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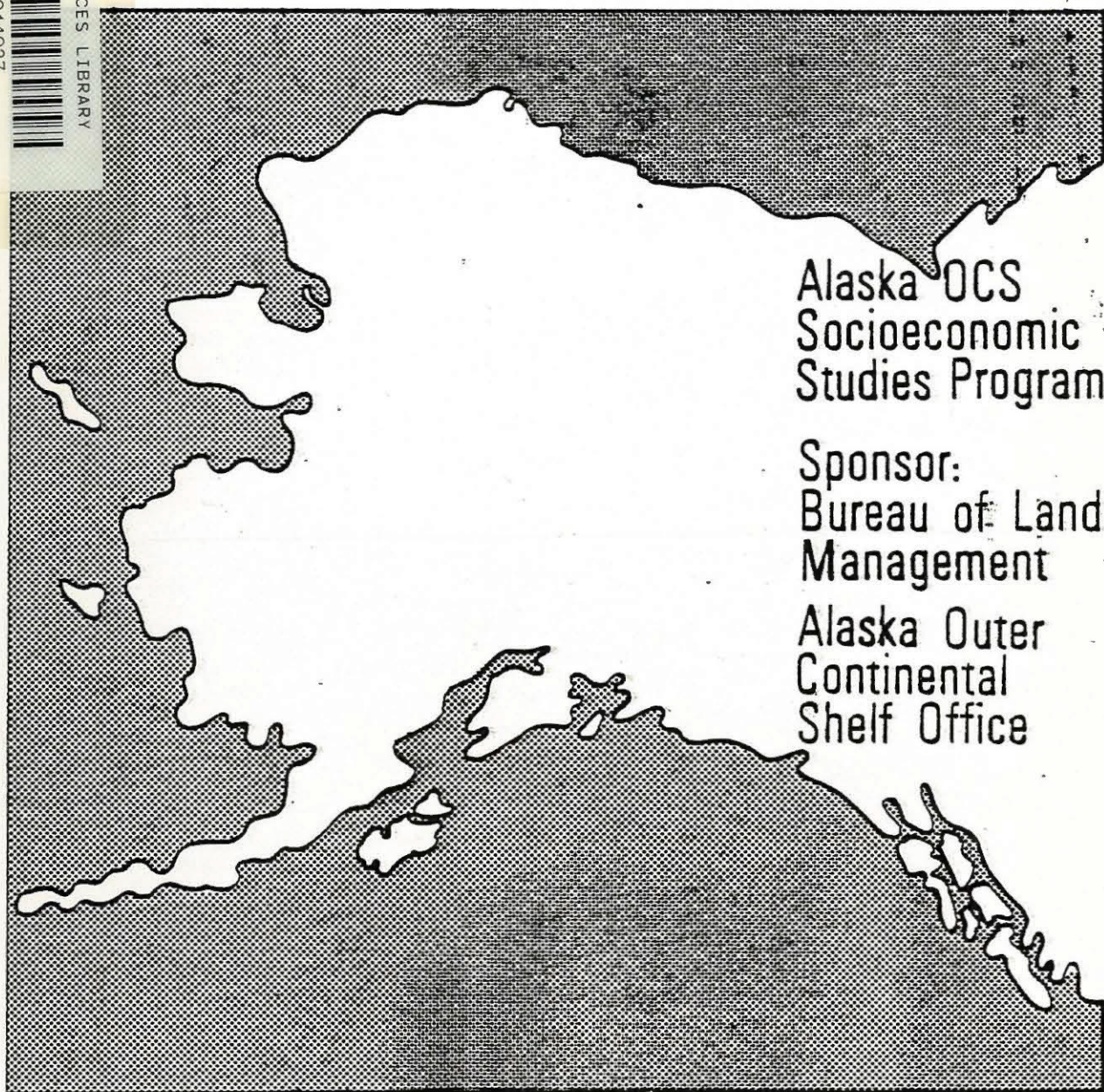
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## St. George Basin
## Petroleum Development Scenarios
## Economic & Demographic Analysis

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ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM

ST. GEORGE BASIN PETROLEUM DEVELOPMENT SCENARIOS
ECONOMIC AND DEMOGRAPHIC ANALYSIS

PREPARED FOR

BUREAU OF LAND MANAGEMENT
ALASKA OUTER CONTINENTAL SHELF OFFICE

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

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April 1981

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# I. INTRODUCTION

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

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

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

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

## II. STATEWIDE AND REGIONAL GROWTH: THE BASELINE HISTORICAL ANALYSIS

### The Statewide Economy: Statehood - 1978

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

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

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

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

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

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

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

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

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

PRODUCTION

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

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

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

(millions of current dollars)

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

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

SOURCE:  See Table 1 Notes

Table 1 Notes

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

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

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

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

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

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

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

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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 tran-
sition 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.

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

|  | 1960 | 1965 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Civilian Labor Force | 73.6 | 89.8 | 91.6 | 97.7 | 103.6 | 109.1 | 125.6 | 156.0 | 168.0 | 174.0 | 181.0 |
| Total Unemployment | 5.9 | 7.7 | 6.5 | 8.0 | 8.6 | 9.3 | 9.9 | 10.8 | 14.0 | 16.0 | 20.0 |
| % of Total Labor Force | 8.0% | 8.6% | 7.1% | 8.2% | 8.3% | 8.5% | 7.9% | 6.9% | 8.3% | 9.2% | 11.0% |
| Total Employment | 67.7 | 82.1 | 85.1 | 89.6 | 95.0 | 99.9 | 115.7 | 145.3 | 154.0 | 158.0 | 161.0 |

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

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Table 2 Notes

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

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

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

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

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

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

It is also worth noting that during the pre-pipeline period the unemploy-
ment 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 pri-
marily met by significant in- and out-migration and by changes in labor
force participation rates. As a consequence, the long-run rate of unem-
ployment is quite stable and the simple expansion of economic activity
has little effect in terms of reducing unemployment. The second block
of data in Table 2 provides annual average employment data by broad
industry classification. In addition to illustrating the sustained
growth of employment and production in all industry categories, these
data also indicate relative changes in the significance of specific
industries.

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

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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.

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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 pay-

ments has increased substantially but still remains well below the

national figure of 12.6 percent. The data also generally confirm the

relative changes in the composition of industry activity that were

observed in the employment data.

The growth of aggregate personal income in Table 4 reflects not only

aggregate growth of production but also the influence of inflation.

Table 5 presents aggregate personal income in both current and constant

dollars. Growth of constant dollar personal income has been significant

and has averaged 7.8 percent per year. During the 1974-1977 period, the

growth was even more dramatic at 11.8 percent in real terms. The com-

bined effects of inflation and the plateauing of economic activity follow-

ing completion of pipeline construction have resulted in a slight decline

in real personal income in 1978.

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

(millions of current dollars)

