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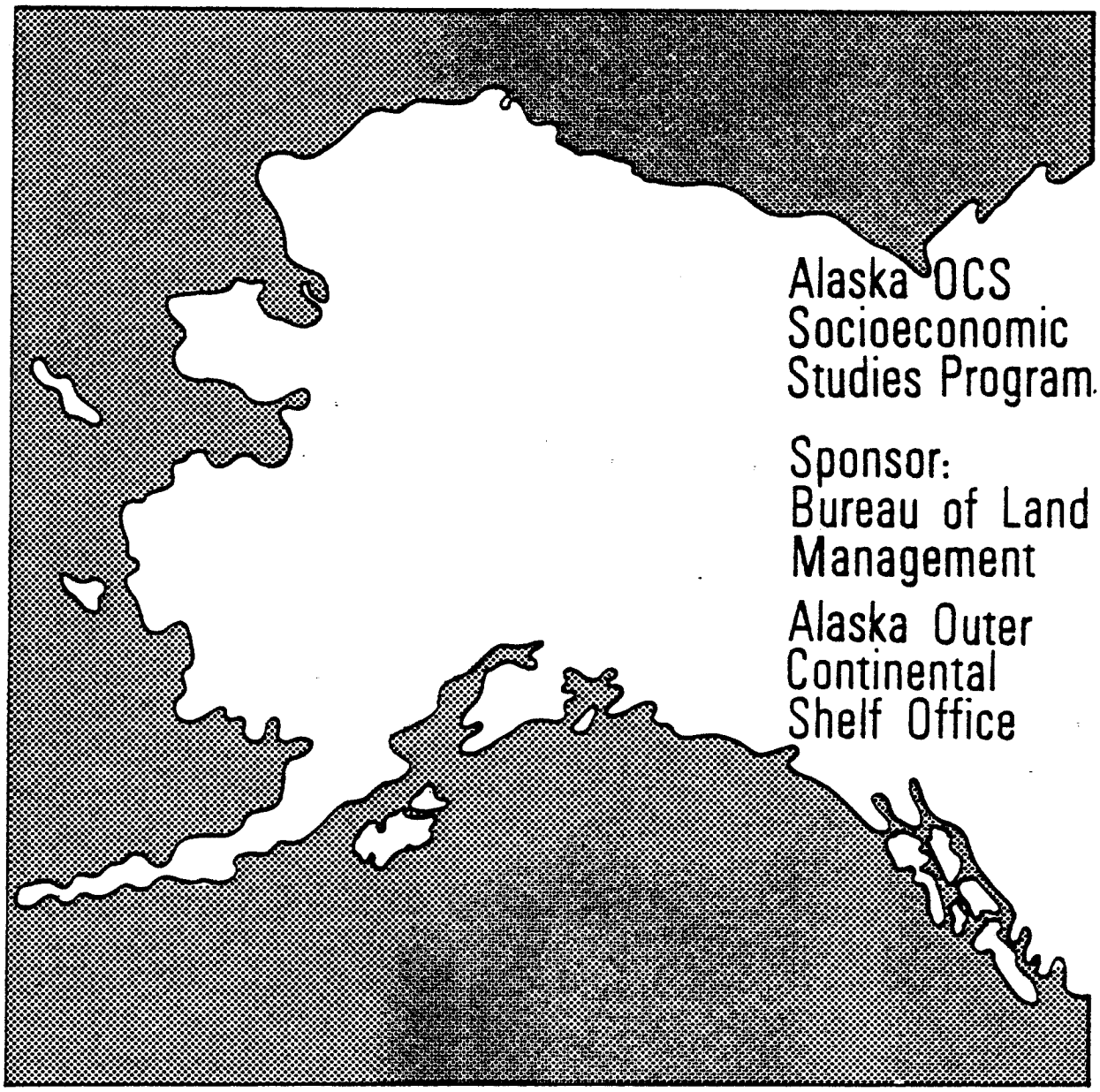

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St. George Basin
Petroleum Development Scenarios
Economic & Demographic Analysis

TECHNICAL REPORT NO. 57

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ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM

ST. GEORGE BASIN PETROLEUM DEVELOPMENT SCENARIOS ECONOMIC AND DEMOGRAPHIC ANALYSIS

PREPARED FOR

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ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM
ST. GEORGE BASIN PETROLEUM DEVELOPMENT SCENARIOS
ECONOMIC AND DEMOGRAPHIC ANALYSIS

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I. INTRODUCTION

The present study provides the historic baseline analysis and base case projections against which the economic effects of the proposed St. George Basin OCS lease sale are measured. The analysis and projections are carried out at the statewide level and for selected regions within the state economy. The regions include the Anchorage, Southcentral, and Southwest regions of the Man-in-the-Arctic Program (MAP) models. In addition, the baseline analysis and projections have also been carried out at the subregional level for the Aleutian Islands Census Division. In this instance, projections have been made utilizing the Institute's Small Community Population Impact Model (SCIMP).

Part II of the study contains the historical baseline analysis for each of the economic areas in question and generally focuses on specific economic and demographic concerns relevant to an understanding of the historic growth of the economies. The baseline analysis also assists in laying the foundation for assumptions regarding future growth of the areas. Particular emphasis has been placed on the analysis of the Aleutian Islands Census Division for two reasons. First, this is the first ISER-OCS lease sale analysis which has called specifically for study at the census division level. Second, and more important, is the fact that the Aleutian Islands Census Division can expect the greatest relative (although perhaps not absolute) impact resulting from the proposed OCS sale.

Part III contains three important elements. First, the underlying projection methodology is explained and reviewed in terms of the accuracy and limitations of the projection methodology and the projections themselves. Second, the assumptions necessary to "drive" the models are presented. Finally, the base case projections for the respective areas are presented.

Part IV of the study presents a description and analysis of the projected impacts associated with the proposed St. George Basin sale. Results for the mean and low case scenarios are discussed, both at the statewide and regional levels. Supporting materials are contained in the appendices.

II. STATEWIDE AND REGIONAL GROWTH: THE BASELINE HISTORICAL ANALYSIS

The Statewide Economy: Statehood - 1978

In carrying out the historic baseline studies, either for Alaska or the regions, it is important to keep in mind the purpose of the analysis. There are three primary objectives involved. First, the analysis should provide the uninitiated reader with a general sense of the structure of the economy and how and why it has changed over time. Second, the study should provide some indication of how individuals within the system have benefited from the functioning of the system; i.e., an assessment of economic well-being. Third, the baseline history should provide guidance in developing assumptions regarding future development of the economy.

Hence, the historical baseline study is not simply a description of the economy, but rather provides an analysis of the growth and changes in the system, the dimensions of economic well-being, and its future prospects. With these comments in mind, we can now turn to the baseline study of the state as a whole.

At the risk of oversimplification, the economic history of Alaska can be summarized as one of resources, defense, disaster, more resources, and government. Prior to World War II, interest in the state focused largely on natural resource exploitation, primarily based on furs, fish, and hard rock minerals. World War II and the cold war aftermath lead to a sizeable military-government involvement in the state, both in terms of population and economic activity.

The advent of statehood found an economy reflecting a narrowly based private sector, largely dependent upon limited natural resource activity, and a large federal civilian and military presence. In 1960, for example, federal civilian wages and salaries accounted for 25 percent of the total civilian wage bill, while state government (5.9 percent) and local government (5.1 percent) made up an additional 11 percent of total wage and salary payments. When military payrolls are included, 42.5 percent of wage and salary income was accounted for by government.

Discovery of the Swanson River oil field in 1957 had done much to raise expectations about future economic prospects, but it was not until major discoveries in Cook Inlet during 1965 that the oil and gas industry became firmly established and significant levels of production were assured. The emergence of petroleum resources as a significant factor in the Alaska economy considerably improved the potential for private sector development and, more importantly, helped to shore up the extremely shaky fiscal base of state government.

For the mid- and latter part of the decade of the 1960s, it was to be natural disaster that provided much of the impetus for economic growth. The Good Friday earthquake of 1964 resulted in a major reconstruction effort which supported levels of economic activity that probably would not have been achieved otherwise. A second disaster, of lesser statewide magnitude but of great consequence for the Fairbanks region, was the flood of 1967. Disaster relief and reconstruction funds, followed later by flood control projects, provided a needed boost for the region's economy.

Discovery of oil at Prudhoe Bay in 1968 marks the beginning of the latest phase of Alaska economic history. Development of the supergiant field, construction of the oil pipeline, and the related flows of revenue to state government are providing the impetus for sustained economic growth and diversification that should carry the state well into the 21st century.

Against this backdrop, we can now look more specifically at several important dimensions of growth and change in the Alaska economy. As suggested earlier, there are certain key measures of economic activity that are central to the analysis. Personal income and employment data provide insight into the overall growth of the economy and changes in the composition of economic activity. In addition, these data can be used as general indicators of changes in economic well-being over time. An important corollary variable is population growth. It is also instructive to review aggregate measurs of production for the economy.

In addition to these general measures of economic activity, there are several specific attributes of the economy that need to be considered. These include such topics as secular and seasonal unemployment, the structure of costs and prices, and the role of state government with respect to determining overall economic activity. Finally, we must consider issues related to potential future economic activity. We now turn to specific measures of the economy.

PRODUCTION

Data measuring the gross value of production by industrial classification are not available for recent years. However, various measures of the value of output for selected industries have been compiled and are presented in Table 1. Except for agriculture, the industries reflect the primary "export base" components of the private sector economy. Data on federal and total government expenditures have also been included for comparative purposes. Furthermore, a large portion of federal government outlays indirectly reflects an export of goods and services by the private sector economy of Alaska.

Fisheries and petroleum have clearly dominated growth in the value of production in the private sector. Value of catch to fishermen has grown at an average annual rate of 15 percent over the period, and wholesale value has grown almost as rapidly (14.4 percent), reflecting both the substantial growth of shellfishing and rising product prices. When deflated by the consumer price index (which is appropriate if we are interested in implicit purchasing power), the value of catch grew at almost 10.3 percent and the wholesale value by 9.5 percent. Crude oil and natural gas percentage growth rates are relatively meaningless since the base in 1960 is negligible, but their significance is obvious. It is also worth noting that in 1978 (the last year for which data are available) production of minerals other than oil and gas and sand and gravel amounted to 18.4 million dollars, or about 0.6 percent of the total value of mineral production. Neither has there been any significant change in the value of this dimension of mining over the past two

Table 1. Value of Production for Selected Industries
Various Years, 1960-1979

(millions of current dollars)

Industry	Agriculture	Forestry	Fisheries				Oil & Gas		Federal Government Outlays in Alaska (FY)	Total Government Spending in Alaska (FY)
			Value to Fishermen			Wholesale Value	Crude Oil	Dry Gas		
Year			Salmon	Shellfish	Total					
1960	5.6	47.3	33.6	3.1	40.9	96.7	1.2	.03	155.8	N.A.
1961	5.7	48.0	35.7	5.1	46.5	128.7	17.7	.129	N.A.	N.A.
1962	5.7	52.3	42.1	7.1	58.4	131.9	31.2	.467	N.A.	N.A.
1963	5.3	54.1	31.3	9.6	46.9	109.0	32.7	1.1	N.A.	N.A.
1964	5.6	61.0	41.4	10.0	56.8	140.9	33.6	1.7	N.A.	N.A.
1965	5.3	57.5	48.3	14.5	70.1	166.6	34.1	1.8	533.7	N.A.
1966	5.3	71.2	54.2	17.6	81.9	197.3	44.1	6.3	N.A.	N.A.
1967	5.2	80.6	24.6	18.3	48.8	126.7	88.2	7.3	N.A.	N.A.
1968	4.9	89.2	49.5	27.9	79.9	191.7	186.7	4.4	N.A.	N.A.
1969	4.3	101.0	40.6	20.8	68.1	144.2	214.5	12.7	N.A.	N.A.
1970	5.2	93.7	68.0	20.5	97.5	213.9	232.8	18.2	728.7	N.A.
1971	5.0	103.5	51.4	26.0	85.5	198.7	234.3	18.0	852.9	N.A.
1972	6.0	82.3	45.3	33.6	92.4	185.7	221.7	18.0	989.4	N.A.
1973	7.0	131.4	60.1	61.4	142.4	283.0	239.6	19.5	1018.6	1592
1974	8.1	154.7	65.7	62.8	144.8	254	347.4	22.5	1135.9	1730
1975	9.2	133.5	55.3	55.4	129.4	293	364.6	42.8	1326.8	2000
1976	8.8	149.5	118.0	96.5	239.6	452	318.8	60.5	1368.1	2226
1977	9.9	179.3	171	157	349	723[p]	988.9	66.6	1544.9	2524
1978	9.2	N.A.	238[p]	272[p]	543[p]	1118[p]	2701.5	89.6	1753.0	2845[e]
1979	9.1[p]	N.A.	317[p]	231[p]	606[p]	1243[p]	5493.6[p]	91.5	1932.2	3147

p = preliminary
e = estimate
N.A. = not available

SOURCE: See Table 1 Notes

Table 1 Notes

The data are primarily obtained from selected tables in The Alaksa Economy: Year-End Performance Report 1978 (Alaska Department of Commerce and Economic Development, Division of Economic Enterprise; Juneau, Alaska) and Alaska Statistical Review (Alaska Department of Commerce and Economic Development, Division of Economic Enterprise; Juneau, Alaksa, 1980). The latter source is a preliminary report. Specific sources for each column of the table follow.

Agriculture: page B-13 Alaska Statistical Review (ASR). Value of sales is approximately 74 percent of value of production, with the balance being used on farm.

Forestry: Data from 1960-1971 are from Alaska Statistical Review (1972), p. 90, and reflect total end product value. For 1972-1977, the data are from the 1978 Year End Performance Report and reflect only forest product exports. Here the series are not comparable, but individually reflect growth in the periods in question. Comparable series are not available over the full period.

Fisheries: Data for 1972-1975 are from the 1978 Year End Performance Report, p. 58. 1976 data are from Alaska Catch and Production: 1976 (Alaska Department of Fish and Game). 1977-1979 data are from ASR (1980). 1960-1971 data are from ASR (1972) p. 74. Data for 1960-71, 1976-79 are comparable. Data for 1972-75 represent approximately 92 percent of total wholesale value.

Oil and Gas: ASR (1980) p. B-3. It should be noted that these data do not include value added in transportation and here reflect approximate wellhead value.

Federal Government Outlays in Alaska: 1960-1977 data are from 1978 Year End Report, p. 105. 1978-1979 data are from ASR (1980), p. E-2. Data are for fiscal year ending in given calendar year.

Total Government Spending in Alaska: Data from ASR (1980) p. E-1. The total is net of intergovernmental transfers.

decades. In deflated dollars, federal government expenditures have grown at about 9.3 percent.

Government expenditures are not directly comparable to the value of production in other industries since they reflect not only government production (wages and salaries) but purchases of goods and services and transfer payments to individuals. However, in another sense these expenditures do reflect a measure of demand for production of goods and services throughout the economy as a whole and underscore the continuing importance of government spending in the economy.

Of particular significance in overall government spending is the role of state government spending. The state fiscal history can roughly be divided into three periods: early post-statehood, Prudhoe Bay sale to pipeline completion, and Prudhoe Bay production.

During the first period, federal government grants, both statehood transition grants and others, were an important component of state government revenues. The relative decline in federal grants were more than offset by revenues linked to general economic growth and the development of Cook Inlet petroleum resources, but expenditures were constrained by available revenues.

The $900 million Prudhoe Bay lease sale in the fall of 1969 ushered in the second period and led to an immediate doubling of state government expenditures. Growth in expenditures continued rapidly, although still

constrained by available revenues and the rapidly diminishing balance of the lease sale. The third period is marked by the commencement of production from Prudhoe Bay; and, for the first time, the state has significant potential surplus revenues.

The rapid expansion of revenues since 1969 has resulted in a closely correlated growth of state government expenditures. This is reflected not only in expanding state government employment and wages but also by total government expenditures for purchases of goods and services and transfers to local government. The net result has been that state government spending (both directly and through local government) has assumed a significant role in the overall determination of economic activity in Alaska. This is a pattern which will prevail for some time into the future.

In summary, the role of natural resources in the growth of the Alaska economy has been dominated by fisheries and petroleum. Forest products have remained regionally important, primarily for Southeast Alaska, but have not demonstrated significant growth. Agriculture has remained stagnant, and, in real terms, the value of production has declined. Government has remained a major force in the economy, with state and local government increasing in relative proportion to total government.

EMPLOYMENT, UNEMPLOYMENT, AND WORK FORCE

Analysis of employment, unemployment, and work force data is important for several reasons. First, since labor is one of the key factors of

production, employment data provide a general indicator of the growth and composition of production over time. The main deficiency with these data for such purposes is that they ignore changes in factor proportions over time and differences in factor proportions between industries. This omission is particularly important in industries that are highly capital-intensive, such as the petroleum industry. Also, since these data are based on job counts, they do not reflect actual man hours of production and, hence, provide only an approximate measure of labor input.

Second, work force data, in conjunction with total employment data, determine unemployment. It is instructive to observe the patterns of unemployment over time and in response to changes in total economic activity. Third, the data are useful in measuring seasonal patterns of economic activity and how this may have changed over time.

Tables 2 and 3 provide summary data on employment, labor force, and unemployment for selected years over the 1960-1978 period. Total employment over this period grew at an annual average rate of 4.9 percent. However, substantial variation in the growth rate is evident. From 1960-1973, the rate was 3 percent; while for 1974-1978 (reflecting the pipeline boom) the rate was 8.6 percent. The growth of the civilian labor force shows a similar pattern, although increasing at a slightly higher rate. The result of this is that total unemployment has grown at about 7 percent per year over the period and the unemployment rate has also increased.

TABLE 2. CIVILIAN EMPLOYMENT, UNEMPLOYMENT, AND LABOR FORCE 1960, 1965, 1970-1978, BY BROAD INDUSTRY CLASSIFICATION (in thousands)

	1960		1965		1970		1971		1972		1973		1974		1975		1976		1977		1978	
Total Civilian Labor Force	73.6		89.8		91.6		97.7		103.6		109.1		125.6		156.0		168.0		174.0		181.0	
Total Unemployment	5.9		7.7		6.5		8.0		8.6		9.3		9.9		10.8		14.0		16.0		20.0	
% of Total Labor Force	8.0%		8.6%		7.1%		8.2%		8.3%		8.5%		7.9%		6.9%		8.3%		9.2%		11.0%	
Total Employment	67.7		82.1		85.1		89.6		95.0		99.9		115.7		145.3		154.0		158.0		161.0	
	Emp.	%	Emp.	%	Emp.	%	Emp.	%	Emp.	%	Emp.	%	Emp.	%	Emp.	%	Emp.	%	Emp.	%	Emp.	%
Non-Agricultural Wage and Salary Employment	56.9	100.0	70.5	100.0	92.5	100.0	97.6	100.0	105.4	100.0	111.2	100.0	129.7	100.0	163.7	100.0	173.5	100.0	166.0	100.0	163.2	100.0
Mining	1.1	1.9	1.1	1.6	3.0	3.2	2.4	2.5	2.1	2.0	2.0	1.8	3.0	2.3	3.8	2.3	4.0	2.3	5.0	3.0	5.6	3.4
Contract Construction	5.9	10.4	6.5	9.2	6.9	7.5	7.4	7.6	7.9	7.5	7.8	7.0	14.1	10.9	25.9	15.8	30.2	17.4	19.5	11.7	12.2	7.5
Manufacturing	5.8	10.1	6.2	8.8	7.8	8.4	7.8	8.0	8.1	7.7	9.4	8.5	9.6	7.4	9.6	5.9	10.3	5.9	10.9	6.6	11.5	7.0
Food Processing	2.8	4.9	3.0	4.3	3.7	4.0	3.6	3.7	3.7	3.5	4.6	4.1	4.3	3.3	4.3	2.6	5.1	2.9	5.5	3.3	6.3	3.9
Logging, Lumber, Pulp	2.2	3.9	2.3	3.3	2.8	3.0	2.8	2.9	2.8	2.7	3.2	2.9	3.6	2.8	3.4	2.1	3.2	1.8	3.5	2.1	1.8	1.1
Transportation, Communications Public Utilities	6.8	12.0	7.3	10.4	9.1	9.8	9.8	10.0	10.0	9.5	10.4	9.4	12.4	9.6	16.5	10.1	15.8	9.1	15.6	9.4	16.4	10.0
Trade	7.7	13.5	10.0	14.2	15.4	16.6	16.1	16.5	17.1	16.2	18.3	16.5	21.1	16.3	26.2	16.0	27.6	15.9	28.5	17.2	28.8	17.6
Finance, Insurance, Real Estate	1.4	2.5	2.2	3.1	3.1	3.4	3.2	3.3	3.7	3.5	4.2	3.8	4.9	3.8	6.0	3.7	7.1	4.1	7.8	4.7	8.2	5.0
Services	5.6	9.8	7.5	10.6	11.4	12.3	12.5	12.8	14.0	13.3	15.2	13.7	18.3	14.1	25.1	15.3	27.7	16.0	27.4	16.5	27.6	16.9
Government	22.7	39.9	29.7	42.1	35.6	38.5	38.0	38.9	41.7	39.6	42.8	38.5	45.3	34.9	49.5	30.2	49.7	28.6	50.7	30.5	52.2	32.0
Federal	15.6	27.4	17.4	24.7	17.1	18.5	17.3	17.7	17.2	16.3	17.2	15.5	18.0	13.9	18.3	11.2	17.9	10.3	17.7	10.7	18.1	11.1
State	3.9	6.9	7.0	9.9	10.4	11.2	11.7	12.0	13.3	12.6	13.8	12.4	14.2	10.9	15.5	9.5	14.1	8.1	13.9	8.4	14.3	8.8
Local	3.2	5.6	5.3	7.5	8.1	8.8	9.0	9.2	11.2	10.6	11.9	10.7	13.1	10.1	15.8	9.7	17.6	10.1	19.1	11.5	19.8	12.1

Table 2 Notes

Sources of data: 1960, 1965 ASR (1972) p. 16. It should be noted that the "labor force" data are actually work force data for these two years and are not directly comparable with the data for 1970-1978. The basic difference between the two series is that work force estimates are based on job counts and, hence, a worker may be counted more than once if holding two or more jobs. Labor force estimates are supposed to eliminate this double counting. Thus, the work force data for 1960 and 1965 somewhat overstate the actual number of employed.

In 1970-1978, labor force and total employment estimates are obtained from Alaska Labor Force Estimates by Area (Alaska Department of Labor), various years.

Non-agricultural wage and salary data are obtained from the Statistical Quarterly (Alaska Department of Labor) for the various years.

TABLE 3. INDEX OF SEASONAL VARIATION IN NONAGRICULTURAL EMPLOYMENT: SELECTED YEARS 1960-1978

	1960	1965	1970	1972	1974	1976	1978
Total Nonagricultural Employment	39.4	30.6	22.7	24.6	32.0	23.1	14.0
Contract Construction	156.2	91.7	69.5	77.6	108.2	64.7	47.2
Manufacturing	136.3	116.3	107.9	105.2	70.8	78.2	86.5
Food Processing	211.5	195.2	196.3	175.3	100.6	112.0	125.0
Trade	20.8	20.0	15.6	14.8	25.1	13.5	12.0
Services	28.4	17.2	10.7	16.2	26.8	13.3	17.8
Unemployment Rate, All Industries	117.5	74.4	59.2	65.1	82.3	45.8	30.0
Labor Force	28.2	26.5	21.8	21.0	27.1	21.2	12.0

SOURCE: Compiled from Statistical Quarterly (Alaska Department of Labor), selected years. Seasonal variation is measured as the high month minus the low month divided by average annual figure, stated as a percent. Unemployment data are from Labor Force Estimates (Alaska Department of Labor), various years.

It is also worth noting that during the pre-pipeline period the unemployment rate was relatively stable and that the somewhat higher rates of 1977 and 1978 reflect in large part a readjustment to a more normal post-pipeline period. These data clearly illustrate the openness of the Alaska labor market. Large variations in the demand for labor are primarily met by significant in- and out-migration and by changes in labor force participation rates. As a consequence, the long-run rate of unemployment is quite stable and the simple expansion of economic activity has little effect in terms of reducing unemployment. The second block of data in Table 2 provides annual average employment data by broad industry classification. In addition to illustrating the sustained growth of employment and production in all industry categories, these data also indicate relative changes in the significance of specific industries.

Employment in mining is the one basic sector industry that has increased its share of total employment. The federal government share has declined substantially over the period, while both state and local government have grown, with much of the growth in state government employment occurring during the 1960s and the early 1970s. Local government growth lagged state government in the early years, but by 1975 local government employment exceeded state government employment. Of particular interest is the growth of support sector activity, including trade, finance, insurance and real estate, and services. This growth reflects a steady diversification of support sector activity and the process of import substitution in response to increasing market size, growth of incomes,

and opportunities for specialization. In short, the data reflect a general maturation of the economy.

It is also of interest to consider changes in seasonal patterns of economic activity. Table 3 summarizes seasonal activity in selected industries, as well as for total nonagricultural wage and salary employment, labor force, and unemployment. Seasonal variation is measured as the high month minus the low month divided by the average annual figure for the respective variable. Because of secular growth in the variables, the index tends to overstate seasonality for any given year, but for comparative purposes, over time, the index is satisfactory.

The data reflect two important dimensions of the Alaska economy. First, seasonality varies drastically from industry to industry, with construction and manufacturing (especially food processing) showing the greatest seasonal swings. Second, while significant seasonality remains in all industry, there has been a major reduction over time.

In summary, the data on labor force, employment, and unemployment illustrate several important features of the Alaska economy. First, while growth has been uneven, aggregate economic activity has increased substantially since statehood. Contract construction, mining, and support sector industries grew rapidly during pipeline construction. With the exception of contract construction, levels of employment achieved at the peak of pipeline construction have generally been sustained or have increased.

Second, structural change that reflects a general maturing of the economy has occurred, as evidenced by the increased share of total employment accounted for by support sector activity, including trade, finance, insurance and real estate, and services. Coupled with the greatly reduced dependence of the state on federal government activity and the growth of petroleum and fisheries, the data indicate a general broadening and diversification of economic activity.

Third, in addition to sustained secular growth, there has been a marked decrease in seasonal swings in economic activity. In part, this reflects the relative growth of industries with smaller seasonal variations. In addition, construction and fish processing seasonality have also reduced substantially.

Finally, the relative stability of unemployment rates over time clearly indicates the openness of the Alaska labor market. The generally higher than national average unemployment rates have not responded to aggregate economic expansion historically and probably will not in the future.

PERSONAL INCOME

Personal income measures that part of the total value of production that accrues to individuals and includes: wage and salary income; other labor income; proprietor's income; income from dividends, interest, and rent; and personal transfer payments. While deficient in many respects as a measure of economic well-being, it is nevertheless a useful indicator of the degree to which individuals share in the total benefits of production.

Table 4 presents estimates of personal income for Alaska, by major source, for selected years covering the period from 1960 through 1978.

Personal income has grown steadily over the entire period, at an average annual rate of 11.3 percent, while for the pipeline period the growth was about 17 percent per year. Wage and salary income accounted for the majority of personal income throughout the period, averaging 80 percent. In contrast, about 68 percent of U.S. personal income is accounted for by wages and salaries. Proprietor income as a share of total personal income has declined somewhat; while that of dividends, interest, and rent has increased modestly. The share accounted for by transfer payments has increased substantially but still remains well below the national figure of 12.6 percent. The data also generally confirm the relative changes in the composition of industry activity that were observed in the employment data.

The growth of aggregate personal income in Table 4 reflects not only aggregate growth of production but also the influence of inflation. Table 5 presents aggregate personal income in both current and constant dollars. Growth of constant dollar personal income has been significant and has averaged 7.8 percent per year. During the 1974-1977 period, the growth was even more dramatic at 11.8 percent in real terms. The combined effects of inflation and the plateauing of economic activity following completion of pipeline construction have resulted in a slight decline in real personal income in 1978.

TABLE 4. PERSONAL INCOME BY MAJOR COMPONENT:
ALASKA, SELECTED YEARS 1960-1978

(millions of current dollars)

COMPONENT	1960		1965		1970		1975		1978	
	$	% Total	$	% Total	$	% Total	$	% Total	$	% Total
Wages & Salary	567.9	84.1	778.2	88.8	1293.9	84.7	3620	85.0	3954.9	80.6
Private, Total	281.5	41.7	463.2	52.8	773.1	50.6	2771	65.1	2907.2	59.2
Mining	10.3	1.5	14.3	1.6	54.2	3.5	116	2.7	248.4	5.1
Contract Construction	77.3	11.5	98.0	11.2	140.2	9.2	1095	25.7	537.8	11.0
Manufacturing	47.1	7.0	59.7	6.8	90.9	5.9	161	3.8	260.9	5.3
Fisheries	17.7	2.6	22.9	2.6	31.4	2.1	46.2	1.1	100.5	2.0
Forest Products	8.4	1.2	22.8	2.6	38.6	2.5	64.8	1.5	50.0	1.0
Support Sector	142.1	21.1	265.3	30.3	457.4	29.9	1364	32.0	1817.0	37.0
Government	286.6	42.5	376.0	42.9	593.6	38.8	993	23.3	1301.8	26.5
Federal Civilian	104.7	15.5	137.6	15.7	195.1	12.8	308	7.2	383.2	7.8
Military	136.0	20.1	143.9	16.4	225.7	14.8	258	6.1	287.5	5.9
State & Local	45.9	6.8	94.4	10.8	172.9	11.3	427	10.0	631.0	12.9
Proprietors' Income	50.1	7.4	62.1	7.1	73.9	4.8	143	3.4	260.5	5.3
Dividend, Interest & Rent	33.0	4.9	52.1	5.9	81.4	5.3	220	5.2	333.4	6.8
Transfer Payments	24.0	3.6	34.2	3.9	79.3	5.2	274	6.4	358.3	7.3
TOTAL	675.0	100.0	876.6	100.0	1528.5	100.0	4257	100.0	3907.1	100.0
Less										
Cont. for Soc. Ins.	11.0		22.3		49.2		172.0		223.5	
Residence Adj.	31.5		45.9		67.1		637.0		314.6	
Resident Personal Income	632.5		900.2		1412.2		3447.0		4369.0	

Table 4 Notes

SOURCE: Major components of the table are obtained from U.S. Department of Commerce, Bureau of Economic Analysis reports of personal income by state. Wages and salary figures (row 1) include wage and salary plus other labor income components of personal income. Except for 1960, the private, total row and subcomponents thereunder, contain wage and salary income, other labor income, and proprietors' income. Total income is the sum of the wages and salary row plus proprietors' income; dividends, interest and rents; and transfer payments. Resident personal income is equal to total income less contribution for social insurance and the residence adjustment.

TABLE 5. ALASKA RESIDENT ADJUSTED PERSONAL INCOME
IN CURRENT AND CONSTANT 1979 DOLLARS
1960, 1965, and 1970-1978

	Millions of Dollars of Personal Income, Total		Per Capita Personal Income	
	Current $	Constant 1979 $	Current $	Constant 1979 $
1960	632.5	1,470.6	2,797	6,503
1965	858.4	1,982.8	3,168	7,318
1970	1,411.9	2,700.3	4,644	8,882
1971	1,557.2	2,954.8	4,939	9,372
1972	1,698.5	3,036.4	5,234	9,631
1973	2,001.5	3,570.0	6,046	10,784
1974	2,436.7	3,822.9	7,138	11,199
1975	3,527.7	4,493.5	9,673	12,321
1976	4,194.8	5,421.4	10,274	13,278
1977	4,313.4	5,346.5	10,455	12,959
1978	4,369.0	4,875.2	10,849	12,106
	Average Annual Percent Growth			
	11.3	7.8	6.9	3.5

SOURCE: Current dollar personal and per capita income from U.S. Department of Commerce, Bureau of Economic Analysis. Deflated by Anchorage Consumer Price Index, U.S. Department of Labor.

There are two other dimensions of personal income that are particularly important in assessing individual economic well-being: per capita income and the distribution of income. Table 5 includes data on the growth of per capita personal income in real and current dollars.

Real per capita income from 1960-1973 grew at an average annual rate of 4 percent. The 1973-1978 period, encompassing pipeline construction and the post-boom readjustment, shows rapid expansion until 1976 and then a substantial drop during 1977 and 1978. The net growth over the period is only 2 percent per year. Two points are worth noting in this respect. First, the rapid expansion of activity occurred during a period of high national inflation and was of sufficient magnitude to lead to additional regional inflation in the Alaska economy. Thus, the real value of per capita income growth was greatly diminished. Second, the rapid expansion of total economic activity had only a minimal effect in raising per capita income, again reflecting the ease of entry into the Alaska labor market.

Data on the distribution of personal income are not available for recent years, but it is instructive to look at the pattern of wages over time. Table 6 presents data on relative wages, by industry, for selected years over the 1965-1978 period.

The numbers reflect the ratio of the average monthly wage for the respective industry divided by the average monthly wage for all nonagricultural wage and salary employment. The data must be interpreted with caution since several factors are at work that may account for year-to-year

TABLE 6. DISTRIBUTION OF RELATIVE WAGE RATES, BY INDUSTRY, FOR ALASKA, SELECTED YEARS, 1965-1978

Industry	1965	1970	1976	1978
Total Nonagriculture Wage and Salary	100	100	100	100
Mining	147	164	140	193
Contract Construction	165	169	210	157
Manufacturing	106	99	73	93
Food Processing	97	78	55	71
Logging, Lumber, and Pulp	115	124	96	119
Other Manufacturing	112	110	83	109
Transportation, Communication, and Public Utilities	115	114	105	128
Wholesale Trade	127	117	94	111
Retail Trade	78	70	50	62
Finance, Insurance, Real Estate	88	81	62	81
Services	74	72	78	75
Government	91	97	74	97
Federal	91	100	70	94
State	91	96	79	111
Local	91	93	72	89

SOURCE: Computed from average monthly wage data from the Statistical Quarterly (Alaska Department of Labor), selected years. Relative wages are the respective industry wage divided by the average wage for all industries x 100.

variability. First, the average monthly wage data reflect both straight time and overtime earnings and are thus sensitive to variation in the ratio of straight time to overtime work.

Second, the average monthly wage is computed by dividing total wages by average monthly employment; and average monthly employment, in turn, reflects both full and part-time work. Thus, the employment data are only an approximation of man hours worked. We are also looking at fairly aggregate data. Some of the variation within industries may be accounted for by changes in composition of activity within the broad industry classifications.

