Alaska OCS Socioeconomic Studies Program

NORTH ALEUTIAN SHELF STATEWIDE AND REGIONAL DEMOGRAPHIC AND ECONOMIC SYSTEMS IMPACT ANALYSIS

Prepared for
Bureau of Land Management
Alaska Outer Continental Shelf Office

June 1982

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Alaska OCS Socioeconomic Studies Program
North Aleutian Shelf Statewide and Regional Demographic and Economic Systems Impact Analysis

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Institute of Social and Economic Research
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ABSTRACT

NORTH ALEUTIAN SHELF STATEWIDE AND REGIONAL
DEMOGRAPHIC AND ECONOMIC SYSTEMS IMPACTS ANALYSES

This study examines economic and demographic impacts of the proposed Outer Continental Shelf (OCS) petroleum development of the North Aleutian Shelf (Sale 75). The study begins with historical baseline analyses of the population and economies of the State of Alaska and of the Anchorage, Aleutian Islands, and Bristol Bay census divisions. Next, base case projections of conditions in the absence of OCS development are prepared for these areas and, subsequently, the impacts of OCS development are examined. The statewide, Anchorage, and Bristol Bay projections used the MAP statewide and regional models, while the Aleutian Islands projections used the SCIMP model. Both of these models were developed at the University of Alaska Institute of Social and Economic Research (ISER). The models' projections reflect numerous assumptions about future exogenous activities.

The statewide base case projection of population in 2000 is 649 thousand. The maximum percentage impact of the North Aleutian Shelf mean case OCS development upon statewide population would be 1.15 percent, or 7,868, in 1982. The Aleutian Islands base case total population (including enclave residents and military) in 2000 is 25,089. The maximum percentage impact of the North Aleutian Shelf mean case OCS development upon the Aleutian Islands population would
be 2.5 percent (822) in 1990. The maximum percentage impacts upon Aleutian Islands resident employment would be 16.6 percent (145) in 1990. The maximum projected impact upon Aleutian Islands nonresident or enclave employment (excluding military) would be 27.6 percent (733) in 1989.
I. INTRODUCTION

This study is concerned primarily with measuring the economic effects of the proposed Outer Continental Shelf (OCS) petroleum development in the North Aleutian Shelf (Sale 75). This study includes a statewide and regional historical baseline analysis and base case projections against which the direct and indirect economic effects of North Aleutian Shelf OCS petroleum development are measured. The analysis and projections are carried out on a statewide level and for three regions within the state: the Aleutian Islands, Bristol Bay, and Anchorage.

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 the base case assumptions regarding future growth of the areas.

Part III contains three important elements. First, the underlying projection methodology is explained and reviewed in terms of the economic models used and the accuracy and limitations of the projection methodology. Second, the assumptions used to "drive" the models are presented. Finally, the base case projections for the respective areas are presented, i.e., the economic and demographic projections in the absence of OCS development.
Part IV of the study presents a description and analysis of the projected impacts associated with the proposed North Aleutian Shelf lease sale. Results for the different OCS 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

This chapter provides historic baseline studies for Alaska and for Anchorage, the Aleutian Islands, and Bristol Bay. These studies are provided for three reasons. First, they 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, they 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, they provide guidance in developing assumptions regarding future development of the economy.

Potential impacts of OCS development will not be felt uniformly throughout the state. Specific regions within Alaska can be expected to experience both the brunt of the impacts and to capture disproportionate shares of the benefits. Therefore, we address not only the statewide economy, but specific regional economies as well.

The Statewide Economy: Statehood - 1979
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 sizable 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 measures 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
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* 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, Alaska, 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.


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.


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 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.

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.
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</table>
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

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<td>Total Nonagricultural Employment</td>
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<td>91.7</td>
<td>69.5</td>
<td>77.6</td>
<td>108.2</td>
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<td>65.1</td>
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<td>Labor Force</td>
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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.
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
## Table 4. Personal Income by Major Component: Alaska, Selected Years 1960-1978

(millions of current dollars)

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<th>COMPONENT</th>
<th>1960</th>
<th>% Total</th>
<th>1965</th>
<th>% Total</th>
<th>1970</th>
<th>% Total</th>
<th>1975</th>
<th>% Total</th>
<th>1978</th>
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<td>Military</td>
<td>136.0</td>
<td>20.1</td>
<td>143.9</td>
<td>16.4</td>
<td>225.7</td>
<td>14.8</td>
<td>258</td>
<td>6.1</td>
<td>287.5</td>
<td>5.9</td>
</tr>
<tr>
<td>State &amp; Local</td>
<td>45.9</td>
<td>6.8</td>
<td>94.4</td>
<td>10.8</td>
<td>172.9</td>
<td>11.3</td>
<td>427</td>
<td>10.0</td>
<td>631.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Proprietors' Income</td>
<td>50.1</td>
<td>7.4</td>
<td>62.1</td>
<td>7.1</td>
<td>73.9</td>
<td>4.8</td>
<td>143</td>
<td>3.4</td>
<td>260.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Dividend, Interest &amp; Rent</td>
<td>33.0</td>
<td>4.9</td>
<td>52.1</td>
<td>5.9</td>
<td>81.4</td>
<td>5.3</td>
<td>220</td>
<td>5.2</td>
<td>333.4</td>
<td>6.8</td>
</tr>
<tr>
<td>Transfer Payments</td>
<td>24.0</td>
<td>3.6</td>
<td>34.2</td>
<td>3.9</td>
<td>79.3</td>
<td>5.2</td>
<td>274</td>
<td>6.4</td>
<td>358.3</td>
<td>7.3</td>
</tr>
<tr>
<td>TOTAL</td>
<td>675.0</td>
<td>100.0</td>
<td>876.6</td>
<td>100.0</td>
<td>1528.5</td>
<td>100.0</td>
<td>4257</td>
<td>100.0</td>
<td>3907.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Less</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cont. for Soc. Ins.</td>
<td>11.0</td>
<td>1.6</td>
<td>22.3</td>
<td>2.6</td>
<td>49.2</td>
<td>3.2</td>
<td>172.0</td>
<td>4.1</td>
<td>223.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Residence Adj.</td>
<td>31.5</td>
<td>4.7</td>
<td>45.9</td>
<td>5.2</td>
<td>67.1</td>
<td>4.5</td>
<td>637.0</td>
<td>16.0</td>
<td>314.6</td>
<td>8.1</td>
</tr>
<tr>
<td>Resident Personal Income</td>
<td>632.5</td>
<td>94.7</td>
<td>900.2</td>
<td>96.2</td>
<td>1412.2</td>
<td>92.0</td>
<td>3447.0</td>
<td>89.9</td>
<td>4369.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>
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.
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.

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Millions of Dollars of Personal Income, Total</th>
<th>Per Capita Personal Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current $</td>
<td>Constant 1979 $</td>
</tr>
<tr>
<td>1960</td>
<td>632.5</td>
<td>1,470.6</td>
</tr>
<tr>
<td>1965</td>
<td>858.4</td>
<td>1,982.8</td>
</tr>
<tr>
<td>1970</td>
<td>1,411.9</td>
<td>2,700.3</td>
</tr>
<tr>
<td>1971</td>
<td>1,557.2</td>
<td>2,954.8</td>
</tr>
<tr>
<td>1972</td>
<td>1,698.5</td>
<td>3,036.4</td>
</tr>
<tr>
<td>1973</td>
<td>2,001.5</td>
<td>3,570.0</td>
</tr>
<tr>
<td>1974</td>
<td>2,436.7</td>
<td>3,822.9</td>
</tr>
<tr>
<td>1975</td>
<td>3,527.7</td>
<td>4,493.5</td>
</tr>
<tr>
<td>1976</td>
<td>4,194.8</td>
<td>5,421.4</td>
</tr>
<tr>
<td>1977</td>
<td>4,313.4</td>
<td>5,346.5</td>
</tr>
<tr>
<td>1978</td>
<td>4,369.0</td>
<td>4,875.2</td>
</tr>
</tbody>
</table>

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

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

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.
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.

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

SOURCE: Computed from average monthly wage data, Statistical Quarterly (Alaska Department of Labor), selected years.
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. After the pipeline, however, the inflation rate in Anchorage again fell below that of the United States. Except for periods of relative boom in Alaska, consumer prices have tended to rise noticeably slower in Anchorage than outside Alaska. Over the long run, this will tend to narrow price differentials between Alaska and the lower 48 states. Table 8 presents relative rates of growth in the Anchorage and United States CPIs for selected years, and clearly illustrates this pattern.

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 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
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchorage</td>
<td>1.8</td>
<td>4.1</td>
<td>13.3</td>
<td>12.3</td>
<td>6.5</td>
<td>5.8</td>
</tr>
<tr>
<td>United States</td>
<td>2.8</td>
<td>5.6</td>
<td>12.0</td>
<td>7.6</td>
<td>5.3</td>
<td>6.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchorage</td>
<td>6.3</td>
<td>9.4</td>
<td>8.9</td>
<td>7.5</td>
</tr>
<tr>
<td>United States</td>
<td>7.7</td>
<td>11.5</td>
<td>13.0</td>
<td>10.7</td>
</tr>
</tbody>
</table>

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

Table 10 presents the age distribution of Alaska in juxtaposition to the overall U.S. age distribution. As would be expected, the middle age groups are significantly larger in Alaska than for the United States as a whole; almost 34 percent of the Alaska population is
TABLE 9. ALASKA POPULATION AND COMPONENTS
OF CHANGE: 1965-1978
(thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Natural Increase</th>
<th>Total Change</th>
<th>Net Migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>265.2</td>
<td>5.7</td>
<td>10.2</td>
<td>4.5</td>
</tr>
<tr>
<td>1966</td>
<td>271.5</td>
<td>5.3</td>
<td>6.3</td>
<td>1.0</td>
</tr>
<tr>
<td>1967</td>
<td>277.9</td>
<td>5.0</td>
<td>6.4</td>
<td>1.4</td>
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<tr>
<td>1968</td>
<td>284.9</td>
<td>5.1</td>
<td>7.0</td>
<td>1.9</td>
</tr>
<tr>
<td>1969</td>
<td>294.6</td>
<td>5.6</td>
<td>9.7</td>
<td>4.1</td>
</tr>
<tr>
<td>1970</td>
<td>302.4</td>
<td>6.1</td>
<td>7.8</td>
<td>1.7</td>
</tr>
<tr>
<td>1971</td>
<td>312.9</td>
<td>5.9</td>
<td>10.6</td>
<td>4.7</td>
</tr>
<tr>
<td>1972</td>
<td>324.3</td>
<td>5.5</td>
<td>11.4</td>
<td>5.9</td>
</tr>
<tr>
<td>1973</td>
<td>330.4</td>
<td>5.1</td>
<td>6.1</td>
<td>0.9</td>
</tr>
<tr>
<td>1974</td>
<td>351.2</td>
<td>5.6</td>
<td>20.8</td>
<td>15.2</td>
</tr>
<tr>
<td>1975</td>
<td>404.6</td>
<td>5.9</td>
<td>53.4</td>
<td>47.5</td>
</tr>
<tr>
<td>1976</td>
<td>413.3</td>
<td>6.3</td>
<td>8.7</td>
<td>2.4</td>
</tr>
<tr>
<td>1977</td>
<td>411.2</td>
<td>6.8</td>
<td>- 2.1</td>
<td>- 8.9</td>
</tr>
<tr>
<td>1978</td>
<td>407.0</td>
<td>6.7</td>
<td>- 4.3</td>
<td>-11.0</td>
</tr>
<tr>
<td>1979</td>
<td>406.2</td>
<td>7.4</td>
<td>- 0.8</td>
<td>- 8.2</td>
</tr>
<tr>
<td>1980</td>
<td>400.5*</td>
<td></td>
<td>- 5.7</td>
<td></td>
</tr>
</tbody>
</table>

*U.S. Census figure for 1980, so comparability is more difficult.

SOURCE: Alaska Department of Labor
<table>
<thead>
<tr>
<th>Age Cohort</th>
<th>Total</th>
<th>Alaska Age Distribution (% of Total)</th>
<th>U.S. Age Distribution (% of Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 4</td>
<td>38,777</td>
<td>9.68</td>
<td>7.21</td>
</tr>
<tr>
<td>5 - 9</td>
<td>84,917</td>
<td>8.72</td>
<td>7.37</td>
</tr>
<tr>
<td>10 - 14</td>
<td>34,166</td>
<td>8.53</td>
<td>8.05</td>
</tr>
<tr>
<td>15 - 19</td>
<td>36,980</td>
<td>9.23</td>
<td>9.34</td>
</tr>
<tr>
<td>20 - 24</td>
<td>45,058</td>
<td>11.25</td>
<td>9.40</td>
</tr>
<tr>
<td>25 - 29</td>
<td>48,452</td>
<td>12.10</td>
<td>7.29</td>
</tr>
<tr>
<td>30 - 34</td>
<td>41,916</td>
<td>10.46</td>
<td>7.75</td>
</tr>
<tr>
<td>35 - 39</td>
<td>31,182</td>
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<td>6.16</td>
</tr>
<tr>
<td>40 - 44</td>
<td>22,570</td>
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<td>5.15</td>
</tr>
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<td>45 - 49</td>
<td>18,355</td>
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<td>4.89</td>
</tr>
<tr>
<td>50 - 54</td>
<td>15,801</td>
<td>3.95</td>
<td>5.16</td>
</tr>
<tr>
<td>55 - 59</td>
<td>12,592</td>
<td>3.14</td>
<td>5.13</td>
</tr>
<tr>
<td>60 - 64</td>
<td>8,095</td>
<td>2.02</td>
<td>4.45</td>
</tr>
<tr>
<td>65 +</td>
<td>11,530</td>
<td>2.88</td>
<td>11.28</td>
</tr>
</tbody>
</table>

between ages 20 and 35, where the comparable figure for the United States is less than 25 percent. This age group is extremely mobile, and accounts for a good deal of the migration that occurred during the pipeline boom.

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.

The Anchorage Census Division
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 11. 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.

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.
TABLE 11. ANCHORAGE NONAGRICULTURAL WAGE AND SALARY
EMPLOYMENT, SELECTED YEARS
(Thousands)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Emp</td>
<td>%</td>
<td>Emp</td>
<td>%</td>
<td>Emp</td>
<td>%</td>
<td>Emp</td>
</tr>
<tr>
<td>Total NonAgr Wage &amp; Salary Employment</td>
<td>30.678</td>
<td>100.0</td>
<td>34.019</td>
<td>100.0</td>
<td>42.019</td>
<td>100.0</td>
<td>48.252</td>
</tr>
<tr>
<td>Mining</td>
<td>0.371</td>
<td>1.2</td>
<td>0.781</td>
<td>2.3</td>
<td>0.958</td>
<td>2.3</td>
<td>0.806</td>
</tr>
<tr>
<td>Contract Construction</td>
<td>3.126</td>
<td>10.2</td>
<td>2.438</td>
<td>7.2</td>
<td>3.514</td>
<td>8.4</td>
<td>4.272</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.791</td>
<td>2.6</td>
<td>0.834</td>
<td>2.5</td>
<td>1.018</td>
<td>2.4</td>
<td>1.215</td>
</tr>
<tr>
<td>Transportation, Communications, and Utilities</td>
<td>2.618</td>
<td>8.5</td>
<td>3.046</td>
<td>9.0</td>
<td>3.907</td>
<td>9.3</td>
<td>4.522</td>
</tr>
<tr>
<td>Wholesale-Retail</td>
<td>5.279</td>
<td>17.2</td>
<td>6.552</td>
<td>19.3</td>
<td>8.617</td>
<td>20.5</td>
<td>9.948</td>
</tr>
<tr>
<td>Finance, Insurance and Real Estate</td>
<td>1.295</td>
<td>4.2</td>
<td>1.452</td>
<td>4.3</td>
<td>1.980</td>
<td>4.7</td>
<td>2.415</td>
</tr>
<tr>
<td>Services</td>
<td>3.767</td>
<td>12.3</td>
<td>4.652</td>
<td>13.7</td>
<td>6.403</td>
<td>15.2</td>
<td>7.725</td>
</tr>
<tr>
<td>State &amp; Local Government</td>
<td>4.001</td>
<td>13.0</td>
<td>5.022</td>
<td>14.8</td>
<td>6.036</td>
<td>14.4</td>
<td>7.839</td>
</tr>
</tbody>
</table>

SOURCE: Statistical Quarterly (Alaska Department of Labor), various years.
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 12). Over the period from 1970 through 1979, unemployment averaged 7.4 percent. While temporarily dropping during pipeline construction, the unemployment rate has risen 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 13, both in current and constant (1978) dollars. In current dollars,
<table>
<thead>
<tr>
<th>Year</th>
<th>Employment</th>
<th>Labor Force</th>
<th>Unemployment</th>
<th>Unemployment Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>45,757</td>
<td>49,024</td>
<td>3,267</td>
<td>6.7%</td>
</tr>
<tr>
<td>1971</td>
<td>49,484</td>
<td>53,902</td>
<td>4,418</td>
<td>8.2</td>
</tr>
<tr>
<td>1972</td>
<td>52,395</td>
<td>57,535</td>
<td>5,140</td>
<td>8.9</td>
</tr>
<tr>
<td>1973</td>
<td>54,299</td>
<td>60,117</td>
<td>5,818</td>
<td>9.7</td>
</tr>
<tr>
<td>1974</td>
<td>54,691</td>
<td>58,661</td>
<td>3,970</td>
<td>6.8</td>
</tr>
<tr>
<td>1975</td>
<td>64,721</td>
<td>68,481</td>
<td>3,760</td>
<td>5.5</td>
</tr>
<tr>
<td>1976</td>
<td>68,420</td>
<td>73,436</td>
<td>5,016</td>
<td>6.8</td>
</tr>
<tr>
<td>1977</td>
<td>79,023</td>
<td>84,513</td>
<td>5,490</td>
<td>6.5</td>
</tr>
<tr>
<td>1978</td>
<td>74,819</td>
<td>81,551</td>
<td>6,732</td>
<td>8.3</td>
</tr>
<tr>
<td>1979</td>
<td>75,424</td>
<td>81,120</td>
<td>5,696</td>
<td>7.0</td>
</tr>
</tbody>
</table>

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

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.
<table>
<thead>
<tr>
<th>Year</th>
<th>Total (millions)</th>
<th>Per Capita</th>
<th>Total (1978) Dollars</th>
<th>Per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>371</td>
<td>3,412</td>
<td>767</td>
<td>7,056</td>
</tr>
<tr>
<td>1966</td>
<td>398</td>
<td>3,595</td>
<td>722</td>
<td>7,153</td>
</tr>
<tr>
<td>1967</td>
<td>462</td>
<td>4,061</td>
<td>900</td>
<td>7,911</td>
</tr>
<tr>
<td>1968</td>
<td>502</td>
<td>4,228</td>
<td>953</td>
<td>8,027</td>
</tr>
<tr>
<td>1969</td>
<td>570</td>
<td>4,622</td>
<td>1,035</td>
<td>8,391</td>
</tr>
<tr>
<td>1970</td>
<td>635</td>
<td>4,997</td>
<td>1,109</td>
<td>8,730</td>
</tr>
<tr>
<td>1971</td>
<td>733</td>
<td>5,469</td>
<td>1,248</td>
<td>9,313</td>
</tr>
<tr>
<td>1972</td>
<td>800</td>
<td>5,631</td>
<td>1,333</td>
<td>9,383</td>
</tr>
<tr>
<td>1973</td>
<td>880</td>
<td>6,031</td>
<td>1,385</td>
<td>9,490</td>
</tr>
<tr>
<td>1974</td>
<td>1,114</td>
<td>7,402</td>
<td>1,550</td>
<td>10,299</td>
</tr>
<tr>
<td>1975</td>
<td>1,625</td>
<td>10,070</td>
<td>2,011</td>
<td>12,463</td>
</tr>
<tr>
<td>1976</td>
<td>1,903</td>
<td>10,579</td>
<td>2,212</td>
<td>12,296</td>
</tr>
<tr>
<td>1977</td>
<td>2,109</td>
<td>11,592</td>
<td>2,317</td>
<td>12,736</td>
</tr>
<tr>
<td>1978</td>
<td>2,128</td>
<td>11,839</td>
<td>2,128</td>
<td>11,839</td>
</tr>
</tbody>
</table>

Average Annual Percent Growth

- **14.4%**
- **10.0%**
- **8.2%**
- **4.1%**

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

Population for Anchorage grew from 102.3 thousand in 1965 to 185.5 thousand in 1978, at an average annual growth rate of 4.7 percent (see Table 14). 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 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.
TABLE 14. ANCHORAGE POPULATION
1965-1980

(Thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>102.3</td>
</tr>
<tr>
<td>1966</td>
<td>105.9</td>
</tr>
<tr>
<td>1967</td>
<td>107.8</td>
</tr>
<tr>
<td>1968</td>
<td>111.6</td>
</tr>
<tr>
<td>1969</td>
<td>114.2</td>
</tr>
<tr>
<td>1970</td>
<td>126.3</td>
</tr>
<tr>
<td>1971</td>
<td>135.8</td>
</tr>
<tr>
<td>1972</td>
<td>144.2</td>
</tr>
<tr>
<td>1973</td>
<td>149.4</td>
</tr>
<tr>
<td>1974</td>
<td>153.1</td>
</tr>
<tr>
<td>1975</td>
<td>177.8</td>
</tr>
<tr>
<td>1976</td>
<td>185.2</td>
</tr>
<tr>
<td>1977</td>
<td>195.8</td>
</tr>
<tr>
<td>1978</td>
<td>185.5</td>
</tr>
<tr>
<td>1980</td>
<td>173.9*</td>
</tr>
</tbody>
</table>

*U.S. Census data.

SOURCE: Alaska Department of Labor.
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 Heiden west. This is the definition used by the 1970 Census and the Alaska Department of Labor Statistical Quarterly (the 1980 Census used a slightly different definition).

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 15 through 17 provide summary data on commercial fishing. In Table 15 the salmon, shellfish, total catch, and value of catch to fishermen
TABLE 15. CATCH AND VALUE TO FISHERMEN, ALEUTIAN ISLANDS CENSUS DIVISION 1970 TO 1976, SELECTED YEARS

(catch in million pounds; value in million dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Salmon</th>
<th>Shellfish</th>
<th>Total(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pounds</td>
<td>Value</td>
<td>Pounds</td>
</tr>
<tr>
<td>1976</td>
<td>20.910</td>
<td>7.155</td>
<td>154.262</td>
</tr>
<tr>
<td>1973</td>
<td>6.993</td>
<td>1.815</td>
<td>60.966</td>
</tr>
</tbody>
</table>

\(^1\)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 16. SHELLFISH HARVEST, ALEUTIAN ISLANDS
CENSUS DIVISION, 1962, 1965-1976

(millions of pounds)

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

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 17. Shellfish Harvest, by Area, Selected Years 1962 - 1976 (millions of pounds)

#### South Peninsula

<table>
<thead>
<tr>
<th>Year</th>
<th>King Crab</th>
<th>Dungeness</th>
<th>Tanner</th>
<th>Shrimp</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>16.9</td>
<td>-</td>
<td>.0</td>
<td>-</td>
<td>16.9</td>
</tr>
<tr>
<td>1972</td>
<td>4.2</td>
<td>-</td>
<td>3.9</td>
<td>14.8</td>
<td>22.9</td>
</tr>
<tr>
<td>1976</td>
<td>.7</td>
<td>-</td>
<td>7.3</td>
<td>37.4</td>
<td>45.4</td>
</tr>
</tbody>
</table>

#### Aleutians East-Unalaska

<table>
<thead>
<tr>
<th>Year</th>
<th>King Crab</th>
<th>Dungeness</th>
<th>Tanner</th>
<th>Shrimp</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>27.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>27.1</td>
</tr>
<tr>
<td>1972</td>
<td>10.7</td>
<td>-</td>
<td>.0</td>
<td>.1</td>
<td>10.8</td>
</tr>
<tr>
<td>1976</td>
<td>11.4</td>
<td>-</td>
<td>.5</td>
<td>3.7</td>
<td>15.6</td>
</tr>
</tbody>
</table>

#### Aleutians West-Adak

<table>
<thead>
<tr>
<th>Year</th>
<th>King Crab</th>
<th>Dungeness</th>
<th>Tanner</th>
<th>Shrimp</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>12.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>12.5</td>
</tr>
<tr>
<td>1972</td>
<td>16.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16.2</td>
</tr>
<tr>
<td>1976</td>
<td>.4</td>
<td>-</td>
<td>.1</td>
<td>-</td>
<td>.5</td>
</tr>
</tbody>
</table>

#### Bering Sea

<table>
<thead>
<tr>
<th>Year</th>
<th>King Crab</th>
<th>Dungeness</th>
<th>Tanner</th>
<th>Shrimp</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>4.4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4.4</td>
</tr>
<tr>
<td>1972</td>
<td>21.9</td>
<td>-</td>
<td>.1</td>
<td>-</td>
<td>22.0</td>
</tr>
<tr>
<td>1976</td>
<td>70.4</td>
<td>-</td>
<td>22.3</td>
<td>-</td>
<td>92.7</td>
</tr>
</tbody>
</table>

#### Area Totals

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

SOURCE: Alaska Catch and Production (Alaska Department of Fish and Game, Division of Commercial Fisheries), selected years.
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 16 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 17 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 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 17.

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 18. The king crab
TABLE 18. RESIDENCE OF BOATS AND GEAR LICENSE HOLDERS FISHING THE ALEUTIANS

<table>
<thead>
<tr>
<th>Place</th>
<th>Percentage</th>
<th>Place</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kodiak</td>
<td>26.8</td>
<td>Kodiak</td>
<td>41.5</td>
</tr>
<tr>
<td>Alaska Peninsula</td>
<td>4.0</td>
<td>Aleutians</td>
<td>20.0</td>
</tr>
<tr>
<td>Dutch Harbor</td>
<td>4.3</td>
<td>South Central Alaska</td>
<td>3.2</td>
</tr>
<tr>
<td>Out of State</td>
<td>64.9</td>
<td>Anchorage</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other Alaska</td>
<td>7.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non-resident</td>
<td>19.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td>6.5</td>
</tr>
</tbody>
</table>


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.

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 18. 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 19 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
TABLE 19. MILITARY AND RELATED FEDERAL-CIVILIAN EMPLOYMENT AND WAGES, ALEUTIAN ISLANDS CENSUS DIVISION, 1978

<table>
<thead>
<tr>
<th>Military and Related Civilian Employment</th>
<th>Employment</th>
<th>Wages (thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Personnel (Active Duty)</td>
<td>3,453</td>
<td>38,950</td>
</tr>
<tr>
<td>Military-Related Federal Civilian Employment</td>
<td>486</td>
<td>7,072</td>
</tr>
<tr>
<td>PX and NAF (Largely Part-time)¹</td>
<td>330</td>
<td>1,875</td>
</tr>
<tr>
<td>Other Military Related Federal Employment</td>
<td>156</td>
<td>5,127</td>
</tr>
</tbody>
</table>

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


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.

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 20 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.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>174</td>
<td>54</td>
<td>137</td>
<td>125</td>
<td>142</td>
<td>195</td>
<td>285</td>
<td>187</td>
<td>181</td>
<td>180</td>
<td>235</td>
<td>221</td>
<td>116</td>
<td>140</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>292</td>
<td>411</td>
<td>422</td>
<td>471</td>
<td>349</td>
<td>476</td>
<td>657</td>
<td>610</td>
<td>675</td>
<td>851</td>
<td>783</td>
<td>991</td>
<td>1130</td>
<td>1621</td>
</tr>
<tr>
<td>Transportation, Communications, and Utilities</td>
<td>83</td>
<td>55</td>
<td>51</td>
<td>46</td>
<td>57</td>
<td>45</td>
<td>61</td>
<td>41</td>
<td>93</td>
<td>93</td>
<td>87</td>
<td>88</td>
<td>38</td>
<td>31</td>
</tr>
<tr>
<td>Wholesale Retail</td>
<td>117</td>
<td>138</td>
<td>152</td>
<td>138</td>
<td>134</td>
<td>136</td>
<td>125</td>
<td>124</td>
<td>142</td>
<td>137</td>
<td>148</td>
<td>149</td>
<td>110</td>
<td>101</td>
</tr>
<tr>
<td>Finance, Insurance and Real Estate</td>
<td>4&lt;sup&gt;e&lt;/sup&gt;</td>
<td>4&lt;sup&gt;e&lt;/sup&gt;</td>
<td>4&lt;sup&gt;e&lt;/sup&gt;</td>
<td>1&lt;sup&gt;e&lt;/sup&gt;</td>
<td>5&lt;sup&gt;e&lt;/sup&gt;</td>
<td>7&lt;sup&gt;e&lt;/sup&gt;</td>
<td>7&lt;sup&gt;e&lt;/sup&gt;</td>
<td>8&lt;sup&gt;e&lt;/sup&gt;</td>
<td>7&lt;sup&gt;e&lt;/sup&gt;</td>
<td>12</td>
<td>27</td>
<td>32</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Services</td>
<td>12&lt;sup&gt;e&lt;/sup&gt;</td>
<td>13&lt;sup&gt;e&lt;/sup&gt;</td>
<td>108&lt;sup&gt;e&lt;/sup&gt;</td>
<td>232&lt;sup&gt;e&lt;/sup&gt;</td>
<td>268</td>
<td>143</td>
<td>240</td>
<td>82</td>
<td>47</td>
<td>33</td>
<td>20</td>
<td>93</td>
<td>150</td>
<td>171</td>
</tr>
<tr>
<td>Federal Government</td>
<td>678</td>
<td>707</td>
<td>633</td>
<td>550</td>
<td>523</td>
<td>528</td>
<td>574</td>
<td>640</td>
<td>704</td>
<td>813</td>
<td>626</td>
<td>618</td>
<td>569</td>
<td>682</td>
</tr>
<tr>
<td>Total&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1494</td>
<td>1526</td>
<td>1714</td>
<td>1835</td>
<td>1727</td>
<td>1721</td>
<td>2178</td>
<td>1982</td>
<td>2186</td>
<td>2473</td>
<td>2349</td>
<td>2621</td>
<td>2474</td>
<td>3155</td>
</tr>
</tbody>
</table>

<sup>e</sup> = estimated.

<sup>1</sup>Total includes minor amounts of mining and miscellaneous employment for some years.

SOURCE: Statistical Quarterly (Alaska Department of Labor).
Independent series on wholesale and retail trade are not available for the entire period. For those years in which retail trade data were 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 21 presents estimates of resident and nonresident employment for 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
TABLE 21. ALEUTIAN ISLANDS CENSUS DIVISION
ESTIMATED RESIDENT AND NON-RESIDENT
EMPLOYMENT, 1978

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

\[e = \text{estimated.}\]

**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.
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 non-resident, 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 22. 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 surprisingly 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>
<thead>
<tr>
<th>Year</th>
<th>Labor Force</th>
<th>Employment</th>
<th>Unemployment</th>
<th>Unemployment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>1688</td>
<td>1575</td>
<td>113</td>
<td>6.7</td>
</tr>
<tr>
<td>1971</td>
<td>2041</td>
<td>1930</td>
<td>111</td>
<td>5.4</td>
</tr>
<tr>
<td>1972</td>
<td>1880</td>
<td>1763</td>
<td>117</td>
<td>6.2</td>
</tr>
<tr>
<td>1973</td>
<td>2109</td>
<td>1945</td>
<td>164</td>
<td>7.8</td>
</tr>
<tr>
<td>1974</td>
<td>1968</td>
<td>1830</td>
<td>138</td>
<td>7.0</td>
</tr>
<tr>
<td>1975</td>
<td>2371</td>
<td>2207</td>
<td>164</td>
<td>6.9</td>
</tr>
<tr>
<td>1976</td>
<td>2302</td>
<td>2147</td>
<td>155</td>
<td>6.7</td>
</tr>
<tr>
<td>1977</td>
<td>2102</td>
<td>1964</td>
<td>138</td>
<td>6.6</td>
</tr>
<tr>
<td>1978</td>
<td>2343</td>
<td>2196</td>
<td>147</td>
<td>6.3</td>
</tr>
</tbody>
</table>

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 23 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 substantial 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 23. REPORT OF LABOR FORCE 1978
COMPiled BY BUREAU OF INDIAN AFFAIRS
ANCHORAGE AGENCY

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

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 24. 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 commercial fishing and processing incomes flowing out of the region. Finally, an analysis of
### TABLE 24. PERSONAL INCOME BY PLACE OF RESIDENCE:
ALEUTIAN ISLANDS CENSUS DIVISION, 1965-1978

<table>
<thead>
<tr>
<th>Year</th>
<th>Current Dollars</th>
<th>Constant (1978) Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (millions)</td>
<td>Per Capita</td>
</tr>
<tr>
<td>1965</td>
<td>33.951</td>
<td>4,721</td>
</tr>
<tr>
<td>1966</td>
<td>36.093</td>
<td>4,735</td>
</tr>
<tr>
<td>1967</td>
<td>38.886</td>
<td>4,727</td>
</tr>
<tr>
<td>1968</td>
<td>41.688</td>
<td>5,256</td>
</tr>
<tr>
<td>1969</td>
<td>43.677</td>
<td>5,484</td>
</tr>
<tr>
<td>1970</td>
<td>53.671</td>
<td>6,627</td>
</tr>
<tr>
<td>1971</td>
<td>50.655</td>
<td>6,447</td>
</tr>
<tr>
<td>1972</td>
<td>49.968</td>
<td>6,580</td>
</tr>
<tr>
<td>1973</td>
<td>60.849</td>
<td>8,235</td>
</tr>
<tr>
<td>1974</td>
<td>66.084</td>
<td>8,280</td>
</tr>
<tr>
<td>1975</td>
<td>72.717</td>
<td>9,250</td>
</tr>
<tr>
<td>1976</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>79.765</td>
<td>9,932</td>
</tr>
<tr>
<td>1978</td>
<td>85.734</td>
<td>11,619</td>
</tr>
</tbody>
</table>

**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.

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.

