest business success. The cooperative's small freezer plant burned down during the fall, but in the 1968 season the cooperative increased its membership to over one hundred and took almost half of the river's commercial king salmon landings for processing and marketing. The cooperatives plan to sell directly to a Japanese freezer ship in the Kuskokwim

River during the 1968 season involved the organization in a political controversy in which the state administration sought to break the cooperative's agreement with the Japanese in order to protect the interests of the domestic fish buyers. Despite this setback, the possibility of selling the entire catch, including inferior fish directly to Japanese exporters, saving the fishermen the cost of air shipment to Anchorage, the dangers of spoilage, and at least part of the middleman's profit, was influential in the apparent success of the cooperative in 1968 and 1969. Another benefit to cooperative members was the purchase of imported gear and supplies at about half the alternative prices.

In addition to becoming the largest processing enterprise on the Kuskokwim River, the cooperative has more than doubled the cash income of the member fishermen. At the same time the cooperative's competition with the established fish buyers raised the average prices paid even to nonmembers by about one-fourth. The Economic Development Administration approved a loan to the cooperative to reestablish the freezer-smoker plant on a larger scale to increase local receipts from salmon sales, to attract more members, and to allow the cooperative to diversify into other fisheries. With Bethel as its only deep water harbor and its many natural and economic handicaps, however, the region offers little attractions for the basing of offshore or high seas commercial fleets. Fleets and processing plants in the Bristol Bay and Aleutian areas continue to provide some seasonal employment openings for workers from the region.

The Commercial Fisherman

As in the case of Bristol Bay, for all practical purposes, the commercial fishery is based on salmon and two types of gear, the drift and the set gillnet (a minor commercial catch is taken by fishwheel far upstream on the Yukon, but is here considered as outside the region of study). Fishing employment and catch by type of gear and month (average weekly employment and total catch each month) is presented in detail in Volume II: Statistical Appendix and summarized in Table 37. Unlike the Bristol Bay experience for the same period (Table 19), the set gillnet is the more productive form of gear and it is least productive on a unit basis during the June peak runs.

TABLE 37
 ARCTIC-YUKON-KUSKOKWIM REGION
 MONTHLY SALMON FISHING EMPLOYMENT AND CATCH BY GEAR
 SIX YEAR AVERAGES, 1965-1970

<u>GEAR</u>	<u>JUNE</u>	<u>JULY</u>	<u>AUGUST</u>
<u>Employment (weekly average per month)</u>			
Drift Gillnet	456	104	213
Set Gillnet	<u>309</u>	<u>158</u>	<u>157</u>
Total	765	262	370
<u>Catch (thousands of fish)</u>			
Drift Gillnet	73.4	46.1	72.9
Set Gillnet	<u>131.3</u>	<u>128.9</u>	<u>110.6</u>
Total [a]	204.7	174.0	183.5
<u>Productivity (thousand fish per man-month)</u>			
Drift Gillnet	.161	.413	.342
Set Gillnet	<u>.425</u>	<u>.816</u>	<u>.704</u>
Total	.268	.664	.496

[a Fish Wheel salmon catches were negligible and not included.

SOURCE: Statistical Appendix C and E

The productivity per man-month for set gillnets is comparable for both regions, but the Arctic-Yukon-Kuskokwim drift gillnetters are only one-tenth as productive per man-month as their Bristol Bay counterparts. In our sampling of 1969 Alaska income tax returns for vessel operators (set nets being considered as "vessels"), of a total of 202 persons, only two indicated that they were non-residents.

The 1969 Alaska income tax data do not distinguish between drift and set gillnets. The differences between the gross fishing receipts in this region (Table 38) as compared with Bristol Bay (Table 23) can be explained in terms of the mix of the two forms of gear in the first and the dominance of drift gear in the second. As explained in Chapter III, the gross receipts of the vessel operator include the boat and the captain's share while the set netter's receipts can be assumed to be his own income. The income received by these operators from all Alaska sources, including other employment, is higher than the average income for Bristol Bay operators. Income by gear and age for 1969 are summarized in Table 39.

The Alaska Department of Labor 1970 survey of economic and social characteristics of rural Alaska population covered a total of 2,429 individuals 16 years of age and older living in 35 villages of this region. From this a sample was taken of 221 persons indicating fishing as a regular or "important occupation." Of this sample 77.4 percent reported that their 1969 income was less than \$3,000 from all sources, 19.9 percent had incomes between \$3,000 and \$5,999 and 2.7 percent between \$6,000 and \$8,999. Age distribution in the sample was toward the middle and upper age brackets, only 2.3 percent being in the 18- to 21-year-old group, and educational attainment was low, 89 percent having less than a primary grade education (Table 40). Fishing was listed as the primary or "most important occupation by 81.9 percent and food processing by 8.2 percent of the sample. At the time of the survey (spring, 1970) 87.3 percent of the sample and 95 percent of those listing fishing as their primary employment were unemployed. Only 21.7 percent indicated that they would move permanently from their village for employment and 46.6 percent would consider moving temporarily (Table 41).

ARCTIC-YUKON-KUSKOKWIM REGION - VESSEL OPERATORS' INCOME BY GEAR AND

	RESIDENCE - 1969		Average Alaska Income	
	Number	%	All Alaska sources ^a	Gross Fishing Receipts
ALL FISHERMEN (Including "residence not indicated")				
Salmon - gillnet	173	85.6	\$ 5,032	\$ 1,852
seine	5*	2.5	4,034 ^c	2,017 ^c
trolling	3*	1.5		
Sub-Total	181	89.6	\$ 4,988	\$ 1,859
Herring	21	10.4	2,988	1,260
Total	202	100.0	\$ 4,779	\$ 1,797
<u>RESIDENTS</u>				
Salmon - gillnet	170	85.9	\$ 5,071	\$ 1,831
seine	5*	2.5	4,034 ^c	2,017 ^c
trolling	3*	1.5		
Sub-total	178	89.9	\$ 5,024	\$ 1,839
Herring	20	10.1	3,069	1,250
Total	198	100.0	\$ 4,826	\$ 1,780
<u>NON-RESIDENTS</u>				
All gear	2	100.0	\$ <u> </u> ^c	\$ <u> </u> ^c

*These appear to be errors by taxpayers in marking either gear or region on their tax forms.

- a Adjusted gross income, line 15a, Alaska Individual Income Tax Return, form DR600. Includes net profit (loss) from fishing, business, wages, salaries, etc. earned within Alaska.
- b "Total gross receipts from sale of all fishing products sold in Alaska and the receipts from fishing products caught in Alaska waters but sold outside of Alaska" line 4, Alaska Individual Income Tax Return, Schedule DRF-1, "Information Schedule on Fishermen".
- c Combined to avoid disclosure.

TABLE 39

ARCTIC-YUKON-KOSKUKWIM - VESSEL OPERATORS' INCOME BY GEAR, AGE AND RESIDENCE - 1969

	Total	Under 19 yrs.	20-29	A G E G R O U P S					90yrs or more	age not known
				30-39	40-49	50-59	60-69	70-79		
<u>ALL OPERATORS - All gear and species (including "other" and "gear not indicated")</u>										
Number	202	7	41	60	56	27	10	1	-	-
%	100.0	3.5	20.3	29.6	27.7	13.4	5.0	.5	-	-
Average Alaska income all sources ^a	\$4,779	1,350	4,555	5,224	4,698	5,668	3,951	c	-	-
Average gross fishing receipts ^b	\$1,797	1,196	1,563	1,525 ^c	1,727	3,144	1,470	c	-	-
<u>ALL OPERATORS - Salmon - gillnet (A)</u>										
Number	173	7	35	55	44	22	9	1	-	-
%	100.0	4.0	20.2	31.9	25.4	12.7	5.2	.6	-	-
Average Alaska income all sources ^a	\$5,032	1,350	4,869	5,299	4,979	6,465	4,187	c	-	-
Average gross fishing receipts ^b	\$1,852	1,196	1,667	1,405	1,880	3,530	1,468	c	-	-
<u>RESIDENT OPERATORS - All gear and species</u>										
Number	198	7	40	59	54	27	10	1	-	-
%	100.0	3.5	20.2	29.8	27.3	13.6	5.1	.5	-	-
Average Alaska income all sources ^a	\$4,826	1,350	4,528	5,274	4,836	5,668	3,951	c	-	-
Average gross fishing receipts ^b	\$1,780	1,196	1,461	1,546	1,707	3,144	1,470	c	-	-

TABLE 40

ARCTIC-YUKON-KUSKOKWIM REGION -- RESIDENT FISHERMEN SURVEYED BY AGE,
SEX, EDUCATIONAL ATTAINMENT -- 1970

Sex	TOTAL		AGE GROUP					Unknown
	Number	(%)	18-21	22-35	36-49	50-65	65 and over	
Total	221	(100.0)	5	67	82	57	8	2
(%)	(100.0)		(2.3)	(30.3)	(37.1)	(25.1)	(3.6)	(0.9)
Male	208	(94.1)	4	63	78	55	7	1
Female	13	(5.9)	1	4	4	2	1	1
<u>Educational Attainment*</u>								
1-4	151	(68.3)	1	25	70	46	7	2
5-6	28	(12.7)		16	6	6		
7	17	(7.7)	1	13	2	1		
8	12	(5.4)	1	5	4	2		
9-11	9	(4.1)	2	6		1		
12	1	(0.5)		1				
13-15	1	(0.5)		1				
Unknown	2	(0.9)				1	1	

* Years of school completed

TABLE 41

ARCTIC-YUKON-KUSKOKWIM REGION -- RESIDENT FISHERMEN SURVEYED BY PRIMARY OCCUPATION AND EMPLOYMENT STATUS

Major Occupation Group	Total	Employment at Time of Survey		Unemployed at Time of Survey		Willing to Move for Work			
						Permanent		Temporary	
		Number	(%)	Number	(%)	Number	(%)	Number	(%)
1. Professional, technical, management	3	2	(66.7)	1	(33.3)			1	(33.3)
2. Clerical and sales									
3. Services	4	4	(100.0)					3	(16.7)
4. Fisheries	181	9	(5.0)	172	(95.0)	39	(21.5)	86	(47.5)
5. Processing	18	3	(16.7)	15	(83.3)	3	(16.7)	7	(38.9)
6. Machine Trades	1	1	(100.0)						
7. Bench work									
8. Structural work	9	6	(66.7)	3	(33.3)	4	(44.4)	5	(55.6)
9. Transportation	4	3	(75.0)	1	(25.0)	2	(50.0)	1	(25.0)
10. Not identified	1			1	(100.0)				
TOTAL	221	28	(12.7)	193	(87.3)	48	(21.7)	103	(46.6)

Limited Entry Implications

This region is at present in a stage of transition from a subsistence to a commercial fishing economy. As the subsistence fishing declines, residents could shift these traditional activities into the cash economy if markets are made available to them through adequate programs and facilities for the landing, processing, transporting, and marketing of their products. The total fisheries resource base which could be exploited can accommodate modest further commercial expansion, but there appear to be limitations which would fall short of achievement of optimum economic scale. Given the general low potential for economic growth in other resources in the region, low resident incomes and labor mobility, the urgent need and desire for expansion of economic employment opportunities, and the development aids provided under the Alaska Native land settlement, an expansion rather than a limitation of entry appears probable and socially desirable.

CHAPTER V: THE CENTRAL REGIONS: COOK INLET SUB-REGION

The Region -- Its Development and Population

Cook Inlet is a long, narrow embayment in the southcentral coast of Alaska bordered on the east by the Kenai Peninsula and on the west by the Alaska Range. At its northern end it branches into Turnagain Arm and Knik Arm, which merges into the deltas of the Susitna, Matanuska and Knik Rivers. The area of these waters is approximately 50,000 square miles or about the size of the State of New York. The following analysis is confined to the area embraced by the Kenai-Cook Inlet and the Seward 1970 Census Division (Figure 4). To the waters and land drainage areas of the Cook Inlet region the eastern drainages of the Kenai Peninsula into the Gulf of Alaska have been added in order to combine the related fishing activities centered in Seward. This is not a "natural" combination, but it does conform with fisheries management concepts.

In aboriginal times this was the territory of the Tanaina Indians who settled along the shores of the Inlet, the large lakes on the Alaska Peninsula and the main branches of the river system draining into the Inlet. There apparently were no aboriginal places on the eastern drainage of the Kenai Peninsula, but the fisheries and other resources of the area undoubtedly were harvested by the residents of the lower Cook Inlet area. The lives and livelihood of these people were based on the availability of salmon and other fish, sea mammals in the Inlet and land mammals upriver. Russian settlement in the Inlet was a response to the requirements of the fur trade (sea otter and fur seals from the lower Inlet and land furs by trade with interior Indians) and initial American occupation was a response to the harvesting and canning of salmon. There was some mining activity on a small scale on the Peninsula, but until the discovery and development of petroleum resources the resident and non-resident seasonal population were primarily tied to a combination subsistence and commercial fishing and fish processing economy. Related to these activities were homesteading and a modest agricultural production in the lower Cook Inlet area made possible by the seasonal availability of cash

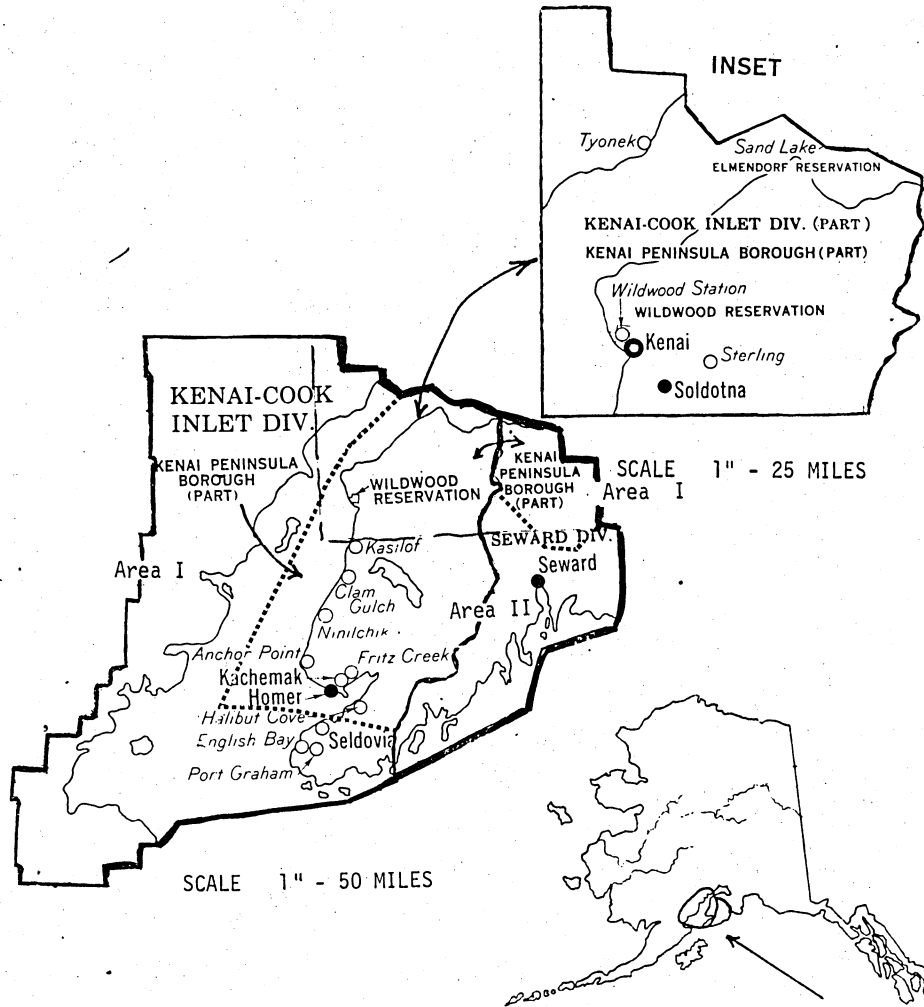


FIGURE 4 - COOK INLET REGION

income earning opportunities in fishing and fish processing. The construction of the Alaska Railroad following World War I (completed in 1923) created the port and city of Seward as a major and permanent population center with an economy based on longshoring and other transportation activities. The mining activities on the Peninsula which had a part in the location of the line, however, faded and disappeared.

From the mid-1950's through the 1960's defense and petroleum activities generated rapid economic growth and a basic shift of settlement patterns. Oil was found at Swanson River in 1957 and within a decade a total of 15 oil and gas fields had been discovered in the upper and middle Inlet areas. A start was made on a petrochemical and processing industry north of Kenai with plants producing ammonia and urea and liquifying natural gas for export to Japan and two small refineries producing a limited range of products for Alaskan consumption. With the completion of the Kenai-Anchorage gas line in 1961, natural gas production began on a commercial basis.

The Great Alaska Earthquake of 1964 completely destroyed the port of Seward and effectively killed it as the principal port of entry to Interior Alaska. Although it was completely rebuilt, during the rehabilitation period most of the traffic shifted to the Port of Anchorage and continues to follow this pattern. The establishment of a State vocational training school, the use of the port for halibut landings and as the base of a forest products industry and scallop harvesting have kept the community alive.

The rise and decline of defense activities can be traced even more briefly. The 1950 census reported one military person in the Homer and two within the Kenai districts. Following the construction of two military facilities during the 1950's, the 1960 census reported 639 persons residing at the Wildwood Station in the Kenai district (305 military and 334 civilians) and 102 military personnel located at the Ohlson Mountain Air Force Station in the Homer district. The 1970 census reported 750 persons residing at the Wildwood Station (417 military and 333 civilians), 67 military personnel at Kenai and none in the Homer district. Since the 1970 census, the military stations have been totally phased out.

TABLE 42

COOK INLET REGION^a - TOTAL POPULATION DISTRIBUTION 1740 - 1970

	Circa 1740	1880	1890	Jun. 1, 1900	Dec. 31, 1909	Jan. 1, 1920	Oct. 1, 1929	Oct. 1, 1939	Apr. 1, 1950	Apr. 1, 1960	Apr. 1, 1970
<u>TOTAL REGION</u>	1,100	809	1,090	1,060	1,614	1,984	2,503	3,138	4,849	9,053	16,586
<u>Kenai Cook Inlet Census Area I^b</u>											
<u>West Side of Inlet</u>											
Tyonek		117	115	100*	80	58	78	136	132	187	232
Other places		91	85	-	-	-	-	-	-	25	46
<u>Seldovia District</u>											
Seldovia		74	99	149	173	258	379	410	437	460	437
Other places		88	107	111	127	192	107	172	264	234	243
Sub-Total	600	390	406	360	380	508	564	718	833	906	958
<u>Kenai-Cook Inlet Census Area II^c</u>											
<u>Homer District</u>											
Military Station		-	-	-	-	-	-	-	-	102	-
Other places		-	-	100*	100*	210	192	398	810	1,905	2,301
<u>Kenai District</u>											
Kenai		44	264	290	250	332	286	303	321	778	3,533
Military Base		-	-	-	-	-	-	-	-	639	750
Other places		275	320	210	250	168	182	194	177	1,767	6,708
Sub-Total	500	319	584	600	600	710	660	895	1,308	5,191	13,292
<u>Seward Census Division</u>											
Seward		-	-	-	534	652	835	949	2,114	1,891	1,587
Other places	600	100*	100*	100*	100*	114	444	576	594	1,065	749
Sub-Total	600	100*	100	100	634	766	1,279	1,525	2,708	2,596	2,336

- a Earlier data adjusted to reflect same area as 1970 Kenai-Cook Inlet and Seward Census Divisions.
b Census Area I: All places without surface land connections.
c Census Area II: All places connected by roads in 1970 Census.
* Estimated

SOURCE: J. W. Swanton, The Indian Tribes of North America (1952); W. H. Oswalt, Alaska Eskimos (1967).
U.S. Bureau of the Census 1880 through 1970.

As has been the case elsewhere in Alaska, the most important long-run effect of defense has been upon transportation. Except for some winter travel by land, prior to the 1950's the settlements were linked together by water transportation supplemented by air service. The Alaska Railroad served primarily as a port of entry for Anchorage and Interior Alaska. In passing through the eastern section of the region it did little more than serve the needs of its employees and was of relatively minor importance to the region's development beyond this. A five-year highway construction program launched in 1950-51, and backed by defense justification, pushed a road from Anchorage around the upper Turnagain Arm area, across the Kenai Peninsula and down its Cook Inlet coast to Homer and roughly parallel to the Railroad to Seward. Improvement of this road system has provided a unifying land force for the region's population, ready access to the metropolitan center of Anchorage and a hook up with the Continental highway system. This linkage has opened both local Alaskan markets to products of the fisheries and recreational resources of the region to the urban population, and has thereby increased the part-time and seasonal participation in the regional economy of residents of Alaska's largest city. The Alaska Railroad was completely modernized. The port of Seward was rebuilt and expanded and the line rehabilitated. In 1964 the State of Alaska Marine Highway System was extended to the region with regular passenger, automobile and freight carrying service between Anchorage, Homer, Seldovia, Kodiak and Seward.

These economic forces have registered their effects upon the region's population (Table 42). Between 1880 and 1950 growth in total population was modest and lagged behind the rates of growth for the larger southcentral Alaska region. While the Cook Inlet population rose from 1,614 in 1909 to 1,984 in 1920, the Anchorage division population increased six-fold from 500 in 1909 to 3,130 in 1920. Between 1929 and 1950 the region's population increased modestly while that of the Anchorage division increased eight-fold during the same period. The rapid population increase between 1950 and 1960 and in the next decade was due primarily to the 1957 discovery of oil and the development of the petroleum and natural gas fields on the Kenai Peninsula and the upper Cook Inlet.