The data first indicate the growing disparity of average wage rates, which would suggest a trend toward a less equal distribution of income. More significant are the changes that occurred at the peak of pipeline construction in 1976. Major distortions in the structure of wages are present, and this suggests that the distribution of benefits during a boom is not uniform, but rather that a small segment of the economy appears to reap a large proportion of the gains. This feature of boom economics is further demonstrated by an analysis of changes in real wages over the 1973-1976 period.

Table 7 shows average monthly wages, by broad industry classification, deflated by the Anchorage consumer price index (CPI). Use of the Anchorage CPI is dictated because there is no statewide index. Hence, the deflation is subject to some error since price changes are not uniform throughout Alaska. As an approximation, however, the data are adequate.

TABLE 7. CHANGE IN REAL AVERAGE MONTHLY WAGE 1973-1976, ALASKA (1973 DOLLARS)

Industry	Average Wage 1973	Average Wage 1976	Average Wage Percent Change
Total Nonagriculture Wage and Salary	$1,006	$1,424	12.3%
Oil and Gas Mining	1,661	2,068	7.6
Contract Construction	1,635	2,985	22.2
Manufacturing	961	1,041	2.7
Transportation, Communication, and Public Utilities	1,141	1,494	9.4
Wholesale Trade	1,177	1,341	4.4
Retail Trade	687	709	1.1
Finance, Insurance, Real Estate	897	884	- 0.5
Services	751	1,107	13.8
Hotels, Motels, Lodging	527	537	0.6
Business Services	732	1,706	32.6
Government	1,024	1,047	0.7
Federal	1,062	1,002	- 1.9
State	992	1,132	4.5
Local	1,003	1,024	0.7

SOURCE: Computed from average monthly wage data, Statistical Quarterly (Alaska Department of Labor), selected years.

It is clear that drastic differences exist among industries and that the economic benefits of rapid economic expansion tend to be concentrated in a select few industries. A major portion of income implied in the growth of construction wages was also earned by nonresidents or temporary resident employees. With the exception of business services, all components of the support sector and government badly lagged the average growth of wages and, implicitly, relative income. Federal government and finance, insurance, and real estate real wages actually declined.

While much of the inflation that occurred during the period is attributable to national inflation, significant regional inflation resulting from pipeline construction activity also occurred. Prior to pipeline construction, the Anchorage CPI had been growing at a less rapid rate than the U.S. CPI. However, during pipeline construction, this relationship was reversed, and the Anchorage CPI grew more rapidly. Table 8 presents relative rates of growth in the Anchorage and U.S. CPIs for selected years and clearly illustrates the regional inflation associated with pipeline construction.

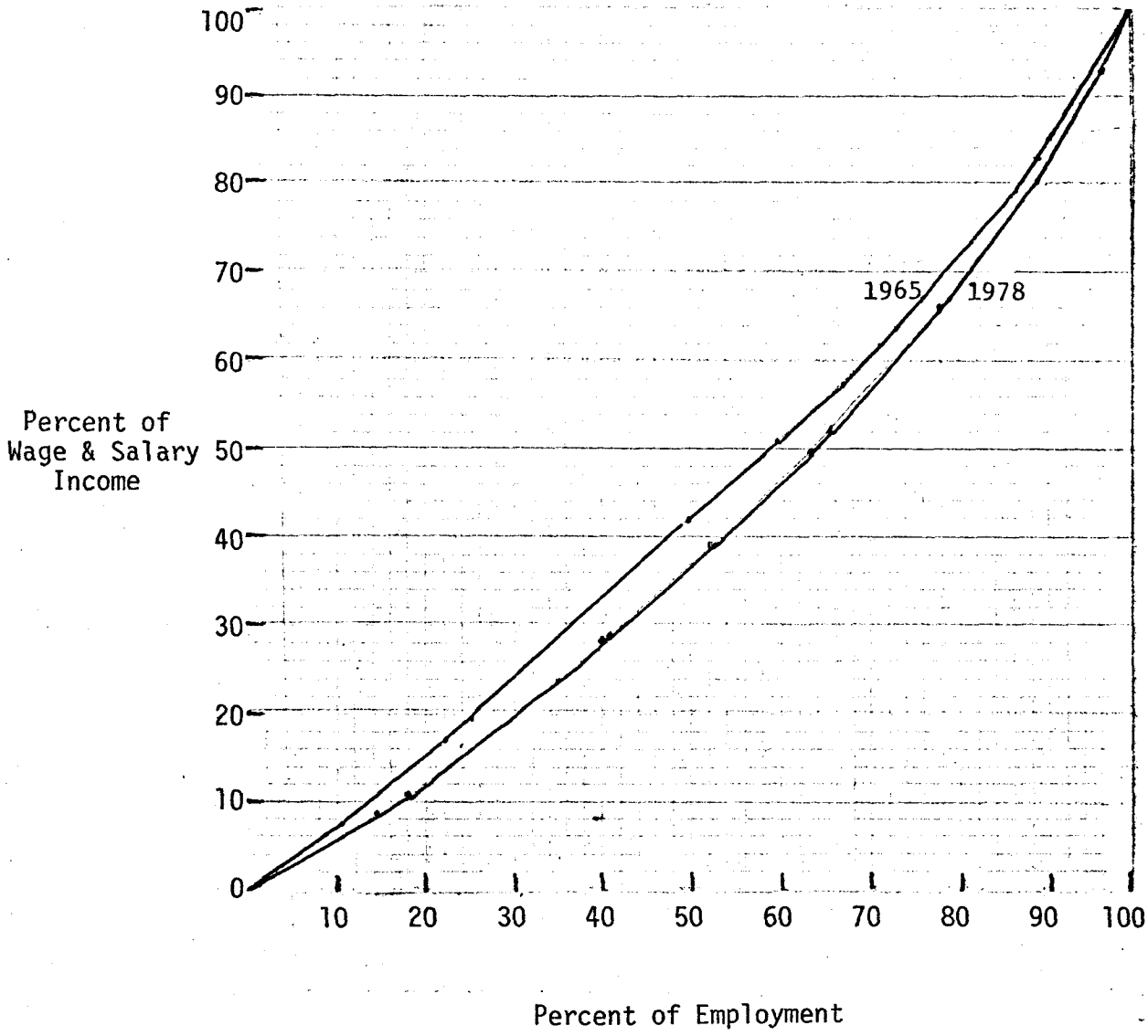
As one final indication of income distribution patterns, a distribution relating percentage of total wage and salary income to percentage of employment has been constructed for 1965 and 1978 (see Figure 1). The distribution was constructed by ranking industries according to average monthly wage. The percentage of total employment and total wage income accounted for by the respective industry was then computed. The cumulative

TABLE 8. RATES OF CHANGE FOR THE ANCHORAGE AND U.S. CONSUMER PRICE INDEX, SELECTED YEARS, 1960-1977

	1960-1970	1970-73	1973-74	1974-75	1975-76	1976-77
Anchorage	1.8	4.1	13.3	12.3	6.5	5.8
United States	2.8	5.6	12.0	7.6	5.3	6.5

SOURCE: Derived from the Bureau of Labor Statistics reports on Anchorage and United States CPIs.

FIGURE 1. DISTRIBUTION OF WAGE AND SALARY INCOME
ALASKA, 1965 and 1978



SOURCE: See text.

employment and income percentages were then plotted, yielding the typical Lorenz-type distribution figure.

A comparison of the two distributions reveals a clear shift toward a less uniform distribution of income. This shift is probably accounted for by two factors. First, as indicated earlier, there has been a sizable increase in the share of total activity accounted for by support sector industries, and these industries generally have lower than average wage rates. Second, there has been a substantial growth in the range of relative wages between industries over time.

In summary, real personal income has shown sustained growth over the entire 1960-1978 period, both in aggregate and per capita terms. The growth has not been uniformly distributed, however, and the wage component has become less uniform over time. This was particularly evident during pipeline construction and supports the hypothesis that the benefits of pipeline construction were largely concentrated in a few sectors.

POPULATION

The remaining dimension of growth to be considered is population. Changes in population are divided into two components, natural increase (or decrease) and in/out-migration. Natural population growth results from an excess of births over deaths and is, hence, determined by birth and death rates.

Alaska exhibits both the highest birth rate and the lowest death rate in the United States; and as a result, the rate of natural population increase is the highest in the United States. This phenomenon is largely accounted for by the relative youthfulness of the population, with over 34 percent of the population between the ages of 14 and 30. This age group has both the highest fertility rate and the lowest death rate.

Net migration (in-migration minus out-migration) is the second factor contributing to population change. Many factors influence the migration decision; but for the Alaska case, it appears that (with the exception of military-related migration) migration occurs largely in response to economic opportunity. In the aggregate, relative rates of unemployment and relative wage differentials in Alaska and elsewhere should be important in determining the migration decision. At the individual level, the economic component of the decision is related to the expected gain resulting from the move. Basically, this is the expected wage differential times the probability of getting a job, less the cost of making the change. Thus, either a change in relative wage rates or relative employment opportunities can influence the decision.

That migration is sensitive to economic opportunity is clearly demonstrated by patterns of migration that occur during and after pipeline construction. Data summarizing population and changes in population for Alaska for the years 1965 through 1978 are presented in Table 9. Both the relative stability of natural increase and the volatility of net migration are clear. Natural increase has averaged about 1.5 percent

TABLE 9. ALASKA POPULATION AND COMPONENTS OF CHANGE: 1965-1978

(thousands)

Year	Total	Natural Increase	Total Change	Net Migration
1965	265.2	5.7	10.2	4.5
1966	271.5	5.3	6.3	1.0
1967	277.9	5.0	6.4	1.4
1968	284.9	5.1	7.0	1.9
1969	294.6	5.6	9.7	4.1
1970	302.4	6.1	7.8	1.7
1971	312.9	5.9	10.6	4.7
1972	324.3	5.5	11.4	5.9
1973	330.4	5.1	6.1	0.9
1974	351.2	5.6	20.8	15.2
1975	404.6	5.9	53.4	47.5
1976	413.3	6.3	8.7	2.4
1977	411.2	6.8	- 2.1	- 8.9
1978	407.0	6.7	- 4.3	-11.0

SOURCE: Alaska Department of Labor

per year; while large variations, even in pre-pipeline years, are evident in the net migration component.

In summary, Alaska's natural population growth is substantially above that of the nation as a whole. Furthermore, the response of migration to economic opportunity is clearly evident. Once again, this emphasizes the openness of the Alaska labor market.

Regional Economies: Anchorage, Southcentral, and Southwest

Potential impacts of OCS development will not be uniformly felt throughout the State. Rather, specific regions within Alaska can be expected both to experience the brunt of the impacts and to capture disproportionate shares of the benefits. In the case of the present proposed lease sale, the Anchorage and southcentral regions can expect impacts as well as the southwest region, within which the sale would occur. Hence, the baseline analysis must address these regions as well as Alaska.

ANCHORAGE

Anchorage has occupied a central role in Alaska's growth since statehood. It has emerged as a key transportation and distribution center, as well as assuming a dominant role in the growth of other support sector activity. The area has also become the State center for petroleum industry administrative facilities. Its importance as a seat of Federal government activity in Alaska has been supplemented by rapid growth of State and local government. Because of the size of the Anchorage economy, it tends to reflect total State activity as well as

to impact upon total economic activity in Alaska. It is because of its central place in the Alaskan economy that economic activity remote from Anchorage is often significantly tied to Anchorage.

Employment, Labor Force, and Unemployment

Direct measures of production for the Anchorage economy are not available. Neither is Anchorage a commodity producer in which resource-based activity is directly important to total economic activity. This makes it particularly important to consider the structure and growth of employment for Anchorage. While such data are only partially reflective of total production, they do provide meaningful insights into changes that have occurred.

Summary data on Anchorage employment, by broad industry classification, for 1965 through 1978, are presented in Table 10. Overall employment has grown at about 7.3 percent per year, and the rate of growth exceeded the statewide rate of 6.7 percent. While growth has generally been consistently upward, it accelerated substantially during pipeline construction. Since then, growth of employment has moderated; but the level of employment still exceeds that achieved during the period of pipeline construction. It is also worth noting that, in contrast to other parts of the State where pipeline construction played a significant role in the expansion of activity, Anchorage growth during this period occurred more uniformly throughout most sectors, reflecting the region's role as a support center.

TABLE 10. ANCHORAGE NONAGRICULTURAL WAGE AND SALARY EMPLOYMENT, SELECTED YEARS

(thousands)

	1965		1968		1970		1972		1974		1976		1978	
	Emp	%	Emp	%	Emp	%	Emp	%	Emp	%	Emp	%	Emp	%
Total NonAgric Wage & Salary Employment	30.678	100.0	34.019	100.0	42.019	100.0	48.252	100.0	58.713	100.0	73.733	100.0	76.893	100.0
Mining	0.371	1.2	0.781	2.3	0.958	2.3	0.806	1.7	1.036	1.8	1.409	1.9	1.874	2.4
Contract Construction	3.126	10.2	2.438	7.2	3.514	8.4	4.272	8.9	5.882	10.0	7.587	10.3	6.431	8.4
Manufacturing	0.791	2.6	0.834	2.5	1.018	2.4	1.215	2.5	1.379	2.3	1.629	2.2	1.683	2.2
Transportation, Communications, and Utilities	2.618	8.5	3.046	9.0	3.907	9.3	4.522	9.4	5.583	9.5	7.409	10.0	7.950	10.3
Wholesale-Retail	5.279	17.2	6.552	19.3	8.617	20.5	9.948	20.6	12.298	20.9	15.958	21.6	16.865	21.9
Finance, Insurance and Real Estate	1.295	4.2	1.452	4.3	1.980	4.7	2.415	5.0	3.151	5.4	4.257	5.8	5.019	6.5
Services	3.767	12.3	4.652	13.7	6.403	15.2	7.725	16.0	10.119	17.2	15.450	21.0	15.538	20.2
Federal Government	9.394	30.6	9.216	27.1	9.534	22.7	9.435	19.6	9.925	16.9	9.813	13.3	9.896	12.9
State & Local Government	4.001	13.0	5.022	14.8	6.036	14.4	7.839	16.2	9.242	15.7	9.465	12.8	11.266	14.7

SOURCE: Statistical Quarterly (Alaska Department of Labor), various years.

Several industries expanded more rapidly than the growth of total employment, including: mining (13.3 percent); transportation, communications, and public utilities (8.9 percent); wholesale-retail trade (9.4 percent); finance, insurance, and real estate (11.0) percent; services (11.5 percent); and State and local government (10.5 percent). Construction, manufacturing, and Federal government growth rates were all below the regional average for the period.

The growth of the support sector illustrates the maturing of the Anchorage economy as was also observed at the statewide level. A comparison of statewide and Anchorage support sector employment as a percent of total employment also indicates the role of Anchorage as a trade, distribution, service, and financial center for the State as a whole. Employment as a percentage of total Anchorage employment considerably exceeds comparable figures at a statewide level in trade, finance, and services. For Anchorage, these industries accounted for 48.6 percent of total employment in 1978; whereas for the State as a whole the figure is only 39.5 percent. The share of total employment accounted for by the Federal government in Anchorage is also above the State proportion, and over 50 percent of total Federal government employment in Alaska is based in Anchorage.

The data on labor force and unemployment also illustrates the openness of the Anchorage economy (see Table 11). Over the period from 1970 through 1979, unemployment averaged 7.4 percent. While temporarily dropping during pipeline construction, the unemployment rate has risen

TABLE 11. ANCHORAGE LABOR FORCE, EMPLOYMENT, AND UNEMPLOYMENT, 1970-1978

Year	Employment	Labor Force	Unemployment	Unemployment Rate
1970	45,757	49,024	3,267	6.7%
1971	49,484	53,902	4,418	8.2
1972	52,395	57,535	5,140	8.9
1973	54,299	60,117	5,818	9.7
1974	54,691	58,661	3,970	6.8
1975	64,721	68,481	3,760	5.5
1976	68,420	73,436	5,016	6.8
1977	79,023	84,513	5,490	6.5
1978	74,819	81,551	6,732	8.3
1979	75,424	81,120	5,696	7.0

SOURCE: Alaska Department of Labor, Labor Force Estimates by Area, selected years.

again to historic levels in the years since completion of the pipeline, averaging 7.7 percent for 1978 and 1979. Hence, while rapid expansion of employment opportunities may temporarily reduce unemployment, the effects are clearly short-run.

Personal Income

Total and per capita personal income for Anchorage are shown in Table 12, both in current and constant (1978) dollars. In current dollars, both total and per capita personal income have grown every year (at average annual rate of 14.4 percent and 10.0 percent, respectively) with considerable increases in the rate occurring during pipeline construction. Much of the growth has been negated by inflation, however. In real terms, total incomes grew at 8.2 percent over the period; while per capita income grew at 4.1 percent. However, both real total and per capita personal income have declined slightly since peaks reached during pipeline construction. It is also worth noting that the growth rates of Anchorage personal income exceeded those of the State for comparable periods.

Population

Population for Anchorage has grown from 102.3 thousand in 1965 to 185.5 thousand in 1978, at an average annual growth rate of 4.7 percent (see Table 13). This was substantially in excess of the statewide growth rate of 3.4 percent. As a result, the Anchorage share of total State population rose from 38.6 percent in 1965 to 45.6 percent in 1978. From 1965 to 1969, the Anchorage and statewide populations grew at about

TABLE 12. ANCHORAGE PERSONAL INCOME
1965-1978

	Current Dollars		Constant (1978) Dollars	
	Total (millions)	Per Capita	Total (millions)	Per Capita
1965	371	3,412	767	7,056
1966	398	3,595	722	7,153
1967	462	4,061	900	7,911
1968	502	4,228	953	8,027
1969	570	4,622	1,035	8,391
1970	635	4,997	1,109	8,730
1971	733	5,469	1,248	9,313
1972	800	5,631	1,333	9,383
1973	880	6,031	1,385	9,490
1974	1,114	7,402	1,550	10,299
1975	1,625	10,070	2,011	12,463
1976	1,903	10,579	2,212	12,296
1977	2,109	11,592	2,317	12,736
1978	2,128	11,839	2,128	11,839
		Average Annual Percent Growth		
	14.4%	10.0%	8.2%	4.1%

SOURCE: Bureau of Economic Analysis, U.S. Department of Commerce.

TABLE 13. ANCHORAGE POPULATION
1965-1978

(thousands)

1965	102.3
1966	105.9
1967	107.8
1968	111.6
1969	114.2
1970	126.3
1971	135.8
1972	144.2
1973	149.4
1974	153.1
1975	177.8
1976	185.2
1977	195.8
1978	185.5

SOURCE: Alaska Department of Labor.

the same rate; while for 1969 through the start of pipeline construction, the population of Anchorage grew at about 6 percent. During this period, the State as a whole grew at about 3.6 percent. Both the State and Anchorage populations grew rapidly during the 1974 through 1976 period (17.7 percent and 20.1 percent, respectively), but the Anchorage population did not peak until 1977; whereas the statewide population reached a peak in 1976. However, the decline in Anchorage population has been proportionately greater than that for the State as a whole. In 1978, statewide population was 6.3 thousand below the pipeline peak; while the Anchorage population was 10.3 thousand below its peak.

In summary, the Anchorage economy has shown substantial growth over the entire period reviewed. Steady diversification of the economy is evident, and the role of Anchorage as an economic center for the State is clear. Furthermore, economic activity remote from Anchorage is nevertheless often significant for the Anchorage economy because of Anchorage's central role.

The southcentral economy includes primarily the Kenai-Cook Inlet, Seward, Matanuska-Sustina, Valdez, Chitina, Whitter, Kodiak, and Cordova-McCarthy Census Division. Economic ties exist between the Kenai-Cook Inlet, Seward, and Matanuska-Susitna Census Divisions and Anchorage. Anchorage is the primary distribution point for commodity flows to those areas. Second, the Anchorage population utilitizes the surrounding areas for recreational purposes. Finally, the surrounding areas (and in particular the Matanuska-Susitna Valley area) constitute an important component

of the Anchorage labor pool. More broadly, the southcentral region as a whole constitutes a labor pool for economic activity throughout the State. This last tie is the most significant in terms of linkages between the proposed OCS lease sale and the southcentral regional economy.

The southwest region is the area that will be directly impacted by the proposed St. George Basin sale. The region includes the Kuskokwim, Wade Hampton, Bethel, Bristol Bay, and Bristol Bay Borough Census Divisions, as well as the Aleutian Islands Census Division. Because the area most directly linked to the proposed sale is the Aleutian Islands Census Division and because links with other areas within the region are negligible, we focus our attention on the Aleutian Islands Census Division.

The Aleutian Islands Census Division

The Aleutian Islands Census Division encompasses all of the Aleutian Islands, the Pribilof Islands, and the Alaska Peninsula from Port Moller west. The census division is also a subregion of the southwest region of the MAP model.

The economy of the Aleutian Islands Census Division in no sense reflects a cohesive, functional economic area. This economic area is composed of several relatively isolated communities and Federal government military installations. Private sector activity is almost totally dependent upon utilization of the abundant fish resources and includes both harvesting

and processing. Harvesting of fur seals on St. Paul Island is also an important local activity. Minor amounts of sheep ranching also occur in the region. Military installations at Shemya and Adak, as well as elsewhere in the region, swell the population, employment, and income figures for the census division but have no perceptible links with other economic units within the census division.

PRODUCTION

Basic sector private production is mostly composed of fisheries-related activity. Both commercial fishing and processing are widely dispersed throughout the region, although processing is more highly concentrated in the eastern portion of the census division. Tables 14 through 16 provide summary data on commercial fishing. In Table 14 the salmon, shellfish, total catch, and value of catch to fishermen are indicated for recent years. The data clearly show the rapid increase in both the value and volume of shellfish harvested in the region.

A longer-run view of shellfish harvest is shown in Table 15 and highlights the growth in the diversity of shellfish caught. In particular, both tanner crab and shrimp have provided much of the growth in the shellfish harvest, helping to offset significant declines in king crab catches that occurred during the late 1960s and early 1970s. Finally, Table 16 provides data on the disparities of catch within areas of the region and how these have changed over recent years. Significant declines in king crab harvests in all areas are noted, with the exception of the Bering Sea which has more than offset the declines in other areas. Tanner crab

TABLE 14. CATCH AND VALUE TO FISHERMEN,
ALEUTIAN ISLANDS CENSUS DIVISION
1970 TO 1976, SELECTED YEARS

(catch in million pounds; value in million dollars)

Year	Salmon		Shellfish		Total[1]	
	Pounds	Value	Pounds	Value	Pounds	Value
1976	20.910	7.155	154.262	61.032	175.921	69.029
1973	6.993	1.815	60.966	25.135	71.261	29.243
1970	28.695	5.102	44.082	9.108	74.540	14.793

[1]Totals include minor amounts of other fish. There is also an unreconciled discrepancy for the weight of shellfish in Table 14 and Table 15 for 1973.

SOURCE: Alaska Catch and Production (Alaska Department of Fish and Game, Division of Commercial Fisheries), selected years. Data prior to 1970 not available on a comparable basis.

TABLE 15. SHELLFISH HARVEST, ALEUTIAN ISLANDS CENSUS DIVISION, 1962, 1965-1976

(millions of pounds)

Year	Kingcrab	Dungeness	Tanner	Shrimp	Total
1962	6.840	-	-	-	6.840
1965	50.704	.017	-	-	50.717
1966	63.993	.025	.000	.000	64.018
1967	61.990	.000	.003	.000	61.993
1968	53.060	.953	.142	4.375	58.530
1969	39.895	1.380	1.662	2.657	45.594
1970	35.408	.717	3.558	4.399	44.082
1971	53.997	.022	2.307	5.228	61.554
1972	52.957	.000	4.054	14.891	71.902
1973	56.620	.201	6.183	18.947	81.951
1974	66.812	.061	13.998	31.245	112.116
1975	70.002	.004	12.592	20.504	103.102
1976	82.943	.000	30.202	41.117	154.262

SOURCE: Alaska Catch and Production: Commercial Fisheries Statistics (Alaska Department of Fish and Game, Division of Commercial Fisheries), various years. Areas included are South Alaska Peninsula, Aleutians East-Unalaska, Aleutians West-Adak, and Bering Sea. These boundaries are not strictly comparable to the census division boundaries, but are adequate for present purposes.

TABLE 16. SHELLFISH HARVEST, BY AREA, SELECTED YEARS 1962 - 1976

(millions of pounds)

South Peninsula

Year	King Crab	Dungeness	Tanner	Shrimp	Total
1967	16.9	-	.0	-	16.9
1972	4.2	-	3.9	14.8	22.9
1976	.7	-	7.3	37.4	45.4

Aleutians East-Unalaska

Year	King Crab	Dungeness	Tanner	Shrimp	Total
1967	27.1	-	-	-	27.1
1972	10.7	-	.0	.1	10.8
1976	11.4	-	.5	3.7	15.6

Aleutians West-Adak

Year	King Crab	Dungeness	Tanner	Shrimp	Total
1967	12.5	-	-	-	12.5
1972	16.2	-	-	-	16.2
1976	.4	-	.1	-	.5

Bering Sea

Year	King Crab	Dungeness	Tanner	Shrimp	Total
1967	4.4	-	-	-	4.4
1972	21.9	-	.1	-	22.0
1976	70.4	-	22.3	-	92.7

Area Totals

	S. Peninsula		Aleutians-E.		Aleutians-W.		Bering Sea		Total
Year	Total	%	Total	%	Total	%	Total	%	
1967	16.9	27.8	27.1	44.5	12.5	20.5	4.4	7.2	60.9
1972	22.9	31.8	10.8	15.0	16.2	22.5	22.0	30.6	71.9
1976	45.4	29.4	15.6	10.1	.5	.3	92.7	60.1	154.2

SOURCE: Alaska Catch and Production (Alaska Department of Fish and Game, Division of Commercial Fisheries), selected years.

and shrimp have been increasingly important for the south Peninsula and Aleutian-East areas.

In short, major changes in the pattern of harvests, both regionally and by species, have occurred. The south Peninsula and Bering Sea areas show overall gains and the Aleutian-East and Aleutian-West areas show net declines. These patterns are also indicated by the percentage shares of total shellfish harvest shown in Table 16.

A second, important dimension of understanding commercial fishing in the Aleutian economy is an analysis of who does the fishing. Data on this point is fragmentary and is presented in Table 17. The king crab and shellfish industry tends to be dominated by nonresident boats and crews, and the area of concentration for these vessels is the Bering Sea. Much of the remainder of the catch is accounted for by Kodiak-based boats.

The information on the salmon harvest is even less precise since the region covered is southwest Alaska (the Aleutian Census Division plus Kodiak). It is assumed, with some uncertainty, that the regional proportions apply to the Aleutians.

The overall picture that emerges is one in which the bulk of the commercial fishing in the Aleutians is carried out by fishermen and vessels which are not resident to the Aleutians. More precise information would be desirable but is simply not available.

TABLE 17. RESIDENCE OF BOATS AND GEAR LICENSE HOLDERS FISHING THE ALEUTIANS

Proportion of King Crab Catch Value by Boat Residence

Place	Percentage
Kodiak	26.8
Alaska Peninsula	4.0
Dutch Harbor	4.3
Out of State	64.9

Proportion of Salmon Catch by Residence of Gear License Holder

Place	Percentage
Kodiak	41.5
Aleutians	20.0
South Central Alaska	3.2
Anchorage	2.6
Other Alaska	7.1
Non-resident	19.2
Unknown	6.5

SOURCE: King Crab: Western Alaska King Crab: Draft Fishery Management Plan (North Pacific Fishery Management Council, Anchorage; Council Review Draft, May 1980). Derived from data on page 30.

Salmon: Derived from Table 9-8, Measuring The Socioeconomic Impacts of Alaska's Fisheries, by George W. Rogers, et al, (Institute of Social and Economic Research; April 1980).

A final dimension of commercial fishing to be considered is that of employment. No systematic, periodic estimates of commercial fishing employment are made for the Aleutians (nor for the rest of the State). Estimates for the 1969 through 1976 period, however, have been compiled for the State and regions (Rogers, 1980) and in turn have been used to estimate employment in the Aleutians for 1978. This has resulted in an estimate of 756 for average annual employment in commercial fishing. Of these, 251 are estimated to be residents of the Aleutian Islands Census Division.

The procedure used to develop these estimates was to compute the ratio of the 1978 to 1976 catch, by species (salmon, shellfish), and apply this ratio to the Rogers' estimates of employment for 1976. Since his employment estimate was for the southwest region, it was then necessary to allocate to the Aleutians the total employment thus estimated. This was accomplished by apportioning total employment on the basis of Aleutian to total southwest region catch and implies uniform productivity throughout the southwest region. The result of these manipulations is an estimate of total Aleutian Islands commercial fishing employment. The estimate of resident employment was developed using ratios presented in Table 17. It goes without saying that these estimates of employment are very approximate and subject to considerable error.

The second major component of the fishing industry in the Aleutians is processing. The present structure of the processing industry reflects a mix of shore-based and floating processors engaged in canning and

freezing. The trend is toward freezing an increasing proportion of the catch.

A tally of processor permits for 1980 compiled from Alaska Department of Fish and Game records indicates seven shore-based facilities at Dutch Harbor; two at Sand Point; and one each at King Cove, False Pass, Squaw Harbor, and Port Moller. Some of these permits may cover firms that are only buying fish for transshipment.

Several floating processor permits are held as well: Dutch Harbor (4), Sand Point (1), and False Pass (1). In addition, some 31 permits are held that allow for floating processors to operate throughout the region. Not all permit holders necessarily utilize their permits, and several may actually be nothing more than buyers. It is clear, however, that processing is geographically well dispersed throughout the Aleutians.

Employment data for processing is available for the Aleutians Census Division from the Statistical Quarterly (Alaska Department of Labor). For 1978, 1,621 was the average annual employment in manufacturing, which for the Aleutians is largely synonymous with fish processing. As is the case with commercial fishing, it is important to determine what proportion of the employment was held by residents of the region.

Data regarding this question are fragmentary. In conversations with industry and local government people, it was estimated that somewhere between 5 and 15 percent of the employment was held by residents. A

second source of information is The Recommended Community Development Plan: City of Unalaska, Alaska (Trick, Nyman, and Hayes: November 1977). According to this study, 72 out of 875 basic sector jobs (1976) were held by residents, and these jobs were primarily in fish processing. This would indicate that about 8.2 percent of processing jobs were held by residents. Community profiles prepared by the Arctic Environmental Information and Data Center for King Cove, False Pass, and Akutan also contain data that tend to support the above sources regarding resident to nonresident ratios.

Using what appears to be a reasonable estimate of the resident share of processing jobs, 10 percent, then 162 of 1,621 jobs were held by residents. The remainder (1,459) were held by nonresidents. Of these, almost all were from outside of Alaska.

Significant seasonal variation exists in processing employment, although to a much lesser degree than is generally the case in the salmon industry. For 1978, average employment for the four quarters was, respectively: 1,255 (January-March), 1,782 (April-June), 1,649 (July-September), and 1,798 (October-December). The low first quarter, followed by substantial gains in the second through fourth quarters, is typical of recent years. Available data do not indicate how seasonal patterns may vary between residents and nonresidents.

The second element of basic sector production in the Aleutians is Federal government and national defense-related activity. Major installations

are located at Adak, Shemya, and Cold Bay. The largest of these is the naval station at Adak. According to data supplied by the Office of Information, Alaska Air Command, there are 1,781 active duty military and civilian defense-related personnel at Adak, as well as 1,400 dependents. These figures do not include additional civilian personnel associated with nondefense activity such as officers' clubs, post-exchanges, etc. Shemya and Cold Bay do not have resident dependents, and military and civilian defense-related personnel number approximately 490. Table 18 summarizes military and related federal civilian employment data for the census division as a whole for 1978.

While the military presence is numerically large, its economic impact on the economy of the Aleutians is negligible. The units are largely self-supporting and the only identifiable ties with the Aleutian or Alaska economy are transportation services provided by Reeve Aleutian Airways (RAA) and some contract construction. One benefit that does result from the military contracts with RAA is the feasibility of providing more frequent air service to other communities in the Aleutians. Contract construction work at the military installations is generally carried out by non-Aleutian based firms, either from Alaska or out-of-state.

In summary, basic sector production in the Aleutians is almost entirely related to fisheries resources or Federal government military-related activity. Fisheries activity has shown substantial growth but is still largely dominated by non-Aleutian resident participants. The military presence, while substantial, has no significant relationships with the rest of the census division.

TABLE 18. MILITARY AND RELATED FEDERAL-CIVILIAN EMPLOYMENT AND WAGES, ALEUTIAN ISLANDS CENSUS DIVISION, 1978

	Employment	Wages (thousands)
Military and Related Civilian Employment	3,939	45,952
Military Personnel (Active Duty)	3,453	38,950
Military-Related Federal Civilian Employment	486	7,072
PX and NAF (Largely Part-time)[1]	330	1,875
Other Military Related Federal Employment	156	5,127

[1] Post exchange and nonappropriate fund activities, including officers' clubs, etc.

SOURCE: Numbers: Basic Economic Statistics of Alaska Census Divisions (Alaska Department of Commerce and Economic Development, Division of Economic Enterprise: November 1979).

EMPLOYMENT, UNEMPLOYMENT, AND LABOR FORCE

Analysis of employment in the Aleutians is important for the same reasons that it was important at the statewide level. Table 19 summarizes average monthly employment for the Aleutian Census Division for the years 1965-1978. Over the period, total employment has grown substantially at an average annual rate of 5.9 percent. This growth has been largely dependent upon growth of the fisheries industry and State and local government. Employment in fish processing grew at an average annual rate of 14.1 percent, while State and local government grew at a rate of 8.5 percent. Federal government employment, primarily related to national defense, fluctuated considerably over the period but has shown no appreciable growth. The same is true for contract construction and transportation, communications, and public utilities. The support sector components of wholesale-retail trade; finance, insurance, and real estate; and services have also expanded as would be expected. Finance, insurance, and real estate grew at an average annual rate of 18.9 percent, although much of this growth occurred after 1973. Services grew at 22.7 percent over the period, but this growth rate must be interpreted with caution. The data for early years were not reported in the Statistical Quarterly (the source document) because of disclosure rules and, hence, were estimated. The large variation in this series also raises the question of inconsistency in the data, possibly due to classification difficulties.

Independent series on wholesale and retail trade are not available for the entire period. For those years in which retail trade data were

TABLE 19. AVERAGE CIVILIAN MONTHLY EMPLOYMENT
ALEUTIAN ISLANDS CENSUS DIVISION, 1965-1978

Industry	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Construction	174	54	137	125	142	195	285	187	181	180	235	221	116	140
Manufacturing	292	411	422	471	349	476	657	610	675	851	783	991	1130	1621
Transportation, Communications, and Utilities	83	55	51	46	57	45	61	41	93	93	87	88	38	31
Wholesale Retail	117	138	152	138	134	136	125	124	142	137	148	149	110[e]	101[e]
Finance, Insurance and Real Estate	4[e]	4[e]	4[e]	1[e]	5[e]	7[e]	7[e]	8[e]	7[e]	12	27	32	37	38
Services	12[e]	13[e]	108[e]	232[e]	268	143	240	82	47	33	20	93	150	171
Federal Government	678	707	633	550	523	528	574	640	704	813	626	618	569	682
State, Local Government	128	138	157	160	174	168	178	206	227	257	316	330	287	371
Total[1]	1494	1526	1714	1835	1727	1721	2178	1982	2186	2473	2349	2621	2474	3155

e = estimated.