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

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Table 4 Notes

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

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

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

Average Annual Percent Growth

| | | | | |
|---|---|---|---|---|
| | 11.3 | 7.8 | 6.9 | 3.5 |

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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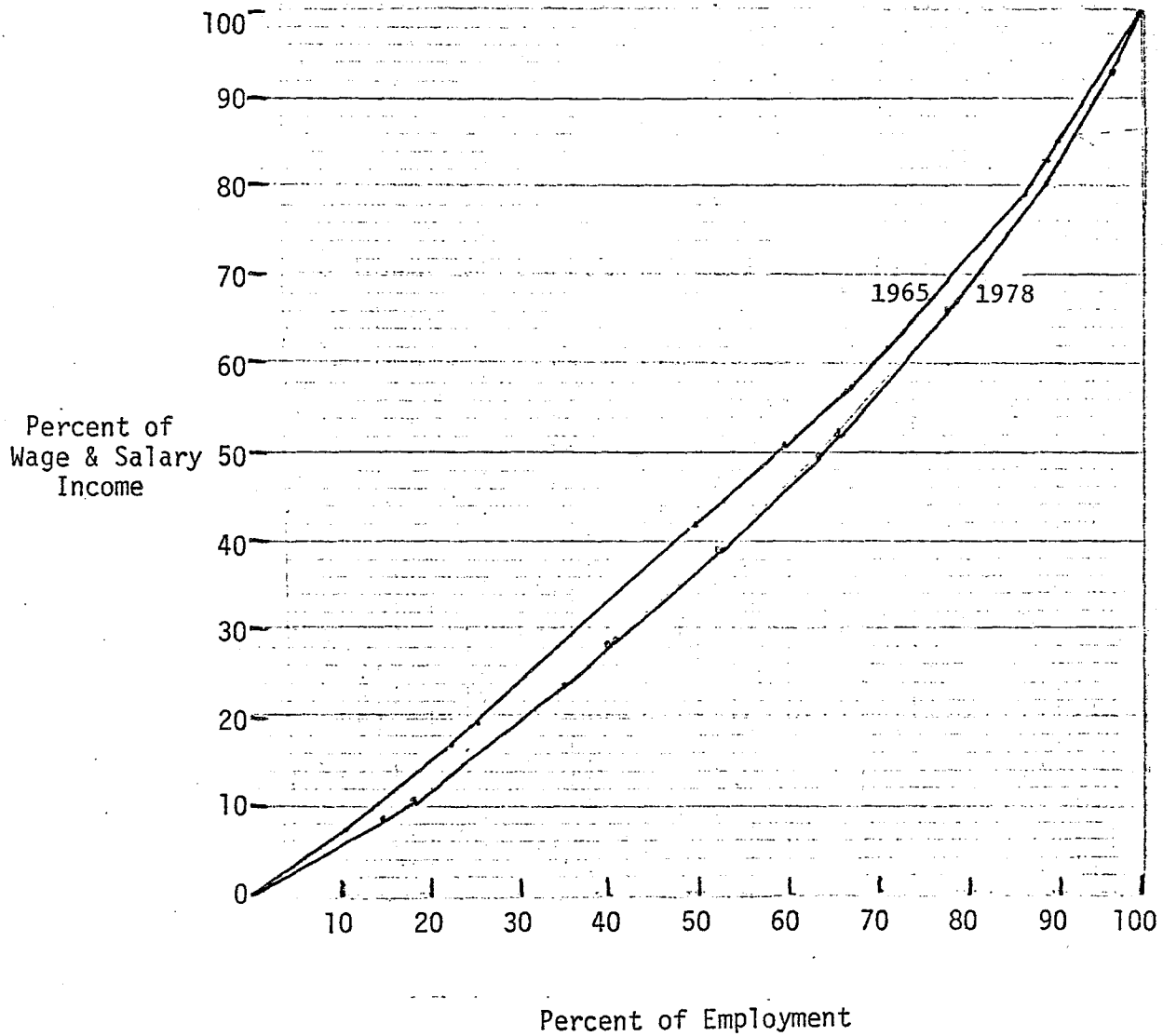


SOURCE: See text.

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

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

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

POPULATION

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

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

Net migration (in-migration minus out-migration) is the second factor
contributing to population change. Many factors influence the migration
decision; but for the Alaska case, it appears that (with the exception
of military-related migration) migration occurs largely in response to
economic opportunity. In the aggregate, relative rates of unemployment
and relative wage differentials in Alaska and elsewhere should be impor-
tant 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 differ-
ential 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 demon-
strated by patterns of migration that occur during and after pipeline
construction. Data summarizing population and changes in population for
Alaska for the years 1965 through 1978 are presented in Table 9. Both
the relative stability of natural increase and the volatility of net
migration are clear. Natural increase has averaged about 1.5 percent

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

(thousands)

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

SOURCE:   Alaska Department of Labor

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

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

## Regional Economies: Anchorage, Southcentral, and Southwest

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

### ANCHORAGE

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

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

## Employment, Labor Force, and Unemployment

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

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

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

## (thousands)

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

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

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Several industries expanded more rapidly than the growth of total employ-
ment, 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 per-
cent); and State and local government (10.5 percent). Construction,
manufacturing, and Federal government growth rates were all below the
regional average for the period.

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

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

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

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

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

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

## Personal Income

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

## Population

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

## TABLE 12. ANCHORAGE PERSONAL INCOME
### 1965-1978

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

### Average Annual Percent Growth

| 14.4% | 10.0% | 8.2% | 4.1% |
|---|---|---|---|

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

TABLE 13.   ANCHORAGE POPULATION
1965-1978

(thousands)

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

SOURCE:   Alaska Department of Labor.

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

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

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

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

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

### The Aleutian Islands Census Division

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

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

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

PRODUCTION

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

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

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

(catch in million pounds; value in million dollars)

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

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

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

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

(millions of pounds)

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

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

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

(millions of pounds)

## South Peninsula

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

## Aleutians East-Unalaska

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

## Aleutians West-Adak

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

## Bering Sea

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

## Area Totals

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

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

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

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

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

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

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

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

| Proportion of King Crab Catch Value by Boat Residence | | Proportion of Salmon Catch by Residence of Gear License Holder | |
|---|---|---|---|
| Place | Percentage | Place | Percentage |
| Kodiak | 26.8 | Kodiak | 41.5 |
| Alaska Peninsula | 4.0 | Aleutians | 20.0 |
| Dutch Harbor | 4.3 | South Central Alaska | 3.2 |
| Out of State | 64.9 | Anchorage | 2.6 |
| | | Other Alaska | 7.1 |
| | | Non-resident | 19.2 |
| | | Unknown | 6.5 |

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

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

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

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

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

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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 depen-
dents. These figures do not include additional civilian personnel
associated with nondefense activity such as officers' clubs, post-
exchanges, etc. Shemya and Cold Bay do not have resident dependents,
and military and civilian defense-related personnel number approximately
490. Table 18 summarizes military and related federal civilian employ-
ment data for the census division as a whole for 1978.

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

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

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

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

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

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

EMPLOYMENT, UNEMPLOYMENT, AND LABOR FORCE

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

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

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

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

e = estimated.

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

SOURCE:  Statistical Quarterly  (Alaska Department of Labor).

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

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

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

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

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

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

e = estimated.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

|  |  | Total | Male | Female |
|---|---|---|---|---|
| a. | Total Aleut population within the Aleutian region | 2,139 | 1,155 | 984 |
| b. | Total under 16 years of age included on line "a" | 963 | 520 | 443 |

Resident Population of Working Age within the Aleutian Region

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

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

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PERSONAL INCOME

Personal income data for the Aleutian Census Division have been compiled
for the years 1965-1978 and are presented in Table 23. Growth in cur-
rent 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 substan-
tially 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 mis-
leading in terms of considering overall economic activity.

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

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

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

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

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

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

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

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

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

SOURCE: See text on personal income.

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

Proprietor's income is the income of self-employed and unincorporated
enterprises. A large portion of this component for the Aleutians should
reflect commercial fishing income, and it was felt that BEA figures did
not adequately reflect this income. An estimate of noncommercial fish-
ing 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 Bottom-
fishing Industry in Alaska); hence, 35 percent of the value of catch has
been used to estimate proprietor's income. This figure has been used in
conjunction with the estimated 1978 southwest region value of catch to
estimate proprietor's income, as shown in the table, and was allocated
by factors established in Table 17.

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

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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 pre-sented in Table 25. The distribution is shown for both Native and white families. Median income for the two groups is similar, and both are well below the statewide figure of 12,443 dollars for the same year. The greatest disparity between Native and white families appears in the under-5,000 dollar groups, with 26 percent of the Native families and 13.8 percent of white families with incomes below 5,000 dollars. It should be noted that the non-Native families include military personnel,

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

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

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

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

POPULATION

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

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

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

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

SOURCE:  Alaska Department of Labor

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


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

SOURCE:   Alaska Department of Labor

TABLE 28.   ALEUT REGION POPULATION
BY COMMUNITY, 1977

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

[1]City Manager's figures.

[2]Includes military population.

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

III. THE BASE CASE


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

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

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

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

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

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

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

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

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dealt with by impact analysis alone.   In short, comparative impact

analysis provides only part of the information necessary for decision

making.

We can now turn to a discussion of the specific methodology employed in

developing the present base case projections (and associated OCS impacts

projections).   At the statewide and regional level two models have been

utilized, the MAP statewide econometric model and the MAP regional

econometric model.   For documentation see Goldsmith, Man-in-the-Arctic

Program:  Alaska Economic Model Documentation.   The MAP statewide model

is actually a system of models composed of economic, fiscal, and popu-

lation models.   The three are interdependent, as shown schematically in

Figure 2.