Because of road construction, the 1970 census reports divided its Kenai-Cook Inlet Division into two major areas, one connected to the road system and the remainder served only water and air transportation. This last area remains very close to past levels of population with virtually all residents located in identifiable places. Although the introduction of roads in the first area was not the primary cause of the rapid growth in population, the opening of the region to week-enders and vacationing motorists had the effect of increasing employment in trade and services beyond those required by the region's resident population and caused a further expansion in levels of total population. Directly attributable to the construction and maintenance of the road system was the establishment of two new communities in the upper Inlet area, Soldotna in 1949 and Sterling in 1954. This also contributed to the population growth in the Seward Census Division outside the City of Seward, much on the Turnagain Arm area near Anchorage. The road system also effected the pattern of settlement. Whereas prior to 1960, most of the population of the Kenai district were reported as living in identifiable "places," in 1970 it was reported that 47% of the district's population was located in fringe developments outside the boundaries of the identifiable places or in strip settlement along the road.

The effects of these developments also are registered in the general social and economic characteristics of the population as reported in the 1960 and 1970 Census. Although the Native Alaskans in the region were an important minority group prior to 1950 and the dominant population group prior to 1920, in 1960 and 1970 they comprised only 12.3% and 7.3% of the total population. General economic conditions of the population improved over the decade. Median family incomes in 1970 were above the State medians and the percentage of families below the Alaska "poverty line" has dropped from 27% in 1959 to 10% in 1969. The infant mortality rate was half the state rate. Other indicators were likewise favorable (Table 43).

COOK INLET REGION - GENERAL SOCIAL AND ECONOMIC CHARACTERISTICS
OF POPULATION 1960 and 1970

	<u>April 1, 1960</u>	<u>April 1, 1970</u>
<u>TOTAL POPULATION</u>	9,053	16,586
percent increase 1960-1970		83.2%
<u>RACE</u>		
Native	1,113	1,209
Non-Native	7,940	15,377
--percent Native	12.3%	7.3%
<u>SEX</u>		
Male	5,077	8,911
Female	3,976	7,675
--Males per 100 females	127.7	116.1
<u>AGE</u>		
Under 18 years	3,694	6,932
Over 65 years	328	470
--percent under 18 over 65	44.4%	44.6%
<u>Family Income and Poverty Status^a</u>		
Median income, all families with income	\$ 6,373	\$ 12,766
Percent of families with:		
--income less than poverty level	22.2%	7.5%
--income less than 75% poverty level	15.6	5.7
--income less than 125% poverty level	27.0	10.0
--income <u>more</u> than 125% poverty level	72.9	90.0
<u>Educational Attainment (Persons 25 years old and over):</u>		
Median years completed:		
--males	11.7	12.3
--females	12.1	12.5
Percentage high school graduates:		
--males	48.1%	61.6%
--females	53.3	68.9
<u>Infant Mortality Rates Calendar Years (Deaths under 1 year of age per 1,000 live births)</u>	44.4	10.8
<u>Employment Status</u>		
Armed Forces	407	575
Civilian Labor Force	3,099	5,633
--(Unemployed)	(454)	(773)
--Ratio Non-worker	1.582	1.672
<u>Weeks Worked in 1969</u>		
Percent of all males 16 yrs. and over:		
50-52 weeks	50.0%	
27-49 weeks	24.5	
26 weeks or less	16.6	
did not work	8.9	
Percent of all females 16 yrs. and over:		
50-52 weeks	14.6%	
27-49 weeks	14.5	
26 weeks or less	23.2	
did not work	47.7	

TABLE 43
Cook Inlet Region
Page 2

Labor Mobility for Males^b

Percentage of males 30-49 yrs. old in 1970:	
--non-worker 1965, non-worker 1970	6.2%
--non-worker 1965, worker 1970	10.0
--worker 1965, worker 1970	71.3
--worker 1965, non-worker 1970	12.5

-
- a Excludes inmates of institutions, members of Armed Forces, college students in dorms, unrelated individuals under 14 years. 1970 poverty line for all families = \$3,388. Poverty line 1960 for all families = \$3,000.
- b "Worker" includes members of Armed Forces.

SOURCE: U. S. Bureau of the Census 1970: PC(1)-C3, Alaska; 1960: PC(1)-C3, Alaska. Infant mortality data from Alaska Department of Health and Social Services

The Cook Inlet Regional Economy

Prior to 1961 the value of fisheries products was the most important element in the regional economy. Although since surpassed by the value of crude petroleum and natural gas, commercial fisheries continue to play a major role. In 1970 the fisheries products harvested and processed within the region represented 8.7% of the total State value of all fisheries products. Between 1960 and 1970 all of the State's commercial crude oil and natural gas products came from the region. There has been a modest but growing forest products development. The Department of Defense activities were significant to the region during the last decade, but were on the way out by 1970.

The structure and trends of the regional economy can best be analyzed from data on the levels and industrial composition of the total employed workforce (Table 44). Within the "commodity producing" sector employment in agriculture and fishing remained fairly stable with the exception of a peaking of fishing activities in the mid-decade. Food processing (primarily fish processing) rose to a higher plateau in the last years of the decade as a result of diversification of products with greater emphasis upon labor-intensive specialty items and the airlift of surplus salmon from Bristol Bay for processing in the Cook Inlet region in 1969 and 1970. "Other manufacturing" rose sharply in the last three years of the period in response to the growth of petroleum related activities and to a lesser degree the development of wood products. Transportation employment fell following the 1964 earthquake. Both state and local government employment rose in response to the needs of a growing local population and industrial development, while military personnel declined. Mining and contract construction both recorded dramatic rises as petroleum developments advanced during the period and began a sharp decline during the last two years as the industry achieved a less labor-intensive phase of production.

Annual averages give only a part of the picture of the region's economy. It is necessary to look at monthly data to get a fuller understanding of its operations. Tables 45 and 46 present employment by months for calendar years 1965 and 1970. The fishing and food

TABLE 44

COOK INLET REGION -- TOTAL EMPLOYED WORKFORCE BY INDUSTRY -- 1960-1970

	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u> [a]	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
	(12 month averages)										
<u>Total Employment</u>	3,030	3,110	3,320	3,420	3,200	3,430	4,315	5,880	6,910	6,650	5,630
<u>Government</u>											
Federal: Military [b	400	400	400	400	300	200	250	300	300	500	110
Civilian	130	130	150	160	170	170	160	150	160	160	160
State and Local	<u>350</u>	<u>360</u>	<u>440</u>	<u>490</u>	<u>420</u>	<u>490</u>	<u>640</u>	<u>670</u>	<u>680</u>	<u>770</u>	<u>880</u>
Sub-Total	880	890	990	1,050	890	860	1,050	1,120	1,190	1,430	1,150
<u>Commodity Producing Industries</u>											
Agriculture [c	110	110	110	110	110	110	110	110	110	110	110
Fishing	210	200	200	240	230	180	175	180	240	230	280
Mining (includes oil and gas)	50	160	170	160	180	220	420	920	1,110	970	650
Contract Construction	50	60	100	110	180	300	410	850	1,230	740	360
Food Processing (primary fish products)	320*	310*	330*	360*	270	290	260	220	250	290	380
Other manufacturing	<u>60</u>	<u>70</u>	<u>70</u>	<u>80</u>	<u>130</u>	<u>250</u>	<u>280</u>	<u>280</u>	<u>280</u>	<u>280</u>	<u>280</u>
Sub-Total	740	840	910	980	1,030	1,170	1,445	2,360	3,070	2,590	2,060
<u>Distributive Industries</u>											
Transportation, Communication, Utilities	510	520	470	410	250	160	240	400	360	310	330
Trade	200	220	230	250	230	300	400	460	530	640	610
Finance, Insurance, Real Estate, Services [d	<u>300</u>	<u>230</u>	<u>290</u>	<u>280</u>	<u>300</u>	<u>400</u>	<u>490</u>	<u>600</u>	<u>710</u>	<u>680</u>	<u>660</u>
Sub-Total	1,010	970	990	940	780	860	1,130	1,460	1,600	1,630	1,600

*Combined to avoid disclosure of individual firm data.

TABLE 44 - Cook Inlet Region - Total Employed Workforce by Industry - 1960-1970
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	<u>1960</u>	<u>1961</u>	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>
<u>Unclassified Employment (non-agricultural)</u>											
Self-employed and unpaid family workers	400	410	430	450	500	540	690	940	1,050	1,000	820

[a Alaska Earthquake destroyed Port of Seward, 1964. Took approximately two years to rebuild.

[b Military personnel stationed in area as of July] (Alaska Command) and civilian employees of Department of Defense.

[c Includes self-employed, unpaid family workers and wage agricultural workers.

[d Includes domestics.

SOURCE: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Fishing employment from this study and data in J. Reardon, op. cit. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area. published annually, and office records.

TABLE 45 COOK INLET SUB-REGION

TOTAL EMPLOYED WORKFORCE BY INDUSTRY AND MONTH, 1970

(Compiled July 5, 1972)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	4,880	4,900	4,990	5,160	5,610	6,040	7,550	6,840	5,750	5,500	5,210	5,100	5,630
TOTAL CIVILIAN EMPLOYMENT)	(4,770)	(4,790)	(4,880)	(5,050)	(5,500)	(5,930)	(7,440)	(6,730)	(5,640)	(5,390)	(5,090)	(4,990)	(5,520)
GOVERNMENT													
Fed -Military [a	110	110	110	110	110	110	110	110	110	110	110	110	110
-Civilian	130	140	130	170	170	180	170	170	170	160	150	170	150
State and Local	780	800	830	830	860	900	910	1,000	890	910	890	980	880
SUBTOTAL	1,020	1,050	1,070	1,110	1,140	1,190	1,190	1,280	1,170	1,180	1,150	1,260	1,150
COMMODITY-PRODUCING INDUSTRIES													
Agriculture [b	40	40	70	80	110	130	150	190	240	150	50	50	110
Commercial Fishing	70	90	40	40	100	340	1,510	690	210	130	70	70	280
Mining (Includes oil & gas)	640	620	630	660	620	630	700	750	730	640	590	600	650
Contract Construct.	310	310	330	290	370	370	360	370	420	460	390	320	360
Food Processing	170	190	190	260	450	580	770	720	350	310	340	270	380
Other Manufact.	260	280	280	290	290	290	280	280	270	270	270	260	280
SUBTOTAL	1,490	1,530	1,540	1,620	1,940	2,340	3,770	3,000	2,220	1,960	1,710	1,570	2,060
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	320	320	370	370	340	320	320	310	290	350	370	320	330
Trade	610	560	570	600	620	620	690	640	620	600	600	610	610
Finance, Ins. & Real Estate	120	130	130	120	120	130	90	90	90	80	80	80	110
Services [c	570	560	580	560	600	600	570	580	540	510	500	480	550
SUBTOTAL	1,620	1,570	1,650	1,650	1,680	1,670	1,624	1,540	1,540	1,540	1,550	1,490	1,600

TABLE 45 -Total Employed Workforce, 1970
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Family [d	750	750	780	780	850	840	920	940	820	820	800	780	820
Commercial Fishermen Participation as Percent of Total Employment	1.4	1.8	.8	.8	1.8	5.6	20.0	10.1	3.7	2.4	1.3	1.4	5.0
Commercial Fishermen Participation as Percent of Total Civilian Employment	1.5	1.9	.8	.8	1.8	5.7	20.3	10.3	3.7	2.4	1.4	1.4	5.1

- [a Military personnel stationed in State as of April 1 - (Alaska Command)
 [b Includes self-employed, unpaid family workers and wage agricultural workers.
 [c Includes domestics.
 [d Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G.W. Rogers, R. Listowski and J. Brakel for U. S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates by Industry and Area, published annually, and office records.

TABLE 46 -COOK INLET SUB-REGION

TOTAL EMPLOYED WORKFORCE BY INDUSTRY AND MONTH, 1965.

(Compiled July 5, 1972)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	2,310	2,300	2,430	2,710	3,270	4,070	5,310	4,450	4,220	3,800	3,440	2,980	3,420
TOTAL CIVILIAN EMPLOYMENT)	(2,110)	(2,100)	(2,230)	(2,510)	(3,070)	(3,870)	(5,110)	(4,250)	(4,020)	(3,600)	(3,240)	(2,780)	(3,230)
GOVERNMENT													
Fed -Military	200	200	200	200	200	200	200	200	200	200	200	200	200
-Civilian	140	150	140	150	170	190	210	200	180	160	160	150	170
State & Local	410	420	420	420	430	460	470	540	660	600	600	460	490
SUBTOTAL	750	770	760	770	800	850	880	940	1,040	960	960	810	860
COMMODITY-PRODUCING INDUSTRY													
Agriculture [b	40	40	60	80	110	130	150	190	240	140	50	50	110
Commercial Fishing	10	0	40	70	100	250	1,200	380	140	10	10	0	180
Mining - (includes oil & gas)	80	90	100	190	260	290	260	260	270	250	290	260	220
Contract Construct.	120	130	120	160	200	370	470	500	620	480	310	160	300
Food Processing	180	170	200	240	390	500	540	360	240	210	230	240	290
Other Manufact.	70	70	70	60	70	80	80	80	70	70	60	50	70
SUBTOTAL	500	500	590	800	1,130	1,630	2,700	1,770	1,580	1,160	950	770	1,170
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	160	130	140	150	160	220	200	160	160	200	160	150	160
Trade	240	240	250	260	280	310	380	370	350	320	320	350	300
Finance, Ins. & Real Estate	50	50	60	50	50	40	50	50	50	70	80	80	60
Services [c	260	260	260	260	300	380	400	400	380	430	400	380	340
SUBTOTAL	710	680	710	720	790	950	1,030	980	950	1,020	960	940	860

TABLE 46 Total Employed Workforce, 1965
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed [d & Unpaid Family	350	350	370	420	550	640	700	760	650	650	570	460	540
Commercial Fishermen Participation as Percent of Total Employment	0.4	0.0	1.6	2.5	3.1	6.4	22.6	8.5	3.3	0.2	0.3	0	5.2
Commercial Fishermen Participation as Percent of Total Civilian Employment	0.5	0.0	1.8	2.8	3.3	6.7	23.5	8.9	3.5	0.3	0.3	0	5.6

- [a Military personnel stationed in State as of April 1 - (Alaska Command)
 [b Includes self-employed, unpaid family workers and wage agricultural workers.
 [c Includes domestics.
 [d Does not include self-employed commercial fishermen. (See Methodology).

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G.W. Rogers, R. Listowski and J. Brakel for U.S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates by Industry and Area, published annually, and office records.

processing industries register the most marked seasonal patterns, and exert an influence on the seasonal patterns of industries within the "distributive" sector. Mining employment by months shows seasonal fluctuation, but the figures also include the influence of longer duration trends; both forces can be seen to be clearly at work within contract construction.

Cook Inlet Commercial Fisheries and Fish Processing Industry¹

Although a dollar value cannot be readily assigned to it, subsistence and sports fishing continue as important elements of the economy. Until the present decade, the Cook Inlet commercial fisheries were dominantly the taking of salmon and canned salmon was the largest product by value and weight. Salmon salting was conducted on a commercial basis on the Kenai River from 1878 and the first salmon cannery was erected at Kasilof in 1882. The industry output expanded reaching an average annual production of 146,400 cases during the 1920's, 225,700 cases during the 1930's, 278,700 cases during the 1940's, 256,900 during the 1950's, and 263,200 during the 1960's. A variety of forms of gear are now used in the harvesting of the salmon, but until 1958 the most important form was the company-owned fish trap. Until the 1950's traps accounted for almost half the salmon catch and the balance was caught with seines and set gill nets. With the establishment of a drift gear fishery in 1947, the percentage of catch shifted away from traps to this new arrival and with the action of the first State Legislature prohibiting traps in 1959, drift gear became the dominant form of harvesting (Table 47). This had important implications for the residents of the region. Traps were the most efficient means of taking salmon and their elimination meant a shift to more labor-intensive modes. This event also marked the end of non-resident (i.e., Seattle based companies) control of harvesting.

¹ J. Rearden, Status of the Cook Inlet-Resurrection Bay Commercial Salmon Fishery, 1965, Information Leaflet 69, Alaska Department of Fish and Game, October 14, 1965.

L.B. Flagg, An Economic Survey of the Cook Inlet Salmon Fishery, 1968, Information Leaflet 145, Alaska Department of Fish and Game, June 1, 1970.

Historical and statistical data on other fisheries based on notes provided by Don Stewart, Management Biologist, Homer and annual commercial fisheries statistics of the Alaska Department of Fish and Game.

TABLE 47
 COOK INLET REGION
 PERCENTAGE OF SALMON CATCH BY GEAR
 1945-1968

<u>Year</u>	<u>Trap</u>	<u>Seine</u>	<u>Drift Net</u>	<u>Set Net</u>
		(percent of total catch)		
1945	44	33		23
1946	44	28		28
1947	46	22	1	31
1948	47	12	5	36
1949	41	12	21	26
1950	37	7	34	22
1951	30	12	37	21
1952	28	23	23	26
1953	15	20	31	34
1954	32	8	24	36
1955	13	42	29	16
1956	31	6	33	30
1957	9	20	47	24
1958	19	23	23	35
1959		14	31	55
1960		17	26	57
1961		18	50	32
1962		30	25	45
1963		19	46	35
1964		19	35	46
1968		12	47	41

SOURCE: J. Reardon, Status of the Cook Inlet-Resurrection Bay Commercial Salmon Fishery, 1965, Alaska Department of Fish and Game, Information Leaflet No 69, p. 11.

L.B. Flagg, An Economic Survey of the Cook Inlet Salmon Fishery, Alaska Department of Fish and Game, Information Leaflet 145 (1970), p. 13.

Clams were canned since 1923, but the annual harvests and value of products remained small. It was not until the introduction of freezing plants and the development of crab and other shellfish resources during the 1960's that the commercial fisheries of the Inlet became significantly diversified. The king crab fishery in the Inlet started in 1951 when 6,619 pounds were landed from Kachemak Bay pots and trawls. Between 1953 and 1959 the average annual production was 1.4 million pounds. The catch jumped to 4.3 million pounds in 1960, rose to 6.9 million pounds in 1962, to 8.4 million pounds in 1963, and dropped to 6.8 million pounds in 1964. Since then the annual catch appears to have stabilized at around 3 to 4 million pounds annually. In 1969 a quota system was established setting a 2 million pound quota on Kachemak Bay and 2.5 million pounds on Kamishak. The dungeness crab fishery also started in 1951. The peak catch in 1963 was 1.7 million pounds, but the annual average for the period 1961-1971 has been 337,041 pounds. Tanner crab has been harvested commercially since 1968 with an annual average catch of 1.3 million pounds. The first attempt at establishing a commercial shrimp fishery was made in 1959 when 4.4 million pounds of shrimp were harvested in the lower Inlet. For the decade of the 1960's the annual catch averaged about 0.8 million pounds but rose to 5.8 million pounds in 1970 and 5.5 million pounds in 1971.

Seward has become a major landing port for halibut caught on the Gulf of Alaska. The catch and value to fishermen statistics for the 1960's are summarized in Table 48. Annual fluctuations in the salmon catch reflect the combination of biological cycles in the several species and races. With the exception of the "over-kill" of king crab in 1963, the shellfish catch data reflects the steady growth and stabilization of this recently established fisheries in the lower Inlet. The variety and relative importance of fisheries products are indicated in the summary data for the 1970 season (Table 49). The basic economic data of the fisheries act manufacture are summarized in Table 50.

TABLE 48
 COOK INLET REGION -- COMMERCIAL CATCH AND VALUE TO FISHERMEN -- 1960-1971

Year	Salmon		Other Fish [a		Shellfish	
	Pounds	Value	Pounds	Value	Pounds	Value
1960	27,074,403 [b	\$3,243,081	23,734	n.a.	5,324,605	\$ 442,155
1961	12,609,578 [b	2,338,359			5,482,206	519,614
1962	34,131,594	5,204,620	3,033	n.a.	7,938,608	187,722
1963	11,548,258	2,118,749	2,521	n.a.	11,961,781	412,360
1964	35,144,058	4,283,599	393	n.a.	7,929,550	888,387
1965	14,119,000	2,564,270	3,749	49	2,896,100	346,937
1966	27,393,286	4,904,423	13,298	n.a.	4,365,500	459,907
1967	14,616,459	2,937,000	19,800	19,000	3,873,100	373,584
1968	29,004,279	4,874,627	46,761	36,217	4,683,100	1,030,889
1969	9,762,112	2,121,691	2,695,221	53,913	6,232,737	1,031,897
1970	18,931,421	3,533,527	4,100,951 [a	1,302,809 [a	11,244,477	1,481,583
1971	8,995,875	2,119,537	5,710,873 [a	1,226,208 [a	11,837,738	1,759,373

n.a. = data not available

[a 1970 and 1971 include halibut landings. Not reported for earlier years.

[b Estimated from number of fish by species.

SOURCE: Alaska Department of Fish and Game

TABLE 49

COOK INLET REGION - 1970 FISH PRODUCTS AND WHOLESAL VALUE BY

	SPECIES AND TYPE OF PRODUCT		
	<u>Pounds Prepared for Market</u>	<u>Wholesale Value to Processor</u>	<u>Wholesale Value per Pound</u>
<u>SALMON</u>			
Fresh	2,922	\$ 3,528	\$1.21
Frozen	2,993,521	1,357,602	.45
Cured ^a	6,805	13,240	1.95
Canned	12,101,424	8,094,496	.67
Roe	924,204	837,677	.91
Total Salmon	16,028,876	\$10,306,573	\$.64
<u>OTHER FISH</u>			
Halibut	3,870,527	\$ 2,114,062	\$.55
Herring	152,561	194,554	1.28
Herring eggs or kelp	3,228	2,358	.73
Bottom Fish	104,650	24,069	.23
Other	157	31	.20
Total Other Fish	4,131,123	\$ 2,335,074	\$.57
<u>SHELLFISH</u>			
King Crab	1,870,263	3,245,868	\$1.74
Dungeness	54,708	45,502	.83
Tanner Crab	396,037	546,948	1.38
Shrimp	946,094	1,088,881	1.15
Clams	690	1,160	1.68
Scallops	710,056	1,043,348	1.47
Total Shellfish	3,977,848	\$ 5,971,707	\$1.50
Total All Products	24,137,847	\$ 18,613,354	\$.77

SOURCE: Alaska Department of Fish and Game

a Cured salmon other than roe.