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 25.
TABLE 25. ALEUTIAN ISLANDS PERSONAL INCOME, 1978
BY SECTOR, COMPONENTS, AND GEOGRAPHIC DISPOSITION

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>To</td>
<td>Sector</td>
<td>Construction</td>
<td>Fishing</td>
<td>Processing</td>
<td>Civilian</td>
<td>Military</td>
<td></td>
</tr>
<tr>
<td>Nongenous Households: TOTAL ALLOCATED BY INDUSTRY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages &amp; Salaries 3.715</td>
<td>0.381</td>
<td>0</td>
<td>2.353</td>
<td>3.022</td>
<td>0</td>
<td>5.206</td>
<td>14.677</td>
</tr>
<tr>
<td>Other Labor Income 0.695</td>
<td>0.071</td>
<td>0</td>
<td>0.440</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.205</td>
</tr>
<tr>
<td>Proprietors' Income 0.951</td>
<td>0.098</td>
<td>12.250</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>13.259</td>
</tr>
<tr>
<td>UNALLOCATED COMPONENTS:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividends, Interest, and Rents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.317</td>
</tr>
<tr>
<td>Transfer Payments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.501</td>
</tr>
<tr>
<td>OUT OF REGION:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wages &amp; Salaries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchorage 0</td>
<td>4.709</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.709</td>
</tr>
<tr>
<td>Southcentral 0</td>
<td>1.087</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.087</td>
</tr>
<tr>
<td>Rest of State 0</td>
<td>0.725</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.725</td>
</tr>
<tr>
<td>Rest of World 0.275</td>
<td>0.725</td>
<td>0</td>
<td>21.173</td>
<td>5.867</td>
<td>40.584</td>
<td>0</td>
<td>68.624</td>
</tr>
<tr>
<td>Other Labor Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchorage 0</td>
<td>0.881</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.881</td>
</tr>
<tr>
<td>Southcentral 0</td>
<td>0.203</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.203</td>
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<tr>
<td>Rest of State 0</td>
<td>0.136</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.136</td>
</tr>
<tr>
<td>Rest of World 0.051</td>
<td>0.136</td>
<td>0</td>
<td>3.958</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4.145</td>
</tr>
<tr>
<td>Proprietors' Income</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anchorage 0</td>
<td>0</td>
<td>0.780</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.780</td>
</tr>
<tr>
<td>Southcentral 0</td>
<td>0</td>
<td>33.600</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>33.600</td>
</tr>
<tr>
<td>Rest of State 0</td>
<td>0</td>
<td>2.130</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.130</td>
</tr>
<tr>
<td>Rest of World 0</td>
<td>0</td>
<td>56.870</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>56.870</td>
</tr>
<tr>
<td>UNALLOCATED, OUT OF REGION:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dividends, Interest, and Rents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.623</td>
</tr>
<tr>
<td>Transfer Payments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.813</td>
</tr>
<tr>
<td>TOTAL</td>
<td>5.687</td>
<td>9.152</td>
<td>105.630</td>
<td>27.924</td>
<td>8.889</td>
<td>40.584</td>
<td>5.206</td>
</tr>
</tbody>
</table>

SOURCE: See text on personal income.
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 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 non-commercial 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 18.

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 26. 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, 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.
<table>
<thead>
<tr>
<th>Native</th>
<th></th>
<th>White</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of Families</td>
<td>Percent</td>
<td>No. of Families</td>
</tr>
<tr>
<td>Under 1,000</td>
<td>7</td>
<td>2.1</td>
<td>0</td>
</tr>
<tr>
<td>1,000-1,999</td>
<td>16</td>
<td>4.9</td>
<td>6</td>
</tr>
<tr>
<td>2,000-2,999</td>
<td>13</td>
<td>4.0</td>
<td>7</td>
</tr>
<tr>
<td>3,000-3,999</td>
<td>30</td>
<td>9.2</td>
<td>31</td>
</tr>
<tr>
<td>4,000-4,999</td>
<td>19</td>
<td>5.8</td>
<td>45</td>
</tr>
<tr>
<td>5,000-5,999</td>
<td>20</td>
<td>6.1</td>
<td>55</td>
</tr>
<tr>
<td>6,000-6,999</td>
<td>26</td>
<td>8.0</td>
<td>65</td>
</tr>
<tr>
<td>7,000-7,999</td>
<td>25</td>
<td>7.7</td>
<td>63</td>
</tr>
<tr>
<td>8,000-8,999</td>
<td>21</td>
<td>6.4</td>
<td>72</td>
</tr>
<tr>
<td>9,000-9,999</td>
<td>18</td>
<td>5.5</td>
<td>37</td>
</tr>
<tr>
<td>10,000-11,999</td>
<td>40</td>
<td>12.2</td>
<td>88</td>
</tr>
<tr>
<td>12,000-14,999</td>
<td>31</td>
<td>9.5</td>
<td>102</td>
</tr>
<tr>
<td>15,000-24,999</td>
<td>56</td>
<td>17.1</td>
<td>43</td>
</tr>
<tr>
<td>25,000-49,999</td>
<td>5</td>
<td>1.5</td>
<td>17</td>
</tr>
<tr>
<td>50,000</td>
<td>0</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

| Median Income | $8,357 | $8,604 |

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

Aggregate population data for 1960 and the years 1970-78 are presented in Table 27; 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 28 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 29 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>
<thead>
<tr>
<th>Year</th>
<th>Total Resident Population</th>
<th>Total Civilian Population</th>
<th>Military</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>6,011</td>
<td>2,633</td>
<td>3,378</td>
</tr>
<tr>
<td>1970</td>
<td>8,057</td>
<td>4,368</td>
<td>3,689</td>
</tr>
<tr>
<td>1971</td>
<td>7,896</td>
<td>4,285</td>
<td>3,611</td>
</tr>
<tr>
<td>1972</td>
<td>7,245</td>
<td>4,634</td>
<td>2,611</td>
</tr>
<tr>
<td>1973</td>
<td>6,914</td>
<td>3,994</td>
<td>2,920</td>
</tr>
<tr>
<td>1974</td>
<td>7,714</td>
<td>4,506</td>
<td>3,208</td>
</tr>
<tr>
<td>1975</td>
<td>7,086</td>
<td>4,208</td>
<td>2,878</td>
</tr>
<tr>
<td>1976</td>
<td>8,282</td>
<td>5,300</td>
<td>2,982</td>
</tr>
<tr>
<td>1977</td>
<td>7,686</td>
<td>4,896</td>
<td>2,790</td>
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<tr>
<td>1978</td>
<td>8,000</td>
<td>6,345</td>
<td>1,655</td>
</tr>
</tbody>
</table>

TABLE 28. ALEUTIAN ISLANDS: COMPONENTS OF POPULATION CHANGE, 1970-78

<table>
<thead>
<tr>
<th>Year</th>
<th>1970 Population</th>
<th>8,057</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Births</td>
<td>1,106</td>
</tr>
<tr>
<td></td>
<td>Deaths</td>
<td>176</td>
</tr>
<tr>
<td></td>
<td>Natural Increase</td>
<td>930</td>
</tr>
<tr>
<td></td>
<td>Net Migration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Civilian</td>
<td>1,047</td>
</tr>
<tr>
<td></td>
<td>Military</td>
<td>-2,034</td>
</tr>
<tr>
<td>1978</td>
<td>1978 Population</td>
<td>8,000</td>
</tr>
</tbody>
</table>

SOURCE: Alaska Department of Labor
<table>
<thead>
<tr>
<th>Community</th>
<th>Native</th>
<th>Non-Native</th>
<th>Total</th>
<th>Transient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akutan</td>
<td>69</td>
<td>5</td>
<td>74</td>
<td>360 - 800</td>
</tr>
<tr>
<td>Atka</td>
<td>92</td>
<td>3</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Belkofski</td>
<td>14</td>
<td>-</td>
<td>14</td>
<td>120</td>
</tr>
<tr>
<td>False Pass</td>
<td>55</td>
<td>2</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>King Cove¹</td>
<td>425</td>
<td>142</td>
<td>567</td>
<td>60</td>
</tr>
<tr>
<td>Nelson Lagoon</td>
<td>49</td>
<td>6</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Nikolski</td>
<td>56</td>
<td>2</td>
<td>58</td>
<td>65</td>
</tr>
<tr>
<td>Sand Point¹</td>
<td>490</td>
<td>339</td>
<td>829</td>
<td></td>
</tr>
<tr>
<td>St. George</td>
<td>175</td>
<td>9</td>
<td>184</td>
<td></td>
</tr>
<tr>
<td>St. Paul</td>
<td>437</td>
<td>63</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Unalaska</td>
<td>168</td>
<td>557</td>
<td>725</td>
<td>700 - 3,000</td>
</tr>
<tr>
<td>Other</td>
<td>126</td>
<td>5,700²</td>
<td>5,826</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,156</strong></td>
<td><strong>6,828</strong></td>
<td><strong>8,984</strong></td>
<td><strong>1,305 - 4,045</strong></td>
</tr>
</tbody>
</table>

¹City Manager's figures.
²Includes military population.

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

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Bristol Bay

Bristol Bay is located in the southwest portion of Alaska on the upper part of the Alaska Peninsula. As a region, it covers approximately 55,000 square miles, which makes it roughly the size of Iowa or Illinois. There are a total of 29 villages in Bristol Bay, and a total population of approximately 5,000 persons. Bristol Bay is, for statistical purposes, actually two separate areas: the Bristol Bay Borough (containing the villages Naknek, South Naknek, and King Salmon) and the Bristol Bay Division (which contains the remainder of the villages, including Dillingham).

The economy of Bristol Bay has one principal component that overshadows all other activity: the commercial salmon fishery. Although affected in varying degrees, all villages of the region are impacted by the salmon industry. The salmon resource serves as an economic base for subsistence living, as well as the commercial economic activity. In recent years a substantial herring roe fishery has developed. In addition to the fishing, King Salmon Air Force Station in King Salmon also accounts for a significant amount of economic activity, yet its linkages with the other economic units within the region are minimal.

PRODUCTION

Basic sector production is composed of fishery related activity. Both commercial fishing and processing assume major economic proportions in
the economy of the region. This has been especially true over the last three years, as Bristol Bay has had three of the biggest fishing years ever. Table 30 summarizes information (data) on commercial fishing.

The data clearly show tremendous growth in the immediate past. The history of the fishery is one of boom and bust cycles. Commercial fishing began in the late 1800s, and though cyclic in terms of annual harvest, the long run harvest cycle peaked in the mid-30s, followed by a downward trend until the 1960s. The catch, despite cyclical fluctuations, remained relatively constant (averaging nine million fish) until the late 1970s. Over the past three years, however, the harvest has been very high. The average harvest over 1979-81 has been 25 million fish, with 1980 and 1981 (28.2 and 27.7 million fish) being the highest and second highest catch in the history of the fishery.

Table 30 also provides the summary data on the newly developing herring roe fishery. As can be seen, prior to 1977 this fishery was of little economic consequence. Growth in this fishery has been in large part a result of low or depleted stocks of herring elsewhere. Virtually all herring is caught for roe which goes for export. Prices have varied substantially. Exvessel prices in Bristol Bay were $110/metric ton in 1976, $155/metric ton in 1977, $330/metric ton in 1978, and a record high of $650/metric ton in 1979, and fell to $200 and $350 in 1980 and 1981, respectively.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>SALMON</th>
<th>HERRING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pounds (millions)</td>
<td>Value ($millions)</td>
</tr>
<tr>
<td>1969</td>
<td>46.0</td>
<td>9.185</td>
</tr>
<tr>
<td>1970</td>
<td>115.8</td>
<td>25.468</td>
</tr>
<tr>
<td>1971</td>
<td>66.7</td>
<td>16.147</td>
</tr>
<tr>
<td>1972</td>
<td>20.8</td>
<td>4.832</td>
</tr>
<tr>
<td>1973</td>
<td>14.5</td>
<td>3.120</td>
</tr>
<tr>
<td>1974</td>
<td>16.0</td>
<td>6.015</td>
</tr>
<tr>
<td>1975</td>
<td>29.7</td>
<td>12.027</td>
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<tr>
<td>1976</td>
<td>48.5</td>
<td>21.948</td>
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<tr>
<td>1977</td>
<td>47.8</td>
<td>26.145</td>
</tr>
<tr>
<td>1978</td>
<td>83.4</td>
<td>52.273P</td>
</tr>
<tr>
<td>1979</td>
<td>130.6</td>
<td>141.462P</td>
</tr>
<tr>
<td>1980</td>
<td>177.4P</td>
<td>84.262P</td>
</tr>
<tr>
<td>1981</td>
<td>180.3P</td>
<td>132.000P</td>
</tr>
</tbody>
</table>

*Actually includes herring roe-on-kelp, but this amounted to only about five percent of the total rate or 1.5 percent of catch in 1981.

P Preliminary data.

SOURCE: Alaska Catch and Production, Alaska Department of Fish and Game.
In short, the major increases in the economic and biological viability of the fisheries in Bristol Bay have been somewhat surprising. It is not known why this has actually occurred; certainly environmental conditions over the past few years have been optimal. This, along with the limited entry program and the extension of the 200 mile limit (with its concomitant decrease in the high-seas salmon gill net fishery), may have had a major impact. High catches are projected to continue for at least one more year, with the point projection for the 1982 harvest at 36 million fish (a potential record catch).*

The other major dimension to understanding commercial fishing is the ultimate distribution of the catch—where does the income from fishing in Bristol Bay flow? Or, more simply put, who does the fishing? The data on this is fragmentary at best. The data is somewhat better for salmon fishing than for herring, but no precise information is available for either.

In discussing salmon fishing, an understanding of the limited entry program is necessary. The ability to fish for salmon in Alaska is contingent on the ownership of a permit that is issued by the State. The permits were initially issued in 1975 on the basis of a point system (priority was given based on geographical location, economic

* A fishermen's strike in 1980 resulted in a harvest of only about half of the available harvest.
dependence, and years in the fishery). The permits are transferable; a fairly substantial market for trading permits has arisen. Each fishery has a given number of permits that are gear type specific.

Table 31 provides data on the geographical distribution of the ownership of permits. As can be seen, there are 2,600 permits in Bristol Bay, of which roughly 47 percent are held by "residents" of Bristol Bay. This is 1979 data; while additional permit transfers have taken place since then, it is doubtful that these figures would change appreciably.

However, there is a significant difference in income flows from the fishery than might be inferred from permit ownership. First, only 38.55 percent of the drift gill net permits and 62.17 percent of the set gill net permits are in the hands of local residents. The earnings of each of these two gear types are significantly different.

From estimates based on survey analysis of the 1979 harvest, the average gross income of the drift gill net fleet was $72,000, as opposed to $16,000 for the set gill net operations (Larson, 1980). Moreover, there appears to be a significant difference in the earnings of Bristol Bay residents as compared with nonlocal residents. The average gross income from fishing (see Table 32) of Bristol Bay drift gill net operators was $52,000, as opposed to $73,000 for other Alaskan fishermen and $81,000 for "out of state" residents. The same type of pattern, though not to the same degree, exists for set gill net operators.
TABLE 31. BRISTOL BAY PERMANENT ENTRY SALMON PERMITS
GEAR TYPE AND RESIDENCE, 1979

<table>
<thead>
<tr>
<th>Gear Type</th>
<th>Nonresident</th>
<th>Bristol Bay Resident</th>
<th>Non-Bristol Bay Alaska Resident</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drift gill net</td>
<td>728</td>
<td>662</td>
<td>337</td>
<td>1,727</td>
</tr>
<tr>
<td>Set gill net</td>
<td>149</td>
<td>567</td>
<td>196</td>
<td>912</td>
</tr>
<tr>
<td>Total</td>
<td>877</td>
<td>1,229</td>
<td>533</td>
<td>2,639</td>
</tr>
</tbody>
</table>

PERCENT

<table>
<thead>
<tr>
<th>Gear Type</th>
<th>Nonresident</th>
<th>Bristol Bay Resident</th>
<th>Non-Bristol Bay Alaska Resident</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drift gill net</td>
<td>27.7</td>
<td>25.2</td>
<td>12.4</td>
<td>65.3</td>
</tr>
<tr>
<td>Set gill net</td>
<td>5.7</td>
<td>21.6</td>
<td>7.4</td>
<td>34.7</td>
</tr>
<tr>
<td>Total</td>
<td>33.4</td>
<td>46.8</td>
<td>19.8</td>
<td>100.0</td>
</tr>
</tbody>
</table>


TABLE 32. AVERAGE GROSS EARNINGS FROM SALMON FISHING
BY GEAR TYPE AND RESIDENCE, 1979

<table>
<thead>
<tr>
<th>Gear Type</th>
<th>All Fishermen</th>
<th>Bris. Bay Residents</th>
<th>Other AK Residents</th>
<th>Out-of-State Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drift gill net</td>
<td>$71,696</td>
<td>$52,147</td>
<td>$72,643</td>
<td>$81,002</td>
</tr>
<tr>
<td>Set gill net</td>
<td>$16,493</td>
<td>$14,724</td>
<td>$17,010</td>
<td>$19,484</td>
</tr>
</tbody>
</table>

This difference in productivity is a result of several factors. Bristol Bay residents tend to have smaller and older boats whereas the limit boats (32 feet limit) are more likely to be operated by a non-Bristol Bay resident. Langdon found that among Bristol Bay native fishermen, 40 percent used smaller (less than 32 feet) boats, while Koslow (1979) reported that more than 90 percent of non-Bristol Bay residents fished limit boats. The boats of the natives (local residents) tend to be older and at a lower level of technology. This may also reflect the local residents' access to financial markets and ability to finance the latest technology. Koslow and Langdon both note that the income of local residents is almost exclusively dependent on salmon fishing, whereas out of area residents are not entirely dependent on the Bristol Bay run. Koslow (1979, p. 8) found that more than half of the local captains are dependent on Bristol Bay income for more than two-thirds of their income, as opposed to 20 percent for non-Alaskan captains. Langdon (1981, p. 63) reported that Bristol Bay native fishermen indicated that 83 percent of their annual incomes come from salmon fishing and 50 percent indicated that salmon fishing was their only source of income. This would seem to have a substantial impact on access to financial markets, which impacts income and productivity.

Based on relative gear productivity and the tenure of limited entry permits, it would seem as though a substantial portion of the income flows to other than local residents. Based on the data presented in
Tables 30 and 31, although Bristol Bay residents own 48.8 percent of the limited entry permits, only 32.3 percent of the income generated from the harvest flows into Bristol Bay.

Other Alaskan residents receive 21.0 percent of the value of the harvest (own 19.8 percent of the permits), while 46.7 percent of the value of the harvest accrues to non-Alaskan residents (who own 33.4 percent of the permits).

The harvest of herring has strikingly different economic characteristics from the salmon fishery. Although the experience for the herring fishery is somewhat limited, it appears that little income flow finds its way into the local economy. From conversation with the area biologists from the Alaska Department of Fish and Game, only a small portion of the exvessel value goes to local fishermen. In 1981, for example, about ten percent of the purse seiners and 80 percent of the gill netters were local Bristol Bay boats. However, the productivity of the gill net fishermen is substantially lower. In 1980, gill netters harvested a 43,000 pound average per boat, while the same figure was 247,000 pounds for purse seiners.

The proportion of the catch in terms of income that goes to local residents is also affected by the predicted harvest. A high harvest quota attracts more boats from outside the region, dropping the proportion of income from the fishery that stays in the local economy. All this has led to requests that the fishery be limited in terms of
entry, or that a large portion be allocated to gill netters. (Many of
the local salmon fishermen can convert easily to the herring fishery--
the capital requirements to entering the herring fishery are minimal.)
However, thus far, the herring fishery has not been managed with the
specific intent of affecting the distribution of income (although the
defacto distributional outcome is affected by the particular manage-
ment scheme currently used). It remains to be seen if distributional
considerations will become an integral part of the management plan.

From 1981 data and information from Alaska Department of Fish and
Game, of the $4,250,000 exvessel value of the herring harvest, only
$600,000 (or 14 percent) accrued to Bristol Bay residents. As a
percent of the total harvest, this is an increase over the previous
year as a result of a lower predicted harvest quota.

The final dimension of commercial fishery to be considered is employ-
ment. No systematic periodic estimates of commercial fishing in
Bristol Bay (or the rest of the state) are made by the Department of
Labor, as fishermen are self-employed and crew members generally work
on a "share" basis, and as such, are not salaried employees. Esti-
mates for 1969 through 1976 have, however, been compiled for the state
and various regions (Rogers, 1980, p. 13), and will be used here to
estimate employment for 1979. It is assumed that crew members come
from the same area as the residence of the permit holders. (There may
be nonresidents who hire residents, but generally this is not the
case.) Rogers used a crew factor of 2.0 (including the captain) for drift gill net fishermen and 2.5 for set gill net operations. Based on those estimates, employment in Bristol Bay is 3,454 for driftnets and 2,280 for setnets, with 2,741 being local residents.

Rogers estimates are probably low, though. Drift net fishermen generally employ a "first crewman" for the whole season, but usually employ a second crewman when the harvest is at the peak. Again, this is difficult to estimate--Langdon (1980) reported an average crew size of 1.44 for all Bristol Bay native fishermen, which is more likely. Also, in a small portion of the cases (estimated by Langdon as 10 percent), the crewmen of non-Bristol Bay fishermen may be residents of Bristol Bay. Utilizing this data, total employment is 6,493, with 3,201 being Bristol Bay residents.

The other component of the fishing industry in Bristol Bay is processing. The present structure of the processing industry reflects a mixture of shore-based and floating processors engaged in canning and freezing. In recent years, the trend has been toward an increase in the proportion of the harvest that is fresh frozen. In 1976 more than 90 percent of the salmon was canned, as compared to 1980 when approximately 21 percent of the harvest went to the fresh/frozen market. Additionally, there is a significant portion of the harvest that is airlifted into fresh markets and to other processing centers (Kenai and Kodiak).
In 1980, more than 180 processors and buyers operated in Bristol Bay. Of these, about one third were on-shore processors, another third were floating processors and catcher/processors, and another third were brokers and buying stations.

Employment data for processing is available for Bristol Bay (both statistical areas) from the Statistical Quarterly (Alaska Department of Labor). For 1979, 889 was the average annual employment in manufacturing; which for Bristol Bay is largely synonymous with fish processing. As is the case with commercial fishing, it is important to determine what proportion of the employment is held by residents of the region.

Data on this question are fragmentary at best. First, it must be understood that total employment in Bristol Bay is highly seasonal and is very dependent on salmon fishing. For 1979, average employment in manufacturing (for both statistical areas combined) for the four quarters was, respectively: 15 (Jan.-March), 101 (April-June), 1,708 (July-Sept.), and 193 (Oct.-Dec.). The lowest is the first quarter, with very little activity. Substantial gains are recorded in the second quarter, especially the latter part. Employment peaks in July (the salmon run peaks around July 10), and then falls off through December to the winter low. Available data does not indicate how the seasonal pattern varies between residents and nonresidents.
No other employment category exhibits such extreme seasonal variations. The processing firms are reluctant to divulge to what extent they import labor, but it is probably substantial. Part of the increase in processing employment goes to resident workers, but it is difficult to know how much.

The last element of the basic sector of Bristol Bay is the military. King Salmon Air Force Station is located in the Bristol Bay Borough and, as of 1978, had 432 active duty and civilian defense related personnel (see Table 33). The military preserve is not as numerically significant as it is in the Aleutians, and the overall regional economic impact is relatively small. Remote bases tend to be self-contained and self supporting, and have little effect on the local economy.

In summary, basic sector production in Bristol Bay is almost exclusively related to salmon fishing, with its relative importance having increased as of late. In terms of providing employment in manufacturing, though, growth has not been substantial because a great deal of the manufacturing labor is imported. However, the harvests over the past three seasons have been very large and the near term projections are for continued high harvests (1982 could exceed all previous harvests). This is likely to have substantial income effects in the region.
TABLE 33. MILITARY AND RELATED FEDERAL CIVILIAN EMPLOYMENT AND WAGES
BRISTOL BAY BOROUGH AND BRISTOL BAY CENSUS DIVISION, 1978

<table>
<thead>
<tr>
<th></th>
<th>Bristol Bay Borough Employment</th>
<th>Bristol Bay Borough Wages (000)</th>
<th>Bristol Bay Census Division Employment</th>
<th>Bristol Bay Census Division Wages (000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military and Related</td>
<td>9</td>
<td>151</td>
<td>432</td>
<td>4,980</td>
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<tr>
<td>Civilian Employment</td>
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<tr>
<td>Military Personnel</td>
<td>5</td>
<td>56</td>
<td>420</td>
<td>4,924</td>
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<tr>
<td>Military Related Federal</td>
<td>4</td>
<td>95</td>
<td>12</td>
<td>58</td>
</tr>
<tr>
<td>Civilian Employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PX and NAF (largely</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>58</td>
</tr>
<tr>
<td>part-time)¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Other</td>
<td>4</td>
<td>95</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

¹PX and NAF (Post Exchange and Nonappropriated Fund activities, including officer's clubs and enlisted men's clubs)


EMPLOYMENT, UNEMPLOYMENT AND LABOR FORCE

The analysis of employment of the Bristol Bay region is important for understanding the sources of major income flows. These income flows provide insight into the sources of growth of the local economy. Tables 34, 35, and 36 summarize average monthly employment of the Bristol Bay Region for the years 1965-1980. Table 34 provides data for the entire region, while Tables 35 and 36 provide breakdowns for the Bristol Bay Census Division and the Bristol Bay Borough.
TABLE 34
AVERAGE CIVILIAN MONTHLY EMPLOYMENT
BRISTOL BAY LABOR AREA

<table>
<thead>
<tr>
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<tbody>
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<td>*</td>
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<td>Manufacturing</td>
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<td>861</td>
<td>798</td>
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<td>&amp; Utilities</td>
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<td>Wholesale &amp; Retail</td>
<td>29</td>
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<td>35</td>
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<td>47</td>
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<td>90</td>
<td>80</td>
<td>101</td>
<td>79</td>
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<td>Finance, Insurance and</td>
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<td>Real Estate</td>
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<tr>
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<td>45</td>
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<td>201</td>
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<td>304</td>
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<td>168</td>
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<td>194</td>
<td>194</td>
<td>195</td>
<td>191</td>
<td>186</td>
</tr>
<tr>
<td>State &amp; Local Government</td>
<td>100</td>
<td>130</td>
<td>150</td>
<td>174</td>
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<td>204</td>
<td>264</td>
<td>317</td>
<td>368</td>
<td>396</td>
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<td>507</td>
<td>437</td>
<td>570</td>
<td>636</td>
<td>566</td>
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<td>*</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,084</td>
<td>1,002</td>
<td>866</td>
<td>943</td>
<td>1,063</td>
<td>1,253</td>
<td>1,243</td>
<td>1,171</td>
<td>1,354</td>
<td>1,267</td>
<td>1,512</td>
<td>1,579</td>
<td>1,513</td>
<td>1,846</td>
<td>2,473</td>
<td>2,278</td>
</tr>
</tbody>
</table>

* Four firms or less reporting, so privacy dictates that data is not listed, though is included in totals.

1 Less than four firms reporting in at least one quarter.

2 Only three quarters reported.

Prior to 1974 data reported on Bristol Bay election district. Since 1975 data has been reported for Bristol Bay Borough and Bristol Bay Census Div.

### TABLE 35. AVERAGE CIVILIAN MONTHLY EMPLOYMENT
BRISTOL BAY CENSUS DIVISION

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Mining</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Contract Construction</td>
<td>70¹</td>
<td>*</td>
<td>66</td>
<td>27¹</td>
<td>34</td>
<td>29</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>97</td>
<td>124</td>
<td>131</td>
<td>207</td>
<td>694¹</td>
<td>313</td>
</tr>
<tr>
<td>Transportation, Communication and Utilities</td>
<td>110</td>
<td>143</td>
<td>170</td>
<td>187</td>
<td>178</td>
<td>191</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>81</td>
<td>41</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>67</td>
<td>63</td>
<td>53</td>
<td>63</td>
<td>71</td>
<td>98</td>
</tr>
<tr>
<td>Finance, Insurance and Real Estate</td>
<td>25¹</td>
<td>35</td>
<td>43</td>
<td>34</td>
<td>32</td>
<td>29</td>
</tr>
<tr>
<td>Services</td>
<td>97¹</td>
<td>128</td>
<td>170</td>
<td>235</td>
<td>393</td>
<td>273</td>
</tr>
<tr>
<td>Federal Government</td>
<td>77</td>
<td>82</td>
<td>100</td>
<td>115</td>
<td>107</td>
<td>113</td>
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<td>331</td>
<td>399</td>
<td>344</td>
<td>372</td>
<td>399</td>
<td>333</td>
</tr>
<tr>
<td>Total</td>
<td>855</td>
<td>977</td>
<td>1,038</td>
<td>1,193</td>
<td>1,690</td>
<td>1,399</td>
</tr>
</tbody>
</table>

**SOURCE:** Statistical Quarterly, Alaska Department of Labor

*Less than four firms reporting, so privacy preservation dictates that data is not listed, though it is included in totals.

¹Less than four firms reporting for at least one quarter.

²Only three quarters of data available.
TABLE 36. AVERAGE CIVILIAN MONTHLY EMPLOYMENT
BRISTOL BAY BOROUGH DIVISION

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>0</td>
<td>0</td>
<td>*</td>
</tr>
<tr>
<td>Contract Construction</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>0</td>
<td>19(^1)</td>
<td>8(^1)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>194</td>
<td>165</td>
<td>133</td>
<td>262</td>
<td>195</td>
<td>349</td>
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<tr>
<td>Transportation, Communication and Utilities</td>
<td>82</td>
<td>69</td>
<td>45</td>
<td>49</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>38</td>
<td>*</td>
<td>43(^1)</td>
</tr>
<tr>
<td>Finance, Insurance and Real Estate</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>11</td>
</tr>
<tr>
<td>Services</td>
<td>85</td>
<td>73</td>
<td>60(^1)</td>
<td>69(^1)</td>
<td>*</td>
<td>513</td>
</tr>
<tr>
<td>Federal Government</td>
<td>118</td>
<td>112</td>
<td>94</td>
<td>80</td>
<td>84</td>
<td>73</td>
</tr>
<tr>
<td>State and Local Government</td>
<td>143</td>
<td>108</td>
<td>93</td>
<td>198</td>
<td>237</td>
<td>233</td>
</tr>
<tr>
<td>Total</td>
<td>657</td>
<td>602</td>
<td>475</td>
<td>653</td>
<td>783</td>
<td>879</td>
</tr>
</tbody>
</table>

**SOURCE:** Statistical Quarterly, Alaska Department of Labor

*Less than four firms reporting, so privacy preservation dictates that data is not listed, though it is included in totals.

\(^1\)Less than four firms reporting for at least one quarter.

\(^2\)Only three quarters of data available.
Over the period, total employment grew substantially at an average annual rate of 5.1 percent. While the basic industry of fish processing registered very little growth, other sectors grew at substantial rates.