[1]Total includes minor amounts of mining and miscellaneous employment for some years.

SOURCE: Statistical Quarterly (Alaska Department of Labor).

available, there is steady growth indicated. Wholesale trade appears to be a much higher proportion of total wholesale-retail trade than is the case statewide, and this is apparently linked to wholesale trade activity associated with fisheries. There may also be problems with the industrial classification of wholesale trade.

Firms may engage in both buying or processing of fish and also wholesaling of fish or fish products. The firm's industrial classification would depend on which activity was of greater proportional significance, and this may change from year-to-year. The result is that the wholesale-retail sector reflects a strong mix of basic and support sector activity. In conjunction with possible industrial classification problems, this would account for the apparent lack of growth in this sector.

There is one significant omission in the employment data; this is employment in commercial fishing. Such employment is not included in the Statistical Quarterly data, and as indicated above, a consistent series is not available elsewhere. Estimated commercial fishing employment for 1978, however, was 756. If we include this figure with total reported employment of 3,155, the commercial fishing employment accounted for about 19 percent of total employment for 1978. Commercial fishing plus processing employment amounts to 61 percent of total employment.

A second issue of concern relates to the residency of job holders. Table 20 presents estimates of resident and nonresident employment for

TABLE 20. ALEUTIAN ISLANDS CENSUS DIVISION
ESTIMATED RESIDENT AND NON-RESIDENT
EMPLOYMENT, 1978

Industry	Resident	Non-Resident	Total
Commercial Fishing	251	505	756
Manufacturing	162	1459	1621
Construction	7	133	140
Transportation, Communication, and Utilities	31	-0-	31
Wholesale/Retail	89	12	101[e]
Finance, Insurance, and Real Estate	38	-0-	38
Services	171	-0-	171
Federal Government Civilian, Military-Related	-0-	484	484
Other Federal Government	198	-0-	198
State Government	88	-0-	88
Local Government	283	-0-	283
Total	1318	2593	3911

e = estimated.

SOURCE: Commercial fishing; see text on production. Manufacturing total from Statistical Quarterly; see text on production for allocation. Federal government civilian military related; Table 18. All other data on tables from Statistical Quarterly (Alaska Department of Labor). For division of allocation to resident and nonresident, see text.

1978. The resident/nonresident breakdown for commercial fishing and processing has already been explained. Allocation of the remainder of employment has been accomplished as follows: State and local government is assumed to be resident employment, as is also the case for transportation, communications, and public utilities; finance, insurance, and real estate; and services. Federal government civilian employment was divided between defense-related and other Federal government activity. Defense-related employment was assigned to the nonresident category (in the sense that incomes earned had no impact on the Aleutian economy), while other Federal government employment was treated as resident employment.

Retail trade was assumed to reflect resident employment. Wholesale trade includes both resident and nonresident employment, and one-half of the employment in wholesale was treated as resident. This division was based on discussions of wholesale trade activity in the Aleutians with the Alaska Department of Labor.

The final industry of concern is contract construction. In conversations with several labor unions and contractors who operate in the Aleutians, it was clear that the vast majority of construction workers in the Aleutians are not residents of the area. Based on a synthesis of these conversations, it was estimated that 5 percent of contract construction employment in the Aleutians was accounted for by residents. The remainder was divided as follows: Anchorage (65 percent), southcentral Alaska (15 percent), the rest of the State (10 percent), and non-Alaska (10 percent). While this breakdown is necessarily an approximation, it does

reflect the collective judgment of a wide variety of participants in contract construction in the Aleutians.

Using the above delineation of employment between resident and nonresident, it appears that just under 34 percent of the civilian employment in the Aleutians is held by residents. The remaining 66 percent is held by nonresidents. Available data do not permit us to estimate comparable breakdowns of employment for other years, and it is not possible to speculate on how the ratio of resident-to-nonresident employment may have changed over time.

Summary data on labor force, unemployment, and employment for 1970-78 are presented in Table 21. It should be noted that the employment data in this table are not consistent with the data of the previous tables. First, the present table does not include estimates of commercial fishing employment. Second, the data reflect the number of job holders, whereas the previous tables reflect numbers of jobs. The data are also supposed to be resident adjusted, although the resident employment estimate is substantially above that obtained in the previous table.

Of particular interest are the data on unemployment and the unemployment rate. Given the seasonal variation in total activity, the rates are suprisingly low. This would suggest that several factors are at work. First, a high degree of seasonal migration is present. Second, Aleutian residents may tend to drop out of the labor force when employment opportunities are not present. Third, the data include a large proportion of government employment which tends to be seasonally stable.

TABLE 21. ALEUTIAN ISLANDS CENSUS DIVISION: CIVILIAN RESIDENT LABOR FORCE, TOTAL EMPLOYMENT, AND UNEMPLOYMENT 1970-1975

Year	Labor Force	Employment	Unemployment	Unemployment Rate (%)
1970	1688	1575	113	6.7
1971	2041	1930	111	5.4
1972	1880	1763	117	6.2
1973	2109	1945	164	7.8
1974	1968	1830	138	7.0
1975	2371	2207	164	6.9
1976	2302	2147	155	6.7
1977	2102	1964	138	6.6
1978	2343	2196	147	6.3

SOURCE: Alaska Labor Force Estimates by Area (Alaska Department of Labor) various years.

A 1978 survey of potential labor force and employment of the Aleut population in the Aleutian region indicates that published data on unemployment may considerably understate the actual situation. Table 22 presents a summary of the survey results. Of the potential labor of 575, only 278 were employed; only 222 earned $5,000 or more for that year; and 297 were not employed.

This implies an unemployment rate of 51.7 percent. This probably overstates the "true" rate since only those of the potential labor force actually employed or seeking employment should be included in the labor force figures used to determine employment rates. There is no way to tell what proportion of the potential labor force would actually seek employment if employment opportunities were available, but it appears that substanial real unemployment exists that is not reflected in published statistics.

In summary, considerable growth in employment in the Aleutians has been evident. This has occurred mainly in response to growth of fisheries-related activity. This growth has also led to growth of employment in the support sector. While historical data are not available to indicate trends, nonresident employment accounts for a dominant proportion of total employment. It also appears that the Native Aleut population has not participated fully in the employment opportunities reflected by overall growth in total employment. Whether this is by choice or due to other reasons is not known.

TABLE 22. REPORT OF LABOR FORCE 1978
COMPILED BY BUREAU OF INDIAN AFFAIRS
ANCHORAGE AGENCY

		Total	Male	Female
a.	Total Aleut population within the Aleutian region	2,139	1,155	984
b.	Total under 16 years of age included on line "a"	963	520	443
Resident Population of Working Age within the Aleutian Region				
c.	Total 16 years and over (a minus b)	1,176	635	541
d.	16-24 years	447	241	206
e.	25-34 years	235	127	108
f.	35-44 years	212	114	98
g.	45-64 years	212	114	98
h.	65 years and over	70	38	32
i.	Not in labor force (16 years and over) Total (j+k+l+m)	601	243	357
j.	Students (16 years and over, including those away at school)	364	196	167
k.	Men, physically or mentally disabled, retired, institutionalized, etc.	47	47	
l.	Women for whom no child care substitutes are available	133		133
m.	Women, housewives, physically or mentally disabled, institutionalized, etc.	57		57
n.	Potential labor force (16 years and over) (c minus i)	575	392	183
o.	Employed, Total (p+q)	278	185	93
p.	Employed, earning 5,000 or more a year (all jobs)	222	148	74
q.	Employed, earning less than 5,000 a year (all jobs)	56	37	19
r.	Not employed (n minus o)	297	207	90

SOURCE: Tribal Specific Health Plan (Aleutian-Pribilof Islands Association Health Department, undated).

PERSONAL INCOME

Personal income data for the Aleutian Census Division have been compiled for the years 1965-1978 and are presented in Table 23. Growth in current dollar total personal income has been at a rate of about 7.4 percent per year, while per capita income has grown at about 7.2 percent per year. When measured in constant dollars, however, the growth has been substantially less. Real per capita income grew at 1.4 percent, while real total personal income grew at 1.6 percent over the period.

Several aspects of the data suggest that the numbers be interpreted with caution. First, the Anchorage Consumer Price Index was used to deflate the personal income series since no more specific index is available. Hence, the adjustment is only approximate. Second, a large proportion of the income is related to military and federal civilian employment directly linked to military activity. Since this income does not enter the Aleutian economy in any meaningful sense, its inclusion is misleading in terms of considering overall economic activity.

Third, while the Bureau of Economic Analysis (BEA) which compiles the data makes a resident adjustment, there is some question as to the validity of the adjustment. In particular, it is not clear to what extent the adjustment captures the effects of commerical fishing and processing incomes flowing out of the region. Finally, an analysis of transfer payments reported for the region shows sizable amounts related to federal military and related civilian employment that probably had no effect on the Aleutian economy.

TABLE 23. PERSONAL INCOME BY PLACE OF RESIDENCE:
ALEUTIAN ISLANDS CENSUS DIVISION, 1965-1978

	Current Dollars		Constant (1978) Dollars	
	Total (million $)	Per Capita	Total (million $)	Per Capita
1965	33.951	4,721	70.207	9,763
1966	36.093	4,735	71.818	9,422
1967	38.886	4,727	75.750	9,208
1968	41.688	5,256	79.149	9,979
1969	43.677	5,484	79.296	9,956
1970	53.671	6,627	93.763	11,577
1971	50.655	6,447	86.255	10,978
1972	49.968	6,580	83.267	10,965
1973	60.849	8,235	95.746	12,958
1974	66.084	8,280	91.949	11,520
1975	72.717	9,250	89.995	11,448
1976	81.383	9,837	94.592	11,434
1977	79.765	9,932	87.638	10,912
1978	85.734	11,619	85.734	11,619

SOURCE: Current dollar income figures from U.S. Department of Commerce, Bureau of Economic Analysis. Constant dollar figures deflated by authors, using Anchorage Consumer Price Index.

For these and other reasons, we have attempted to develop an estimate of personal income for 1978 that more accurately reflects the sources and disposition of personal income for the region. These estimates are shown in Table 24.

As shown in the table, we have indicated personal income sources by type, accruing from the broad industrial classifications designated at the top of the table. The left hand column of the table indicates the estimated breakdown of income to resident and nonresident recipients. Inclusion of the military and related civilian federal income as nonresident is a judgmental decision based on the fact that these incomes do not appear to enter the general income stream of the Aleutian economy, but rather reflect enclave activity.

While much of the basis for allocating income has already been established in preceding sections of this study dealing with the Aleutians, there are several points that need to be expanded. In general, data on wages and salary income were obtained from the Statistical Quarterly for appropriate years. The Bureau of Economic Analysis data on "other labor income" were apportioned to specific private sector industries on a proportional basis and then assigned to either resident or nonresident categories in proportion to resident/nonresident wage and salary incomes. Dividends, interest, and rent were allocated to residents and nonresidents on the basis of total wage and salary income. Total transfer payments were adjusted to assign military transfers (except for veterans' pensions) to the nonresident category. In addition, 10 percent of

TABLE 24. ALEUTIAN ISLANDS PERSONAL INCOME, 1978
BY PLACE OF WORK AND TO PLACE OF RESIDENCE

Income From / To	Support Sector	Contract Construction	Commercial Fishing	Fish Processing	Fed. Gov. Civilian	Fed. Gov. Military	State & Local Govt.	Total
ENDOGENOUS HOUSEHOLDS: TOTAL ALLOCATED BY INDUSTRY								
Wages & Salaries	3.715	0.381	0	2.353	3.022	0	5.206	14.677
Other Labor Income	0.695	0.071	0	0.440	0	0	0	1.206
Proprietors' Income	0.951	0.098	12.250	0	0	0	0	13.299
UNALLOCATED COMPONENTS:								
Dividends, Interest, and Rents								0.317
Transfer Payments								3.501
OUT OF REGION:								
Wages & Salaries								
Anchorage	0	4.709	0	0	0	0	0	4.709
Southcentral	0	1.087	0	0	0	0	0	1.087
Rest of State	0	0.725	0	0	0	0	0	0.725
Rest of World	0.275	0.725	0	21.173	5.867	40.584	0	68.624
Other Labor Income								
Anchorage	0	0.881	0	0	0	0	0	0.881
Southcentral	0	0.203	0	0	0	0	0	0.203
Rest of State	0	0.136	0	0	0	0	0	0.136
Rest of World	0.051	0.136	0	3.958	0	0	0	4.145
Proprietors' Income								
Anchorage	0	0	0.780	0	0	0	0	0.780
Southcentral	0	0	33.600	0	0	0	0	33.600
Rest of State	0	0	2.130	0	0	0	0	2.130
Rest of World	0	0	56.870	0	0	0	0	56.870
UNALLOCATED, OUT OF REGION:								
Dividends, Interest, and Rents								
Rest of World								1.623
Transfers								
Rest of World								4.813
TOTAL	5.687	9.152	105.630	27.924	8.889	40.584	5.206	213.326

SOURCE: See text on personal income.

federal civilian retirement payments were assigned to residents, with the remainder assigned to nonresidents. With the exception of these adjustments, the remainder of transfer payments were assigned to residents.

Proprietor's income is the income of self-employed and unincorporated enterprises. A large portion of this component for the Aleutians should reflect commercial fishing income, and it was felt that BEA figures did not adequately reflect this income. An estimate of noncommercial fishing proprietor's income was made by assuming that the proportion of proprietor's income to wage and salary plus other labor income was the same for the State as for the Aleutians. This led to an estimate of noncommercial fishing proprietor's income of 4.1 million dollars.

Proprietor's income from commercial fishing was based on the value of catch. No reliable data exist on net profits from commercial fishing. It has been estimated, however, that about 35 to 40 percent of the value of catch is reflected in labor income (Scott, Prospects for a Bottomfishing Industry in Alaska); hence, 35 percent of the value of catch has been used to estimate proprietor's income. This figure has been used in conjunction with the estimated 1978 southwest region value of catch to estimate proprietor's income, as shown in the table, and was allocated by factors established in Table 17.

In general, the data for 1978 show total personal income of 213.3 million. Of this total, residents who are part of the nonenclave economy of the region accrued 33 million dollars. Of the 180 million dollars accruing

to nonresidents, about 46.5 million dollars represent wage and salary payments to military personnel and related federal civilian employees, with the remainder (133.9 million dollars) going to other nonresidents.

In terms of the regional allocation of the 180 million dollars, about 6.4 million dollars flowed to the Anchorage region; while 34.9 million dollars went to the southcentral region (primarily Kodiak), with an additional 3.0 million dollars going to the rest of the State. About 136.1 million dollars primarily from commercial fishing and defense-related activities appeared to flow outside the State. Thus, while total personal income was substantial, over 84 percent of the income created by production in the Aleutians flowed out of the Aleutian region. These are indeed very high leakages and present a different picture of the Aleutian economy than that indicated by the BEA personal income data.

In addition to the analysis of total and per capita income, it is again appropriate to consider the distribution of income. Recent data on income distribution are not available, but the Bureau of Indian Affairs prepared an estimate of the 1974 distribution of income which is presented in Table 25. The distribution is shown for both Native and white families. Median income for the two groups is similar, and both are well below the statewide figure of 12,443 dollars for the same year. The greatest disparity between Native and white families appears in the under-5,000 dollar groups, with 26 percent of the Native families and 13.8 percent of white families with incomes below 5,000 dollars. It should be noted that the non-Native families include military personnel,

TABLE 25. FAMILY INCOME: NUMBER AND PERCENT OF NATIVE AND WHITE FAMILIES BY INCOME LEVELS ALEUT CORPORATION AREA

	Native		White	
	No. of Families	Percent	No. of Families	Percent
Under 1,000	7	2.1	0	0
1,000-1,999	16	4.9	6	1.0
2,000-2,999	13	4.0	7	1.1
3,000-3,999	30	9.2	31	4.9
4,000-4,999	19	5.8	45	7.1
5,000-5,999	20	6.1	55	8.7
6,000-6,999	26	8.0	65	10.3
7,000-7,999	25	7.7	63	10.0
8,000-8,999	21	6.4	72	11.4
9,000-9,999	18	5.5	37	5.9
10,000-11,999	40	12.2	88	13.9
12,000-14,999	31	9.5	102	16.2
15,000-24,999	56	17.1	43	6.8
25,000-49,999	5	1.5	17	2.7
50,000	0	-	0	0
Median Income	$8,357		$8,604	

SOURCE: Tribal Specific Health Plan (Aleutian-Pribilof Islands Association Health Department, undated).

whose incomes tend to flatten the distribution somewhat; whereas for the Native distribution, the under-5,000 dollar and over-15,000 dollar income categories are proportionately more important.

POPULATION

Aggregate population data for 1960 and the years 1970-78 are presented in Table 26; it includes total resident and civilian population and military population. Considerable variation in the military population is evident; although for most of the period, it averaged a little over 3,000. For recent years, it has been somewhat lower, dropping to 1,655 in 1978. Total civilian population has shown a steady increase, attributable to both natural increase and net in-migration. Table 27 shows the component of change in both civilian and military population over the 1970-78 period. Civilian population has grown at about 4.8 percent, with natural increase accounting for 47 percent of the total increase. The remainder is accounted for by net in-migration.

Table 28 provides data on population by community and by Native and non-Native components. The data totals are not in strict agreement with the other population data presented but do provide a generally accurate picture of the population distribution in the census division, with major nongovernment-based communities at King Cove, Sand Point, St. Paul, and Unalaska. It is no coincidence that (with the exception of St. Paul) these are the major centers of commercial fishing activity in the Aleutians.

TABLE 26. ALEUTIAN ISLANDS CIVILIAN AND TOTAL RESIDENT POPULATION: 1960, 1970-1978

	Total Resident Population	Total Civilian Population	Military
1960	6,011	2,633	3,378
1970	8,057	4,368	3,689
1971	7,896	4,285	3,611
1972	7,245	4,634	2,611
1973	6,914	3,994	2,920
1974	7,714	4,506	3,208
1975	7,086	4,208	2,878
1976	8,282	5,300	2,982
1977	7,686	4,896	2,790
1978	8,000	6,345	1,655

SOURCE: Alaska Department of Labor

TABLE 27. ALEUTIAN ISLANDS: COMPONENTS OF POPULATION CHANGE, 1970-78

1970 Population	8,057
Births	1,106
Deaths	176
Natural Increase	930
Net Migration	
Civilian	1,047
Military	- 2,034
1978 Population	8,000

SOURCE: Alaska Department of Labor

TABLE 28. ALEUT REGION POPULATION BY COMMUNITY, 1977

	Native	Non-Native	Total	Transient
Akutan	69	5	74	360 - 800
Atka	92	3	95	
Belkofski	14	-	14	
False Pass	55	2	57	120
King Cove[1]	425	142	567	60
Nelson Lagoon	49	6	55	
Nikolski	56	2	58	
Sand Point[1]	490	339	829	65
St. George	175	9	184	
St. Paul	437	63	500	
Unalaska	168	557	725	700 - 3,000
Other	126	5,700[2]	5,826	
Total	2,156	6,828	8,984	1,305 - 4,045

[1]City Manager's figures.

[2]Includes military population.

SOURCE: Tribal Specific Health Plan (Aleutian-Pribilof Islands Association Health Department, undated).

III. THE BASE CASE

In this part of the report we deal with three critical elements of the base case. The first of these is the underlying methodology used to develop the base case. The second element concerns the assumption regarding the future economic activity used to develop the projections. The third is the set of projections themselves.

Impact analysis, as carried out in the present study, is based upon a comparison of sets of economic and demographic projections, where one set is the standard or base case set. The base case serves as a frame of reference against which the economic and demographic changes resulting from the proposed OCS lease sale can be measured and evaluated.

There are two components of this process that are of particular concern. First the question of the accuracy and consistency of the projections. Generally speaking, this is dependent upon the validity of the assumptions utilized regarding future economic growth of the exogenous variables and the projection methodology employed. More will be said on both of these points below.

The second concern relates to the degree of information contained in the projections. Specifically, do the projections contain the information that is necessary to adequately interpret and evaluate the impacts?

While aggregate data on economic and demographic variables generated using the projections methodology employed in this study will answer many questions, it must be recognized that there will be omissions as well.

At the root of impact analysis is the issue of how economic well-being, both individually and collectively, will be affected by the proposed action. Two major problems are associated with this process. First it is not possible to measure all impacts that will result from the lease sale. In part this is due to the volume of information that would be required and the inadequacy of the existing methodology to capture all effects at an acceptable level of cost.

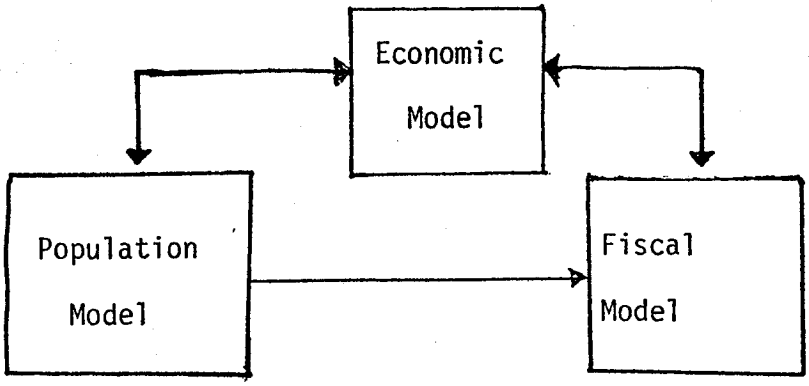
The more serious problem is that many of the effects are not measurable. While reallocation of resources within the context of the functioning of the market, in response to economic change, is desirable from the perspective of efficiency, change on the order of magnitude implied by OCS activity may also lead to situations of market failure and the presence of externalities. These are often difficult to identify and are certainly difficult to measure.

Even if these effects could be isolated they are usually inseparable from a further problem, that of income redistribution. Changes in income distribution and the relative economic position of individuals resulting from OCS activity necessarily implies that there will be lossers and gainers and associated changes in economic welfare. These are problems that involve normative economic judgements and cannot be

dealt with by impact analysis alone. In short, comparative impact analysis provides only part of the information necessary for decision making.

We can now turn to a discussion of the specific methodology employed in developing the present base case projections (and associated OCS impacts projections). At the statewide and regional level two models have been utilized, the MAP statewide econometric model and the MAP regional econometric model. For documentation see Goldsmith, Man-in-the-Arctic Program: Alaska Economic Model Documentation. The MAP statewide model is actually a system of models composed of economic, fiscal, and population models. The three are interdependent, as shown schematically in Figure 2.

FIGURE 2. MAP Sub-Models



In essence, this states that the economic model receives input from the fiscal and population models, the fiscal model receives input from the economic and population models, and the population model utilizes input from the economic models, but not directly from the fiscal model. Thus, when we talk about the economic model we are really describing the interaction of three models. To simplify things somewhat we can describe the important linkages between submodels and then consider the economic model in more detail.

The population-economic model link is the source of population estimates that are of direct interest, and reflect both natural population change and migration induced by changes in economic conditions. The population estimates are also used by the economic model for purposes of computing various per capita values for economic variables.

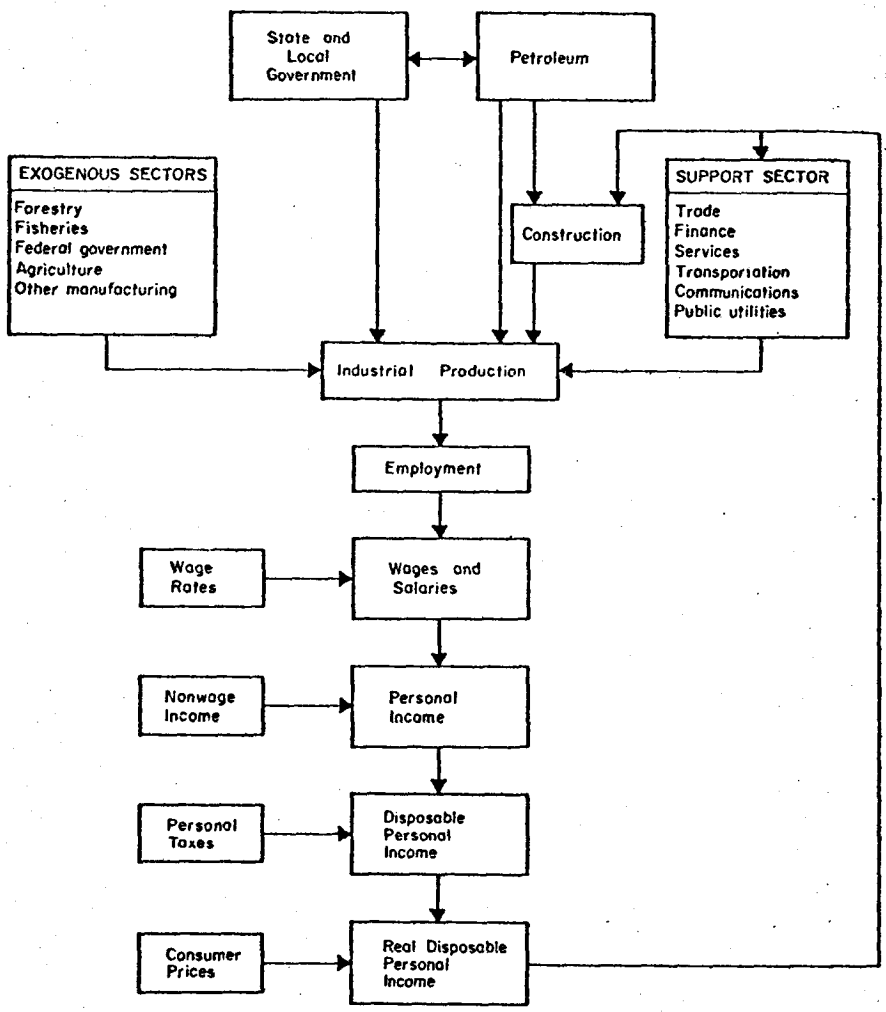
The significant link with the fiscal model relates to the role of State government expenditures as a source of major economic stimulus to the aggregate level of economic activity. In turn, State government (and local government) expenditures are dependent upon two key factors, the overall level of economic activity and the level of activity in the petroleum industry. The system allows for a variety of policy choices regarding state government spending and is one of the key points to consider in assessing economic forecasts.

We can now turn to a consideration of the economic model component of the system.

The MAP statewide and regional models belong to a class of econometric models that are known as disaggregate economic base models. In essence, economic activity is classified as either endogenous or exogenous (or basic). Exogenous activity determines the level of endogenous activity, and the specific relationships between the two components of economic activity are what make up the system of equations that are the econometric model. These models can be quite simple or rather complex, and the MAP models fall in this latter category. It is possible to get a feel for the models by considering the MAP statewide model.

As can be seen in Figure 3, determination of industrial production involves the impact of exogenous sector activity, which includes forestry, fisheries, agriculture and other manufacturing, as well as Federal government wages and salaries. Other exogenous sector activity includes the petroleum industry and components of contract construction such as major pipelines. State and local government expenditures may also be considered as exogenous for discussion purposes, although there is some interdependence between these expenditures and total economic activity. It should be noted that in constructing scenarios for forecasting or projection purposes it is primarily these exogenous variables that must be provided.

FIGURE 3. MAP STATEWIDE MODEL



SOURCE: Man-In-The-Arctic Program Alaskan Economic Model Documentation (ISER, 1979).

These exogenous variables combine with demand from the support sector and endogenous construction to generate total industrial production. Industrial production, through a series of steps, determines employment and income, and finally real disposable personal income, which in turn is a determinant of support sector and endogenous construction economic activity. This means that aggregate production depends on both exogenously determined and endogenously determined economic activity, where endogenous activity depends on total activity. As such, the system is a simultaneous equation structure.

It should also be noted that certain other variables enter the model as well. In particular, wage rates are used in determining total wage and salary payments, where the wage rates are in part dependent upon U.S. wage rates, which are determined exogenously. It should also be observed that the model is particularly sensitive to the wage rates used.

The MAP regional model is structurally similar to the statewide model except that the model is disaggregated to seven regions. (See Figure 4) This means that scenarios (or future values for exogenous variables) must be specified on a regional basis and that forecasts of endogenous variables (such as income, employment, and population) will be generated on a regional basis. Otherwise the models are similar.

For the Aleutian Islands Census Division projections have been developed using the small community population impact model (SCIMP). For documentation

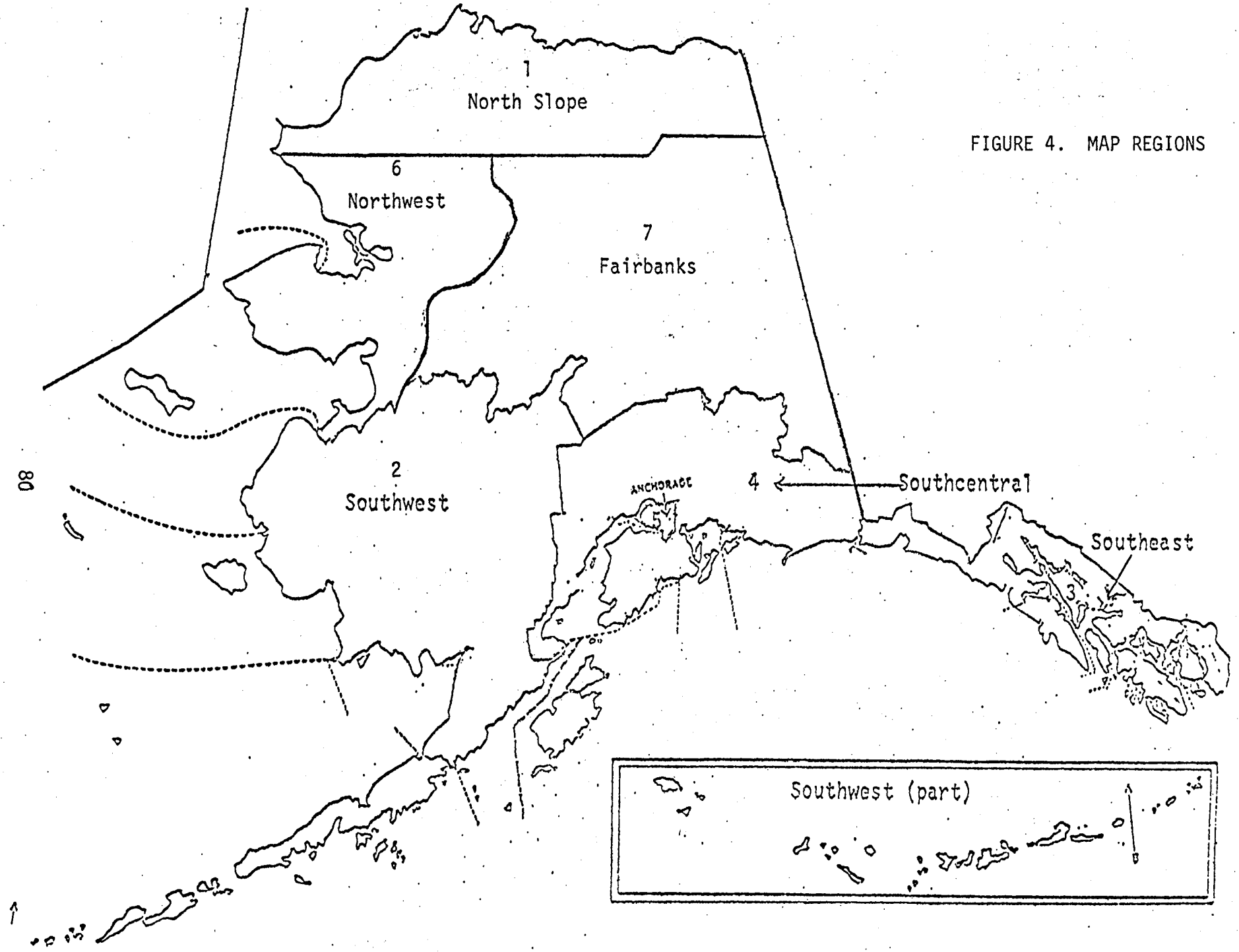


FIGURE 4. MAP REGIONS

see Lee Huskey and Jim Kerr, "Small Community Population Impact Model". Whereas the MAP models are classified as econometric models SCIMP is technically an accounting model. A system of equations describes the economic and demographic structure of the economic system. In turn parameters of the equations and a set of exogenous variable inputs provide the numerical basis for utilizing the model for projection purposes. It is the determination of parameters for the model that distinguishes SCIMP from econometric models.

In an econometric model, parameters are typically determined by the application of econometric methods to historical time series or cross section data and the parameter estimates are an integral component of the model. In the case of SCIMP the parameters are determined exogenously by a variety of means, including point estimates, assumptions based on other research, and in some instances by econometric estimation techniques. In other words, in SCIMP both the parameters and exogenous variable data are inputs, while in an econometric model the parameter estimates are an integral part of the model.

There are both advantages and shortcomings to this approach. On the positive side, SCIMP is generally applicable to small regional economies, rather than being region specific, as would be the case with an econometric model. This results in substantially more limited data requirements than is the case for a fully estimated econometric model. The

shortcoming is also indicated by the less stringent data requirements. Specifically, the quality of the parameter estimates may not be as great as that obtained by econometric techniques. However, the costs are substantially less.

We can now turn to a discussion of the assumptions utilized in developing the base case projections. Since distinct sets of assumptions are necessary for each of the models, these will be considered in turn.

Non-OCS Base Case Assumptions: MAP Models

NATIONAL VARIABLES ASSUMPTIONS

Inasmuch as Alaska is an open economy, it is affected by changes in the national economy. Consequently, several assumptions about the future growth of the U.S. economy are required. The assumptions needed are threefold. First, a forecast of average weekly earnings in the United States is required as an input into the estimation of Alaskan wage rates. Second, the Alaskan price level is tied in part to the national price level so that a forecast of the U.S. consumer price index is needed. Finally, inasmuch as a major determinant of migration to Alaska is the income differential between Alaska and the lower 48, a forecast is required of real per capital disposable income in the United States.