FIGURE 2·  MAP Sub-Models



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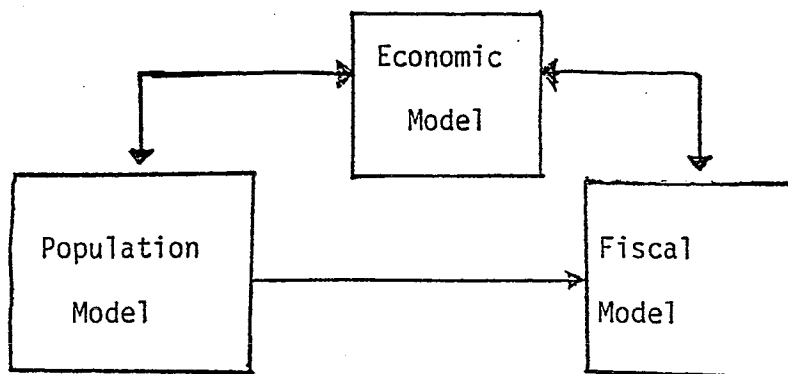
In essence, this states that the economic model receives input from the fiscal and population models, the fiscal model receives input from the economic and population models, and the population model utilizes input from the economic models, but not directly from the fiscal model. Thus, when we talk about 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 con-sider in assessing economic forecasts.

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

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

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

FIGURE 3. MAP STATEWIDE MODEL
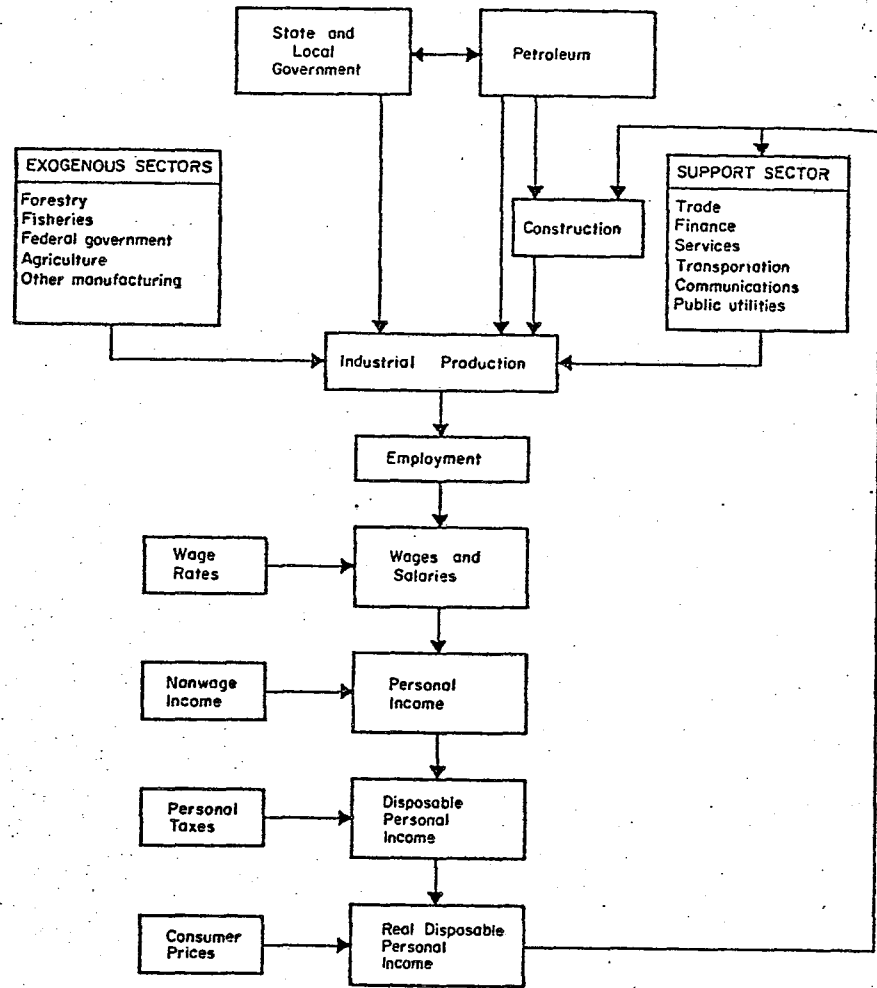


SOURCE:  Man-In-The-Arctic Program Alaskan Economic Model Documentation
(ISER, 1979).

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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 exoge-
nously determined and endogenously determined economic activity, where
endogenous activity depends on total activity. As such, the system is a
simultaneous equation structure.

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

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

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

FIGURE 4. MAP REGIONS

1 North Slope
6 Northwest
7 Fairbanks
2 Southwest
ANCHORAGE
4 Southcentral
Southeast
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Southwest (part)
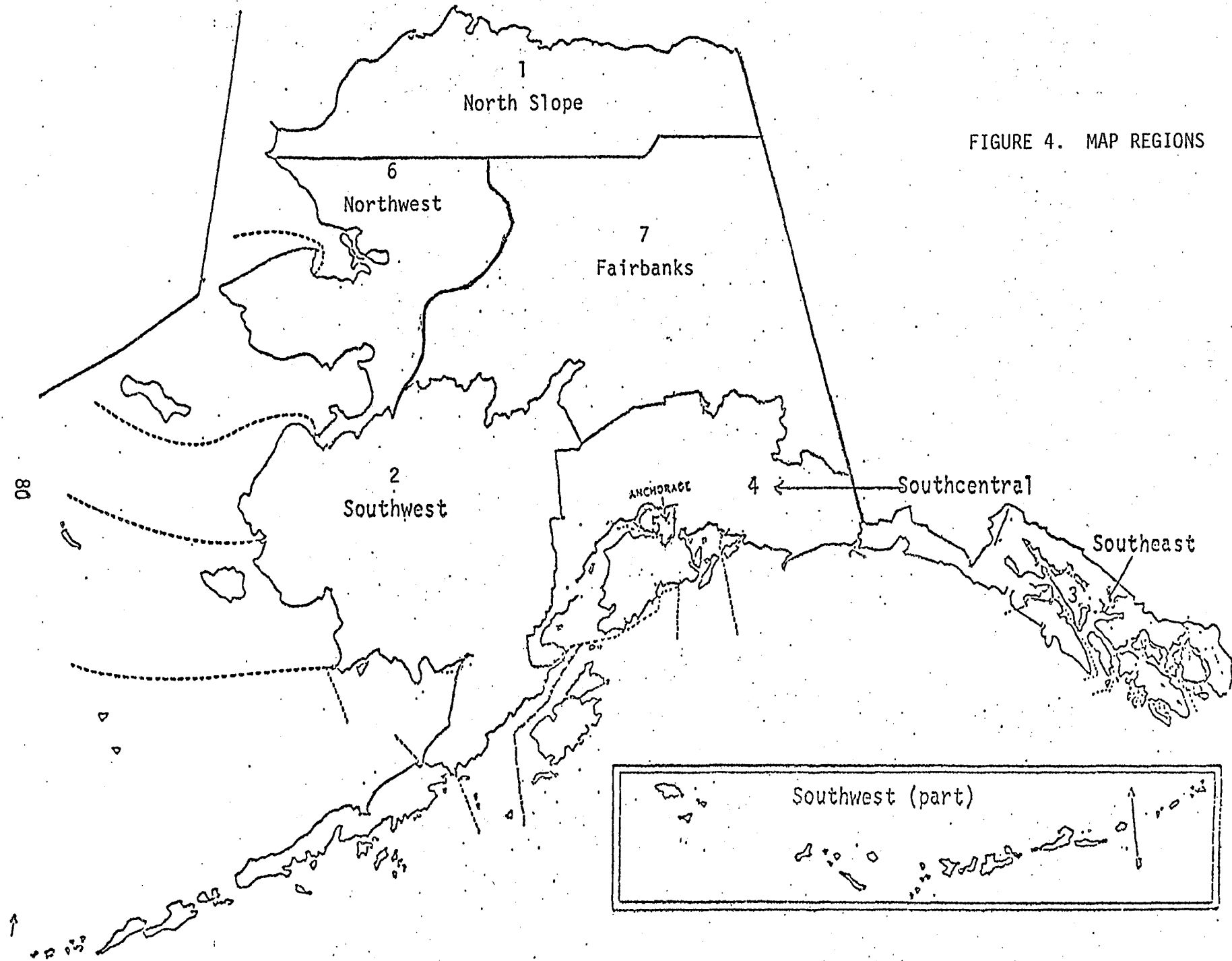
see Lee Huskey and Jim Kerr, "Small Community Population Impact Model".