Manufacturing (synonymous with fish processing) is to a large degree imported (from outside the region), and is very dependent on the size of the fish harvest. As with harvest data (see Table 30), with the exception of the past three years, no consistent pattern exists.

State and local government grew at a 12.25 percent rate, whereas wholesale and retail trade grew at a 11.3 percent rate, and transportation grew at a 6.7 percent rate. Services grew at a 24.1 percent rate, yet this rate of growth is based upon a statistical anomaly, and is probably significantly lower. (Based on the 1965-1979 period, it still registered a 19 percent rated growth.)

In examining monthly employment data presented in Table 37, there appears to be a great deal of volatility in employment in the manufacturing, service, and state and local government sectors. It appears that the increases in employment in the manufacturing and commercial fishing sector are matched by reductions in each of the other two sectors. Apparently, most of the variation in employment in the government takes place in local government employment, where positions are funded with the intention of permitting commercial fishing during the season.
<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>Construction</td>
<td>7*</td>
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<td>9*</td>
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<td>977</td>
<td>438</td>
<td>298</td>
<td>289</td>
<td>64</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>17</td>
<td>11*</td>
<td>16*</td>
<td>84*</td>
<td>298</td>
<td>234</td>
<td>176</td>
<td>1132</td>
<td>2052</td>
<td>1985</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trans.-Comm. &amp; Utilities</td>
<td>200</td>
<td>197</td>
<td>194</td>
<td>209</td>
<td>240</td>
<td>217</td>
<td>227</td>
<td>233</td>
<td>220</td>
<td>255</td>
<td>239</td>
<td>234</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail Trade</td>
<td>64*</td>
<td>62*</td>
<td>63*</td>
<td>60*</td>
<td>71*</td>
<td>69*</td>
<td>61*</td>
<td>68*</td>
<td>87*</td>
<td>79*</td>
<td>84*</td>
<td>82*</td>
</tr>
<tr>
<td>Finance-Insurance</td>
<td>36*</td>
<td>35*</td>
<td>32*</td>
<td>34*</td>
<td>31*</td>
<td>28*</td>
<td>25*</td>
<td>29*</td>
<td>29*</td>
<td>33*</td>
<td>31*</td>
<td>32*</td>
</tr>
<tr>
<td>Services</td>
<td>440*</td>
<td>424*</td>
<td>466*</td>
<td>483*</td>
<td>512*</td>
<td>598*</td>
<td>438*</td>
<td>421*</td>
<td>284*</td>
<td>232*</td>
<td>217*</td>
<td>200*</td>
</tr>
<tr>
<td>Federal Government</td>
<td>196</td>
<td>194</td>
<td>195</td>
<td>181</td>
<td>187</td>
<td>197</td>
<td>196</td>
<td>205</td>
<td>201</td>
<td>184</td>
<td>182</td>
<td>176*</td>
</tr>
<tr>
<td>State &amp; Local Government</td>
<td>692</td>
<td>736</td>
<td>721</td>
<td>755</td>
<td>760</td>
<td>549</td>
<td>351</td>
<td>353</td>
<td>624</td>
<td>660</td>
<td>718</td>
<td>1132</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1956</td>
<td>1958</td>
<td>1969</td>
<td>2185</td>
<td>2544</td>
<td>2788</td>
<td>4198</td>
<td>3158</td>
<td>2708</td>
<td>2184</td>
<td>2052</td>
<td>1985</td>
</tr>
</tbody>
</table>

SOURCE: Statistical Quarterly, Alaska Department of Labor

*Some specific data not reported for disclosure reasons, but included in totals.
One significant omission from the employment data is commercial fishing. Fishing, as previously discussed, is not traditional salaried employment. Fishermen work for crew shares (e.g., 15 percent of the gross to each crewman); and for tax purposes, crewmen and fishermen are considered to be self-employed. Utilizing previous estimates, it would appear that fishermen (and crew) accounted for 6,493 jobs, and that local residents account for 3,201 jobs in fishing employment (though this is highly seasonal). If we include these figures with total reported employment, then fishing accounted for 72 percent of total employment. Commercial fishing and processing account for 80 percent of total employment. Again, it must be reiterated that a great deal of this employment occurs in a relatively short period of time (the three months of the salmon harvest).

A second issue in employment, as explained earlier, relates to the residency of job holders. As indicated above, a significant portion of employment in commercial fishing is non-resident employment. As reported previously, the bulk of employment by processors is also non-resident.

A few of the processing firms have indicated the extent to which they import labor (Table 38), although there is probably not enough information or consistency to be able to make estimates as to the proportion of the payroll from processing that goes to non-resident labor. From interviews with the processors, it would appear that during the
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dillingham/Nushagak</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Queens Fisheries</td>
<td>260</td>
<td>300</td>
<td>0</td>
<td>0</td>
<td>86*</td>
<td>100*</td>
<td></td>
<td></td>
<td>174*</td>
<td>200*</td>
</tr>
<tr>
<td>Peter Pan</td>
<td>210</td>
<td>225</td>
<td>120</td>
<td>120</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td><strong>Naknek/Kwichak</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nelbro</td>
<td>280</td>
<td>225</td>
<td>6</td>
<td>6</td>
<td>134</td>
<td>110</td>
<td></td>
<td></td>
<td>140</td>
<td>109</td>
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<tr>
<td>Red Salmon</td>
<td>197</td>
<td>197</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td></td>
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</tr>
<tr>
<td>Whitney</td>
<td>120</td>
<td>120</td>
<td>10</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td></td>
<td></td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Egegik</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kodiak King</td>
<td>80</td>
<td>85</td>
<td>0</td>
<td>0</td>
<td>19*</td>
<td>20*</td>
<td></td>
<td></td>
<td>61*</td>
<td>65*</td>
</tr>
<tr>
<td>Diamond E.</td>
<td>263</td>
<td>263</td>
<td>0</td>
<td>0</td>
<td>66*</td>
<td>66*</td>
<td></td>
<td></td>
<td>197*</td>
<td>197*</td>
</tr>
<tr>
<td>Columbia Ward</td>
<td>275</td>
<td>300</td>
<td>0</td>
<td>0</td>
<td>150</td>
<td>175</td>
<td></td>
<td></td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>1,685</td>
<td>1,715</td>
<td>156</td>
<td>156</td>
<td>505</td>
<td>521</td>
<td></td>
<td></td>
<td>1,024</td>
<td>1,038</td>
</tr>
<tr>
<td>% of Total</td>
<td>100%</td>
<td>100%</td>
<td>9.2</td>
<td>9.1</td>
<td>30</td>
<td>30</td>
<td></td>
<td></td>
<td>60</td>
<td>61</td>
</tr>
</tbody>
</table>

*Based on a percentage estimate of season peak.

**SOURCE:** Data provided by representatives of respective processors.
processing peak, a substantial portion of the income flow to labor accrues to non-resident labor. Perhaps 60 percent of this income flows outside Alaska and 30 percent to non-Bristol Bay Alaskans. It must be remembered, though, that this is only during salmon season, which is basically June, July; and August. This is when employment is at its peak. However, during the other months, there is little migratory labor—the processors bring in the outside labor only for the fishing season.

This finding is reinforced by data on labor force and employment. During the peak of the 1979 salmon harvest, data on employment suggest that there are 4,200 jobs being filled, yet the labor force at that time was only 2,036; it is doubtful that the difference in the two figures is accounted for by moonlighting.

On average, it appears that 90 percent of processing employment during the peak period is non-resident employment. (For purposes here, it is assumed that peak period is July, August and September, and that all other jobs go to the residents.) Based on 1979 monthly data of the 6,497 month jobs, 1,885 (29 percent) were held by residents, and 4,612 (71 percent) were held by non-residents. Of the non-residents, one third of those non-resident jobs (1,537 jobs or .24 percent of the total) were held by Alaskan residents (outside Bristol Bay). On an annual basis, employment in processing would be allocated as follows: Bristol Bay residents, 157 jobs; non-Alaskan residents, 384 jobs; other Alaskan residents, 128 jobs.
The allocation of the remainder of employment has been accomplished as follows: state and local government is assumed to be local residents, as is also the case for the remainder of the employment categories. With the exception of federal government military employment, most of the other categories are small (construction is the most notable), and though a portion of employment might be allocated to non-residents, for purposes here, employees are assumed to be residents.

Using these assumptions, from the data presented in Table 39, it would appear that 52.3 percent of total employment was held by Bristol Bay residents. The remaining 47.7 percent is held by non-residents. Again, it must be emphasized that this is an estimate, but it does provide a benchmark. Data are not available to make this determination for other years. Also, it is not possible to speculate how resident employment shares will change over time.

TABLE 39. BRISTOL BAY AVERAGE ANNUAL ESTIMATED RESIDENT AND NON-RESIDENT EMPLOYMENT, 1979

<table>
<thead>
<tr>
<th>Industry</th>
<th>Resident</th>
<th>Non-Resident</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Fishing</td>
<td>3,201</td>
<td>3,292</td>
<td>6,493</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>157</td>
<td>512</td>
<td>669</td>
</tr>
<tr>
<td>Construction</td>
<td>34</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>Transportation</td>
<td>178</td>
<td>0</td>
<td>178</td>
</tr>
<tr>
<td>Communications and Utilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wholesale and Retail Trade</td>
<td>152</td>
<td>0</td>
<td>152</td>
</tr>
<tr>
<td>Finance</td>
<td>32</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Services</td>
<td>393</td>
<td>0</td>
<td>393</td>
</tr>
<tr>
<td>Federal Gov't (military) 1978 data</td>
<td></td>
<td>432</td>
<td>432</td>
</tr>
<tr>
<td>Other Federal Government</td>
<td>107</td>
<td>0</td>
<td>107</td>
</tr>
<tr>
<td>State and Local Government</td>
<td>399</td>
<td>0</td>
<td>399</td>
</tr>
<tr>
<td>Total</td>
<td>4,653</td>
<td>4,236</td>
<td>8,889</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>%</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>52.3%</td>
<td>47.65%</td>
</tr>
</tbody>
</table>

95
Summary data on the labor force, employment, and unemployment for 1970-1981 are presented in Tables 40 and 41. It should be noted here that the employment data in this table is fundamentally and definitionally different from the employment data in previous tables. First, as in the previous data, no official data is available on commercial fishing. Secondly, the data here reflects job holder status, and is based solely on residents (i.e., resident adjusted). Thirdly, and perhaps the most important difference, the data reflect the number of job holders, whereas the previously presented data reflected the number of jobs. The difficulty here is that it is possible to hold more than one job, and thus, it is difficult to adjust income flows on the basis of jobs.

Of particular interest are the levels of unemployment and the unemployment rate. These are surprisingly low, given the cyclic variation in employment (number of jobs). However, given the definition of labor force participation used and the nature of the economy in Bristol Bay, they less surprising. The data suggests that a substantial amount of movement in and out of the labor force is present.

Most observers feel that employment and unemployment figures are tenuous when examining "Bush" economies. People tend to enter the labor force during the summer months when employment opportunities are present. During the remaining part of the year, although they could potentially be employed, they are not in the labor force. This is
### TABLE 40. SUMMARY EMPLOYMENT STATISTICS, BRISTOL BAY LABOR AREA

<table>
<thead>
<tr>
<th>Year</th>
<th>Labor Force</th>
<th>Employment</th>
<th>Unemployment</th>
<th>Unemployment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>1,384</td>
<td>1,228</td>
<td>156</td>
<td>11.3</td>
</tr>
<tr>
<td>1971</td>
<td>1,483</td>
<td>1,280</td>
<td>203</td>
<td>13.7</td>
</tr>
<tr>
<td>1972</td>
<td>1,468</td>
<td>1,291</td>
<td>177</td>
<td>12.1</td>
</tr>
<tr>
<td>1973</td>
<td>1,547</td>
<td>1,399</td>
<td>148</td>
<td>9.6</td>
</tr>
<tr>
<td>1974</td>
<td>1,601</td>
<td>1,494</td>
<td>107</td>
<td>6.7</td>
</tr>
<tr>
<td>1975</td>
<td>2,005</td>
<td>1,897</td>
<td>108</td>
<td>5.4</td>
</tr>
<tr>
<td>1976</td>
<td>2,096</td>
<td>1,943</td>
<td>153</td>
<td>7.3</td>
</tr>
<tr>
<td>1977</td>
<td>1,928</td>
<td>1,778</td>
<td>150</td>
<td>7.8</td>
</tr>
<tr>
<td>1978</td>
<td>1,661</td>
<td>1,497</td>
<td>164</td>
<td>9.9</td>
</tr>
<tr>
<td>1979</td>
<td>1,838</td>
<td>1,679</td>
<td>159</td>
<td>8.7</td>
</tr>
<tr>
<td>1980</td>
<td>1,824</td>
<td>1,573</td>
<td>151</td>
<td>8.3</td>
</tr>
<tr>
<td>1981*</td>
<td>1,860</td>
<td>1,723</td>
<td>137</td>
<td>7.4</td>
</tr>
</tbody>
</table>

*Based on the first three quarters only.


### TABLE 41. MONTHLY LABOR FORCE AND EMPLOYMENT, BRISTOL BAY, 1979

<table>
<thead>
<tr>
<th>Month</th>
<th>Civilian Labor Force</th>
<th>Employment</th>
<th>Unemployment</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>1,609</td>
<td>1,433</td>
<td>176</td>
<td>10.9</td>
</tr>
<tr>
<td>February</td>
<td>1,686</td>
<td>1,508</td>
<td>199</td>
<td>11.8</td>
</tr>
<tr>
<td>March</td>
<td>1,828</td>
<td>1,578</td>
<td>250</td>
<td>13.7</td>
</tr>
<tr>
<td>April</td>
<td>1,811</td>
<td>1,633</td>
<td>178</td>
<td>9.8</td>
</tr>
<tr>
<td>May</td>
<td>1,960</td>
<td>1,764</td>
<td>196</td>
<td>10.0</td>
</tr>
<tr>
<td>June</td>
<td>1,922</td>
<td>1,768</td>
<td>154</td>
<td>8.0</td>
</tr>
<tr>
<td>July</td>
<td>2,036</td>
<td>1,933</td>
<td>103</td>
<td>5.1</td>
</tr>
<tr>
<td>August</td>
<td>1,911</td>
<td>1,800</td>
<td>111</td>
<td>5.8</td>
</tr>
<tr>
<td>September</td>
<td>1,879</td>
<td>1,775</td>
<td>111</td>
<td>5.9</td>
</tr>
<tr>
<td>October</td>
<td>1,939</td>
<td>1,800</td>
<td>139</td>
<td>7.2</td>
</tr>
<tr>
<td>November</td>
<td>1,805</td>
<td>1,656</td>
<td>139</td>
<td>7.7</td>
</tr>
<tr>
<td>December</td>
<td>1,679</td>
<td>1,527</td>
<td>152</td>
<td>9.1</td>
</tr>
</tbody>
</table>

**SOURCE:** Statistical Quarterly, Alaska Department of Labor, 1980.
primarily because of the way in which labor force participation is measured. Those persons who have not actively sought work, even though they may have wanted to work, are considered out of the labor force; therefore, they don't appear within official estimates of unemployment. This effect is similar to what is referred to as the "discouraged worker" effect in national employment data, except in the Alaskan bush the basic economic structure is somewhat different. Nonetheless, it is felt by many that the narrow definition of unemployment accounts for much of the perceived difference between published rates of unemployment and the proportion of people who are not gainfully employed (i.e., unemployed). This shows up somewhat in labor force participation rates—-in 1980, the labor force participation rate for Bristol Bay was 24.5 percent, whereas for Alaska and the United States as a whole, it was 47.7 and 46.9, respectively. Many people enter the labor force during the summer when fishing season is in full swing, and then are out of the labor force until the next year.

In a study done by the state in the lower Yukon-Kuskokwim Region, it was estimated that actual unemployment was 24.7 percent, as opposed to official estimates of 13.2 percent. The study used a broader (less restrictive) definition of unemployment that was intended to measure the available worker pool. The question asked was, "Does . . . . want a regular job now, either full- or part-time?"
This is reinforced further by Langdon's study among resident Bristol Bay fishermen. While fishing represents the single most important employment opportunity in Bristol Bay, it is only important for that middle three-month period. Langdon reported that Bristol Bay native fishermen received 83 percent of their annual income from fishing, and that among 58 percent of the fishermen, fishing was their sole source of income. It is recognized that salmon fishing is seasonal, yet the fisherman who is unemployed for the other nine months of the year is an under-utilized resource.

PERSONAL INCOME

Personal income data for the Bristol Bay region for the years 1959-1979 (both statistical areas) have been compiled and are presented in Table 42 and Table 43. The growth rate of current dollar total personal income for the Bristol Bay Division and the Bristol Bay Borough was 11.92 percent and 7.96 percent respectively. Per capita income growth for each was 10.49 percent and 6.92 percent respectively. However, when measured in constant dollars, the growth appears to have been substantially less. In real terms, per capita income has grown at a rate of only 5.68 percent in the Bristol Bay Division and 2.1 percent in the Bristol Bay Borough.

A couple of aspects of the above data suggest that the numbers need to be taken with a fair amount of caution. First, the Anchorage Consumer Price Index was used to adjust the time series to constant dollar
<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL (000)</th>
<th>PER CAPITA</th>
<th>1979 DOLLARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959</td>
<td>2,491</td>
<td>812</td>
<td>1,975</td>
</tr>
<tr>
<td>1962</td>
<td>3,052</td>
<td>918</td>
<td>1,975</td>
</tr>
<tr>
<td>1965</td>
<td>3,906</td>
<td>1,196</td>
<td>2,604</td>
</tr>
<tr>
<td>1966</td>
<td>4,175</td>
<td>1,295</td>
<td>2,710</td>
</tr>
<tr>
<td>1967</td>
<td>4,372</td>
<td>1,260</td>
<td>2,581</td>
</tr>
<tr>
<td>1968</td>
<td>4,753</td>
<td>1,378</td>
<td>2,757</td>
</tr>
<tr>
<td>1969</td>
<td>5,110</td>
<td>1,476</td>
<td>2,855</td>
</tr>
<tr>
<td>1970</td>
<td>6,407</td>
<td>1,829</td>
<td>3,419</td>
</tr>
<tr>
<td>1971</td>
<td>7,348</td>
<td>2,085</td>
<td>3,784</td>
</tr>
<tr>
<td>1972</td>
<td>6,853</td>
<td>1,854</td>
<td>3,278</td>
</tr>
<tr>
<td>1973</td>
<td>15,595</td>
<td>4,174</td>
<td>7,079</td>
</tr>
<tr>
<td>1974</td>
<td>13,908</td>
<td>3,635</td>
<td>5,562</td>
</tr>
<tr>
<td>1975</td>
<td>16,233</td>
<td>4,088</td>
<td>5,499</td>
</tr>
<tr>
<td>1976</td>
<td>16,230</td>
<td>3,857</td>
<td>4,815</td>
</tr>
<tr>
<td>1977</td>
<td>18,018</td>
<td>4,257</td>
<td>4,984</td>
</tr>
<tr>
<td>1978</td>
<td>19,636</td>
<td>4,645</td>
<td>5,078</td>
</tr>
<tr>
<td>1979</td>
<td>23,720</td>
<td>5,973</td>
<td>5,973</td>
</tr>
</tbody>
</table>

**SOURCE:** Current dollar income figures from U.S. Department of Commerce, Bureau of Economic Analysis. Constant dollar figures deflated by using Anchorage CPI.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL (000)</th>
<th>PER CAPITA</th>
<th>BASED ON 1979 DOLLARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959</td>
<td>3,394</td>
<td>3,341</td>
<td></td>
</tr>
<tr>
<td>1962</td>
<td>4,122</td>
<td>3,734</td>
<td>8,271</td>
</tr>
<tr>
<td>1965</td>
<td>3,705</td>
<td>3,447</td>
<td>7,505</td>
</tr>
<tr>
<td>1966</td>
<td>3,947</td>
<td>3,703</td>
<td>7,550</td>
</tr>
<tr>
<td>1967</td>
<td>4,089</td>
<td>3,574</td>
<td>7,323</td>
</tr>
<tr>
<td>1968</td>
<td>4,413</td>
<td>3,878</td>
<td>7,759</td>
</tr>
<tr>
<td>1969</td>
<td>6,792</td>
<td>5,946</td>
<td>11,504.58</td>
</tr>
<tr>
<td>1970</td>
<td>5,758</td>
<td>4,994</td>
<td>9,336</td>
</tr>
<tr>
<td>1971</td>
<td>7,304</td>
<td>6,041</td>
<td>10,963</td>
</tr>
<tr>
<td>1972</td>
<td>7,339</td>
<td>6,678</td>
<td>11,821</td>
</tr>
<tr>
<td>1973</td>
<td>9,315</td>
<td>8,369</td>
<td>14,195</td>
</tr>
<tr>
<td>1974</td>
<td>10,028</td>
<td>8,462</td>
<td>12,948</td>
</tr>
<tr>
<td>1975</td>
<td>11,419</td>
<td>9,157</td>
<td>12,319</td>
</tr>
<tr>
<td>1976</td>
<td>12,707</td>
<td>9,678</td>
<td>12,804</td>
</tr>
<tr>
<td>1977</td>
<td>11,761</td>
<td>8,890</td>
<td>10,408</td>
</tr>
<tr>
<td>1978</td>
<td>13,014</td>
<td>10,711</td>
<td>11,711</td>
</tr>
<tr>
<td>1979</td>
<td>15,705</td>
<td>12,737</td>
<td>12,737</td>
</tr>
</tbody>
</table>

**SOURCE:** Current dollar incomes from U.S. Department of Commerce, Bureau of Economic Analysis. Constant dollar figures deflated by using Anchorage CPI.
amounts, since no more specific index is available. There is a considerable difference in prices between Bristol Bay and Anchorage, yet aside from some tenuous estimates of the gross difference, no consistent time series is available. Secondly, the CPI has come under a significant amount of criticism as of late, in that many feel that it has consistently overstated inflation, and thus, the rate of real income growth would actually have been higher over the period. Thirdly, the data in no way provides any information about the subsistence economy. If the poverty level of income were adjusted to Bristol Bay, it would suggest that the bulk of the population is below the poverty level. What is missing in the personal income data is the value of subsistent income and how this has changed over time. Additionally, in examining the data for the two different statistical areas, it is evident that the income in the Bristol Bay Borough is more than twice that in the Bristol Bay Division. This has to be explained in large part by the fact that Bristol Bay Borough is one of the centers of commerce, and the portion of individual's existence that is tied up in subsistence activity is less than in the more rural areas. The Bristol Bay Division, on the other hand, includes all the outlying bush communities, in addition to the commercial center of Dillingham.

Data on the distribution of income for Bristol Bay is presented in Table 44. It is recognized that this data is fairly dated, yet it is important as a point of reference. The distribution and levels of income have certainly changed since 1970, but no attempt is made here to speculate what these changes have been.
The distribution is shown for both white and non-white (native) groups. The largest disparity exists in the two lowest income classes, which accounted for 43.4 percent and 42.3 percent of the native families, but only 15.6 percent and 16.9 percent of the white families. Also, compared with statewide data, Bristol Bay natives appear to be concentrated more in the lower income classes.

It must be remembered, however, that the white population is concentrated more in the commercial centers and King Salmon Air Force Station, which would tend to raise the income levels and flatten the distribution. Also, this data does not include any value for subsistence income.

<table>
<thead>
<tr>
<th>Income Class</th>
<th>Bristol Bay Total</th>
<th>Bristol Bay White</th>
<th>Bristol Bay Non-White</th>
<th>Alaskan Total</th>
<th>Alaskan White</th>
<th>Alaskan Non-White</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0 - 4,999</td>
<td>31.9</td>
<td>15.6</td>
<td>43.4</td>
<td>14.1</td>
<td>9.9</td>
<td>37.7</td>
</tr>
<tr>
<td>$5,000-9,999</td>
<td>31.7</td>
<td>16.9</td>
<td>42.3</td>
<td>23.6</td>
<td>22.4</td>
<td>30.1</td>
</tr>
<tr>
<td>$10,000-14,999</td>
<td>21.8</td>
<td>42.5</td>
<td>7.3</td>
<td>24.6</td>
<td>25.5</td>
<td>19.2</td>
</tr>
<tr>
<td>$15,000-24,999</td>
<td>13.2</td>
<td>23.5</td>
<td>6.0</td>
<td>28.2</td>
<td>31.3</td>
<td>11.0</td>
</tr>
<tr>
<td>$25,000 and more</td>
<td>1.3</td>
<td>1.6</td>
<td>1.1</td>
<td>9.6</td>
<td>10.9</td>
<td>1.9</td>
</tr>
</tbody>
</table>

100.0 100.0 100.0

100.0 100.0 100.0

Source: Kresge, Fison, and Gasbarro, Bristol Bay: A Socioeconomic Study, ISEGR Report No. 41, University of Alaska, 1974, p. 4.2.
POPULATION

Aggregate population data for Bristol Bay for 1960, 1970, and 1980 are presented in Table 45; included is the data on population by racial group (native and non-native components). Table 46 provides data on the components of the changes in population between 1960, 1970, and 1980. Overall population grew at a 1.74 percent rate over the two decades, with the native component growing at a somewhat higher rate.

Virtually all of the population growth in Bristol Bay has been accounted for by natural increase. From 1960 to 1970, there was a substantial increase in natural increase, coupled with negative changes in military population and net migration.

Between 1970 and 1980, there was a further reduction in military population, with positive implied net migration and positive natural increase. However, over the two decades, the changes in military population and net migration appear to have been negative. The totals are not in strict agreement, but the data do provide a generally consistent picture with respect to the major causes of population change.

Table 47 provides data on population by community, by native, and non-native components. The highest concentration of Caucasians is in the Dillingham and Naknek areas (the primary centers of the region). Though Caucasians make up 30 percent of the total population, 76 percent of the Caucasian population resides in these two areas, where combined they account for 50 percent of the population.
### TABLE 45. POPULATION GROWTH
BRISTOL BAY, 1960-1980

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population</td>
<td>4,024</td>
<td>4,632</td>
<td>5,683</td>
<td>1.74</td>
</tr>
<tr>
<td>White</td>
<td>1,423</td>
<td>1,593</td>
<td>1,726</td>
<td>0.96</td>
</tr>
<tr>
<td>American Indian, Eskimo, and Aleut</td>
<td>2,574</td>
<td>3,003</td>
<td>3,880</td>
<td>2.07</td>
</tr>
<tr>
<td>Black</td>
<td>27</td>
<td>36</td>
<td>48</td>
<td>2.91</td>
</tr>
<tr>
<td>Asian</td>
<td></td>
<td></td>
<td>7</td>
<td>NA</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td>22</td>
<td>NA</td>
</tr>
</tbody>
</table>

1Prior to 1974, only one census division for Bristol Bay was reported.


### TABLE 46. COMPONENTS OF POPULATION CHANGE
BRISTOL BAY BOROUGH 1960 - 1980

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1960 Population</td>
<td>4024</td>
<td>-97</td>
<td>947</td>
</tr>
<tr>
<td>Change in Military Population</td>
<td>-242</td>
<td>497</td>
<td></td>
</tr>
<tr>
<td>Natural Increase (births-deaths)</td>
<td>-242</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civilian Migration</td>
<td>497</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970 Population¹</td>
<td>4632</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>Bristol Bay Borough</th>
<th>Dillingham Census Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970 Population¹</td>
<td>4974</td>
<td>1147</td>
<td>3827</td>
</tr>
<tr>
<td>Change in Military Population</td>
<td>-70</td>
<td>369</td>
<td>-439</td>
</tr>
<tr>
<td>Natural Increase (births-deaths)</td>
<td>649</td>
<td>92</td>
<td>557</td>
</tr>
<tr>
<td>Civilian Migration</td>
<td>124</td>
<td>-525</td>
<td>649</td>
</tr>
<tr>
<td>1980 Population</td>
<td>5677</td>
<td>1083</td>
<td>4594</td>
</tr>
</tbody>
</table>

¹1970 population was reported for the whole of Bristol Bay, whereas the second reference to 1970 population comes from Alaska 1980 Population - A Preliminary Look, Alaska Department of Labor, 1981.
**TABLE 47. DILLINGHAM CENSUS AREA POPULATION BY COMMUNITY, 1980**

<table>
<thead>
<tr>
<th>Community</th>
<th>White</th>
<th>Native</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aleknagik</td>
<td>16</td>
<td>138</td>
<td>-</td>
<td>154</td>
</tr>
<tr>
<td>Clarks Point</td>
<td>9</td>
<td>70</td>
<td>-</td>
<td>79</td>
</tr>
<tr>
<td>Dillingham</td>
<td>660</td>
<td>891</td>
<td>8</td>
<td>1563</td>
</tr>
<tr>
<td>Ekwok</td>
<td>5</td>
<td>71</td>
<td>1</td>
<td>77</td>
</tr>
<tr>
<td>Manokotak</td>
<td>20</td>
<td>273</td>
<td>1</td>
<td>294</td>
</tr>
<tr>
<td>Newhalen</td>
<td>5</td>
<td>82</td>
<td>-</td>
<td>87</td>
</tr>
<tr>
<td>New Stuyahok</td>
<td>20</td>
<td>311</td>
<td>-</td>
<td>331</td>
</tr>
<tr>
<td>Nondalton</td>
<td>11</td>
<td>161</td>
<td>1</td>
<td>173</td>
</tr>
<tr>
<td>Port Heiden</td>
<td>31</td>
<td>59</td>
<td>2</td>
<td>92</td>
</tr>
<tr>
<td>Togiak</td>
<td>26</td>
<td>443</td>
<td>1</td>
<td>470</td>
</tr>
</tbody>
</table>

**Bristol Bay Borough**  
(King Salmon, Naknek & South Naknek)
- White: 660  
- Native: 360  
- Other: 74  
- Total: 1094

| Total          | 1464 | 2805 | 88 | 4357 |

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.

**Methodology**

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 is 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 losers 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.

THE MAP AND SCIMP MODELS
We can now turn to a discussion of the models utilized 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 of the MAP statewide model, 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: The MAP Statewide Model
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. THE MAP STATEWIDE ECONOMIC 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 dissagregates the MAP statewide model estimates for population and for employment in the basic, support, and government sectors among 20 regions. Most of these regions correspond to Alaska census divisions. In order to use the regional model, scenarios (or future values for exogenous variables) must be specified on a regional basis. The MAP regional model is described in Appendix A.

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

**The Base Case Assumptions: The MAP Models**

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

A set of assumptions about the future levels of various exogenous economic activities defines a development scenario. There are five types of assumptions required for the MAP model development scenarios. These are assumptions about the future level of national variables which directly or indirectly affect Alaska economic activity; assumptions about employment requirements of special projects, such as the gas pipeline; assumptions about the employment requirements for exogenous industry and government sectors of the Alaska economy; an assumption as to the number of tourists who will visit Alaska; and assumptions about State government revenues and expenditures.
Our use of assumptions in developing the base case scenarios does not mean that we are predicting that all or any of these events will occur, since there is considerable 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.

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.