The long-run assumptions for these national variables are based on long-term forecasts prepared by Data Resources, Inc., in their September 1979 forecast of U.S. economic activity (TRENDLONG0979). This forecast predicts a long-run average rate of increase in the U.S. consumer price index of 8.85 percent through 1990. A rate of 8.3 percent (the 1990 value) is used for the 1991-2000 period. Real disposable per capita income is forecast to increase at a 3.38 percent average annual rate. Hourly earnings are forecast to increase at 10.2 percent, while average hours worked are forecast to decline slowly at -0.23 percent.

The Base Case Assumptions

The impact of OCS development on the economy will be measured as the change from the level of activity from the base case. The base case is defined as the level of activity which is projected to occur without the OCS lease sale of interest. This section describes the base case which will be used in this study.

A set of assumptions about the future level of various exogenous economic activity defines a development scenario. A development scenario is required to forecast the future level of activity in the economy with each model used in the analysis. There are three major types of assumptions required for a development scenario. First, the models require assumptions about the future level of national variables which directly or indirectly affect Alaska economic activity. Secondly, assumptions about the future development of the exogenous sectors of the Alaska economy are required. These assumptions can be separated into OCS and non-OCS assumptions; the major difference between the base case and the impact case is the addition to the OCS assumptions of the OCS lease sale of interest. Finally, the models require assumptions about the State government finances. These include both assumptions about State expenditure decisions and assumptions about the level of exogenous State revenues.

Consequently, average weekly earnings may be expected to grow at an annual rate of 9.97 percent (i.e., 10.2 percent minus 0.23 percent). These long-term average growth rates were adopted as the three national variable assumptions utilized in the analysis.

THE ECONOMIC SCENARIOS

The economic scenarios consist of time series on employment and output in certain export base or exogenous industries. This does not mean that we are predicting that all or any of these events will occur since there is a highly variable degree of uncertainty with respect to the levels and timing of the events in these scenarios. What it does mean is that with a certain degree of probability, we expect the general level of economic activity to follow this scenario. We assume that there is a medium probability that the level of activity will be at least as great as that described by this scenario.

The major exception to this important assumption is related to the exogenous series in fisheries-related activity. These series were developed by Sea Grant and Earl Coombs, Inc., under contract with the BLM/ Alaska OCS Office. The components related to bottomfishing, in the opinion of the ISER staff, are greatly in excess of what can reasonably be expected to actually occur. To the extent that these series do in fact turn out to be too high, then the aggregate projections will also be high and the probability that they will be achieved must necessarily be reduced. Since we have been specifically instructed to use the series by the Alaska OCS Office we have done so, but we are not in agreement with the assumptions.

Primarily as a result of the uncertainty attached to the occurrence, magnitude, and timing of any particular event, agreement about particular scenarios is hard to achieve even among those most knowledgeable about the Alaska economy. Emphasizing our concern mainly with general levels of activity, the probabilistic nature of the specific scenario should reduce the disagreement. In an attempt to reduce even further the disagreement, the scenario was developed based upon existing scenarios which have attained some measure of consensus. The most important source for these scenarios were the scenarios developed in the level B Southcentral Water Study (Scott, 1979) and the Susitna Dam feasibility study (Goldsmith and Huskey, 1980). The major exception is the series related to bottomfishing activity, as commented upon above.

The economic scenario is described in Table 29. The assumptions are described below; these discussions are organized by industry.

Mining

Currently, the mining sector in Alaska is dominated both in employment and output by the petroleum industry. This is assumed to continue in the future.

The scenario includes production at Prudhoe Bay and in the Upper Cook Inlet. Production from the Sadlerochet formation at Prudhoe is assumed to include both primary recovery and secondary recovery using water flooding. Development of the water flooding facilities begins in 1982.

The Kuparak formation is also assumed to be developed with production rising to 120,000 barrels per day by 1984. Employment associated with these developments peaks in the early 1980s with the development of Kuparak and the water flooding project. Upper Cook Inlet employment is assumed to remain at its existing level throughout the projection period. This assumes a rising level of exploration, development, and production of gas in the Kenai fields which would replace employment lost because of declining oil production. Also included is exploration, development, and production in NPRA, beginning in 1985.

Finally, the mining includes the "moderate" cases of the following OCS leases: Beaufort State/Federal Sale, Northern Gulf (Sale 55), the two Cook Inlet Sales, and the Bering-Norton Sale (57).

TABLE 29. SCENARIO ECONOMIC ASSUMPTIONS

Special Projects	Description	Dates & Employment	Location	Source
Trans-Alaska Pipeline	The construction of the TAPS was completed in 1977. Additional construction of four pump stations is assumed as well as pipeline operations.	1979-1982 - Pump station construction of 90/year 1977-2000 - Operations employment of 1500/yr.	Operations employment allocated: 1/3 to Southcentral 1/3 to Fairbanks 1/3 to N. Slope	E. Porter, Bering-Norton Statewide-Regional Economic and Demographic Systems, Impact Analysis, Alaska OCS Socioeconomic Studies Program, Bureau of Land Management, 1980.
Northwest Gasline	Construction of natural gas pipeline from Prudhoe Bay which includes construction of an associated gas conditioning facility on the North Slope.	1982-1986 - Construction peak employment of 7,823 (1984) 1986-2000 - Operations begin employing 400 petroleum and 200 transport workers	2/3 of pipeline construction and transportation employment in Fairbanks. 1/3 in North Slope. All gas conditioning employemnt in North Slope.	E. Porter, 1980.
Prudhoe Bay Petroleum Production	Primary recovery from Sadlerochit formation, secondary recovery using water flooding of that formation and development of the Kuparuk formation.	1982-1984 - Construction of water flooding project peak employment of 2,917 (1983) 1980-2000 - Mining employment long-run average of 1,802/year	All in North Slope	E. Porter, 1980.
Upper Cook Inlet Petroleum Production	Employment associated with declining oil production is assumed to be replaced by employment associated with rising gas production maintaining current levels of employment.	1980-2000 - Mining employment of 705/year	All in Southcental region	E. Porter, 1980

TABLE 29. SCENARIO ECONOMIC ASSUMPTIONS (cont.)

Special Projects	Description	Dates & Employment	Location	Source
Beluga Coal Production	Moderate development of Beluga coal resource for export.	1985-1990 - construction - peak employment of 400 (1987) 1988-2000 - operations employment of 210/year long-run average	Located in Southcental region	Pacific Northwest Laboratory, Beluga Coal Field Development: Social Effects and Management Alternatives, 1979.
Pacific LNG Project	Construction of current proposal by Pacific LNG	1982-1985 - Construction peak employment of 1,323/year (1984) 1986-2000 - Operations employment of 100/yr.	Located in Southcentral region	E. Porter, 1980.
Petrochemical Development	Development includes refinery and petrochemical facility using states royalty has as feed stock.	1984-1986 - construction employment of 2400/year 1987-2000 - operations employment 1118/year	Southcentral	Based on modifed Alpetco proposal (E. Porter, 1980) and J. Kruse, Fairbanks Petrochemical Study, 1978.
Susitna Project	Construction of two dams on the Susitna River for a major hydroelectric project.	1984-1998 - construction peak employment 1414 (1992). 1991-2000 - operations employment 19 per dam.	Southcentral	E. Porter, 1980.
National Petroleum Reserve in Alaska	Petroleum production in NPRA. Production in five fields with a total reserve of 2.5 billion bbls equivalents of oil and gas. Construction of 525 miles of pipeline.	Leases held between 1983-1990. Development and exploration begins in 1985. Average mining employment of 460/year.		Based on mean scenario under Management Plan 2 in Office of Minerals Policy and Research Analysis, U.S. Department of Interior, Final Report of the 105(b) Economic and Policy Analysis, 1979.
Bradley Lake	Construction of hydroelectric facility	1981-1985 - construction - peak employment of 300 (1983) 1986-2000 - Operations employment (10)	Southcentral	

TABLE 29. SCENARIO ECONOMIC ASSUMPTIONS (cont.)

Industry Assumptions	Description	Dates & Employment	Railbelt Location	Source
Fisheries/Food Processing	Small increase in employment in traditional fishery. Major expansion of domestic groundfish industry. Expansion to replace foreign fishery in the 200 mile limit by 2000.	Fishery employment expands to 9638 by 2000 (resident). Processing employment expands to 10,420 by 2000 (resident).	Resident regional employment in year 2000: F P Southcentral 2658/2405 Southeast 1376/538 Northwest 57/17 Southwest 5547/7306 Anchorage 0/154	Sea Grant, 1980; Earl Coombs, Inc., memo to OCS; OCS.
Forestry/Pulp and Paper Manufacturing	Employment expands to accommodate 960 million board feet of lumber.		Approximately 11% of activity in Fairbanks region. Remainder in Southeast.	M. Scott, 1979.
Other Manufacturing	Expansion of existing manufacturing of locally consumed goods.	Growth of output at 4% per year.	Regional distribution based on existing distribution of employment.	
Federal Government	Civilian employment assumed to grow at recent historical rate. Military declines at 0.05%	Civilian employment grows at 1.0%/year	Existing regional distribution.	M. Scott, 1979.
Other Mining	No expansion of existing nonspecial projects.	Employment constant at 1979 level, 2,350/yr.	Regional allocation constant	
Agriculture	Assumes that a relatively low priority is given to agriculture development because of priorities for recreation and wilderness or the lack of markets.	Employment grows to 1,037 by 2000.	71% of growth located in Fairbanks region and 29% in Southcentral region. Other regions remain the same.	M. Scott, 1979.

In addition to the petroleum development, some other mining is assumed to take place. Development of the Beluga coal resources is assumed. In this scenario, coal is assumed to be produced for export.

The special projects described above do not exhaust the mining employment in the state. Additional employment occurs in the exploration, development, and production of nonpetroleum minerals, as well as a major component of headquarters employment in Anchorage. Market forces and governmental policies are assumed to be such that this component of mining remains constant.

Agriculture-Forestry-Fisheries

This industry is, in reality, three distinct subindustries which represent Alaska's renewable resource industries. Of the three, the fishing industry is currently the largest in terms of both employment and value of product. Agriculture is currently only a marginal industry employing few people statewide (Scott, 1979). Current state efforts to develop agriculture may lead to its increased importance in the future. Forestry consists of only a small component; the future of forestry is most appropriately discussed with the future of lumber and wood products manufacturing.

The future of agricultural development in the state depends importantly on governmental policies and actions. State and Federal land policies, infrastructure development and loan programs, and marketing programs will determine the future of this industry. Agriculture is assumed to

rise only slightly from its current levels of employment. This assumes that agriculture receives low priorities from government.

Fisheries also hold promise for the future. The major determinant of future increases in fisheries employment will be the expansion of the Alaska bottomfish industry. The creation of the 200 mile limit may support increased Alaska bottomfish activity.

The fishing industry is assumed to undergo a rapid expansion in this scenario. Total resident employment in fisheries grows at 8.0 percent per year over the projection period, while employment in processing expands at 13.3 percent. This growth results primarily from the development of the bottomfish industry. The domestic fishery is assumed to completely replace the foreign fishery operating within the 200 mile limit by 2000 and expand to catch the allowable biological catch (Sea Grant, 1980; Earl Coombs, Inc. memo to BLM/AK OCS Office, and BLM/AK OCS Office). We would state again that we feel that the bottomfish projections are substantially over optimistic and we are using them at the instruction of the BLM/AK OCS Office.

Not all fishery related employment is assumed to have full economic impact on the state and regional economy. Boats and crews may be from outside and only fish Alaska waters; these crews have limited impact on the economy. Processing employees are also often brought in from outside the state and live in enclaves having little effect. For this reason, the resident share rather than total employment has been used. Table 30 provides estimates for 1980, 1990, and 2000.

TABLE 30 RESIDENT EMPLOYMENT IN FISHERIES

Harvesting

Year	Aleutians	Rest of the Southwest	Northwest	Southeast	Southcentral	Anchorage	Total
1980	388	642	57	1259	1164	0	3510
1990	1141	642	57	1301	1303	0	4444
2000	4905	642	57	1376	2658	0	9638

Processing

Year	Aleutians	Rest of the Southwest	Northwest	Southeast	Southcentral	Anchorage	Total
1980	175	32	21	225	359	39	851
1990	1394	65	21	420	503	53	2456
2000	7208	98	17	538	2405	154	10420

SOURCE: See text.

For the Aleutians and part of Southcentral (Kodiak) the figures were supplied by OCS, for bottomfishing. The remainder of traditional and bottomfishing total employment projections, by region, were obtained from Sea Grant (1980). Residency adjustments were developed utilizing residency factors in Rogers (1980) and are based upon residence of fishermen, by type of gear, fishing in each of the regions. Projections for processing were similarly developed.

Federal Government

Federal government employment has always been an important component of Alaska's economy. In recent years, Federal government employment has been growing very little; increases in civilian employment have been offset by decreases in military employment. Low rates of growth in Federal government employment are assumed to occur. Civilian employment grows at about 1 percent per year, while military employment declines at 0.05 percent per year.

Manufacturing

The manufacturing industry in Alaska has four important components: seafood processing, lumber-wood products-pulp, petrochemicals, and manufacturing for the local economy. Production of seafood processing is expected to continue to dominate the food processing industry in Alaska; growth of this industry was based on projections provided by Sea Grant to SESP (Sea Grant, 1980 and OCS, as explained above).

The growth of the lumber-wood-paper-pulp sector of manufacturing in the state is determined primarily by two factors. These are the Forest

Service allowable annual cut and the Japanese market conditions. Growth in lumber-wood-paper-pulp reflect an increase in annual allowed cut by half the 1970 level over the period.

The petrochemical industry in Alaska currently consists of the developments in Kenai. The petrochemical industry expands with the construction of the Pacific LNG facility as currently planned and the development of a petrochemical facility which uses the state's royalty oil and gas. The petrochemical complex is assumed to use the state's royalty gas, to produce ethylene or fuel-grade methanol, as well as include a fuels refinery as defined by Alpetco. Although no major proposal like this is currently proposed, interest in such a project has currently been expressed by major international firms.

The final component of the manufacturing industry consists of those industries producing for local consumption and other diverse specialized production. It was assumed that this sector would grow because of increased market size, allowing scale economies which make local production viable. This sector was assumed to grow at 4 percent per year.

Transportation

The exogenous portion of the transportation industry is that which serves special projects. This industry includes the operations employment for TAPS and the Northwest gasline.

Construction

The final exogenous industry for which scenarios are required is that portion of the construction industry where the level is determined outside the economy. This sector includes construction employment associated with the special projects described above. This sector does not include capital improvement projects of any level of government or construction activity which supports the local economy; the remainder of construction activity is determined endogenously in the MAP model. The major development of special projects occurs in the early part of the projection period. The most important project during this period is the construction of the Northwest gasline which is assumed to begin in 1982. The construction of the petrochemical facility is assumed to begin in 1984. An additional major construction project is the construction of the Susitna Hydro Project which begins in 1984. Construction of the bottomfish processing facilities projected also increase employment. It is assumed that it will require 40 man years to build a processing plant (conversation with industry sources).

STATE FISCAL POLICY ASSUMPTIONS

Past studies of the Alaskan economy conducted within the Man-in-the-Arctic Program, the OCS Studies Program, and other miscellaneous programs have indicated repeatedly the key role of State government fiscal policy as a major determinant of both historical and future State economic growth.

Over the period of study, State government will receive revenues from oil development which far exceed current levels of expenditure. The

rate at which the government chooses to spend these revenues (or to offset existing revenue sources with them) will serve to determine not only direct employment in the government sector but, through the multiplier effects of such expenditures or tax reductions, will have impacts on all endogenous sectors, affecting the growth of employment, income, prices, and migration into the state.

Two factors affect the current framework in which State fiscal policy will be determined. First, revenues have already overtaken expenditures as a consequence of the onset of production from Prudhoe Bay and will continue to increase as a consequence of both increased production and price increases. Second, the establishment of the Permanent Fund, as a constitutional amendment in 1976, places constraints on the use of certain petroleum revenues. It requires that a minimum of 25 percent of all mineral lease rentals, royalties, royalty sale proceeds, Federal mineral revenue sharing payments, and bonuses received by the State be put in the fund.

These changes in the structure of State spending limit the usefulness of past fiscal policies in determining the fiscal policy rules to be used. The rate of State expenditures, because it is a matter of policy choice within this new framework, cannot be modeled simply from past experience. Past experience can, however, provide qualitative guidance in formulating hypothetical fiscal policy options for use in simulation. First, we can expect that, as in the past, increasing levels of economic activity

generate new demands for government services. As prices and population rise, increased expenditure is required to simply maintain services at a constant level. In fact, however, this level will be expected to rise over time if historical trends continue.

Secondly, historical data gives at least some indication of State fiscal policy response to surplus petroleum revenues. The revenues generated by the Prudhoe Bay lease sale in FY 1970 led to a rapid jump in both the level and growth of nominal and per capita expenditures, with nominal expenditures jumping from an average growth of 8.9 percent annually prior to the sale to an average 19.7 percent after the sale; and real per capita expenditures jumped from 2.3 percent prior to the sale to 7.7 percent after the sale.

If these qualitative features carry over into future fiscal responses to surplus petroleum revenues, future real per capita expenditures can be expected to rise within the bounds set by revenue quantities and statutory constraints. At a minimum, the State might choose simply to maintain real per capita expenditures at their current levels. At a maximum, it could choose to spend all but 25 percent of restricted petroleum revenues as they are incurred. Unfortunately, the range of possibilities within these brackets is very large. While it is foolish to try to anticipate the actual fiscal policy choices of the State, it is possible to simulate each of the extremes. As a compromise, for purposes of simulation, a middle-range policy can then be selected. This is the strategy followed here.

The mid-range forecast used in the base case was developed as follows. First, exogenous petroleum revenues were estimated. The petroleum revenues used in this forecast were based on the most recent Petroleum Production Revenues Forecast which is prepared quarterly by the Alaska Department of Revenue. Next, two forecasts were made, one in which real per capita State government expenditures are maintained at existing levels and a second in which only the legislated minimum is saved. These cases provide the extremes. A path of growth in State expenditures which is midway between these extremes was chosen to use in the base case. The result was a growth rate of 14 percent in nominal State government expenditures.

Non-OCS Base Case Assumptions: SCIMP

The utilization of SCIMP requires projection of a set of exogenous variables and a set of control parameters. In general the control parameters for the base case include: demographic parameters, labor force participation rates, and economic base multipliers.

Parameters for the population distributions were based on 1970 census data and the Aleutian-Pribilof Islands Association Health Department, Tribal Specific Health Plan. Since we were concerned with the nonmilitary and military dependents population, this component of total population was netted out for distribution purposes. Military and dependents are included in population totals however. Birth rates and survivor rate parameters were based on the 1970 census and more recent data or vital statistics from the U.S. Department of Health and Welfare. No noneconomic induced migration was assumed.

Labor force participation rates by Cohort for residents were based on 1970 census data and adjusted to current levels by reference to aggregate labor force participation rates indicated in Alaska Department of Labor data on work force and population. Data from the Tribal Specific Health Plan cited above were also utilized in establishing Native labor force participation rates.

The multipliers needed were estimated from employment data for the Aleutians developed in Part II of the report. An aggregate multiplier,

defined as the ratio of resident support sector employment to resident plus nonresident basic sector employment, was estimated using data from Table 20. The support sector includes: resident employment in wholesale-retail trade; finance, insurance, and real estate; services; and transportation, communication, and public utilities. The basic sector includes all other employment except Federal government defense-related cilivian employment.

The result was a multiplier of 0.1062. This multiplier was then disaggregated into local and enclave multipliers, using the assumption that the enclave multiplier was equal to 0.2 times the local multiplier. This resulted in a local multiplier of 0.2332 and an enclave multiplier of 0.0466. The local and enclave multipliers were assumed to double (in response to major growth in the region) over the 20 year projection period. This assumption was based on a review of similarly estimated multipliers for other regions in the state, keeping in mind the lack of interdependence between local economies of the Aleutians.

The exogenous variables for which estimates must be supplied to the model include: government, construction, fisheries employment, the military, and non-OCS mining. State and local government was assumed to maintain a constant proportion to resident plus enclave employment. Federal government nondefense-related civilian employment was assumed to grow at 0.05 percent per year, in keeping with past trends. Military

and related federal civilian employment was assumed to maintain current levels (based on a review of historic data).

Data on the growth of fisheries was based on information contained in Sea Grant (1980) and figures supplied to ISER by OCS, as discussed above. Construction was assumed to respond to the rapid growth of fisheries. Total construction was set at 0.21 times resident fisheries employment, where the ratio was developed by assuming that construction to total employment ratios for the Aleutians will approximate that of the State in the future. Resident construction employment is set at 5 percent of total construction initially, as indicated by prior analysis, and grows to 15 percent of total construction employment by the end of the projection period. Data for fisheries and construction employment are presented in Table 31.

This completes the description of the base case assumptions. We now turn to the base case projections.

TABLE 31. PROJECTED EMPLOYMENT IN FISHERIES AND CONSTRUCTION ALEUTIAN ISLANDS CENSUS DIVISION: 1980-2000

	Construction		Fisheries (Harvesting & Processing)	
Year	Resident	Nonresident	Resident	Nonresident
1980	6	112	563	2349
1981	6	115	574	2313
1982	8	134	675	2872
1983	9	140	709	2890
1984	10	148	752	2903
1985	12	167	854	3464
1986	14	187	959	3480
1987	18	221	1137	3984
1988	24	281	1453	4413
1989	32	362	1874	4815
1990	46	486	2535	5139
1991	64	640	3350	5789
1992	81	757	3989	5541
1993	108	955	5048	5978
1994	141	1167	6228	5976
1995	161	1254	6736	5576
1996	200	1464	7922	5413
1997	242	1662	9069	5206
1998	283	1823	10029	4742
1999	331	2002	11110	4410
2000	382	2162	12113	3891

SOURCE: See text.

The Base Case Projections

The historical baseline analysis and the base case assumptions have laid the groundwork for the base projections. Before reviewing these projections, it again needs to be emphasized that the projections are not forecasts of what actually will occur. These base projections are projections of economic and demographic variables, given the assumption that the specific projects, growth rates, etc., occur. As discussed above, however, there is a reasonable probability (with the exception of fisheries) that the assumptions utilized will generate a growth path that actually will be obtained or exceeded. With these comments in mind, we can now turn to the projections.

THE MAP STATEWIDE BASE CASE PROJECTIONS

Population

Projections of populations, net migration, and natural increase are shown in Table 32, Population growth over the period averages 2.73 percent, divided about equally between the 1980s (2.68 percent) and the 1990s (2.78 percent). The 1980s begin with a relatively stable population, but from 1982-1986 growth is quite rapid (at about 5 percent). This growth is primarily a reflection of the gas pipeline construction, the waterflood project at Prudhoe Bay, the Pacific LNG plant construction, and construction of a major petrochemical facility. During the 1990s construction of the Susitna hydroelectric project and fisheries expansion are the main driving forces, and the growth of population is more even.

TABLE 32. PROJECTED POPULATION AND COMPONENTS OF CHANGE: ALASKA, 1980-2000

(Thousands)

	POPTST	MIGNET	NATINC
1980	400.5	-6.087	4.857
1981	399.946	-6.557	4.496
1982	407.591	1.985	4.115
1983	421.857	8.6	4.103
1984	453.741	25.943	4.356
1985	480.755	20.125	5.306
1986	494.946	6.605	5.966
1987	499.657	-3.026	6.07
1988	502.956	-4.212	5.805
1989	509.16	-1.047	5.521
1990	522.219	5.927	5.382
1991	538.342	8.83	5.534
1992	553.102	7.187	5.795
1993	567.305	6.418	5.982
1994	579.898	4.625	6.141
1995	593.178	5.198	6.227
1996	610.49	9.092	6.341
1997	629.74	10.741	6.613
1998	648.981	10.381	6.939
1999	666.24	8.071	7.24
2000	686.394	10.735	7.439

SOURCE: MAP Model Projections

POPST = State Population
MIGNET = Net Migration
NATINC = Natural Increase

Natural population increases are fairly steady over the entire period. In contrast net migration shows strong swings in response to fluctuation in labor demand associated with big project construction.

The net result is a population of 685.6 thousand in 2000, an increase of 71 percent over the 1980 population of 400.3 thousand. Of this increase 119.9 thousand is accounted for by natural increase, while the balance is attributed to net migration.

Employment

Projections of employment for total employment (EM99ST), wage and salary employment (EM98ST), the support sector (EMS1ST), government (EMG9ST), and the basic sector (EMB1ST), are presented in Table 33. Total employment grows from 186.68 thousand in 1980 to 381.41 thousand in 2000, a growth rate of 3.64 percent. Growth of basic sector employment (at 5.3 percent) occurs in response to construction, expanding petroleum-related activity, and growth of bottomfishing. Expansion is somewhat more rapid in the first decade (6.0 percent) compared to the 1990s (4.6 percent). Government growth (1.67 percent) is largely accounted for by growth of State and local government.

Support sector growth is strong and reflects the growth of the basic sector. For the entire period, growth averages 5.2 percent but is somewhat more rapid (at 5.8 percent) during the 1980s than during the 1990s (4.6 percent). Support sector employment as a percent of total employment grows from 33 percent in 1980 to 44 percent in 2000.

TABLE 33. PROJECTED EMPLOYMENT: ALASKA, 1980-2000
(Thousands)

	EM99ST	EM98ST	EMS1ST	EMG9ST	EMB1ST
1980	186.959	172.351	61.49	83.476	27.385
1981	188.596	173.924	61.515	84.378	28.03
1982	196.533	181.55	64.129	84.752	32.669
1983	208.348	192.915	70.481	84.67	37.765
1984	231.99	215.694	84.833	82.324	48.537
1985	247.582	230.741	99.298	83.653	47.79
1986	252.867	235.845	104.147	87.392	44.307
1987	253.228	236.194	103.279	90.029	42.885
1988	254.72	237.635	102.286	91.172	44.176
1989	258.978	241.749	103.782	92.677	45.29
1990	268.705	251.153	107.908	94.327	48.919
1991	280.438	262.504	113.935	96.165	52.404
1992	290.769	272.504	119.855	98.141	54.508
1993	300.493	281.923	125.297	100.248	56.378
1994	308.996	290.163	129.884	102.625	57.655
1995	318.198	299.084	134.509	104.658	59.917
1996	330.349	310.872	140.676	106.378	63.819
1997	343.607	323.741	148.035	108.421	67.286
1998	356.557	336.318	155.325	110.894	70.099
1999	367.928	347.368	161.592	113.699	72.077
2000	381.562	360.622	168.165	115.968	76.49

EM99ST = Total State Employment (Including military & self-employed)
EM98ST = Wage & Salary Employment (State total)
EMS1ST = Transport, Communications, & Public Utility Employment; Wholesale-Retail Trade; Finance, Insurance & Real Estate; & Services (State total)
EMG9ST = Federal, State, & Local Government Employment (State total)
EMB1ST = Basic Sector Employment (State total)

SOURCE: MAP Model Projections

In summary, the projections indicate a 20 year period of sustained growth. However, the first 10 years tend to be more volatile and reflect the concentration of several major projects in the 1982-1986 period. The 1990s growth in employment is somewhat more evenly paced, responding largely to growth in fisheries and the construction of the Susitna hydropower project.

Personal Income, Wages and Prices

Personal income projections (measured in 1980 dollars), both total and per capita, are shown in Table 34. Total personal income grows from 4183.5 million dollars in 1980 to 13,414.7 million dollars in 2000, an average annual rate of growth of 6.0 percent. As was the case with other variables considered, the rate of growth for the first 10 years (6.9 percent) is somewhat higher than for the second 10 years (5.1 percent). In part this reflects a somewhat lower rate of growth in employment, but it also is a result of changes in the composition of economic activity.

This is more clearly seen in the data on per capita income. Over the first decade per capita income grows at an annual rate of 4.1 percent, while for the 1990-2000 period the rate of growth is only 2.3 percent. This decline is attributable to two factors. First, an increasing share of total employment is accounted for by support sector activity, with relatively lower real wages than the economy as a whole. Second, much of the growth of basic sector employment during the 1990s is in fisheries, again an industry with relatively low wage rates.

TABLE 34. PROJECTED TOTAL AND PER CAPITA REAL PERSONAL INCOME: ALASKA, 1980-2000

(Personal Income in Millions of 1980 Dollars, Per Capita Income in 1980 Dollars)

	PIRST	PIRPCST
1980	4199.89	10486.6
1981	4317.35	10794.8
1982	4702.6	11537.6
1983	5375.63	12742.8
1984	7105.73	15660.3
1985	7999.46	16639.4
1986	7768.98	15696.6
1987	7426.66	14863.5
1988	7499.95	14911.8
1989	7693.18	15109.5
1990	8142.64	15592.4
1991	8690.42	16142.9
1992	9175.56	16589.3
1993	9603.43	16928.2
1994	9926.27	17117.2
1995	10370.8	17483.4
1996	11011.1	18036.5
1997	11686.2	18557.1
1998	12284.5	18928.9
1999	12748.5	19135.
2000	13427.4	19562.2

SOURCE: MAP Model Projections

PIRST = Personal Real Income (State total)
PIRPCST - Real Per Capita Personal Income (State total)

Variation in the overall growth of total and per capita personal income is also evident in the projections. Both grow steadily from 1980-1985 and then drop. It is not until 1990 that real total personal income exceeds its 1985 level and not until 1993 that per capita income reaches its 1985 level. Thereafter, both series grow steadily upward.

Projection of wages and salaries, including: government wages and salaries (WSG9RST), support sector wages and salaries (WSS1RST), and basic sector wages and salaries (WSB1RST) are shown in Table 35. Total government wages grow at an overall rate of 5 percent with the growth rate for the first 10 years (5.1 percent) slightly above the second period (4.8 percent). Support sector wages grow at a rate of 7.4 percent during the 1980s, and the rate drops to 5.1 percent during the 1990s. For the period as a whole the rate is 6.2 percent.

Basic sector wages grow somewhat more rapidly, especially during the first 10 years (9.5 percent) reflecting both the slightly higher rate of growth of employment and higher wage rates. During the next 10 years, the rate drops to 5.6 percent and is slightly above that of the support sector. Again, this is primarily a result of the lower wage rates in fisheries.

The wage bills in the basic and support sectors mirror the pattern of growth seen in personal income. Both series peak in 1985 and then

TABLE 35. PROJECTED WAGES AND SALARIES: ALASKA, 1980-2000

(Millions of 1980 Dollars)

	WSG9RST	WSS1RST	WSB1RST
1980	1545.92	1115.15	768.539
1981	1602.94	1123.7	799.85
1982	1666.83	1197.95	986.416
1983	1759.29	1391.02	1288.02
1984	1863.39	1893.22	2193.57
1985	2024.97	2317.58	2343.71
1986	2157.44	2313.22	1945.65
1987	2253.87	2187.76	1668.55
1988	2331.4	2143.19	1691.61
1989	2429.03	2167.34	1721.32
1990	2537.35	2260.64	1888.04
1991	2663.1	2411.29	2071.03
1992	2796.15	2557.71	2191.17
1993	2932.37	2684.49	2275.4
1994	3072.72	2775.16	2302.96
1995	3213.45	2885.77	2419.97
1996	3363.83	3054.49	2636.33
1997	3529.2	3247.61	2835.02
1998	3703.93	3420.47	2973.69
1999	3884.17	3550.95	3037.51
2000	4063.33	3716.09	3256.52

SOURCE: MAP Model Projections

WSG9RST = Government Wages & Salaries (State total)
WSS1RST = Support Sector Wages & Salaries (State total)
WSB1RST = Basic sector Wages & Salaries (State total)

decline steadily for 3 years and then begin growing again. Support sector wages reach peak 1985 levels in 1991, but it is not until 1995 that basic sector total wages equal those obtained in 1985. Thereafter the growth is steady.

Projections for real wage rates are shown in Table 36. These include the real wage rates for the basic sector (WRB1RST), government (WRG9RST), and the support sector (WRS1RST). Basic sector real wages increase rapidly during the first 10 years (3.27 percent per year) and drop to 1.0 percent thereafter. Overall, the growth rate is 2.13 percent. Support sector real wage rates grow at an average annual rate of 1.0 percent over the 20 year period with the rate at 1.47 percent for the 1980s. During the 1990s the rate is only 0.54 percent. Government real wages show the greatest growth at 3.24 percent over the entire period. During the 1980s the rate is 3.8 percent and drops to 2.7 percent in the 1990s. The cyclical pattern of growth observed earlier is again apparent.

It is also worth noting that our discussion of income and wages has been in real terms. Over this period inflation has been substantial. The USCPI has grown at an average rate of 8.4 percent. For the 1980s the rate was 8.5 percent and during the 1990s the rate was 8.3 percent. These rates exceeded the growth in the Alaska index which grew at 7.9 percent over the 20 year period. For the 1980s and 1990s the rates were, respectively, 8.1 and 7.7 percent (see Table 37).

TABLE 36. PROJECTED REAL WAGE RATES:

ALASKA, 1980-2000

(1980 Dollars)

	WRB1RST	WRG9RST	WRS1RST
1980	28063.8	18519.4	18135.4
1981	28535.	18997.	18267.1
1982	30193.8	19667.2	18680.3
1983	34106.	20778.3	19736.2
1984	45193.8	22634.9	22316.9
1985	49041.8	24206.8	23339.8
1986	43913.4	24686.9	22211.1
1987	38907.5	25034.9	21182.9
1988	38292.2	25571.4	20952.8
1989	38006.4	26209.7	20883.6
1990	38595.6	26899.7	20949.7
1991	39520.4	27693.	21163.8
1992	40198.8	28491.1	21340.
1993	40359.7	29251.1	21425.
1994	39943.7	29941.3	21366.5
1995	40388.4	30704.3	21454.1
1996	41309.7	31621.6	21712.9
1997	42134.	32551.	21938.2
1998	42421.5	33400.6	22021.3
1999	42142.5	34161.8	21974.8
2000	42574.7	35038.3	22097.9

SOURCE: MAP Model Projections

WRB1RST = Basic Sector Real Wage
WRG9RST = Government Real Wage
WRS1RST = Support Sector Real Wage

TABLE 37. PROJECTED ALASKA AND U.S.