TABLE 50
 COOK INLET REGION
 SALMON AND SHELLFISH HARVESTING AND PROCESSING.
 1970

	<u>Catch Value To Fishermen</u>	<u>Value Added (Pounds Lost) By Processing</u>	<u>Value of Finished Products (Wholesale)</u>
TOTAL VALUES			
Salmon	\$3,533,527	\$6,773,046	\$10,306,573
Shellfish	1,759,373	4,212,334	5,971,707
As Percent Finished Product Values			
Salmon	34.3	65.7	100.0
Shellfish	29.5	70.5	100.0
Regional Values as Percent of Total State Values			
Salmon	5.2	7.8	6.7
Shellfish	8.6	15.6	12.6
POUNDS			
Salmon	\$18,931,421	(\$2,902,545)	\$16,028,876
Shellfish	11,244,477	(7,266,629)	3,977,848
As Percent of Original Catch Weights			
Salmon	100.0	(15.3)	84.7
Shellfish	100.0	(64.6)	35.4

The Commercial Fisherman

The salmon fishing effort is concentrated in July and August with minor employment in June and September. In contrast, employment in shellfish is year-round with monthly fluctuations. The drop in June and July probably indicates some transfer to salmon fishing during its peak activity (Table 51). The difference in seasonal patterns of monthly employment in the salmon and shellfish fisheries also gives a clue as to resident or non-resident orientation of employment. Because it provides employment in every month of the year, the harvesting of shellfish is necessarily resident. A 1968 survey of active commercial salmon fishermen, on the other hand, revealed that 23 percent were from outside the State of Alaska and that their efforts accounted for 21 percent of the salmon harvest. For the 1962, 1963, and 1964 seasons, non-residents accounted for 13, 28, and 20 percent of the total catch respectively. Canneries owned one-third of the drift and seine boats. The remainder of these fleets were independently owned.² As compared with other Alaska regions, therefore, the Cook Inlet fisheries are resident oriented.

Tables 52 and 53 relate fishing employment to volume and value of harvest. As discussed in Chapter III, the Bristol Bay Region productivity and income per fisherman figures calculated by dividing the total fish harvest by the number of licenses gives a misleading impression of the economic importance of fishing to those engaged in these activities. The use of man-months as the unit of measurement corrects this impression and helps explain why individuals continue as fishermen despite progressive shortening of seasons, the physical drop in the size of salmon runs, and the annual fluctuations. For salmon harvesting the number of fish and value per man-month of effort in 1965-70. The harvest yield and value per man-month is slightly lower for shellfish, but these fisheries provide virtually year-round employment.

These values represent gross returns, of course, but the same general conclusions can be drawn from the 1968 economic study of salmon which presents the gross receipts, expenses, and net income of the principal operator of vessels or units of the gear (The "fisherman" definition did not include assistants.) (Table 53) For the various forms of gear by resident and non-resident license holders, net income from salmon fishing in Cook Inlet,

²L. B. Flagg, op. cit.

TABLE 51

COOK INLET REGION -- MONTHLY FISHING EMPLOYMENT -- SIX YEAR AVERAGE -- 1965-1970 [a

	Salmon (all gear)				Crab (all gear)			Shrimp (all gear)
	Purse Seine	Beach Seine	Drift Net	Set Net	Dungeness	King	Tanner	
January					[b	31	6	2
February					[b	48	8	2
March					1	35	9	2
April					1	39	10	3
May					1	13	7	3
June	6		62	43	3	12	5	4
July	130	9	872	315	3	27	3	4
August	99	2	141	187	5	81		4
September	3		1	27	7	76		5
October					4	48	4	6
November					4	20	[b	4
December					[b	29	3	5
12 Month Average	20	1	90	48	3	38	5	4

[a Includes principal gear operator and all assistants engaged in fishing.

[b Six year average less than one fisherman.

SOURCE: Statistical Appendix D

TABLE 51 -A

COOK INLET REGION -
 COMMERCIAL SALMON FISHING EMPLOYMENT AND CATCH
 BY MONTH AND GEAR, SIX YEAR-AVERAGES -- 1965-1970

	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
<u>Employment</u> (Weekly average per month)				
Purse Seine	13	143	94	3
Beach Seine	-	10	4	-
Drift Gillnet	79	798	117	1
Set Gillnet	90	317	172	23
Total	<u>182</u>	<u>1,268</u>	<u>387</u>	<u>27</u>
<u>Catch</u> (Thousands of fish)				
Purse Seine	10	328	135	1
Beach Seine	-	21	10	-
Drift Gillnet	34	1,500	109	1
Set Gillnet	53	1,260	392	8
Total	<u>97</u>	<u>3,109</u>	<u>646</u>	<u>10</u>
<u>Productivity</u> (Thousands of fish per man-month)				
Purse Seine	0.8	2.3	1.4	0.3
Beach Seine	-	2.1	2.5	-
Drift Gillnet	0.4	1.9	0.9	1.0
Set Gillnet	0.6	4.0	2.3	0.3
Total	<u>0.5</u>	<u>2.5</u>	<u>1.7</u>	<u>0.4</u>

SOURCE: Statistical Appendixes C and E.

TABLE 52

COOK INLET REGION - COMMERCIAL FISHING EFFORT RETURN -- 1965-1970

<u>Year and Gear</u>	<u>Total Man-months of Employment</u>	<u>Number (pounds) of Fish per Man-month (a)</u>	<u>Value to Fishermen per Man-month (b)</u>
<u>Salmon Seine</u>		(number fish)	
1965	116	1,295	\$1,601
1966	264	1,882	1,694
1967	244	1,860	2,288
1968	228	2,917	2,478
1969	240	1,115	1,582
1970	336	2,420	2,494
<u>Salmon Drift Gillnet</u>			
1965	778	1,881	\$2,325
1966	1,180	1,862	1,676
1967	1,020	1,163	1,431
1968	1,060	2,538	2,156
1969	1,190	631	895
1970	1,216	1,304	1,343
<u>Salmon Set Gillnet</u>			
1965	568	811	\$1,002
1966	643	4,006	3,607
1967	496	1,505	1,852
1968	616	3,847	3,267
1969	434	1,100	1,560
1970	675	1,526	1,572
<u>All Shellfish</u>		(pounds)	
1965	429	6,896	\$ 809
1966	293	14,723	1,570
1967	509	7,609	734
1968	635	7,212	1,623
1969	821	7,592	1,257
1970	848	13,129	1,733
Six-year average	589	9,361	1,333

(a) Total annual catch divided by total man-months at employment

(b) Value allocated to gear on basis of number of salmon caught. Assumes same price paid for all gear.

SOURCE: Statistical Appendixes C and E, Table 48, above.

TABLE 53

COOK INLET REGION - SALMON FISHERMEN^(a) - ECONOMIC DATA -- 1968

Residence and Gear	No. Sampled that Fished during:			Avg. Time Fished in Weeks - 1968	Avg. Total No. Fish Caught - 1968	Avg. Salmon Gross Receipts - 1968	Avg. Expenses - 1968	Avg. Net Income Salmon Fishing	% Total 1968 Income from Salmon Fishing
	1966	1967	1968						
<u>Residents</u> ^(b)									
Drift	85	89	110	5.99	5,779	\$4,706	\$1,785	\$2,921	51.7
Set	83	91	151	9.02	5,907	4,605	1,981	2,624	62.6
Seine	13	10	19	7.87	18,066	8,360	4,786	3,574	49.9
<u>Non-resident</u>									
Drift	53	58	63	4.63	7,490	6,112	2,463	3,649	66.6
Set	11	10	13	9.57	7,329	6,848	3,402	3,446	48.9

^(a)Fishermen defined as the vessel or gear operator. Does not include assistants employed by the "fishermen."

^(b)Resident means resident of Alaska, not necessarily of the region.

SOURCE: L. B. Flagg, "An Economic Survey of the Cook Inlet Salmon Fishery, 1968," Information Leaflet 145, Alaska Department of Fish and Game, June 1, 1970, Page 14.

on the average, accounted for 49 to 67 percent of total 1968 cash income in each category, while the effort to realize this return was limited to a time span of only 10 to 19 percent of the total weeks in the year. Unlike the Bristol Bay case, the amount of time devoted to fishing during the season was almost exactly the same for resident and non-resident fishermen. The non-residents, however, caught more fish per vessel or gear.³ For the true residents of the region fishing is an important element in their cash income and a key to sustaining the life style of the Lower Inlet which includes homesteading, subsistence hunting and fishing, and other part-time wage or salary employments. These fishermen would place a relatively higher value on continued participation in the fishery than the value of their harvest would indicate. Without fishing their continued residence in the region probably would no longer be possible. The other Alaskan residents, principally the weekend and vacation fishermen from Kenai and Anchorage, have a lower economic stake in maintaining continuing engagement in the fisheries and their exclusion would involve less personal sacrifice or economic loss to the region and the state. The non-resident minority, like the first resident group, has a heavy stake in continuing participation, and a slight edge in terms of productivity and investment in vessels and gear. They are a traditional Alaskan target, however, for if they could be discriminated against legally, the costs and problems of their elimination could be "exported."

Putting the resident fishermen into the broader employment context of the region, however, economic and social hardship created by a strongly enforced limited entry program could be temporary. The regional economy is based upon petroleum and other expanding economic activities added to what was formerly a dominant fishing economy. Although the growth in alternative job opportunities had no measurable effects upon fisheries employment in the past, if entry into fishing is arbitrarily limited, those fishermen eliminated might find other employment within the region. Growth in the shellfish fisheries is very recent and could provide alternatives to the highly seasonal salmon fishing for those who do not wish to stop being fishermen. Roads and the state marine highway system provide economic and feasible means for people to leave the region to seek employment elsewhere. Finally, a significant proportion of the resident fishermen of this region are sports/commercial

³The income data obtained from 1969 Alaska income tax sources has been combined with other southcentral Alaska regions and analyzed in Chapter VIII.

fishermen (weekend and vacation participants) with regular income from other sources. It was not possible to segregate this group in the present study but it can be assumed that the analysis of a comparable group in southeast Alaska provides indicators that the economic and social impacts of their elimination would be minor.

Transfer of labor vocationally or geographically will not be accomplished automatically and without hardship to individual families. It will be a political necessity that any attempt to limit entry be accompanied by programs to assist in relocation and retraining as well as compensation for economic loss suffered by the displaced fisherman. The magnitude and cost of such programs will have to be estimated in advance and taken into account in any cost-benefit analysis of management programs.

Another factor difficult to fit into the calculus is that no matter what its size, the required labor force will always be a highly seasonal one in salmon and only less so in other fisheries. A 1960-65 survey of the Cook Inlet salmon fishery noted, for example, that 69 percent of the catch for that period was accounted for in two districts and 60 percent within these two districts during two or three twenty-four hour fishing periods per year at the peak of each run.⁴ To further complicate calculations of labor force requirements, the species of salmon run in cycles of varying lengths and the annual prediction of volumes is still far from reliable. The seasonality and cyclical uncertainty of labor force requirements, therefore, means that there always must be times when more than enough fishermen are employed in order to assure that they will be available when the runs peak. (Refer to the discussion of Bristol Bay seasonality, pages 50-51 above.) The "Inlet" way of life," although falling outside the boundaries of economic efficiency analysis, is an essential element to the continuation of the harvest and its preservation must be weighed in deciding as to what group of fishermen are to be eliminated.

⁴J. Rearden, op. cit. page 2.

On balance and compared with other fisheries regions in Alaska, the Cook Inlet might appear to be the region most readily adaptable to limited entry regulation. A closer look at the nature of employment and labor force needs, however, suggest that measures of industry efficiency or productivity of fishing effort should not be taken as the final or only basis upon which decisions are made on revisions of management programs.

CHAPTER VI: THE CENTRAL REGIONS: SOUTHWEST

The Region's Population and Economic Development

The southwest region of this study includes Kodiak Island and the Alaska Peninsula drainage into Shelikof Strait and the North Pacific, the tip of the Peninsula beyond Heidon, the Aleutian Islands, and the Pribilof Islands. Unlike Bristol Bay and Cook Inlet, it is not a well-defined geographic region, but like the Arctic-Yukon-Kuskokwim region of this study, it is a collection of districts in the same general location, having similar physical characteristics, and tied together by a common basic economy beyond fishing. This combines the area covered by the Kodiak Island Borough, the 1970 Kodiak Census Division, and the 1970 Aleutian Islands Census Division (Figure 5).

In aboriginal times the region was inhabited by an estimated 15,000 Aleuts living primarily on the Aleutian and Pribilof Islands, 1,000 Peninsular Eskimo on portions of the Alaska Peninsula within this study region, and 6,500 Koniag Eskimos on Kodiak Island and the shore of the mainland across the Shelikof Strait. These inhabitants lived upon the marine mammals of the sea, the salmon runs, and other fisheries. The first Russian commercial contacts and the occupation (circa 1760) were based upon the hunt for sea otter, fur seal, and other furs, and between 1784 and 1800 Kodiak Island was headquarters for the Russian-American Company and the management of the territory claimed by Russia in North America. The most important effects of this period were the tragic decline in Native population (from an estimated 23,000 persons at the time of initial contact to 4,500 by the U.S. Census in 1880), the depletion of sea otter resources, and the start of the depletion of the fur seals.

Initial interest in the region following transfer to the United States in 1867 was in harvesting the fur seal of the Pribilof Islands. This resource was saved from extinction by international treaties and agreements arrived at from the Bering Sea Arbitration begun in 1893 and eventually resulting in the Fur Seal Treaty between Russia, the United States, Japan, and Great Britain in 1911. By outlawing pelagic sealing and appointing the United States and Russia to manage and harvest the herds within their jurisdictions in the name of an international commission, the resource was not only saved but restored to its former abundance. Halibut and salmon fishing expanded into the region in the closing decades of the nineteenth century. The first salmon cannery on Kodiak

Attu I
Navy Town
Shemya Station
Agattu I

B E R I N G S E A
ALEUTIAN ISLAND DIV. (PART)
Kiska I
Semisopochnoi I
Adak Station
Clam Lagoon NC Stn.
Amchilka I
Rats Islands
Atka I
Amlia I
P A C I F I C O C E A N

St. Paul
Pribilof Islands
St. George

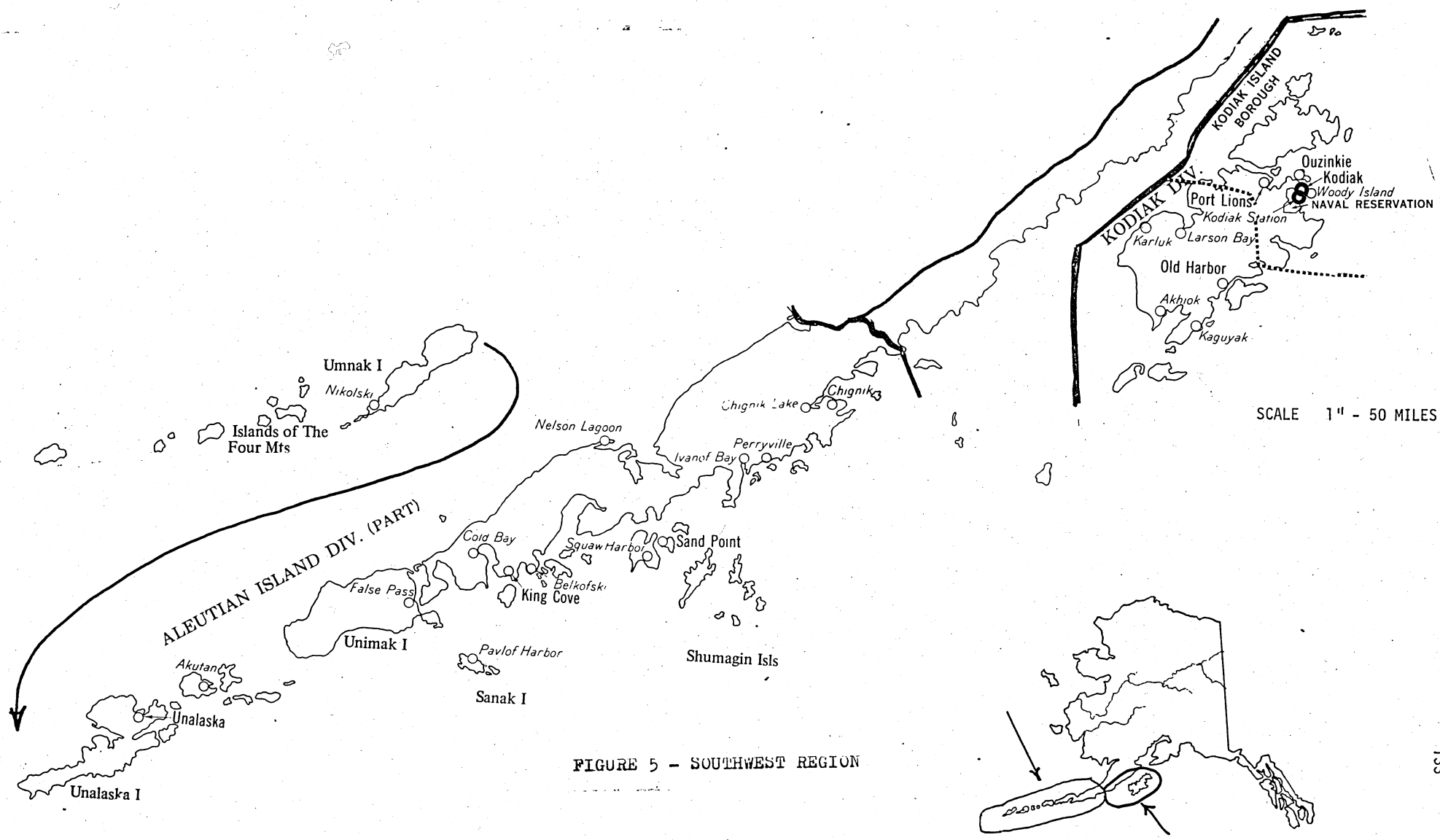


FIGURE 5 - SOUTHWEST REGION

Island was built in 1882, followed by rapid expansion at Karluk, Chignik, and other places on Kodiak and the Peninsula. The harvesting and canning of salmon continued as the principal commercial activity within the region until the rapid expansion of crab and other shellfish outstripped it in economic value following World War II.

The pre-World War II period was one of stagnation in population growth; the first official United States census count in 1880 of 4,501 persons was not exceeded until the October 1939 count of 4,533 persons. The threefold increase in population by the 1950 census is attributable to the construction and operation of the major facilities and sea and air craft of the North Pacific frontier of the Department of Defense and the U.S. Coast Guard at Kodiak, Adak, Shemya, and elsewhere on the Peninsula and along the Chain (Table 54).

The general social and economic characteristics (Table 55) are greatly influenced by the presence of defense and defense-related personnel. In the 1970 census, members of the armed forces (5,180) and civilian population employed and living on the main defense bases and stations (3,499) accounted for half the total population of the study region. This domination of defense is also reflected in the industrial composition of the employed workforce in 1970 and 1965 (Tables 56 and 57) in which government employment (including military) comprised 61 percent and 64.2 percent of the annual average total employed workforce respectively. The government sector of the economy is important to the marine-oriented civilian economy in providing navigational aids and performing search and rescue functions, but beyond that the two sectors have only minor economic interaction in civilian employment in construction and distributive industries. Commercial fishing and food processing employment accounted for 52.6 percent of annual monthly average nongovernment employment in 1970 and 69.1 percent of the high month of July. In 1965 the annual employment in fishing and processing was 47.2 percent of nongovernment employment and in the high month of August 59.3 percent. If an adjustment could be made in these calculations to eliminate the government-related nongovernment employment, the overwhelming dependence of the region's economy of defense and commercial fishing and processing would be even more sharply identified.

TABLE 54

SOUTHWEST REGION^a - TOTAL POPULATION DISTRIBUTION - 1880-1970

	Circa 1740	1880	1890	Jun. 1, 1900	Dec. 31, 1909	Jan. 1, 1920	Oct. 1, 1929	Oct. 1, 1939	Apr. 1, 1950	Apr. 1, 1960	Apr. 1, 1970
<u>TOTAL REGION</u>	<u>23,000</u>	<u>4,501</u>	<u>5,461^c</u>	<u>3,747</u>	<u>3,965</u>	<u>3,965</u>	<u>3,960</u>	<u>4,533</u>	<u>12,933</u>	<u>13,185</u>	<u>17,466</u>
<u>Pribilof Islands</u>	<u>-^b</u>	<u>390</u>	<u>337</u>	<u>300</u>	<u>291</u>	<u>350</u>	<u>400</u>	<u>482</u>	<u>546</u>	<u>641</u>	<u>613</u>
<u>Aleutian Islands</u>	<u>15,500</u>	<u>1,617</u>	<u>997</u>	<u>900</u>	<u>792</u>	<u>750</u>	<u>716</u>	<u>816</u>	<u>5,054</u>	<u>3,995</u>	<u>5,909</u>
Adak U.S.N. Base	-	-	-	-	-	-	-	-	-	2,613	2,249
Adak N.R.S.	-	-	-	-	-	-	-	-	-	-	527
Clam Lagoon N.C. Stat.	-	-	-	-	-	-	-	-	4,470	-	1,246
Shemya Station	-	-	-	-	-	-	-	-	-	442	1,131
Other defense	-	-	-	-	-	-	-	-	-	219	362
Other Places	15,500	1,617	997	900	792	730	716	816	584	721	394
<u>Alaska Penninsula- Unga District</u>	<u>1,000</u>	<u>625</u>	<u>1,027</u>	<u>1,200</u>	<u>1,303</u>	<u>1,420</u>	<u>1,115</u>	<u>1,141</u>	<u>1,069</u>	<u>1,375</u>	<u>1,535</u>
Defense Stations	-	-	-	-	-	-	-	-	177	104	90
<u>Kodiak Island</u>	<u>6,500</u>	<u>1,869</u>	<u>3,100^c</u>	<u>1,347</u>	<u>1,579</u>	<u>1,465</u>	<u>1,729</u>	<u>2,094</u>	<u>6,264</u>	<u>7,174</u>	<u>9,409</u>
Kodiak (St. Paul)	-	288	495	341	438	374	442	864	1,710 ^d	2,628	3,798
U.S.N. & U.S.C.G.	-	-	-	-	-	-	-	-	3,000 ^d	2,743	3,052
Other Places	6,500	1,581	3,055	1,006	1,141	1,091	1,287	1,230	1,554 ^d	1,803	2,559

a Earlier data adjusted to represent same area as Aleutian Islands and Kodiak Island 1970 Census Divisions.

b Combined with Aleutian Islands estimates.

c 1890 Count appears to include non-resident seasonal fishermen and shore workers on Kodiak Island.

d Civilian population on Navy base estimated.