Our base case assumptions are summarized in Table 48. They include national variable assumptions, project assumptions, industry and government assumptions, tourism assumptions, and government policy assumptions. Below we present a detailed description of these assumptions.
<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National Variables Assumptions</strong></td>
<td></td>
</tr>
<tr>
<td>1. U.S. Inflation Rate</td>
<td>Growth in consumer prices slows to 7.5 percent annually by 1985.</td>
</tr>
<tr>
<td>2. Average Weekly Earnings</td>
<td>Growth in average weekly earnings rises to 8 percent annually by 1985.</td>
</tr>
<tr>
<td>3. Real Per Capita Income</td>
<td>Growth in real per capita income rises to 2 percent annually by 1985.</td>
</tr>
<tr>
<td><strong>Special Project Assumptions</strong></td>
<td></td>
</tr>
<tr>
<td>1. Trans-Alaska Pipeline</td>
<td>Construction of 4 additional pumping stations provides 90 jobs through 1982; operating employment remains constant at 1,500.</td>
</tr>
<tr>
<td>3. Prudhoe Bay Petroleum Production</td>
<td>Construction employment on Prudhoe water flooding project peaks at over 1,000 in 1983. Permanent operating employment rises to 1667 in 1983.</td>
</tr>
<tr>
<td>5. National Petroleum Reserve in Alaska</td>
<td>Development and production from 5 oil fields and construction of 525 miles of pipeline provide between 500 and 1,000 jobs after 1985.</td>
</tr>
<tr>
<td>6. OCS Development</td>
<td>Exploration employment only for sales CI, 55, 57, 60, and 70. Development of Sale 71 lease (Beaufort Sea) area results in maximum employment of 1,756 in 1994. Development of Sale BF lease area results in maximum employment of 1,082 in 1989.</td>
</tr>
<tr>
<td>7. Beluga-Chuitna Coal Production</td>
<td>Eventual export of 4.4 million tons per year provides total employment of 524.</td>
</tr>
<tr>
<td>Assumptions</td>
<td>Description</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Industry and Government Assumptions</strong></td>
<td></td>
</tr>
<tr>
<td>1. Other Mining Activity</td>
<td>Employment increases from a 1979 level of 3,140 at 1 percent annually.</td>
</tr>
<tr>
<td>2. Agriculture</td>
<td>Expansion results in employment of over 1,000 by 2000.</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
</tr>
<tr>
<td>4. Commercial Fishing:</td>
<td>Employment levels in fishing and fish processing remain constant at 6,323</td>
</tr>
<tr>
<td>Non-Bottomfish</td>
<td>and 7,123, respectively.</td>
</tr>
<tr>
<td>and Processing</td>
<td></td>
</tr>
<tr>
<td>6. Federal Civilian</td>
<td>Rises at 0.5 percent annual rate from 17,915 in 1979 to 19,893 in 2000.</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
</tr>
<tr>
<td>7. Federal Military</td>
<td>Employment remains constant at 23,333.</td>
</tr>
<tr>
<td><strong>Tourism Assumptions</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of tourists visiting Alaska rises at 4 percent annual rate from 505,400</td>
</tr>
<tr>
<td></td>
<td>to over 1.1 million by 2000.</td>
</tr>
<tr>
<td><strong>Policy Assumptions</strong></td>
<td>Exogenous revenues from petroleum production taxes, royalty payments,</td>
</tr>
<tr>
<td></td>
<td>property taxes, and special corporate taxes peak at about $10 billion</td>
</tr>
<tr>
<td></td>
<td>annually by 1989. Real per capita expenditures grow in proportion to the</td>
</tr>
<tr>
<td></td>
<td>growth in real per capita income.</td>
</tr>
</tbody>
</table>
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. 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 capita disposable income in the United States.

In 1979, consumer prices in the United States rose 11.5 percent, average weekly earnings grew 7.5 percent, and real per capita disposable income grew by 0.5 percent. In the base case, it is assumed that the growth in U.S. consumer prices slows to a long run rate of 7.5 percent by 1985, that the growth in average weekly earnings rises to a long run rate of 8 percent by 1985, and that real per capita personal income growth rises 2 percent annually by the mid-80s.

SPECIAL PROJECTS ASSUMPTIONS

Widely differing special projects with major implications for future Alaskan development have been proposed by a variety of federal and state agencies and private developers. Each project generates direct employment in one or more of the sectors of the Alaskan economy
treated as exogenous by the MAP forecasting model. The sectors are manufacturing, mining, and parts of the construction and transportation sectors. This section presents our assumptions as to the direct employment generated by each of the major projects either currently in operation or proposed.

1. Trans-Alaska Pipeline (Alyeska)

Trans-Alaska Pipeline assumptions are given in Table 49. Trans-Alaska Pipeline Service (TAPS) employment through 1977 included only the exogenous construction employment engaged in the initial construction of the pipeline. Employment since completion in 1977 and future employment is of two types. These are additional construction of four pump stations (see Oil and Gas Journal, 2/25/80, p. 72), and exogenous transportation sector employment associated with operation of the line.

2. Alaska Natural Gas Transportation System

In December 1980, the Northwest Alaska Pipeline Company received rights of way for the Alaskan portion of a 4,800 mile pipeline to transport natural gas from Prudhoe Bay to the United States West Coast and Midwest (see Oil and Gas Journal, 12/8/80, p. 50). Employment projections for this project are shown in Table 50. Construction of the 741-mile Alaskan portion of the line and an accompanying gas conditioning plant on the North Slope was assumed to get underway in 1981 and to be operational by 1987. Construction employment was expected to peak at 10,589 in 1986, falling to a long-term total of 319 persons in transportation and petroleum sector employment.
TABLE 49. TRANS-ALASKA PIPELINE EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>EMCNX1</th>
<th>EMT9X</th>
<th>MTOTB</th>
<th>B04</th>
<th>B09</th>
<th>B24</th>
<th>B26</th>
<th>B29</th>
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<tbody>
<tr>
<td>1980</td>
<td>0.09</td>
<td>1.5</td>
<td>1.59</td>
<td>0.474</td>
<td>0.169</td>
<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
</tr>
<tr>
<td>1981</td>
<td>0.09</td>
<td>1.5</td>
<td>1.59</td>
<td>0.474</td>
<td>0.079</td>
<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
</tr>
<tr>
<td>1982</td>
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<td>1.5</td>
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<td>0.079</td>
<td>0.316</td>
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</tr>
<tr>
<td>1984</td>
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<td>1.5</td>
<td>1.59</td>
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<td>0.079</td>
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</tr>
<tr>
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<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
</tr>
<tr>
<td>1986</td>
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<td>0.079</td>
<td>0.079</td>
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<tr>
<td>1987</td>
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<td>0.079</td>
<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
</tr>
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<tr>
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<td>0.552</td>
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<tr>
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<td>1.59</td>
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<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
</tr>
<tr>
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<td>1.59</td>
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<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
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<tr>
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<td>1.5</td>
<td>1.59</td>
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<td>0.079</td>
<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
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<tr>
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<td>1.5</td>
<td>1.59</td>
<td>0.474</td>
<td>0.079</td>
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<td>0.316</td>
<td>0.552</td>
</tr>
<tr>
<td>2000</td>
<td>0.09</td>
<td>1.5</td>
<td>1.59</td>
<td>0.474</td>
<td>0.079</td>
<td>0.079</td>
<td>0.316</td>
<td>0.552</td>
</tr>
</tbody>
</table>

EMCNX1 = Exogenous employment in high wage construction (thousands)
EMT9X = Exogenous employment in transportation (thousands)
MTOT = Total exogenous employment (thousands)
B04 = Basic sector employment, Barrow/North Slope census division (thousands)
B09 = Basic sector employment, Fairbanks census division (thousands)
B24 = Basic sector employment, S.E. Fairbanks census division (thousands)
B26 = Basic sector employment, Valdez/Chitina/Whittier census division (thousands)
B29 = Basic sector employment, Yukon Koyukuk census division (thousands)

SOURCE: Construction estimate based on assumed installation of four pump stations adding capacity of .15 mmbd each, from Beaufort OCS Development Scenarios, Davis and Moore, 1978.
<table>
<thead>
<tr>
<th>Year</th>
<th>EMP9</th>
<th>EMCNX1</th>
<th>EMT9X</th>
<th>MTOT</th>
<th>B04</th>
<th>B09</th>
<th>B24</th>
<th>B25</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.069</td>
<td>0.0</td>
<td>0.065</td>
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<tr>
<td>1981</td>
<td>0.0</td>
<td>0.217</td>
<td>0.0</td>
<td>0.217</td>
<td>0.046</td>
<td>0.069</td>
<td>0.037</td>
<td>0.065</td>
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<tr>
<td>1982</td>
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<td>0.217</td>
<td>0.0</td>
<td>0.217</td>
<td>0.046</td>
<td>0.069</td>
<td>0.037</td>
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<tr>
<td>1983</td>
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<td>0.0</td>
<td>0.563</td>
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</tr>
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<td>0.0</td>
<td>7.103</td>
<td>2.207</td>
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</tr>
<tr>
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<td>0.16</td>
<td>10.589</td>
<td>0.0</td>
<td>10.749</td>
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<td>2.062</td>
<td>2.069</td>
<td>3.621</td>
</tr>
<tr>
<td>1987</td>
<td>0.2</td>
<td>6.074</td>
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<td>6.393</td>
<td>1.663</td>
<td>1.491</td>
<td>1.191</td>
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<tr>
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<td>0.468</td>
<td>0.119</td>
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<td>0.145</td>
<td>0.126</td>
<td>0.185</td>
</tr>
<tr>
<td>1989</td>
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<td>0.119</td>
<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
<td>0.04</td>
</tr>
<tr>
<td>1990</td>
<td>0.2</td>
<td>0.0</td>
<td>0.119</td>
<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
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<td>0.008</td>
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<td>0.119</td>
<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
<td>0.04</td>
</tr>
<tr>
<td>1993</td>
<td>0.2</td>
<td>0.0</td>
<td>0.119</td>
<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
<td>0.04</td>
</tr>
<tr>
<td>1994</td>
<td>0.2</td>
<td>0.0</td>
<td>0.119</td>
<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
<td>0.04</td>
</tr>
<tr>
<td>1995</td>
<td>0.2</td>
<td>0.0</td>
<td>0.119</td>
<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
<td>0.04</td>
</tr>
<tr>
<td>1996</td>
<td>0.2</td>
<td>0.0</td>
<td>0.119</td>
<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
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</tr>
<tr>
<td>1997</td>
<td>0.2</td>
<td>0.0</td>
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<td>0.319</td>
<td>0.228</td>
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<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
<td>0.04</td>
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<tr>
<td>2000</td>
<td>0.2</td>
<td>0.0</td>
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<td>0.319</td>
<td>0.228</td>
<td>0.008</td>
<td>0.043</td>
<td>0.04</td>
</tr>
</tbody>
</table>

EMP9 = Exogenous employment in mining (thousands)
EMCNX1 = Exogenous employment in high wage construction (thousands)
EMT9X = Exogenous employment in transportation (thousands)
MTOT = Total exogenous employment (thousands)
B04 = Basic sector employment, Barrow/North Slope census division (thousands)
B09 = Basic sector employment, Fairbanks census division (thousands)
B24 = Basic sector employment, S.E. Fairbanks census division (thousands)
B25 = Basic sector employment, Upper Yukon census division (thousands)

Although construction did not begin in 1981, total Northwest Alaskan Pipeline Company employment for the year actually averaged 347 (Northwest Alaskan Pipeline Company), somewhat higher than the figure of 217 assumed for 1981. The employment assumptions used also reflect the delays in construction expected to result from factors such as the current lawsuit against the pipeline financing waivers recently passed by Congress.

3. Prudhoe Bay Petroleum Production

Prudhoe Bay petroleum production assumptions are shown in Table 51. This employment includes that associated with primary recovery operations from the Sadlerochit formation, secondary recovery (using water flooding) of that formation, new developments of the Kuparuk formation west of Prudhoe Bay, and the permanent work force of Atlantic Richfield Company (ARCO) and British Petroleum (BP) at the main Prudhoe base headquarters. The key assumptions serving as the basis for the employment forecasts are the following:

- Seven rigs (4 Sohio, 3 ARCO) continue development drilling at a rate of 14 wells per year per rig through 1983 (based on estimated activity in Oil and Gas Journal, 2/25/80, p. 88).

- The proposed Prudhoe water flooding project begins in 1981 and is completed by 1985, adding approximately 1 billion barrels of recoverable reserves to Prudhoe. Construction employment peaks
TABLE 51. PRUDHOE BAY PETROLEUM PRODUCTION EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>EMP9</th>
<th>EMCNX2</th>
<th>MTOT</th>
<th>BO4</th>
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</table>

EMP9 = Exogenous employment in mining (thousands)
EMCNX2 = Exogenous employment in average wage construction (thousands)
MTOT = Total exogenous employment (thousands)
BO4 = Basic sector employment, Barrow/North Slope census division (thousands)

SOURCE: Construction employment is that associated with Prudhoe waterflood project, from U.S. Army Corps of Engineers, Final EIS, Prudhoe Bay Oilfield Waterflood Project, pp. 2-60. For mining employment sources, see text.
at over 1,000 in 1983, and operations employment adds 300 to the permanent Prudhoe work force (Corps of Engineers, 1980).

- The Kuparuk formation west of Prudhoe is developed. Production at a rate of 50,000 bbls. per day begins in December 1981, rising to 80,000 bbls. per day in 1982 and rising to 250,000 bbls. per day by 1986 (Oil and Gas Journal, 12/21/81, p. 32).

- Permanent ARCO and BP employment on the North Slope rises from 1,000 in 1977 to 1,667 in 1983, remaining constant thereafter (based on Prudhoe Bay Case Study, OCS Program Technical Report No. 4).

- Ten additional rigs are active in exploration and development outside of the Sadlerochit reservoir.

4. **Upper Cook Inlet Petroleum Production**

Petroleum sector employment in the Kenai-Cook Inlet Census Division was 778 in 1979 (four quarter average employment, taken from Alaska Department of Labor, *Statistical Quarterly*, 1979 issues), consisting of exploration, development, and production associated with the Kenai oil and gas fields. Currently, the 120,000 barrels per day output of oil is expected to decline drastically over the forecast period, possibly as fast as 15-20 percent per year. The decline may be partially slowed, however, by a possible redrilling program being considered by the operators (see Oil and Gas Journal, 2/4/80, p. 36);
and in any case, the prospects for gas development are brighter than those for oil. Gas production is likely to expand from its current 5,000 MMCF per day once the LNG facility proposed by Pacific Lighting and Pacific Gas and Electric (see below) are constructed even without any substantial new discoveries. It is assumed that these increases, coupled with continued exploration activity and possible enhanced recovery of oil, will be adequate to maintain Upper Cook Inlet petroleum employment at its 1978 level throughout the forecast period, as shown in Table 52.

5. Development of the National Petroleum Reserve in Alaska (NPR-A)

The National Petroleum Reserve in Alaska (previously NPR-4) has been the target of publicly sponsored exploration for oil and gas since World War II, first by the Navy and later by the Interior Department. The first exploration program began in 1944 and ended in 1953, after discovery of nine oil and gas fields, all but one being noncommercial (the largest gas field, the Barrow gas field, currently produces for local consumption). In 1974 Congress directed the Navy to resume exploration, eventually transferring the program to the Department of Interior in 1977. To date, this most recent exploration program has produced 22 dry holes and several test wells planned or in progress (Oil and Gas Journal, 12/8/80, p. 36).

Nonetheless, USGS estimates that NPR-A can be expected to contain 5.96 billion barrels of oil in place and 11.3 trillion cubic feet of gas, about 26 percent of which is likely to be recoverable. A study of
## TABLE 52. UPPER COOK INLET PETROLEUM PRODUCTION EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>EMP9</th>
<th>MTOT</th>
<th>B12</th>
</tr>
</thead>
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<tr>
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<td>0.778</td>
</tr>
<tr>
<td>1981</td>
<td>0.778</td>
<td>0.778</td>
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</tr>
<tr>
<td>1982</td>
<td>0.778</td>
<td>0.778</td>
<td>0.778</td>
</tr>
<tr>
<td>1983</td>
<td>0.778</td>
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<td>0.778</td>
</tr>
<tr>
<td>1984</td>
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<tr>
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<tr>
<td>1986</td>
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<tr>
<td>1987</td>
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</tr>
<tr>
<td>1988</td>
<td>0.778</td>
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<tr>
<td>1989</td>
<td>0.778</td>
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<tr>
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<tr>
<td>2000</td>
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<td>0.778</td>
<td>0.778</td>
</tr>
</tbody>
</table>

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**EMP9**  = Exogenous employment in mining (thousands)  
**MTOT**  = Total exogenous employment (thousands)  
**B12**  = Basic sector employment, Kenai/Cook Inlet census division (thousands)  

**SOURCE:** See text.
alternative methods for development of the reserve was completed in 1979 by Interior (see Final Report of the 105(b) Economic and Policy Analysis, 12/15/79). In late 1980, Congress passed legislation requiring that the reserve be opened to private leasing by 1982 (Oil and Gas Journal, 12/8/80). Interior held the first sale on January 27, 1982.

It is assumed that five commercial fields are discovered and developed, representing 1.85 billion barrels of oil and 3.73 trillion cubic feet of gas, as described in the mean scenario of the Interior 105(b) study. Construction associated with the development includes 525 miles of pipeline. Construction employment peaks at about 600 following each of the several discoveries. Petroleum sector employment averages about 250/year, and pipeline operation adds 69 to the transportation sector work force, as shown in Table 53.

6. OCS Development
Prior to the scheduled date of OCS Sale 75, eight other OCS sales will have occurred, as follows:

<table>
<thead>
<tr>
<th>Sale</th>
<th>Location</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>Gulf of Alaska</td>
<td>1976</td>
</tr>
<tr>
<td>CI</td>
<td>Lower Cook Inlet</td>
<td>1977</td>
</tr>
<tr>
<td>BF</td>
<td>Beaufort Sea</td>
<td>1979</td>
</tr>
<tr>
<td>55</td>
<td>Gulf of Alaska</td>
<td>1980</td>
</tr>
<tr>
<td>60</td>
<td>Lower Cook Inlet</td>
<td>1981</td>
</tr>
<tr>
<td>71</td>
<td>Beaufort Sea</td>
<td>1982</td>
</tr>
<tr>
<td>57</td>
<td>Bering-Norton</td>
<td>1982</td>
</tr>
<tr>
<td>70</td>
<td>St. George</td>
<td>1983</td>
</tr>
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</table>
TABLE 53. NATIONAL PETROLEUM RESERVE IN ALASKA
EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>EMP9</th>
<th>EMCNX2</th>
<th>EMTX</th>
<th>MTOT</th>
<th>BO2</th>
<th>BO4</th>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td>0</td>
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<td>0</td>
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<tr>
<td>1982</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td>0.004</td>
<td>0.172</td>
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</tr>
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<td>1984</td>
<td>0.088</td>
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<td>0.582</td>
<td>0.009</td>
<td>0.573</td>
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<td>0.115</td>
<td>0.55</td>
<td>0.665</td>
<td>0.012</td>
<td>0.653</td>
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<tr>
<td>1986</td>
<td>0.222</td>
<td>0.383</td>
<td>0.605</td>
<td>0.022</td>
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<tr>
<td>1987</td>
<td>0.177</td>
<td>0.157</td>
<td>0.388</td>
<td>0.018</td>
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<tr>
<td>1988</td>
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<td>0.527</td>
<td>0.019</td>
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<tr>
<td>1990</td>
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<td>0.86</td>
<td>0.02</td>
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<tr>
<td>1991</td>
<td>0.267</td>
<td>0.383</td>
<td>0.719</td>
<td>0.027</td>
<td>0.692</td>
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<tr>
<td>1992</td>
<td>0.222</td>
<td>0.157</td>
<td>0.448</td>
<td>0.022</td>
<td>0.426</td>
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<tr>
<td>1993</td>
<td>0.232</td>
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<td>0.572</td>
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<tr>
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<td>0.222</td>
<td>0.546</td>
<td>0.837</td>
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<td>1995</td>
<td>0.249</td>
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<td>0.905</td>
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<td>1996</td>
<td>0.312</td>
<td>0.383</td>
<td>0.764</td>
<td>0.031</td>
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<td>1997</td>
<td>0.267</td>
<td>0.157</td>
<td>0.493</td>
<td>0.027</td>
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<td>1998</td>
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<td>0.617</td>
<td>0.028</td>
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<td>1999</td>
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<td>0.546</td>
<td>0.882</td>
<td>0.027</td>
<td>0.855</td>
<td></td>
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<tr>
<td>2000</td>
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</table>

EMP9  = Exogenous employment in mining (thousands)
EMCNX2 = Exogenous employment in average wage construction (thousands)
EMTX  = Exogenous employment in transportation (thousands)
MTOT  = Total exogenous employment (thousands)
BO2   = Basic sector employment, Anchorage census division (thousands)
BO4   = Basic sector employment, Barrow/North Slope census division (thousands)

SOURCE: See text.
The first Gulf of Alaska sale (Sale 46) resulted in the drilling of ten dry holes, and exploration has ended in these tracts. Disappointing results of exploration on tracts leased in Lower Cook Inlet (Sale CI) in 1977 also resulted at least temporarily in a halt to exploration there. Exploration is currently underway on tracts leased in the 1979 Beaufort sale and the 1980 Gulf of Alaska sale, and new leasing in Lower Cook Inlet has just occurred.

In the base case, no future employment is assumed to result from Sale 46. In addition, it is assumed that no recoverable resources are discovered on tracts leased in sales CI, 55, 57, 60 and 70; that is, such sales are assumed to generate only exploration employment. The level of recoverable resources in the remaining two sales is assumed to be the USGS estimated mean for the areas, as shown in Table 54.

<table>
<thead>
<tr>
<th>Sale</th>
<th>Location</th>
<th>Recoverable Oil</th>
<th>Recoverable Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>BF</td>
<td>Beaufort Sea</td>
<td>.75 BBO</td>
<td>1.625 TCFG</td>
</tr>
<tr>
<td>71</td>
<td>Beaufort Sea</td>
<td>2.38 BBO</td>
<td>1.78 TCFG</td>
</tr>
</tbody>
</table>


Exploration in 1982 on Sale CI is assumed to provide 38 jobs in mining and 9 jobs in transportation, with 4 of these jobs located in the Anchorage Census Division. No subsequent employment is provided by
Sale CI. The levels of employment assumed for the remaining six OCS sales are shown in Tables 55-60.

6. Beluga-Chuitna Coal Production

USGS has long recognized the potential economic significance of a large number of beds of subbituminous coal on the west side of Cook Inlet near Tyonek (see USGS, Coal Resources of Alaska, 1967). Recently, several alternative proposals for developing the Beluga-Chuitna fields for export to Japan or other Pacific rim locations have been considered (see Pacific Northwest Laboratory, Beluga Coal Field Development: Social Effects and Management Alternatives, 1979, and Bechtel, Preliminary Feasibility Study: Coal Export Program, Chuitna River Field, Alaska, 1980).

The base case scenario assumes that a coal export program is implemented beginning in 1985. Production begins in 1989 and eventually reaches 4.4 tons per year. Construction begins in 1985, with peak employment of 400 in 1987. Operations employment is 524 distributed 80 percent in mining and 20 percent in transportation, as shown in Table 61.

INDUSTRY AND GOVERNMENT ASSUMPTIONS

In addition to the project-specific assumptions described above, other portions of the exogenous sectors are affected by trends and events which must be anticipated, although they are not as directly traceable
TABLE 55. OCS SALE BF (BEAUFORT SEA)
EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>EMP9</th>
<th>EMCNX1</th>
<th>BO2</th>
<th>BO4</th>
<th>MTOT</th>
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<tr>
<td>1980</td>
<td>0</td>
<td>0.066</td>
<td>0.008</td>
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<td>0.062</td>
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<td>1986</td>
<td>0.112</td>
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<td>0.01</td>
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<td>1988</td>
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<td>0.036</td>
<td>1.046</td>
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<td>1997</td>
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<td>0.032</td>
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<td>0.417</td>
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</tr>
<tr>
<td>1998</td>
<td>0.393</td>
<td>0.032</td>
<td>0.361</td>
<td>0.393</td>
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<tr>
<td>1999</td>
<td>0.393</td>
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<td>0.361</td>
<td>0.393</td>
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</table>

EMP9 = Exogenous employment in mining (thousands)
EMCNX1 = Exogenous employment in high wage construction (thousands)
MTOT = Total exogenous employment (thousands)
BO2 = Basic sector employment, Anchorage census division (thousands)
BO4 = Basic sector employment, Barrow/North Slope census division (thousands)

### TABLE 56: OCS SALE 55 (GULF OF ALASKA) EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Year</th>
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<th>MTOT</th>
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<th>B02</th>
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</table>

**EMP9** = Exogenous employment in mining (thousands)

**EMT9X** = Exogenous employment in transportation (thousands)

**MTOT** = Total exogenous employment (thousands)

**B02** = Basic sector employment, Anchorage census division (thousands)

**B11** = Basic sector employment, Southeast Alaska (thousands)

## Table 57. OCS Sale 60 (Lower Cook Inlet) Employment Assumptions

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</table>

EMP9 = Exogenous employment in mining (thousands)
EMCNX1 = Exogenous employment in high wage construction (thousands)
EMT9X = Exogenous employment in transportation (thousands)
MTOT = Total exogenous employment (thousands)
BO2 = Basic sector employment, Anchorage census division (thousands)
B12 = Basic sector employment, Kenai/Cook Inlet census division (thousands)

**Source:** U.S. Department of the Interior, Final Environmental Impact Statement, Proposed Federal-State Oil and Gas Lease Sale, Lower Cook Inlet.
TABLE 58. OCS SALE 71 (BEAUFORT SEA) EMPLOYMENT ASSUMPTIONS

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<th>MTOT</th>
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</table>

EMP9  = Exogenous employment in mining (thousands)
EMCNX2 = Exogenous employment in average wage construction (thousands)
EMT9X  = Exogenous employment in transportation (thousands)
MTOT   = Total exogenous employment (thousands)
B02    = Basic sector employment, Anchorage census division (thousands)
B04    = Basic sector employment, Barrow/North Slope census division (thousands)

## Table 59. OCS Sale 57 (Bering Norton) Employment Assumptions

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EMP9  = Exogenous employment in mining (thousands)
EMCNX1 = Exogenous employment in average wage construction (thousands)
EMT9X  = Exogenous employment in transportation (thousands)
MTOT   = Total exogenous employment (thousands)
B02    = Basic sector employment, Anchorage census division (thousands)
B18    = Basic sector employment, Nome census division (thousands)

### TABLE 60. OCS SALE 70 (St. George) EMPLOYMENT ASSUMPTIONS

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**EMPS** = Exogenous employment in mining (thousands)

**EMT9X** = Exogenous employment in transportation (thousands)

**MTOT** = Total exogenous employment (thousands)

**BO1** = Basic Sector Employment, Aleutian Islands census division (thousands)

**BO2** = Basic sector employment, Anchorage census division (thousands)

### TABLE 61. BELUGA CHUITNA COAL PRODUCTION EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>EMP9</th>
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<tr>
<td>1987</td>
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<tr>
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</tr>
<tr>
<td>1990</td>
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</tr>
<tr>
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<tr>
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EMP9 = Exogenous employment in mining (thousands)
EMCNX2 = Exogenous employment in average wage construction (thousands)
EMT9X = Exogenous employment in transportation (thousands)
MTOT = Total exogenous employment (thousands)
B12 = Basic sector employment, Kenai/Cook Inlet census division (thousands)

to specific development projects. These sectors include the following: the portion of mining sector employment not accounted for by the above projects, which will be called "other mining"; agricultural employment; logging and sawmill employment; fish harvesting and processing employment; and federal government employment. We turn now to a discussion of the assumptions used to project employment in these sectors.

1. Other Mining Activity

In 1979, total mining sector employment in Alaska was 5,773, of which 5,354 was in oil and gas. Of this, 2,633 was accounted for by projects discussed above. The residual, or 3,140, is classified as "other mining." It consists of administrative personnel in Anchorage associated with minerals industries, a variety of petroleum exploration activities on the North Slope and elsewhere not broken down by project (i.e., the Husky operation in NPR-A, various drilling contractors on state and native lands, seismic work being conducted offshore prior to OCS lease sales, etc.), and hardrock mining activities.

In the base case, it is assumed that such employment increases from its current level at a rate of one percent annually, as shown in Table 62.

2. Agriculture

Currently, agriculture represents a very small sector of the Alaskan economy, consisting of less than 200 persons, primarily in the Matanuska-Susitna and Fairbanks census divisions.
TABLE 62. "OTHER MINING" EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>EMP9</th>
<th>B01</th>
<th>B02</th>
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<th>B05</th>
<th>B08</th>
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<td>0.005</td>
<td>0.004</td>
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<td>0.012</td>
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<tr>
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<td>0.004</td>
<td>0.12</td>
<td>0.02</td>
<td>0.012</td>
<td>0.005</td>
<td>0.0.</td>
</tr>
</tbody>
</table>
E9P9 = Exogenous employment in mining (thousands)
B01 = Basic sector employment, Aleutian Islands census division (thousands)
B02 = Basic sector employment, Anchorage census division (thousands)
B04 = Basic sector employment, Barrow/North Slope census division (thousands)
B05 = Basic sector employment, Bethel census division (thousands)
B08 = Basic sector employment, Cordova/McCarthy census division (thousands)
E09 = Basic sector employment, Fairbanks census division (thousands)
B11 = Basic sector employment, Southeast Alaska (thousands)
B14 = Basic sector employment, Kobuk census division (thousands)
B16 = Basic sector employment, Kuskokwim census division (thousands)
B17 = Basic sector employment, Matanuska/Susitna census division (thousands)
B18 = Basic sector employment, Nome census division (thousands)
B21 = Basic sector employment, Seward census division (thousands)
B25 = Basic sector employment, Upper Yukon census division (thousands)
B26 = Basic sector employment, Valdez/Chitina/Whittier census division (thousands)
B29 = Basic sector employment, Yukon Koyukuk census division (thousands)

SOURCE: 1979 values from Alaska Department of Labor, Statistical Quarterly, thereafter assumed to grow at one percent annually.
In the base case, it is assumed that after 1982, state support of an agricultural industry results in expansion of the existing industry to over 1,000 persons by the year 2000, as shown in Table 63.


3. **Logging and Sawmill Employment**

Employment in logging and sawmills is classified by the MAP model as exogenous manufacturing employment, while employment in pulpmills is calculated endogenously. In 1979, the Alaskan timber industry harvested approximately 500 million board feet of lumber.

In the base case, timber output is assumed to rise to 960 million board feet by the year 2000, implying a rise in manufacturing employment from 2,204 in 1980 to 4,103 in 2000, as shown in Table 64. The rate of growth in output in this case is approximately equal to the historical growth in the industry.

4. **Commercial Fishing: Non-Bottomfish**

Statewide employment in non-bottomfish commercial fishing and fish processing is assumed to remain constant at current levels of about 6,323 and 7,123, respectively. These figures and their regional breakdowns, shown in Table 65, are based on projections to 1980 of estimates presented in George Rogers, *Measuring the Socioeconomic Impacts of Alaska's Fisheries*, ISER (April, 1980).
### TABLE 63. AGRICULTURAL EMPLOYMENT ASSUMPTIONS

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<tr>
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**EMAGRI** = Exogenous employment in agriculture (thousands)

**B01** = Basic sector employment, Aleutian Islands census division (thousands)

**B09** = Basic sector employment, Fairbanks census division (thousands)

**B12** = Basic sector employment, Kenai/Cook Inlet census division (thousands)

**B17** = Basic sector employment, Matanuska/Susitna census division (thousands)

### TABLE 64. LOGGING AND SAWMILL EMPLOYMENT ASSUMPTIONS

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**EMMX2** = Exogenous employment in average wage manufacturing (thousands)  
**B02** = Basic sector employment, Anchorage census division (thousands)  
**B08** = Basic sector employment, Cordova/McCarthy census division (thousands)  
**B09** = Basic sector employment, Fairbanks census division (thousands)  
**B11** = Basic sector employment, Southeast Alaska (thousands)  
**B12** = Basic sector employment, Kenai/Cook Inlet census division (thousands)  
**B15** = Basic sector employment, Kodiak census division (thousands)  
**B21** = Basic sector employment, Seward census division (thousands)

**SOURCE:** 1979 value was taken from Alaska Department of Labor, Statistical Quarterly.
### TABLE 65. NONBOTTOMFISH COMMERCIAL FISHING AND PROCESSING EMPLOYMENT ASSUMPTIONS

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<td>0.004</td>
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<tr>
<td>1995</td>
<td>1.253</td>
<td>0.043</td>
<td>2.907</td>
<td>0.004</td>
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<td>0.054</td>
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<td>1996</td>
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<td>0.043</td>
<td>2.907</td>
<td>0.004</td>
<td>0.</td>
<td>0.054</td>
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<tr>
<td>1997</td>
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<td>0.054</td>
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<td>1998</td>
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<td>0.043</td>
<td>2.907</td>
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<td>0.054</td>
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<td>1999</td>
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<td>2.907</td>
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<tr>
<td>2000</td>
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<td>0.043</td>
<td>2.907</td>
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<td>0.054</td>
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</table>
EMX2 = Exogenous employment in average wage manufacturing (thousands)
EMFISH = Exogenous employment in fish harvesting (thousands)
MTOT = Total exogenous employment (thousands)
B01 = Basic sector employment, Aleutian Islands census division (thousands)
B02 = Basic sector employment, Anchorage census division (thousands)
B05 = Basic sector employment, Bethel census division (thousands)
B06 = Basic sector employment, Bristol Bay Region (thousands)
B08 = Basic sector employment, Cordova/McCarthy census division (thousands)
B11 = Basic sector employment, Southeast Alaska (thousands)
B12 = Basic sector employment, Kenai/Cook Inlet census division (thousands)
B14 = Basic sector employment, Kobuk census division (thousands)
B15 = Basic sector employment, Kodiak census division (thousands)
B16 = Basic sector employment, Kuskokwim census division (thousands)
B18 = Basic sector employment, Nome census division (thousands)
B21 = Basic sector employment, Seward census division (thousands)
B26 = Basic sector employment, Valdez/Chitina/Whittier census division (thousands)
B27 = Basic sector employment, Wade Hampton census division (thousands)

5. **Bottomfish Harvesting and Processing**

The 1981 American domestic catch of bottomfish in the Bering Sea and the Gulf of Alaska totaled 107,540 metric tons (North Pacific Fisheries Management Council, 1981). This is less than 6 percent of the optimum yield of 1.9 million metric tons calculated for these areas by the North Pacific Fisheries Management Council.