PRICE INDEXES: 1980-2000

	RPI	USCPI
1980	354.655	245.292
1981	388.455	269.576
1982	423.483	294.916
1983	457.326	320.279
1984	496.964	345.581
1985	529.697	372.881
1986	568.09	404.203
1987	614.	438.56
1988	663.687	474.959
1989	715.79	513.906
1990	771.758	556.56
1991	830.519	602.753
1992	892.902	652.781
1993	960.717	706.961
1994	1034.07	765.639
1995	1113.83	829.186
1996	1200.21	898.008
1997	1292.68	972.542
1998	1392.14	1053.26
1999	1499.48	1140.68
2000	1616.84	1235.36

SOURCE: MAP Model Projections

RPI = Alaska Relative Price Index
USCPI = U.S. Consumer Price Index

Government Revenues and Expenditures

State government revenue projections by source are shown in Table 38. The variables include: total State government revenues (REVGFR), petroleum revenues (RP9SR), revenues from the Federal government (RFDSR), and other revenues (RNDSR),. Total revenue grows steadily from 1980 (2.3 billion dollars) to a peak of 5.9 billion dollars in 1991 and declines steadily thereafter to 4.7 billion dollars in 2000. The bulk of these revenues are accounted for by petroleum revenues. After steady growth these peak in 1989 (at 3.6 billion dollars) and decline through the year 2000 to a level of 1.2 billion dollars.

Receipts from the Federal government decline throughout the period, from 0.2 billion in 1980 to 0.07 billion dollars in 2000. Other revenues increase steadily and substantially from a level of 0.2 billion dollars in 1980 to over 3.4 billion dollars in 2000. These revenues include such items as: corporate income taxes, personal income taxes, earnings on fund balances, and miscellaneous tax receipts.

Expenditure data are presented in Table 39 and include total State government real expenditures (E99SR) and real per capita expenditures (E99SRPC). Total expenditures grow at 5.7 percent over the entire period and at 5.5 percent for the first 10 years. During the 1990s the rate is slightly higher at 5.9 percent. The growth is relatively stable throughout.

TABLE 38. PROJECTED STATE GOVERNMENT REVENUES:

ALASKA, 1980-2000

(Millions of 1980 Dollars)

	REVGFR	RP9SR	RFDSR	RNDSR
1980	2261.48	1823.45	226.924	211.104
1981	3078.93	2671.92	206.993	200.017
1982	3418.73	2837.4	192.225	389.107
1983	3786.51	3016.41	182.065	588.029
1984	4102.89	3074.91	175.905	852.069
1985	4629.05	3347.3	171.682	1110.07
1986	5032.42	3507.34	163.334	1361.74
1987	5274.69	3545.	152.122	1577.57
1988	5498.34	3575.76	141.381	1781.19
1989	5752.71	3627.67	132.219	1992.82
1990	5807.75	3468.27	124.836	2214.65
1991	5865.1	3309.33	118.534	2437.24
1992	5751.53	2984.34	112.406	2654.79
1993	5643.89	2702.58	106.399	2834.92
1994	5493.31	2402.9	100.438	2989.98
1995	5341.95	2139.36	94.8	3107.8
1996	5204.76	1912.38	89.857	3202.53
1997	5088.2	1708.92	85.37	3293.9
1998	4970.27	1520.71	81.072	3368.49
1999	4841.05	1347.7	76.769	3416.58
2000	4719.95	1192.99	72.821	3454.13

SOURCE: MAP Model Projections

REVGFR = Total State Government Revenues
RP9SR = Petroleum Revenues
RFDSR = Revenues from the Federal Government
RNDSR = Other Revenues

TABLE 39. PROJECTED TOTAL AND PER CAPITA STATE GOVERNMENT EXPENDITURES: ALASKA, 1980-2000

(Millions of 1980 Dollars)

	E99SR	E99SRPC
1980	1489.56	1101.03
1981	1550.34	1147.55
1982	1621.2	1177.49
1983	1711.4	1200.97
1984	1795.38	1171.37
1985	1920.26	1182.44
1986	2041.14	1220.85
1987	2152.91	1275.56
1988	2270.58	1336.45
1989	2400.04	1395.43
1990	2537.63	1438.54
1991	2688.21	1478.26
1992	2850.45	1525.65
1993	3020.14	1576.
1994	3198.71	1632.93
1995	3385.41	1689.55
1996	3581.6	1736.78
1997	3790.97	1782.11
1998	4012.94	1830.53
1999	4247.27	1887.23
2000	4490.41	1936.68

SOURCE: MAP Model Projections

E99SR = State Government Real Expenditures
E99SRPC = Real Per Capita State Government Expenditures

Growth of real per capita expenditures is more erratic and reflects the fluctuation in population observed earlier. Expenditures first peak in 1983, decline and rise again throughout the period, and surpass the 1983 peak in 1986. Overall growth is at an average annual rate of 2.87 percent with growth at 2.7 percent during the 1980s rising to 3.01 percent in the 1990s.

The fund balance also accumulates throughout the period, in nominal terms. However, in real terms the fund peaks in 1996 and declines thereafter (see Table 40).

TABLE 40. PROJECTED FUND BALANCES IN CURRENT AND 1980 DOLLARS: ALASKA, 1980-2000

	FUND	FUNDR
1980	1930.41	1838.64
1981	4005.47	3483.11
1982	6620.	5280.51
1983	9843.99	7271.09
1984	13713.7	9321.46
1985	18505.	11800.9
1986	24156.2	14363.7
1987	30542.1	16802.9
1988	37698.8	19187.5
1989	45735.4	21583.5
1990	54273.8	23755.5
1991	63303.5	25747.3
1992	72364.6	27376.4
1993	81423.4	28629.1
1994	90275.1	29489.7
1995	98812.4	29967.2
1996	1.070E+05	30103.2
1997	1.146E+05	29956.9
1998	1.217E+05	29525.3
1999	1.279E+05	28803.5
2000	1.330E+05	27787.9

SOURCE: MAP Model Projections

FUND = Fund Balance
FUNDR = Real Fund Balance

The Base Case: The Anchorage, Southcentral, and Southwest Regions

In this section we review the base case projections for the Anchorage (R5), Southcentral (R4), and Southwest (R2) Regions. Projections for the Aleutian Islands Census Division are included in the following section.

Population

Population projections for the three regions are shown in Table 41. Population growth in the regions reflects the general level of projected growth for the regions. For the 1980-2000 period growth in Region 2 and Region 4 exceeds that of the state; Region 2 growth occurs largely in response to rapid expansion of bottomfishing, and is concentrated in the 1990-2000 period where the growth rate is 6.31 percent. Growth in Region 4 reflects construction of the LNG plant and petroleum-related activity. Growth tends to be more rapid in the 1980-1990 period (at 3.61 percent per year) and tapers off to 2.01 percent from 1990-2000. Region 5 (Anchorage) population declines moderately until 1982, and then grows at a rate of 2.76 percent for the remainder of the decade. Growth is similar (at 2.83 percent) throughout the 1990s.

As a result of the population growth, minor changes in regional population shares occur. In Region 2 population grows from 6.7 percent of total population to 9.6 percent, while Anchorage declines from 49 percent to 44.6 percent. Region 4 population as a percentage of the state remains at about 11.2 percent.

TABLE 41. PROJECTED REGIONAL POPULATION: 1980-2000

(Thousands)

	POPR2	POPR4	POPR5
1980	26.95	44.549	196.154
1981	27.186	45.484	188.536
1982	27.451	47.076	187.061
1983	27.017	48.569	191.521
1984	26.424	52.082	206.018
1985	27.694	55.694	219.954
1986	29.69	60.131	225.467
1987	30.724	62.499	224.861
1988	31.805	62.384	225.142
1989	33.339	62.928	227.343
1990	35.776	63.497	231.686
1991	38.535	64.644	238.232
1992	41.014	65.571	245.089
1993	44.451	66.762	251.392
1994	48.475	66.722	256.927
1995	49.981	67.577	263.489
1996	53.414	69.004	271.383
1997	56.398	70.898	280.449
1998	59.934	72.674	289.395
1999	63.101	73.885	297.39
2000	65.993	77.476	306.259

SOURCE: MAP Model Projections POPR2 = Total Population, Region 2 (Southwest)
POPR4 = Total Population, Region 4 (Southcentral)
POPR5 = Total Population, Region 5 (Anchorage)

Employment

The regional growth in total employment (EM99) generally mirrors the growth in population. Employment growth, however, occurs at a slightly higher rate than population, inferring a slight increase in the employment to population ratio. Growth in Region 2 (at 5.4 percent) exceeds that of either Region 4 (3.8 percent per year) or Region 5 (3.7 percent). As was the case with population, growth in Region 2 is concentrated in the 1990s, while for Region 4 growth of employment is more rapid during the 1980s. Growth in Anchorage employment tends to be more uniform, at 3.8 percent per year during the 1980s and 3.5 percent during the 1990s (see Table 42).

Growth of support sector employment (EMS1) parallels growth of total employment (see Table 43), although in each case support sector employment as a percent of total employment increases. As would be expected, the share of total employment is largest for the largest of the three regions (55 percent in Region 5) while for Southwest the share is 27 percent. For Region 4 the comparable figure is 37 percent.

Total government employment (EMG) projections are shown in Table 44. Because these figures include federal civilian and military government employment (with little net growth) the overall growth (at 1.8 percent per year) is not great for Regions 2 and 5. In Region 4, where these components of total government employment are relatively small, the overall growth rate is about 3.2 percent. The share of total employment accounted for by government declines in each region.

TABLE 42. PROJECTED REGIONAL TOTAL EMPLOYMENT:

1980-2000

(Thousands)

	EM99R2	EM99R4	EM99R5
1980	12.6	20.133	83.186
1981	12.667	20.302	83.885
1982	12.831	21.293	86.487
1983	12.784	22.442	91.553
1984	12.827	25.219	101.255
1985	13.496	27.033	111.448
1986	14.348	29.088	115.569
1987	14.862	29.857	115.383
1988	15.443	30.003	115.395
1989	16.278	30.534	117.216
1990	17.572	31.283	120.755
1991	19.076	32.317	125.763
1992	20.499	33.207	130.72
1993	22.425	34.234	135.286
1994	24.699	34.362	139.325
1995	25.814	35.13	143.565
1996	27.947	36.308	148.8
1997	29.903	37.756	154.836
1998	32.171	39.04	160.813
1999	34.285	39.774	166.165
2000	36.328	42.127	171.808

SOURCE: MAP Model Projections

EM99R2 = Total Employment, Region 2 (Southwest)
EM99R4 = Total Employment, Region 4, (Southcentral)
EM99R5 = Total Employment, Region 5, (Anchorage)

TABLE 43. PROJECTED REGIONAL SUPPORT SECTOR EMPLOYMENT: 1980-2000

(Thousands)

	EMS1R2	EMS1R4	EMS1R5
1980	2.661	6.214	33.393
1981	2.629	6.151	33.535
1982	2.636	6.272	35.442
1983	2.531	6.718	39.663
1984	2.626	7.54	48.266
1985	3.023	8.833	56.542
1986	3.399	10.019	58.977
1987	3.497	10.492	57.737
1988	3.593	10.293	57.081
1989	3.801	10.512	57.998
1990	4.176	10.747	60.374
1991	4.591	11.119	63.998
1992	5.067	11.462	67.469
1993	5.576	11.889	70.54
1994	6.226	12.152	73.049
1995	6.549	12.461	75.771
1996	7.146	12.905	79.405
1997	7.705	13.509	83.687
1998	8.447	14.113	87.815
1999	9.017	14.686	91.286
2000	9.638	15.416	95.032

SOURCE: MAP Model Projections
EMS1R2 = Support Sector Employment, Region 2 (Southwest)
EMS1R4 = Support Sector Employment, Region 4 (Southcentral)
EMS1R5 = Support Sector Employment, Region 5 (Anchorage)

TABLE 44. PROJECTED REGIONAL GOVERNMENT EMPLOYMENT:

1980-2000

(Thousands)

	EMG9R2	EMG9R4	EMG9R5
1980	7.789	6.914	35.027
1981	7.879	7.028	35.35
1982	7.93	7.062	35.488
1983	7.948	7.027	35.453
1984	7.841	6.67	34.773
1985	7.947	6.841	35.2
1986	8.231	7.314	36.507
1987	8.435	7.641	37.437
1988	8.53	7.785	37.847
1989	8.646	7.977	38.365
1990	8.776	8.185	38.945
1991	8.918	8.416	39.583
1992	9.067	8.664	40.257
1993	9.225	8.928	40.979
1994	9.401	9.23	41.792
1995	9.555	9.485	42.497
1996	9.687	9.696	43.095
1997	9.839	9.951	43.793
1998	10.02	10.264	44.635
1999	10.224	10.62	45.588
2000	10.394	10.903	46.373

SOURCE: MAP Model Projections

EMG9R2 = Total Government Employment, Region 2 (Southwest)
EMG9R4 = Total Government Employment, Region 4 (Southcentral)
EMG9R5 = Total Government Employment, Region 5 (Anchorage)

Basic sector employment (EMB1) projections for each of the regions are presented in Table 45. Employment growth reflects the occurrence of major project employment in Region 4 (especially LNG and petroleum development while Region 2 responds to growth in bottomfishing. Growth of Anchorage basic employment is relatively stable over time and captures the indirect basic employment of projects outside the region.

Personal Income

Data on real personal income (PIR) for the regions is presented in Table 46. Over the full projection period the average annual rates of growth are 8.4 percent, 6.3 percent, and 5.7 percent for Regions 2, 4, and 5, respectively. Growth in the Southwest Region occurs primarily in response to expansion of bottomfishing, and is more rapid in the 1990s (at 9.9 percent) than during the 1980s (6.9 percent). For the Southcentral Region the pattern is reversed. Petroleum-related activity is primarily responsible for the growth rate of 8.7 percent during the 1980s. The rate drops to 4.0 percent during the 1990s. Growth of personal income in the Anchorage Region is more uniform, at 6.4 percent during the 1980s and falls slightly to 5.1 percent in the 1990s.

Per capita real personal income (PIRPC) projections are included in Table 47. Growth rates of per capita income are similar, (at 3.7 percent, 3.4 percent, and 3.4 percent for Regions 2, 4, and 5, respectively) when looked at over the full projection period. For Regions 4 and 5,

TABLE 45. PROJECTED REGIONAL BASIC EMPLOYMENT:

1980-2000

(Thousands)

	EMB1R2	EMB1R4	EMB1R5
1980	1.765	4.035	8.435
1981	1.788	4.157	8.588
1982	1.917	4.93	8.912
1983	1.977	5.629	9.468
1984	2.052	7.874	10.64
1985	2.227	8.191	11.699
1986	2.415	8.465	12.002
1987	2.641	8.39	12.138
1988	3.024	8.602	12.352
1989	3.538	8.72	12.632
1990	4.332	9.011	13.002
1991	5.282	9.418	13.472
1992	6.084	9.709	14.037
1993	7.346	10.03	14.597
1994	8.795	9.614	15.115
1995	9.437	9.815	15.714
1996	10.845	10.319	16.431
1997	12.094	10.883	17.197
1998	13.442	11.232	17.934
1999	14.784	11.036	18.633
2000	16.04	12.322	19.475

SOURCE: MAP Model Projections
EMB1R2 = Basic Sector Employment, Region 2 (Southwest)
EMB1R4 = Basic Sector Employment, Region 4 (Southcentral)
EMB1R5 = Basic Sector Employment, Region 5 (Anchorage)

TABLE 46. PROJECTED TOTAL PERSONAL INCOME BY REGION:

1980-2000

(Millions of 1980 Dollars)

	PIRR2	PIRR4	PIRR5
1980	284.499	413.355	1888.03
1981	290.288	425.007	1939.7
1982	302.953	473.587	2049.97
1983	318.536	549.57	2263.92
1984	345.493	788.195	2746.38
1985	389.143	902.409	3188.34
1986	424.979	922.245	3260.63
1987	436.942	876.357	3196.17
1988	459.845	881.093	3231.14
1989	495.377	903.333	3334.42
1990	556.016	947.955	3505.16
1991	616.382	1001.55	3706.73
1992	686.056	1047.23	3910.72
1993	763.443	1093.66	4105.61
1994	864.322	1085.33	4269.86
1995	916.52	1119.84	4459.88
1996	1016.73	1179.45	4699.95
1997	1107.72	1254.	4977.61
1998	1227.82	1308.92	5238.02
1999	1318.95	1322.36	5471.73
2000	1429.22	1407.98	5734.68

SOURCE: MAP Model Projections

PIPR2 = Real Personal Income, Region 2 (Southwest)
PIPR4 = Real Personal Income, Region 4 (Southcentral)
PIPR5 = Real Personal Income, Region 5 (Anchorage)

TABLE 47. PROJECTED PER CAPITA REGIONAL PERSONAL INCOME:

1980-2000

(1980 Dollars)

	PIRPCR2	PIRPCR4	PIRPCR5
1980	10556.6	9278.64	9625.23
1981	10677.8	9344.09	10288.2
1982	11036.1	10060.1	10958.9
1983	11790.1	11315.2	11820.7
1984	13075.	15133.6	13330.8
1985	14051.7	16202.9	14495.5
1986	14313.7	15337.2	14461.7
1987	14221.6	14021.9	14214.
1988	14458.3	14123.8	14351.6
1989	14858.7	14355.	14666.9
1990	15541.6	14929.1	15128.9
1991	15995.2	15493.4	15559.3
1992	16727.4	15971.	15956.3
1993	17174.8	16381.3	16331.5
1994	17830.1	16266.3	16618.9
1995	18337.3	16571.2	16926.3
1996	19034.9	17092.5	17318.5
1997	19641.2	17687.5	17748.7
1998	20486.3	18010.7	18099.9
1999	20902.3	17897.6	18399.2
2000	21657.1	18173.1	18724.9

SOURCE: MAP Model Projections

PIRPCR2 = Real Per Capita Personal Income, Region 2 (Southwest)
PIRPCR4 = Real Per Capita Personal Income, Region 4 (Southcentral)
PIRPCR5 = Real Per Capita Personal Income, Region 5 (Anchorage)

however, the increase tends to be more rapid in the first ten years (4.9 percent and 4.6 percent, respectively), declining to 2.0 percent and 2.2 percent during the 1990s.

In summary, growth of population, employment, and income is substantial in all three regions. The specific rates of growth over time, however, vary considerably in response to the timing and occurrence of major projects and industry growth within regions. It should also be noted that much of the projected growth for Region 2 occurs in the Aleutian Islands Census Division and we now turn to a combination of projections for this area.

Base Case Projections: SCIMP and the Aleutian Islands Census Division

As stated earlier, the major growth area within the Southwest Region is the Aleutian Islands Census Division. The driving force behind this projected growth is the assumed rapid expansion of the bottomfishing industry, as set forth in the base case assumptions.

Projections of employment by sector are presented in Table 48. Employment in the support sector (EMS) is the primary endogenous series and reflects resident employment. Growth in this sector occurs at an average annual rate of 16.9 percent. This implies a doubling of support sector growth every five years. The growth rate is also quite stable, at 17.0 percent for the first half of the projection period and 16.9 percent during the second half.

Support sector employment, as a proportion of total resident employment (TE) also grows over time, rising from 25 percent in 1981 to over 33 percent in 2000. When viewed as a proportion of total civilian and defense employment (TOTE), support sector employment grows from 6 percent to 24 percent. In both instances, the growth in the total share of employment accounted for by support sector employment reflects the growth of the multipliers over time and the general process of import substitution. In addition, it reflects the declining relative importance of nonresident employment in the region.

TABLE 48. ALEUTIAN ISLANDS CENSUS DIVISION EMPLOYMENT PROJECTIONS: 1981-2000

Year	EMS	EMG	EMA	EMX	TE	EMM	ENCLV	TOTE
1981	400	578	588	6	1572	2523	2428	6523
1982	491	666	689	8	1854	2523	3006	7383
1983	522	680	723	9	1934	2523	3030	7478
1984	557	695	766	10	2028	2523	3051	7602
1985	664	787	868	12	2331	2523	3631	8485
1986	728	814	973	14	2528	2523	3667	8718
1987	869	914	1151	18	2952	2523	4205	9680
1988	1064	1029	1467	24	3584	2523	4694	10801
1989	1311	1159	1888	32	4390	2523	5177	12090
1990	1633	1321	2549	46	5579	2523	5625	13727
1991	2141	1555	3364	64	7124	2523	6429	16076
1992	2471	1644	4003	81	8199	2523	6298	17020
1993	3095	1899	5062	108	10165	2523	6933	19621
1994	3764	2119	6242	141	12266	2523	7143	21932
1995	4101	2174	6750	161	13186	2523	6830	22539
1996	4831	2381	7936	200	15348	2523	6877	24748
1997	5534	2564	8980	242	17321	2523	6868	26712
1998	6248	2712	10043	283	19286	2523	6565	28374
1999	7044	2888	11124	331	21387	2523	6412	30322
2000	7815	3026	12127	382	23350	2523	6053	31926

SOURCE: SCIMP Projections.

Civilian nondefense-related federal government and state and local government (EMG) grow steadily over the period, at an average annual rate of 9.1 percent. The bulk of the growth is accounted for by expanding state and local government in response to regional growth and averages 11 percent per year.

Resident employment in manufacturing and commercial fishing is included in variable EMA and reflects the projected growth of bottomfishing. Growth averages 17.3 percent over the projection period. The growth rate is greater than that for the fisheries industry itself, since an increasing proportion of total fisheries employment, over time, is assumed to be resident employment. Enclave employment (ENCLV) is the other variable reflecting fisheries growth (ENCLV includes nonresident construction). Enclave fisheries employment includes nonresident employment in both harvesting and processing. During the first half of the projection period, enclave fisheries employment grows at about 9.8 percent; while during the second half of the projection period, it grows at less than one percent annually. This is because of the substitution of resident for nonresident participation in the fisheries industry.

Resident construction employment (EMX) also reflects the rapid growth of employment and population. It grows at about 24 percent per year. This very rapid growth is in part due to the substitution of resident for nonresident employment over time and also reflects a modest increase in the share of construction to total resident employment.

Total resident employment (TE) grows at a rate of 15.3 percent per year over the projection period and is relatively stable throughout the whole period. Military and defense-related civilian employment (EMM) was assumed to be constant, and so there is no growth in this sector. Total employment (TOTE) is the sum of total resident employment plus EMM and ENCLV employment. Because of the "no growth" assumption for EMM and the relatively low growth rate of ENCLV (4.9 percent) resident employment as a percent of total employment grows over time, from 24 percent in 1980 to 73 percent in 2000.

Population projections for the Aleutians are contained in Table 49. Total resident civilian population (BPOPP) grows from 3,777 in 1981 to 41,597 by 2000. The average annual rate of growth for the entire period is 13.5 percent. Over the first half of the period population growth averages 12.5 percent; while for the second half, the growth rate increases slightly to 14.4 percent.

Total population for the census division (BASPP) includes, in addition to BPOPP, military and defense-related civilian government employees and dependents plus enclave employees. Total population grows from 10,595 in 1981 to 52,040 in 2000, at an average annual rate of 8.7 percent. Growth during the second half of the projection period occurs at a somewhat higher rate (9.6 percent), reflecting the growth of enclave employment related to development of the bottomfishing industry.

TABLE 49. ALEUTIAN ISLANDS CENSUS DIVISION:
SCIMP POPULATION PROJECTIONS, 1981-2000

Year	BPOPP	BASPP
1981	3777	10595
1982	4169	11565
1983	4239	11659
1984	4447	11888
1985	5056	13077
1986	5316	13373
1987	6179	14774
1988	7295	16379
1989	8712	18279
1990	10860	20875
1991	13551	24370
1992	15092	25780
1993	18934	30257
1994	22343	33876
1995	23423	34643
1996	27939	39206
1997	30961	42219
1998	34501	45456
1999	38199	49001
2000	41597	52040

SOURCE: SCIMP Projections.

IV. PROJECTED IMPACTS OF THE PROPOSED ST. GEORGE BASIN SALE

Introduction

In this portion of the report we present a brief description of the projection scenarios for the proposed St. George Basin sale and a discussion and analysis of the projected impacts. Included are two scenarios, an "exploration only," or low case, and the mean case.

Projections of sale impacts are developed by adjusting the non-OCS base case to include direct impacts (primarily employment) of the mean and low cases and re-running the appropriate model. A comparison of the mean or low case run is then made with the non-OCS base case projections of the previous section. The difference in the values of the respective variables of the mean or low case and non-OCS base case runs thus provides a measure of the impact of the scenarios. Projections are developed for the 1980-2000 period.

Before turning to the discussion of the results, a brief description of the scenarios will be helpful. In the low case exploration begins in 1983. A total of 21 wells are drilled, no discoveries are made, and activity ceases in 1987. Average monthly employment directly associated with this activity is, from 1983-1987, respectively; 188, 292, 342, 292, and 117. Because not all employees will reside in Alaska but rather come to work on the project and maintain residences elsewhere (and as a result have no perceptable impact on the Alaska economy), total project

employment is adjusted downward by the use of SEAR factors.* Thus, employment that directly affects the Alaska economy (and serves as input for the model) is less. For the years 1983-1987 the adjusted project employment is, respectively; 28, 101, 118, 104, and 52.

The mean case also commences in 1983, with the start of exploration drilling. A total of 55 exploration wells are drilled by 1987. By 1987 the development phase is also underway. Construction of platform and equipment begins in 1985; production and service wells are started in 1987, as is construction of trunk pipelines. Production begins in 1989.

Direct employment (average monthly employment) grows rapidly, from 480 in 1983, to 5924 in 1987. Thereafter, employment declines, and from 1992 through the end of the projection period averages about 1818. As was the case in the low scenario, the total employment data were adjusted by the SEAR factors before being used in the model runs. It should also be noted that the estimates of total direct OCS employment for each of the scenarios was provided to ISER by the BLM/Alaska Outer Continental Shelf Office.

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*For a full discussion of SEAR factors see "Western Gulf of Alaska Petroleum Development Scenarios: Economic and Demographic Impacts" (Technical Report No. 38), Bureau of Land Management, Alaska Outer Continental Shelf Office (August 1979). In addition, OCS direct and SEAR adjusted employment for the mean and exploration only cases is included in Appendix C.

We can now turn to a discussion of the projections and impacts. Results of the mean and low scenarios for the statewide and regional MAP model runs will be considered first. Following this is a discussion of the projections for the Aleutian Islands Census Division, based on SCIMP.

The Mean Case Scenario: Statewide Impacts

POPULATION

Over the projection period to the year 2000 there is a net increase of about 15,000 people above what would have occurred in the absence of the mean case (701.4 thousand versus 686.4 thousand). This is equivalent to 2.2 percent of the base case projected population. The bulk of this increase occurs in the early years of the project (1983-1989), and after this period the difference in the level of population remains roughly constant.

Of the 15,000 difference in total population about 69 percent is accounted for by net in-migration, while the remainder (31 percent) is attributable to natural increases in population. Net migration is particularly high during early phases of the project, amounting to a cumulative total of 15.4 thousand by 1990. This is followed by a period of net out-migration over the next several years. Over the projection period net migration adds 10.3 thousand to the total state population. (See Tables 50 and 51.)

TABLE 50. PROJECTED STATEWIDE POPULATION IMPACTS, ABSOLUTE VALUES: MEAN CASE

	POPTST - EXOGENOUS MEAN	MIGNET - EXOGENOUS MEAN	NATINC - EXOGENOUS MEAN
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.36	0.36	0.
1984	0.871	0.497	0.015
1985	1.88	0.976	0.034
1986	2.937	0.987	0.072
1987	6.906	3.863	0.108
1988	11.301	4.142	0.259
1989	15.569	3.862	0.413
1990	16.822	0.712	0.548
1991	15.519	-1.852	0.551
1992	14.124	-1.852	0.453
1993	13.597	-0.893	0.363
1994	13.588	-0.326	0.315
1995	13.674	-0.206	0.292
1996	13.768	-0.181	0.274
1997	14.092	0.066	0.259
1998	14.587	0.239	0.256
1999	14.891	0.044	0.261
2000	15.037	-0.113	0.259

POPST = State Population
MIGNET = Net Migration
NATINC = Natural Increase

SOURCE: MAP Model Projections.

TABLE 51. PROJECTED STATEWIDE POPULATION IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	POPTST - EXOGENOUS	MIGNET - EXOGENOUS	NATINC - EXOGENOUS
	MEAN	MEAN	MEAN
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.085	4.186	0.
1984	0.192	1.915	0.337
1985	0.391	4.851	0.637
1986	0.593	14.94	1.2
1987	1.382	-127.676	1.773
1988	2.247	-98.325	4.47
1989	3.058	-368.696	7.472
1990	3.221	12.013	10.185
1991	2.883	-20.979	9.952
1992	2.554	-25.768	7.823
1993	2.397	-13.911	6.071
1994	2.343	-7.044	5.135
1995	2.305	-3.96	4.902
1996	2.255	-1.989	4.318
1997	2.238	0.611	3.915
1998	2.248	2.301	3.689
1999	2.235	0.539	3.608
2000	2.191	-1.049	3.484

POPST = State Population
MIGNET = Net Migration
NATINC = Natural Increase

SOURCE: MAP Model Projections.

EMPLOYMENT

The pattern of net employment differences (for total state employment) between the base and mean case generally follows that of direct lease-related employment. Net impacts occur with the initiation of exploration drilling and increase rapidly over the 1983-1989 period, reflecting the heavy employment requirements of the development phase. After peak employment is reached in 1989 (at 3.7 percent above the base case or 9.9 thousand), differences in employment decline to about 1.9 - 2.0 percent (6,000 - 7,000) above the base case.

The same general pattern holds for components of total employment. Basic sector employment (EMB1ST) expands above the base case largely as a result of lease-related activity and essentially parallels project employment. Support sector employment (EMS1ST) expansion is somewhat greater, reflecting both direct and indirect multiplier effects. The same pattern is also present in government employment (EMG9ST) although the amplitude is considerably less.

All series peak in about the 1989 - 1991 period, and at their respective peaks basic sector employment is 5.5 percent above the base case, support sector employment is 5.4 percent over, and government drifts 1.7 percent above the base case. Table 52 provides annual projections of the differences between the base case and the OCS lease case. Table 53 presents the percentage difference between the base and perturbed case.

TABLE 52. PROJECTED STATEWIDE EMPLOYMENT IMPACTS, ABSOLUTE VALUES: MEAN CASE

MEAN

	EM99ST	EM98ST	EMB1ST	EMS1ST	EMG9ST
1980	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.
1983	0.266	0.256	0.121	0.116	0.019
1984	0.617	0.595	0.224	0.315	0.057
1985	1.299	1.254	0.428	0.718	0.109
1986	1.934	1.869	0.474	1.175	0.219
1987	4.689	4.531	1.848	2.466	0.216
1988	7.341	7.094	1.971	4.492	0.632
1989	9.746	9.422	2.499	5.742	1.181
1990	9.895	9.571	2.275	5.806	1.491
1991	8.302	8.037	1.481	4.962	1.593
1992	6.951	6.732	1.434	3.86	1.438
1993	6.388	6.19	1.474	3.417	1.299
1994	6.249	6.059	1.433	3.334	1.291
1995	6.203	6.018	1.399	3.319	1.299
1996	6.179	5.997	1.368	3.325	1.305
1997	6.35	6.166	1.454	3.388	1.324
1998	6.646	6.457	1.551	3.531	1.374
1999	6.791	6.601	1.53	3.651	1.421
2000	6.82	6.633	1.5	3.698	1.435

EM99ST = Total State Employment (Including military & self-employed)
EM98ST = Wage & Salary Employment (State total)
EMB1ST = Basic Sector Employment (State total)
EMS1ST = Transport, Communications, & Public Utility Employment (State total)
EMG9ST = Federal, State, & Local Government Employment (State total)

SOURCE: MAP Model Projections.

TABLE 53. PROJECTED STATEWIDE EMPLOYMENT IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

MEAN

	EM99ST	EM98ST	EMB1ST	EMS1ST	EMG9ST
1980	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.
1983	0.128	0.133	0.322	0.164	0.022
1984	0.266	0.276	0.462	0.371	0.069
1985	0.525	0.544	0.895	0.723	0.13
1986	0.765	0.792	1.071	1.128	0.251
1987	1.852	1.918	4.31	2.388	0.24
1988	2.882	2.985	4.461	4.391	0.693
1989	3.763	3.897	5.518	5.532	1.274
1990	3.682	3.811	4.651	5.38	1.581
1991	2.961	3.062	2.827	4.355	1.657
1992	2.39	2.47	2.631	3.221	1.465
1993	2.126	2.196	2.615	2.727	1.296
1994	2.022	2.088	2.486	2.567	1.258
1995	1.919	2.012	2.334	2.467	1.241
1996	1.871	1.929	2.144	2.364	1.225
1997	1.848	1.905	2.161	2.289	1.221
1998	1.864	1.92	2.213	2.273	1.239
1999	1.846	1.9	2.122	2.259	1.25
2000	1.787	1.839	1.961	2.199	1.237

EM99ST = Total State Employment (Including military & self-employed)
EM98ST = Wage & Salary Employment (State total)
EMB1ST = Basic Sector Employment (State total)
EMS1ST = Transport, Communications, & Public Utility Employment (State total)
EMG9ST = Federal, State, & Local Government Employment (State total)

SOURCE: MAP Model Projections.

INCOME, WAGES, AND PRICES

Total personal income, in real 1980 dollars (PIRST) above the base case is a modest 9.6 million dollars in 1983, and grows to 418.7 million dollars at the peak of activity in 1989, at which time it is 5.4 percent above the base case. After this the difference tapers off, and averages about 2 percent above the base case until the end of the projection period.

Real per capita income exhibits the same general cyclical pattern, but the percentage impacts are substantially less. At the start of exploration per capita income is only 12 dollars above the base case. The difference rises sharply until 1988, to 376 dollars (plus 2.5 percent) and then drops equally rapidly. By 1992 per capita income is actually less than that in the base case (by about 0.1 percent - 0.2 percent). This is primarily a result of changes in the composition of employment, in which support sector employment grows relative to total employment, but in which the average real wage for support sector employment does not increase in response to OCS activity. Tables 54 and 55 contain the absolute and percent differences between the base and mean case for the personal income and per capita income variables.

Real wage and salary payments follow the same general pattern as personal income. The least differences are seen in the government wage bill (WSG9RST), in which the difference grows from about 0.5 million dollars in 1983 to 46.9 million dollars in 1990 (a 1.8 percent increase above

TABLE 54. PROJECTED STATEWIDE REAL PERSONAL INCOME IMPACTS, ABSOLUTE VALUES: MEAN CASE

	PIRST - EXOGENOUS		PIRPCST - EXOGENOUS
	MEAN		MEAN
1980	0.	1980	0.
1981	0.	1981	0.
1982	0.	1982	0.
1983	9.629	1983	11.937
1984	26.223	1984	27.68
1985	65.262	1985	70.402
1986	85.512	1986	79.156
1987	264.113	1987	318.754
1988	361.637	1988	375.543
1989	418.703	1989	349.617
1990	393.73	1990	243.836
1991	260.211	1991	53.59
1992	223.898	1992	-18.34
1993	215.258	1993	-25.676
1994	214.187	1994	-31.004
1995	215.711	1995	-38.5
1996	218.633	1996	-47.551
1997	230.758	1997	-47.77
1998	246.867	1998	-44.082
1999	253.977	1999	-45.465
2000	258.156	2000	-51.34

PIRST = Personal Real Income (State total)
PIRPCST = Real Per Capita Personal Income (State total)

SOURCE: MAP Model Projections.