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 exog-

enously 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 econo-

metric model. This results in substantially more limited data require-

ments than is the case for a fully estimated econometric model. The

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

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

## Non-OCS Base Case Assumptions: MAP Models

NATIONAL VARIABLES ASSUMPTIONS

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

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

## The Base Case Assumptions

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

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

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

THE ECONOMIC SCENARIOS

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

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

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

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

## Mining

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

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

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

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

TABLE 29.  SCENARIO ECONOMIC ASSUMPTIONS

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

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TABLE 29. SCENARIO ECONOMIC ASSUMPTIONS (cont.)

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

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TABLE 29.   SCENARIO ECONOMIC ASSUMPTIONS (cont.)

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

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

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

## Agriculture-Forestry-Fisheries

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

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

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

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

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

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

## TABLE 30  RESIDENT EMPLOYMENT IN FISHERIES

### Harvesting

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

### Processing

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

SOURCE:  See text.

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

## Federal Government

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

## Manufacturing

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

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

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

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

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

## Transportation

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

## Construction

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

## STATE FISCAL POLICY ASSUMPTIONS

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

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

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

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

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

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

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

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

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

## Non-OCS Base Case Assumptions:  SCIMP

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

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

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

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

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

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

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

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

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

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

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

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

SOURCE:    See text.

## The Base Case Projections

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

## THE MAP STATEWIDE BASE CASE PROJECTIONS

### Population

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

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# TABLE 32. PROJECTED POPULATION AND COMPONENTS

## OF CHANGE: ALASKA, 1980-2000

### (Thousands)

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

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SOURCE:    MAP Model Projections

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

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

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

## Employment

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

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

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

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

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

SOURCE:      MAP Model Projections

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

## Personal Income, Wages and Prices

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

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

TABLE 34.   PROJECTED TOTAL AND PER CAPITA REAL

PERSONAL INCOME:   ALASKA, 1980-2000

(Personal Income in Millions of 1980 Dollars,

Per Capita Income in 1980 Dollars)

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

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SOURCE:   MAP Model Projections

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

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

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

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

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

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TABLE 35.  PROJECTED WAGES AND SALARIES: ALASKA,

1980-2000

(Millions of 1980 Dollars)

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

SOURCE:   MAP Model Projections

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

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

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

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

TABLE 36.   PROJECTED REAL WAGE RATES:

ALASKA, 1980-2000

(1980 Dollars)

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

SOURCE:   MAP Model Projections

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

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# TABLE 37.  PROJECTED ALASKA AND U.S.

## PRICE INDEXES:  1980-2000

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

SOURCE:   MAP Model Projections          RPI = Alaska Relative Price Index
                                         USCPI = U.S. Consumer Price Index

Government Revenues and Expenditures

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

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

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

TABLE 38.    PROJECTED STATE GOVERNMENT REVENUES:

ALASKA, 1980-2000

(Millions of 1980 Dollars)

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

SOURCE:    MAP Model Projections

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

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TABLE 39.  PROJECTED TOTAL AND PER CAPITA STATE

GOVERNMENT EXPENDITURES:  ALASKA, 1980-2000

(Millions of 1980 Dollars)

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

SOURCE:   MAP Model Projections


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

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

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

# TABLE 40.  PROJECTED FUND BALANCES IN CURRENT AND

## 1980 DOLLARS:  ALASKA, 1980-2000

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

SOURCE:    MAP Model Projections

FUND = Fund Balance
FUNDR = Real Fund Balance

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

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

### Population

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

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

## TABLE 41. PROJECTED REGIONAL POPULATION: 1980-2000

### (Thousands)

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

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

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## Employment

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

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

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

TABLE 42.  PROJECTED REGIONAL TOTAL EMPLOYMENT:

1980-2000

(Thousands)

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

SOURCE:    MAP Model Projections

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

TABLE 43.   PROJECTED REGIONAL SUPPORT SECTOR EMPLOYMENT:

1980-2000

(Thousands)

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

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

TABLE 44.   PROJECTED REGIONAL GOVERNMENT EMPLOYMENT:

1980-2000

(Thousands)

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

SOURCE:   MAP Model Projections

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

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

## Personal Income

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

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

TABLE 45.  PROJECTED REGIONAL BASIC EMPLOYMENT:

1980-2000

(Thousands)

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

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

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# TABLE 46. PROJECTED TOTAL PERSONAL INCOME BY REGION:

## 1980-2000

## (Millions of 1980 Dollars)

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

SOURCE:    MAP Model Projections

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

TABLE 47.  PROJECTED PER CAPITA REGIONAL PERSONAL INCOME:

1980-2000

(1980 Dollars)

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

SOURCE:    MAP Model Projections

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

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

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

Base Case Projections:  SCIMP and the

Aleutian Islands Census Division

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

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

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

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

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

SOURCE:   SCIMP Projections.

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

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

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

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

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

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

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

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

GOVERNMENT REVENUE AND EXPENDITURES

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

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

| | WRB1RST — EXOGENOUS | | WRS1RST — EXOGENOUS | | WRG9RST — EXOGENOUS |
|---|---|---|---|---|---|
| | MEAN | | MEAN | | MEAN |
| 1980 | 0. | 1980 | 0. | 1980 | 0. |
| 1981 | 0. | 1981 | 0. | 1981 | 0. |
| 1982 | 0. | 1982 | 0. | 1982 | 0. |
| 1983 | 17.527 | 1983 | 4.988 | 1983 | 1.672 |
| 1984 | 40.508 | 1984 | 11.699 | 1984 | 5.488 |
| 1985 | 182.301 | 1985 | 37.937 | 1985 | 16.844 |
| 1986 | 235.363 | 1986 | 54.477 | 1986 | 24.504 |
| 1987 | 1168.26 | 1987 | 258.508 | 1987 | 102.945 |
| 1988 | 1363.79 | 1988 | 335.926 | 1988 | 154.937 |
| 1989 | 1214.65 | 1989 | 279.574 | 1989 | 118.242 |
| 1990 | 909.027 | 1990 | 194.531 | 1990 | 71.027 |
| 1991 | 330.098 | 1991 | 53.797 | 1991 | -5.535 |
| 1992 | 156.125 | 1992 | 0.402 | 1992 | -48.742 |
| 1993 | 188.965 | 1993 | 5.035 | 1993 | -44.34 |
| 1994 | 215.957 | 1994 | 10.57 | 1994 | -42.613 |
| 1995 | 216.742 | 1995 | 13.108 | 1995 | -42.91 |
| 1996 | 207.145 | 1996 | 13.094 | 1996 | -45.012 |
| 1997 | 222.078 | 1997 | 12.055 | 1997 | -47.047 |
| 1998 | 249.176 | 1998 | 12.887 | 1998 | -48.867 |
| 1999 | 264.793 | 1999 | 16.566 | 1999 | -49.633 |
| 2000 | 258.695 | 2000 | 18.316 | 2000 | -50.719 |

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

SOURCE:    MAP Model Projections.

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

| WRB1RST – EXOGENOUS | | WRS1RST – EXOGENOUS | | WRG9RST – EXOGENOUS | |
|---|---|---|---|---|---|
| | MEAN | | MEAN | | MEAN |
| 1980 | 0. | 1980 | 0. | 1980 | 0. |
| 1981 | 0. | 1981 | 0. | 1981 | 0. |
| 1982 | 0. | 1982 | 0. | 1982 | 0. |
| 1983 | 0.051 | 1983 | 0.025 | 1983 | 0.008 |
| 1984 | 0.09 | 1984 | 0.052 | 1984 | 0.024 |
| 1985 | 0.372 | 1985 | 0.163 | 1985 | 0.07 |
| 1986 | 0.536 | 1986 | 0.245 | 1986 | 0.099 |
| 1987 | 3.003 | 1987 | 1.22 | 1987 | 0.411 |
| 1988 | 3.562 | 1988 | 1.603 | 1988 | 0.606 |
| 1989 | 3.196 | 1989 | 1.339 | 1989 | 0.451 |
| 1990 | 2.355 | 1990 | 0.929 | 1990 | 0.264 |
| 1991 | 0.835 | 1991 | 0.254 | 1991 | -0.02 |
| 1992 | 0.388 | 1992 | 0.002 | 1992 | -0.171 |
| 1993 | 0.468 | 1993 | 0.024 | 1993 | -0.152 |
| 1994 | 0.541 | 1994 | 0.049 | 1994 | -0.142 |
| 1995 | 0.557 | 1995 | 0.062 | 1995 | -0.14 |
| 1996 | 0.501 | 1996 | 0.06 | 1996 | -0.142 |
| 1997 | 0.527 | 1997 | 0.055 | 1997 | -0.145 |
| 1998 | 0.587 | 1998 | 0.059 | 1998 | -0.146 |
| 1999 | 0.628 | 1999 | 0.075 | 1999 | -0.145 |
| 2000 | 0.608 | 2000 | 0.083 | 2000 | -0.145 |

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

SOURCE:   MAP Model Projections.