Most people agree that the American catch of bottomfish in Alaskan waters will substantially increase over the next twenty years, replacing foreign harvests. However, there is considerable uncertainty as to the extent to which employment in Alaska in bottomfish harvesting and processing may be expected to rise. Past projections have varied widely, primarily as a result of differences in assumptions about total harvests, the location of bottomfish processing (onshore or offshore), and residency patterns of employees.

A number of factors suggest that the U.S. fishing fleet, and in particular onshore Alaska processors, are at an economic disadvantage compared to foreign operations. These are high U.S. labor costs (in particular in Alaska), high transportation costs from Alaska (due partly to the Jones Act), lack of a well-developed transportation and services infrastructure, lack of a highly skilled, stable work force for an onshore processing industry, lack of U.S. marketing channels for Alaska groundfish, high American interest rates, subsidization of foreign fisheries, high quality standards in foreign markets, and import barriers for foreign markets. These factors are discussed in
Scott (1980) and Natural Resources Consultants (1980). Working in favor of the future development of the U.S. bottomfish industry are the commitment of the State of Alaska to this goal and the carrot and stick provided by U.S. allocations of Alaska groundfish resources to foreign operators.

The bottomfish harvesting and processing employment assumptions used in the MAP model runs were based on a number of assumptions, of which the most important are:

- Domestic harvests grow at a constant rate from their 1981 levels to optimum yield levels in 2000.

- In 2000, 60 percent of the catch is accounted for by catcher processors, 20 percent by joint ventures with foreign processors, and 20 percent by onshore Alaska processors. The allocation of the domestic catch changes in a linear fashion over time from the 1981 levels of approximately 89 percent for joint ventures and 11 percent for onshore processing.

- 30 percent of catcher processor employees, 80 percent of trawler employees, and 100 percent of onshore processing plant employees are Alaska residents.

These and other assumptions used in projecting bottomfish employment are reviewed in Appendix B. The bottomfish employment projections are presented in Table 66.
### TABLE 66. BOTTOMFISH FISHING AND PROCESSING EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>EMCNX2</th>
<th>EMMX2</th>
<th>EMFISH</th>
<th>BO1</th>
<th>BO2</th>
<th>B15</th>
<th>MTOT</th>
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**EMCNX2** = Exogenous employment in average wage construction (thousands)
**EMMX2** = Exogenous employment in average wage manufacturing (thousands)
**EMFISH** = Exogenous employment in fish harvesting (thousands)
**BO1** = Basic sector employment, Aleutian Islands census division (thousands)
**BO2** = Basic sector employment, Anchorage census division (thousands)
**B15** = Basic sector employment, Kodiak census division (thousands)
**MTOT** = Total exogenous employment (thousands)

**Source:** See text.

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6. Federal Civilian Employment

Historically, federal civilian employment has grown at an average annual rate of about 0.5 percent. By 1979, such employment had reached a level of 17,915 persons.

In the base case, it is assumed that the historical growth pattern continues in the future, raising federal civilian employment to 19,893 by the year 2000, as shown in Table 67.

7. Federal Military Employment

In 1979, active duty military personnel in Alaska numbered 23,323 persons. In the base case, it is assumed that this level is maintained throughout the forecast period, as shown in Table 68.

TOURISM ASSUMPTIONS

Recent changes in the specification of the MAP model have been made to net out those portions of transportation, trade, and service sector employment generated by tourist activity in the state. Such estimates are now generated in forecasts as a function of an exogenously forecast estimate of total tourists visiting Alaska during the forecast period. In 1979, the Alaska Division of Tourism estimated that 505,400 persons visited the state.

In the base case, it is assumed that the number of visitors continues to grow at a constant annual rate of 4 percent, reaching over 1.1 million persons annually by the year 2000.
## Table 67. Federal Civilian Employment Assumptions

| G08 | 2.328 | 2.416 | 0.104 | 0.248 | 0.286 | 0.077 | 0.097 | 0.178 | 0.05 |
| 60  | 0.036 | 0.34   | 0.428 | 0.105 | 0.16 | 0.288 | 0.078 | 0.098 | 0.179 | 0.06 |
| 81  | 0.036 | 2.351  | 0.44   | 0.105 | 0.425 | 0.289 | 0.078 | 0.098 | 0.18  | 0.06 |
| 82  | 0.037 | 2.363  | 0.453  | 0.106 | 0.322 | 0.291 | 0.079 | 0.099 | 0.181 | 0.06 |
| 83  | 0.037 | 2.375  | 0.465  | 0.107 | 0.223 | 0.292 | 0.079 | 0.099 | 0.182 | 0.07 |
| 84  | 0.037 | 2.387  | 0.477  | 0.107 | 0.245 | 0.294 | 0.079 | 0.099 | 0.183 | 0.07 |
| 85  | 0.037 | 2.399  | 0.49   | 0.108 | 0.256 | 0.295 | 0.079 | 0.099 | 0.184 | 0.07 |
| 86  | 0.037 | 2.411  | 0.502  | 0.108 | 0.257 | 0.296 | 0.079 | 0.099 | 0.185 | 0.07 |
| 87  | 0.037 | 2.423  | 0.515  | 0.109 | 0.259 | 0.298 | 0.081 | 0.101 | 0.186 | 0.07 |
| 88  | 0.038 | 2.435  | 0.527  | 0.109 | 0.26 | 0.298 | 0.081 | 0.101 | 0.186 | 0.07 |
| 89  | 0.038 | 2.447  | 0.54   | 0.11  | 0.261 | 0.301 | 0.081 | 0.102 | 0.187 | 0.07 |
| 90  | 0.038 | 2.459  | 0.552  | 0.11  | 0.262 | 0.302 | 0.082 | 0.103 | 0.187 | 0.07 |
| 91  | 0.038 | 2.472  | 0.565  | 0.111 | 0.264 | 0.304 | 0.082 | 0.103 | 0.189 | 0.07 |
| 92  | 0.039 | 2.485  | 0.578  | 0.111 | 0.265 | 0.305 | 0.083 | 0.104 | 0.19  | 0.07 |
| 93  | 0.039 | 2.496  | 0.591  | 0.112 | 0.266 | 0.307 | 0.083 | 0.104 | 0.191 | 0.07 |
| 94  | 0.039 | 2.509  | 0.604  | 0.113 | 0.268 | 0.309 | 0.083 | 0.105 | 0.192 | 0.07 |
| 95  | 0.039 | 2.521  | 0.617  | 0.113 | 0.269 | 0.31 | 0.084 | 0.105 | 0.193 | 0.07 |
| 96  | 0.039 | 2.534  | 0.63   | 0.114 | 0.27 | 0.312 | 0.084 | 0.106 | 0.194 | 0.07 |
| 97  | 0.039 | 2.547  | 0.643  | 0.114 | 0.272 | 0.313 | 0.085 | 0.106 | 0.195 | 0.07 |
| 98  | 0.04  | 2.559  | 0.656  | 0.115 | 0.273 | 0.315 | 0.085 | 0.107 | 0.196 | 0.07 |
| 99  | 0.04  | 2.572  | 0.67   | 0.115 | 0.275 | 0.316 | 0.086 | 0.107 | 0.197 | 0.07 |

<p>| G24 | 0.337 | 0.034 | 0.045 | 0.135 | 0.259 |
| 1980 | 0.337 | 0.034 | 0.045 | 0.136 | 0.261 |
| 1981 | 0.34   | 0.035 | 0.045 | 0.136 | 0.262 |
| 1982 | 0.34   | 0.035 | 0.046 | 0.137 | 0.263 |
| 1983 | 0.34   | 0.035 | 0.046 | 0.138 | 0.264 |
| 1984 | 0.34   | 0.035 | 0.046 | 0.138 | 0.266 |
| 1985 | 0.34   | 0.035 | 0.046 | 0.139 | 0.267 |
| 1986 | 0.34   | 0.035 | 0.047 | 0.14  | 0.268 |
| 1987 | 0.34   | 0.036 | 0.047 | 0.141 | 0.27 |
| 1988 | 0.35   | 0.036 | 0.047 | 0.142 | 0.273 |
| 1989 | 0.35   | 0.036 | 0.048 | 0.143 | 0.274 |
| 1990 | 0.35   | 0.036 | 0.048 | 0.143 | 0.275 |
| 1991 | 0.36   | 0.037 | 0.049 | 0.146 | 0.281 |
| 1992 | 0.36   | 0.037 | 0.049 | 0.147 | 0.282 |
| 1993 | 0.36   | 0.037 | 0.049 | 0.148 | 0.284 |
| 1994 | 0.36   | 0.037 | 0.049 | 0.148 | 0.285 |
| 1995 | 0.37   | 0.038 | 0.05  | 0.149 | 0.286 |</p>
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<tr>
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</tr>
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<td>Government Employment, Anchorage census division (thousands)</td>
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<td>Government Employment, Barrow/North Slope census division (thousands)</td>
</tr>
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<td>G05</td>
<td>Government Employment, Bethel census division (thousands)</td>
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<td>Government Employment, Bristol Bay Region (thousands)</td>
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<td>Government Employment, Cordova/McCarthy census division (thousands)</td>
</tr>
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<td>Government Employment, Fairbanks census division (thousands)</td>
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<td>Government Employment, Southeast Alaska (thousands)</td>
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<td>G12</td>
<td>Government Employment, Kenai/Cook Inlet census division (thousands)</td>
</tr>
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<td>Government Employment, Kobuk census division (thousands)</td>
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<td>Government Employment, Kuskokwim census division (thousands)</td>
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<td>Government Employment, Matanuska/Susitna census division (thousands)</td>
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<td>Government Employment, Nome census division (thousands)</td>
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<td>Government Employment, S.E. Fairbanks census division (thousands)</td>
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<td>Government Employment, Upper Yukon census division (thousands)</td>
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<td>Government Employment, Valdez/Chitina/Whittier census division (thousands)</td>
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**SOURCE:** Alaska Department of Labor, Statistical Quarterly, various issues, for 1979 value. Projections from 1979 as described in text.
### Table 68. Federal Military Employment Assumptions

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<td>2.176</td>
<td>11.864</td>
<td>0.016</td>
<td>0.014</td>
<td>0.369</td>
</tr>
<tr>
<td>1999</td>
<td>23.323</td>
<td>2.176</td>
<td>11.864</td>
<td>0.016</td>
<td>0.014</td>
<td>0.369</td>
</tr>
<tr>
<td>2000</td>
<td>23.323</td>
<td>2.176</td>
<td>11.864</td>
<td>0.016</td>
<td>0.014</td>
<td>0.369</td>
</tr>
</tbody>
</table>

**Note:** The table continues with similar entries for GO8 to G29, with values indicating specific employment assumptions for different years and categories.
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>G01</td>
<td>Government Employment, Aleutian Islands census division (thousands)</td>
</tr>
<tr>
<td>G02</td>
<td>Government Employment, Anchorage census division (thousands)</td>
</tr>
<tr>
<td>G04</td>
<td>Government Employment, Barrow/North Slope census division (thousands)</td>
</tr>
<tr>
<td>G05</td>
<td>Government Employment, Bethel census division (thousands)</td>
</tr>
<tr>
<td>G06</td>
<td>Government Employment, Bristol Bay Region (thousands)</td>
</tr>
<tr>
<td>G08</td>
<td>Government Employment, Cordova/McCarty census division (thousands)</td>
</tr>
<tr>
<td>G09</td>
<td>Government Employment, Fairbanks census division (thousands)</td>
</tr>
<tr>
<td>G11</td>
<td>Government Employment, Southeast Alaska (thousands)</td>
</tr>
<tr>
<td>G12</td>
<td>Government Employment, Kenai/Cook Inlet census division (thousands)</td>
</tr>
<tr>
<td>G14</td>
<td>Government Employment, Kobuk census division (thousands)</td>
</tr>
<tr>
<td>G15</td>
<td>Government Employment, Kodiak census division (thousands)</td>
</tr>
<tr>
<td>G16</td>
<td>Government Employment, Kuskokwim census division (thousands)</td>
</tr>
<tr>
<td>G17</td>
<td>Government Employment, Matanuska/Susitna census division (thousands)</td>
</tr>
<tr>
<td>G18</td>
<td>Government Employment, Nome census division (thousands)</td>
</tr>
<tr>
<td>G21</td>
<td>Government Employment, Seward census division (thousands)</td>
</tr>
<tr>
<td>G24</td>
<td>Government Employment, S.E. Fairbanks census division (thousands)</td>
</tr>
<tr>
<td>G25</td>
<td>Government Employment, Upper Yukon census division (thousands)</td>
</tr>
<tr>
<td>G26</td>
<td>Government Employment, Valdez/Chitina/Whittier census division (thousands)</td>
</tr>
<tr>
<td>G27</td>
<td>Government Employment, Wade Hampton census division (thousands)</td>
</tr>
<tr>
<td>G29</td>
<td>Government Employment, Yukon Koyukuk census division (thousands)</td>
</tr>
</tbody>
</table>

**SOURCE:** Alaska Department of Labor.
POLICY ASSUMPTIONS

Virtually all past work done using the MAP forecasting model as well as work by other forecasters confirms the central role that state government fiscal policy will play in shaping the pattern of future economic development in Alaska. State expenditures not only determine direct government employment, but also affect all endogenous sectors of the economy through expenditures on goods and services and capital improvements. State revenues drawn out of personal income affect local demands directly, and those drawn from resources serve to relax expenditure constraints on state government.

While anticipating the course of future revenues and expenditures is necessarily extremely speculative, some of the general outlines of the pattern of state fiscal behavior are already in place, and serve as a guide to several of the major assumptions utilized in the base case.

First, on the revenue side, a variety of taxes have been revised in the recent past. For these projections, we assume that the state personal income tax is permanently eliminated. The petroleum corporate income tax assumptions reflect the changes made during the 1981 legislative session. Exogenous state revenues are composed of four items—the property tax on petroleum facilities, royalty payments, state severance taxes, and petroleum corporate income taxes.

As shown in Table 69, property tax revenues from the Prudhoe facility, the TAPS pipeline, the Alaska Natural Gas Transportation System, and
### Table 69: State Revenue Assumptions
(Millions of Current Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>RPTS</th>
<th>RPPS</th>
<th>RPRY</th>
<th>RTCSKPX</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>469.9</td>
<td>350.</td>
<td>881.3</td>
<td>135.12</td>
</tr>
<tr>
<td>1982</td>
<td>1678.</td>
<td>358.801</td>
<td>1666.</td>
<td>820.</td>
</tr>
<tr>
<td>1983</td>
<td>2102.</td>
<td>369.348</td>
<td>2087.</td>
<td>495.</td>
</tr>
<tr>
<td>1984</td>
<td>2480.</td>
<td>379.617</td>
<td>2463.</td>
<td>593.16</td>
</tr>
<tr>
<td>1985</td>
<td>2896.</td>
<td>387.264</td>
<td>2894.</td>
<td>694.8</td>
</tr>
<tr>
<td>1986</td>
<td>3497.</td>
<td>397.263</td>
<td>3473.</td>
<td>836.4</td>
</tr>
<tr>
<td>1987</td>
<td>3978.</td>
<td>543.154</td>
<td>3962.</td>
<td>952.8</td>
</tr>
<tr>
<td>1988</td>
<td>3675.</td>
<td>564.186</td>
<td>4404.</td>
<td>969.48</td>
</tr>
<tr>
<td>1989</td>
<td>4149.</td>
<td>586.663</td>
<td>4928.</td>
<td>1089.24</td>
</tr>
<tr>
<td>1990</td>
<td>4002.</td>
<td>601.828</td>
<td>4830.</td>
<td>1059.84</td>
</tr>
<tr>
<td>1991</td>
<td>3752.</td>
<td>614.356</td>
<td>4641.</td>
<td>1007.16</td>
</tr>
<tr>
<td>1992</td>
<td>3656.</td>
<td>622.681</td>
<td>4631.</td>
<td>994.44</td>
</tr>
<tr>
<td>1993</td>
<td>3775.</td>
<td>628.037</td>
<td>4814.</td>
<td>1030.68</td>
</tr>
<tr>
<td>1994</td>
<td>3661.</td>
<td>634.014</td>
<td>4718.</td>
<td>1005.48</td>
</tr>
<tr>
<td>1995</td>
<td>3417.</td>
<td>634.542</td>
<td>4481.</td>
<td>947.76</td>
</tr>
<tr>
<td>1996</td>
<td>3256.</td>
<td>630.545</td>
<td>4380.</td>
<td>916.32</td>
</tr>
<tr>
<td>1997</td>
<td>3420.</td>
<td>621.568</td>
<td>4659.</td>
<td>969.48</td>
</tr>
<tr>
<td>1998</td>
<td>3420.</td>
<td>607.445</td>
<td>4659.</td>
<td>969.48</td>
</tr>
<tr>
<td>1999</td>
<td>3420.</td>
<td>589.322</td>
<td>4659.</td>
<td>969.48</td>
</tr>
<tr>
<td>2000</td>
<td>3420.</td>
<td>566.396</td>
<td>4659.</td>
<td>969.48</td>
</tr>
</tbody>
</table>

**RPTS** = Oil and gas production taxes (millions of current dollars)

**RPRY** = Oil and gas royalties (millions of current dollars)

**RPPS** = Oil and gas property taxes (millions of current dollars)

**RTCSKPX** = Special oil and gas corporate taxes (millions of current dollars)

**Sources:**
OCS development reach over 500 million dollars by the end of the forecast period. Oil and gas royalty, production tax, and special corporate tax revenues peak at about $10 billion annually by 1989, based on recent petroleum production revenue forecasts by the Alaska Department of Revenue.

On the expenditure side, it is assumed that real per capita expenditures will grow over the forecast period in proportion to the growth in real per capita income.

While this assumed behavior is somewhat more conservative than has been observed in the last several years, it is impossible to use the expenditure path of the recent past as a long term trend, inasmuch as it is simply not sustainable in the long run. The implicitly assumed unitary income elasticity of expenditures does represent a sustainable policy over the forecast period.
The Base Case Assumptions: The SCIMP Model

Utilization of the SCIMP model requires initial period population figures, projected exogenous employment, and a variety of control parameters including employment multipliers, demographic parameters, and labor force participation rates. These assumptions are discussed in this section.

The assumption was made throughout that there is no interaction between the military populations stationed on Adak and Shemya and the rest of the economy of the Aleutian Islands. These populations were assumed to remain constant over the entire period. They were subtracted from total population of the region before running the SCIMP model, and added back into the final population figures. In addition, OCS offshore employment was assumed to have no interaction with the rest of the local economy.

POPULATION

Starting population data for 1980 were taken from 1980 census printouts. Calculation of the input data by age, race, and sex for civilian population is presented in Table 70. This population was adjusted upward slightly to allow for consistency with the 1970 definition of the Aleutian Islands census division, which is the basis for other input data reported for the region by the State of Alaska. The adjusted 1980 civilian population was 4,328. Adding in the military population of 3,915 results in a total 1980 population of 8,243.
### TABLE 70: CALCULATION OF POPULATION DATA FOR SCIMP RUN, ALEUTIAN ISLAND CENSUS DIVISION

<table>
<thead>
<tr>
<th>Age Cohort</th>
<th>Total Population (Including Military)</th>
<th>Civilian Population</th>
<th>Adjusted Civilian Population&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>0-14</td>
<td>857</td>
<td>773</td>
<td>444</td>
</tr>
<tr>
<td>15-19</td>
<td>576</td>
<td>278</td>
<td>361</td>
</tr>
<tr>
<td>20-24</td>
<td>1,017</td>
<td>523</td>
<td>643</td>
</tr>
<tr>
<td>25-29</td>
<td>759</td>
<td>438</td>
<td>424</td>
</tr>
<tr>
<td>30-44</td>
<td>1,204</td>
<td>587</td>
<td>620</td>
</tr>
<tr>
<td>45-64</td>
<td>410</td>
<td>239</td>
<td>44</td>
</tr>
<tr>
<td>64+</td>
<td>55</td>
<td>52</td>
<td>2</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4,878</td>
<td>2,890</td>
<td>2,588</td>
</tr>
</tbody>
</table>

<sup>a</sup>Calculated from 1980 census data on native population by age group. These data were not sex-specific.

<sup>b</sup>The 1980 census definition of the Aleutian Islands excluded four communities: Chignik, Chignik Lagoon, Chignik Lake, and Perryville, the population of which totals 475. Civilian population figures were adjusted upwards proportionately by a factor of .12328 to make population figures consistent with statistics issued by the State of Alaska.

**SOURCE:** 1980 census printouts.
EXOGENOUS EMPLOYMENT

The SCIMP model requires projections of exogenous employment for the entire period. Projections were supplied for federal government employment and for employment in fish harvesting, fish processing, and other basic sector activities. The fish harvesting employment was further subdivided between residents of the Aleutian Islands and nonresidents. Fish processing and other basic sector activities were similarly divided between local residents and enclave employees whose permanent residence is outside the Aleutian Islands.

In developing the fish harvesting and processing employment assumptions, that part of employment involved with species other than bottomfish was assumed to remain constant, with resident harvesting employment at 251, nonresident harvesting employment at 505, resident processing employment at 162, and nonresident processing employment at 1,459. In contrast, bottomfish harvesting employment was assumed to grow rapidly. The calculation of bottomfish employment is discussed in Appendix B.

Other basic sector activities include a small amount of resident employment in agriculture and primarily enclave employment associated with OCS exploration activities from the St. George sale (no development and operations employment is assumed to result from this sale), and construction of bottomfish processing facilities.
Federal government civilian employment was assumed to rise at a rate of 0.5 percent annually from a 1980 level of 706.

The exogenous employment assumptions are summarized in Table 71.

EMPLOYMENT MULTIPLIERS
The SCIMP model calculates support sector employment by multiplying exogenous employment by employment multipliers. A multiplier of .2332 was assumed for all resident employment, based on calculations done for an earlier study (Tuck and Huskey, St. George Basin Petroleum Development Scenarios, Economic and Demographic Analysis, 1981, page 101). A much lower multiplier of .0466 was assumed for exogenous enclave employment, based on the same source. Finally, a figure of .0233 (half the enclave multiplier) was assumed for nonresident fish harvesting employment, on the assumption that these workers would have an even smaller interaction with the local economy. These multiplier assumptions are shown in Table 71.

State and local government employment was calculated by multiplying resident civilian population in the previous year by a factor of .0948. This reflects an assumption that this ratio remains constant over time. The figure was based on the ratio of the 1979 average state and local government employment (reported in the Alaska Department of Labor's Statistical Quarterly) to the 1978 civilian population (calculated by reducing the 1978 population figure reported in the
TABLE 71. SCIMP MODEL EXOGENOUS EMPLOYMENT ASSUMPTIONS

<table>
<thead>
<tr>
<th>Projection Year (1-1981)</th>
<th>EMFPR</th>
<th>EMFPNR</th>
<th>EMFHR</th>
<th>EMFHRN</th>
<th>EMX</th>
<th>EMXNR</th>
<th>FGVT</th>
</tr>
</thead>
</table>

Multiplier .2332 .0466 .2332 .0233 .2332 .0466 .2332

EMFPR = Resident fish processing employment.
EMFPNR = Nonresident (enclave) fish processing employment.
EMFHR = Resident fish harvesting employment.
EMFHRN = Nonresident fish harvesting employment.
EMX = Other basic sector resident employment.
EMXNR = Other basic sector nonresident (enclave) employment.
FGVT = Federal government civilian employment.

OTHER PARAMETERS
Birth rate and survival rate parameters were based on 1970 census data and more recent data obtained from the U.S. Department of Health, Education and Welfare. No noneconomic induced migration was assumed.

Labor force participation rates for white males were assumed to be the same as those published in the Survey of Income and Education (1976, Spring). The published labor force participation rates for white females, native males and native females were adjusted upwards by a factor of 1.144. This was done so that the 1980 labor force (predicted by multiplying the labor force participation rates by the 1980 population figures) would equal the total labor force calculated by adding 1980 unemployment figures to the total employment figure projected by the model for 1980.

This completes the description of the base case assumptions. We now turn to the base case projections.
## Table 72. Projected Population and Components of Change: Alaska, 1980 to 2000

(Thousands of Persons)

<table>
<thead>
<tr>
<th>Year</th>
<th>POP</th>
<th>NATINC</th>
<th>POMIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>402,057</td>
<td>5.03</td>
<td>-7.4</td>
</tr>
<tr>
<td>1981</td>
<td>415,577</td>
<td>4.62</td>
<td>7.39</td>
</tr>
<tr>
<td>1982</td>
<td>433,439</td>
<td>4.804</td>
<td>11.537</td>
</tr>
<tr>
<td>1983</td>
<td>448,932</td>
<td>5.133</td>
<td>8.812</td>
</tr>
<tr>
<td>1984</td>
<td>464,682</td>
<td>5.343</td>
<td>8.824</td>
</tr>
<tr>
<td>1985</td>
<td>489,654</td>
<td>5.558</td>
<td>17.802</td>
</tr>
<tr>
<td>1986</td>
<td>521,101</td>
<td>6.14</td>
<td>23.684</td>
</tr>
<tr>
<td>1987</td>
<td>537,185</td>
<td>6.935</td>
<td>7.51</td>
</tr>
<tr>
<td>1988</td>
<td>540,376</td>
<td>7.041</td>
<td>-5.54</td>
</tr>
<tr>
<td>1989</td>
<td>543,411</td>
<td>6.645</td>
<td>-5.344</td>
</tr>
<tr>
<td>1990</td>
<td>545,608</td>
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<td>-5.766</td>
</tr>
<tr>
<td>1991</td>
<td>552,977</td>
<td>5.951</td>
<td>-0.451</td>
</tr>
<tr>
<td>1992</td>
<td>560,559</td>
<td>5.843</td>
<td>-0.054</td>
</tr>
<tr>
<td>1993</td>
<td>569,582</td>
<td>5.756</td>
<td>1.453</td>
</tr>
<tr>
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<td>579,119</td>
<td>5.742</td>
<td>1.959</td>
</tr>
<tr>
<td>1995</td>
<td>589,578</td>
<td>5.756</td>
<td>2.845</td>
</tr>
<tr>
<td>1996</td>
<td>600,638</td>
<td>5.812</td>
<td>3.366</td>
</tr>
<tr>
<td>1997</td>
<td>611,903</td>
<td>5.893</td>
<td>3.466</td>
</tr>
<tr>
<td>1998</td>
<td>623,553</td>
<td>5.979</td>
<td>3.739</td>
</tr>
<tr>
<td>1999</td>
<td>635,533</td>
<td>6.076</td>
<td>3.945</td>
</tr>
<tr>
<td>2000</td>
<td>648,598</td>
<td>6.179</td>
<td>4.9</td>
</tr>
</tbody>
</table>

**POP** = Population (thousands)

**NATINC** = Civilian non-Native natural increase in population (thousands)

**POMIG** = Net increase in population due to migration (thousands)

**Source:** MAP Model Base Case Projections.
Civilian non-Native 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 large construction projects.

The net result is a population of 649 thousand in 2000, an increase of 61 percent over the 1980 population of 402 thousand. Of this increase 111 thousand is accounted for by civilian non-Native natural increase, while the balance is attributed to native increase and net migration.

Age Structure

Projections of age structure of the Alaska population are shown in Table 73. The share of adults stays almost the same throughout the period, while the shares of children and aged decline and rise by about two percent, respectively.

Employment

Projections of total employment (EM99), wage and salary employment (EM991), and employment in the basic sector (EMNS), the support sector (EMSP), and government (EMG9) are presented in Table 74. Total employment grows from 204.4 thousand in 1980 to 341.8 thousand in 2000, a growth rate of 2.6 percent. Growth of basic sector employment (at 2.7 percent) occurs in response to construction, expanding petroleum-related activity, and growth of bottomfishing. Expansion is somewhat more rapid in the first decade (3.4 percent) than in the 1990s (2.0 percent).
TABLE 73. PROJECTED AGE STRUCTURE OF ALASKA POPULATION, 1980 - 2000
(Proportion of Total Population)

<table>
<thead>
<tr>
<th>Year</th>
<th>POP.KID</th>
<th>POP.AD</th>
<th>POP.GER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.291</td>
<td>0.669</td>
<td>0.04</td>
</tr>
<tr>
<td>1981</td>
<td>0.29</td>
<td>0.668</td>
<td>0.042</td>
</tr>
<tr>
<td>1982</td>
<td>0.29</td>
<td>0.668</td>
<td>0.042</td>
</tr>
<tr>
<td>1983</td>
<td>0.289</td>
<td>0.668</td>
<td>0.043</td>
</tr>
<tr>
<td>1984</td>
<td>0.289</td>
<td>0.667</td>
<td>0.044</td>
</tr>
<tr>
<td>1985</td>
<td>0.288</td>
<td>0.669</td>
<td>0.044</td>
</tr>
<tr>
<td>1986</td>
<td>0.287</td>
<td>0.67</td>
<td>0.043</td>
</tr>
<tr>
<td>1987</td>
<td>0.287</td>
<td>0.669</td>
<td>0.043</td>
</tr>
<tr>
<td>1988</td>
<td>0.288</td>
<td>0.667</td>
<td>0.045</td>
</tr>
<tr>
<td>1989</td>
<td>0.289</td>
<td>0.665</td>
<td>0.047</td>
</tr>
<tr>
<td>1990</td>
<td>0.289</td>
<td>0.663</td>
<td>0.048</td>
</tr>
<tr>
<td>1991</td>
<td>0.288</td>
<td>0.662</td>
<td>0.05</td>
</tr>
<tr>
<td>1992</td>
<td>0.287</td>
<td>0.662</td>
<td>0.051</td>
</tr>
<tr>
<td>1993</td>
<td>0.286</td>
<td>0.662</td>
<td>0.052</td>
</tr>
<tr>
<td>1994</td>
<td>0.284</td>
<td>0.662</td>
<td>0.053</td>
</tr>
<tr>
<td>1995</td>
<td>0.283</td>
<td>0.663</td>
<td>0.054</td>
</tr>
<tr>
<td>1996</td>
<td>0.281</td>
<td>0.663</td>
<td>0.055</td>
</tr>
<tr>
<td>1997</td>
<td>0.278</td>
<td>0.664</td>
<td>0.058</td>
</tr>
<tr>
<td>1998</td>
<td>0.277</td>
<td>0.664</td>
<td>0.059</td>
</tr>
<tr>
<td>2000</td>
<td>0.276</td>
<td>0.664</td>
<td>0.06</td>
</tr>
</tbody>
</table>

---

POP.KID = Share of children (under age 15) in total population
POP.AD  = Share of adults (between ages 15 and 65) in total population
POP.GER = Share of aged (over age 65) in total population

SOURCE: MAP Model Base Case Projections.
<table>
<thead>
<tr>
<th>Year</th>
<th>EM99</th>
<th>EM991</th>
<th>EMNS</th>
<th>EMSP</th>
<th>EMG9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>204.352</td>
<td>190.1</td>
<td>45.983</td>
<td>79.777</td>
<td>78.591</td>
</tr>
<tr>
<td>1981</td>
<td>213.712</td>
<td>198.785</td>
<td>48.817</td>
<td>81.878</td>
<td>83.017</td>
</tr>
<tr>
<td>1982</td>
<td>227.441</td>
<td>211.75</td>
<td>52.979</td>
<td>86.692</td>
<td>87.77</td>
</tr>
<tr>
<td>1983</td>
<td>238.289</td>
<td>221.976</td>
<td>55.743</td>
<td>91.751</td>
<td>90.795</td>
</tr>
<tr>
<td>1984</td>
<td>248.404</td>
<td>231.498</td>
<td>57.923</td>
<td>97.515</td>
<td>92.966</td>
</tr>
<tr>
<td>1985</td>
<td>266.667</td>
<td>248.714</td>
<td>65.548</td>
<td>106.685</td>
<td>94.454</td>
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<tr>
<td>1986</td>
<td>291.365</td>
<td>271.928</td>
<td>74.407</td>
<td>118.14</td>
<td>98.818</td>
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<tr>
<td>1987</td>
<td>302.46</td>
<td>282.322</td>
<td>72.645</td>
<td>123.112</td>
<td>106.703</td>
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<tr>
<td>1988</td>
<td>300.616</td>
<td>280.525</td>
<td>66.574</td>
<td>124.316</td>
<td>109.726</td>
</tr>
<tr>
<td>1989</td>
<td>297.076</td>
<td>277.123</td>
<td>64.861</td>
<td>123.852</td>
<td>108.363</td>
</tr>
<tr>
<td>1990</td>
<td>293.142</td>
<td>273.339</td>
<td>64.395</td>
<td>121.57</td>
<td>107.177</td>
</tr>
<tr>
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<td>294.713</td>
<td>274.728</td>
<td>66.318</td>
<td>122.244</td>
<td>106.151</td>
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<td>1993</td>
<td>300.396</td>
<td>279.854</td>
<td>67.478</td>
<td>125.829</td>
<td>107.09</td>
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<tr>
<td>1994</td>
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<td>283.692</td>
<td>68.439</td>
<td>128.303</td>
<td>107.878</td>
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<td>288.45</td>
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<td>293.723</td>
<td>71.469</td>
<td>134.243</td>
<td>109.927</td>
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<td>299.092</td>
<td>72.949</td>
<td>137.477</td>
<td>111.138</td>
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<tr>
<td>1998</td>
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<td>304.725</td>
<td>74.59</td>
<td>140.872</td>
<td>112.343</td>
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<tr>
<td>1999</td>
<td>334.3</td>
<td>310.561</td>
<td>76.289</td>
<td>144.373</td>
<td>113.638</td>
</tr>
<tr>
<td>2000</td>
<td>341.827</td>
<td>317.327</td>
<td>78.612</td>
<td>148.251</td>
<td>114.964</td>
</tr>
</tbody>
</table>

**EM99** = Total employment (thousands)
**EM991** = Total wage and salary employment (thousands)
**EMNS** = Employment in basic sector: agriculture, mining, construction and manufacturing (thousands)
**EMSP** = Employment in services (thousands)
**EMG9** = Government employment (thousands)

**SOURCE:** MAP Model Base Case Projections.
However, growth is most rapid (8.4 percent) over the period 1980 to 1986, reflecting primarily gas pipeline construction. Between 1986 and 1990, following the peak of the pipeline construction, basic sector employment falls. Government growth (1.9 percent) is largely accounted for by growth of state and local government.