TABLE 55. PROJECTED STATEWIDE REAL PERSONAL INCOME IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	PIRST - EXOGENOUS	PIRPCST - EXOGENOUS
	MEAN	MEAN
1980	0.	0.
1981	0.	0.
1982	0.	0.
1983	0.179	0.094
1984	0.369	0.177
1985	0.816	0.423
1986	1.101	0.504
1987	3.556	2.145
1988	4.822	2.518
1989	5.443	2.314
1990	4.635	1.564
1991	3.224	0.332
1992	2.44	-0.111
1993	2.241	-0.152
1994	2.158	-0.181
1995	2.08	-0.22
1996	1.986	-0.264
1997	1.975	-0.257
1998	2.01	-0.233
1999	1.992	-0.238
2000	1.923	-0.262

PIRST = Personal Real Income (State total)
PIRPCST = Real Per Capita Personal Income (State total)

SOURCE: MAP Model Projections.

the base case). After this peak the differences drop to about 33.5 million dollars by 1993 and increases gradually to about 44.3 million dollars by the year 2000. The average percentage difference over the period is about 1.1 percent.

The difference in total support sector real wages (WSS1RST) grows from 2.6 million dollars in 1983 to 150.5 million dollars in 1989 (a 6.9 percent increase above the base case) and drops to 72.7 million dollars by 1994. Thereafter, the percentage difference averages about 2.3 percent. Basic sector wage bills (WSB1RST) closely approximate those of the support sector, although the average wage rates are higher. Basic sector total wages in the OCS case are about 8.9 percent above the base case in the peak year (1989), but the percentage difference drops steadily until the end of the projection period, at which time the difference is 2.6 percent. (See Tables 56 and 57.)

In terms of impact on the real wage rate the greatest impact is on wage rates in the basic sector (WRB1RST). From a difference of 18 dollars in 1983, the differential grows to 1364 dollars in 1988, a 3.6 percent difference over the base case. This drops steadily until 1992. Thereafter the difference averages about 0.5 percent per year until the end of the projection period in 2000. Differences in the wage rate for the support sector (WRS1RST) are much less, rising from 5 dollars in 1983 to 336 dollars in 1988 (a 1.6 percent difference over the base case). After dropping sharply for four years the average difference over the

TABLE 56. PROJECTED STATEWIDE REAL WAGE AND SALARY IMPACTS, ABSOLUTE VALUES: MEAN CASE

	WSB1RST - EXOGENOUS		WSS1RST - EXOGENOUS		WSG9RST - EXOGENOUS
	MEAN		MEAN		MEAN
1980	0.	1980	0.	1980	0.
1981	0.	1981	0.	1981	0.
1982	0.	1982	0.	1982	0.
1983	4.807	1983	2.635	1983	0.529
1984	12.102	1984	8.021	1984	1.731
1985	29.765	1985	20.546	1985	4.05
1986	31.372	1986	31.837	1986	7.561
1987	124.173	1987	79.577	1987	14.706
1988	138.403	1988	129.982	1988	30.372
1989	153.036	1989	150.527	1989	42.047
1990	134.35	1990	143.744	1990	46.911
1991	76.333	1991	111.415	1991	43.576
1992	66.388	1992	82.422	1992	36.108
1993	70.437	1993	73.857	1993	33.498
1994	70.011	1994	72.655	1994	34.224
1995	69.773	1995	73.043	1995	35.335
1996	70.025	1996	74.082	1996	36.37
1997	76.531	1997	76.155	1997	37.93
1998	83.67	1998	79.804	1998	40.412
1999	83.949	1999	82.959	1999	42.826
2000	84.043	2000	84.859	2000	44.313

WSB1RST = Basic Sector Wages & Salaries (State total)
WSS1RST = Support Sector Wages & Salaries (State total)
WSG9RST = Government Wages & Salaries (State total)

SOURCE: MAP Model Projections.

TABLE 57. PROJECTED STATEWIDE REAL WAGE AND SALARY IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

WSB1RST - EXOGENOUS		WSS1RST - EXOGENOUS		WSG9RST - EXOGENOUS	
	MEAN		MEAN		MEAN
1980	0.	1980	0.	1980	0.
1981	0.	1981	0.	1981	0.
1982	0.	1982	0.	1982	0.
1983	0.373	1983	0.189	1983	0.03
1984	0.552	1984	0.424	1984	0.093
1985	1.27	1985	0.887	1985	0.2
1986	1.612	1986	1.376	1986	0.35
1987	7.442	1987	3.637	1987	0.652
1988	6.182	1988	6.065	1988	1.303
1989	8.891	1989	6.945	1989	1.731
1990	7.116	1990	6.359	1990	1.849
1991	3.666	1991	4.621	1991	1.636
1992	3.03	1992	3.222	1992	1.291
1993	3.096	1993	2.751	1993	1.142
1994	3.04	1994	2.618	1994	1.114
1995	2.883	1995	2.531	1995	1.1
1996	2.656	1996	2.425	1996	1.081
1997	2.699	1997	2.345	1997	1.075
1998	2.814	1998	2.333	1998	1.091
1999	2.764	1999	2.336	1999	1.103
2000	2.581	2000	2.284	2000	1.091

WSB1RST = Basic Sector Wages & Salaries (State total)
WSS1RST = Support Sector Wages & Salaries (State total)
WSG9RST = Government Wages & Salaries (State total)

SOURCE: MAP Model Projections.

remainder of the projection period is less than 0.1 percent. In the case of government (WRG9RST) the difference is even less, growing from less than 2 dollars in 1983 to 155 dollars in 1988 (a 0.6 percent difference). Thereafter the difference drops quickly, and over the last several years the difference is actually marginally negative. Tables 58 and 59 contain the detailed data.

Changes in the Alaska Relative Price Index (RPI) are minimal. A slight increase over the base case (approximately 0.1 percent) occurs in the early of the project, but before the project peaks the differential becomes negative (by about 0.3 - 0.5 percent). Statistically the differences are probably not significant and for all intents and purposes there is no real effect on the index. Data on the index are included in Table 60.

GOVERNMENT REVENUE AND EXPENDITURES

The impact of the mean case scenario is highly limited. The maximum difference in total state government revenues (REVGFR) is about 1.7 percent in 1990 and 1991, and averages about 1.4 percent from 1993 through the end of the projection period. The impact on petroleum revenues (RP9SR) and federal government revenue (RFDSR) are slightly greater. Differences in petroleum revenues peak at about 62 million dollars in 1990 and decline thereafter to about 35 million dollars in 2000. However, because petroleum revenues in general are declining, the percentage difference between the mean and base case tends to grow, increasing to about 2.9 percent by 2000. Differences in revenue from

TABLE 58. PROJECTED STATEWIDE REAL WAGE RATE IMPACTS, ABSOLUTE VALUES: MEAN CASE

	WRB1RST - EXOGENOUS	WRS1RST - EXOGENOUS	WRG9RST - EXOGENOUS
	MEAN	MEAN	MEAN
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	17.527	4.988	1.672
1984	40.508	11.699	5.488
1985	182.301	37.937	16.844
1986	235.363	54.477	24.504
1987	1168.26	258.508	102.945
1988	1363.79	335.926	154.937
1989	1214.65	279.574	118.242
1990	909.027	194.531	71.027
1991	330.098	53.797	-5.535
1992	156.125	0.402	-48.742
1993	188.965	5.035	-44.34
1994	215.957	10.57	-42.613
1995	216.742	10.108	-42.91
1996	207.145	13.094	-45.012
1997	222.078	12.055	-47.047
1998	249.176	12.887	-48.867
1999	264.793	16.566	-49.633
2000	258.695	18.316	-50.719

WRB1RST = Basic Sector Real Wage
WRS1RST = Support Sector Real Wage
WRG9RST = Government Real Wage

SOURCE: MAP Model Projections.

TABLE 59. PROJECTED STATEWIDE REAL WAGE RATE IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	WRB1RST - EXOGENOUS		WRS1RST - EXOGENOUS		WRG9RST - EXOGENOUS
	MEAN		MEAN		MEAN
1980	0.	1980	0.	1980	0.
1981	0.	1981	0.	1981	0.
1982	0.	1982	0.	1982	0.
1983	0.051	1983	0.025	1983	0.008
1984	0.09	1984	0.052	1984	0.024
1985	0.372	1985	0.163	1985	0.07
1986	0.536	1986	0.245	1986	0.099
1987	3.003	1987	1.22	1987	0.411
1988	3.562	1988	1.603	1988	0.606
1989	3.196	1989	1.339	1989	0.451
1990	2.355	1990	0.929	1990	0.264
1991	0.835	1991	0.254	1991	-0.02
1992	0.388	1992	0.002	1992	-0.171
1993	0.468	1993	0.024	1993	-0.152
1994	0.541	1994	0.049	1994	-0.142
1995	0.557	1995	0.062	1995	-0.14
1996	0.501	1996	0.06	1996	-0.142
1997	0.527	1997	0.055	1997	-0.145
1998	0.567	1998	0.059	1998	-0.146
1999	0.628	1999	0.075	1999	-0.145
2000	0.608	2000	0.083	2000	-0.145

WRB1RST = Basic Sector Real Wage
WRS1RST = Support Sector Real Wage
WRG9RST = Government Real Wage

SOURCE: MAP Model Projections.

TABLE 60. PROJECTED STATEWIDE RELATIVE PRICE INDEX IMPACTS, ABSOLUTE AND PERCENTAGE DIFFERENCES: MEAN CASE

	Absolute Difference	Percentage Difference
	RPI - EXOGENOUS	RPI - EXOGENOUS
	MEAN	MEAN
1980	0.	0.
1981	0.	0.
1982	0.	0.
1983	0.096	0.021
1984	0.336	0.068
1985	0.562	0.106
1986	0.41	0.072
1987	-0.34	-0.055
1988	-1.717	-0.259
1989	-2.851	-0.398
1990	-3.812	-0.494
1991	-4.293	-0.517
1992	-3.982	-0.446
1993	-3.663	-0.381
1994	-3.563	-0.345
1995	-3.633	-0.326
1996	-3.752	-0.313
1997	-3.793	-0.293
1998	-3.843	-0.276
1999	-3.977	-0.265
2000	-4.119	-0.255

RPI = Alaska Relative Price Index

SOURCE: MAP Model Projections.

the federal government peak at about 3.4 million dollars and then decline steadily. In terms of percentage differences it is 2.8 percent in 1990 and averages about 1.9 - 2.0 percent for most of the 1990s.

Other state government revenues, including state corporate income taxes and earnings on fund balances (RNDSR) are moderately impacted. The percentage difference (mean over base case) grows to about 1.5 percent in 1990, and amounts to about 33 million dollars. The difference declines slightly, and the average difference over most of the 1990s is about 1.0 percent. (See Tables 61 and 62 for supporting data.)

Total real state government expenditures (E99SR) increase somewhat as a result of expanded population resulting directly and indirectly from the mean case scenario. The difference amounts to 81.7 million dollars in 1990, drops somewhat, but begins to increase again by the end of the projection period. In terms of percentage differences the peak differential (3.2 percent) is reached in 1990, and drops steadily thereafter, to about 2.20 percent by the year 2000. Per capita real state government expenditures (E99SRPC) are not impacted, and the percent difference remains constant at 0.0 percent.

Impacts on the real fund balance (FUNDR) are also modest. Under the mean case scenario the balance is about 152 million dollars, or 0.6 percent above the base case in 1992. After this peak the differential drops steadily and is about 0.3 percent by 2000. Data for the state government expenditure and fund balance variables are contained in Tables 63 and 64.

TABLE 61. PROJECTED STATEWIDE REVENUE & FUND IMPACTS, ABSOLUTE VALUES: MEAN CASE

MEAN	REVGFR	RP9SR	RFDSR	RNDSR
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	-0.644	-0.633	0.064	-0.076
1984	-2.145	-2.077	0.109	-0.175
1985	-3.109	-3.549	0.28	0.16
1986	-0.016	-2.528	0.556	1.959
1987	14.516	6.537	1.551	6.428
1988	42.129	22.889	2.592	16.649
1989	79.719	50.673	3.375	25.669
1990	98.418	61.681	3.474	33.261
1991	99.379	60.54	3.064	35.775
1992	89.992	55.559	2.574	31.859
1993	81.754	51.328	2.259	28.167
1994	77.676	48.056	2.066	27.551
1995	75.715	45.467	1.915	28.335
1996	74.113	43.146	1.781	29.188
1997	72.391	40.847	1.676	29.868
1998	71.156	38.679	1.594	30.883
1999	70.508	36.676	1.502	32.331
2000	69.672	34.7	1.401	33.573

FUNDR - EXOGENOUS	MEAN
1980	0.
1981	0.
1982	0.
1983	-2.77
1984	-10.395
1985	-21.922
1986	-26.062
1987	-15.797
1988	19.289
1989	64.961
1990	113.281
1991	147.855
1992	151.785
1993	147.828
1994	144.641
1995	141.044
1996	136.523
1997	124.996
1998	109.281
1999	92.051
2000	72.387

REVGFR = Total State Government Revenues
RP9SR = Petroleum Revenues
RFDSR = Revenues from the Federal Government
RNDSR = Other Revenues
FUNDR = Real Fund Balance

SOURCE: MAP Model Projections.

TABLE 62. PROJECTED STATEWIDE REVENUE & FUND IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

MEAN	REVGFR	RP9SR	RFDSR	RNDSR
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	-0.017	-0.021	0.035	-0.013
1984	-0.052	-0.068	0.062	-0.021
1985	-0.067	-0.106	0.163	0.014
1986	-0.	-0.072	0.34	0.144
1987	0.275	0.184	1.02	0.407
1988	0.766	0.64	1.833	0.935
1989	1.386	1.397	2.553	1.288
1990	1.695	1.778	2.783	1.502
1991	1.694	1.829	2.585	1.468
1992	1.565	1.862	2.29	1.2
1993	1.449	1.899	2.123	0.994
1994	1.414	2.	2.057	0.921
1995	1.417	2.125	2.021	0.912
1996	1.424	2.256	1.983	0.911
1997	1.423	2.39	1.963	0.907
1998	1.432	2.544	1.966	0.917
1999	1.456	2.721	1.956	0.946
2000	1.476	2.909	1.924	0.972

FUNDR - EXOGENOUS	MEAN
1980	0.
1981	0.
1982	0.
1983	-0.038
1984	-0.112
1985	-0.186
1986	-0.181
1987	-0.094
1988	0.101
1989	0.301
1990	0.477
1991	0.574
1992	0.554
1993	0.516
1994	0.49
1995	0.473
1996	0.454
1997	0.417
1998	0.37
1999	0.32
2000	0.26

REVGFR = Total State Government Revenues
RP9SR = Petroleum Revenues
RFDSR = Revenues from the Federal Government
RNDSR = Other Revenues
FUNDR = Real Fund Balance

SOURCE: MAP Model Projections.

TABLE 63. PROJECTED STATEWIDE REAL GOVERNMENT EXPENDITURE IMPACTS, ABSOLUTE VALUES: MEAN CASE

E99SR - EXOGENOUS		E99SRPC - EXOGENOUS	
	MEAN		MEAN
1980	0.	1980	0.
1981	0.	1981	0.
1982	0.	1982	0.
1983	1.462	1983	0.001
1984	3.449	1984	0.002
1985	7.507	1985	-0.002
1986	12.105	1986	-0.004
1987	29.753	1987	-0.001
1988	51.015	1988	0.
1989	73.385	1989	-0.001
1990	81.743	1990	0.001
1991	77.492	1991	-0.003
1992	72.783	1992	-0.003
1993	72.384	1993	-0.001
1994	74.95	1994	-0.
1995	78.000	1995	-0.003
1996	80.771	1996	0.
1997	84.838	1997	0.002
1998	90.196	1998	-0.
1999	94.926	1999	-0.003
2000	98.379	2000	0.002

E99SR = State Government Real Expenditures
E99SRPC = Real Per Capita State Government Expenditures

SOURCE: MAP Model Projections.

TABLE 64. PROJECTED STATEWIDE REAL GOVERNMENT EXPENDITURE IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	E99SR - EXOGENOUS	E99SRPC - EXOGENOUS
	MEAN	MEAN
1980	0.	0.
1981	0.	0.
1982	0.	0.
1983	0.085	0.
1984	0.192	0.
1985	0.391	-0.
1986	0.593	-0.
1987	1.382	-0.
1988	2.247	0.
1989	3.058	-0.
1990	3.221	0.
1991	2.883	-0.
1992	2.553	-0.
1993	2.397	-0.
1994	2.343	-0.
1995	2.305	-0.
1996	2.255	0.
1997	2.238	0.
1998	2.248	-0.
1999	2.235	-0.
2000	2.191	0.

E99SR = State Government Real Expenditures
E99SRPC = Real Per Capita State Government Expenditures

SOURCE: MAP Model Projections.

Impacts of the Mean Case Scenario on the Anchorage, Southcentral, and Southwest Regions

Regional Population Impacts

Population impacts and percentage differences projected for the mean case for Southwest Alaska (POPTR2), Southcentral (POPTR4), and Anchorage (POPTR5) are presented in Tables 65 and 66. In terms of the absolute impact, Anchorage undergoes the greatest expansion, with the difference between the mean case and base case growing from 365 people in 1983 to 9184 people in 1990 (a 4.0 percent difference). After this peak percentage difference drops to about 2.6 percent by 2000.

The impact on Southcentral and Southwest Alaska are similar in terms of the absolute level of population change. In both cases the population difference grows to about 1900 by the year 1990, and then declines moderately, but by the end of the projection period each has started to increase slightly. The percentage difference in the two regions differ because of the difference in the population base of the regions. In Southwest Alaska the peak level difference is about 5.6 percent and declines to about 2.1 percent. For Southcentral Alaska the percentage difference increases to 3.1 percent in 1990 and generally declines thereafter to 2.2 percent. It might also be noted that 75 percent of the total population impact by the year 2000 is concentrated in the three regions.

TABLE 65 PROJECTED REGIONAL POPULATION IMPACTS, ABSOLUTE VALUES: MEAN CASE

	POPTR2	POPTR4	POPTR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.008	0.081	0.365
1984	0.006	0.16	0.714
1985	0.065	0.292	1.382
1986	0.173	0.421	1.936
1987	0.371	0.937	4.759
1988	1.173	1.312	6.578
1989	1.873	1.843	8.847
1990	1.792	1.94	9.184
1991	1.75	1.724	8.12
1992	1.634	1.593	7.522
1993	1.533	1.545	7.42
1994	1.493	1.531	7.374
1995	1.467	1.533	7.362
1996	1.442	1.541	7.363
1997	1.412	1.59	7.611
1998	1.395	1.655	7.937
1999	1.401	1.681	8.028
2000	1.4	1.713	8.034

POPR2 = Total Population, Region 2 (Southwest)
POPR4 = Total Population, Region 4 (Southcentral)
POPR5 = Total Population, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 66. PROJECTED REGIONAL POPULATION IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	POPTR2	POPTR4	POPTR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.029	0.167	0.19
1984	0.021	0.307	0.346
1985	0.233	0.524	0.628
1986	0.582	0.7	0.858
1987	1.207	1.5	2.117
1988	3.689	2.103	2.922
1989	5.619	2.928	3.891
1990	5.008	3.056	3.964
1991	4.541	2.667	3.409
1992	3.983	2.429	3.069
1993	3.448	2.314	2.952
1994	3.079	2.294	2.87
1995	2.935	2.269	2.794
1996	2.7	2.233	2.713
1997	2.503	2.242	2.714
1998	2.327	2.278	2.743
1999	2.22	2.275	2.699
2000	2.122	2.211	2.623

POPR2 = Total Population, Region 2 (Southwest)
POPR4 = Total Population, Region 4 (Southcentral)
POPR5 = Total Population, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

Regional Employment Impacts

The impact of the mean case is projected for each of the three regions for several categories of employment, including total employment (EM99), support sector employment (EMS1), basic sector employment (EMB1), and government sector employment (EMG9). For each of the employment variables there is a strong cyclical pattern present that largely follows project employment. In Region 2 total employment impact peaks in 1989, with an additional 962 employees (a 6.0 percent increase above the base case), with only a modest decline thereafter. The percentage difference drops to 2.3 percent by 2000.

The peak differentials (absolute level and percentage differences) for Region 4 and Region 5 are, respectively; 1138 employees, 3.7 percent, and 5614 employees and 4.8 percent. For both regions the percentage difference declines steadily until the end of the projection period. About 78 percent of the total state employment impact in the peak year occurs in the three regions. (See Tables 67 and 68.)

Differences in basic sector employment for the peak year (1989) are respectively 109, 467, and 1679 for Regions 2, 4, and 5. The comparable percentage differentials are 3.1 percent, 5.4 percent, and 13.3 percent. Thus, the largest percentage impacts occur outside the impacted region. This reflects two phenomena. First, nonresident enclave employment is not included in developing the projections. Second, the employment data reflect place of residence rather than the place of work. In the case

TABLE 67. PROJECTED REGIONAL TOTAL EMPLOYMENT IMPACTS, ABSOLUTE VALUES: MEAN CASE

	EM99R2	EM99R4	EM99R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.001	0.046	0.217
1984	0.01	0.094	0.45
1985	0.039	0.182	0.892
1986	0.087	0.262	1.24
1987	0.244	0.638	3.095
1988	0.622	0.861	4.312
1989	0.969	1.138	5.614
1990	0.934	1.124	5.535
1991	0.899	0.89	4.455
1992	0.651	0.759	3.767
1993	0.82	0.701	3.541
1994	0.818	0.675	3.454
1995	0.815	0.662	3.412
1996	0.813	0.653	3.386
1997	0.814	0.673	3.524
1998	0.823	0.706	3.725
1999	0.836	0.713	3.778
2000	0.837	0.718	3.767

EM99R2 = Total Employment, Region 2 (Southwest)
EM99R4 = Total Employment, Region 4 (Southcentral)
EM99R5 = Total Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 68. PROJECTED REGIONAL TOTAL EMPLOYMENT IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	EM99R2	EM99R4	EM99R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.009	0.206	0.237
1984	0.077	0.373	0.444
1985	0.292	0.672	0.801
1986	0.606	0.899	1.073
1987	1.641	2.137	2.683
1988	4.029	2.869	3.737
1989	5.955	3.727	4.789
1990	5.315	3.592	4.533
1991	4.712	2.754	3.543
1992	4.15	2.287	2.882
1993	3.655	2.048	2.617
1994	3.313	1.963	2.479
1995	3.156	1.884	2.376
1996	2.908	1.799	2.275
1997	2.721	1.784	2.276
1998	2.558	1.809	2.317
1999	2.439	1.793	2.274
2000	2.304	1.705	2.193

EM99R2 = Total Employment, Region 2 (Southwest)
EM99R4 = Total Employment, Region 4 (Southcentral)
EM99R5 = Total Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

of Region 5 (Anchorage) part of the expansion reflects project-related employment in Anchorage based headquarters. (See Tables 69 and 70.) For reference purposes Appendix D includes direct OCS employment by place of work as well as by place of residence.

Support sector peak differences (in absolute and percentage terms) for the three regions are respectively; Region 2 (781, 20.6 percent), Region 4 (498, 4.6 percent), and Region 5 (3275, 5.6 percent). The relatively high support sector impact for Region 2 reflects the inclusion of OCS-related transportation employment. (See Tables 71 and 72.)

Finally, government sector differences in employment at peak project level (again in absolute and percentage differences) for the three regions are: Region 2 (109, 1.2 percent), Region 4 (210, 2.5 percent), and Region 5 (520, 1.3 percent). In each region the peak level impacts decline modestly, with the percentage impacts in Regions 2 and 5 declining to about 1 percent, while for Region 4 the difference drops to about 1.7 percent. The supporting data for absolute changes are contained in Tables 73, and for percentage impact levels in Table 74.

Regional Personal Income Impacts

The impact of the mean case on regional real personal income is relatively small. For the three regions the peak differences between the mean and base cases (in absolute and percentage terms) are: Region 2 (23.7 million dollars, 4.8 percent), Region 4 (61.1 million dollars, 6.8 percent), and

TABLE 69. PROJECTED REGIONAL BASIC SECTOR EMPLOYMENT IMPACTS, ABSOLUTE VALUES: MEAN CASE

	EMB1R2	EMB1R4	EMB1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.001	0.024	0.096
1984	0.003	0.043	0.166
1985	0.008	0.081	0.301
1986	0.005	0.094	0.325
1987	0.08	0.368	1.258
1988	0.095	0.37	1.286
1989	0.109	0.467	1.679
1990	0.103	0.401	1.516
1991	0.079	0.231	0.975
1992	0.077	0.229	0.98
1993	0.077	0.237	1.034
1994	0.08	0.222	1.006
1995	0.081	0.212	0.976
1996	0.085	0.203	0.947
1997	0.088	0.217	1.013
1998	0.092	0.232	1.087
1999	0.096	0.223	1.063
2000	0.099	0.22	1.029

EMB1R2 = Basic Sector Employment, Region 2 (Southwest)
EMB1R4 = Basic Sector Employment, Region 4 (Southcentral)
EMB1R5 = Basic Sector Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 70. PROJECTED REGIONAL BASIC SECTOR EMPLOYMENT IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	EMB1R2	EMB1R4	EMB1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.045	0.422	1.016
1984	0.165	0.541	1.561
1985	0.362	0.989	2.573
1986	0.218	1.113	2.709
1987	3.015	4.386	10.368
1988	3.132	4.296	10.412
1989	3.07	5.354	13.293
1990	2.372	4.446	11.657
1991	1.489	2.452	7.234
1992	1.264	2.354	6.985
1993	1.044	2.358	7.082
1994	0.908	2.309	6.655
1995	0.864	2.156	6.213
1996	0.788	1.966	5.764
1997	0.73	1.995	5.893
1998	0.684	2.069	6.058
1999	0.648	2.021	5.706
2000	0.616	1.782	5.265

EMB1R2 = Basic Sector Employment, Region 2 (Southwest)
EMB1R4 = Basic Sector Employment, Region 4 (Southcentral)
EMB1R5 = Basic Sector Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 71. PROJECTED REGIONAL SUPPORT SECTOR EMPLOYMENT IMPACTS, ABSOLUTE VALUES: MEAN CASE

	EMS1R2	EMS1R4	EMS1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.001	0.019	0.102
1984	0.003	0.042	0.24
1985	0.024	0.082	0.51
1986	0.067	0.132	0.783
1987	0.151	0.232	1.601
1988	0.486	0.39	2.602
1989	0.781	0.489	3.274
1990	0.731	0.498	3.275
1991	0.712	0.425	2.764
1992	0.677	0.322	2.148
1993	0.655	0.277	1.923
1994	0.652	0.267	1.872
1995	0.646	0.264	1.861
1996	0.64	0.264	1.867
1997	0.636	0.268	1.929
1998	0.639	0.279	2.034
1999	0.645	0.289	2.096
2000	0.642	0.296	2.118

EMS1R2 = Support Sector Employment, Region 2 (Southwest)
EMS1R4 = Support Sector Employment, Region 4 (Southcentral)
EMS1R5 = Support Sector Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 72. PROJECTED REGIONAL SUPPORT SECTOR EMPLOYMENT IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	EMS1R2	EMS1R4	EMS1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.032	0.287	0.257
1984	0.105	0.559	0.497
1985	0.809	0.932	0.901
1986	1.984	1.322	1.327
1987	4.328	2.212	2.774
1988	13.513	3.789	4.559
1989	20.557	4.654	5.646
1990	17.497	4.637	5.425
1991	13.510	3.910	4.319
1992	13.352	2.809	3.184
1993	11.754	2.332	2.725
1994	10.468	2.194	2.563
1995	9.864	2.118	2.456
1996	8.953	2.046	2.351
1997	8.26	1.984	2.305
1998	7.562	1.976	2.317
1999	7.151	1.967	2.296
2000	6.66	1.922	2.229

EMS1R2 = Support Sector Employment, Region 2 (Southwest)
EMS1R4 = Support Sector Employment, Region 4 (Southcentral)
EMS1R5 = Support Sector Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 73. PROJECTED REGIONAL GOVERNMENT EMPLOYMENT IMPACTS, ABSOLUTE VALUES: MEAN CASE

	EMG9R2	EMG9R4	EMG9R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.001	0.002	0.006
1984	0.004	0.007	0.019
1985	0.008	0.015	0.036
1986	0.015	0.029	0.071
1987	0.016	0.029	0.071
1988	0.044	0.083	0.208
1989	0.082	0.155	0.388
1990	0.102	0.196	0.488
1991	0.109	0.21	0.52
1992	0.098	0.189	0.47
1993	0.088	0.171	0.424
1994	0.088	0.171	0.421
1995	0.088	0.172	0.423
1996	0.088	0.173	0.425
1997	0.09	0.175	0.431
1998	0.093	0.182	0.448
1999	0.096	0.189	0.463
2000	0.097	0.19	0.467

EMG9R2 = Total Government Employment, Region 2 (Southwest)
EMG9R4 = Total Government Employment, Region 4 (Southcentral)
EMG9R5 = Total Government Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 74. PROJECTED REGIONAL GOVERNMENT EMPLOYMENT IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	EMG9R2	EMG9R4	EMG9R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.018	0.034	0.018
1984	0.053	0.11	0.055
1985	0.095	0.217	0.101
1986	0.182	0.402	0.195
1987	0.184	0.379	0.19
1988	0.519	1.067	0.549
1989	0.944	1.94	1.01
1990	1.165	2.395	1.253
1991	1.218	2.491	1.315
1992	1.081	2.181	1.168
1993	0.958	1.918	1.036
1994	0.932	1.851	1.007
1995	0.922	1.814	0.996
1996	0.912	1.782	0.985
1997	0.913	1.763	0.985
1998	0.931	1.775	1.003
1999	0.943	1.775	1.015
2000	0.936	1.747	1.007

EMG9R2 = Total Government Employment, Region 2 (Southwest)
EMG9R4 = Total Government Employment, Region 4 (Southcentral)
EMG9R5 = Total Government Employment, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 75. PROJECTED REGIONAL REAL PERSONAL INCOME IMPACTS, ABSOLUTE VALUES: MEAN CASE

	PIRR2	PIRR4	PIRR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.129	1.694	6.796
1984	0.556	4.298	16.234
1985	1.684	10.323	36.711
1986	2.558	13.565	46.562
1987	10.107	44.106	137.956
1988	17.965	54.377	177.931
1989	23.659	61.123	215.235
1990	23.171	54.734	200.895
1991	19.271	34.63	144.737
1992	16.941	27.851	122.906
1993	16.348	27.183	121.957
1994	16.685	26.452	121.074
1995	16.98	26.25	121.219
1996	17.619	26.274	122.191
1997	18.185	27.937	130.586
1998	19.06	29.991	140.697
1999	19.798	30.292	143.332
2000	20.502	30.804	144.148

PIPR2 = Real Personal Income, Region 2 (Southwest)
PIPR4 = Real Personal Income, Region 4 (Southcentral)
PIPR5 = Real Personal Income, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 76. PROJECTED REGIONAL REAL PERSONAL INCOME IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	PIRR2	PIRR4	PIRR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.04	0.308	0.3
1984	0.161	0.545	0.591
1985	0.433	1.144	1.151
1986	0.602	1.471	1.428
1987	2.313	5.033	4.316
1988	3.907	6.172	5.507
1989	4.776	6.766	6.455
1990	4.167	5.774	5.731
1991	3.126	3.458	3.905
1992	2.469	2.659	3.143
1993	2.141	2.486	2.97
1994	1.93	2.437	2.836
1995	1.853	2.344	2.718
1996	1.733	2.228	2.6
1997	1.642	2.228	2.623
1998	1.552	2.291	2.686
1999	1.501	2.291	2.619
2000	1.435	2.188	2.514

PIPR2 = Real Personal Income, Region 2 (Southwest)
PIPR4 = Real Personal Income, Region 4 (Southcentral)
PIPR5 = Real Personal Income, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

Region 5 (215.2 million dollars, 6.5 percent). By the end of the projection period the percentage differences have narrowed to about 1.4 percent - 2.5 percent. (See Tables 75 and 76.)

Real per capita income impacts generally reflect those observed at the statewide level. Increases occur at the start of the project (1983) and continue for a few years. These increases are followed by a period of declining differences, and towards the end of the projection period the differences become negative (although by less than 1 percent). As in the statewide case this is due to the combined effects of increasing population and a shift in the composition of employment from relatively high paying industries to expanded service sector employment. The effect in Regions 4 and 5 is negligible, but for Region 2 the capita income is about 146 dollars below the base case. Supporting data are contained in Tables 77 and 78.

The Low (Exploration Only) Case Scenario: Statewide and Regional Impacts

The impacts associated with the low case, as measured against the base case are virtually undetectable. Insignificant differences between the low and base cases occur during the four years in which exploration activity takes place. Even at the "peak" of the impact, the percentage differences and variables rarely exceed 0.2 percent, and in most cases is substantially less (usually less than 0.1 percent). The only exception to this occurs in the net migration (MIGNET) variable. Even in this instance the absolute impact is less than 200 people. For reference

TABLE 77. PROJECTED REGIONAL REAL PER CAPITA INCOME IMPACTS, ABSOLUTE VALUES: MEAN CASE

	PIRPCR2	PIRPCR4	PIRPCR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	8.215	15.945	12.953
1984	18.238	35.902	32.512
1985	28.016	99.902	75.363
1986	2.844	117.336	81.664
1987	155.477	488.086	306.176
1988	30.375	562.73	360.434
1989	-118.633	535.277	361.902
1990	-124.387	393.809	257.176
1991	-216.398	119.281	74.656
1992	-243.504	35.93	11.406
1993	-216.984	27.461	2.977
1994	-198.672	22.742	-5.555
1995	-192.867	12.156	-12.508
1996	-179.23	-0.871	-19.074
1997	-165.105	-2.488	-15.625
1998	-155.18	2.418	-10.012
1999	-147.074	2.848	-14.316
2000	-145.703	-4.047	-20.012

PIRPCR2 = Real Per Capita Personal Income, Region 2 (Southwest)
PIRPCR4 = Real Per Capita Personal Income, Region 4 (Southcentral)
PIRPCR5 = Real Per Capita Personal Income, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

TABLE 78. PROJECTED REGIONAL REAL PER CAPITA INCOME IMPACTS, PERCENTAGE DIFFERENCES: MEAN CASE

	PIRPCR2	PIRPCR4	PIRPCR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.07	0.141	0.11
1984	0.139	0.237	0.244
1985	0.199	0.617	0.52
1986	0.02	0.765	0.565
1987	1.093	3.481	2.154
1988	0.21	3.984	2.511
1989	-0.798	3.729	2.467
1990	-0.8	2.638	1.7
1991	-1.353	0.77	0.48
1992	-1.456	0.225	0.071
1993	-1.263	0.168	0.018
1994	-1.114	0.14	-0.033
1995	-1.052	0.073	-0.074
1996	-0.942	-0.005	-0.11
1997	-0.841	-0.014	-0.088
1998	-0.757	0.013	-0.055
1999	-0.704	0.016	-0.078
2000	-0.673	-0.022	-0.107

PIRPCR2 = Real Per Capita Personal Income, Region 2 (Southwest)
PIRPCR4 = Real Per Capita Personal Income, Region 4 (Southcentral)
PIRPCR5 = Real Per Capita Personal Income, Region 5 (Anchorage)

SOURCE: MAP Model Projections.

purposes the supporting data have been included in Appendix A. Also included in Appendix D is OCS direct employment by place of work as well as by place of residence.