SOURCE: J. W. Swanton, The Indian Tribes of North America (1952); W. H. Oswalt, Alaska Eskimos (1967); U.S. Bureau of the Census, 1880-1970.

TABLE 55

SOUTHWEST REGION - GENERAL SOCIAL AND ECONOMIC CHARACTERISTICS OF
POPULATION 1960 and 1970

	<u>April 1, 1960</u>	<u>April 1, 1970</u>
<u>TOTAL POPULATION</u>	13,185	17,466
percent increase 1960-1970		32.5%
<u>RACE</u>		
Native	3,316	3,807
Non-Native	9,869	13,659
--percent Native	25.1%	21.8%
<u>SEX</u>		
Male	8,632	11,137
Female	4,553	6,329
--Males per 100 females	189.6	176.0
<u>AGE</u>		
Under 18 years	4,333	5,778
Over 65 years	227	288
--percent under 18 over 65	34.6%	34.7%
<u>Family Income and Poverty Status^a</u>		
Median income, all families with income	\$ 6,550	\$10,253
Percent of families with:		
--income less than poverty level	14.2%	7.0%
--income less than 75% poverty level	8.5	4.2
--income less than 125% poverty level	20.4	13.5
--income <u>more</u> than 125% poverty level	79.6	86.5
<u>Educational Attainment</u> (Persons 25 years old and over):		
Median years completed:		
--males	11.6	12.3
--females	11.5	12.1
Percentage high school graduates:		
--males	47.1%	62.6%
--females	49.9	56.8
<u>Infant Mortality Rates, Calendar Years</u> (Deaths under 1 year of age per 1,000 live births)	43.6	17.9
<u>Employment Status</u>		
Armed Forces	4,224	5,180
Civilian Labor Force	2,942	4,023
--(Unemployed)	(413)	(445)
--Ratio Non-worker	0.841	0.900
<u>Weeks Worked in 1969</u>		
Percent of all males 16 yrs. and over:		
50-52 weeks	63.4%	
27-49 weeks	20.6	
26 weeks or less	11.9	
did not work	4.1	
Percent of all females 16 yrs. and over:		
50-52 weeks	13.3%	
27-49 weeks	17.3	
26 weeks or less	30.5	
did not work	38.9	

TABLE 55
 Southwest Region
 Page 2

Labor Mobility for Males^b

Percentage of males 30-49 yrs. old in 1970:	
--non-worker 1965, non-worker 1970	6.2%
--non-worker 1965, worker 1970	8.9
--worker 1965, worker 1970	79.6
--worker 1965, non-worker 1970	5.4

a Excludes inmates of institutions, members of Armed Forces, college students in dorms, unrelated individuals under 14 years. 1970 poverty line for all families = \$3,388. Poverty line 1960 for all families = \$3,000.

b "Worker" includes members of Armed Forces.

SOURCE: U. S. Bureau of the Census 1970: PC(1)-C3, Alaska; 1960: PC(1)-C3, Alaska. Infant mortality data from Alaska Department of Health and Social Services.

TABLE 56 -SOUTHWESTERN SUB-REGION

TOTAL EMPLOYED WORKFORCE BY INDUSTRY & MONTH, 1970

(Rounded to nearest ten)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	9,740	9,440	9,370	9,420	10,010	11,560	13,830	13,570	10,700	10,140	10,110	10,060	10,670
TOTAL CIVILIAN EMPLOYMENT)	(4,770)	(4,470)	(4,400)	(4,450)	(5,030)	(6,590)	(8,860)	(8,590)	(5,730)	(5,160)	(5,140)	(5,080)	(5,700)
GOVERNMENT													
Fed - Military [a	4,970	4,970	4,970	4,970	4,980	4,970	4,970	4,980	4,970	4,980	4,970	4,980	4,970
- Civilian	840	840	810	850	870	890	1,050	1,000	900	1,010	960	950	910
State & Local	580	630	590	620	650	680	580	560	650	620	640	640	620
SUBTOTAL	6,390	6,440	6,370	6,440	6,500	6,540	6,600	6,540	6,520	6,610	6,570	6,570	6,510
COMMODITY-PRODUCING INDUSTRY													
Agriculture [b	30	30	30	30	50	50	60	70	90	50	30	40	50
Commercial Fishing	670	500	390	450	580	1,580	2,700	2,580	820	610	670	610	1,010
Mining - (includes oil & gas)	10	20	20	20	0	10	10	10	20	30	30	30	20
Contract Construct.	140	170	180	210	210	180	260	260	370	340	310	270	240
Food Processing	990	820	870	700	980	1,470	2,290	2,180	1,080	880	880	970	1,180
Other Manufact.	30	30	30	60	70	40	50	50	50	40	20	20	40
SUBTOTAL	1,870	1,570	1,520	1,470	1,890	3,330	5,370	5,150	2,430	1,950	1,940	1,940	2,540
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	270	260	270	250	290	280	290	290	310	220	210	190	260
Trade	450	430	440	480	500	520	520	510	510	460	480	480	480
Finance, Ins. & Real Estate	60	50	50	60	60	70	70	70	70	80	80	70	70
Services [c	430	430	440	440	470	470	550	600	530	510	530	510	490
SUBTOTAL	1,210	1,170	1,200	1,230	1,320	1,340	1,430	1,470	1,420	1,270	1,300	1,250	1,300

TABLE 56 - Total Employed Workforce, 1970
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed [d & Unpaid Workers	270	260	280	280	310	350	430	410	330	310	300	300	320
Commercial Fishermen Participation as Percent of Total Employment	6.9	5.3	4.2	4.8	5.8	13.7	19.5	19.0	7.7	6.0	6.6	6.1	9.5
Commercial Fishermen Participation as Percent of Total Civilian Employment	14.0	11.2	8.9	10.1	11.5	24.0	30.5	30.0	14.3	11.8	13.0	12.0	17.7

- [a] Military personnel stationed in State as of April 1 - (Alaska Command)
 [b] Includes self-employed, unpaid family workers and wage agricultural workers.
 [c] Includes domestics.
 [d] Does not include self-employed commercial fishermen. (See Methodology).

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G.W. Rogers, R. Listowski and J. Brakel for U.S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

TABLE 57 SOUTHWESTERN SUB-REGION

TOTAL EMPLOYMENT WORKFORCE BY INDUSTRY AND MONTH, 1965

(Rounded to nearest ten)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	8,550	8,620	8,650	8,510	9,690	10,600	12,060	12,750	11,360	9,970	9,700	9,640	10,000
TOTAL CIVILIAN EMPLOYMENT)	(3,720)	(3,790)	(3,820)	(3,680)	(4,860)	(5,770)	(7,230)	(7,920)	(6,530)	(5,140)	(4,870)	(4,810)	(5,180)
GOVERNMENT													
Fed -Military [a	4,830	4,830	4,830	4,830	4,830	4,830	4,830	4,830	4,830	4,830	4,830	4,830	4,830
-Civilian	1,220	1,194	1,186	883	1,133	1,160	1,310	1,310	1,200	1,240	1,280	1,310	1,200
State & Local	314	333	340	360	350	360	660	390	410	400	400	400	430
SUBTOTAL	6,360	6,360	6,360	6,070	6,310	6,350	6,800	6,530	6,440	6,440	6,470	6,540	6,420
COMMODITY-PRODUCING INDUSTRY													
Agriculture [b	30	30	30	30	50	44	60	70	80	60	40	40	50
Commercial Fishing	289	330	330	280	360	1,150	1,770	2,020	1,510	510	440	370	780
Mining - (includes oil & gas)	0	0	0	0	0	0	0	0	0	0	0	0	0
Contract Construct.	170	180	180	440	590	700	720	790	730	606	460	260	490
Food Processing	590	640	640	480	980	930	1,180	1,670	1,110	860	850	980	910
Other Manufact.	10	0	0	10	10	10	10	20	20	20	20	20	10
SUBTOTAL	1,090	1,180	1,180	1,240	1,990	2,830	3,740	4,570	3,450	2,060	1,810	1,670	2,230
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	170	170	170	170	190	250	280	302	280	247	240	230	230
Trade	310	280	310	340	340	320	320	340	320	350	360	380	330
Finance, Ins. & Real Estate	40	40	40	40	40	40	40	30	40	40	40	40	40
Services [c	280	290	290	330	420	430	460	490	430	420	420	420	390
SUBTOTAL	800	780	810	880	990	1,040	1,100	1,160	1,070	1,060	1,060	1,170	980

1965

TABLE 57 - Total Employed Workforce 1965
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self Employed [d & Unpaid Family	300	300	300	320	400	380	420	490	400	410	360	360	370
Commercial Fishermen													
Participation as Percent of Total Employment	3.4	3.8	3.8	3.3	3.7	10.8	14.7	15.8	13.3	5.1	4.5	3.8	7.8
Commercial Fishermen Participation as Percent of Total Civilian Employment	7.8	8.7	8.6	7.6	7.4	19.9	24.5	25.5	23.1	9.9	9.0	7.7	15.1

- [a Military personnel stationed in State as of April 1 - (Alaska Command)
 [b Includes self-employed, unpaid family workers and wage agricultural workers.
 [c Includes domestics.
 [d Does not include self-employed commercial fishermen. (See Methodology).

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G.W. Rogers, R. Listowski and J. Brakel for U.S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

Commercial Fisheries and Fish Processing Industries

Salmon, shellfish, and halibut comprise more of the commercial fisheries of the region. The commercial salmon harvest for the period 1960-71 exhibited alternating high and low catches each year with an abnormal low of less than fifteen million pounds in 1967 and an abnormal high of more than 102 million in 1970 (Table 58). Halibut landings from the international high-seas fleets are important, but their values were only 22.1 percent of salmon catch values in 1970 and 29.3 percent in 1971. The rise in economic importance of shellfish harvests in the region has been the most important change since World War II. The value of the shellfish catch rose from \$2.0 million in 1960 to \$23.4 million in 1971, or 28.8 percent of the value of the salmon catch in 1960 to 225.0 percent in 1971. During 1970 the monthly average employment in commercial salmon fishing was 429 as compared with 489 in shellfish harvestings.

With the exception of the two abnormally low years of 1965 and 1967, the Kodiak district accounted for between 51.4 percent of the total region catch in 1971 to 80.9 percent in 1966, the Aleutians-Peninsula district between 11.4 percent and 38.3 percent of the catch, and the Chignik district between 7.5 percent and 18.4 percent (Table 59). Each of the regions of this study has a different form of gear as its most important, in the southwest, the purse seine being the dominant gear. In 1970 it accounted for 88.2 percent of the total catch by all forms of gear (92.3 percent in the Kodiak district, 71.0 percent in the Aleutians-Peninsula district and 100.0 percent in the Chignik district). Drift gillnets were only significant in the Aleutians-Peninsula district accounting for 25 percent of the district catch, but only 6.1 percent of the total region catch (Table 60).

Because of the high catch in 1970, the value of salmon products was almost half the value of all fisheries products and exceeded slightly the value of shellfish (Table 61). Comparing the wholesale value to the processor with the raw fish value to the fishermen, the value added by processing in all salmon products was 62.1 percent of the final wholesale value, in other fish (primarily halibut) 23.0 percent, and shellfish 52.5 percent.

TABLE 58

SOUTHWEST SUB-REGION - COMMERCIAL CATCH AND VALUE TO FISHERMEN - 1960-1971

Year	<u>SALMON</u>		<u>OTHER FISH/a</u>		<u>SHELLFISH</u>		SHELLFISH VALUE as percent of SALMON VALUE
	Pounds	Value	Pounds	Value	Pounds	Value	
1960	68,413,676	\$ 6,981,304	57,600	n.a.	27,818,268	\$ 2,012,525	28.8%
1961	43,333,428	5,107,366	--	--	46,032,354	3,551,884	69.5
1962	84,842,568	11,583,229	--	--	58,655,575	5,038,748	43.5
1963	46,751,004	5,763,453	--	--	81,696,787	6,049,795	105.0
1964	83,887,121	8,862,267	619,550	n.a.	87,566,140	6,598,043	74.5
1965	44,085,000	5,497,988	1,482,095	n.a.	145,469,400	13,365,875	243.1
1966	68,366,127	9,095,851	6,266,580	n.a.	180,834,700	18,774,022	206.4
1967	14,760,994/b	2,310,522/b	5,157,395	n.a.	169,007,100	16,813,824	727.7
1968	68,836,779	9,888,957	3,983,708	n.a.	126,631,900	19,933,433	201.6
1969	87,089,240	12,101,053	2,273,945	\$ 61,173	114,382,598	18,873,679	156.0
1970	102,219,503	15,742,936	11,218,948/a	3,473,179/a	134,249,063	18,141,886	115.2
1971	64,616,970	10,387,206	10,599,117/a	3,106,349/a	166,684,050	23,372,309	225.0

/a Halibut included in 1970 and 1971, not reported for earlier years.

/b Kodiak 1967 catch only one-tenth 1948-1970 annual average.

n.a. - Data not available.

SOURCE: Alaska Department of Fish and Game

TABLE 59

SOUTHWEST SUB-REGION - COMMERCIAL SALMON CATCH BY DISTRICT - 1960-1971

Year	Total Sub-region thousands of fish	Kodiak District		Chignik District		Aleutian-Peninsula District	
		thous.	% sub-reg.	thous.	% sub-reg.	thous.	% sub-reg.
1960	14,283.6	8,456.3	59.2	1,069.0	7.5	4,758.3	33.3
1961	9,453.3	4,882.0	51.6	955.1	10.0	3,616.2	38.3
1962	23,588.8	15,750.1	66.8	2,249.4	9.5	5,589.3	23.7
1963	11,926.2	6,249.6	52.4	2,195.3	18.4	3,481.3	29.2
1964	20,768.7	13,713.8	66.0	2,578.3	12.4	4,476.6	21.6
1965	10,196.9	3,692.1	36.2	1,880.2	18.4	4,624.6	45.4
1966	15,095.7	12,217.9	80.9	1,160.2	7.7	1,717.6	11.4
1967	2,343.0	735.2	31.4	662.7	28.3	945.1	40.3
1968	16,353.3	10,337.5	63.2	2,395.9	14.7	3,619.9	22.1
1969	19,037.7	13,678.5	71.9	2,179.0	11.4	3,180.2	16.7
1970	22,556.8	13,939.2	61.8	3,094.7	13.7	5,522.9	24.5
1971	12,398.5	6,378.1	51.4	1,999.0	16.1	4,021.4	32.5

SOURCE: Governor's Gear Limitation Committee, 1960-71, Registration Area Catch by Gear and Species

TABLE 60

SOUTHWEST SUB-REGION - COMMERCIAL SALMON
CATCH BY DISTRICT AND GEAR - 1970 .

Gear	Total Southwest	Kodiak District	Chignik District	Aleutians- Peninsula District
(Thousands of Fish)				
Purse Seine	19,883.8	12,869.0	3,094.7	3,920.1
Beach Seine	139.5	139.5	--	--
Drift Gillnet	1,380.1	--	--	1,380.1
Set Gillnet	<u>1,153.4</u>	<u>930.7</u>	<u>--</u>	<u>222.7</u>
All Gear	<u>22,556.8</u>	<u>13,939.2</u>	<u>3,094.7</u>	<u>5,522.9</u>
(Percent Total Catch)				
Purse Seine	88.2	92.3	100.0	71.0
Beach Seine	0.6	1.0	--	--
Drift Gillnet	6.1	--	--	25.0
Set Gillnet	<u>5.1</u>	<u>6.7</u>	<u>--</u>	<u>4.0</u>
All Gear	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

SOURCE: Alaska Department of Fish and Game

TABLE 61

SOUTHWESTERN REGION - 1970 FISH PRODUCTS AND WHOLESALE VALUE, BY
SPECIES AND TYPE OF PRODUCT

	<u>Pounds Prepared for Market</u>	<u>Wholesale Value to Processor</u>	<u>Wholesale Value per Pound</u>
<u>SALMON</u>			
Fresh	397,908	\$ 100,225	\$.25
Frozen	2,851,424	1,177,851	.41
Cured ^a	55,950	39,190	.70
Canned	53,116,944	35,988,884	.68
Roe	3,442,120	4,215,114	1.22
Total Salmon	<u>59,864,346</u>	<u>\$41,521,264</u>	<u>\$.69</u>
<u>OTHER FISH</u>			
Halibut	8,712,988	\$ 4,356,491	\$.50
Herring	152,235	147,773	.97
Herring eggs or kelp	-	-	-
Bottom Fish	53,149	3,298	.06
Other	26,727	2,695	.10
Total Other Fish	<u>8,945,144</u>	<u>\$ 4,510,257</u>	<u>\$.50</u>
<u>SHELLFISH</u>			
King Crab	11,476,763	\$20,281,672	\$1.77
Dungeness	4,386,530	2,048,392	.47
Tanner Crab	2,240,417	2,443,957	1.09
Shrimp	10,306,294	12,830,446	1.24
Clams	217,355	60,811	.28
Scallops	748,284	863,676	1.15
Total Shellfish	<u>29,375,643</u>	<u>\$38,528,954</u>	<u>\$1.31</u>
Total All Products	<u>98,185,133</u>	<u>\$84,560,478</u>	<u>\$.86</u>

SOURCE: Alaska Department of Fish and Game

a Cured salmon other than roe.

The Commercial Salmon Fisherman -- Employment and Productivity

Employment in the commercial harvest of salmon in the region is limited annually to the period June - September, with the peak in the month of July but relatively high catches continuing through August. Employment and productivity vary by month and by type of gear, as indicated in Table 62, summarizing the six-year period 1965-1970. In terms of number of persons employed and total fish caught, purse seines are the most important form of gear, but in terms of productivity per unit of effort (thousands of fish per man-month) it is matched by the beach seine and drift gillnet. The number of possible sites for beach seines and set gillnets is probably relatively fixed by natural conditions and beach space and the use of the drift gillnet appears to be limited by other physical factors.

The Commercial Salmon Fisherman -- Income and Other Characteristics

Because of data disclosure requirements, it was not possible to make a regional break-out of income data collected in this study below the central region. The southwest sub-region data, therefore, is combined with that for the other sub-regions and analyzed in Chapter VIII.

TABLE 62

SOUTHWEST SUB-REGION - MONTHLY COMMERCIAL SALMON FISHING
EMPLOYMENT AND CATCH BY GEAR, SIX-YEAR AVERAGES
1965 - 1970

<u>Gear</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
<u>Employment</u> (Weekly average per month)				
Purse Seine	557	1,468	1,239	218
Beach Seine	3	24	8	4
Drift Gillnet ^{/a}	127	78	33	10
Set Gillnet	<u>147</u>	<u>996</u>	<u>102</u>	<u>224</u>
Total	<u>834</u>	<u>2,566</u>	<u>1,382</u>	<u>456</u>
<u>Catch</u> (Thousands of fish)				
Purse Seine	1,215	6,604	4,633	71
Beach Seine	3	92	32	3
Drift Gillnet ^{/a}	556	160	47	5
Set Gillnet	<u>159</u>	<u>670</u>	<u>193</u>	<u>6</u>
Total	<u>1,933</u>	<u>7,526</u>	<u>4,905</u>	<u>85</u>
<u>Productivity</u> (Thousands of fish per man-month)				
Purse Seine	2.2	4.5	3.7	0.3
Beach Seine	1.0	3.8	4.0	0.8
Drift Gillnet ^{/a}	4.4	2.1	1.4	0.5
Set Gillnet	<u>1.1</u>	<u>0.7</u>	<u>1.9</u>	<u>*</u>
Total	2.3	2.9	3.5	0.2

^{/a} Aleutians-Peninsula only.

*Negligible

SOURCE: Statistical Appendix

CHAPTER VII: THE CENTRAL REGIONS: PRINCE WILLIAM SOUND

The Prince William Sound study region includes the Sound, its islands, and the mainland drainage as well as the drainage of the Copper River and the Bering River into the Gulf of Alaska. The land area includes the Valdez-Chitina-Whittier and the Cordova-McCarthy 1970 Census Divisions (Figure 6). The coastal fringes were inhabited in aboriginal times by an estimated 1,600 Chugach Eskimo, a small number of Eyak Indians at the mouth of the Copper River, and Ahtena Indians in the upper Copper River drainage. Salmon and sea mammals were the principal means of subsistence for the coastal people while salmon and hunting of big and small game supported the interior population. Russian and Aleut sea otter hunters and Tlingit Indians invaded the area during the period of Russian occupation and two salmon canneries were built near the present site of Cordova in 1889. Clams and other shellfish were commercially harvested and packed.