Support sector growth reflects the growth of the basic sector. For the entire period, growth averages 3.1 percent. Growth is somewhat more rapid (at 4.3 percent) during the 1980s than during the 1990s (2.0 percent).

Support sector employment as a percent of total employment grows from 39.0 percent in 1980 to 43.4 percent in 2000. The share of basic sector employment also rises slightly, from 22.5 to 23.0 percent, while the share of government employment falls from 38.5 to 33.6 percent.

In summary, there is considerable growth in employment over the 20-year period. 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.

**Personal Income, Wages and Prices**

Personal income projections (measured in 1981 dollars), both total and per capita, are shown in Table 75. Total personal income grows from
TABLE 75. PROJECTED PERSONAL INCOME AND PERSONAL INCOME PER CAPITA: ALASKA, 1980 - 2000
(Millions of 1981 Dollars, respectively)

<table>
<thead>
<tr>
<th>Year</th>
<th>PI.81</th>
<th>PIPC.81</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>5750.38</td>
<td>14302.4</td>
</tr>
<tr>
<td>1981</td>
<td>6060.18</td>
<td>14582.6</td>
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<tr>
<td>1982</td>
<td>6531.98</td>
<td>15070.1</td>
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<tr>
<td>1983</td>
<td>6939.5</td>
<td>15457.8</td>
</tr>
<tr>
<td>1984</td>
<td>7456.85</td>
<td>16047.2</td>
</tr>
<tr>
<td>1985</td>
<td>8594.86</td>
<td>17552.9</td>
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<tr>
<td>1986</td>
<td>9978.68</td>
<td>19149.2</td>
</tr>
<tr>
<td>1987</td>
<td>9968.82</td>
<td>18557.5</td>
</tr>
<tr>
<td>1988</td>
<td>9344.13</td>
<td>17291.9</td>
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<td>1989</td>
<td>9130.03</td>
<td>16801.3</td>
</tr>
<tr>
<td>1990</td>
<td>8983.99</td>
<td>16463.3</td>
</tr>
<tr>
<td>1991</td>
<td>9141.17</td>
<td>16530.8</td>
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<tr>
<td>1992</td>
<td>9260.97</td>
<td>16521.1</td>
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<td>1993</td>
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<td>16601.4</td>
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<tr>
<td>1994</td>
<td>9662.39</td>
<td>16684.7</td>
</tr>
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<td>1995</td>
<td>9905.07</td>
<td>16800.3</td>
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<tr>
<td>1996</td>
<td>10164.2</td>
<td>16922.4</td>
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<tr>
<td>1997</td>
<td>10428.7</td>
<td>17043.7</td>
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<tr>
<td>1998</td>
<td>10711.9</td>
<td>17178.8</td>
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<tr>
<td>1999</td>
<td>11003.9</td>
<td>17314.4</td>
</tr>
<tr>
<td>2000</td>
<td>11341.2</td>
<td>17485.7</td>
</tr>
</tbody>
</table>

PI.81 = Real personal income (millions of 1981 dollars)
PIPC.81 = Real per capita personal income (1981 dollars)

SOURCE: MAP Model Base Case Projections.
5,750 million dollars in 1980 to 11,341 million dollars in 2000, an average annual rate of growth of 3.5 percent. As was the case with other variables considered, the rate of growth is highest for the first six years (9.6 percent), turns negative between 1986 and 1990 (-2.6 percent), and rises at 7.2 percent between 1990 and 2000. This reflects both changes in the rate of growth of employment as well as changes in the composition of economic activity.

This is more clearly seen in the data on per capita income. Between 1980 and 1986, per capita income grows at an annual rate of 5.0 percent, between 1986 and 1990 it declines by 3.7 percent per year, and for the 1990-2000 period rises by only 0.6 percent per year. The decline for the period 1986 to 1990 and the subsequent slow rate of growth are 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, also an industry with relatively low wage rates.

Projection of total wages and salaries by sector are shown in Table 76. The wage bills in the basic and support sectors mirror the pattern of growth seen in personal income. Wages in the two sectors peak in 1986 and 1987, respectively, decline steadily until 1990, and then begin growing again. Support sector wages do not regain peak 1987 levels until 1995, and basic sector wages do not reach 1986 levels again during the period.
TABLE 76. PROJECTED WAGES AND SALARIES BY SECTOR:
ALASKA, 1980 - 2000
(Millions of 1981 Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>WS99.81</th>
<th>WSNS.81</th>
<th>WSSP.81</th>
<th>WSG9.81</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>4494.67</td>
<td>1150.75</td>
<td>1662.47</td>
<td>1699.02</td>
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<tr>
<td>1981</td>
<td>4705.05</td>
<td>1230.27</td>
<td>1698.34</td>
<td>1810.42</td>
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<tr>
<td>1982</td>
<td>5138.68</td>
<td>1393.41</td>
<td>1770.94</td>
<td>1977.18</td>
</tr>
<tr>
<td>1983</td>
<td>5478.66</td>
<td>1506.18</td>
<td>1882.99</td>
<td>2092.19</td>
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<td>1984</td>
<td>5923.72</td>
<td>1670.9</td>
<td>2059.9</td>
<td>2194.77</td>
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<td>6904.72</td>
<td>2223.38</td>
<td>2391.78</td>
<td>2292.01</td>
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<td>1986</td>
<td>8090.04</td>
<td>2847.89</td>
<td>2776.15</td>
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<tr>
<td>1987</td>
<td>8045.7</td>
<td>2549.8</td>
<td>2784.6</td>
<td>2713.51</td>
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<td>1988</td>
<td>7476.12</td>
<td>1975.08</td>
<td>2689.63</td>
<td>2813.51</td>
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<tr>
<td>1989</td>
<td>7289.87</td>
<td>1838.73</td>
<td>2638.72</td>
<td>2814.44</td>
</tr>
<tr>
<td>1990</td>
<td>7169.77</td>
<td>1795.2</td>
<td>2555.89</td>
<td>2820.61</td>
</tr>
<tr>
<td>1991</td>
<td>7303.63</td>
<td>1895.67</td>
<td>2577.65</td>
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<td>1992</td>
<td>7404.19</td>
<td>1905.61</td>
<td>2608.24</td>
<td>2892.12</td>
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<td>7567.48</td>
<td>1949.57</td>
<td>2673.99</td>
<td>2945.63</td>
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<td>1994</td>
<td>7739.2</td>
<td>1988.6</td>
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<td>3342.23</td>
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<tr>
<td>1999</td>
<td>8844.93</td>
<td>2271.79</td>
<td>3140.04</td>
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<td>2000</td>
<td>9122.31</td>
<td>2356.55</td>
<td>3237.59</td>
<td>3529.44</td>
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</table>

WS99.81 = Total real wages and salaries (millions of 1981 dollars)
WSNS.81 = Total real wages and salaries in basic sector (millions of 1981 dollars)
WSSP.81 = Total real wages and salaries in services (millions of 1981 dollars)
WSG9.81 = Total real wages and salaries in government (millions of 1981 dollars)

SOURCE: MAP Model Base Case Projections.
Total government wages grow throughout the period at an overall rate of 3.7 percent with the growth rate for the first 10 years (5.2 percent) considerably above that for the second period (2.3 percent).

Projections of real wage rates are shown in Table 77. These include the real wage rates for the basic sector (WRNS.81), the support sector (WRSP.81), and government (WRG9.81). Basic sector real wage rates increase rapidly from 1980 to 1986 (7.3 percent per year), decline at a rate of 7.6 percent per year until 1990, and then increase at only 0.7 percent per year until 2000. Overall, the growth rate is 0.9 percent. Support sector real wage rates grow at an average annual rate of 2.0 percent over the period 1980-1986, decline at a rate of 2.7 percent over the period 1986-1990, and rise at a rate of only 0.4 percent over the period 1990-2000. Overall the growth rate is only 0.2 percent for the entire period. Government wages show the greatest rate of growth of 1.8 percent over the entire period.

Our discussion of income and wages has been in real terms. Over this period inflation has been substantial. As shown in Table 78, for most of the period both the Alaska and the United States inflation rates are projected to be 7.0 percent or greater.

**Government Revenues and Expenditures**

State government revenue projections by source are shown in Table 79. The variables include: total state government revenues (RSGF.81), petroleum revenues (RP9S.81), revenues from the Federal government
TABLE 77. PROJECTED REAL WAGE RATES: ALASKA, 1981 - 2000
(1981 Dollars)

<table>
<thead>
<tr>
<th></th>
<th>WRNS.81</th>
<th>WRSP.81</th>
<th>WRG9.81</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>25025.4</td>
<td>20838.9</td>
<td>21618.4</td>
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<tr>
<td>1981</td>
<td>25201.5</td>
<td>20742.3</td>
<td>21807.8</td>
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<td>26301.3</td>
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<td>22526.8</td>
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<td>29778.7</td>
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<td>30222.6</td>
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<td>29976.9</td>
<td>21838.6</td>
<td>30700.4</td>
</tr>
</tbody>
</table>

WRNS.81 = Real wage rate in basic sector (1981 dollars)
WRSP.81 = Real wage rate in services sector (1981 dollars)
WRG9.81 = Real wage rate in government (1981 dollars)

SOURCE: KAP Model Base Case Projections.
TABLE 78. PROJECTED ALASKA AND U.S. INFLATION RATES, 1980 - 2000  
(Percnet Change from Previous Year/100)

<table>
<thead>
<tr>
<th>Year</th>
<th>ALINF</th>
<th>USINF</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>1981</td>
<td>0.089</td>
<td>0.091</td>
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<td>0.083</td>
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<tr>
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<td>0.079</td>
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<td>1984</td>
<td>0.076</td>
<td>0.074</td>
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<tr>
<td>1985</td>
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</tr>
<tr>
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<tr>
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<td>0.069</td>
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<tr>
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<tr>
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<td>0.07</td>
</tr>
<tr>
<td>1999</td>
<td>0.069</td>
<td>0.07</td>
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<tr>
<td>2000</td>
<td>0.068</td>
<td>0.07</td>
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</tbody>
</table>

ALINF = Alaska rate of inflation  
USINF = U.S. rate of inflation

SOURCE: MAP Model Base Case Projections.
<table>
<thead>
<tr>
<th>Year</th>
<th>RSFG.81</th>
<th>RP9S.81</th>
<th>RSFD.81</th>
<th>RSIN.81</th>
<th>RSNP.81</th>
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<tr>
<td>1980</td>
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<td>363.311</td>
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<td>1982</td>
<td>5054.43</td>
<td>4164.37</td>
<td>365.687</td>
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<td>526.634</td>
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<td>886.692</td>
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<td>1989</td>
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<td>5154.3</td>
<td>543.126</td>
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<td>4758.18</td>
<td>553.048</td>
<td>1889.14</td>
<td>894.096</td>
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<td>4773.89</td>
<td>564.856</td>
<td>1989.98</td>
<td>910.004</td>
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<td>4377.32</td>
<td>577.337</td>
<td>2087.26</td>
<td>928.153</td>
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<td>1995</td>
<td>7008.22</td>
<td>3907.81</td>
<td>591.025</td>
<td>2150.64</td>
<td>949.773</td>
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<td>1996</td>
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<td>3541.56</td>
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<td>2938.51</td>
<td>651.166</td>
<td>2086.07</td>
<td>1052.49</td>
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<td>5788.25</td>
<td>2698.28</td>
<td>668.269</td>
<td>2007.42</td>
<td>1082.56</td>
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</table>

RSFG.81 = Total state government revenues (millions of 1981 dollars)
RP9S.81 = Petroleum revenues (millions of 1981 dollars)
RSFD.81 = Federal grants (millions of 1981 dollars)
RSIN.81 = Interest earnings (millions of 1981 dollars)
RSNP.81 = Non-petroleum revenues (millions of 1981 dollars)

SOURCE: MAP Model Base Case Projections.
(RSFD.81), interest earnings (RSIN.81), and non-petroleum revenues (RSNP.81). Non-petroleum revenues include federal grants; thus, total state revenues are the sum of petroleum revenues, interest earnings, and non-petroleum revenues. Total revenue grows steadily from 2.7 billion dollars in 1980 to a peak of 8.5 billion dollars in 1990, and declines steadily thereafter to 5.8 billion dollars in 2000. The bulk of these revenues are accounted for by petroleum revenues. These peak in 1989 at 6.2 billion dollars, and decline through the year 2000 to a level of 2.7 billion dollars.

Receipts from the Federal government increase throughout the period, from .3 billion dollars in 1980 to .7 billion dollars in 2000. Interest earnings rise from .1 billion dollars in 1980 to nearly 2.2 billion dollars in 1996, and then begin to decline. Other revenues (RSNP.81 - RSFD.81) increase from .2 to .4 billion dollars over the period.

Expenditure data are presented in Table 80 and include total State government real expenditures (E99S.81) and real per capita expenditures (ESPC.81). Total expenditures grow at 6.3 percent over the entire period and at 10.4 percent for the first 10 years. During the 1990s the rate is considerably lower at 2.3 percent.

Growth of real per capita expenditures is very rapid at 70 percent per year over the period 1980-1983. Thereafter expenditures fluctuate between 7900 and 9600 dollars per capita.
TABLE 80. PROJECTED STATE GOVERNMENT EXPENDITURES:  
ALASKA, 1980 - 2000  
(Millions of 1981 Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>E995.81</th>
<th>ESPC.81</th>
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<tbody>
<tr>
<td>1980</td>
<td>1647.4</td>
<td>4594.86</td>
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<tr>
<td>1981</td>
<td>2726.79</td>
<td>6561.45</td>
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<tr>
<td>1982</td>
<td>3362.02</td>
<td>7756.61</td>
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<td>1983</td>
<td>3570.36</td>
<td>7952.99</td>
</tr>
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<td>1984</td>
<td>3761.97</td>
<td>8095.8</td>
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<tr>
<td>1985</td>
<td>3970.72</td>
<td>8109.23</td>
</tr>
<tr>
<td>1986</td>
<td>4365.8</td>
<td>8378.04</td>
</tr>
<tr>
<td>1987</td>
<td>4894.61</td>
<td>9111.58</td>
</tr>
<tr>
<td>1988</td>
<td>5082.58</td>
<td>9405.64</td>
</tr>
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<td>1989</td>
<td>5032.65</td>
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<td>1990</td>
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<td>9133.95</td>
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<td>1991</td>
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<tr>
<td>1992</td>
<td>4964.51</td>
<td>8856.35</td>
</tr>
<tr>
<td>1993</td>
<td>5053.96</td>
<td>8890.66</td>
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<td>1994</td>
<td>5196.57</td>
<td>8973.23</td>
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<td>1995</td>
<td>5340.2</td>
<td>9057.66</td>
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<tr>
<td>1996</td>
<td>5504.29</td>
<td>9164.06</td>
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<tr>
<td>1997</td>
<td>5675.02</td>
<td>9274.36</td>
</tr>
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<td>1998</td>
<td>5850.85</td>
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<td>1999</td>
<td>6036.27</td>
<td>9497.97</td>
</tr>
<tr>
<td>2000</td>
<td>6230.01</td>
<td>9605.34</td>
</tr>
</tbody>
</table>

E995.81 = Total state government expenditures (millions of 1981 dollars)  
ESPC.81  = Per capita state expenditures (1981 dollars)  

SOURCE: MAP Model Base Case Projections.
As shown in Table 81, the permanent fund balance peaks in 1995 and declines thereafter. This downturn occurs when the decline in the value of the fund, due to inflation, begins to exceed the increase in value due to additions to the fund and reinvested interest earnings.

THE MAP REGIONAL BASE CASE PROJECTIONS: ANCHORAGE

The MAP regional model base case projections for Anchorage are shown in Table 82. The Anchorage population is projected to rise from 179 thousand in 1980 to 286 thousand in 2000, resulting in an overall growth rate of 2.4 percent. The growth rate is higher during the first decade (3.0 percent per year) than the second decade (1.8 percent per year). Total employment rises slightly faster than population (2.6 percent per year). However, employment declines slightly from 1988 to 1990. Support sector employment rises from 49.3 percent to 53.4 percent of total employment, basic sector employment rises from 14.4 percent to 16.7 percent of total employment, while government employment falls from 36.4 to 29.8 percent of total employment.

THE MAP REGIONAL BASE CASE PROJECTIONS: BRISTOL BAY

MAP regional model projections for Bristol Bay are shown in Table 83. Population is projected to increase from 5,185 in 1980 to 6,378 in 2000, or at a rate of only 1.0 percent. Total employment grows only slightly faster, at a rate of 1.3 percent. The share of basic sector employment in total employment is projected to fall from 46.6 percent to 39.2 percent; the share of government employment in total employment is projected to rise from 31.6 percent to 37.1 percent; and the
TABLE 81. PROJECTED ALASKA PERMANENT FUND BALANCE AND PERMANENT FUND BALANCE PER CAPITA: 1980 to 2000  
(Millions of 1981 Dollars and 1981 Dollars, respectively)

<table>
<thead>
<tr>
<th>Year</th>
<th>BAL99.81</th>
<th>BL9PC.81</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>2229.99</td>
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<tr>
<td>1981</td>
<td>3200.5</td>
<td>7701.34</td>
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<td>5015.59</td>
<td>11571.6</td>
</tr>
<tr>
<td>1983</td>
<td>6879.1</td>
<td>15323.2</td>
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<td>1984</td>
<td>8954.18</td>
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<td>1985</td>
<td>11481.7</td>
<td>23448.7</td>
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<td>1986</td>
<td>14202.2</td>
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<td>31502.7</td>
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<td>19251.2</td>
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<td>21995.</td>
<td>40475.9</td>
</tr>
<tr>
<td>1990</td>
<td>24230.8</td>
<td>44403.2</td>
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<td>1991</td>
<td>26032.5</td>
<td>47077.</td>
</tr>
<tr>
<td>1992</td>
<td>27476.1</td>
<td>49015.5</td>
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<tr>
<td>1993</td>
<td>28873.1</td>
<td>50691.7</td>
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<tr>
<td>1994</td>
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<td>30004.2</td>
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<td>48461.</td>
</tr>
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<td>46397.</td>
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<tr>
<td>1999</td>
<td>27823.</td>
<td>43779.</td>
</tr>
<tr>
<td>2000</td>
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<td>40614.2</td>
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</table>

BAL99.81 = Accumulated Permanent Fund balance (millions of 1981 dollars)  
BL9PC.81 = Per capita accumulated Permanent Fund balance (1981 dollars)  

SOURCE: MAP Model Base Case Projections.
TABLE 82. BASE CASE PROJECTED POPULATION AND EMPLOYMENT, ANCHORAGE CENSUS DIVISION, 1980 - 2000

<table>
<thead>
<tr>
<th>Year</th>
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<th>M.02</th>
<th>B.02</th>
<th>G.02</th>
<th>S.02</th>
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<td>94.26</td>
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<td>97.71</td>
<td>14.37</td>
<td>35.79</td>
<td>47.54</td>
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<td>190.95</td>
<td>103.78</td>
<td>16.19</td>
<td>37.42</td>
<td>50.17</td>
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<td>108.54</td>
<td>17.10</td>
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<td>112.86</td>
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<td>119.61</td>
<td>19.47</td>
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P.02 = Population, Anchorage census division (thousands)
M.02 = Total employment, Anchorage census division (thousands)
B.02 = Basic sector employment, Anchorage census division (thousands)
G.02 = Government employment, Anchorage census division (thousands)
S.02 = Support sector employment, Anchorage census division (thousands)

SOURCE: MAP regional model projections.
TABLE 83. BASE CASE PROJECTED POPULATION AND EMPLOYMENT, 
BRISTOL BAY REGION, 1980 - 2000

<table>
<thead>
<tr>
<th>Year</th>
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<td>3.832</td>
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<td>1.815</td>
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</table>

P.06 = Population, Bristol Bay Region (thousands)  
M.06 = Total employment, Bristol Bay Region (thousands)  
B.06 = Basic sector employment, Bristol Bay Region (thousands)  
G.06 = Government employment, Bristol Bay Region (thousands)  
S.06 = Support sector employment, Bristol Bay Region (thousands)

SOURCE: MAP regional model projections.
share of support sector employment in total employment is projected to rise from 21.9 percent to 23.7 percent.

THE SCIMP MODEL BASE CASE PROJECTIONS: THE ALEUTIAN ISLANDS
This section discusses the SCIMP base case projections of employment and population in the Aleutian Islands. In the tables, years 1-20 represent the years 1981 to 2000.

Basic sector employment projections from 1981 to 2000 are summarized in Table 84. Total exogenous employment rises from 2,656 to 9,145, a growth rate of 6.7 percent. All of this growth is the result of expansion in the bottomfish industry. The share of enclave employment in total employment falls from 81.9 percent to 58.5 percent, reflecting the assumption built into the bottomfish employment projections of a rising resident share.

Projected government employment is shown in Table 85. Total government employment rises from 3,294 to 4,284. Most of the increase results from an increase in state and local government employment from 410 to 1,329. This increase is proportional to the increase in resident population.

Table 86 summarizes total employment. Support sector employment—equal to basic sector and government employment multiplied by employment multipliers, rises from 459 to 1,547, at a rate of 6.6 percent per year. Total employment rises from 6,410 to 14,975, at a rate of
TABLE 84. SCIMP MODEL: BASIC SECTOR
EMPLOYMENT PROJECTIONS, BASE CASE

<table>
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<th>Projection:</th>
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<td>3865, I</td>
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<td>4557, I</td>
<td>7263, I</td>
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<tr>
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<td></td>
<td>15, I</td>
<td>4967, I</td>
<td>8167, I</td>
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<td></td>
<td>15, I</td>
<td>5349, I</td>
<td>9145, I</td>
<td></td>
</tr>
</tbody>
</table>

EMA = Fishing and fish processing resident employment
EMX = Other basic sector resident employment
ENCLV = Basic sector nonresident employment
EMBA = Total basic sector employment (resident and nonresident)
TABLE 85. SCIMP MODEL: GOVERNMENT EMPLOYMENT PROJECTIONS, BASE CASE

<table>
<thead>
<tr>
<th>Year (1=1961)</th>
<th>EML</th>
<th>FGVT</th>
<th>EMIL</th>
<th>EMGT</th>
</tr>
</thead>
<tbody>
<tr>
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<td>410.</td>
<td>710.</td>
<td>2175.</td>
<td>3294.</td>
</tr>
<tr>
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<td>429.</td>
<td>713.</td>
<td>2175.</td>
<td>3317.</td>
</tr>
<tr>
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<td>443.</td>
<td>717.</td>
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<td>3334.</td>
</tr>
<tr>
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<td>720.</td>
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<td>3356.</td>
</tr>
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<td>478.</td>
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<td>2175.</td>
<td>3377.</td>
</tr>
<tr>
<td>6I</td>
<td>496.</td>
<td>727.</td>
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<td>3399.</td>
</tr>
<tr>
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<td>515.</td>
<td>731.</td>
<td>2175.</td>
<td>3421.</td>
</tr>
<tr>
<td>8I</td>
<td>535.</td>
<td>735.</td>
<td>2175.</td>
<td>3444.</td>
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<tr>
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<td>556.</td>
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<td>3470.</td>
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<tr>
<td>10I</td>
<td>584.</td>
<td>742.</td>
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<td>3501.</td>
</tr>
<tr>
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<td>616.</td>
<td>746.</td>
<td>2175.</td>
<td>3537.</td>
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<tr>
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<td>654.</td>
<td>750.</td>
<td>2175.</td>
<td>3578.</td>
</tr>
<tr>
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<td>697.</td>
<td>753.</td>
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<td>3625.</td>
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<td>748.</td>
<td>757.</td>
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<td>3680.</td>
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<tr>
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<td>808.</td>
<td>761.</td>
<td>2175.</td>
<td>3744.</td>
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<tr>
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<td>880.</td>
<td>765.</td>
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<td>3820.</td>
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<td>965.</td>
<td>768.</td>
<td>2175.</td>
<td>3908.</td>
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<td>2175.</td>
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<td>776.</td>
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<td>1329.</td>
<td>780.</td>
<td>2175.</td>
<td>4284.</td>
</tr>
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EML = State and local government employment (all resident)
FGVT = Federal government civilian employment (all resident)
EMIL = Federal government military employment (all resident)
EMGT = Total government employment (all resident)
TABLE 86. SCIMP MODEL: EMPLOYMENT PROJECTIONS, BASE CASE

Projection Year (1=1981) | EMBA  | EMGT  | EMS  | EMTT  |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<td>11</td>
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<td>459</td>
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<td>21</td>
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<td>31</td>
<td>3045</td>
<td>3334</td>
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<tr>
<td>41</td>
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<td>3356</td>
<td>500</td>
<td>7126</td>
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<td>51</td>
<td>3428</td>
<td>3377</td>
<td>516</td>
<td>7321</td>
</tr>
<tr>
<td>61</td>
<td>3451</td>
<td>3399</td>
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<td>7380</td>
</tr>
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<td>71</td>
<td>3397</td>
<td>3421</td>
<td>544</td>
<td>7362</td>
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<tr>
<td>81</td>
<td>3270</td>
<td>3444</td>
<td>560</td>
<td>7274</td>
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<tr>
<td>91</td>
<td>3436</td>
<td>3470</td>
<td>585</td>
<td>7490</td>
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<tr>
<td>10I</td>
<td>3631</td>
<td>3501</td>
<td>615</td>
<td>7747</td>
</tr>
<tr>
<td>11I</td>
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<tr>
<td>12I</td>
<td>4140</td>
<td>3578</td>
<td>695</td>
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<td>4466</td>
<td>3625</td>
<td>747</td>
<td>8839</td>
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<td>4853</td>
<td>3680</td>
<td>810</td>
<td>9343</td>
</tr>
<tr>
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<td>5314</td>
<td>3744</td>
<td>885</td>
<td>9943</td>
</tr>
<tr>
<td>16I</td>
<td>5858</td>
<td>3820</td>
<td>975</td>
<td>10652</td>
</tr>
<tr>
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<td>6503</td>
<td>3908</td>
<td>1082</td>
<td>11494</td>
</tr>
<tr>
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<td>1211</td>
<td>12487</td>
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<tr>
<td>19I</td>
<td>8167</td>
<td>4137</td>
<td>1366</td>
<td>13669</td>
</tr>
<tr>
<td>20I</td>
<td>9145</td>
<td>4284</td>
<td>1547</td>
<td>14975</td>
</tr>
</tbody>
</table>

EMBA = Total basic sector employment (resident and nonresident)
EMGT = Total government employment (all resident)
EMS = Total support sector employment (all resident)
EMTT = Total employment (resident and nonresident)
4.6 percent per year. Resident civilian employment (not shown in the table) rises from 2,060 to 7,452, at a rate of 7.0 percent per year.

Different measures of population are shown in Table 87. The civilian resident population rises from 4,530 in 1981 to 15,825 in 2000 as a result of increased resident bottomfish employment. This represents a rate of population increase of 6.8 percent per year. Enclave population (which includes nonresident fishermen) rises from 2,175 to 5,349, at a rate of 4.9 percent per year. The total population of the region, including military and military dependents as well as enclave workers, rises from 10,620 to 25,089, a growth rate of 4.6 percent per year.
### TABLE 87. SCIMP MODEL: POPULATION PROJECTIONS, BASE CASE

<table>
<thead>
<tr>
<th>Projection Year (t=1981)</th>
<th>BPOPP</th>
<th>PMIL</th>
<th>PRES</th>
<th>ENCLV</th>
<th>BASPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>4530</td>
<td>3915</td>
<td>8445</td>
<td>2175</td>
<td>10620</td>
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<tr>
<td>1982</td>
<td>4675</td>
<td>3915</td>
<td>8590</td>
<td>2209</td>
<td>10799</td>
</tr>
<tr>
<td>1983</td>
<td>4862</td>
<td>3915</td>
<td>8777</td>
<td>2519</td>
<td>11296</td>
</tr>
<tr>
<td>1984</td>
<td>5048</td>
<td>3915</td>
<td>8963</td>
<td>2714</td>
<td>11677</td>
</tr>
<tr>
<td>1985</td>
<td>5241</td>
<td>3915</td>
<td>9156</td>
<td>2839</td>
<td>11995</td>
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<tr>
<td>1986</td>
<td>5438</td>
<td>3915</td>
<td>9353</td>
<td>2826</td>
<td>12179</td>
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<tr>
<td>1987</td>
<td>5646</td>
<td>3915</td>
<td>9561</td>
<td>2731</td>
<td>12292</td>
</tr>
<tr>
<td>1988</td>
<td>5873</td>
<td>3915</td>
<td>9788</td>
<td>2556</td>
<td>12344</td>
</tr>
<tr>
<td>1989</td>
<td>6167</td>
<td>3915</td>
<td>10082</td>
<td>2652</td>
<td>12734</td>
</tr>
<tr>
<td>1990</td>
<td>6509</td>
<td>3915</td>
<td>10424</td>
<td>2760</td>
<td>13184</td>
</tr>
<tr>
<td>1991</td>
<td>6902</td>
<td>3915</td>
<td>10817</td>
<td>2889</td>
<td>13704</td>
</tr>
<tr>
<td>1992</td>
<td>7362</td>
<td>3915</td>
<td>11277</td>
<td>3036</td>
<td>14313</td>
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<tr>
<td>1993</td>
<td>7900</td>
<td>3915</td>
<td>11815</td>
<td>3207</td>
<td>15022</td>
</tr>
<tr>
<td>1994</td>
<td>8537</td>
<td>3915</td>
<td>12452</td>
<td>3404</td>
<td>15856</td>
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<tr>
<td>1995</td>
<td>9293</td>
<td>3915</td>
<td>13208</td>
<td>3634</td>
<td>16842</td>
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<td>1996</td>
<td>10187</td>
<td>3915</td>
<td>14102</td>
<td>3899</td>
<td>18001</td>
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<tr>
<td>1997</td>
<td>11251</td>
<td>3915</td>
<td>15166</td>
<td>4206</td>
<td>19372</td>
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<tr>
<td>1998</td>
<td>12518</td>
<td>3915</td>
<td>16433</td>
<td>4557</td>
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<tr>
<td>1999</td>
<td>14029</td>
<td>3915</td>
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<td>15825</td>
<td>3915</td>
<td>19740</td>
<td>5349</td>
<td>25089</td>
</tr>
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</table>

**BPQPP** = Civilian resident population  
**PMIL** = Military and military dependent population  
**PRES** = Total resident population  
**ENCLV** = Civilian enclave (nonresident) population  
**BASPP** = Total population (resident and nonresident)
IV. PROJECTED IMPACTS OF THE NORTH ALEUTIAN SHELF SALE

In this portion of the report, we describe the six North Aleutian Shelf OCS sale cases and their projected impacts. Projections of sale impacts are developed by adjusting the non-OCS base case assumptions to include direct OCS impacts (primarily employment) and rerunning the models. The differences between the new projections and the base case projections represent the combined direct and indirect impacts of OCS development. We present tables of both absolute impacts (i.e., increases in employment) and percentage impacts (i.e., percentage changes in employment).