The Mean Case Scenario: The Aleutian Islands Census Division Impacts

Population

Population impacts at the census division level tend to be substantial, both in terms of resident and total population. The impacts would be much greater (in percentage terms) if it were not for the already large population increase associated with projected fisheries expansion.

Table 79 includes the base case and mean case population projections. Resident population (BPOPP) impact first occurs in 1983 and increases rapidly to a peak value of 2033 in 1989 (23.3 percent above the base case value). In absolute value the mean minus base case difference then declines until 1991, and stabilizes at about 1560 for the remainder of the projection period. However, the percentage difference drops steadily as population growth related to expanded fisheries activity grows. By 2000 the percentage difference is only 3.7 percent.

Because of the high proportion of enclave employment, the total population impact is greater and peaks in 1987 at a level of 6807 (46.1 percent above the base case). After a short period of decline (as activity shifts from development to production) the total impact stabilizes at about 2700 for the remainder of the projection period. The percentage impact declines to 5.0 percent.

TABLE 79. PROJECTED CHANGES IN RESIDENT AND TOTAL POPULATION MEAN CASE, ALEUTIAN ISLANDS CENSUS DIVISION: 1981-2000*

Year	BPOPP	Change in Res. Pop.	% Dif. Mean-Base	Total Res. Pop.	BASPP	TOCSP	% Dif. Mean-Base	TOTPOP
1981	3777	0	0.0	3777	10595	0	0.0	10595
1982	4169	0	0.0	4169	11565	0	0.0	11565
1983	4239	39	0.9	4278	11659	518	4.4	12177
1984	4447	69	1.6	4516	11888	872	7.3	12760
1985	5056	148	2.9	5204	13077	1737	13.3	14815
1986	5316	286	5.4	5602	13373	2922	21.8	16294
1987	6179	1032	16.7	7211	14774	6807	46.1	21581
1988	7295	1565	21.5	8860	16379	6467	39.5	22846
1989	8712	2033	23.3	10745	18279	5892	32.2	24172
1990	10860	1852	17.1	12712	20875	4217	20.2	25092
1991	13551	1596	11.8	15147	24370	2594	10.6	26964
1992	15092	1612	10.7	16704	25780	2756	10.7	28537
1993	18934	1586	8.4	20520	30257	2914	9.6	33171
1994	22343	1559	7.0	23902	33876	2764	8.2	36639
1995	23423	1572	6.7	24995	34643	2654	7.7	37297
1996	27939	1499	5.4	29438	39206	2466	6.3	41672
1997	30961	1534	5.0	32495	42219	2678	6.3	44898
1998	34501	1556	4.5	36057	45456	2884	6.3	48340
1999	38199	1539	4.0	39738	49001	2744	5.6	51745
2000	41597	1527	3.7	43124	52040	2609	5.0	54649

TABLE NOTES

*BPOPP = resident civilian population, base case.

Change in resident population = change in resident population due to OCS activity.

BASPP = resident population plus military and dependents plus enclave employment, base case.

TOCSP = total OCS-related population. Nonresident OCS population impact is equal to TOSCP - change in resident population.

TOTPOP = BASPP + TOCSP.

SOURCE: SCIMP mean case and base case projections.

Employment

Projected resident and nonresident employment impacts are summarized in Table 80. Changes in total resident employment (ΔTE) include changes in support sector employment (ΔEMS), changes in state and local government (included in ΔEMG), and changes in exogenous construction and mining (ΔEMX).

The total resident employment impact grows to a peak of 1133 in 1989 (25.8 percent above the base case), drops slightly, and averages about 873 for the remainder of the projection period. The percentage difference declines to 3.9 percent. Employment in the support sector follows the same general pattern, peaking at a value of 445 above the base case (a percentage difference of 33.9 percent), dropping slightly, and then slowing increasing over the rest of the period. The percentage difference declines to 4.5 percent.

State and local government employment is only modestly impacted. The mean minus base case difference peaks at 64 (in 1989) and is 5.5 percent above the base case. The absolute and percentage differences decline steadily thereafter.

The greatest impact in absolute and percentage terms occurs in construction and mining. The difference in employment grows to 624 in 1989. Because of the extremely small base case value of the variable, the percentage difference is 1850.0 percent. The difference stabilizes

TABLE 80. PROJECTED CHANGES IN RESIDENT AND NONRESIDENT EMPLOYMENT, MEAN CASE, ALEUTIAN ISLANDS CENSUS DIVISION: 1981-2000*

	ΔEMS		ΔEMG		ΔEMA		ΔEMX		ΔTE		ΔEMM		ΔENCLV		ΔTOTE	
Year	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1981	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0	0	0	0.0	0	0.0
1982	0	0.0	0	0.0	0	0	0	0.0	0	0.0	0	0	0	0.0	0	0.0
1983	25	4.8	0	0.0	0	0	1	11.1	26	1.3	0	0	479	15.8	505	6.8
1984	44	7.9	0	0.0	0	0	2	20.0	46	2.3	0	0	803	26.3	849	11.2
1985	93	14.0	0	0.0	0	0	19	58.3	112	4.8	0	0	1589	43.8	1701	20.0
1986	164	22.5	0	0.0	0	0	45	221.4	209	8.3	0	0	2636	71.9	2845	32.6
1987	387	44.5	7	0.8	0	0	149	727.8	543	18.4	0	0	5775	137.4	6319	65.3
1988	422	39.7	36	3.5	0	0	392	1533.3	850	23.7	0	0	4902	104.4	5753	53.3
1989	445	33.9	64	5.5	0	0	624	1850.0	1133	25.8	0	0	3859	74.5	4992	41.3
1990	341	20.9	52	3.9	0	0	561	1119.6	954	17.1	0	0	2365	42.0	3319	24.2
1991	253	11.8	45	2.9	0	0	540	743.8	838	11.8	0	0	998	15.5	1835	11.4
1992	272	11.0	42	2.6	0	0	540	566.7	854	10.4	0	0	1144	18.2	1998	11.7
1993	295	9.5	34	1.8	0	0	540	400.0	869	8.5	0	0	1328	19.2	2197	12.0
1994	296	7.9	27	1.3	0	0	540	283.0	863	7.0	0	0	1205	16.9	2068	9.4
1995	297	7.2	25	1.1	0	0	540	235.4	862	6.5	0	0	1082	15.8	1944	8.6
1996	298	6.2	20	0.8	0	0	540	170.0	858	5.6	0	0	967	14.1	1825	7.4
1997	323	5.8	15	0.6	0	0	540	123.1	878	5.1	0	0	1144	16.7	2023	7.6
1998	351	5.6	12	0.4	0	0	540	90.8	903	4.7	0	0	1328	20.2	2231	7.9
1999	352	5.0	9	0.3	0	0	540	63.1	901	4.2	0	0	1205	18.8	2106	6.9
2000	353	4.5	7	0.2	0	0	540	41.4	900	3.9	0	0	1082	17.9	1982	6.2

TABLE NOTES

*ΔTE = Change in total resident employment and is the sum of changes in the support sector resident employment (ΔEMS), changes in state and local government (federal government employment is not changed) employment (ΔEMG), changes in manufacturing employment (ΔEMA), and changes in exogenous resident construction and mining employment, or resident OCS employment (ΔEMX). Changes in total regional employment (ΔTOTE) equal the change in resident employment plus the change in enclave employment (ΔENCLV). Percentage differences are the percentage differences between the mean case and base case.

SOURCE: SCIMP mean case and base case projections.

at 540 in 1991 and remains at that level for the remainder of the projection period. The percentage difference declines to 41.4 percent.

The nonresident employment impact is captured by changes in enclave employment. The difference peaks at 5775 in 1978 (137.4 percent above the base case) and declines to an average of about 1150. The percentage difference drops as well, and averages between 15 and 20 percent for 1990-2000.

The combined resident and nonresident employment impact peaks at a value of 6219 in 1987 (65.3 percent above the base case). Obviously this is a substantial increase, and would be far greater if fisheries-related employment had not also been growing. In absolute terms the difference drops considerably in the production phase, and averages about 2000 for most of the 1990s. The percentage difference drops steadily to a level of 6.2 percent.

The Low Case Scenario: The Aleutian Islands Census Division

As was the case at the statewide and regional levels, the impact of the low scenario is negligible. Impacts are limited to a five-year period (1983-1987). Population and employment projections are contained in Tables 81 and 82. Resident population peaks in 1985, at a level of 30 over the base case (0.6 percent), while total population increases

TABLE 81. PROJECTED CHANGES IN RESIDENT AND TOTAL POPULATION, LOW CASE, ALEUTIAN ISLANDS CENSUS DIVISION: 1981-1988*

Year	BPOPP	Change in Res. Pop.	% Dif. Low-Base	Total Res. Pop.	BASPP	TOCSP	% Dif. Low-Base	TOTPOP
1981	3777	0	0.0	3777	10595	0	0.0	10595
1982	4169	0	0.0	4169	11565	0	0.0	11565
1983	4239	15	0.4	4254	11659	203	1.7	11862
1984	4447	25	0.6	4472	11888	317	2.7	12205
1985	5056	30	0.6	5086	13077	372	2.8	13449
1986	5316	27	0.5	5343	13373	319	2.4	13692
1987	6179	11	0.2	6190	14774	128	0.9	14903
1988	7295	0	0.0	7295	16379	0	0.0	16379

*See notes to Table 79. There are no impacts after 1987.

SOURCE: SCIMP low case and base case projections.

TABLE 82. PROJECTED CHANGES IN RESIDENT AND NONRESIDENT EMPLOYMENT, LOW CASE, ALEUTIAN ISLANDS CENSUS DIVISION: 1981-1988*

	ΔEMS		ΔEMG		ΔEMA		ΔEMX		ΔTE		ΔEMM		ΔENCLV		ΔTOTE	
Year	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1981	0	0,0	0	0	0	0	0	0	0	0.0	0	0	0	0.0	0	0.0
1982	0	0.0	0	0	0	0	0	0	0	0.0	0	0	0	0.0	0	0.0
1983	10	1.9	0	0	0	0	0	0	10	0.5	0	0	188	6.2	198	2.6
1984	16	2.9	0	0	0	0	0	0	16	0.8	0	0	292	9.6	308	4.1
1985	19	2.9	0	0	0	0	0	0	19	0.8	0	0	342	9.4	361	4.3
1986	17	2.3	0	0	0	0	0	0	17	0.7	0	0	292	8.0	309	3.5
1987	7	0.8	0	0	0	0	0	0	7	0.2	0	0	117	2.8	124	1.3
1988	0	0.0	0	0	0	0	0	0	0	0.0	0	0	0	0.0	0	0.0

*See explanatory notes to Table 80.

SOURCE: SCIMP low case and base case projections.

by 372, a 2.8 percent increase. In both instances the differences disappear by 1988 when exploration activity has ceased.

Employment impacts are even less. Resident employment increases by 19 over the base case in 1985 (a 0.8 percent difference). Total employment increases by 361, reflecting the large enclave employment proportion. The percentage difference is 4.3 percent. By 1988 the differences in all variables are back to zero.

APPENDIX A

COMPUTER PRINTOUT OF LOW CASE IMPACTS, STATEWIDE AND REGIONAL

SIMULATION OUTPUT BY VARIABLE

POPTST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.164
1984	0.317
1985	0.443
1986	0.486
1987	0.395
1988	0.232
1989	0.153
1990	0.124
1991	0.11
1992	0.102
1993	0.095
1994	0.091
1995	0.087
1996	0.088
1997	0.083
1998	0.079
1999	0.075
2000	0.072

SIMULATION OUTPUT BY VARIABLE

MIGNET - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.164
1984	0.148
1985	0.114
1986	0.027
1987	-0.107
1988	-0.174
1989	-0.084
1990	-0.03
1991	-0.013
1992	-0.007
1993	-0.005
1994	-0.004
1995	-0.003
1996	0.002
1997	-0.004
1998	-0.003
1999	-0.004
2000	-0.001

SIMULATION OUTPUT BY VARIABLE

NATINC - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.
1984	0.007
1985	0.012
1986	0.016
1987	0.016
1988	0.011
1989	0.004
1990	0.001
1991	-0.
1992	-0.001
1993	-0.001
1994	-0.001
1995	-0.001
1996	-0.001
1997	-0.001
1998	-0.001
1999	-0.001
2000	-0.001

SIMULATION OUTPUT BY DSET

LOW

	EM99ST	EM98ST	EMB1ST	EMS1ST	EMG9ST
1980	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.
1983	0.121	0.116	0.059	0.046	0.011
1984	0.224	0.216	0.08	0.106	0.03
1985	0.301	0.291	0.095	0.152	0.045
1986	0.317	0.306	0.088	0.165	0.053
1987	0.233	0.225	0.061	0.119	0.045
1988	0.103	0.1	0.007	0.066	0.027
1989	0.045	0.043	0.004	0.026	0.013
1990	0.026	0.026	0.003	0.014	0.009
1991	0.02	0.02	0.002	0.01	0.008
1992	0.018	0.017	0.002	0.008	0.007
1993	0.017	0.016	0.002	0.008	0.007
1994	0.016	0.016	0.002	0.008	0.006
1995	0.016	0.016	0.002	0.008	0.006
1996	0.017	0.016	0.002	0.008	0.006
1997	0.017	0.017	0.002	0.008	0.006
1998	0.016	0.015	0.002	0.008	0.006
1999	0.015	0.015	0.002	0.007	0.006
2000	0.015	0.015	0.002	0.008	0.005

SIMULATION OUTPUT BY VARIABLE

PIRST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	3.84
1984	6.961
1985	9.703
1986	9.961
1987	7.199
1988	2.758
1989	1.352
1990	0.918
1991	0.773
1992	0.762
1993	0.727
1994	0.734
1995	0.738
1996	0.871
1997	0.758
1998	0.777
1999	0.738
2000	0.813

SIMULATION OUTPUT BY VARIABLE

PIRPCST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	4.148
1984	4.395
1985	4.84
1986	4.703
1987	2.664
1988	-1.398
1989	-1.875
1990	-1.93
1991	-1.863
1992	-1.687
1993	-1.566
1994	-1.41
1995	-1.324
1996	-1.152
1997	-1.23
1998	-1.105
1999	-1.031
2000	-0.879

SIMULATION OUTPUT BY VARIABLE

WSG9RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.24
1984	0.648
1985	1.01
1986	1.217
1987	1.106
1988	0.748
1989	0.457
1990	0.383
1991	0.364
1992	0.357
1993	0.354
1994	0.355
1995	0.366
1996	0.381
1997	0.388
1998	0.38
1999	0.389
2000	0.401

SIMULATION OUTPUT BY VARIABLE

WSS1RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.905
1984	2.222
1985	3.19
1986	3.372
1987	2.322
1988	1.29
1989	0.515
1990	0.272
1991	0.194
1992	0.171
1993	0.153
1994	0.151
1995	0.151
1996	0.159
1997	0.17
1998	0.146
1999	0.151
2000	0.162

SIMULATION OUTPUT BY VARIABLE

WSB1RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	2.022
1984	2.864
1985	3.708
1986	3.625
1987	2.522
1988	0.241
1989	0.135
1990	0.106
1991	0.093
1992	0.09
1993	0.083
1994	0.085
1995	0.092
1996	0.095
1997	0.092
1998	0.079
1999	0.089
2000	0.096

SIMULATION OUTPUT BY VARIABLE

WRB1 RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.344
1984	-15.379
1985	-19.371
1986	-5.68
1987	3.52
1988	-0.652
1989	-0.023
1990	0.137
1991	0.156
1992	0.246
1993	0.164
1994	0.188
1995	0.121
1996	0.145
1997	0.078
1998	0.035
1999	0.145
2000	0.258

SIMULATION OUTPUT BY VARIABLE

WRG9RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.023
1984	-0.344
1985	-0.859
1986	-0.996
1987	-0.258
1988	0.559
1989	1.172
1990	1.437
1991	1.559
1992	1.59
1993	1.574
1994	1.563
1995	1.620
1996	1.676
1997	1.707
1998	1.641
1999	1.754
2000	1.82

SIMULATION OUTPUT BY VARIABLE

WRS1 RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	-0.039
1984	-1.719
1985	-3.484
1986	-2.742
1987	-1.984
1988	-0.805
1989	-0.34
1990	-0.148
1991	-0.113
1992	-0.039
1993	-0.074
1994	-0.082
1995	-0.09
1996	-0.102
1997	-0.09
1998	-0.141
1999	-0.055
2000	-0.027

SIMULATION OUTPUT BY VARIABLE

RPI - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.043
1984	0.097
1985	0.108
1986	0.101
1987	0.13
1988	0.201
1989	0.272
1990	0.312
1991	0.341
1992	0.369
1993	0.398
1994	0.43
1995	0.464
1996	0.5
1997	0.538
1998	0.582
1999	0.627
2000	0.675

SIMULATION OUTPUT BY DSET

LOW

	REVGFR	RP9SR	RFDSR	RNDSR
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	-0.294	-0.285	0.029	-0.039
1984	-0.586	-0.6	0.049	-0.037
1985	-0.559	-0.683	0.074	0.053
1986	-0.418	-0.623	0.082	0.123
1987	-0.723	-0.753	0.051	-0.021
1988	-1.484	-1.085	0.003	-0.402
1989	-2.262	-1.378	-0.022	-0.863
1990	-2.594	-1.399	-0.03	-1.167
1991	-2.762	-1.357	-0.031	-1.376
1992	-2.809	-1.233	-0.031	-1.543
1993	-2.848	-1.12	-0.031	-1.694
1994	-2.859	-0.999	-0.03	-1.83
1995	-2.875	-0.891	-0.029	-1.955
1996	-2.879	-0.796	-0.028	-2.056
1997	-2.887	-0.711	-0.027	-2.15
1998	-2.902	-0.635	-0.026	-2.24
1999	-2.902	-0.563	-0.026	-2.315
2000	-2.902	-0.498	-0.025	-2.379

SIMULATION OUTPUT BY VARIABLE

E99SR - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.666
1984	1.252
1985	1.763
1986	2.005
1987	1.701
1988	1.045
1989	0.717
1990	0.594
1991	0.546
1992	0.518
1993	0.502
1994	0.496
1995	0.489
1996	0.517
1997	0.5
1998	0.471
1999	0.477
2000	0.461

SIMULATION OUTPUT BY VARIABLE

E99SRPC - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.001
1984	-0.002
1985	-0.005
1986	0.001
1987	-0.001
1988	-0.001
1989	-0.001
1990	-0.004
1991	-0.002
1992	-0.005
1993	-0.003
1994	-0.001
1995	-0.003
1996	0.
1997	0.002
1998	-0.007
1999	0.
2000	-0.005

SIMULATION OUTPUT BY VARIABLE

FUNDR - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	-1.262
1984	-3.363
1985	-5.145
1986	-6.48
1987	-8.52
1988	-11.613
1989	-14.965
1990	-17.437
1991	-19.555
1992	-21.469
1993	-23.273
1994	-24.914
1995	-26.422
1996	-27.832
1997	-29.137
1998	-30.379
1999	-31.516
2000	-32.492

SIMULATION OUTPUT BY VARIABLE

POPTST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.039
1984	0.07
1985	0.092
1986	0.098
1987	0.079
1988	0.046
1989	0.03
1990	0.024
1991	0.02
1992	0.018
1993	0.017
1994	0.016
1995	0.015
1996	0.014
1997	0.013
1998	0.012
1999	0.011
2000	0.011

Percentage

SIMULATION OUTPUT BY VARIABLE

MIGNET - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	1.903
1984	0.569
1985	0.565
1986	0.402
1987	3.545
1988	4.133
1989	8.029
1990	-0.503
1991	-0.153
1992	-0.1
1993	-0.073
1994	-0.093
1995	-0.05
1996	0.018
1997	-0.038
1998	-0.033
1999	-0.046
2000	-0.012

Percentage

SIMULATION OUTPUT BY VARIABLE

NATINC - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.
1984	0.153
1985	0.23
1986	0.271
1987	0.271
1988	0.197
1989	0.073
1990	0.013
1991	-0.008
1992	-0.016
1993	-0.018
1994	-0.019
1995	-0.018
1996	-0.016
1997	-0.011
1998	-0.01
1999	-0.008
2000	-0.007

Percentage

SIMULATION OUTPUT BY DSET

LOW

	EM99ST	EM98ST	EMB1ST	EMS1ST	EMG9ST
1980	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.
1983	0.058	0.06	0.156	0.065	0.014
1984	0.096	0.1	0.165	0.125	0.036
1985	0.122	0.126	0.198	0.153	0.053
1986	0.125	0.13	0.199	0.158	0.06
1987	0.092	0.095	0.142	0.115	0.05
1988	0.041	0.042	0.016	0.064	0.03
1989	0.017	0.018	0.008	0.025	0.014
1990	0.01	0.01	0.005	0.013	0.01
1991	0.007	0.008	0.004	0.009	0.008
1992	0.006	0.006	0.003	0.007	0.007
1993	0.006	0.006	0.003	0.006	0.007
1994	0.005	0.005	0.003	0.006	0.006
1995	0.005	0.005	0.003	0.006	0.006
1996	0.005	0.005	0.003	0.006	0.006
1997	0.005	0.005	0.003	0.006	0.006
1998	0.004	0.005	0.003	0.005	0.005
1999	0.004	0.004	0.003	0.005	0.005
2000	0.004	0.004	0.002	0.004	0.005

Percentage

SIMULATION OUTPUT BY VARIABLE

PIRST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.071
1984	0.098
1985	0.121
1986	0.128
1987	0.097
1988	0.037
1989	0.018
1990	0.011
1991	0.009
1992	0.008
1993	0.008
1994	0.007
1995	0.007
1996	0.008
1997	0.006
1998	0.006
1999	0.006
2000	0.006

Percentage

SIMULATION OUTPUT BY VARIABLE

PIRPCST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.033
1984	0.028
1985	0.029
1986	0.03
1987	0.018
1988	-0.009
1989	-0.012
1990	-0.012
1991	-0.012
1992	-0.01
1993	-0.009
1994	-0.008
1995	-0.008
1996	-0.006
1997	-0.007
1998	-0.006
1999	-0.005
2000	-0.004

Percentage

SIMULATION OUTPUT BY VARIABLE

WSG9RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.014
1984	0.035
1985	0.05
1986	0.056
1987	0.049
1988	0.032
1989	0.019
1990	0.015
1991	0.014
1992	0.013
1993	0.012
1994	0.012
1995	0.011
1996	0.011
1997	0.011
1998	0.01
1999	0.01
2000	0.01

Percentage

SIMULATION OUTPUT BY VARIABLE

WSS1RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.065
1984	0.117
1985	0.138
1986	0.146
1987	0.106
1988	0.06
1989	0.024
1990	0.012
1991	0.008
1992	0.007
1993	0.006
1994	0.005
1995	0.005
1996	0.005
1997	0.005
1998	0.004
1999	0.004
2000	0.004

Percentage

SIMULATION OUTPUT BY VARIABLE

WSB1RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.157
1984	0.131
1985	0.158
1986	0.186
1987	0.151
1988	0.014
1989	0.008
1990	0.006
1991	0.004
1992	0.004
1993	0.004
1994	0.004
1995	0.003
1996	0.004
1997	0.003
1998	0.003
1999	0.003
2000	0.003

Percentage

SIMULATION OUTPUT BY VARIABLE

WRB1RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.001
1984	-0.034
1985	-0.039
1986	-0.013
1987	0.009
1988	-0.002
1989	-0.
1990	0.
1991	0.
1992	0.001
1993	0.
1994	0.
1995	0.
1996	0.
1997	0.
1998	0.
1999	0.
2000	0.001

Percentage

SIMULATION OUTPUT BY VARIABLE

WRG9RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.
1984	-0.002
1985	-0.004
1986	-0.004
1987	-0.001
1988	0.002
1989	0.004
1990	0.005
1991	0.006
1992	0.006
1993	0.005
1994	0.005
1995	0.005
1996	0.005
1997	0.005
1998	0.005
1999	0.005
2000	0.005

Percentage

SIMULATION OUTPUT BY VARIABLE

WRS1RST - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	-0.
1984	-0.008
1985	-0.015
1986	-0.012
1987	-0.009
1988	-0.004
1989	-0.002
1990	-0.001
1991	-0.001
1992	-0.
1993	-0.
1994	-0.
1995	-0.
1996	-0.
1997	-0.
1998	-0.001
1999	-0.
2000	-0.

Percentage

SIMULATION OUTPUT BY VARIABLE

RPI - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.009
1984	0.02
1985	0.02
1986	0.018
1987	0.021
1988	0.03
1989	0.038
1990	0.04
1991	0.041
1992	0.041
1993	0.041
1994	0.042
1995	0.042
1996	0.042
1997	0.042
1998	0.042
1999	0.042
2000	0.042

Percentage

SIMULATION OUTPUT BY DSET

LOW

	REVGFR	RP9SR	RFDSR	RNDSR
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	-0.008	-0.009	0.016	-0.007
1984	-0.014	-0.02	0.028	-0.004
1985	-0.012	-0.02	0.043	0.005
1986	-0.008	-0.018	0.05	0.009
1987	/-0.014	-0.021	0.034	-0.001
1988	-0.027	-0.03	0.002	-0.023
1989	-0.039	-0.038	-0.017	-0.043
1990	-0.045	-0.04	-0.024	-0.053
1991	-0.047	-0.041	-0.027	-0.056
1992	-0.049	-0.041	-0.028	-0.058
1993	-0.05	-0.041	-0.029	-0.06
1994	-0.052	-0.042	-0.03	-0.061
1995	-0.054	-0.042	-0.031	-0.063
1996	-0.055	-0.042	-0.031	-0.064
1997	-0.057	-0.042	-0.032	-0.065
1998	-0.058	-0.042	-0.033	-0.067
1999	-0.06	-0.042	-0.033	-0.068
2000	-0.061	-0.042	-0.034	-0.069

Percentage

SIMULATION OUTPUT BY VARIABLE

E99SR - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.039
1984	0.07
1985	0.092
1986	0.098
1987	0.079
1988	0.046
1989	0.03
1990	0.023
1991	0.02
1992	0.018
1993	0.017
1994	0.016
1995	0.014
1996	0.014
1997	0.013
1998	0.012
1999	0.011
2000	0.01

Percentage

SIMULATION OUTPUT BY VARIABLE

E99SRPC - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	0.
1984	-0.
1985	-0.
1986	0.
1987	-0.
1988	-0.
1989	-0.
1990	-0.
1991	-0.
1992	-0.
1993	-0.
1994	-0.
1995	-0.
1996	0.
1997	0.
1998	-0.
1999	0.
2000	-0.

Percentage

SIMULATION OUTPUT BY VARIABLE

FUNDR - EXOGENOUS

	LOW
1980	0.
1981	0.
1982	0.
1983	-0.017
1984	-0.036
1985	-0.044
1986	-0.045
1987	-0.051
1988	-0.061
1989	-0.069
1990	-0.073
1991	-0.076
1992	-0.078
1993	-0.081
1994	-0.084
1995	-0.088
1996	-0.092
1997	-0.097
1998	-0.103
1999	-0.109
2000	-0.117

Percentage

SIMULATION OUTPUT BY DSET - ERROR

RRE7095_ER

	POPTR2	POPTR4	POPTR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.004	0.038	0.171
1984	0.	0.065	0.273
1985	0.004	0.084	0.36
1986	0.007	0.085	0.365
1987	0.012	0.057	0.256
1988	0.013	0.024	0.113
1989	0.009	0.015	0.079
1990	0.007	0.012	0.063
1991	0.007	0.011	0.055
1992	0.007	0.01	0.05
1993	0.007	0.01	0.046
1994	0.007	0.009	0.043
1995	0.006	0.009	0.041
1996	0.007	0.009	0.041
1997	0.006	0.008	0.039
1998	0.006	0.008	0.037
1999	0.006	0.007	0.035
2000	0.006	0.007	0.034

	EM99R2	EM99R4	EM99R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.	0.021	0.1
1984	0.003	0.036	0.168
1985	0.004	0.048	0.221
1986	0.005	0.049	0.221
1987	0.006	0.032	0.147
1988	0.004	0.011	0.05
1989	0.002	0.005	0.022
1990	0.001	0.003	0.013
1991	0.001	0.002	0.01
1992	0.001	0.002	0.008
1993	0.001	0.002	0.008
1994	0.001	0.002	0.008
1995	0.001	0.001	0.008
1996	0.001	0.002	0.008
1997	0.001	0.002	0.008
1998	0.	0.001	0.008
1999	0.	0.001	0.008
2000	0.	0.001	0.008

	EMS1R2	EMS1R4	EMS1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.001	0.008	0.043

[illegible]	[illegible]	[illegible]	[illegible]
1986	0.001	0.023	0.126
1987	0.002	0.013	0.081
1988	0.002	0.006	0.037
1989	0.001	0.002	0.015
1990	0.	0.001	0.008
1991	0.	0.001	0.005
1992	0.	0.	0.005
1993	0.	0.	0.005
1994	0.	0.	0.005
1995	0.	0.	0.005
1996	0.	0.	0.005
1997	0.	0.	0.005
1998	0.	0.	0.005
1999	-0.	0.	0.005
2000	-0.	0.	0.005

	EMG9R2	EMG9R4	EMG9R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.001	0.001	0.004
1984	0.002	0.004	0.01
1985	0.003	0.006	0.015
1986	0.004	0.007	0.017
1987	0.003	0.006	0.015
1988	0.002	0.004	0.009
1989	0.001	0.002	0.004
1990	0.001	0.001	0.003
1991	0.	0.001	0.002
1992	0.	0.001	0.002
1993	0.	0.001	0.002
1994	0.	0.001	0.002
1995	0.	0.001	0.002
1996	0.	0.001	0.002
1997	0.	0.001	0.002
1998	0.	0.001	0.002
1999	0.	0.001	0.002
2000	0.	0.001	0.001

	EMB1R2	EMB1R4	EMB1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.	0.012	0.048
1984	0.	0.016	0.063
1985	0.	0.018	0.074
1986	0.	0.018	0.067
1987	0.	0.012	0.045
1988	0.	0.001	0.003
1989	0.	0.	0.001
1990	0.	0.	0.001
1991	0.	0.	0.001
1992	0.	0.	0.001
1993	0.	0.	0.001
1994	0.	0.	0.001
1995	0.	0.	0.001
1996	0.	0.	0.001
1997	0.	0.	0.001
1998	0.	0.	0.001
1999	0.	0.	0.001
2000	0.	0.	0.001

	PIRR2	PIRR4	PIRR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.024	0.685	2.973
1984	0.094	1.209	5.333
1985	0.141	1.682	7.371
1986	0.169	1.664	6.965
1987	0.192	1.079	4.431
1988	0.141	0.292	1.226
1989	0.07	0.129	0.625
1990	0.046	0.079	0.441
1991	0.038	0.06	0.386
1992	0.036	0.058	0.381
1993	0.034	0.053	0.371
1994	0.032	0.053	0.371
1995	0.029	0.054	0.379
1996	0.04	0.067	0.441
1997	0.028	0.053	0.395
1998	0.027	0.053	0.402
1999	0.02	0.05	0.395
2000	0.029	0.056	0.426

	PIRPCR2	PIRPCR4	PIRPCR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	2.836	5.23	4.977
1984	3.375	4.43	8.207
1985	3.156	5.672	9.746
1986	2.191	5.98	7.461
1987	0.723	4.43	3.535
1988	-1.527	-0.824	-1.762
1989	-1.832	-1.449	-2.32
1990	-1.949	-1.641	-2.23
1991	-1.91	-1.695	-1.996
1992	-1.883	-1.633	-1.711
1993	-1.816	-1.586	-1.523
1994	-1.766	-1.445	-1.328
1995	-1.766	-1.344	-1.191
1996	-1.648	-1.199	-0.988
1997	-1.703	-1.324	-1.055
1998	-1.594	-1.187	-0.906
1999	-1.559	-1.09	-0.852
2000	-1.375	-0.93	-0.719

SIMULATION OUTPUT BY DSET - PERCENT ERROR

RRE7095_PCER

	POPTR2	POPTR4	POPTR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.016	0.078	0.089
1984	0.002	0.124	0.133
1985	0.014	0.151	0.164
1986	0.025	0.141	0.162
1987	0.039	0.092	0.114
1988	0.041	0.039	0.05
1989	0.026	0.024	0.035
1990	0.021	0.019	0.027
1991	0.018	0.017	0.023
1992	0.016	0.016	0.02
1993	0.015	0.015	0.018
1994	0.014	0.014	0.017
1995	0.013	0.013	0.015
1996	0.012	0.013	0.015
1997	0.011	0.012	0.014
1998	0.01	0.011	0.013
1999	0.009	0.01	0.012
2000	0.008	0.009	0.011

	EM99R2	EM99R4	EM99R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.001	0.094	0.109
1984	0.02	0.144	0.166
1985	0.03	0.176	0.199
1986	0.036	0.167	0.191
1987	0.038	0.107	0.127
1988	0.027	0.038	0.043
1989	0.011	0.015	0.018
1990	0.006	0.009	0.01
1991	0.004	0.006	0.008
1992	0.003	0.005	0.006
1993	0.003	0.004	0.006
1994	0.002	0.004	0.006
1995	0.002	0.004	0.006
1996	0.002	0.004	0.006
1997	0.002	0.004	0.005
1998	0.001	0.003	0.005
1999	0.001	0.003	0.005
2000	0.001	0.003	0.005

	EMS1R2	EMS1R4	EMS1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.021	0.114	0.108
1984	0.017	0.212	0.18

1985	0.028	0.252	0.216
1986	0.039	0.229	0.213
1987	0.063	0.122	0.14
1988	0.055	0.06	0.064
1989	0.02	0.022	0.026
1990	0.008	0.01	0.013
1991	0.004	0.006	0.009
1992	0.002	0.004	0.007
1993	0.002	0.003	0.007
1994	0.001	0.003	0.006
1995	0.001	0.003	0.006
1996	0.001	0.003	0.006
1997	0.001	0.003	0.006
1998	0.	0.003	0.006
1999	-0.	0.002	0.005
2000	-0.	0.002	0.005

	EMG9R2	EMG9R4	EMG9R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.01	0.021	0.011
1984	0.026	0.06	0.028
1985	0.038	0.088	0.041
1986	0.044	0.096	0.047
1987	0.037	0.079	0.039
1988	0.022	0.047	0.023
1989	0.01	0.023	0.011
1990	0.007	0.016	0.007
1991	0.005	0.014	0.006
1992	0.005	0.013	0.005
1993	0.004	0.012	0.005
1994	0.004	0.011	0.004
1995	0.004	0.01	0.004
1996	0.004	0.01	0.004
1997	0.004	0.01	0.004
1998	0.004	0.009	0.004
1999	0.003	0.008	0.004
2000	0.003	0.008	0.003

	EMB1R2	EMB1R4	EMB1R5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	-0.	0.206	0.502
1984	0.01	0.197	0.589
1985	0.015	0.224	0.631
1986	0.016	0.208	0.561
1987	0.016	0.147	0.368
1988	0.013	0.012	0.021
1989	0.006	0.005	0.012
1990	0.004	0.003	0.009
1991	0.002	0.002	0.007
1992	0.002	0.001	0.007
1993	0.001	0.001	0.007
1994	0.001	0.001	0.007
1995	0.001	0.001	0.007
1996	0.001	0.001	0.007
1997	0.001	0.001	0.006
1998	0.	0.001	0.
1999	0.	0.001	0.006

	PIRR2	PIRR4	PIRR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.008	0.125	0.131
1984	0.027	0.153	0.194
1985	0.036	0.186	0.231
1986	0.04	0.18	0.214
1987	0.044	0.123	0.139
1988	0.031	0.033	0.038
1989	0.014	0.014	0.019
1990	0.008	0.008	0.013
1991	0.006	0.006	0.01
1992	0.005	0.006	0.01
1993	0.004	0.005	0.009
1994	0.004	0.005	0.009
1995	0.003	0.005	0.008
1996	0.004	0.006	0.009
1997	0.002	0.004	0.008
1998	0.002	0.004	0.008
1999	0.002	0.004	0.007
2000	0.002	0.004	0.007

	PIRPCR2	PIRPCR4	PIRPCR5
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	0.024	0.046	0.042
1984	0.026	0.029	0.062
1985	0.022	0.035	0.067
1986	0.015	0.039	0.052
1987	0.005	0.032	0.025
1988	-0.011	-0.006	-0.012
1989	-0.012	-0.01	-0.016
1990	-0.013	-0.011	-0.015
1991	-0.012	-0.011	-0.013
1992	-0.011	-0.01	-0.011
1993	-0.011	-0.01	-0.009
1994	-0.01	-0.009	-0.008
1995	-0.01	-0.008	-0.007
1996	-0.009	-0.007	-0.006
1997	-0.009	-0.007	-0.006
1998	-0.008	-0.007	-0.005
1999	-0.007	-0.006	-0.005
2000	-0.006	-0.005	-0.004

APPENDIX B

FISHERIES ASSUMPTIONS

EARL R. COMBS, INC.
CONSULTANTS IN ECONOMICS AND PLANNING
9725 - S.E. 36th St. • Mercer Island, WA 98040 • (206)232-3991

MEMORANDUM 7/17/80

TO: Roger Marks
BLM/OCS Office
PO Box 1159
Anchorage AK 99510

Comments Regarding Technical Memos, SG-3 and BF (71-1)

Based upon a review of the methods, standards and assumptions applicable to Technical Memo SG-3, I have several comments regarding some of the assumptions which will be utilized for the ISER model. It is my opinion that the employment assumptions as they exist right now are not reflective of the industrial character of fishing activity which is likely to take place in the future.