During the gold rushes of '98, the region provided two entrances into the interior near the present towns of Valdez and Cordova. The search for gold and the general reconnaissance surveys of the period led to the discovery of the Bering River coal fields and the copper deposits in the interior of the region. Copper City was established in 1898 as the port of entry for the Richardson Trail and telegraph line into the Tanana Valley, the town incorporating as Valdez in 1901, and the trail becoming the present Richardson Highway - with a continuous history as a major transportation route into interior Alaska. Cordova grew out of a combination of the original Eyak village and fish processing in the vicinity combined with the major copper discoveries in the Copper River valley and the construction of a railroad from tidewater to the Kennicott mining development at McCarthy in 1911. Copper was produced in significant quantities at several locations within the region, place-names bearing testimony to this history, but the bonanza was at Kennicott, which produced between 1911-1938.

The history of the region is reflected in the population data (Table 63), the highest population reported by the 1909 census reflecting the peak of prospecting and mining activities followed by a major drop and plateau. Recent growth in Valdez reflects increased employment in transportation during and immediately following World War II, the establishment of highway and mental

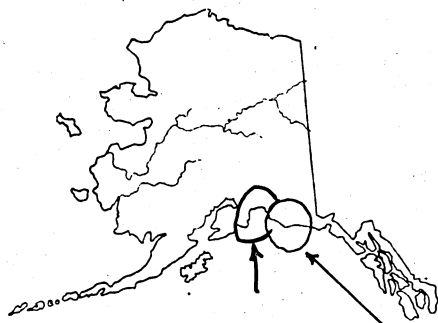
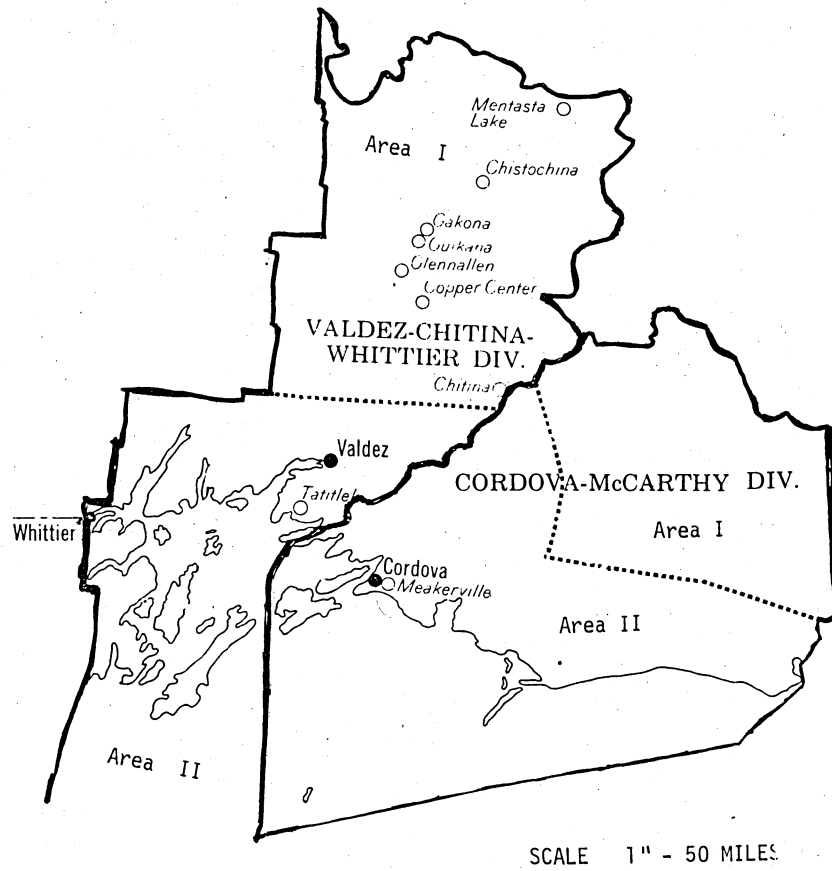


FIGURE 6 - PRINCE WILLIAM SOUND REGION

TABLE 63

PRINCE WILLIAM SOUND REGION^a - TOTAL POPULATION DISTRIBUTION 1740-1970

	Circa 1740	1880	1890	Jun. 1, 1900	Dec. 31, 1909	Jan. 1, 1920	Oct. 1, 1929	Oct. 1, 1939	Apr. 1, 1950	Apr. 1, 1960	Apr. 1, 1970
<u>TOTAL REGION</u>	1,750	976	617	815	7,357	3,920	4,071	3,202	3,919	4,603	4,955
<u>CORDOVA-MC CARTHY AREA</u>											
Cordova	-	-	-	-	1,152	955	980	938	1,165	1,128	1,167
Air Force Station	-	-	-	-	-	-	-	-	-	134	-
Other places	150	695	246	300*	627	1,221	1,227	598	408	497	690
Sub-Total	150	695	246	300	1,779	2,176	2,257	1,536	1,573	1,759	1,857
<u>VALDEZ-WHITTIER- CHITINA AREA</u>											
Valdez	-	-	-	315	810	466	442	529	554	555	1,055
Whittier (incl. port)	-	-	-	-	-	-	-	-	627	1,112	130
Other places	1,600	281	371	200*	4,768	1,278	1,372	1,137	1,165	1,177	1,913
Sub-Total	1,600	281	371	515	5,578	1,744	1,814	1,666	2,346	2,844	3,098

a Earlier data adjusted to represent same area as Cordova-McCarthy and Valdez-Chitina-Whittier 1970 Census Divisions.

SOURCE: J. W. Swanton, The Indian Tribes of North America (1952); W. H. Oswalt, Alaska Eskimos (1967); U. S. Bureau of the Census, 1880-1970

* Estimated

health hospital facilities, and other state programs in the community. The Great Earthquake of 1964 wiped out the old town of Valdez and caused a high loss of life, but the town was reconstructed on a new site and its development has continued. Cordova ceased to serve as a port of entry and transportation with the closing of the Kennicott mines, but the highway programs which will eventually connect it with the main system and renewed interest in the mineral resources of the region may reestablish the function which originally brought the present community into existence. Its continued life has been supported by salmon and shellfish harvesting and processing.

The general social and economic characteristics of the region (Table 64) exhibit improvement in the economic well-being of the population between 1960 and 1970. The number of families with incomes above the Alaska poverty level (125 percent of the national guides) increased from 72.8 percent to 85.5 percent; infant mortality rates declined dramatically. With the end of mineral development and production, the economy has been based primarily upon fisheries and highways. The importance of these activities is reflected in the employment in state and local government, commercial fishing, food processing, and transportation in 1970 and 1965 (Tables 65 and 66).

Commercial Fisheries and Fish-Processing Industries

Salmon and shellfish comprise most of the commercial fishing and processing in the region, with herring and some halibut providing a fluctuating minor input. Salmon catch has fluctuated from low catches of 15.2 million pounds in 1960 (and similar amounts in 1961, 1965, and 1968) to highs of 38.7 million pounds in 1963 and 1971 (Table 67). Shellfish catch has declined steadily throughout the 1960-71 period from 3.4 million pounds in 1960 to 1.3 million pounds in 1971. In terms of pounds and value, dungeness crab has been the most important species of shellfish landed (2.7 million pounds in 1960 and 0.5 million pounds in 1971) and razor clams the second (433.9 thousand pounds in 1960 and 38.0 thousand in 1971) with minor amounts of king and tanner crab and shrimp. In addition to the commercial salmon catch there has long been subsistence salmon catch by fish wheel and nets in the upper Copper River. In 1971 the reported catch by 4,542 permit holders being 39,263 salmon.

TABLE 64

PRINCE WILLIAM SOUND REGION - GENERAL SOCIAL AND ECONOMIC CHARACTERISTICS
OF POPULATION 1960 and 1970

	<u>April 1, 1960</u>	<u>April 1, 1970</u>
<u>TOTAL POPULATION</u>	4,603	4,955
percent of increase		7.6%
<u>RACE</u>		
Native	861	985
Non-Native	3,742	3,970
--Percent Native	18.7%	19.9%
<u>SEX</u>		
Male	2,772	2,726
Female	1,831	2,229
--Males per 100 females	151.4	122.3
<u>AGE</u>		
Under 18 years	1,663	1,872
Over 65 years	186	189
--Percent under 18 over 65	40.2%	41.6%
<u>Family Income and Poverty Status^a</u>		
Median income, all families with income	\$6,567	\$12,167
Percent of families with:		
--income less than poverty level	20.0%	10.5%
--income less than 75% poverty level	14.2	7.6
--income less than 125 % poverty level	27.2	14.5
--income <u>more</u> than 125% pverty level	72.8	85.5
<u>Educational Attainment</u> (Persons 25 years old and over):		
Median years completed:		
--males	11.6	12.2
--females	12.2	12.3
Percentage high school graduates:		
--males	47.7%	57.7%
--females	56.4	60.5
<u>Infant Mortality Rates, Calendar Years</u> (Deaths under 1 year per 1,000 live births)	75.5	28.0
<u>Employment Status</u>		
Armed Forces	667	38
Civilian Labor Force	1,454	2,108
--(Unemployed)	(150)	(205)
--Ratio Non-worker	1,170	1.309
<u>Weeks Worked in 1969</u>		
Percent of all males 16 yrs. and over:		
50-52 weeks	39.4%	
27-49 weeks	25.8	
26 weeks or less	23.4	
did not work	11.3	
Percent of all females 16 yrs. and over:		
50-52 weeks	19.0%	
27-49 weeks	18.8	
26 weeks or less	30.6	
did not work	31.6	

TABLE 64
 Prince William Sound Region
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Labor Mobility for Males^b

Percentage of males 30-49 yrs. old in 1970	
--non-worker 1965, non-worker 1970	11.6%
--non-worker 1965, worker 1970	11.4
--worker 1965, worker 1970	66.3
--worker 1965, non-worker 1970	10.8

a Excludes inmates of institutions, members Armed Forces, college students in dorms, unrelated individuals under 14 years. 1970 poverty line for all families = \$3,388. Poverty line 1960 for all families = \$3,000.

b "Worker" includes members of Armed Forces.

SOURCE: U. S. Bureau of the Census 1970: PC(1)-C3, Alaska; 1960: PC(1)-C3, Alaska. Infant mortality data from Alaska Department of Health and Social Services.

TABLE 65 -PRINCE WILLIAM SOUND SUB-REGION
 TOTAL EMPLOYED WORKFORCE BY INDUSTRY AND MONTH, 1970

(Compiled July 5, 1972)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	1,460	1,500	1,630	1,760	2,160	2,900	3,250	2,850	2,440	1,960	1,740	1,660	2,110
TOTAL CIVILIAN EMPLOYMENT	(1,400)	(1,440)	(1,570)	(1,700)	(2,100)	(2,840)	(3,190)	(2,790)	(2,380)	(1,900)	(1,680)	(1,600)	(2,050)
GOVERNMENT													
Fed -Military [a	60	60	60	60	60	60	60	60	60	60	60	60	60
-Civilian	80	80	90	90	90	100	120	120	130	110	110	110	100
State & Local	520	540	550	550	560	690	700	730	770	610	600	590	620
SUBTOTAL	660	680	700	700	710	850	880	910	960	780	770	760	780
COMMODITY-PRODUCING INDUSTRIES													
Agriculture [b	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial Fishing	30	30	50	90	360	670	800	470	210	90	20	10	240
Mining (Includes oil & Gas)	70	70	80	90	90	110	90	100	100	90	90	90	90
Contract Construct.	30	30	40	30	40	50	60	60	80	110	100	60	60
Food Processing	90	80	130	140	190	330	540	400	270	130	50	50	200
Other Manufact.	0	0	0	0	0	10	0	10	10	10	10	10	0
SUBTOTAL	220	210	300	350	680	1,170	1,490	1,040	670	430	270	220	590
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	80	100	90	100	110	130	120	120	100	80	80	80	100
Trade	120	120	130	160	200	220	210	210	180	160	140	140	160
Finance, Ins. & Real Estate	20	20	20	30	20	20	20	20	20	20	20	20	20
Services [c	170	170	180	200	200	210	210	230	220	240	230	220	210
SUBTOTAL	390	410	420	490	530	580	560	580	520	500	470	460	490

TABLE 65 -Total Employed Workforce, 1970
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	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Family [d]	190	200	210	220	240	300	320	320	290	250	230	220	250
Commercial Fishermen													
Participation as Percent of Total Employment	2.1	2.0	3.1	5.1	16.7	23.1	24.6	16.5	8.6	4.6	1.1	.6	11.4
Commercial Fishermen													
Participation as Percent of Total Civilian Employment	2.1	2.1	3.2	5.3	17.1	23.6	25.1	16.8	8.8	4.7	1.2	.6	11.7

[a Military personnel stationed in State as of April 1 - (Alaska Command)

[b Includes self-employed, unpaid family workers and wage agricultural workers.

[c Includes domestics.

[d Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G.W. Rogers, R. Listowski and J. Brakel for U.S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates by Industry and Area, published annually, and office records.

TABLE 66 -PRINCE WILLIAM SOUND SUB-REGION

TOTAL EMPLOYMENT WORKFORCE BY INDUSTRY AND MONTH, 1965

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	1,360	1,420	1,430	1,490	1,900	2,360	2,730	2,280	1,870	1,860	1,630	1,370	1,820
TOTAL CIVILIAN EMPLOYMENT)	(1,250)	(1,330)	(1,340)	(1,400)	(1,810)	(2,270)	(2,640)	(2,190)	(1,780)	(1,770)	(1,540)	(1,280)	(1,730)
GOVERNMENT													
Fed -Military [a	90	90	90	90	90	90	90	90	90	90	90	90	90
-Civilian	150	130	130	130	120	120	150	150	150	140	140	140	140
State & Local	380	400	410	410	420	480	490	490	480	460	440	430	440
SUBTOTAL	620	620	630	630	630	690	730	730	720	690	670	660	670
COMMODITY-PRODUCING INDUSTRY													
Agriculture [b	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial Fishing	0	0	20	60	270	430	790	360	100	50	30	0	180
Mining - (includes oil & gas)	10	10	10	10	10	30	40	40	40	40	10	10	20
Contract Construct.	120	110	80	140	200	250	250	240	260	300	190	100	190
Food Processing	50	100	120	50	150	260	230	220	140	100	90	50	130
Other Manufact.	10	10	0	0	10	10	10	10	10	10	10	10	10
SUBTOTAL	190	230	230	260	640	980	1,320	870	550	510	330	170	530
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	160	170	160	150	130	150	140	140	120	110	130	100	140
Trade	110	110	110	130	150	160	150	160	150	150	130	120	140
Finance, Ins. & Real Estate	20	20	20	20	20	20	20	20	20	20	20	20	20
Services [c	150	150	160	180	180	180	190	190	170	220	220	190	180
SUBTOTAL	420	450	450	480	480	510	500	510	460	500	500	430	480

TABLE 66 - Total Employment Workforce, 1965
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed [d & Unpaid Family	110	120	120	120	150	180	180	170	140	160	130	110	140
Commercial Fishermen Participation as Percent of Total Employment	.0	.0	1.4	4.0	14.2	18.2	28.9	15.8	5.3	3.2	1.8	.0	9.9
Commercial Fishermen Participation as Percent of Total Civilian Employment	.0	.0	1.5	4.3	14.9	18.9	30.0	16.4	5.6	3.4	1.9	.0	10.4

- [a] Military personnel stationed in State as of April 1 - (Alaska Command)
 [b] Includes self-employed, unpaid family workers and wage agricultural workers.
 [c] Includes domestics.
 [d] Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G. W. Rogers, R. Listowski and J. Brakel for U.S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

TABLE 67

PRINCE WILLIAM SOUND SUB-REGION -- COMMERCIAL CATCH AND VALUE TO FISHERMEN -- 1960-1971

Year	SALMON		OTHER FISH		SHELLFISH	
	Pounds	Value	Pounds	Value	Pounds	Value
1960	15,261,356 ^{/a}	\$2,113,964	51,974	n.a.	3,405,859	\$360,812
1961	16,698,034 ^{/a}	2,354,075	4,465	n.a.	3,017,822	314,863
1962	34,047,199	5,722,011	1,560	n.a.	2,885,739	354,570
1963	38,699,474	3,987,884	3,923	n.a.	3,364,567	471,337
1964	30,235,890	3,977,667	172	n.a.	3,497,536	491,446
1965	16,802,000	2,678,787	2,115	n.a.	2,266,533	279,058
1966	23,580,370	3,708,091	4,430	n.a.	1,061,295	119,528
1967	20,422,023	3,434,298	82,122	n.a.	2,675,127	360,092
1968	19,364,767	3,873,476	n.a.	n.a.	2,847,485	436,264
1969	29,551,493	6,632,568	750,473	\$ 24,978	2,427,977	347,293
1970	23,578,449	5,186,584	277,805	106,104	2,163,177	293,920
1971	38,749,886	7,436,515	2,698,612	507,670	1,340,913	217,478

^{/a} Estimated by multiplying numbers of fish by ten-year averages of salmon weights, by species and district. Average salmon weights for 1960 and 1961 not available.

n.a. - data not available

SOURCE: 1969-1971 Statistical Leaflets; other years annual area management reports, Alaska Department of Fish and Game.

The most important form of salmon gear used in the region is the purse seine, which accounted for between two-thirds to 89 percent of the annual total catch during the period 1965-71 (Table 68). Drift gillnets account for virtually all of the remainder of catch with set nets and troll accounting for negligible amounts. Canned salmon accounted for the major portion of the 1970 wholesale value of fish products (Table 69).

The Commercial Salmon Fisherman -- Employment and Productivity

Employment in the commercial harvesting of salmon extends from May through September with the peak activity in the month of July (Table 70). Drift gillnets account for all or most of the early catch falling off sharply in July when purse seine becomes the dominant form of gear. There probably is a shift of fishermen from gillnets to seine in July, on the evidence of the seasonal employment pattern. Because of the efficiency of the gear and the fact that it is employed at the peak of the major runs, its productivity is more than three times that of drift gillnets.

The Commercial Salmon Fisherman -- Income and Other Characteristics

Because of data disclosure requirements, it was not possible to make a regional break-out of income data collected in this study below the central region level. The Prince William Sound data, therefore, is combined with that for the other sub-regions and analyzed in Chapter VIII.

TABLE 68

PRINCE WILLIAM SOUND SUB-REGION -- COMMERCIAL SALMON
CATCH BY GEAR -- 1965-1971

<u>Year</u>	<u>Total</u>	<u>Purse Seine</u>	<u>Drift Gillnet</u>	<u>Set Gillnet</u>	<u>Troll</u>
(Thousands of Fish)					
1965	3,815.5	2,794.4	1,002.6	12.0	6.5
1966	4,458.9	3,150.0	1,245.1	60.3	3.5
1967	3,727.8	2,881.1	819.8	--	26.9
1968	3,842.4	2,840.0	996.3	--	6.1
1969	6,277.8	5,255.8	931.0	86.2	4.8
1970	4,558.5	3,035.1	1,460.5	60.8	2.1
1971	8,982.2	7,957.6	1,021.4	--	3.2

(Percent of all Gear)

1965	100.0	73.2	26.3	0.3	0.2
1966	100.0	70.6	27.9	1.4	0.1
1967	100.0	77.3	22.0	--	0.7
1968	100.0	73.9	25.9	--	0.2
1969	100.0	83.7	14.8	1.4	0.1
1970	100.0	66.6	32.0	1.3	0.1
1971	100.0	88.6	11.4	--	*

*Less than 0.1%.

SOURCE: Alaska Department of Fish and Game.

TABLE 69

PRINCE WILLIAM SOUND REGION - 1970 FISH PRODUCTS AND WHOLESAL VALUE

BY SPECIES AND TYPE OF PRODUCT

	<u>Pounds Prepared for Market</u>	<u>Wholesale Value to Processor</u>	<u>Wholesale Value per Pound</u>
<u>SALMON</u>			
Fresh	270,977	\$ 121,902	\$.45
Frozen	1,939,054	1,090,694	.56
Cured ^a	55	145	2.64
Canned	14,549,712	11,629,133	.80
Roe	772,681	706,532	.91
Total Salmon	<u>17,532,479</u>	<u>\$13,548,406</u>	<u>\$.77</u>
<u>OTHER FISH</u>			
Halibut	28,744	\$ 12,654	\$.44
Herring	56,184	42,086	.75
Herring eggs or kelp	42,805	43,563	1.02
Total Other Fish	<u>127,733</u>	<u>\$ 98,303</u>	<u>\$.77</u>
<u>SHELLFISH</u>			
King Crab	8,340	\$ 8,111	\$.97
Dungeness	391,914	222,992	.57
Tanner Crab	174,001	267,596	1.54
Shrimp	7,887	11,451	1.45
Clams	17,289	16,143	.93
Total Shellfish	<u>599,431</u>	<u>\$ 526,293</u>	<u>\$.88</u>
Total All Products	<u>18,259,643</u>	<u>\$14,173,002</u>	<u>\$.78</u>

SOURCE: Alaska Department of Fish and Game

a Cured salmon other than roe.

TABLE 70

PRINCE WILLIAM SOUND SUB-REGION, MONTHLY SALMON FISHING
 EMPLOYMENT AND CATCH BY GEAR¹ -- SIX-YEAR AVERAGES --
 1965-1970

<u>Gear</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
<u>Employment</u> (Weekly average per month)					
Purse Seine	-	73	473	171	-
Drift Gillnet	185	365	143	106	126
Set Gillnet	-	-	8	9	-
TOTAL	185	438	624	286	126
<u>Catch</u> (Thousands of fish)					
Purse Seine	-	33	2,277	1,015	-
Drift Gillnet	302	469	105	85	105
Set Gillnet	-	-	18	19	-
TOTAL	302	502	2,400	1,119	105
<u>Productivity</u> (Thousands fish per man-month)					
Purse Seine	-	.45	4.81	5.94	-
Drift Gillnet	1.63	1.28	.73	.80	.83
Set Gillnet	-	-	2.25	2.11	-
TOTAL	1.63	1.15	3.85	3.91	.83

¹Troll salmon catches were negligible.