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

| Absolute Difference | | Percentage Difference | |
|---|---|---|---|
| RPI - EXOGENOUS | | RPI - EXOGENOUS | |
| | MEAN | | MEAN |
| 1980 | 0. | 1980 | 0. |
| 1981 | 0. | 1981 | 0. |
| 1982 | 0. | 1982 | 0. |
| 1983 | 0.096 | 1983 | 0.021 |
| 1984 | 0.336 | 1984 | 0.068 |
| 1985 | 0.562 | 1985 | 0.106 |
| 1986 | 0.41 | 1986 | 0.072 |
| 1987 | -0.34 | 1987 | -0.055 |
| 1988 | -1.717 | 1968 | -0.259 |
| 1989 | -2.851 | 1989 | -0.398 |
| 1990 | -3.812 | 1990 | -0.494 |
| 1991 | -4.293 | 1991 | -0.517 |
| 1992 | -3.982 | 1992 | -0.446 |
| 1993 | -3.663 | 1993 | -0.381 |
| 1994 | -3.563 | 1994 | -0.345 |
| 1995 | -3.633 | 1995 | -0.326 |
| 1996 | -3.752 | 1996 | -0.313 |
| 1997 | -3.793 | 1997 | -0.293 |
| 1998 | -3.843 | 1998 | -0.276 |
| 1999 | -3.977 | 1999 | -0.265 |
| 2000 | -4.119 | 2000 | -0.255 |

RPI = Alaska Relative Price Index

SOURCE: MAP Model Projections.

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

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

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

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

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

| MEAN | REVGFR | RP9SR | RFDSR | RNDSR | FUNDR - EXOGENOUS MEAN |
|------|--------|-------|-------|-------|------------------------|
| 1980 | 0. | 0. | 0. | 0. | 1980    0. |
| 1981 | 0. | 0. | 0. | 0. | 1981    0. |
| 1982 | 0. | 0. | 0. | 0. | 1982    0. |
| 1983 | -0.644 | -0.633 | 0.064 | -0.076 | 1983    -2.77 |
| 1984 | -2.145 | -2.077 | 0.109 | -0.175 | 1984    -10.395 |
| 1985 | -3.109 | -3.549 | 0.28 | 0.16 | 1985    -21.922 |
| 1986 | -0.016 | -2.528 | 0.556 | 1.959 | 1986    -26.062 |
| 1987 | 14.516 | 6.537 | 1.551 | 6.428 | 1987    -15.797 |
| 1988 | 42.129 | 22.889 | 2.592 | 16.649 | 1988    19.289 |
| 1989 | 79.719 | 50.673 | 3.375 | 25.669 | 1989    64.961 |
| 1990 | 98.418 | 61.681 | 3.474 | 33.261 | 1990    113.281 |
| 1991 | 99.379 | 60.54 | 3.064 | 35.775 | 1991    147.855 |
| 1992 | 89.992 | 55.559 | 2.574 | 31.859 | 1992    151.785 |
| 1993 | 81.754 | 51.328 | 2.259 | 28.167 | 1993    147.828 |
| 1994 | 77.676 | 48.056 | 2.066 | 27.551 | 1994    144.641 |
| 1995 | 75.715 | 45.467 | 1.915 | 28.335 | 1995    141.044 |
| 1996 | 74.113 | 43.146 | 1.781 | 29.188 | 1996    136.523 |
| 1997 | 72.391 | 40.847 | 1.676 | 29.868 | 1997    124.996 |
| 1998 | 71.156 | 38.679 | 1.594 | 30.883 | 1998    109.281 |
| 1999 | 70.508 | 36.676 | 1.502 | 32.331 | 1999    92.051 |
| 2000 | 69.672 | 34.7 | 1.401 | 33.573 | 2000    72.387 |

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

SOURCE: MAP Model Projections.

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

| MEAN | | | | | FUNDR - EXOGENOUS | |
| --- | --- | --- | --- | --- | --- | --- |
| | REVGFR | RP9SR | RFDSR | RNDSR | | MEAN |
| 1980 | 0. | 0. | 0. | 0. | 1980 | 0. |
| 1981 | 0. | 0. | 0. | 0. | 1981 | 0. |
| 1982 | 0. | 0. | 0. | 0. | 1982 | 0. |
| 1983 | -0.017 | -0.021 | 0.035 | -0.013 | 1983 | -0.038 |
| 1984 | -0.052 | -0.068 | 0.062 | -0.021 | 1984 | -0.112 |
| 1985 | -0.067 | -0.106 | 0.163 | 0.014 | 1985 | -0.186 |
| 1986 | -0. | -0.072 | 0.34 | 0.144 | 1986 | -0.181 |
| 1987 | 0.275 | 0.184 | 1.02 | 0.407 | 1987 | -0.094 |
| 1988 | 0.766 | 0.64 | 1.833 | 0.935 | 1988 | 0.101 |
| 1989 | 1.396 | 1.397 | 2.553 | 1.288 | 1989 | 0.301 |
| 1990 | 1.695 | 1.778 | 2.783 | 1.502 | 1990 | 0.477 |
| 1991 | 1.694 | 1.829 | 2.585 | 1.468 | 1991 | 0.574 |
| 1992 | 1.565 | 1.862 | 2.29 | 1.2 | 1992 | 0.554 |
| 1993 | 1.449 | 1.899 | 2.123 | 0.994 | 1993 | 0.516 |
| 1994 | 1.414 | 2. | 2.057 | 0.921 | 1994 | 0.49 |
| 1995 | 1.417 | 2.125 | 2.021 | 0.912 | 1995 | 0.473 |
| 1996 | 1.424 | 2.256 | 1.983 | 0.911 | 1996 | 0.454 |
| 1997 | 1.423 | 2.39 | 1.963 | 0.907 | 1997 | 0.417 |
| 1998 | 1.432 | 2.544 | 1.966 | 0.917 | 1998 | 0.37 |
| 1999 | 1.456 | 2.721 | 1.956 | 0.946 | 1999 | 0.32 |
| 2000 | 1.476 | 2.909 | 1.924 | 0.972 | 2000 | 0.26 |

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

SOURCE:   MAP Model Projections.

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

| E99SR - EXOGENOUS | | E99SRPC - EXOGENOUS | |
|---|---|---|---|
| MEAN | | MEAN | |
| 1980 | 0. | 1980 | 0. |
| 1981 | 0. | 1981 | 0. |
| 1982 | 0. | 1982 | 0. |
| 1983 | 1.462 | 1983 | 0.001 |
| 1984 | 3.449 | 1984 | 0.002 |
| 1985 | 7.507 | 1985 | -0.002 |
| 1986 | 12.105 | 1986 | -0.004 |
| 1987 | 29.753 | 1987 | -0.001 |
| 1988 | 51.015 | 1988 | 0. |
| 1989 | 73.385 | 1989 | -0.001 |
| 1990 | 81.743 | 1990 | 0.001 |
| 1991 | 77.492 | 1991 | -0.003 |
| 1992 | 72.783 | 1992 | -0.003 |
| 1993 | 72.384 | 1993 | -0.001 |
| 1994 | 74.95 | 1994 | -0. |
| 1995 | 78.888 | 1995 | -0.003 |
| 1996 | 80.771 | 1996 | 0. |
| 1997 | 84.838 | 1997 | 0.002 |
| 1998 | 90.196 | 1998 | -0. |
| 1999 | 94.926 | 1999 | -0.003 |
| 2000 | 98.379 | 2000 | 0.002 |

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

SOURCE:   MAP Model Projections.