At the present time, as well as historically, the nature of Alaskan fisheries is one of utilizating high value resources on a seasonal basis by employing mostly transient labor. A significant number of fishing vessels are used which spend a large amount of time berthed in locations far from the fishing grounds; in some cases outside of the State of Alaska. This is particularly true about the areas for both the St. George and Northern Aleutian lease sales impacts studies. Fisheries in this part of Alaska are predominantly for king and tanner crab, salmon, halibut and shrimp. The king and tanner crab fisheries are largely based at Dutch Harbor during the season with some vessels basing at Kodiak and to a lesser degree at other ports along the Alaska Peninsula. Vessels spend from two, to at most six, months in these fisheries. The salmon fishery relies heavily on drift gillnet vessels that operate out of several ports in Bristol Bay. These are coastal fisheries. Again, the season is short and the activity peaks during a small part of the year. Halibut fishing is accomplished primarily by traditional halibut schooners many of which base themselves in Puget Sound and travel to Western Alaska for the prime fishing seasons. It is a short season because of quota restrictions. Shrimp trawling is accomplished primarily by the drag fleet centered in Kodiak. Again, these vessels currently participate in that fishery during only a portion of the year.

Processing activities for all of these fisheries are geared to the fishing seasons. Most of the products are packed or canned during the limited season. Both the

harvesting and processing labor forces are made up largely of people who do not live at the locations from which they base their fishing or conduct their processing.

The largest opportunities for expanding U.S. commercial fisheries in the future lie in the complex of fishes commonly referred to as bottomfish. These resources are abundant in the Bering Sea and currently support a large distant water fishery prosecuted by foreign fleets almost exclusively. There is a small level of bottomfish fishing by the shrimp drag fleet out of Kodiak. This currently accounts for less than 1% of the total production. Most of the fish are used for bait. According to the non-OCS assumptions produced by the University of Alaska, an excess of 2 million m.t. round weight of this resource complex is available for utilization by U.S. industry. This is not to say, however, that bottomfish are the only potential resource for future exploitation by U.S. industry. The traditional resources may also provide some added increment of production possibilities. I base this contention on the fact that some of these resources are currently at less than historical production levels at the present time and that enlightened management programs which encourage stock rehabilitation and increased production through enhancement measures will allow production to reach historic levels over the next 20 year period. In terms of tonnage, the future growth potential of traditional resources is less than 10% of that available in the bottomfish complex.

Groundfish fisheries around the world are conducted differently than present Alaska fishing activities. This is true in North America and Canadian ports and on our own Eastern seaboard as well as in Northern Europe where similar species and in some cases similar weather and ocean conditions are present. Groundfish fishing and processing must be carried out on a nearly year round basis. The resources are generally available during that time period with some shifting among species groups. Also, the economic margins available to harvesters and processors are considerably less than those for the higher valued species which comprise most of current Alaskan production. Rising costs of energy and associated high costs of vessels and processing facilities necessitate continuous production while limiting the opportunity for distant water fisheries similar to the system employed by foreign fleets.

Trawling operations and bottomfish production in Canada including British Columbia and the Maritime Provinces

along the Atlantic Ocean, as well as Northern European communities in Norway, Denmark, Scotland, and so forth, are supported by communities which base themselves largely on the seafood production and related activities. It is fairly common to find the local population either totally or substantially dependent on either fishing or processing. In many cases families will have both spouses employed in these sectors. Many of these communities outside of Alaska are also remote and have severe weather conditions. It seems most reasonable that future Alaskan fishing activities will be shaped by economic and operational concerns and take the form of comparable activities occurring in similar regions.

In short, it is my opinion that Alaskan fisheries, especially those of concern for these projects and including those pursued from Kodiak Island westward through the Aleutian and Pribilof Islands will be characterized by nearly year round activity supporting both shore based and sea based processing and fishing activities with a substantial population that will work and live in these communities. Because of these considerations I feel it most appropriate to modify some of the assumptions included in SG-3. The changes recommended are the following:

1) The portion of the population generated by seafood production activities which live in the respective communities should be greater than the 10-30% assumed. I recommend using 80%.

2) The above assumption should also be applied to those employed in groundfish harvesting, i.e. 80% will live in the Aleutians, etc.

One other area I wish to comment on concurs the assumptions associated with the non-OCS case for these lease sales as developed in the draft report submitted by the University of Alaska. For the most part their assumptions are reasonably acceptable. The major exceptions I would cite are the labor estimates associated with processing activities. Both the labor estimates for shore processing and sea processing seem quite low by comparable industrial standards. I am not certain how the figures for those assumptions were developed so it is difficult to tell where points of departure lie. Our research indicates that shore processing will require nearly 50% more people for production than their estimates show and that the labor requirement aboard catcher/processor type vessels will be more than double their estimates.

Our shore base processing plant estimates are built up by combining experiences of operators currently in the business and a substantial amount of input from Canadian operators, as well as projections of needs recommended by vendors of the different processing equipment and facilities. We have found that the experiences of other users of automated processing equipment shows that the manufacturers advertised production rates are generously stated. For planning purposes we use 75% of the advertised production rate and also recognize that due to coffee breaks, mechanical breakdowns, and human efficiencies that production will not generally take place for the complete eight hour period in a normal operating shift. We plan an effective seven hours of production at the reduced production rate. This may in part account for our average production per processing line being approximately 3,000 m.t. of round weight input per year versus the 4,500 m.t. of round weight input per year as assumed for the non-OCS case. In my opinion the lower figure is more realistic.

Regarding sea based processing based both on existing foreign experience with similar kinds of processing activities and also upon a vessel system which we conceived and had assistance in designing both from Nickum and Spaulding Naval Architects and FIDECO, an international fisheries consulting firm with considerable experience designing and operating catcher/processor vessels. It is more realistic to assume that a catcher/processor of approximately 250' OAL primarily targeting on Alaska pollock and producing 9,100 m.t. per year would require 80 people. These labor figures include a one-third excess over basic manning requirements to allow crew rotation - a common practice in existing operations.

It is my recommendation that the above assumptions be included for the impacts analysis associated with both St. George and Northern Aleutian lease sales.

Sincerely,

Jeffrey J. Tobolski.
President

JJTas

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ON SHORE PROCESSING

Maximum sustainable yield (MSY) from Sea Grant Tech. Report No. 51 is 2,014,019 m.t. A considerable portion of the resource available in the Bering Sea is likely to be harvested by the trawl fleet and future catcher/processors based in Kodiak. We assume that about 300,000 m.t. will be produced out of Kodiak. There is precedent for this assumption in that the Kodiak fleet currently ranges into this area yet prefers to live in Kodiak, and Kodiak has facilities to allow future transshipment of fisheries products. This leaves 1,714,019 m.t. for production in the Bering Sea area.

Half of the remaining harvest will be caught by catcher/processors leaving 857,009 m.t. for shore based processing.

Average trawler annual catch (Sea Grant) 2,700 m.t. Trawler has a crew of six.

857,009 divided by 2,700 = 318 = vessels needed
318 vessels x 6 crew = 1,908 = primary employment

We assume that an on shore processing plant will process 60,000 m.t. (132 million lbs) of fish in the round and employ 606 employees.

No. on shore plants=857,009 divided by 60,000 = 14.3 plants
No. primary employment=14.3 x 606 = 8,666 employees

Total primary employment for shore based harvesting and processing 8,666 + 1,908 = 10,574

AT SEA PROCESSING

For planning purposes the average sea catcher/processor is assumed to be about 250' OAL and will operate two processing lines on 16 hour shifts and will fish an average of 14 hours/day. This vessel would have an annual catch rate of 9,100 m.t./ year. The total resource for harvest and processing is 857,009 m.t. Consequently, 857,009 divided by 9,100 yields the need for about 94 vessels of this type.

Each vessel has a crew of 60 men and a 1.33 crew rotation requirement for a total crew complement of 80 primary employees.

Total primary employment for sea based processing is:

94 x 80 = 7,520

Total Primary Employment = 18,094

Shore Based Processing In The Aleutians

Of the 2,014,029 m.t. of groundfish available in the Aleutians and Bering Sea, the following species composition was recommended by the Resource Availability Task Team for the Systems Strategy to Support Fisheries Development in Alaska study prepared for Economic Development Administration and National Marine Fisheries Service, 1980. The Resource Task Team was made up of:

Jim Branson	NPFMC, Anchorage
Bert Larkins	NMFS, Northwest & AK Center
Phil Rigby	ADF&G
Rick Dutton	Icicle Seafoods, Inc.
Jeff Tobolski	Earl R. Combs, Inc. (ECI)
Len Guluka	Earl R. Combs, Inc. (ECI)

The Bering Sea and Aleutian Resource Availability

Species	% of Catch
Pollock	68.9
Cod	2.5
POP	4.6
Flatfish	22.2
Other	1.8
Total	100 %

The above resource composition was used to design a 60,000 m.t. groundfish processing unit. The plant would occupy 210,000 sq ft of space. The plant would be comprised of 32 separate processing lines operating for 210 days a year with 8 hour shifts per day at 90% capacity. The lines consist of: 25 cod/pollock lines
1 POP line
3 Flatfish lines
3 Hand filleting lines for over size and under size fish

A typical automated cod/pollock line employs 20 people and is rated at 3,000 m.t. output per year. This line operates at 75% efficiency due to downtime, maintenance, and delays for 7 of the 8 hours in a shift (due to employee downtime) which results in a 2,000 m.t. annual output. The perch/rockfish and flatfish lines are 4,500 m.t. lines with an annual output of 3,000 m.t. per year at 75% line efficiency and 87.3% labor efficiency. The hand filleting line is a 2,250 m.t. line with an annual output of 1,500 m.t. per year.

A typical perch line employs 28 people while the flatfish and hand filleting lines employ 5 and 32 employees, respectively.

The plant also uses three deboning units for better waste recovery employing three people. 52 supervisory and other operational employees are also used. They include dock workers, scale and inspection personnel, warehousemen, freezer packers, mechanics and plant and floor managers.

The indirect labor includes 17 other employees which include plant managers, marketing and clerical and bookkeeping personnel.

Total plant employment is 606 employees receiving $9,127,000 annually in wages; $12,321,000 with benefits.

Employment 60,000 m.t. Unit

	# employees	# lines
Indirect Personnel	17	-
Supervisory/General	52	-
Cod/Pollock lines	429	25
Perch/Rockfish lines	28	1
Flatfish line	14	3
Hand Fillet line	63	3
Deboning	3	-
Total	606	32

Cod/Pollock Line (single line*)

Job	# employees
Washer	1
Header & Gutter	1
Filleting Machine Operator	1
Skinner	1
Trimmer/Butcher	8
Packer	8
	20

Equipment Used	Number
Roundfish washer	1
Infeed table	1
Baader 161 H&G machine	1
Fish elevator	1

Baader 189 cod/pollock filleting machine	1
Arenco CUS 80 skinning machine	1
Candling and trimming table	1
Fillet washer/phosphate applicator	1
Packing table	1

* When multiple lines in use the number of personnel required may decrease as some personnel could operate more than one machine of similar design

Perch/Rockfish Line (single line*)

Job	# employees
Hopper tender	1
Header and Gutter	1
Filleting machine operator	1
Skinner	1
Trimmer/Butcher	12
Packer	12
	28

Equipment Used	Number
3100 lb Hopper	1
Washer/Descaler	1
Infeed table	1
Baader 417 head cutter	2
Baader 195 filleting machine	2
Arenco CUS 80 skinning machine	2
Candling/Trimming table	1
Fillet washer/phosphate applicator	1
Packing table	1

* See footnote for cod/pollock line

Flatfish Line

Job	# Employee
Washer	1
Header/Filleter	2
Packer	2
	5

Equipment Used	Number
Pneumatic tipper	1
Arenco CUS head cutter	2
Dressing area	2
Wash tank	1

Hand Fillet Line

Job	# Employee
Hopper operator	1
Incentive filleter	16
Weighing	2
Skinner	1
Butcher/Trimmer	6
Packers	6
	32

Equipment Used	Number
Hopper 2300 lb capacity	1
Flohr washer/descaler	1
Weighing scales - filleting table	2
ABCO Incentive filleting table	1
Roller table	1
TRIO skinning machine	1
Washer/phosphate applicator	1
Packing table	1

Sea Based Processing In The Aleutians

Sea based processing will perhaps be carried out by vessels of various configurations. Our own investigations and discussions with knowledgeable people in the industry, however, lead us to believe that most vessels for this purpose will be in the 200' plus OAL. More specifically we believe that a vessel of 250' OAL would be required to harvest and process pollock and other groundfish species in the Bering Sea and Aleutian areas.

Each one of these vessels would conduct about nine trips a year, each trip lasting four weeks or 30 days. Estimated catch for this vessel is about 9,100 m.t./year. It would have enough crew to fish and process the catch and man the vessels. The crew on any trip would number at least 60 men. Therefore, the vessel must have enough staterooms each accommodating four people at the most. Because there must be

some rotation in the crew, any vessel must have one-third more crew over and above the trip crew waiting in port to substitute for the next trip. This means that a total of 80 people have to be attached to a single vessel.

A design for this kind of vessel was prepared for Earl R. Combs, Inc. (ECI) by Nickum & Spaulding. It was reviewed by FIDECO and found to be a good representative of the practical realities of sea based operations. This design compares very well with these of some vessel used in foreign sea based operations in the Bering Sea.

A copy of this design is attached and shows various profiles including: inboard, boat deck, upper deck, main deck and double bottom plans. It gives a detailed configuration of the various spaces and their purposes.

CREW REQUIREMENTS REQUIRED

FOR 250-FOOT CATCHER/PROCESSOR

Position	Number
Ship's Master	1
1st Mate	1
2nd Mate	1
Chief Engineer	1
1st Asst. Engineer	1
2nd Asst. Engineer	1
Production Superintendent	1
Production Foreman	2
Production Crew *	35
Fishing Superintendent	1
Fishing/Deck Crew	20
Chief Cook	1
Asst. Cook	2
Steward	2
	60

* The production crew works two shifts on two production lines

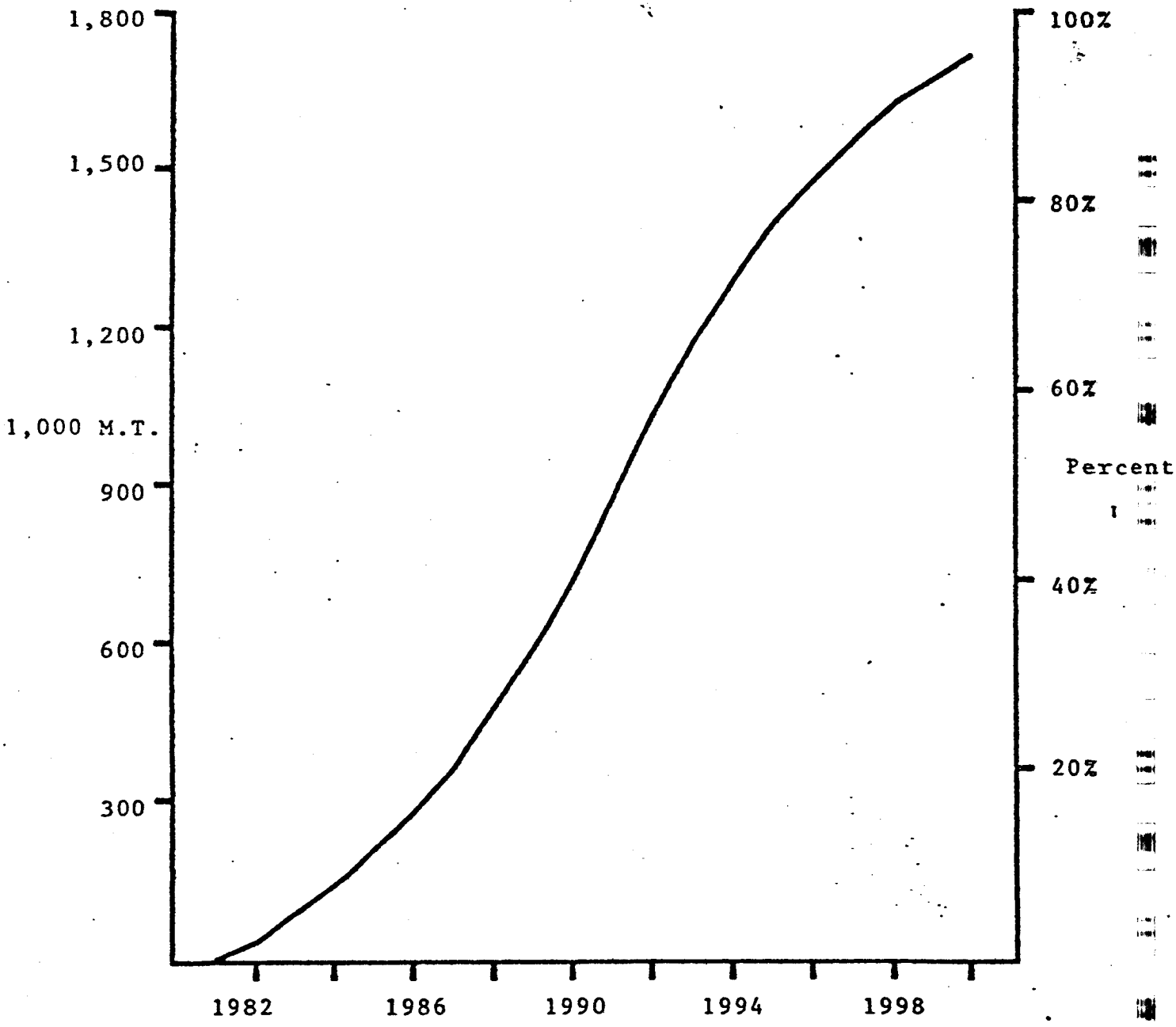
Projected Resource Growth Rate

It is of our opinion that the U.S. fishing industry growth during the next 20 year can be approximated by a bell shaped type curve. The early stage will be typically a period of slow cautious growth as the industry establishes itself. This will be followed by a period of rapid growth as other firms begin to take advantage of the opportunities. The last stage will be a period of deceleration as MSY's are reached.

The problem facing the industry in the early stages will be many. The personnel lack the technical knowledge and skills necessary to exploit the resources. This will require an extensive period of training, experimenting, and trial and error. In addition, the 1979 average composite wholesale groundfish price to processors was approximately $.98 and industry sources feel that it will require around $1.05 for the industry to break even without having to target on the higher valued species. Therefore, the early growth of the industry will be slow.

As skill levels increase and prices rise, more and more opportunities will present themselves to the industry. This industry can be expected to grow quite rapidly for a period of time. Then as the more productive fishing grounds are utilized harvesters will look to less productive areas for growth. In addition, the higher valued groundfish species will then approach their MSY's and a period of deceleration should occur.

Therefore, we feel that a typical industry growth curve is approximated by a normal distribution and our projected resource growth for the Aleutians reflects this assumption.



PROJECTED FISHERIES RESOURCE UTILIZATION IN THE BERING SEA AND ALEUTIAN ISLANDS

Residency Employment for Groundfish Production
Aleutian Islands

Year	Groundfish Harvest (1,000 m.t.)[1/]	Onshore Process Portion[2/]	Number of Vessels[3/]	Harvest Employment[4/]	Number of Onshore Plants[5/]	Process Employment[6/]	Employment	Percent Residency[9/]	Residency Employment
1980	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0
1982	50	25	9	54	1	606	660	10	66
1983	100	50	19	114	1	606	720	10	72
1984	150	75	28	168	1	606	774	10	77
1985	200	100	37	222	2	1,212	1,434	10	143
1986	250	125	46	276	2	1,212	1,488	10	149
1987	350	175	65	390	3	1,818	2,208	15	331
1988	450	225	83	498	4	2,424	2,922	20	584
1989	600	300	111	666	5	3,030	3,696	25	924
1990	750	375	139	834	6	3,636	4,470	30	1,341
1991	900	450	167	1,002	8	4,848	5,850	35	2,048
1992	1,000	500	185	1,110	8	4,848	5,958	40	2,383
1993	1,150	575	213	1,278	10	6,060	7,338	45	3,302
1994	1,300	650	241	1,446	11	6,666	8,112	50	4,056
1995	1,350	675	250	1,500	11	6,666	8,166	55	4,491
1996	1,400	700	259	1,554	12	7,272	8,826	60	5,296
1997	1,500	750	278	1,668	13	7,878	9,546	65	6,205
1998	1,600	800	296	1,776	13	7,878	9,654	70	6,758
1999	1,650	825	306	1,836	14	8,484	10,320	75	7,740
2000	1,700	850	315	1,890	14	8,484	10,374	80	8,299

1/ Year 2000 total from Sea Grant (Bering-Norton Petroleum Development Scenarios Commercial Fish Industry Impact Analysis). Shape of growth from Earl R. Combs, Inc. memo (July 18, 1980).

2/ Assumes half of processing onshore, half offshore (Sea Grant).

3/ Assumes 2,700 m.t./vessel (Combs).

4/ Assumes 6/crew (Combs).

5/ Assumes 60,000 m.t./plant (Combs).

6/ Assumes 606/plant (Combs).

9/ Assumes 80 percent long-run residency (Combs) for onshore processing with the rate halved for catcher/processors. This is graduated from the current 10 percent rate assuming an initial 5-year lag.

Catcher/ Process Portion[2/]	Number of Vessels[7/]	Employment[8/]	Percent Residency[9/]	Residency Employment	Total Residency Employment
0	0	0	0	0	0
0	0	0	0	0	0
25	3	240	10	24	90
50	5	400	10	40	112
75	8	640	10	64	141
100	11	880	10	88	231
125	14	1,120	10	112	261
175	19	1,520	10	152	483
225	25	2,000	10	200	784
300	33	2,640	10	264	1,188
375	41	3,280	15	492	1,833
450	49	3,920	15	588	2,636
500	55	4,400	20	880	3,263
575	63	5,040	20	1,008	4,310
650	71	5,680	25	1,420	5,476
675	74	5,920	25	1,480	5,971
700	77	6,160	30	1,848	7,144
750	82	6,560	30	1,968	8,173
800	88	7,040	35	2,464	9,222
825	91	7,280	35	2,548	10,288
850	93	7,440	40	2,976	11,275

2/ Assumes half of processing onshore, half offshore (Sea Grant.)

7/ Assumes 9,100 m.t./vessel (Combs).

8/ Assumes 80/crew (Combs).

9/ Assumes 80 percent long-run residency (Combs) for onshore processing with the rate halved for catcher/processors. This is graduated from the current 10 percent rate assuming an initial 5-year lag.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

ALASKA OUTER CONTINENTAL SHELF OFFICE
Post Office Box 1159
Anchorage, Alaska 99510

IN REPLY REFER TO

3331.5

September 12, 1980

Memorandum

To: Acting Coordinator, Socioeconomic Studies Program

From: Socioeconomic Specialist

Subject: Assumptions Regarding Bottomfishery Development

The potential for bottomfishery industry development in the Aleutian Islands by the end of this century to cause social and economic structural change is considerable. Thus accurate estimate of the degree of industry development is important for building a base against which to measure OCS impacts.

The two major considerations to estimate are total domestic production and local residency of the production employment. For the St. George studies to proceed, assumptions were made regarding these (see attached July 23 memo).

Those assumptions were optimistic towards the possibility of bottomfishery development. Due to the significant structural changes such development will cause, these assumptions were met by resistance from some contractors. This forced us to reassess these assumptions one final time before requiring the contractors to go ahead based on them.

In the last several weeks we have done some thinking on the matter, some reading, and had some in- and out-house discussion with knowledgeable persons. We have decided to uphold our assumptions based on the following:

- The pivotal factor necessary for development of the resource is a federal/state policy towards commitment to such. The policy is currently developed, and is energetic. Studies and planning programs have been implemented. It is expected that subsidy funds will be available.

- Extended domestic jurisdiction has been established.

- Two of our fisheries contractors, Sea Grant and Earl Combs, have independently projected this optimistic development.

- Richard Careaga, planner for Dutch Harbor, is planning for 20,000 people by the year 2000.

- Per capita consumption of fish is increasing. Aggregate supply is essentially fixed. This, coupled with the fact that over the past 10 years the real wholesale price of bottomfish has been growing at a rate of 7% above the food processors' cost index and is expected to continue doing such, indicates prices should accelerate.

- The capital requirements for such development are relatively modest (approx. $3 billion).

- Many of the vessels that have been built for the Alaska shellfish fleets in the past few years have been designed to allow them to enter the groundfish fishery as it becomes more profitable and as the shellfish seasons become shorter.

- The increasing number of joint ventures indicate the increasing number of bottomfishing vessels. They are also a logical intermediate step toward full development.

- Large processors are currently buying smaller existing plants to operate and develop during down time.

Roger Mead

APPENDIX C

OCS TOTAL DIRCT AND SEAR ADJUSTED EMPLOYMENT: EXPLORATION ONLY AND MEAN CASES, ST. GEORGE BASIN

APPENDIX C

TABLE C-1. OCS TOTAL DIRECT AND SEAR ADJUSTED EMPLOYMENT: EXPLORATION ONLY AND MEAN CASES, ST. GEORGE BASIN

Exploration Only

	Mining		Construction		Transportation		HQTS*	Total	
Year	Total	SEAR	Total	SEAR	Total	SEAR		Total	SEAR
1980	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0
1983	131	50	0	0	57	23	0	188	73
1984	198	64	0	0	93	37	0	292	101
1985	232	72	0	0	110	46	0	342	119
1986	198	65	0	0	93	39	0	292	105
1987	97	44	0	0	20	8	0	177	53
1988	0	0	0	0	0	0	0	0	0
1989									
1990									
1991									
1992									
1993									
1994									
1995									
1996									
1997									
1998									
1999									
2000	0	0	0	0	0	0	0	0	0

*No SEAR adjustment performed on headquarters employment.

SOURCE: Total direct OCS employment from Alaska OCS Office. SEAR adjustments performed by ISER.

APPENDIX C

TABLE C-2. OCS TOTAL DIRECT AND SEAR ADJUSTED EMPLOYMENT: EXPLORATION ONLY AND MEAN CASES, ST. GEORGE BASIN

Mean Only

	Mining		Construction		Transportation		HQTS*	Total	
Year	Total	SEAR	Total	SEAR	Total	SEAR		Total	SEAR
1980	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0
1983	299	84	37	18	143	57	0	480	160
1984	468	118	111	55	227	91	0	805	264
1985	535	136	753	172	320	162	0	1608	470
1986	468	122	1806	190	407	254	0	2681	565
1987	733	244	4721	1165	470	363	0	5924	1771
1988	769	247	3871	1075	670	616	16	5310	1954
1989	1148	795	2427	873	940	880	31	4515	2574
1990	1064	738	1241	619	720	711	101	3026	2189
1991	951	710	0	0	720	711	133	1671	1554
1992	1096	758	|	|	|	|	|	1816	1602
1993	1280	819	|	|	|	|	|	2000	1663
1994	1157	778	|	|	|	|	|	1877	1622
1995	1035	738	|	|	|	|	|	1755	1582
1996	920	700	|	|	|	|	|	1640	1544
1997	1096	758	|	|	|	|	|	1816	1602
1998	1280	819	|	|	|	|	|	2000	1663
1999	1157	778	|	|	|	|	|	1877	1622
2000	1035	738	0	0	720	711	133	1755	1582

*No SEAR adjustment performed on headquarters employment.

SOURCE: Total direct OCS employment from Alaska OCS Office. SEAR adjustments performed by ISER.

APPENDIX D

OCS TOTAL DIRECT AND SEAR ADJUSTED EMPLOYMENT BY PLACE OF WORK AND BY PLACE OF RESIDENCE: EXPLORATION ONLY AND MEAN CASES, ST. GEORGE BASIN

APPENDIX D

TABLE D-1. OCS TOTAL DIRECT AND SEAR ADJUSTED EMPLOYMENT BY PLACE OF WORK AND BY PLACE OF RESIDENCE: EXPLORATION ONLY AND MEAN CASES, ST. GEORGE BASIN

Exploration Only

	By Region								Statewide	
	Region 2		Region 4		Region 5		Not in AK		Total	Total Dir.
Year	EMP	RES	EMP	RES	EMP[1]	RES	EMP	RES	SEAR EMP	OCS EMP
1980	0	0	0	0	0	0	0	0	0	0
1981	0			0		0		0	0	0
1982	0			0		0		0	0	
1983	188			15		58		115	73	188
1984	292			21		81		190	101	292
1985	342			24		95		223	119	342
1986	292			22		83		187	105	292
1987	177			12		42		123	53	177
1988	0			0		0		0	0	0
1989										
1990										
1991										
1992										
1993										
1994										
1995										
1996										
1997										
1998										
1999										
2000	0	0	0	0	0	0	0	0	0	0

[1]There is no headquarters employment in this case.

APPENDIX D

TABLE D-2. OCS TOTAL DIRECT AND SEAR ADJUSTED EMPLOYMENT BY PLACE OF WORK AND BY PLACE OF RESIDENCE: EXPLORATION ONLY AND MEAN CASES, ST. GEORGE BASIN

Mean Only

	By Region								Statewide	
	Region 2		Region 4		Region 5		Not in AK		Total	Total Dir.
Year	EMP	RES	EMP	RES	EMP	RES	EMP	RES	SEAR EMP	OCS EMP
1980	0	0	0	0	0	0	0	0	0	0
1981	0	0	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	0	0	0	0	0
1983	480	1	0	32	0	127	0	320	160	480
1984	805	2		52	0	209		542	264	805
1985	1608	19		87	0	364		1138	470	1608
1986	2681	45		106	0	415		2125	565	2681
1987	5924	149		333	0	1288		4154	1771	5924
1988	5294	391		314	16	1248		3357	1954	5310
1989	4484	624		395	31	1559		1937	2579	4515
1990	2925	561		320	101	1309		836	2189	3026
1991	1538	540		186	133	828		117	1554	1671
1992	1683			195		867		214	1602	1816
1993	1867			206		917		337	1663	2000
1994	1744			194		888		255	1662	1877
1995	1622			184		858		173	1582	1755
1996	1507			175		829		96	1544	1640
1997	1683			186		876		214	1602	1816
1998	1867			197		925		338	1663	2000
1999	1744			187		895		255	1622	1877
2000	1622	540	0	182	133	860	0	173	1582	1755

TABLE NOTES

Note: "EMP" is total direct OCS employment in the indicated region and includes both resident and nonresident employment. "RES" is direct OCS employment of residents of the indicated region. Hence, the sum of the "RES" columns for Alaska is equal to SEAR adjusted total direct OCS employment, while the sum of "EMP" columns equals total direct OCS employment.

SOURCE: Total direct OCS employment from Alaska OCS Office. Allocation of residents to regions and SEAR adjustment by ISER.

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