SOURCE: Statistical Appendixes C and E

CHAPTER VIII: THE CENTRAL REGIONS: A NOTE ON 1969 FISHERIES CATCH AND INCOME

1969 Central Region Catch Characteristics

The 1969 salmon harvest by districts of the central region, species, and type of gear are summarized in Table 71. The nature of these activities has been discussed in the previous chapters, but the data are presented for the year 1969 as an aid in interpreting the combined income data available for that year. Similar data for shellfish harvest in 1969 are presented in Table 72. Unfortunately, the 1969 fish ticket data which served in this study as a basis for estimating employment and fishing effort apparently were not complete for the Prince William Sound district, and this precluded an analysis of catch and income return per man-month of effort. Table 73 relates monthly catch and employment for the six-year period, 1965-1970, which somewhat overcame the inadequacies of the 1969 data. The discussions in previous chapters on the effects of seasonality of runs and type of gear upon efficiency as measured in terms of catch per man-month apply to this comparison with little modification.

Vessel Operators' 1969 Income

The attempt in this study to collect actual income data for the year 1969 from Alaska Department of Revenue records yielded income data for a sample of 803 resident vessel operators (697 salmon gear operators) and 296 nonresident vessel operators (267 salmon gear operators). Two-thirds of the sample were gillnetters (both drift and set) and approximately twenty-two percent were seiners (Table 74). As discussed in Chapter III on Bristol Bay, the income return includes the boat share as they were made by the operators (usually the owners) of vessels or units of gear. Average gross receipts from fishing (before deducting the boat or gear share or costs of operation) for residents of the region was \$10,215, or almost three times the average for Bristol Bay resident fishermen. The nonresident vessel operators of the central region grossed slightly more than twice the fishing return of the Bristol Bay nonresidents. The difference is due to a combination of more productive seine gear (refer to Table 73) and better runs in 1969. A comparison of gross fishing receipts with income from all Alaska sources indicates that the central region resident fishermen are also more dependent upon fishing alone for their annual total income than are the Bristol Bay resident fishermen.

TABLE 71

SOUTHCENTRAL REGION - CATCH CHARACTERISTICS OF 1969 COMMERCIAL SALMON HARVEST BY SPECIES, GEAR, AND DISTRICTS

District & Gear	KINGS (Chinook)	REDS (Sockeye)	COHO (Silver)	PINKS (Humpback)	CHUM (Dog)	TOTAL	VALUE TO FISHERMEN
(Thousands of Fish)							
<u>Prince William Sound</u>							
Purse Seine	0.7	143.7	6.0	4,801.0	304.4	5,255.8	
Drift Net	14.2	820.0	81.6	5.5	9.7	931.0	
Set Net	--	56.8	0.2	22.1	7.1	86.2	
Troll	2.6	--	1.4	0.8	--	4.8	
Sub-total	<u>17.5</u>	<u>1,020.5</u>	<u>89.2</u>	<u>4,829.4</u>	<u>321.2</u>	<u>6,277.8</u>	<u>\$6,632,568</u>
<u>Cook Inlet</u>							
Purse Seine	--	12.5	0.5	192.6	62.1	267.7	
Drift Net	0.4	470.9	33.1	8.2	238.5	751.1	
Set Net	12.1	331.7	68.1	35.0	30.5	477.4	
Sub-total	<u>12.5</u>	<u>815.1</u>	<u>101.7</u>	<u>235.8</u>	<u>331.1</u>	<u>1,496.2</u>	<u>\$2,121,691</u>
<u>Kodiak</u>							
Purse Seine	2.4	397.6	47.1	11,994.6	511.6	12,953.3	
Beach Seine	--	8.2	0.2	20.9	0.3	29.6	
Drift Net	--	--	--	0.1	0.3	0.4	
Set Net	--	185.7	1.5	485.2	22.8	695.2	
Sub-total	<u>2.4</u>	<u>591.5</u>	<u>48.8</u>	<u>12,500.8</u>	<u>535.0</u>	<u>13,678.5</u>	<u>\$8,115,978</u>
<u>Chignik</u>							
Purse Seine	3.4	310.1	18.1	1,779.6	67.8	2,179.0	\$1,545,527
<u>Aleutians-Peninsula</u>							
Purse Seine	1.6	291.6	13.7	1,416.2	193.0	1,916.1	
Beach Seine	--	1.4	0.2	7.4	0.9	9.9	
Drift Net	3.3	857.5	26.5	15.6	213.4	1,116.3	

TABLE 71 - Southcentral Region
Page two

District & Gear	KINGS (Chinook)	REDS (Sockeye)	COHO (Silver)	PINKS (Humpback)	CHUM (Dog)	TOTAL	VALUE TO FISHERMEN
<u>Aleutians-Peninsula (Con't.)</u>							
Set Net	<u>2.3</u>	<u>95.3</u>	<u>18.3</u>	<u>7.4</u>	<u>14.6</u>	<u>137.9</u>	
Sub-total	7.2	1,245.8	58.7	1,446.6	421.9	3,180.2	\$2,439,548
<u>TOTAL CENTRAL REGION</u>							
Purse Seine	8.1	1,155.5	85.4	20,184.0	1,138.9	22,571.9	
Beach Seine	--	9.6	0.4	28.3	1.2	39.5	
Drift Net	17.9	2,148.4	141.2	29.4	461.9	2,798.8	
Set Net	14.4	669.5	88.1	549.7	75.0	1,396.7	
Troll	<u>2.6</u>	--	<u>1.4</u>	<u>0.8</u>	--	<u>4.8</u>	
<u>GRAND TOTAL</u>	<u>43.0</u>	<u>3,983.0</u>	<u>316.5</u>	<u>20,792.2</u>	<u>1,677.0</u>	<u>26,811.7</u>	<u>\$20,855,312</u>

SOURCE: Catch by gear, species, district from data compiled from Alaska Department of Fish and Game records. Value to Fishermen from Statistical Leaflet No. 19.

TABLE 72

SOUTHCENTRAL REGION - CATCH CHARACTERISTICS OF 1969 COMMERCIAL SHELLFISH
HARVEST BY SPECIES AND DISTRICT

Species	Prince William Sound	Cook Inlet	Kodiak	Aleutians -Peninsula	Total
(thousands of pounds)					
King Crab	48.1	248.1	12,724.1	29,865.2	42,885.5
Dungeness Crab	1,413.9	48.5	5,813.7	1,266.0	8,542.1
Tanner Crab	936.5	1,479.7	6,822.7	667.6	9,906.5
Shrimp	2.6	1,847.2	41,243.5	3,076.9	46,170.2
Scallops	--	0.2	1,012.9	38.1	1,051.2
Clams	<u>26.8</u>	<u>--</u>	<u>12.1</u>	<u>47.4</u>	<u>86.3</u>
TOTAL	<u>2,427.9</u>	<u>3,623.7</u>	<u>67,629.0</u>	<u>34,961.2</u>	<u>108,641.8</u>
Value to Fishermen	\$318,795	\$1,031,897	\$7,546,212	\$8,431,570	\$17,328,474

SOURCE: Catch by species and district compiled from Alaska Department of Fish and Game records. Value to fishermen from Statistical Leaflet No. 19.

TABLE 73

SOUTHCENTRAL REGION -- MONTHLY SALMON FISHING EMPLOYMENT AND
CATCH BY GEAR -- SIX-YEAR AVERAGES -- 1965-1970

<u>Gear</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>
<u>Employment</u> (Weekly average per month)					
Purse Seine	3	642	2,232	1,504	220
Beach Seine	-	3	33	12	4
Drift Gillnet	186	571	977	256	136
Set Gillnet	3	237	519	283	36
Troll	-	1	3	5	1
TOTAL	192	1,457	3,763	2,060	397
<u>Catch</u> (Thousands of fish)					
Purse Seine	1	1,258	9,209	5,783	72
Beach Seine	-	115	42	4	-
Drift Gillnet	313	1,060	1,348	222	111
Set Gillnet	-	212	1,781	599	14
Troll	-	-	4	4	-
TOTAL	314	2,645	12,384	6,612	197
<u>Productivity</u> (Thousand of fish per man-month)					
Purse Seine	.33	1.96	4.13	3.85	.33
Beach Seine	-	38.33	1.27	.33	-
Drift Gillnet	1.68	1.86	1.38	.87	.82
Set Gillnet	-	.89	3.43	2.12	.39
Troll	-	-	1.33	.80	-
TOTAL	1.65	1.82	3.29	3.21	.50

SOURCE: Statistical Appendixes C and E

TABLE 74

SOUTHCENTRAL REGION - VESSEL OPERATORS' INCOME BY GEAR AND RESIDENCE

1969

	Number	%	Average Alaska Income	
			All Alaska Sources	Gross Fishing Receipts
<u>ALL OPERATORS (including "residence not indicated")</u>				
Salmon - gillnet	714	64.8	\$ 6,394	\$ 7,269
seine	239	21.6	8,472	18,754
trolling	16	1.4	10,597	17,211
Sub-Total	969	87.8	6,976	10,266
Halibut	16	1.4	10,719	14,726
Crab	93	8.4	11,090	31,957
Shrimp	4	.4	9,153 ^c	10,833 ^c
Herring	7	.6		
All other & unknown	15	1.4	6,453	2,457
<u>Total</u>	<u>1,104</u>	<u>100.0</u>	<u>\$ 7,391</u>	<u>\$ 12,057</u>
<u>RESIDENTS</u>				
Salmon - gillnet	511	63.7	\$ 7,412	\$ 7,158
seine	174	21.7	9,189	18,577
trolling	12	1.5	12,446	19,127
Sub-Total	697	86.9	\$ 7,942	\$ 10,215
Halibut	10	1.2	12,901	16,481
Crab	78	9.7	10,651	30,930
Shrimp	4	.5	11,296	11,155
Herring	4	.5		
All other & unknown	10	1.2	10,054	1,764
<u>Total</u>	<u>803</u>	<u>100.0</u>	<u>\$ 8,327</u>	<u>\$ 12,209</u>
<u>NON-RESIDENTS</u>				
Salmon - gillnet	198	66.8	\$ 3,684	\$ 7,625
seine	65	22.0	6,552	19,226
trolling	4	1.4	5,050	11,460
Sub-total	267	90.2	4,403	10,507
Halibut	6	2.0	7,083	11,801
Crab	15	5.1	13,375	37,296
Shrimp	-	-	-	-
Herring	3	1.0	822 ^c	6,142 ^c
All other & unknown	5	1.7		
<u>Total</u>	<u>296</u>	<u>100.0</u>	<u>\$ 4,815</u>	<u>\$ 11,772</u>

- a Adjusted gross income, line 15a, Alaska Individual Income Tax Return, form DR-600, Includes net profit (loss) from fishing, business, wages, salaries, etc. earned within Alaska.
- b "Total gross receipts from sale of all fishing products sold in Alaska and the receipts from fishing products caught in Alaska waters but sold outside of Alaska", line 4, Alaska Individual Income Tax Return, Schedule DRF-1, "Information Schedule on Fishermen".
- c Combined to avoid disclosure.

Table 75 presents 1969 income data by age, residency, and gear. For all forms of gear and species, the relative age distribution for resident and nonresident fishermen was similar, with a slightly younger orientation in the nonresident sample. Average gross receipts from fishing by age group varied, with the highest earners among residents in the 30-39 year bracket and among nonresidents in the 50-59 year bracket. Further variations were present in the data organized by type of gear.

TABLE 75

SOUTHCENTRAL REGION -- VESSEL OPERATORS' INCOME BY AGE, GEAR, AND RESIDENCE -- 1969

	Total	AGE GROUP									
		Under 19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over	Unknown
ALL OPERATORS -- All Gear and Species (including "other" and "gear not indicated")											
Number	1,104	44	179	269	289	207	86	13	2	1	5
%	100.0	4.0	16.2	24.3	26.9	18.8	7.8	1.2	0.2	0.1	0.5
[a]	\$ 7,391	2,092	6,990	8,352	8,726	6,844	5,330	3,154	[c]	[c]	6,011
[b]	\$12,057	3,077	12,206	13,785	11,833	14,882	7,149	3,370	[c]	[c]	1,951
ALL OPERATORS -- Salmon -- Gillnet (A)											
Number	714	37	117	166	188	125	63	12	2	1	3
%	100.0	5.2	16.4	23.2	26.4	17.5	8.8	1.7	0.3	0.1	0.4
[a]	\$6,394	2,131	5,617	7,275	7,935	6,234	4,348	3,206	[c]	[c]	[c]
[b]	\$7,269	3,282	8,167	8,749	7,033	7,645	5,212	5,874	[c]	[c]	[c]
ALL OPERATORS -- Salmon -- Seine (B)											
Number	239	4	38	64	68	50	13	1			1
%	100.0	1.7	15.9	26.8	28.5	20.9	5.4	0.4			0.4
[a]	\$ 8,472	[c]	9,715	9,772	8,417	7,319	6,318	[c]			[c]
[b]	\$18,754	[c]	15,212	21,292	17,787	22,032	17,005	[c]			[c]
ALL OPERATORS -- Trolling (C)											
Number	16		3	5	2	2	2				
%	100.0		18.8	31.2	25.0	12.5	12.5				
[a]	\$10,597		[c]	10,932	[c]	[c]	[c]				[c]
[b]	\$17,211		[c]	32,716	[c]	[c]	[c]				[c]
ALL OPERATORS -- Halibut (D)											
Number	16		1	3	7	4	1				
%	100.0		6.3	18.8	43.6	25.0	6.3				
[a]	\$10,719		[c]	[c]	9,552	[c]	[c]				[c]
[b]	\$14,726		[c]	[c]	7,811	[c]	[c]				[c]

TABLE 75 -- Southcentral Region
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	Total	AGE GROUP								90 and over	Unknown
		Under 19	20-29	30-39	40-49	50-59	60-69	70-79	80-89		
ALL OPERATORS -- Crab (E)											
Number	93	2	17	24	23	21	5				1
%	100.0	2.2	18.3	25.7	24.7	22.6	5.4				1.1
[a	\$11,090	[c	9,245	11,075	15,656	8,995	7,934				[c
[b	\$31,957	[c	31,018	28,132	36,890	40,954	10,253				[c
RESIDENTS -- All Gear and Species (including "other" and "gear not indicated")											
Number	803	36	131	196	223	141	58	12	2	1	3
%	100.0	4.5	16.3	24.4	27.8	17.6	7.2	1.5	0.2	0.1	0.4
[a	\$ 8,327	2,276	7,844	9,800	9,758	7,370	6,161	3,077	[c	[c	[c
[b	\$12,209	3,356	11,725	15,100	11,766	14,954	7,073	2,849	[c	[c	[c
NON-RESIDENTS -- All Gear and Species (including "other" and "gear not indicated")											
Number	296	8	47	72	72	66	28	1			2
%	100.0	2.7	15.9	24.3	24.3	22.3	9.5	0.3			0.7
[a	\$ 4,815	1,259	4,701	4,471	5,318	5,720	3,608	[c			[c
[b	\$11,772	1,819	13,774	10,175	12,462	14,729	7,305	[c			[c

- [a Average Alaska income, all sources
[b Average gross fishing receipts
[c Combined to avoid disclosure

CHAPTER IX: THE SOUTHEAST REGION

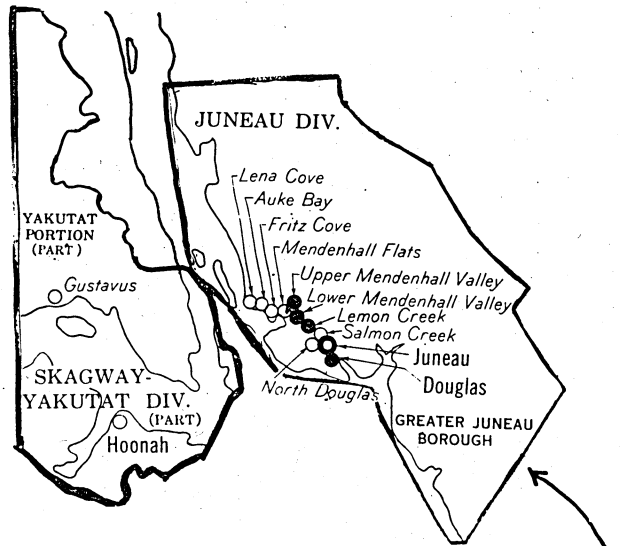
The Region and Its Past Development

Southeast Alaska is a large archipelago and a narrow strip of the mainland lying along the northwest coast of the North American continent. Geographically it is a continuation of the continental Pacific Mountain system and is closely related to the coastal region of British Columbia. It comprises all that land and intervening waters lying east of the meridian of 141 degrees west longitude, north of latitude 55 degrees north, and west and south of the Alaska-Canada boundary line from Portland Canal to the 141st meridian. It is a combination of the 1970 Census Divisions presented in Figure 7.

Within this region lies a land area of 35,527 square miles, 60 percent of which is a mainland strip and the balance consisting of the hundreds of islands comprising the Alexander Archipelago. Land, however, accounts for only a part of the region's total area. The total region is roughly 400 miles long by approximately 120 miles in width from the Canadian boundary to a line connecting the seaward shores of the western isles. Its approximate composition, therefore, is about forty-four percent mainland, thirty percent islands, and twenty-six percent water area. The first two elements in the composition - the mainland and the islands - are laced together by the third element which forms an intricate system of inland seaways nearly all of which is navigable by small craft, and the mainline of the system, the Inside Passage, by ocean-going steamers. There are 9,000 miles of shoreline around the contour of the islands and mainland.

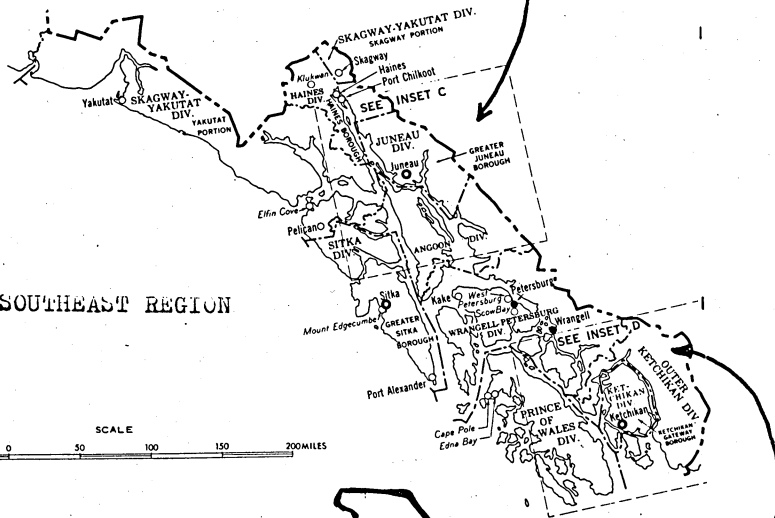
Long before the European discovery of southeast Alaska, it supported one of the heaviest concentrations of aboriginal populations found in the western hemisphere north of the areas of highest civilization in Mexico and Central America. In aboriginal times, it was known as the "territory of the Tlingit," one of the several "nation groups" among the coastal Indians of the northwest Pacific. Not only did this region provide the means of support for a relatively heavy concentration of population, it also provided the economic means for the elaboration of a primitive culture rich in art, oral literature, and social and legal organization.

This high aboriginal culture arose upon an ample natural resource base. The land provided the timber for housing, canoes, and other artifacts as well as game, fruit, and vegetable foods, but it was the marine resources which

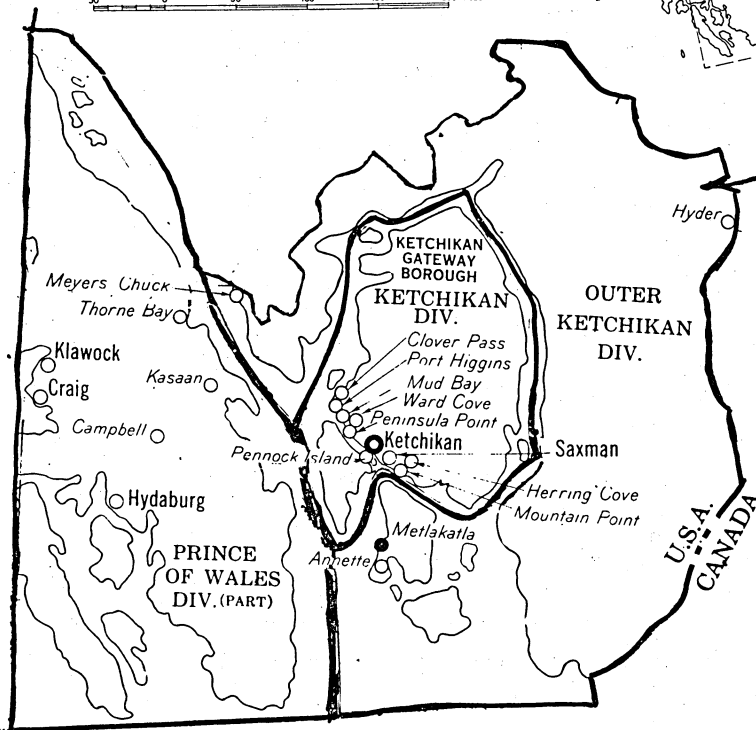


SCALE 1" - 25 MILES

FIGURE 7 - SOUTHEAST REGION



SCALE 0 50 100 150 200 MILES



SCALE 1" - 25 MILES

provided the principal source of wealth and well-being. The sea afforded rich harvests of salmon, halibut, cod, herring, "olachen," and other fish. The sea also provided tremendous quantities of edible mollusks, abundant marine game - hair seal, sea lion, porpoise, whale sea otter - and important plant matter.

Following the ill-fated attempts to establish outposts near Yakutat (1796) and Sitka (1799), the Russians through force of arms were able to re-establish what was to become the capital of their Alaskan empire at Sitka in 1804. From that date until the transfer of Alaska to the United States, the economy of Russian America was based upon the fur trade and this, in turn, primarily upon the harvesting of the sea otter. Among the several factors which influenced the Russian decision to sell its Alaskan holdings to the United States in 1867 was the decline of the sea otter trade.