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

| E99SR – EXOGENOUS | | E99SRPC – EXOGENOUS | |
|---|---|---|---|
| | MEAN | | MEAN |
| 1980 | 0. | 1980 | 0. |
| 1981 | 0. | 1981 | 0. |
| 1982 | 0. | 1982 | 0. |
| 1983 | 0.085 | 1983 | 0. |
| 1984 | 0.192 | 1984 | 0. |
| 1985 | 0.391 | 1985 | -0. |
| 1986 | 0.593 | 1986 | -0. |
| 1987 | 1.382 | 1987 | -0. |
| 1988 | 2.247 | 1988 | 0. |
| 1989 | 3.058 | 1989 | -0. |
| 1990 | 3.221 | 1990 | 0. |
| 1991 | 2.883 | 1991 | -0. |
| 1992 | 2.553 | 1992 | -0. |
| 1993 | 2.397 | 1993 | -0. |
| 1994 | 2.343 | 1994 | -0. |
| 1995 | 2.303 | 1995 | -0. |
| 1996 | 2.255 | 1996 | 0. |
| 1997 | 2.238 | 1997 | 0. |
| 1998 | 2.248 | 1998 | -0. |
| 1999 | 2.235 | 1999 | -0. |
| 2000 | 2.191 | 2000 | 0. |

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

SOURCE:   MAP Model Projections.

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

### Regional Population Impacts

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

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

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

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

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

SOURCE:   MAP Model Projections.

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

| | POPTR2 | POPTR4 | POPTR5 |
|------|--------|--------|--------|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | -0.029 | 0.167 | 0.19 |
| 1984 | 0.021 | 0.307 | 0.346 |
| 1985 | 0.233 | 0.524 | 0.628 |
| 1986 | 0.582 | 0.7 | 0.858 |
| 1987 | 1.207 | 1.5 | 2.117 |
| 1988 | 3.689 | 2.103 | 2.922 |
| 1989 | 5.619 | 2.928 | 3.891 |
| 1990 | 5.008 | 3.056 | 3.964 |
| 1991 | 4.541 | 2.667 | 3.409 |
| 1992 | 3.933 | 2.429 | 3.069 |
| 1993 | 3.448 | 2.314 | 2.952 |
| 1994 | 3.079 | 2.294 | 2.87 |
| 1995 | 2.935 | 2.269 | 2.794 |
| 1996 | 2.7 | 2.233 | 2.713 |
| 1997 | 2.503 | 2.242 | 2.714 |
| 1998 | 2.327 | 2.278 | 2.743 |
| 1999 | 2.22 | 2.275 | 2.699 |
| 2000 | 2.122 | 2.211 | 2.623 |

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

SOURCE: MAP Model Projections.

## Regional Employment Impacts

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

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

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

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

| | EM99R2 | EM99R4 | EM99R5 |
|---|---|---|---|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | 0.001 | 0.046 | 0.217 |
| 1984 | 0.01 | 0.094 | 0.45 |
| 1985 | 0.039 | 0.182 | 0.892 |
| 1986 | 0.087 | 0.262 | 1.24 |
| 1987 | 0.244 | 0.638 | 3.095 |
| 1988 | 0.622 | 0.861 | 4.312 |
| 1989 | 0.969 | 1.128 | 5.614 |
| 1990 | 0.934 | 1.124 | 5.535 |
| 1991 | 0.899 | 0.89 | 4.455 |
| 1992 | 0.851 | 0.759 | 3.767 |
| 1993 | 0.82 | 0.701 | 3.541 |
| 1994 | 0.818 | 0.675 | 3.454 |
| 1995 | 0.815 | 0.662 | 3.412 |
| 1996 | 0.813 | 0.653 | 3.386 |
| 1997 | 0.814 | 0.673 | 3.524 |
| 1998 | 0.823 | 0.706 | 3.725 |
| 1999 | 0.836 | 0.713 | 3.778 |
| 2000 | 0.837 | 0.718 | 3.767 |

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

SOURCE:   MAP Model Projections.

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

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

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

SOURCE:   MAP Model Projections.

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of Region 5 (Anchorage) part of the expansion reflects project-related

employment in Anchorage based headquarters. (See Tables 69 and 70.)

For reference purposes Appendix D includes direct OCS employment by

place of work as well as by place of residence.

Support sector peak differences (in absolute and percentage terms) for

the three regions are respectively; Region 2 (781, 20.6 percent),

Region 4 (498, 4.6 percent), and Region 5 (3275, 5.6 percent). The

relatively high support sector impact for Region 2 reflects the

inclusion of OCS-related transportation employment. (See Tables 71 and 72.)

Finally, government sector differences in employment at peak project

level (again in absolute and percentage differences) for the three

regions are: Region 2 (109, 1.2 percent), Region 4 (210, 2.5 percent),

and Region 5 (520, 1.3 percent). In each region the peak level impacts

decline modestly, with the percentage impacts in Regions 2 and 5 de-

clining to about 1 percent, while for Region 4 the difference drops to

about 1.7 percent. The supporting data for absolute changes are contained

in Tables 73, and for percentage impact levels in Table 74.

Regional Personal Income Impacts

The impact of the mean case on regional real personal income is relatively

small. For the three regions the peak differences between the mean and

base cases (in absolute and percentage terms) are: Region 2 (23.7 million

dollars, 4.8 percent), Region 4 (61.1 million dollars, 6.8 percent), and

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

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

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

SOURCE:   MAP Model Projections.

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

| | EMB1R2 | EMB1R4 | EMB1R5 |
|---|---|---|---|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | 0.045 | 0.422 | 1.016 |
| 1984 | 0.165 | 0.541 | 1.561 |
| 1985 | 0.362 | 0.989 | 2.573 |
| 1986 | 0.218 | 1.113 | 2.709 |
| 1987 | 3.015 | 4.386 | 10.368 |
| 1988 | 3.132 | 4.296 | 10.412 |
| 1989 | 3.07 | 5.354 | 13.293 |
| 1990 | 2.372 | 4.446 | 11.657 |
| 1991 | 1.489 | 2.452 | 7.234 |
| 1992 | 1.264 | 2.354 | 6.985 |
| 1993 | 1.044 | 2.358 | 7.082 |
| 1994 | 0.908 | 2.309 | 6.655 |
| 1995 | 0.864 | 2.156 | 6.213 |
| 1996 | 0.788 | 1.966 | 5.764 |
| 1997 | 0.73 | 1.995 | 5.893 |
| 1998 | 0.684 | 2.069 | 6.058 |
| 1999 | 0.648 | 2.021 | 5.706 |
| 2000 | 0.616 | 1.782 | 5.285 |

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

SOURCE:   MAP Model Projections.

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

| | EMS1R2 | EMS1R4 | EMS1R5 |
|---|---|---|---|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | -0.001 | 0.019 | 0.102 |
| 1984 | 0.003 | 0.042 | 0.24 |
| 1985 | 0.024 | 0.082 | 0.51 |
| 1986 | 0.067 | 0.132 | 0.783 |
| 1987 | 0.151 | 0.232 | 1.601 |
| 1988 | 0.486 | 0.39 | 2.602 |
| 1989 | 0.731 | 0.489 | 3.274 |
| 1990 | 0.731 | 0.498 | 3.275 |
| 1991 | 0.712 | 0.425 | 2.764 |
| 1992 | 0.677 | 0.322 | 2.143 |
| 1993 | 0.655 | 0.277 | 1.923 |
| 1994 | 0.652 | 0.267 | 1.872 |
| 1995 | 0.646 | 0.264 | 1.861 |
| 1996 | 0.64 | 0.264 | 1.867 |
| 1997 | 0.636 | 0.268 | 1.929 |
| 1998 | 0.639 | 0.279 | 2.034 |
| 1999 | 0.645 | 0.289 | 2.096 |
| 2000 | 0.642 | 0.296 | 2.118 |

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

SOURCE:   MAP Model Projections.

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

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

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

SOURCE:  MAP Model Projections.