The OCS Sale Cases

We analyze the impacts of six different OCS cases, which we refer to as the low, mean, high, alternative four, mean offshore loading, and alternative four offshore loading cases, respectively. All of these cases assume that some oil and gas resources are discovered and developed. Given this assumption, the low case assumes a level of resources that will occur with 95 percent probability, the mean case assumes a level of resources that will occur with 50 percent probability, and the high case assumes a level of resources that will occur with only 5 percent probability.

For all of the cases, the Alaska OCS office provided estimates of employment in different activities for the exploration, construction, and operations phases of OCS development. This information is reproduced in Appendix C. In order to use these employment figures in the
MAP and SCIMP models, it was necessary to make assumptions about the share of employees who would be Alaska residents, and the share who would be residents of the Aleutian Islands. These assumptions are discussed in Appendix C. Table 88 presents resident Alaskan OCS employment for each case. These figures were utilized for the MAP model projections. In the mean case, resident Alaskan employment rises from 103 in 1984 to 2,072 in 1989, and then declines to a level of 1,597 in 1994, remaining at this level for the rest of the projection period. In the low case, maximum employment of 597 is reached in 1987, declining to a constant level of 492 after 1992. In the high case, maximum employment is 3,436 in 1990, declining to a constant level of 2,635 after 1996. In the alternative four case and the mean offshore loading cases, employment levels are approximately 80 percent of the mean case levels. In the alternative four offshore loading case, employment levels are approximately 60 percent of the mean case levels.

Tables 89-94 present Aleutian Islands onshore resident and enclave OCS employment associated with each case. These figures were utilized for the SCIMP model projections. In the mean case, local resident employment rises to 161 by 1991, and thereafter remains constant throughout the projection period. Maximum local resident employment is 53 for the low case, 305 for the high case, 127 for the alternative four case, 119 for the mean offshore loading case, and 95 for the alternative four offshore loading case.
TABLE 88. NORTH ALEUTIAN SHELF OCS RESIDENT ALASKAN EMPLOYMENT ASSUMPTIONS FOR MAP MODEL PROJECTIONS (Thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Case</th>
<th>Low Case</th>
<th>High Case</th>
<th>Alternative IV Case</th>
<th>Mean Case Offshore Loading</th>
<th>Alternative IV Case Offshore Loading</th>
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<td>0.00</td>
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<td>0.00</td>
<td>0.17</td>
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<td>0.00</td>
</tr>
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<td>0.00</td>
<td>0.17</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>1966</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.17</td>
<td>0.00</td>
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</tr>
<tr>
<td>1967</td>
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<td>0.00</td>
<td>0.17</td>
<td>0.00</td>
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<tr>
<td>1969</td>
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<td>0.00</td>
<td>0.00</td>
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<td>1973</td>
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<td>0.00</td>
<td>0.17</td>
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SOURCE: Alaska OCS Office; residency assumptions presented in Appendix C.
TABLE 89. OCS EMPLOYMENT INPUTS FOR SCIMP MODEL RUNS,
MEAN CASE

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident Employment</th>
<th>Enclave Employment</th>
<th>Dutch Harbor Enclave Employment</th>
<th>Cold Bay Enclave Employment</th>
</tr>
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<tbody>
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</tr>
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<td>145. I</td>
<td>733. I</td>
<td>89. I</td>
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<td>I1990I</td>
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<td>660. I</td>
<td>89. I</td>
<td>571. I</td>
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</table>

SOURCE: Alaska OCS Office (see Appendix C).
TABLE 90. OCS EMPLOYMENT INPUTS FOR SCIMP MODEL RUNS, LOW CASE

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident Employment</th>
<th>Enclave Employment</th>
<th>Dutch Harbor Enclave Employment</th>
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<tr>
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<td>41. I</td>
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SOURCE: Alaska OCS Office (see Appendix C).
TABLE 91. OCS EMPLOYMENT INPUTS FOR SCIMP MODEL RUNS, HIGH CASE

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<th>Resident Employment</th>
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<td>0. I</td>
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<td>0. I</td>
<td>0. I</td>
<td>0. I</td>
</tr>
<tr>
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<td>289. I</td>
<td>82. I</td>
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<tr>
<td>I1987I</td>
<td>64. I</td>
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<td>208. I</td>
<td>91. I</td>
</tr>
<tr>
<td>I1989I</td>
<td>182. I</td>
<td>1428. I</td>
<td>89. I</td>
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SOURCE: Alaska OCS Office (see Appendix C).
TABLE 92. OCS EMPLOYMENT INPUTS FOR SCIMP MODEL RUNS,
ALTERNATIVE FOUR CASE

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident Employment</th>
<th>Enclave Employment</th>
<th>Dutch Harbor Enclave Employment</th>
<th>Cold Bay Enclave Employment</th>
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</thead>
<tbody>
<tr>
<td>1981</td>
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<td>0. I 0. I 0. I 0. I</td>
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<td>0. I 0. I 0. I 0. I</td>
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<tr>
<td>1982</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
</tr>
<tr>
<td>1983</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
</tr>
<tr>
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<tr>
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<td>0. I 0. I 0. I 0. I</td>
</tr>
<tr>
<td>1986</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
</tr>
<tr>
<td>1987</td>
<td>63. I 240. I 150. I 90. I</td>
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<td>0. I 0. I 0. I 0. I</td>
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<tr>
<td>1988</td>
<td>104. I 393. I 124. I 269. I</td>
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</tr>
<tr>
<td>1989</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
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<tr>
<td>1990</td>
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<td>0. I 0. I 0. I 0. I</td>
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<tr>
<td>1991</td>
<td>124. I 441. I 48. I 393. I</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
</tr>
<tr>
<td>1992</td>
<td>127. I 368. I 48. I 320. I</td>
<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
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<tr>
<td>1993</td>
<td>127. I 368. I 48. I 320. I</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
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<tr>
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<td>0. I 0. I 0. I 0. I</td>
</tr>
<tr>
<td>1995</td>
<td>127. I 368. I 48. I 320. I</td>
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<td>0. I 0. I 0. I 0. I</td>
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<td>0. I 0. I 0. I 0. I</td>
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<td>1998</td>
<td>127. I 368. I 48. I 320. I</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
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<tr>
<td>1999</td>
<td>127. I 368. I 48. I 320. I</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
</tr>
<tr>
<td>2000</td>
<td>127. I 368. I 48. I 320. I</td>
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<td>0. I 0. I 0. I 0. I</td>
<td>0. I 0. I 0. I 0. I</td>
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SOURCE: Alaska OCS Office (see Appendix C).
TABLE 93. OCS EMPLOYMENT INPUTS FOR SCIMP MODEL RUNS,
MEAN OFFSHORE LOADING CASE

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident Employment</th>
<th>Enclave Employment</th>
<th>Dutch Harbor Enclave Employment</th>
<th>Cold Bay Enclave Employment</th>
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<tbody>
<tr>
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<td>0. I</td>
<td>0. I</td>
</tr>
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<td>0. I</td>
<td>0. I</td>
<td>0. I</td>
</tr>
<tr>
<td>11983I</td>
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<td>0. I</td>
<td>0. I</td>
<td>0. I</td>
</tr>
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<td>140. I</td>
<td>40. I</td>
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<td>319. I</td>
<td>223. I</td>
<td>96. I</td>
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<td>311. I</td>
<td>192. I</td>
<td>119. I</td>
</tr>
<tr>
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<td>89. I</td>
<td>174. I</td>
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</tr>
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<td>57. I</td>
<td>100. I</td>
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</table>

SOURCE: Alaska OCS Office (see Appendix C).
TABLE 94. OCS EMPLOYMENT INPUTS FOR SCIMP MODEL RUNS, ALTERNATIVE FOUR OFFSHORE LOADING CASE

<table>
<thead>
<tr>
<th>Year</th>
<th>Resident Employment</th>
<th>Enclave Employment</th>
<th>Dutch Harbor Enclave Employment</th>
<th>Cold Bay Enclave Employment</th>
</tr>
</thead>
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<tr>
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<td>0. I</td>
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<tr>
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<td>0. I</td>
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<tr>
<td>I1983I</td>
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<td>0. I</td>
<td>0. I</td>
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<tr>
<td>I1985I</td>
<td>36. I</td>
<td>189. I</td>
<td>147. I</td>
<td>42. I</td>
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</table>

SOURCE: Alaska OCS Office (see Appendix C).
In the mean case, enclave employment peaks at 733 in 1989, and falls to a constant level of 463 by 1992. In the low case, peak enclave employment of 153 occurs in 1990, falling to a constant level of 126 by 1992. In the high case, peak enclave employment is 1,823, falling to a constant level of 839 by 1993. For the alternative four, mean offshore loading, and alternative four offshore loading cases, respectively, peak enclave employment is 493, 319, and 260, falling subsequently to constant levels of 368, 157, and 130.

In addition to generating employment, OCS development also results in additional state revenues from property taxes on petroleum industry facilities. Oil and gas property tax assumptions used in the MAP model projections are presented in Table 95. These assumptions are based on estimates of taxable value of OCS facilities provided by the Alaska OCS office.
TABLE 95. NORTH ALEUTIAN SHELF SALE OIL AND GAS PROPERTY TAX
ASSUMPTIONS USED FOR MAP MODEL PROJECTIONS
(Millions of Dollars)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Case</th>
<th>Low Case</th>
<th>High Case</th>
<th>Alternative Four Case</th>
<th>Mean Offshore Loading Case</th>
<th>Alternative Four Offshore Loading Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.</td>
<td>0.</td>
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<td>0.</td>
<td>0.</td>
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<tr>
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<td>0.</td>
<td>0.</td>
<td>0.</td>
<td>0.</td>
</tr>
<tr>
<td>1982</td>
<td>0.</td>
<td>0.</td>
<td>0.</td>
<td>0.</td>
<td>0.</td>
<td>0.</td>
</tr>
<tr>
<td>1983</td>
<td>0.</td>
<td>0.</td>
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<td>0.</td>
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</tr>
<tr>
<td>1984</td>
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<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>1985</td>
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<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>1986</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>1987</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
</tr>
<tr>
<td>1988</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
<td>0.133</td>
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<tr>
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<td>10.448</td>
<td>0.956</td>
<td>33.737</td>
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<tr>
<td>1990</td>
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<td>15.117</td>
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<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
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<td>15.117</td>
<td>97.23</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
<td>1992</td>
<td>68.113</td>
<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
<td>1993</td>
<td>68.113</td>
<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
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<td>68.113</td>
<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
<td>1995</td>
<td>68.113</td>
<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
<td>1996</td>
<td>68.113</td>
<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
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<td>68.113</td>
<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
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<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
<tr>
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<td>68.113</td>
<td>15.117</td>
<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
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<td>109.892</td>
<td>59.035</td>
<td>59.035</td>
<td>0.956</td>
</tr>
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</table>

SOURCE: See text.
Statewide Impacts

This section discusses statewide impacts of the North Aleutian Shelf OCS cases, as projected by the MAP statewide model. The accompanying tables present both absolute (numerical) impacts associated with the six OCS cases as well as percentage impacts (the size of the impact as a percentage of the base case projected value of the variables). The impacts result primarily from the employment associated with the OCS sales. Where OCS employment levels are similar between cases, the projected impacts are also similar. Thus, impacts are generally highest for the high case and lowest for the low case. Impacts for the alternative four and mean offshore loading cases are slightly less than for the mean case, and slightly lower still for the alternative four offshore loading case. Our discussion of the impacts will focus on the mean case and the high case. However, the tables permit quick comparison with impacts for the other cases.

POPULATION

As shown in Table 96, the mean case results in a population impact of 9,085 in the year 2000, or a 1.4 percent increase over the base case population. The maximum percentage impact over the base case population is 1.15 percent, in 1989.

The high case population impact is 14,168 in the year 2000, with the maximum percentage impact of 2.5 percent occurring in 1991.
### TABLE 96.

**PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE**

**STATEWIDE POPULATION**

(Thousands)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean Case</th>
<th>Low Case</th>
<th>High Case</th>
<th>Alternative Case</th>
<th>Mean Offshore Loading Case</th>
<th>Alternative Four Offshore Loading Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>1982</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<td>0.0</td>
</tr>
<tr>
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<td>0.378</td>
<td>0.212</td>
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</tr>
<tr>
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<td>0.375</td>
<td>0.197</td>
<td>0.61</td>
<td>0.314</td>
<td>1.964</td>
<td>1.711</td>
</tr>
<tr>
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<td>1.864</td>
<td>1.07</td>
<td>0.755</td>
<td>1.171</td>
<td>3.403</td>
<td>2.590</td>
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<tr>
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<td>3.403</td>
<td>1.907</td>
<td>2.066</td>
<td>2.593</td>
<td>5.516</td>
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</tr>
<tr>
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<td>7.924</td>
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<td>13.84</td>
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<td>6.295</td>
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</tr>
<tr>
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<td>2.245</td>
<td>12.599</td>
<td>6.18</td>
<td>6.786</td>
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</tr>
<tr>
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<td>13.052</td>
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<td>7.213</td>
<td>5.669</td>
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</table>

### PERCENTAGE IMPACT

<table>
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<tr>
<th>Year</th>
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<th>Low Case</th>
<th>High Case</th>
<th>Alternative Case</th>
<th>Mean Offshore Loading Case</th>
<th>Alternative Four Offshore Loading Case</th>
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</thead>
<tbody>
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<td>1980</td>
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<td>0.0</td>
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<td>0.0</td>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
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<td>0.0</td>
<td>0.0</td>
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**SOURCE:** MAP Statewide Model Projections.
EMPLOYMENT

Tables 97-100 present projected impacts upon total employment and employment in the basic, services, and government sectors. In the mean case, 7,335 additional jobs occur in 1989, an increase of 2.5 percent in total employment (Table 97). In the high case, 12,758 additional jobs occur in 1991, or an increase of 4.3 percent in total employment.

In 1989, for the mean case, the 2,903 additional basic sector jobs represent an increase of 4.5 percent in basic sector employment (Table 98). In the high case, the 4,304 additional jobs in 1990 represent an increase of 6.7 percent in basic sector employment.

In the mean case, a maximum of 3,679 additional service sector jobs are generated in 1991, an increase of 3.0 percent (Table 99). In the high case, 6,792 additional service sector jobs are generated in 1992, an increase of 5.5 percent.

In the mean case, a maximum of 1,255 additional government jobs are generated in 1990, an increase of 1.2 percent (Table 100). In the high case, 1,882 additional government jobs are generated in 1992, an increase of 1.8 percent.

INCOME, WAGE RATES, AND INFLATION

Tables 101 and 102 present projected impacts on real personal income and per capita personal income. For the mean case, the maximum impact
### Table 97. Projected Impact of North Aleutian Shelf Sale

**Statewide Total Employment**

(Thousands)

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### Percentage Impact

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**Source:** MAP Statewide Model Projections.
TABLE 98. PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE
STATEWIDE BASIC SECTOR EMPLOYMENT
(Thousands)

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PERCENTAGE IMPACT

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TABLE 101. PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE
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(Millions of 1981 Dollars)

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SOURCE: MAP Statewide Model Projections.
TABLE 102. PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE  
STATEWIDE REAL PER CAPITA PERSONAL INCOME  
(1981 Dollars)

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<th>High Case</th>
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PERCENTAGE IMPACT

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SOURCE: MAP Statewide Model Projections.
on real personal income is $343 million, or 3.7 percent, in 1989. The maximum impact on real personal income is $554 million, or 6.1 percent, in 1991. The maximum mean case impact on real per capita personal income is $383, or 2.3 percent, in 1989; and the maximum high case impact is $599, or 3.6 percent, in 1990.

Table 103 presents projected impacts on real wages and salaries. For the mean case, the maximum projected impact is $289 million, or 4.0 percent, in 1989. For the high case, the maximum projected impact is $462 million, or 6.3 percent, in 1991.

Tables 104-106 present projected impacts on real wage rates in the basic sector, services, and government. The wage rate impacts are highest in the basic sector, with a maximum mean case increase of $1,174 (4.1 percent) in 1989, and a maximum high case increase of $1,819 (6.5 percent) in 1990. In contrast, the maximum mean case impact upon service sector wages is only $168 (0.8 percent) in 1989; while the maximum high case impact upon service sector wages is $316 (1.5 percent) in 1990. Impacts on government wages are very small; the maximum high case impact is less than 0.4 percent.

As shown in Table 107, the projected impacts on the Alaska rate of inflation are insignificant.
## Table 103. Projected Impact of North Aleutian Shelf Sale

**Statewide Total Real Wages and Salaries**

(Millions of 1981 Dollars)

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<th>High Case</th>
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### Absolute Impact

### Percentage Impact

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**Source:** MAP Statewide Model Projections.
### TABLE 104. PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE
STATEWIDE REAL WAGE RATE IN BASIC SECTOR
(1981 Dollars)

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### PERCENTAGE IMPACT

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**Source:** M.F.P Statewide Model Projections.

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## Table 105. Projected Impact of North Aleutian Shelf Sale

Statewide Real Wage Rate in Services Sector
(1981 Dollars)

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*Source: NAP Statewide Model Projections.*
### Table 106. Projected Impact of North Aleutian Shelf Sale

Statewide real wage rate in government sector (1981 Dollars)

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### Percentage Impact

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**Source:** MAP Statewide Model Projections.
TABLE 107. PROJECTED IMPACT OF NORTH
ALEUTIAN SHELF SALE
ALASKA RATE OF INFLATION

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PERCENTAGE IMPACT

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SOURCE: MAP Statewide Model Projections.
GOVERNMENT REVENUES, EXPENDITURES, AND THE PERMANENT FUND BALANCE

As shown in Table 108, the OCS cases have relatively little impact upon state revenues. The maximum mean case impact is $34 million (0.4 percent); the maximum high case impact is $49 million (0.6 percent); both occur in 1991. As shown in Table 109, year 2000 state government interest earnings decline by $22 million (1.0 percent) in the mean case and by $35 million (1.8 percent) in the high case. These declines reflect the impacts of increased government expenditures upon the permanent fund balance. As shown in Table 110, total state government expenditures in the year 2000 increase by $74 million (1.2 percent) in the mean case and $106 million (1.7 percent) in the high case, as a result of the higher state population. However, as shown in Table 111, state government per capita expenditures decline slightly, with the maximum high case decline of $44 (0.5 percent) in 2000.

As shown in Table 112, the decrease in the year 2000 permanent fund balance is $340 million (1.3 percent) for the mean case, and $555 million (1.3 percent) for the high case. On a per capita basis, the declines are more significant. As shown in Table 113, the year 2000 decrease is $1,079 per person (2.7 percent) for the mean case and $1,704 per person (4.2 percent) for the high case.
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**Source:** MAP Statewide Model Projections.
TABLE 109. PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE STATE GOVERNMENT INTEREST EARNINGS
(Millions of 1981 Dollars)

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SOURCE: MAP Statewide Model Projections.
### TABLE 110. PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE TOTAL STATE GOVERNMENT EXPENDITURES (Millions of 1981 Dollars)

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**SOURCE:** MAP Statewide Model Projections.
TABLE 111. PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE PER CAPITA STATE EXPENDITURES (1981 Dollars)

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<tr>
<th>Year</th>
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PERCENTAGE IMPACT

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SOURCE: MAP Statewide Model Projections.
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**Source:** MAP Statewide Model Projections.
### Table 113. Projected Impact of North Aleutian Shelf Sale

Per Capita Accumulated Permanent Fund Balance (1981 Dollars)

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Source: MAP Statewide Model Projections.
Regional Impacts: Anchorage

Table 114 presents projected impacts on Anchorage population. The year 2000 population increases by 4,358 (1.5 percent) in the mean case and by 6,847 (2.4 percent) in the high case.

Table 115 presents projected impacts on the Anchorage employment. In the mean case, the maximum increase in employment is 3,167 (2.3 percent) in 1990; in the high case, the maximum increase in employment is 5,594 (4.1 percent) in 1991.

Regional Impacts: Bristol Bay

Projected impacts of the North Aleutian Shelf OCS sales in Bristol Bay, shown in Tables 116 and 117, are very small. The maximum population increases projected for the mean and high cases, respectively, are 26 and 38 (0.4 percent and 0.6 percent) in the year 2000. The maximum employment increases projected for these two cases are 41 (0.9 percent) and 68 (1.5 percent), in 1990 and 1992, respectively. These population and employment impacts are results of increased levels of activity in the statewide economy, rather than direct results of OCS activity.
### TABLE 114: PROJECTED IMPACT OF NORTH ALEUTIAN SHELF SALE
ANCHORAGE POPULATION
(Thousands)

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<th>Year</th>
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**SOURCE:** MAP Regional Model Projections.
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BRISTOL BAY POPULATION 
(Thousands)

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**Source:** MAP Regional Model Projections.
Aleutian Islands Impacts

This section discusses impacts of the OCS cases upon the Aleutian Islands, as projected by the SCIMP model. Pairs of tables present absolute and procentage impacts.

EMPLOYMENT

Nonresident or enclave basic sector employment impacts are shown in Tables 118 and 119. These represent OCS enclave employment; thus, the figures in Table 118 reproduce the enclave employment figures of Tables 89-94. As shown in Table 119, the maximum percentage impact upon enclave employment is 27.6 percent for the mean case (in 1989) and 66.1 percent for the high case (in 1990).

Tables 120 and 121 present impacts upon basic sector resident employment. The absolute impact projections presented in Table 120 are slightly lower than the resident OCS employment shown in Tables 89-94. This is because the SCIMP model does not treat permanent migrants as residents in the year of migration. The maximum increases in resident basic sector employment are 161 after 1991 for the mean case, and 314 in 1992 for the high case; or 16.6 percent in 1990 for the mean case and 31.3 percent in 1991 for the high case.
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SOURCE: SCIMP Model Projections.
TABLE 119. PROJECTED PERCENTAGE IMPACT OF NORTH ALEUTIAN SHELF SALE
ALEUTIAN ISLANDS BASIC SECTOR
NONRESIDENT EMPLOYMENT

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SOURCE: SCIMP Model Projections.
### TABLE 120. PROJECTED ABSOLUTE IMPACT OF NORTH ALEUTIAN SHELF SALE
ALEUTIAN ISLANDS BASIC SECTOR
RESIDENT EMPLOYMENT

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**SOURCE:** SCIMP Model Projections.
TABLE 121. PROJECTED PERCENTAGE IMPACT OF NORTH
ALEUTIAN SHELF SALE
ALEUTIAN ISLANDS BASIC SECTOR
RESIDENT EMPLOYMENT

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SOURCE: SCIMP Model Projections.
Tables 122 and 123 present impacts on civilian government employment. All of these impacts are upon state and local government, as a result of higher population. For the mean case, government employment rises by a maximum of 16, or 1.1 percent, in 1993. For the high case, government employment rises by a maximum of 49, or 3.4 percent, in 1993.

Tables 124 and 125 present impacts upon support sector employment. For the mean case, support sector employment rises by a maximum of 46, or 7.5 percent, in 1991. For the high case, support sector employment rises by a maximum of 92, or 13.2 percent, in 1991.

POPULATION

Impacts upon civilian resident population are shown in Tables 126 and 127. For the mean case, population rises by a maximum of 173, or 2.3 percent, in 1992. For the high case, population rises by a maximum of 513, or 7.0 percent, in 1992.

Finally, Tables 128 and 129 present impacts upon total population. This figure includes military personnel and dependents, enclave residents, and fishermen; i.e., all people physically present in the Aleutian Islands except for offshore OCS workers. For the mean case, total population increases by a maximum of 843, or 6.2 percent, in 1989. For the high case, total population rises by a maximum of 2,163, or 14.1 percent, in 1990.
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TABLE 126. PROJECTED ABSOLUTE IMPACT OF NORTH ALEUTIAN SHELF SALE
ALEUTIAN ISLANDS CIVILIAN RESIDENT POPULATION

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SOURCE: SCIMP Model Projections.
TABLE 129. PROJECTED PERCENTAGE IMPACT OF NORTH
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(INCLUDING MILITARY, MILITARY DEPENDENTS,
ENCLAVE RESIDENTS, AND FISHERMEN)

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SOURCE: SCIMP Model Projections.
APPENDIX A: THE MAP REGIONAL MODEL

Introduction
This appendix presents in general outline form the structure of the new MAP regional model utilized in this report. This model replaces a more cumbersome model used in earlier OCS studies.

In developing this model, several major objectives were addressed. These objectives are the following:

- that the structure be simple and generalizable
- that the parameters be specified in terms with clear, intuitive meaning
- that the regions be disaggregated to census division levels
- that the model be sufficiently flexible to be tied easily to the MAP statewide model.

This appendix is organized as follows: Part II examines in detail the structure of the model. Part III presents estimates of the model parameters.

Structure of the Model
OVERVIEW
The model consists of two components as shown in Figure 4. Given an exogenous estimate of statewide employment, by sector (provided from a corresponding state model run), and vectors of basic and government employment in each of the twenty regions shown in Figure 5, the
Figure 4. SCHEMATIC REPRESENTATION OF REGIONAL MODEL CDMOD

MAP STATEWIDE MODEL

BETA (t)

GAMMA (t)

\[ B_i^t \]

\[ G_i^t \]

EMPLOYMENT COMPONENT

\[ M_i^t \]

POPULATION COMPONENT

\[ P_i^t \]

REGIONALIZATION MODEL
Central cities of SMSA's with fewer than 50,000 inhabitants

Standard Metropolitan Statistical Areas (SMSA's)
The employment component of the model generates estimates of support and total employment in each of the twenty regions. The population component accepts these estimates along with exogenous estimates of statewide population (also from the statewide model) to generate regional population estimates.

**The Employment Component**

Each of the twenty regions is disaggregated into three types of employment: basic, government, and support. Basic employment consists of all sectors or portions of sectors treated as exogenous in the state model: agriculture, forestry, fisheries, manufacturing, mining, construction, and a portion of transportation. Government consists of federal civilian and military employees as well as state and local employees. Support includes all other employment.

The structure of the employment model is as follows:

Define:

- \( S_{ij} \) = Support sector employment in region \( i \) serving region \( j \)
- \( B_i \) = Basic sector employment in region \( i \).
- \( G_i \) = Government sector employment in region \( i \).
- \( M_i \) = Total employment in region \( i \).
- \( \alpha_{ij} \) = Proportion of region \( j \) support requirements supplied by region \( i \).
- \( b_j \) = Support employment required per unit of total employment in region \( j \).
Total employment in each of \( n \) regions is written:

\[
\begin{align*}
S_{11} + S_{12} + \ldots + S_{1n} + B_1 + G_1 &= M_1 \\
S_{21} + S_{22} + \ldots + S_{2n} + B_2 + G_2 &= M_2 \\
\vdots \quad \vdots \quad \quad \vdots \\
S_{n1} + S_{n2} + \ldots + S_{nn} + B_n + G_n &= M_n
\end{align*}
\]

Total support sector requirements within each region may be written:

\[
\begin{align*}
S_{11} + S_{21} + \ldots + S_{n1} &= b_1 M_1 \\
S_{12} + S_{22} + \ldots + S_{n2} &= b_2 M_2 \\
\vdots \quad \vdots \quad \quad \vdots \\
S_{1n} + S_{2n} + \ldots + S_{nn} &= b_n M_n
\end{align*}
\]

But \( S_{ij} = \alpha_{ij} b_j M_j \), so that system (1) may be rewritten:

\[
\begin{align*}
\alpha_{11} b_1 M_1 + \alpha_{12} b_2 M_2 + \ldots + \alpha_{1n} b_n M_n + B_1 + G_1 &= M_1 \\
\alpha_{21} b_1 M_1 + \alpha_{22} b_2 M_2 + \ldots + \alpha_{2n} b_n M_n + B_2 + G_2 &= M_2 \\
\vdots \quad \vdots \quad \quad \vdots \\
\alpha_{n1} b_1 M_1 + \alpha_{n2} b_2 M_2 + \ldots + \alpha_{nn} b_n M_n + B_n + G_n &= M_n
\end{align*}
\]

or, in matrix notation,

\[
A = [\alpha_{ij} b_j]
\]

\[
M = [M_j]
\]

\[
AM + B + G = M \quad \text{where} \quad B = [B_i] \quad G = [G_i]
\]
If the A matrix were known, then total employment is calculated as a linear function of basic and government employment, or

\begin{equation}
M = [I - A]^{-1} [B + G]
\end{equation}

Of course, we do not know A. By incorporating known regional data with a single simplifying assumption and a behavioral hypothesis describing the allocation of interregional support demands, however, it is possible to estimate A for a point in time, say 1979.

**Known Regional Data.** Regional employment for 1979 was available from the Alaska Department of Labor publications, specifically *Statistical Quarterly* and *Alaska Economic Trends*. The breakdown of such employment by basic, government, and support sectors is shown in Table 130 for 1979.

**A Simplifying Assumption.** Since the major concern of the regional model is to capture the effect of support sector demands which are supplied in regions other than the one giving rise to such demands, rather than to examine the effects of differential support demands across regions, it seems plausible, or at least not overly restrictive, to impose the condition that

\begin{equation}
b_1 = b_2 = \ldots = b_n = b = (1 - \frac{B + G}{M})
\end{equation}
That is, a unit of total employment, wherever it occurs in the state, is assumed to give rise to the same support sector requirements. The difference between regions, then, is solely the difference in the locations from which these demands will be supplied.

This assumption has the obvious disadvantage that it neglects real interregional differences in demand for support sector services. However, it also has several advantages which may more than compensate for this shortcoming. Most obviously, it reduces our estimation problem by n-1 parameters. More importantly, it is extremely valuable as a tool for maintaining consistency with the statewide MAP model, both in a static and a dynamic sense. Currently, a unit of basic sector employment in the state model has the same static employment impact regardless of its location in the state. Regionally varying bj's would produce differing total statewide static impacts by location, thus being inconsistent with the state model. Furthermore, the introduction of b exogenously provides a valuable tool for maintaining dynamic consistency between the models. By letting b vary with time so as to reflect the corresponding state run, we both force the A matrix to vary over time to reflect the same degree of structural change represented by the state model and force the employment totals to replicate the statewide results.

A Behavioral Hypothesis. The major reason that not all support sector requirements are supplied internally from that region is that it would be more costly to do so than to secure those services from a different
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*Includes Bristol Bay and Bristol Bay Borough Census Divisions.

**Includes the following Census Divisions: Angoon, Haines, Juneau, Ketchikan, Outer Ketchikan, Prince of Wales, Sitka, Skagway-Yakutat, and Wrangell-Petersburg.

¹Mining, manufacturing, construction, agriculture-forestry-fisheries, and miscellaneous.

²Federal, state, and local government.
region. It is only natural, then, that the cost of supply should be
the major determining factor in deciding on which other regions to
supply the requirements. Such costs as transportation, communication,
etc. are generally expected to increase with distance and to decrease
with the size of the support sector source of the region. Specif-
ically, we will assume that such costs are:

\[ C_{ij} = k \frac{R_{ij}}{M_i} \]

where \( C_{ij} \) = cost of supplying a unit of
support service to region j
from region i

\( R_{ij} \) = distance* between regions i
and j

\( M_i \) = total employment of region i

\( k \) = an arbitrary constant

and are as presented in Table 131 for \( k = 1000 \).