In 1878 the first salmon canneries in Alaska were erected at Klawock and Sitka and within eight years canneries were operating in all areas of the region. The size of the canned salmon pack continued to expand rapidly, the peak being reached with the 1941 season. In 1878 the first gold mining camp in Alaska came into existence at Windham Bay. Discoveries extended throughout the region and production continued until World War II brought the closing of the last of the large operations in 1944. Gold values reported since then have been primarily from old mill cleanups. Significant values were realized from other natural resources, but canned salmon and gold were the economic lifeblood of southeast Alaska from the 1880's until the early 1950's.

During the period 1906 through 1957, a total of 6,489,480 fine ounces of gold were produced by the region's lode mines, and 107,543,175 standard cases (48 one-pound cans) of canned salmon came from the region's canneries. Converting these quantities to 1957 prices (average 1957 wholesale price for canned salmon), the value of the products of the lode gold mines was \$227,131,738 and the value of the salmon canneries was \$2,446,600,000 (more than ten times the value of gold at 1957 prices).

Since the mid-century, the region's economy has been undergoing basic changes. Following the closing of the last lode gold mining operation in 1944, except for a brief export of significant values of uranium in the late nineteen fifties, the minerals industry of the region has been virtually nonexistent. Fisheries products have experienced almost continuous decline, falling from the

1941 high total output of 255,590,000 pounds prepared for market to the 1955 low of 86,580,177 pounds. The cause of this decline has been simply over-exploitation and depletion of the salmon resources, and although heartening rehabilitation progress has been made since 1955, production can never recover its past high levels.

But the region is not limited exclusively to marine resources. The major land cover is that of the dense coastal rain forests of the Pacific Northwest, predominantly western hemlock and Sitka spruce. Approximately 73 percent of the region's land area is within the Tongass National Forest, which contains an estimated 146 billion board feet of commercial timber, 92 billion board feet of which is economically accessible under present conditions.

Despite the extent and generally good commercial quality of these forest resources and the natural means provided for their economic harvesting and movement to mills, until 1954 they had been subjected only to a modest harvest to provide special cuttings of high-grade spruce logs for export during World War I and World War II and small annual harvests primarily for local timber requirements. In 1954 a mill initially producing 300 tons daily (later increased to 525 tons) of high alpha pulp for use in rayon and cellulose acetate production went into operation at Ketchikan and late in 1959 a similar mill at Sitka started with an initial capacity of 390 tons per day for export to Japan. The average annual timber cut in the Tongass National Forest jumped dramatically from an average of 55 billion board feet for the five-year period 1949-1953 to 189 billion board feet for 1954-1958 and 317 billion board feet for 1959-1961. Plans to develop a third major pulp and wood products complex near Juneau have been stalled by court proceedings brought by the Sierra Club and others.

Following transfer to the United States, Sitka, and then Juneau, served as capitals of the District, Territory, and State of Alaska. This has introduced a public administration and political element into the regional economy out of proportion to the number of regional residents.

The historical pattern of regional change and development is reflected in population trends and distribution (Table 76). Because of their orientation to fishing, the aboriginal villages of the region have survived with few exceptions. Four became absorbed into the new settlements of non-Native people (Sitka, Ketchikan, Wrangell, and Juneau-Douglas).

Population characteristics of 1960-1970 are compared in Table 77.

76 (Continued)

	1839	1861	1880	1890	Jun. 1, 1900	Dec. 31, 1909	Jan. 1, 1920	Oct. 1, 1929	Oct. 1, 1939	Apr. 1, 1950	Apr. 1, 1960	Apr. 1, 1970
SOUTHERN DIVISION^c	2,682	1,764	1,663	1,874	2,170	3,520	5,670	6,781	8,226	9,485	11,842	13,823
1. Prince of Wales Island	2,004	1,431	1,390	542	780	945	1,188	1,218	1,572	1,400	1,772	2,106
Klawok	269	411	527	287	131	241	361	437	455	404	251	213
Other Tlingit Places	-	262	60	-	116	29	-	-	-	-	-	-
Craig	-	-	-	-	-	-	212	231	505	374	373	272
Kasaan	249	200	180	64	150	125	126	112	85	47	36	30
Other Haida Places	1,486	558	623	191	338	436	23	19	62	-	-	-
Hydaburg	-	-	-	-	-	-	346	319	348	353	251	214
Other Places	-	-	-	-	45	110	120	100	117	272	961	1,377
2. Ketchikan Gateway Borough Area	678	333	273	509	770	1,767	3,025	4,429	5,742	6,829	8,774	10,041
Ketchikan (City)	-	-	-	40	460	1,613	2,458	4,260	4,695	5,305	6,483	6,994
Saxman and earlier Tlingit places (before 1900)	678	333	273	50	142	154	103	112	111	167	153	135
Other places	-	-	-	419	168	-	464	57	936	1,357	2,138	2,912
3. Remainder Southern Division	-	-	-	823	620	808	1,457	1,134	912	1,256	1,296	1,676
McClakatla	-	-	-	823	560	602	574	466	674	817	798	1,050
Annette	-	-	-	-	-	-	-	-	-	302	337	195
Hyder	-	-	-	-	-	-	237	254	72	30	32	49
Other Places	-	-	-	-	60	206	646	414	166	107	129	382

a Earlier data adjusted to represent same area as Juneau, Haines and Skagway-Yakutat 1970 Census Divisions.

b Earlier data adjusted to represent same area as Sitka, Angoon and Wrangell-Petersburg 1970 Census Divisions.

c Earlier data adjusted to represent same area as Prince of Wales, Ketchikan and Outer Ketchikan 1970 Census Divisions.

SOURCES: 1839 and 1861 estimated from census data by Veniaminov and other Russian sources given in Ivan Petrov, "Report on the Population, Industries and Resources of Alaska," Tenth Census of the United States, 1880, pp. 96-99., 1880-1970 U. S. Bureau of the Census.

TABLE 76
SOUTHEAST REGION - TOTAL POPULATION DISTRIBUTION 1839-1970

	1839	1861	1880	1890	Jun. 1, 1900	Dec. 31, 1909	Jan. 1, 1920	Oct. 1, 1929	Oct. 1 1939	Apr. 1, 1950	Apr. 1, 1960	Apr. 1, 1970
TOTAL REGION	9,260	9,648	7,748	8,038	14,350	15,213	17,402	19,304	25,241	28,203	35,403	42,565
NORTHERN DIVISION^a	2,326	3,747	3,325	3,825	8,901	8,212	7,342	7,615	10,442	10,553	12,690	17,217
1. City and Borough of Juneau Area	696	830	929	2,047	4,094	5,384	5,458	5,500	7,647	7,818	9,745	13,556
Juneau	-	-	-	1,253	1,864	1,644	3,058	4,043	5,729	5,956	6,797	6,050
Douglas	-	-	-	402	825	1,722	919	593	522	699	1,042	1,243
Auk Village	203	118	300	324	261	218	-	-	-	-	-	-
Taku and Sumdum	493	712	619	42	137	-	-	-	-	-	-	-
Other Places	-	-	10	26	1,007	1,800	1,481	864	1,396	1,163	1,906	-
2. Lynn Canal-Icy St.- Yakutat	1,630	2,917	2,396	1,778	4,807	2,828	1,884	2,115	2,795	2,735	2,945	3,661
Haines	-	-	-	-	85	445	314	344	357	338	392	463
Port Chilkoot (Ft. Seward)	-	-	-	-	-	255	186	234	337	125	120	220
Skagway	-	-	-	-	3,117	872	494	492	634	758	659	675
Klukwan & other Tlingit places	498	1,616	988	722	611	290	167	97	97	91	112	103
Balance Lynn Canal	-	-	-	230	287	115	58	84	76	110	309	751
Hoonah	782	331	908	453	447	462	402	514	716	563	686	748
Balance Icy Strait	-	-	-	65	63	68	68	66	188	360	367	511
Yakutat (incl. Dry Bay and Lituya)	350	970	500	308	297	321	195	284	390	390	300	190
CENTRAL DIVISION^b	4,252	4,137	2,760	2,339	3,279	3,481	4,390	4,908	6,573	8,165	10,871	11,525
1. Sitka-Chatham St.	2,329	2,965	1,769	1,654	2,020	1,829	2,120	1,902	3,017	4,187	6,690	6,612
Sitka	850	1,021	916	1,190	1,396	1,039	1,175	1,056	1,987	1,985	3,237	3,370
Mt. Edgecumbe (B.I.A.)	-	-	-	-	-	-	-	-	-	1,147	1,884	835
Angoon (Killisnoo)	729	600	666	460	422	351	370	322	368	429	395	400
Other Places	750	1,344	187	4	202	439	575	524	662	627	1,174	2,007
2. Frederick Sound and Chatham St.	1,923	1,172	991	685	1,259	1,652	2,270	3,006	3,556	3,978	4,181	4,913
Petersburg (incl. West Petersburg)	-	-	-	-	26	585	879	1,297	1,373	1,679	1,528	2,065
Kake (incl. adjacent Tlingit Places)	393	455	568	296	330	289	387	386	419	376	455	448
Wrangell (incl. Wrangell Institute)	20	30	106	316	868	743	821	948	1,325	1,489	1,590	2,029
Wrangell Area Tlingit Places	1,510	697	317	73	-	-	-	-	-	-	-	-
Other Places	-	-	-	-	35	35	183	375	439	434	608	871

TABLE 77

SOUTHEASTERN REGION - GENERAL SOCIAL AND ECONOMIC CHARACTERISTICS
OF POPULATION 1960 and 1970

	April 1, 1960	April 1, 1970
<u>TOTAL POPULATION</u>	35,403	42,565
percent increase 1960-1970		20.2%
<u>RACE</u>		
Native	9,242	8,248
Non-Native	26,161	34,317
--percent Native	26.1%	19.4%
<u>SEX</u>		
Male	19,132	22,332
Female	16,271	20,233
--Males per 100 females	117.6	110.4
<u>AGE</u>		
Under 18 years	14,137	17,031
Over 65 years	1,906	2,039
--percent under 18 over 65	45.3%	44.8%
<u>Family Income and Poverty Status^a</u>		
Median income, all families with income	\$ 8,269	\$13,601
Percent of families with:		
--income less than poverty level	10.9%	7.7%
--income less than 75% poverty level	7.0	4.9
--income less than 125% poverty level	15.0	10.0
--income <u>more</u> than 125% poverty level	85.0	90.0
<u>Educational Attainment (Persons 25 years old and over):</u>		
Median years completed:		
--males	11.3	12.3
--females	12.0	12.4
Percentage high school graduates:		
--males	48.0	63.0
--females	54.5	67.1
<u>Infant Mortality Rates, Calendar Years (deaths under 1 year of age per 1,000 live births)</u>	37.4	31.5
<u>Employment Status</u>		
Armed Forces	609	757
Civilian Labor Force	14,251	17,630
--(Unemployed)		(1,500)
--Ratio Non-worker	1,382	1.315
<u>Weeks Worked in 1969</u>		
Percent of all males 16 yrs. and over:		
50-52 weeks	52.2%	
27-49 weeks	22.7%	
26 weeks or less	16.3%	
did not work	8.8%	
Percent of all females 16 yrs. and over:		
50-52 weeks	24.0%	
27-49 weeks	16.3%	
26 weeks or less	22.4%	
did not work	37.3%	

TABLE 77
Southeastern Region
Page 2

Labor Mobility for Males^b

Percentage of males 30-49 yrs. old in 1970:	
--non-worker 1965, non-worker 1970	3.2%
--non-worker 1965, worker 1970	7.1
--worker 1965, worker 1970	81.3
--worker 1965, non-worker 1970	8.3

a Excludes inmates of institutions, members of Armed Forces, college students in dorms, unrelated individuals under 14 years. 1970 poverty line for all families = \$3,388. Poverty line 1960 for all families = \$3,000.
b "Worker" includes members of Armed Forces.

SOURCE: U. S. Bureau of the Census 1970: PC(1)-C3, Alaska; 1960: PC(1)-C3, Alaska. Infant mortality data from Alaska Department of Health and Social Services.

Regional Economy

As compared with the other regions of this study, the southeast region presents a higher level, and more diverse state, of development. Although military (800 persons in 1970 and 650 in 1965) is relatively low in the total employed work force, the location of the state capitol at Juneau gives government employment an important place (37 percent in 1970 and 34 percent in 1965). "Other manufacturing" (primarily pulp and lumber products) is the most important commodity-producing industrial classification (14 percent in 1970 and 1965).

Commercial fishing and food processing are of relatively modest significance in the monthly average annual employed work force (nine percent in 1970 and 1965), but as in the other study regions, these classifications assume major significance in the months of peak salmon harvest (20 percent of total employed work force in August, 1970, and 24 percent in July, 1965). Despite expansion of other industries, the Native population of the region remains heavily dependent upon fishing and fish processing for employment, income, and the preservation of the remains of their traditional way of life.¹

Commercial Fisheries and Fish Products

The commercial fisheries catch and value to fishermen for 1960-1971 indicate the economic importance of these industries and their fluctuating nature (Table 80). Salmon catch hit peaks in 1961, 1963, 1964, 1966, and 1968, and extreme lows in 1960, 1967, and 1969. Other fish (primarily halibut) and shellfish have generally declined over the period.

Canned salmon, frozen salmon, halibut (primarily frozen), and salmon roe are the most important products in terms of wholesale value. In 1970 the wholesale value of these products ranged from \$22.5 million for canned salmon to \$3.1 million for roe (Table 81).

Prior to the outlawing of fish traps following Alaska's becoming a state, this form of gear was the single most important form, accounting for half of the catch in most years. A few traps are still operated in the Annette Island Reservation by the residents of Metlakatla, and these have not been reflected in this study. In terms of employment and catch, the purse seine is the most

¹For an analysis of the experience of the 1950's and 1960's, and the impact of the shift of the regional economy from fish to forest products, see George W. Rogers, "Economic Development in Southeast Alaska and Its Impact on the Native Population," Alaska Public Policy, ed. by Gordon Scott Harrison.

TABLE 78 - SOUTHEASTERN REGION
 TOTAL EMPLOYED WORKFORCE BY INDUSTRY & MONTH, 1970

(Rounded by nearest ten)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	16,480	16,840	18,220	19,410	21,120	22,730	25,060	25,740	23,000	19,920	18,980	18,210	20,470
TOTAL CIVILIAN EMPLOYMENT	15,680	16,040	16,100	18,610	20,320	21,930	24,260	24,940	22,800	19,120	18,180	17,410	19,570
GOVERNMENT													
Fed - Military [a]	800	800	800	800	800	800	800	800	800	800	800	800	800
- Civilian	1,960	2,020	2,020	2,100	2,240	2,180	2,130	2,150	2,170	2,060	2,060	2,050	2,100
State & Local	4,400	4,570	4,630	4,580	4,660	4,880	5,140	4,890	5,100	4,860	4,820	4,900	4,790
SUBTOTAL	7,160	7,390	7,450	7,480	7,700	7,860	8,070	7,840	8,070	7,720	7,680	7,750	7,680
COMMODITY-PRODUCING INDUSTRIES													
Agriculture [b]	30	30	30	30	30	30	30	30	40	40	30	30	30
Commercial Fishing	130	130	120	430	1,090	1,670	3,320	3,310	1,280	220	150	100	1,000
Mining (includes oil & gas)	30	30	30	40	60	60	60	80	80	60	40	30	50
Contract Construct.	300	300	370	460	600	720	790	900	1,090	880	820	650	660
Food Processing	230	280	290	750	890	1,170	1,490	1,800	1,090	440	340	280	750
Other Manufact.	1,920	2,080	2,770	2,970	3,020	3,100	2,980	3,150	3,150	3,010	2,600	2,140	2,740
SUBTOTAL	2,640	2,850	3,610	4,680	5,690	6,750	8,670	9,270	6,730	4,650	3,980	3,230	5,230
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	1,430	1,250	1,500	1,560	1,710	1,920	1,950	2,170	1,910	1,700	1,570	1,530	1,690
Trade	1,920	1,940	2,000	2,020	2,140	2,200	2,230	2,200	2,190	2,010	1,970	2,070	2,070
Finance, Ins. & Real Estate	330	330	340	340	340	360	360	360	340	330	330	340	340
Services [c]	1,830	1,870	2,000	1,970	2,070	2,140	2,200	2,230	2,200	2,080	2,060	1,990	2,050
SUBTOTAL	5,510	5,390	5,840	5,890	6,260	6,620	6,740	6,960	6,640	6,120	5,930	5,930	6,150

TABLE 78 - Southeastern, Total Employed Workforce, 1970
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Workers [d	1,170	1,210	1,320	1,360	1,470	1,500	1,580	1,670	1,560	1,430	1,390	1,300	1,410
Commercial Fishermen Participation as Per Cent of Total Employment	.8	.8	.7	2.2	5.2	7.3	13.2	12.9	5.6	1.1	.8	.5	4.9
Commercial Fishermen Participation as Per Cent of Total Civilian Employment	.8	.8	.7	2.3	5.4	7.6	13.7	13.3	5.6	1.2	.8	.6	5.1

[a Military personnel stationed in State as of April 1 - (Alaska Command).

[b Includes self-employed, unpaid family workers and wage agricultural workers.

[c Includes domestics.

[d Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually. Commercial fishing employment from study of commercial fisheries employment by G. W. Rogers, R. Listowski and J. Brakel for U. S. Department of Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

TABLE 79 - SOUTHEASTERN REGION

TOTAL EMPLOYED WORKFORCE BY INDUSTRY & MONTH, 1965

(Rounded to nearest ten)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
TOTAL EMPLOYMENT	13,900	14,460	15,290	16,350	17,830	19,440	22,370	22,430	18,970	16,980	16,240	15,420	17,470
TOTAL CIVILIAN EMPLOYMENT	13,230	13,790	14,620	15,680	17,160	18,770	21,700	21,770	18,300	16,320	15,570	14,760	16,800
GOVERNMENT													
Fed - Military [a]	670	670	670	670	670	670	670	660	670	660	670	660	670
- Civilian	2,010	2,000	2,050	2,060	2,070	2,110	2,250	2,190	2,180	2,100	2,070	2,040	2,090
State & Local	2,930	3,020	3,100	3,090	2,910	3,100	3,160	3,420	3,440	3,280	3,200	3,220	3,160
SUBTOTAL	5,610	5,690	5,820	5,820	5,650	5,880	6,080	6,270	6,290	6,040	5,940	5,920	5,920
COMMODITY-PRODUCING INDUSTRY													
Agriculture [b]	20	20	30	30	30	30	30	40	40	30	30	30	30
Commercial Fishing	50	60	70	100	910	1,310	3,600	3,380	1,180	250	110	20	920
Mining (includes oil & gas)				10	20	20	10	10	10	10	10	10	10
Contract Construct.	370	570	640	770	809	850	870	870	890	830	730	560	730
Food Processing	210	310	360	340	610	1,010	1,650	1,610	580	340	340	280	640
Other Manufact.	1,590	1,790	2,050	2,520	2,620	2,810	2,680	2,690	2,750	2,740	2,430	2,070	2,390
SUBTOTAL	2,240	2,750	3,150	3,770	4,990	6,030	8,840	8,600	5,450	4,200	3,650	2,970	4,720
DISTRIBUTIVE INDUSTRIES													
Trans. Comm. & Public Utilities	1,460	1,370	1,520	1,690	1,830	2,010	1,930	2,060	1,980	1,660	1,640	1,530	1,720
Trade	1,460	1,460	1,490	1,570	1,620	1,660	1,660	1,640	1,630	1,600	1,570	1,630	1,580
Finance, Ins. & Real Estate	290	290	290	290	290	320	300	310	300	320	320	320	300
Services [c]	1,470	1,490	1,530	1,580	1,670	1,750	1,730	1,730	1,670	1,640	1,630	1,630	1,630
SUBTOTAL	4,680	4,610	4,830	5,130	5,410	5,740	5,620	5,740	5,590	5,220	5,160	5,110	5,230

TABLE 79 - Southeastern, Total Employed Workforce, 1965
Page 2

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual Average
UNCLASSIFIED EMPLOYMENT													
Self-Employed & Unpaid Workers [d	1,370	1,410	1,490	1,630	1,780	1,800	1,830	1,820	1,640	1,520	1,490	1,420	1,600
Commercial Fishermen Participation as Per Cent of Total Employment	.4	.4	.5	.6	5.1	6.7	16.1	15.1	6.2	1.5	.7	.1	5.3
Commercial Fishermen Participation as Per Cent of Total Civilian Employment	.4	.4	.5	.6	5.3	7.0	16.6	15.5	6.4	1.5	.7	.1	5.5

[a Military personnel stationed in State as of April 1 - (Alaska Command).

[b Includes self-employed, unpaid family workers and wage agricultural workers.

[c Includes domestics.

[d Does not include self-employed commercial fishermen. (See Methodology)

Source: Military and total population from Alaska Department of Labor, Current Population Estimates by Election Districts, Alaska, published annually.
Commercial fishing employment from study of commercial fisheries employment by G. W. Rogers, R. Listowski and J. Brakel for U. S. Department of
Commerce. All others from Alaska Department of Labor, Alaska Workforce Estimates, by Industry and Area, published annually, and office records.