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

|  | EMG9R2 | EMG9R4 | EMG9R5 |
|---|---|---|---|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | 0.001 | 0.002 | 0.006 |
| 1984 | 0.004 | 0.007 | 0.019 |
| 1985 | 0.008 | 0.015 | 0.036 |
| 1986 | 0.015 | 0.029 | 0.071 |
| 1987 | 0.016 | 0.029 | 0.071 |
| 1988 | 0.044 | 0.083 | 0.208 |
| 1989 | 0.082 | 0.155 | 0.388 |
| 1990 | 0.102 | 0.196 | 0.488 |
| 1991 | 0.109 | 0.21 | 0.52 |
| 1992 | 0.098 | 0.189 | 0.47 |
| 1993 | 0.088 | 0.171 | 0.424 |
| 1994 | 0.088 | 0.171 | 0.421 |
| 1995 | 0.088 | 0.172 | 0.423 |
| 1996 | 0.068 | 0.173 | 0.425 |
| 1997 | 0.09 | 0.175 | 0.431 |
| 1998 | 0.093 | 0.182 | 0.448 |
| 1999 | 0.096 | 0.189 | 0.463 |
| 2000 | 0.097 | 0.19 | 0.467 |

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

SOURCE:   MAP Model Projections.

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

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

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

SOURCE:   MAP Model Projections.

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

| | PIRR2 | PIRR4 | PIRR5 |
|------|--------|--------|---------|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | 0.129 | 1.694 | 6.796 |
| 1984 | 0.556 | 4.298 | 16.234 |
| 1985 | 1.684 | 10.323 | 36.711 |
| 1986 | 2.558 | 13.565 | 46.562 |
| 1987 | 10.107 | 44.106 | 137.956 |
| 1988 | 17.965 | 54.377 | 177.931 |
| 1989 | 23.659 | 61.123 | 215.235 |
| 1990 | 23.171 | 54.734 | 200.895 |
| 1991 | 19.271 | 34.63 | 144.737 |
| 1992 | 16.941 | 27.851 | 122.906 |
| 1993 | 16.348 | 27.183 | 121.957 |
| 1994 | 16.685 | 26.452 | 121.074 |
| 1995 | 16.98 | 26.25 | 121.219 |
| 1996 | 17.619 | 26.274 | 122.191 |
| 1997 | 18.185 | 27.937 | 130.586 |
| 1998 | 19.06 | 29.991 | 140.687 |
| 1999 | 19.798 | 30.292 | 143.332 |
| 2000 | 20.502 | 30.804 | 144.148 |

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

SOURCE:   MAP Model Projections.

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

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

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

SOURCE:   MAP Model Projections.

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


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

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

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

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

| | PIRPCR2 | PIRPCR4 | PIRPCR5 |
|---|---|---|---|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | 8.215 | 15.945 | 12.953 |
| 1984 | 18.238 | 35.902 | 32.512 |
| 1985 | 28.016 | 99.902 | 75.363 |
| 1986 | 2.844 | 117.336 | 81.664 |
| 1987 | 155.477 | 489.086 | 306.176 |
| 1988 | 30.375 | 562.73 | 360.434 |
| 1989 | -118.633 | 535.277 | 361.902 |
| 1990 | -124.387 | 393.809 | 257.176 |
| 1991 | -216.398 | 119.281 | 74.656 |
| 1992 | -243.504 | 35.93 | 11.406 |
| 1993 | -216.984 | 27.461 | 2.977 |
| 1994 | -198.672 | 22.742 | -5.555 |
| 1995 | -192.867 | 12.156 | -12.508 |
| 1996 | -179.23 | -0.871 | -19.074 |
| 1997 | -165.105 | -2.488 | -15.625 |
| 1998 | -155.18 | 2.418 | -10.012 |
| 1999 | -147.074 | 2.848 | -14.316 |
| 2000 | -145.703 | -4.047 | -20.012 |

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

SOURCE:   MAP Model Projections.

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

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

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

SOURCE:   MAP Model Projections.

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

### The Mean Case Scenario: The Aleutian Islands
### Census Division Impacts

#### Population

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

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

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

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

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

## TABLE NOTES

*BPOPP = resident civilian population, base case.

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

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

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

TOTPOP = BASPP + TOCSP.

SOURCE:   SCIMP mean case and base case projections.

Employment

Projected resident and nonresident employment impacts are summarized in Table 80. Changes in total resident employment ($\Delta TE$) include changes in support sector employment ($\Delta EMS$), changes in state and local government (included in $\Delta EMG$), and changes in exogenous construction and mining ($\Delta EMX$).

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

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

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

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

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

TABLE NOTES

*$\Delta$TE = Change in total resident employment and is the sum of changes in the support sector resident employment ($\Delta$EMS), changes in state and local government (federal government employment is not changed) employment ($\Delta$EMG), changes in manufacturing employment ($\Delta$EMA), and changes in exogenous resident construction and mining employment, or resident OCS employment ($\Delta$EMX). Changes in total regional employment ($\Delta$TOTE) equal the change in resident employment plus the change in enclave employment ($\Delta$ENCLV). Percentage differences are the percentage differences between the mean case and base case.

SOURCE:   SCIMP mean case and base case projections.

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

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

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

### The Low Case Scenario: The Aleutian Islands
### Census Division

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

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

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

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

SOURCE: SCIMP low case and base case projections.

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

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

*See explanatory notes to Table 80.

SOURCE:  SCIMP low case and base case projections.

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

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

APPENDIX A

COMPUTER PRINTOUT OF LOW CASE IMPACTS,
STATEWIDE AND REGIONAL

SIMULATION OUTPUT BY VARIABLE

POPTST - EXOGENOUS

LOW

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

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SIMULATION OUTPUT BY VARIABLE

MIGNET - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY VARIABLE

NATINC - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY DSET

LOW

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

SIMULATION OUTPUT BY VARIABLE

PIRST - EXOGENOUS

LOW

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

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SIMULATION OUTPUT BY VARIABLE

PIRPCST - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY VARIABLE

WSG9RST - EXOGENOUS

LOW

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

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SIMULATION OUTPUT BY VARIABLE

WSS1RST - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY VARIABLE

WSB1RST - EXOGENOUS

LOW

| | |
|------|-------|
| 1980 | 0. |
| 1981 | 0. |
| 1982 | 0. |
| 1983 | 2.022 |
| 1984 | 2.864 |
| 1985 | 3.708 |
| 1986 | 3.625 |
| 1987 | 2.522 |
| 1988 | 0.241 |
| 1989 | 0.135 |
| 1990 | 0.106 |
| 1991 | 0.093 |
| 1992 | 0.09 |
| 1993 | 0.083 |
| 1994 | 0.085 |
| 1995 | 0.082 |
| 1996 | 0.095 |
| 1997 | 0.092 |
| 1998 | 0.079 |
| 1999 | 0.089 |
| 2000 | 0.096 |

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SIMULATION OUTPUT BY VARIABLE

    WRB1RST - EXOGENOUS

        LOW

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

SIMULATION OUTPUT BY VARIABLE

WRG9RST - EXOGENOUS

LOW

| | |
|---|---|
| 1980 | 0. |
| 1981 | 0. |
| 1982 | 0. |
| 1983 | 0.023 |
| 1984 | -0.344 |
| 1985 | -0.859 |
| 1986 | -0.996 |
| 1987 | -0.258 |
| 1988 | 0.559 |
| 1989 | 1.172 |
| 1990 | 1.437 |
| 1991 | 1.559 |
| 1992 | 1.59 |
| 1993 | 1.574 |
| 1994 | 1.563 |
| 1995 | 1.622 |
| 1996 | 1.676 |
| 1997 | 1.707 |
| 1998 | 1.641 |
| 1999 | 1.754 |
| 2000 | 1.82 |

SIMULATION OUTPUT BY VARIABLE

WRS1RST - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY VARIABLE

RPI — EXOGENOUS

LOW

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

SIMULATION OUTPUT BY DSET

LOW

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

SIMULATION OUTPUT BY VARIABLE

E99SR - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY VARIABLE

E99SRPC - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY VARIABLE

FUNDR - EXOGENOUS

LOW

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

SIMULATION OUTPUT BY VARIABLE

POPTST - EXOGENOUS

LOW

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

Percentage

SIMULATION OUTPUT BY VARIABLE

MIGNET - EXOGENOUS

LOW

| | |
|---|---|
| 1980 | 0. |
| 1981 | 0. |
| 1982 | 0. |
| 1983 | 1.903 |
| 1984 | 0.569 |
| 1985 | 0.565 |
| 1986 | 0.402 |
| 1987 | 3.545 |
| 1988 | 4.133 |
| 1989 | 5.029 |
| 1990 | -0.503 |
| 1991 | -0.153 |
| 1992 | -0.1 |
| 1993 | -0.073 |
| 1994 | -0.093 |
| 1995 | -0.05 |
| 1996 | 0.018 |
| 1997 | -0.038 |
| 1998 | -0.033 |
| 1999 | -0.046 |
| 2000 | -0.012 |