The total costs of interregional service provision are then:

\[ C = \sum_{j=1}^{n} \sum_{i=1}^{n} C_{ij} S_{ij} \]

We hypothesize that the \( S_{ij} \)'s actually chosen in any given time period
are chosen in such a way as to minimize the costs of providing the
required services observed in region j from each of the sources of
such supply i.

*Air fares were used as a proxy for distance since straight line
distances fail to capture the structure of statewide transportation
and communications networks.
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* Indicates $c_{ij} < 0.5.$
Estimating the Interregional Interaction Matrix. The hypothesis of (c) and the condition of (b) imply that our observed 1979 data represented the solution to a constrained minimization problem of the form:

\[
\begin{align*}
\text{Min} & \quad \sum_{j=1}^{n} \sum_{i=1}^{n} C_{ij} S_{ij} \\
\text{ST} & \quad S_{11} + S_{12} + \ldots + S_{2n} = M_{1}^{79} - B_{1}^{79} - G_{1}^{79} \\
& \quad S_{21} + S_{22} + \ldots + S_{2n} = M_{2}^{79} - B_{2}^{79} - G_{2}^{79} \\
& \quad \vdots \quad \vdots \quad \vdots \quad \vdots \\
& \quad S_{n1} + S_{n2} + \ldots + S_{nn} = M_{n}^{79} - B_{n}^{79} - G_{n}^{79} \\
(7) & \quad S_{11} + S_{21} + \ldots + S_{n1} = b^{79} M_{1}^{79} \\
& \quad S_{12} + S_{22} + \ldots + S_{n2} = b^{79} M_{2}^{79} \\
& \quad \vdots \quad \vdots \quad \vdots \quad \vdots \\
& \quad S_{1n} + S_{2n} + \ldots + S_{nn} = b^{79} M_{n}^{79} \\
S_{ij} & \geq 0 \quad \forall i,j
\end{align*}
\]
Note that $S_{ij} = \alpha_{ij} M_{ji}^{79}$, so that problem (7) may be reformulated in terms of decision variables with a far more intuitive meaning than the $S_{ij}$'s, namely the $\alpha_{ij}$'s. The reformulated problem is then:

$$\begin{align*}
\text{Min } & \sum_{j=1}^{n} \sum_{i=1}^{n} C_{ij} \alpha_{ij} M_{ji}^{79} \\
\text{ST } & \alpha_{11} + \alpha_{12} \frac{M_{2}^{79}}{M_{1}^{79}} + \ldots + \alpha_{1n} \frac{M_{n}^{79}}{M_{1}^{79}} = \frac{N_{1}^{79}}{b^{79}} \\
& \alpha_{21} \frac{M_{1}^{79}}{M_{2}^{79}} + \alpha_{22} + \ldots + \alpha_{2n} \frac{M_{n}^{79}}{M_{2}^{79}} = \frac{N_{2}^{79}}{b^{79}} \\
& \vdots \\
& \alpha_{n1} \frac{M_{1}^{79}}{M_{n}^{79}} + \alpha_{n2} \frac{M_{2}^{79}}{M_{n}^{79}} + \ldots + \alpha_{nn} = \frac{N_{n}^{79}}{b^{79}} \\

(7') \quad & \alpha_{11} + \alpha_{21} + \ldots + \alpha_{n1} = 1 \\
& \alpha_{12} + \alpha_{22} + \ldots + \alpha_{n2} = 1 \\
& \vdots \\
& \alpha_{1n} + \alpha_{2n} + \ldots + \alpha_{nn} = 1 \\
& \alpha_{ij} \geq 0 \quad \forall i,j
\end{align*}$$

where $N_{i}^{79} = M_{i}^{79} - B_{i}^{79} - G_{i}^{79}$
which, assuming that a feasible solution exists, can be solved using a standard linear programming routine.

The solution, a set of nxn $\alpha_{ij}$'s, comprises a matrix which we will call the regional interaction matrix. Each entry, $\alpha_{ij}$, represents the share of support requirements in region $j$ supplied from region $i$. Each of the columns, therefore, must sum to unity. Thus, a quick glance down each column provides a subjective test of the plausibility of the matrix. A priori, one would expect nonzero entries in all of the diagonal elements and along the rows of the regional support centers (Bethel, Fairbanks, Nome,) and probably along the entire row corresponding to Anchorage, which is a statewide support center.

**Summary.** Once the regional interaction matrix has been determined for a single year, say 1979, then this together with $b^{79}$ determines fully the A matrix which existed in 1979. For projections to a future period $t$, we will assume that the interregional interaction matrix remains stable, but that $b$ changes in the regional model as it does in a corresponding run of the statewide model. Therefore, employment is estimated in year $t$ as

$$
M(t) = [I - A(t)]^{-1} [B(t) + G(t)]
$$

where $A(t) = b(t) [\alpha_{ij}^{79}]$

**The Population Component**

Currently, the population model is specified as independent of the employment model. We can define:
\[ R_{ij} = \text{Residents from region } i \text{ working in region } j \]
\[ \beta_{ij} = \text{Proportion of employees working in region } j \text{ residing in region } i \]
\[ R_i = \text{ Resident employment in region } i \]
\[ P_i = \text{Population in region } i \]
\[ d_i = \text{Dependents per employee in region } i \]

Total resident employment in the regions may be written as:

\[ R_{11} + R_{12} + \ldots + R_{1n} = R_1 \]
\[ R_{21} + R_{22} + \ldots + R_{2n} = R_2 \]
\[ \vdots \]
\[ R_{n1} + R_{n2} + \ldots + R_{nn} = R_n \]

or, since \( R_{ij} = \beta_{ij}M_{ij} \), as

\[ \beta_{11}M_1 + \beta_{12}M_2 + \ldots + \beta_{1n}M_n = R_1 \]
\[ \beta_{21}M_1 + \beta_{22}M_2 + \ldots + \beta_{2n}M_n = R_2 \]
\[ \vdots \]
\[ \beta_{n1}M_1 + \beta_{n2}M_2 + \ldots + \beta_{nn}M_n = R_n \]

Total resident population may then be written:

\[ (1+d_1)\beta_{11}M_1 + (1+d_1)\beta_{12}M_2 + \ldots + (1+d_1)\beta_{1n}M_n = P_1 \]
\[ (1+d_2)\beta_{21}M_1 + (1+d_2)\beta_{22}M_2 + \ldots + (1+d_2)\beta_{2n}M_n = P_2 \]
\[ \vdots \]
\[ (1+d_n)\beta_{n1}M_1 + (1+d_n)\beta_{n2}M_2 + \ldots + (1+d_n)\beta_{nn}M_n = P_n \]
or in matrix notation

\[(11) \quad QM = P \quad \text{where} \quad Q = [(1 + d_i)\beta_{ij}] \]
\[M = [M_i] \]
\[P = [P_i] \]

Now, the interregional structure of nonresident employment is captured in the Q matrix, called the location matrix, which is unknown and must be estimated.

Generally, there are three properties which this matrix should ideally satisfy. First, it would be desirable that such a structure reflect differential dependency rates across regions \((d_i \neq d_j)\). Second, it should reflect independence of extra-regional employment changes. That is, if employment does not change in region \(i\), population should not change in region \(i\). Third, it should be consistent with the state model. Unfortunately, it is impossible to satisfy all three properties simultaneously.

The first and second property may be satisfied by assuming that employees reside in the region of their employment. If such is the case, then the interregional location matrix, composed of the \(\beta_{ij}\)'s, is the identity matrix, and system (9) implies that

\[(12) \quad d_i = \frac{P_i}{M_i} - 1 \quad (i = 1, \ldots, n) \]
so that $Q$ is a diagonal matrix which can be estimated using 1979 data. Unfortunately, this procedure cannot be made consistent with the statewide model since total population impacts of changes in the scenarios will be dependent on the location of employment as well as its magnitude, while it is currently independent of location in the statewide model.

By adjusting the $d_i$'s over time, so that

$$
(13) \quad (1 + d_i^t) = (1 + d_i^{79}) \times \left[ \frac{\sum M_i^t}{\sum (1+d_i^{79}) M_i^t} \right] \times \theta(t)
$$

where $\theta(t)$ = statewide population-to-employment ratio, we can force consistency with the state model, but at a cost of giving up the independence of extra-regional employment change property. Now, a change in employment in region $j \neq i$ will change the adjustment factor in (13), thus changing total population in region $i$ even if employment does not change in region $i$.

Consistency with the state model and independence of extraregional employment changes may be achieved by requiring that all $d_i$'s are equal to the statewide average, but this fails to satisfy the first property and is inconsistent with an identity location matrix. If we are willing to abandon the first property, the problem may be solved in much the same way as was the problem posed in estimating the parameters of the employment component, by solving the following linear programming problem:
$$\text{Min} \sum_{j=1}^{n} \sum_{i=1}^{n} C_{ij} R_{ij}$$

ST \quad R_{11} + R_{12} + \ldots + R_{1n} = R_1^{79}

R_{21} + R_{22} + \ldots + R_{nn} = R_2^{79}

\ldots \quad \ldots

R_{n1} + R_{n2} + \ldots + R_{nn} = R_n^{79}

(14) \quad R_{11} + R_{21} + \ldots + R_{nn} = (1+d^{79}) M_1^{79}

R_{12} + R_{22} + \ldots + R_{nn} = (1+d^{79}) M_2^{79}

\ldots \quad \ldots

R_{1n} + R_{2n} + \ldots + R_{nn} = (1+d^{79}) M_n^{79}$$
or alternately, since \( R_{ij} = (1+d^{79}) \beta_{ij} M^{79}_i \)

\[
\begin{align*}
\min (1+d^{79}) \sum_{j=1}^{n} \sum_{i=1}^{n} C_{ij} \beta_{ij} M^{79}_j
\end{align*}
\]

\[
\begin{align*}
ST \quad \beta_{11} M_1 + \beta_{12} M_2 + \ldots + \beta_{1n} M_n = P_1 / (1+d^{79})
\end{align*}
\]

\[
\begin{align*}
\beta_{21} M_1 + \beta_{22} M_2 + \ldots + \beta_{2n} M_n = P_2 / (1+d^{79})
\end{align*}
\]

\[
\begin{align*}
\vdots
\end{align*}
\]

\[
\begin{align*}
\vdots
\end{align*}
\]

\[
\begin{align*}
\vdots
\end{align*}
\]

\[
\begin{align*}
(14') \beta_{n1} M_1 + \beta_{n2} M_2 + \ldots + \beta_{nn} M_n = P_n / (1+d^{79})
\end{align*}
\]

\[
\begin{align*}
\beta_{11} + \beta_{21} + \ldots + \beta_{n1} = 1
\end{align*}
\]

\[
\begin{align*}
\beta_{12} + \beta_{22} + \ldots + \beta_{n2} = 1
\end{align*}
\]

\[
\begin{align*}
\vdots
\end{align*}
\]

\[
\begin{align*}
\vdots
\end{align*}
\]

\[
\begin{align*}
\beta_{1n} + \beta_{2n} + \ldots + \beta_{nn} = 1
\end{align*}
\]

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The current version of the model adopts the second of these three alternate procedures, using an identity location matrix and adjusting the $d_i$'s over time as described by equation (13).

While such a procedure has the obvious advantage of simplicity, it has several serious drawbacks. First, as mentioned earlier, such a specification necessarily will produce population impacts in regions where no employment changes have occurred, as a consequence of the adjustment factor in equation (13). The operation of this factor gives the model the property that growing regions will attract population from (relatively) stagnant regions. However, within the constraints of the limited scope of this project, it was felt that such a drawback was less serious than those associated with the available alternatives. Furthermore, there are several reasons to believe that this effect is likely to not be a serious shortcoming of the model. First, the population drawn from stagnant regions is quite small and is generally offset by induced increases in government employment which are always more widely dispersed than initial changes in basic employment. More importantly, however, the direction of the effect will always be the same as a real effect--interregional migration, which has been neglected entirely. Thus, the drain may actually offset, at least in a small way, a known estimation error. Nonetheless, the population estimation procedure must be regarded as generally much weaker than the employment component described earlier, and it needs to be improved with further research.
PARAMETERS OF THE MODEL

The Regional Employment Interaction Matrix

The 1979 $[a_{ij}]$ matrix estimated by the linear programming routine for the problem described in Part II is presented in Table 132. Note that the pattern is as would have been expected. All diagonal terms are nonzero, with the larger support centers being self-sufficient (having diagonal entries of 1). Anchorage and Fairbanks appear to be the only significant support centers, with Anchorage supplying most regions and Fairbanks supplying Kuskokwim, Upper Yukon, and Yukon-Koyukuk. Two local support centers emerge, with Bethel supporting Wade Hampton and Nome supporting Kobuk.

Employment Location Matrix

As discussed above in Part II, the regional employment location matrix will, in this application, be assumed to be the identity matrix.

Population/Employment Ratio Vector

The vector of population-to-employment ratios for 1979 is presented in Table 133.
<p>| Demand Region   | 01  | 02  | 04  | 05  | 06  | 08  | 09  | 11  | 12  | 14  | 15  | 16  | 17  | 18  | 21  | 24  | 25  | 26  | 27  | 29  |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Aleutian Islands | .16 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Anchorage       | .84 | 1.  | .73 | .44 | .41 | .19 | .08 | .01 | .43 | .28 | .7  | .21 | .25 |     |     |     |     |     |     |
| Barrow          |     | .27 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Bethel          |     |     |     |     |     |     |     |     |     |     |     |     |     | .49 |     |     |     |     |     |
| Bristol Bay     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .56 |     |     |     |     |
| Cordova/McCarthy|     |     |     |     |     |     |     |     |     |     |     |     |     | .59 |     |     |     |     |     |
| Fairbanks       |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .45 |     |     |     |
| Southeast Alaska|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .41 |     |     |
|                 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .24 |     |     |
| Kenai/Cook Inlet|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .92 |     |     |
| Kobuk           |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .71 |     |     |
| Kodiak          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .57 |     |
| Kuskokwim      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .55 |
| Matanuska/Susitna|   |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Nome            |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .28 |     |     | 1.  |
| Seward          |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .72 |
| S.E. Fairbanks  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .3  |
| Upper Yukon     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .59 |
| Valdez/Chitina/Whittier | |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
| Wade Hampton    |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .79 |
| Yukon Koyukuk  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     | .51 |</p>
<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
<th>Employment</th>
<th>Population/ Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø1 Aleutian Islands</td>
<td>7,030</td>
<td>6,104</td>
<td>1.15</td>
</tr>
<tr>
<td>Ø2 Anchorage</td>
<td>177,981</td>
<td>93,241</td>
<td>1.91</td>
</tr>
<tr>
<td>Ø4 Barrow/North Slope</td>
<td>4,771</td>
<td>5,575</td>
<td>0.86</td>
</tr>
<tr>
<td>Ø5 Bethel</td>
<td>9,739</td>
<td>3,697</td>
<td>2.63</td>
</tr>
<tr>
<td>Ø6 Bristol Bay</td>
<td>5,204</td>
<td>3,814</td>
<td>1.36</td>
</tr>
<tr>
<td>Ø8 Cordova/McCarthy</td>
<td>2,475</td>
<td>1,752</td>
<td>1.41</td>
</tr>
<tr>
<td>Ø9 Fairbanks</td>
<td>54,000</td>
<td>27,576</td>
<td>1.96</td>
</tr>
<tr>
<td>11 Southeast Alaska</td>
<td>51,319</td>
<td>29,840</td>
<td>1.72</td>
</tr>
<tr>
<td>12 Kenai/Cook Inlet</td>
<td>23,244</td>
<td>7,864</td>
<td>2.96</td>
</tr>
<tr>
<td>14 Kobuk</td>
<td>4,695</td>
<td>1,451</td>
<td>3.24</td>
</tr>
<tr>
<td>15 Kodiak</td>
<td>9,956</td>
<td>7,326</td>
<td>1.36</td>
</tr>
<tr>
<td>16 Kuskokwim</td>
<td>2,941</td>
<td>571</td>
<td>5.15</td>
</tr>
<tr>
<td>17 Matanuska/Susitna</td>
<td>18,910</td>
<td>3,410</td>
<td>5.55</td>
</tr>
<tr>
<td>18 Nome</td>
<td>6,755</td>
<td>2,361</td>
<td>2.06</td>
</tr>
<tr>
<td>21 Seward</td>
<td>3,152</td>
<td>1,532</td>
<td>2.06</td>
</tr>
<tr>
<td>24 S.E. Fairbanks</td>
<td>5,507</td>
<td>2,025</td>
<td>2.72</td>
</tr>
<tr>
<td>25 Upper Yukon</td>
<td>1,482</td>
<td>426</td>
<td>3.48</td>
</tr>
<tr>
<td>26 Valdez/Chitina/Whittier</td>
<td>7,013</td>
<td>2,320</td>
<td>3.02</td>
</tr>
<tr>
<td>27 Wade Hampton</td>
<td>4,853</td>
<td>1,039</td>
<td>4.67</td>
</tr>
<tr>
<td>29 Yukon Koyukuk</td>
<td>5,325</td>
<td>2,521</td>
<td>2.11</td>
</tr>
<tr>
<td>ST Statewide</td>
<td>406,352</td>
<td>204,445</td>
<td>1.99</td>
</tr>
</tbody>
</table>
APPENDIX B: PROJECTION OF BOTTOMFISH HARVESTING
AND PROCESSING EMPLOYMENT

The MAP and SCIMP models require as inputs projections of resident and nonresident employment in fish harvesting and fish processing. One source of employment in these areas which has not been important in the past, but which may expand greatly in the future, is bottomfish harvesting and processing. The 1981 bottomfish harvest in the Bering Sea and the Gulf of Alaska totaled 1,614 thousand metric tons. Of this, the U.S. harvest accounted for only 108 thousand metric tons, or 6.7 percent of the total, while foreign fishing fleets (primarily Japan, the U.S.S.R., Korea, and Taiwan) accounted for the rest (Alaska Department of Fish and Game; National Marine Fisheries Service).

While most observers expect that U.S. bottomfish harvests will rise greatly over the next 20 years, the total extent of this increase and its effects on employment are highly uncertain. A number of factors suggest that the U.S. fishing fleet, and in particular onshore Alaska processors, are at an economic disadvantage compared to foreign operations. These are high U.S. labor costs (in particular in Alaska), high transportation costs from Alaska (due partly to the Jones Act), lack of a well-developed transportation and services infrastructure, lack of a highly skilled, stable labor force for an onshore processing industry, lack of U.S. marketing channels for Alaska groundfish, high American interest rates, subsidization of foreign fisheries, high quality standards in foreign markets, and import barriers for foreign
markets. These factors are discussed in Scott (1980) and Natural Resources Consultants (1980). Working in favor of the future development of the U.S. bottomfish industry are the commitment of the State of Alaska to growth of the industry and the carrot and stick provided by U.S. allocations of Alaska groundfish resources to foreign operators.

Widely varying estimates of employment impacts of bottomfish industry expansion have been produced by earlier studies such as those by Sea Grant (Terry, 1980), and Earl R. Combs, Inc. (1981). The difference in these estimates can be attributed to differences in assumptions about total U.S. harvest levels, the allocation of the harvest between different harvesting and processing methods, employment requirements per metric ton harvested and processed, and the residency patterns of harvesting and processing employees. In order to project employment for this study, assumptions were made with respect to each of these variables, based on past studies and other available evidence.

The assumptions used to project Aleutian Islands employment for the SCIMP model varied slightly from those used to project statewide and census division employment for the MAP model, due to the availability of more recent harvest data and a revision of residency assumptions. The assumptions are presented below.

1. Total Domestic Bottomfish Harvest, by Region. The North Pacific Fisheries Management Council divides Alaska bottomfish resources by two regions, the Gulf of Alaska and the Bering Sea/Aleutian Island
area. We used this same regional division. A similar division was used by the Sea Grant study (Terry, 1980), except that only the Chirikov/Shumagin (western) part of the Gulf of Alaska was studied.

Earlier studies by Sea Grant (Terry, 1980) and Earl R. Coombs (1981) assumed that U.S. domestic bottomfish harvests will rise from present levels to a maximum sustained yield level in the year 2000. The Sea Grant study assumed a constant growth rate, with most of the growth occurring towards the end of the period, while the Combs study assumed a normal growth path, with much more rapid growth during the early part of this period.

The assumptions in these studies are to a large extent arbitrary. The rate and form of U.S. takeover of the Alaska bottomfishery will depend upon uncertain economic trends and political and management decisions. Our own best guess is that the growth of the U.S. bottomfish industry will proceed relatively gradually at first, due to the unfavorable economic factors listed above, but will eventually be substantial, as a result of improving markets and political and management support of a U.S. industry. Therefore, we assumed that in each region the domestic catch would grow at a constant rate of growth from 1981 harvest levels to the optimum yield level. This assumption is similar to the Sea Grant assumption, except that we choose the optimum yield rather than maximum sustained yield as the harvest level when total replacement is achieved. This is the harvest level which the North
The high ending share for catcher processors reflects an assumption that this form of harvesting and processing will eventually prove most economical for development of the U.S. domestic bottomfish industry.

3. **Employment per Metric Ton Harvested and Processed.** The following figures are assumed for employment coefficients:

<table>
<thead>
<tr>
<th>Offshore Processing</th>
<th>Joint Venture Trawlers</th>
<th>Catcher Processors</th>
<th>Trawlers Fishing for Onshore Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trawlers Fishing for Onshore Plants</td>
<td>.00323</td>
<td>.026</td>
<td>.077</td>
</tr>
<tr>
<td>Onshore Processing Plants</td>
<td>.00222</td>
<td>.60</td>
<td>.20</td>
</tr>
<tr>
<td>Joint Venture Trawlers</td>
<td>.00222</td>
<td>.20</td>
<td></td>
</tr>
</tbody>
</table>

The first three figures are based on employment assumptions in the Sea Grant study (Terry, 1980, pp. 46, 47). The offshore processing figure is an average for all bottomfish species (Terry, 1980, Table 4.110, p. 525). We assumed the same employment coefficient for joint venture trawlers as for trawlers fishing for onshore plants.
4. **Residency.** For the MAP models, residency patterns were assumed to remain constant throughout the projection period. For the SCIMP model employment projections, residency shares were assumed to increase in a linear fashion over time from 1981 until 2000, as a result of growth in local communities and establishment of a year-round harvesting and processing industry. These assumptions are shown in Table 135.

The MAP model residency assumptions were used for the census division breakdown of employment for the regional model. Thus, employees fishing in the Bering Sea, but residing in Kodiak, were considered to be located in Kodiak for the regional model base case assumptions. This was in contrast with the treatment of "enclave" employment in the MAP regional model assumptions, where, for instance, employment at Prudhoe Bay is considered to be located in the Barrow/North Slope region, even though very few of these employees reside in the region.

5. **Onshore Processing Plant Construction Employment.** A ratio of .0015 man-years of construction employment per metric ton increase in onshore processing plant capacity is assumed. This construction employment is assumed to occur in the year prior to the increase in onshore processing capacity. For the SCIMP model runs, all of this employment was assumed to be nonresident.
TABLE 135. BOTTOMFISH EMPLOYMENT RESIDENCY ASSUMPTIONS

MAP Models: Residency Share Assumptions\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>Aleutian Islands</th>
<th>Kodiak</th>
<th>Anchorage</th>
<th>Outside of Alaska</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catcher Processors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bering Sea</td>
<td>0.2</td>
<td>0.0</td>
<td>0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Gulf of Alaska</td>
<td>0.0</td>
<td>0.2</td>
<td>0.1</td>
<td>0.7</td>
</tr>
<tr>
<td>Joint Venture Trawlers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bering Sea</td>
<td>0.4</td>
<td>0.4</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Gulf of Alaska</td>
<td>0.0</td>
<td>0.8</td>
<td>0.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Onshore Processing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bering Sea</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Gulf of Alaska</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Trawlers for Onshore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bering Sea</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Gulf of Alaska</td>
<td>0.0</td>
<td>1.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

SCIMP MODEL: Share of Bering Sea Fishing and Processing Employment Residing in the Aleutian Islands

<table>
<thead>
<tr>
<th>Employment Type</th>
<th>1981</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catcher Processors</td>
<td>.2</td>
<td>.2</td>
</tr>
<tr>
<td>Joint Venture Trawlers</td>
<td>.2</td>
<td>.5</td>
</tr>
<tr>
<td>Onshore Processing</td>
<td>.25</td>
<td>.8</td>
</tr>
<tr>
<td>Trawlers Fishing for Onshore Plants</td>
<td>.25</td>
<td>.8</td>
</tr>
</tbody>
</table>

\(^a\) Assumed to remain constant.
Employment Projections

The bottomfish employment projections based on these assumptions are presented in Table 66 (Chapter III, page 150) for the MAP models, and in Table 136 for the SCIMP model.

**TABLE 136. SCIMP MODEL ALEUTIAN ISLANDS BOTTOMFISH EMPLOYMENT ASSUMPTIONS**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Harvest</td>
<td>87,512</td>
<td>160,500</td>
<td>342,400</td>
<td>7,307,000</td>
<td>1,559,000</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joint Venture Trawlers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident</td>
<td>35</td>
<td>70</td>
<td>147</td>
<td>262</td>
<td>346</td>
</tr>
<tr>
<td>Nonresident</td>
<td>139</td>
<td>197</td>
<td>283</td>
<td>360</td>
<td>346</td>
</tr>
<tr>
<td>Catcher Processors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident</td>
<td>1</td>
<td>15</td>
<td>66</td>
<td>212</td>
<td>604</td>
</tr>
<tr>
<td>Nonresident</td>
<td>6</td>
<td>61</td>
<td>264</td>
<td>848</td>
<td>2,417</td>
</tr>
<tr>
<td>Trawlers Fishing for Onshore Plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident</td>
<td>4</td>
<td>13</td>
<td>52</td>
<td>178</td>
<td>554</td>
</tr>
<tr>
<td>Nonresident</td>
<td>11</td>
<td>23</td>
<td>50</td>
<td>94</td>
<td>138</td>
</tr>
<tr>
<td>Processing Plants</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident</td>
<td>13</td>
<td>45</td>
<td>177</td>
<td>600</td>
<td>1,864</td>
</tr>
<tr>
<td>Nonresident</td>
<td>38</td>
<td>78</td>
<td>169</td>
<td>315</td>
<td>466</td>
</tr>
</tbody>
</table>

**SOURCE:** See text.
Appendix B Sources

Alaska Department of Fish and Game, Groundfish Catch Statistics, included in North Pacific Fisheries Management Council briefing paper (November 24, 1981).


APPENDIX C: OCS EMPLOYMENT ASSUMPTIONS

OCS annual employment figures were provided by the Alaska OCS office. These figures were broken down according to the phases and activities shown in column (1) of Table 137. These figures are reproduced as Tables 138-143, corresponding to the different OCS cases studied.

In order to use these employment figures in the MAP models, it was necessary to make assumptions regarding the shares of OCS workers who would be Alaska residents. These assumptions are shown in column (4) of Table 137. For use in the SCIMP model projections for the Aleutian Islands, it was necessary to make assumptions regarding the shares of OCS workers who would be residents of the Aleutian Islands. These assumptions are shown in column (5) of Table 137. Both the state residency and local residency assumptions are based on a paper by Will Nebesky and Lee Huskey, entitled "Patterns of Resident Employment in Alaska's Outer Continental Shelf Industry" (November, 1981).
<table>
<thead>
<tr>
<th>Activity</th>
<th>Abbreviation</th>
<th>Location</th>
<th>(4) Share of Employment to AK Residents (SEAR) (For Use in MAP Model)</th>
<th>(5) Share of Employment To Local Residents SELR (i.e., Share of Workers not Living In Enclaves--For Use In SCIMP Model)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration Phase</td>
<td></td>
<td></td>
<td></td>
<td></td>
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(a) Onshore pipeline construction local resident employees were assumed to live at Cold Bay.

(b) No assumption was made as to the location of residence of those workers who work offshore but live locally, i.e., in the Aleutians. Presumably, they would live either in Cold Bay or Dutch Harbor.

(c) Assumed to be 20 percent aircraft and 80 percent vessels, based on a ratio of one helicopter to two vessels during exploration (Alaska OCS Office).

(d) Assumed to be 20 percent Cold Bay Base and 80 percent Dutch Harbor Base, based on aircraft and vessel breakdown.

(e) Same as (d).

(f) Assumed to be 85 percent offshore and 15 percent onshore.

(g) Assumed to be 34 percent aircraft and 66 percent vessels, based on a ratio of one helicopter to one vessel during development and production (Alaska OCS Office).

(h) Assumed to be 34 percent Cold Bay Base and 66 percent Dutch Harbor.
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<th>AIRCRAFT/VESSELS (TRANSPORTATION)</th>
<th>SHORE BASES (MINING)</th>
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## OCS Employment, Mean Base Case

### (Continued)

**North Aleutian Shelf Sale 75**

Mean Base Case

**Estimated Employment Construction Phase (Man-Months)**

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<th>Shelf Base</th>
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**Note:**
- **Platform Installation** and **Shelf Base** are given in thousands of barrels per day (kbb/d).
- **Pipeline Construction**, **DIL Terminal**, and **LNG Terminal** are in thousands of man-months.
- **Total Man-Months** is the sum of pipeline construction, DIL terminal, and LNG terminal man-months.
- **Average Monthly Employment** is calculated from the total man-months.
### OCS Employment, Mean Base Case

#### (Continued)

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OCS EMPLOYMENT, MEAN BASE CASE  
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TOTAL MONTHLY EMPLOYMENT
TABLE 139. OCS EMPLOYMENT, LOW FIND (95% PROBABILITY) CASE

REPORT DATE 10/16/81  PCN C5400

NORTH ALEUTIAN SHELF SALE 75
95 PERCENT CASE
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### OCS Employment, Low Find (95% Probability) Case (Continued)

**North Aleutian Shelf Sale 75**
**95 Percent Case**

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### OCS Employment, Low Find (95% Probability) Case

**(Continued)**

**Report Date**: 10/16/81  **PCN**: CS429

**North Aleutian Shelf Sale 75**

**95% Estimated Employment**

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TABLE 140. OCS EMPLOYMENT, HIGH FIND (5% PROBABILITY) CASE

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OCS EMPLOYMENT, HIGH FIND (5% PROBABILITY) CASE

(Continued)

REPORT DATE 10/16/81  PCN C5411

NORTH ALEUTIAN SHELF SALE 75
5 PERCENT CASE

ESTIMATED EMPLOYMENT CONSTRUCTION PHASE (MAN-MONTHS)

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OCS EMPLOYMENT, HIGH FIND (5% PROBABILITY) CASE  
(Continued)

NORTH ALEUTIAN SHELF SALE 75  
5 PERCENT CASE

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## OCS Employment, High Find (5% Probability) Case

### (Continued)

**North Aleutian Shelf Sale 75: 5 Percent Case**

**Summary of Direct Employment (Man-Months)**

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## Table 141. OCS Employment, Alternative 4 Case

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OCS EMPLOYMENT, ALTERNATIVE 4 CASE (Continued)

NORTH ALEUTIAN SHELF SALE 75
ALTERNATIVE IV
ESTIMATED EMPLOYMENT CONSTRUCTION PHASE (MAN-MONTHS)
### OCS Employment, Alternative 4 Case

(Continued)

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OCS EMPLOYMENT, MEAN BASE CASE WITH OFFSHORE LOADING
(Continued)

REPORT DATE 12/09/81  PCN CS410

NORTH ALEUTIAN SHELF SALE 75
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ESTIMATED EMPLOYMENT CONSTRUCTION PHASE (MAN-MONTHS)

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### OCS Employment, Mean Base Case with Offshore Loading

(Continued)

#### North Aleutian Shelf Sale 75

**Plan Base Case - Offshore Loading**

**Summary of Direct Employment (Man-Peats)**

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# Table 143. Alternative 4 Case with Offshore Loading

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**ALTERNATIVE 4 CASE WITH OFFSHORE LOADING**

(Continued)

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# ALTERNATIVE 4 CASE WITH OFFSHORE LOADING (Continued)

**NORTH ATLANTIC SHELF SALE 75**

**ALTERNATIVE IV - OFFSHORE LOADING**

**ESTIMATED EMPLOYMENT DEVELOPMENT/PRODUCTION PHASE (MAN-MONTHS)**

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# Alternative 4 Case with Offshore Loading

(Continued)

## Summary of Direct Employment (Monthly)

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REFERENCES


Alaska Department of Fish and Game. Alaska Catch and Production: Commercial Fisheries Statistics. Various years.