TABLE 80
SOUTHEAST REGION - COMMERCIAL CATCH AND VALUE TO FISHERMEN 1960-1971

Year	S A L M O N		OTHER FISH		SHELLFISH		T O T A L	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
1960	34,238,553	6,327,373	103,268,274	3,618,628	5,339,964	293,998	142,846,791	10,239,999
61	102,565,300	12,482,830	80,212,600	5,117,810	6,343,700	364,680	189,121,600	17,965,320
62	83,425,850	12,762,640	58,441,290	6,724,220	9,104,410	744,200	150,971,550	20,231,060
63	102,412,430	14,844,120	50,271,570	3,994,530	8,909,200	797,190	161,586,200	19,635,840
64	115,948,420	15,985,610	63,653,050	4,186,790	8,264,000	752,930	187,865,470	20,925,330
1965	83,139,060	13,458,630	50,269,012	5,915,941	6,830,752	521,790	140,238,824	19,896,361
66	140,729,181	24,206,885	35,018,433	6,975,256	6,443,094	520,368	182,190,708	31,702,509
67	49,842,233	9,767,257	25,355,141	4,241,340	7,518,923	782,890	82,716,297	14,791,487
68	134,982,258	23,920,389	8,534,786	912,286	9,357,288	2,823,547	152,854,332	27,656,220
69	38,916,476	9,620,381	16,380,503	2,920,653	7,022,598	1,649,020	62,319,577	14,190,054
1970	76,586,332	15,283,791	19,226,773	4,080,004	4,430,870	634,501	100,243,975	19,998,296
71	66,141,642	14,091,257	16,726,594	3,198,546	3,536,456	678,220	86,404,692	17,968,023

SOURCE: Alaska Department of Fish and Game

TABLE 80
SOUTHEAST REGION - COMMERCIAL CATCH AND VALUE TO FISHERMEN 1960-1971

Year	S A L M O N		OTHER FISH		SHELLFISH		T O T A L	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
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SOURCE: Alaska Department of Fish and Game

important form of gear today. Drift gillnets and trolls are also significant. A comparison of salmon catch by month and gear is presented in Table 82 for the period 1965-1970. As in other regions, the purse seine is the most efficient gear in terms of fish caught per man-month of effort (at the peak, four times the productivity of drift and set nets and ten times the productivity of the troll).

The continuation of fishing with this diversity of gear characterized by such a range of relative productivity or efficiency is explained by the range of specialized harvesting techniques required by each species of salmon. Looking at the same period (1965-1970) the catch by species and gear leads to major qualifications to the conclusions drawn from over-simplified analysis appropriate to a highly specialized salmon fishery such as Bristol Bay. Table 83 indicates that although troll gear may appear to be the least efficient in terms of total numbers of fish caught, it is virtually the only gear taking king salmon and is the most important form of gear in the taking of cohos. Purse seines which are tops in terms of number of fish caught per unit of effort, on the other hand, take virtually no kings and are most heavily specialized in the taking of pinks or humpback salmon. If efficiency is measured in terms of ability to harvest king salmon in southeast Alaska, therefore, the conclusion would be that troll gear is the most efficient and purse seines the least efficient gear.

A further qualification which must be made in interpreting relative gear efficiency is the relative importance of sports/commercial fishermen in the harvest employment and catch statistics. As discussed in Chapter II and elsewhere, the sports/commercial fishermen are part-time, weekend, or vacation fishermen. Frequently, their participation in commercial fishing is only a token effort serving purposes of paying part of pleasure craft operating expenses or providing an income tax write off. Segregation of this class of fishermen is important to an accurate analysis of commercial fishing effort, but unfortunately it is difficult to accomplish. An attempt was made to get an indication of the effect of sports/commercial fishing by a classification of southeast 1969 troll license data by power trollers and hand trollers. The assumption made is that the first are full time commercial fishermen and the second are sports/commercial fishermen. This is a reasonable enough assumption, although it should be remembered that there are exceptions in both cases. The preliminary results are summarized

TABLE 82

SOUTHEASTERN REGION - MONTHLY SALMON FISHING EMPLOYMENT AND CATCH BY GEAR -- SIX-YEAR AVERAGES -- 1965-1970

<u>Gear</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
<u>Employment</u> (Weekly average per month)										
Purse Seine	-	-	-	95	1,883	1,801	354	5	-	-
Drift Gillnet	-	-	27	224	562	497	355	21	-	-
Set Gillnet	-	-	-	63	112	68	81	1	-	-
Troll	<u>28</u>	<u>122</u>	<u>376</u>	<u>604</u>	<u>692</u>	<u>757</u>	<u>276</u>	<u>89</u>	<u>44</u>	<u>16</u>
TOTAL	28	122	403	986	3,249	3,123	1,066	116	44	16
<u>Catch</u> (Thousands of fish)										
Purse Seine	-	-	-	72	5,455	8,111	260	-	-	-
Drift Gillnet	-	-	2	83	448	510	294	21	-	-
Set Gillnet	-	-	-	51	63	48	98	-	-	-
Troll	<u>1</u>	<u>5</u>	<u>43</u>	<u>122</u>	<u>300</u>	<u>339</u>	<u>69</u>	<u>6</u>	<u>3</u>	<u>1</u>
TOTAL	1	5	45	328	6,266	9,008	721	27	3	1
<u>Productivity</u> (Thousands of fish per man-month)										
Purse Seine	-	-	-	.76	2.90	4.50	.73	-	-	-
Drift Gillnet	-	-	.07	.37	.80	1.03	.83	1.00	-	-
Set Gillnet	-	-	-	.81	.56	.71	1.21	-	-	-
Troll	<u>.04</u>	<u>.04</u>	<u>.11</u>	<u>.20</u>	<u>.43</u>	<u>.45</u>	<u>.25</u>	<u>.07</u>	<u>.07</u>	<u>.06</u>
TOTAL	.04	.04	.11	.33	1.93	2.88	.68	.23	.07	.06

in Table 84.^{/2} This indicates that 53.2 percent of the troll boats and 57.4 percent of the fishermen licensed to fish commercially in 1969 caught only 13.5 percent of the harvest by that form of gear.^{/3} Man-month data is not presently available on this basis, but the man-month productivity of power trollers should clearly be higher than that of the hand trollers who in most cases are also operating vessels designed for pleasure rather than work.

Commercial Fishermen - Income and Other Characteristics

The survey of 1969 Alaska Income Tax returns of fishermen yielded data on a sample of 850 resident and 297 nonresident commercial fishing vessel operators (Table 85). Resident salmon seiners grossed from fishing on the average almost twice the amount grossed by nonresident seiners, but the average grossed by resident operators of all forms of gear was pulled below the nonresident gross by the average low gross of resident trollers (\$3,546 as compared to \$6,176 average for nonresident trollers). On the other hand, the resident trollers were the only group with Alaska income from all sources above gross fishing receipts. In fact, they had almost three times as many fishing receipts.

The explanation for this apparent anomaly is the presence of the sports/commercial fisherman in the troll gear data. As part of the 1969 survey, the Department of Revenue auditors compiling fisherman income tax data were instructed to code clearly identifiable sports/commercial fishermen. A total of 223 salmon trollers were so identified and only six gillnetters and two halibut multiple-gear operators. Although the 231 identified sports/commercial operators accounted for only seven percent of the total statewide sample, 233 sports/commercial trollers accounted for 32 percent of the total troll gear sample. As only three percent of the total statewide sample of trollers was located outside southeast Alaska, the troll data can be taken as reasonably representative of conditions in this region.

Table 86 summarizes the average 1969 Alaska income from all sources and the average gross fishing receipts for these two categories of trollers. The first income distribution pattern for each contrasts sharply. Sports/commercial

^{/2}The preliminary incomplete nature of this data must be emphasized. Time did not permit further checking on accuracy of the compilation, but it can be taken as a reasonable indicator.

^{/3}These conclusions are based on the assumption that the coho (silver) troll catch is divided between power and hand trollers in the same proportion as the catch for which data was available.

TABLE 84

SOUTHEAST REGION - ESTIMATED POWER AND TROLLER KING
AND PINK SALMON CATCH AND EMPLOYMENT - 1969/a

	<u>Resident</u>	<u>Nonresident</u>	<u>Total</u>	<u>Percent</u>
<u>Total Number Boats Fishing</u>				
Power Troller	551	223	778	46.8
Hand Troller	810	74	884	53.2
Total	1,365	297	1,662	100.0
		Unknown	45	
	Total All Troll Boats		1,707	
<u>Estimated Number Fishermen</u>				
Power Troller	580	230	810	42.6
Hand Troller	899	92	991	57.4
Total	1,579	322	1,901	100.0
<u>Thousands of Pounds of King and Pink Salmon Caught/b</u>				
Power Troller	2,317.8	1,337.7	3,655.5	86.5
Hand Troller	390.2	181.8	572.0	13.5
Total	2,708.0	1,519.5	4,227.5	100.0

/aPreliminary. Subject to revision upon completion of revised printout.

/bBreakdown of Coho (silver) troll catch of 2,836,101 pounds not available at this time.

SOURCE: Alaska Department of Fish and Game

TABLE 85

SOUTHEASTERN REGION - VESSEL OPERATORS' INCOME BY GEAR AND
RESIDENCE - 1969

	Number	%	Average Alaska Income	
			All Alaska sources ^a	Fishing Receipts ^b
<u>ALL OPERATORS (Including "residence not indicated")</u>				
Salmon - gillnet	223	19.3	\$4,936	\$ 7,547
seine	165	14.3	2,912	14,510
trolling	678	58.8	7,869	4,104
Sub-Total	1,066	92.4	\$6,488	\$ 6,435
Halibut	49	4.2	7,069	15,582
Crab	23	2.0	7,157	26,899
Shrimp	5	.4	2,304	5,684
All other (herring not identified)	11	1.0	4,600	5,026
Total	1,154	100.0	\$6,490	\$ 7,214
<u>RESIDENTS</u>				
Salmon - gillnet	147	17.3	\$6,137	\$ 6,829
seine	94	11.1	5,002	18,192
trolling	541	63.6	9,258	3,546
Sub-Total	782	92.0	\$8,160	\$ 5,924
Halibut	38	4.5	7,653	14,660
Crab	21	2.5	7,598	28,218
Shrimp	3	.4	6,102 ^c	4,017 ^c
All other	6	.6		
Total	850	100.0	\$8,102	\$ 6,845
<u>NON-RESIDENTS</u>				
Salmon - gillnet	76	25.6	\$2,613	\$ 8,934
seine	68	22.9	(128)	9,165
trolling	134	45.1	2,370	6,176
Sub-Total	278	93.6	\$1,825	\$ 18,764
Halibut	11	3.7	5,050	
Crab	2	.7		
Shrimp	1	.3	1,702 ^c	8,571 ^c
All other	5	1.7		
Total	297	100.0	\$1,941	\$ 8,097

a Adjusted gross income, line 15a, Alaska Individual Income Tax Return, form DR600. Includes net profit (loss) from fishing, business, wages, salaries, etc. earned within Alaska.

b "Total gross receipts from sale of all fishing products sold in Alaska and the receipts from fishing products caught in Alaska waters but sold outside of Alaska", line 4, Alaska Individual Income Tax Return, Schedule DRF-1, "Information Schedule on Fishermen"

c Combined to avoid disclosure

TABLE 86

SOUTHEAST REGION - COMMERCIAL AND SPORTS/COMMERCIAL SALMON
TROLLERS BY GROSS FISHING RECEIPTS AND TOTAL
ALASKA INCOME, ALL SOURCES - 1969

Thousands of Dollars	Average Alaska Income, All Sources				Average Gross Fishing Receipts			
	Commercial Number	Percent	Sports/Commercial Number	Percent	Commercial Number	Percent	Sports/Commercial Number	Percent
(Loss)	47	9.8	3	1.4	-	-	-	-
\$ 0. - 0.9	66	13.8	1	0.4	91	19.0	200	89.7
1. - 1.9	64	13.4	-	-	60	12.6	16	7.2
2. - 2.9	51	10.7	-	-	58	12.1	3	1.3
3. - 3.9	37	7.7	1	0.4	43	9.0	4	1.8
4. - 5.9	54	11.3	7	3.1	65	13.6	-	-
6. - 7.9	43	9.0	18	8.1	49	10.3	-	-
8. - 9.9	34	7.1	25	11.2	33	6.9	-	-
10. - 12.9	34	7.1	52	23.3	25	5.2	-	-
13. - 15.9	20	4.2	45	20.2	14	2.9	-	-
16 & over	28	5.9	71	31.9	40	8.4	-	-
<u>TOTAL</u>	<u>478</u>	<u>100.0</u>	<u>223</u>	<u>100.0</u>	<u>478</u>	<u>100.0</u>	<u>223</u>	<u>100.0</u>

SOURCE: Commercial Fishermen Survey 1969 Alaska Income Tax returns.

vessel operators with income of \$16,000 or over accounted for 31.8 percent of the sample as compared with only six percent of the commercial trollers. Only five percent of the sports/commercial trollers had total incomes under \$6,000 per year as compared with 67 percent of the commercial trollers. In contrast 89.7 percent of the sports/commercial trollers grossed less than \$900 from fishing while 81.2 percent of the commercial trollers grossed more than \$1,000.

Table 87 summarizes vessel operators' income by age, gear, and residence for 1969. In general, the patterns are not substantially different from the other regions of this study. Table 88 summarizes the troller sample by age and commercial and sports/commercial classifications. The median age of the commercial fisherman falls within the 40-49 age bracket while the sports/commercial median is in the 30-39 bracket. The dropping off point in the first group comes immediately after the 60-69 age bracket and the second group after 50-59 years.

All of this analysis merely provides some documentation for the general observation that a significant proportion of the region's trollers are really pleasure craft owners who earn substantial incomes from other activities and only nominal amounts from fishing.

TABLE 87

SOUTHEASTERN REGION - VESSEL OPERATORS' INCOME BY AGE, GEAR AND RESIDENCE - 1969

	AGE GROUP										
	Total	Under 19 yrs.	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over	Age not known
<u>ALL OPERATORS - All gear and species (including "other" and "gear not indicated")</u>											
Number	1,154	22	166	251	269	255	140	33	1	-	17
%	100.0	1.9	14.4	21.8	23.3	22.1	12.1	2.9	.1	-	1.5
Average Alaska Income all sources ^a	\$6,490	1,402	6,875	8,455	7,232	5,811	3,712	3,060	c	-	8,575
Average gross fishing receipts ^b	\$7,214	2,014	5,484	7,156	8,904	7,747	6,496	5,699	c	-	6,245
<u>ALL OPERATORS - Salmon - gillnet (A)</u>											
Number	223	9	29	43	51	57	25	4	-	-	5
%	100.0	4.1	13.0	19.3	22.9	22.5	11.2	1.8	-	-	2.2
Average Alaska Income all sources ^a	\$4,936	1,815	4,049	7,162	5,324	4,527	4,189	c	-	-	6,116
Average gross fishing receipts ^b	\$7,547	3,699	5,165	10,802	7,842	6,968	7,885	c	-	-	5,657
<u>ALL OPERATORS - Salmon - Seine (B)</u>											
Number	165	-	19	37	44	41	17	4	-	-	3
%	100.0	-	11.5	22.4	26.7	24.8	10.3	2.4	-	-	1.8
Average Alaska Income all sources ^a	\$2,912	-	3,564	4,854	2,065	2,260	2,896	c	-	-	c
Average gross fishing receipts ^b	\$14,510	-	18,467	13,658	15,194	13,898	12,460	c	-	-	c
<u>ALL OPERATORS - Salmon - Trolling (C)</u>											
Number	678	12	105	157	151	138	83	22	1	-	9
%	100.0	1.8	15.5	23.2	22.3	20.4	12.2	3.2	.1	-	1.3
Average Alaska Income all sources ^a	\$7,896	1,139	8,466	10,110	9,142	6,908	3,725	4,164	c	-	12,142
Average gross fishing receipts ^b	\$4,104	854	3,032	4,287	4,363	4,892	4,087	2,452	c	-	5,996

TABLE 87 (Continued)
A G E G R O U P S

	Total ^D	Under 19 yrs.	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90 and over	age not known
<u>ALL OPERATORS - Halibut (D)</u>											
Number	49	1	9	8	9	10	9	3	-	-	-
%	100	2.0	18.4	16.3	18.4	20.4	18.4	6.1	-	-	-
Average Alaska income all sources ^a	\$7,069	c	6,756	3,654	10,007	10,368	4,546	c	-	-	-
Average gross fishing receipts ^b	\$15,582	c	3,028	8,780	33,060	17,918	14,558	c	-	-	-
<u>ALL OPERATORS - Crab (E)</u>											
Number	25	-	2	5	9	5	2	-	-	-	-
%	100	-	8.7	21.7	39.2	21.7	8.7	-	-	-	-
Average Alaska income all sources ^a	\$7,157	-	c	3,889	9,003	10,831	c	-	-	-	-
Average gross fishing receipts ^b	\$26,899	-	c	15,614	38,258	24,571	c	-	-	-	-
<u>RESIDENTS - All Gear and Species (including "Other" and "gear not indicated")</u>											
Number	850	20	135	188	201	172	93	28	1	-	12
%	100	2.4	15.9	22.1	23.7	20.2	10.9	3.3	.1	-	1.4
Average Alaska Income all sources ^a	\$8,102	1,459	7,726	10,389	9,293	7,732	4,608	3,576	c	-	11,120
Average gross fishing receipts ^b	\$6,845	1,979	5,022	6,511	9,162	7,360	6,012	5,903	c	-	3,693
<u>NON-RESIDENTS - All gear and Species (including "other" and "gear not indicated")</u>											
Number	297	2	31	62	66	81	46	4	-	-	5
%	100	.7	10.4	20.9	22.2	27.3	15.5	1.3	-	-	1.7
Average Alaska Income all sources ^a	\$1,941	c	3,167	2,756	941	1,769	1,901	c	-	-	2,465
Average gross fishing receipts ^b	\$8,907	c	7,498	9,145	7,695	8,314	7,291	c	-	-	12,370

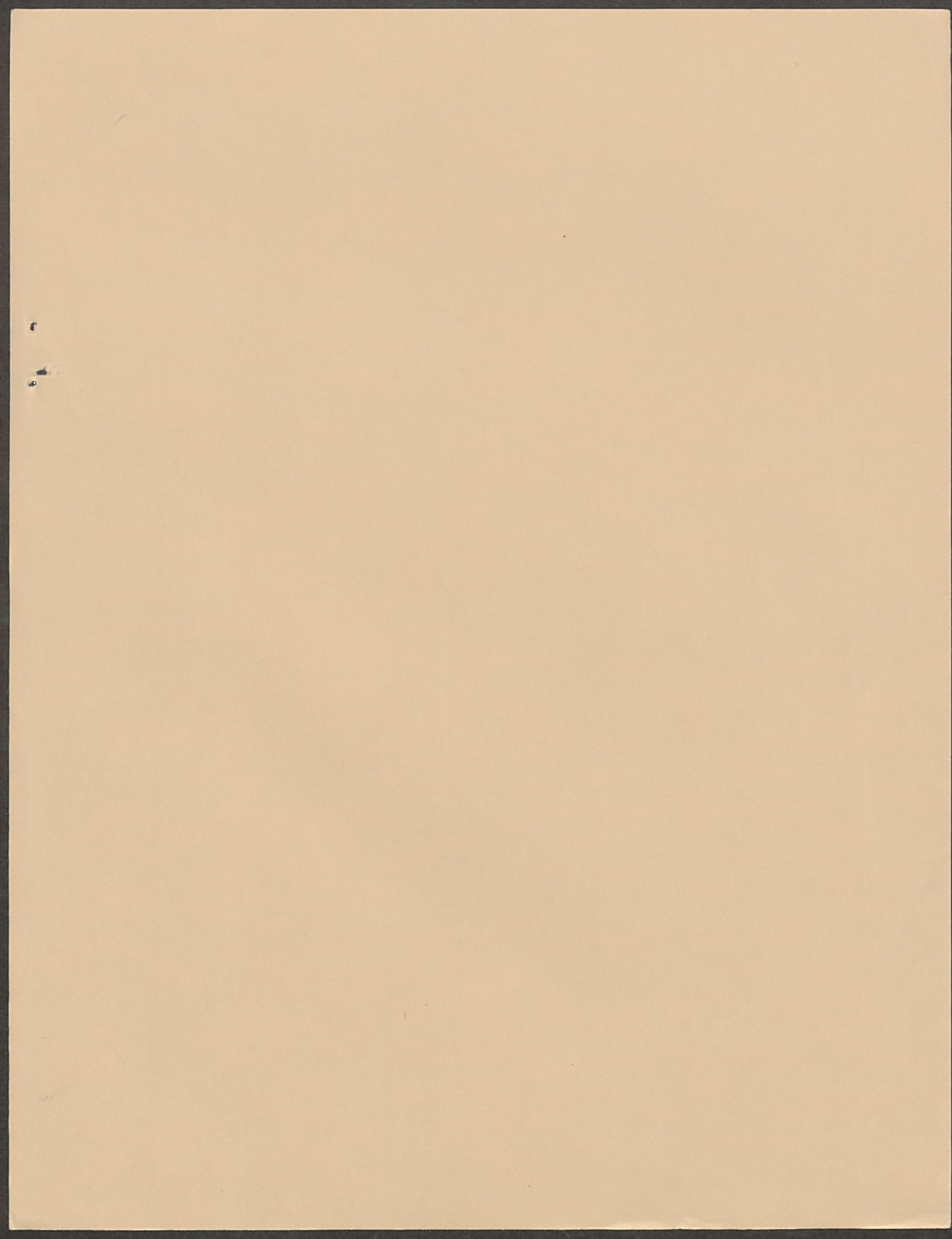
TABLE 88
 SOUTHEAST REGION - COMMERCIAL AND SPORTS/COMMERCIAL
 SALMON TROLLERS - BY AGE - 1969

Age Group	Commercial/a		Sports/Commercial/b	
	Number	Percent	Number	Percent
19 and under	11	2.5	1	0.4
20-29	59	13.2	46	19.9
30-39	82	18.3	75	32.4
40-49	90	20.1	61	26.4
50-59	102	22.9	36	15.6
60-69	78	17.4	5	2.2
70-79	20	4.5	2	0.9
80-89	1	0.2	-	-
90 and over	-	-	-	-
Age unknown	4	0.9	5	2.2
TOTAL	447	100.0	231	100.0

^{/a}Includes 16 trollers from Central Region and three from Arctic-Yukon-Kuskokwim Region.

^{/b}Includes six gillnet and two halibut multiple-gear sports/commercial vessel operators.

SOURCE: Commercial fishermen survey of 1969 Alaska Income Tax returns.



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