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Percentage

SIMULATION OUTPUT BY VARIABLE

NATINC - EXOGENOUS

LOW

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

Percentage

SIMULATION OUTPUT BY DSET

LOW

| | EM99ST | EM98ST | EMB1ST | EMS1ST | EMG9ST |
|------|--------|--------|--------|--------|--------|
| 1980 | 0. | 0. | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. | 0. | 0. |
| 1983 | 0.058 | 0.06 | 0.156 | 0.065 | 0.014 |
| 1984 | 0.096 | 0.1 | 0.165 | 0.125 | 0.036 |
| 1985 | 0.122 | 0.126 | 0.198 | 0.153 | 0.053 |
| 1986 | 0.125 | 0.13 | 0.199 | 0.158 | 0.06 |
| 1987 | 0.092 | 0.095 | 0.142 | 0.115 | 0.05 |
| 1988 | 0.041 | 0.042 | 0.016 | 0.064 | 0.03 |
| 1989 | 0.017 | 0.018 | 0.008 | 0.025 | 0.014 |
| 1990 | 0.01 | 0.01 | 0.005 | 0.013 | 0.01 |
| 1991 | 0.007 | 0.008 | 0.004 | 0.009 | 0.008 |
| 1992 | 0.006 | 0.006 | 0.003 | 0.007 | 0.007 |
| 1993 | 0.006 | 0.006 | 0.003 | 0.006 | 0.007 |
| 1994 | 0.005 | 0.005 | 0.003 | 0.006 | 0.006 |
| 1995 | 0.005 | 0.005 | 0.003 | 0.006 | 0.006 |
| 1996 | 0.005 | 0.005 | 0.003 | 0.006 | 0.001 |
| 1997 | 0.005 | 0.005 | 0.003 | 0.006 | 0.001 |
| 1998 | 0.004 | 0.005 | 0.003 | 0.005 | 0.001 |
| 1999 | 0.004 | 0.004 | 0.003 | 0.005 | 0.005 |
| 2000 | 0.004 | 0.004 | 0.002 | 0.004 | 0.005 |

Percentage

SIMULATION OUTPUT BY VARIABLE

PIRST - EXOGENOUS

LOW

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

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Percentage

SIMULATION OUTPUT BY VARIABLE

PIRPCST - EXOGENOUS

LOW

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

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Percentage

SIMULATION OUTPUT BY VARIABLE

WSG9RST - EXOGENOUS

LOW

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

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Percentage

SIMULATION OUTPUT BY VARIABLE

WSS1RST - EXOGENOUS

LOW

| | |
|------|-------|
| 1980 | 0. |
| 1981 | 0. |
| 1982 | 0. |
| 1983 | 0.065 |
| 1984 | 0.117 |
| 1985 | 0.138 |
| 1986 | 0.146 |
| 1987 | 0.103 |
| 1988 | 0.06 |
| 1989 | 0.024 |
| 1990 | 0.012 |
| 1991 | 0.008 |
| 1992 | 0.007 |
| 1993 | 0.006 |
| 1994 | 0.005 |
| 1995 | 0.005 |
| 1996 | 0.005 |
| 1997 | 0.005 |
| 1998 | 0.004 |
| 1999 | 0.004 |
| 2000 | 0.004 |

214

Percentage

SIMULATION OUTPUT BY VARIABLE

WSB1RST - EXOGENOUS

LOW

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

Percentage

SIMULATION OUTPUT BY VARIABLE

WRB1RST - EXOGENOUS

LOW

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

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Percentage

SIMULATION OUTPUT BY VARIABLE

WRG9RST - EXOGENOUS

LOW

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

Percentage

SIMULATION OUTPUT BY VARIABLE

WRS1RST - EXOGENOUS

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

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Percentage

SIMULATION OUTPUT BY VARIABLE

RPI - EXOGENOUS

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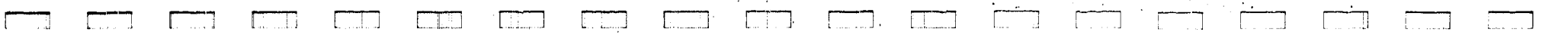
| | LOW |
|------|-------|
| 1980 | 0. |
| 1981 | 0. |
| 1982 | 0. |
| 1983 | 0.009 |
| 1984 | 0.02 |
| 1985 | 0.02 |
| 1986 | 0.018 |
| 1987 | 0.021 |
| 1988 | 0.03 |
| 1989 | 0.038 |
| 1990 | 0.04 |
| 1991 | 0.041 |
| 1992 | 0.041 |
| 1993 | 0.041 |
| 1994 | 0.042 |
| 1995 | 0.042 |
| 1996 | 0.042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

Percentage

SIMULATION OUTPUT BY DSET

LOW

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

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Percentage

SIMULATION OUTPUT BY VARIABLE

E99SR - EXOGENOUS

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

Percentage

SIMULATION OUTPUT BY VARIABLE

E99SRPC - EXOGENOUS

LOW

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

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Percentage

SIMULATION OUTPUT BY VARIABLE

FUNDR - EXOGENOUS

LOW

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

Percentage

SIMULATION OUTPUT BY DSET - ERROR

RRE7095_ER

| | POPTR2 | POPTR4 | POPTR5 |
|------|--------|--------|--------|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | -0.004 | 0.038 | 0.171 |
| 1984 | 0. | 0.065 | 0.273 |
| 1985 | 0.004 | 0.084 | 0.36 |
| 1986 | 0.007 | 0.085 | 0.365 |
| 1987 | 0.012 | 0.057 | 0.256 |
| 1988 | 0.013 | 0.024 | 0.113 |
| 1989 | 0.009 | 0.015 | 0.079 |
| 1990 | 0.007 | 0.012 | 0.063 |
| 1991 | 0.007 | 0.011 | 0.055 |
| 1992 | 0.007 | 0.01 | 0.05 |
| 1993 | 0.007 | 0.01 | 0.046 |
| 1994 | 0.007 | 0.009 | 0.043 |
| 1995 | 0.000 | 0.000 | 0.041 |
| 1996 | 0.007 | 0.009 | 0.041 |
| 1997 | 0.006 | 0.008 | 0.039 |
| 1998 | 0.006 | 0.008 | 0.037 |
| 1999 | 0.006 | 0.007 | 0.035 |
| 2000 | 0.006 | 0.007 | 0.034 |

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

| | EMS1R2 | EMS1R4 | EMS1R5 |
|------|--------|--------|--------|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | 0.001 | 0.0 | |

| | | | |
|---|---|---|---|
| 1985 | 0.001 | 0.022 | 0.122 |
| 1986 | 0.001 | 0.023 | 0.126 |
| 1987 | 0.002 | 0.013 | 0.081 |
| 1988 | 0.002 | 0.006 | 0.037 |
| 1989 | 0.001 | 0.002 | 0.015 |
| 1990 | 0. | 0.001 | 0.008 |
| 1991 | 0. | 0.001 | 0.000 |
| 1992 | 0. | 0. | 0.005 |
| 1993 | 0. | 0. | 0.005 |
| 1994 | 0. | 0. | 0.005 |
| 1995 | 0. | 0. | 0.005 |
| 1996 | 0. | 0. | 0.005 |
| 1997 | 0. | 0. | 0.005 |
| 1998 | 0. | 0. | 0.005 |
| 1999 | -0. | 0. | 0.005 |
| 2000 | -0. | 0. | 0.005 |

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

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

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

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

SIMULATION OUTPUT BY DSET - PERCENT ERROR

RRE7095_PCER

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

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

| | EMS1R2 | EMS1R4 | EMS1R5 |
|---|---|---|---|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | -0.021 | 0.114 | 0.108 |

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

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

| | EMB1R2 | EMB1R4 | EMB1R5 |
|---|---|---|---|
| 1980 | 0. | 0. | 0. |
| 1981 | 0. | 0. | 0. |
| 1982 | 0. | 0. | 0. |
| 1983 | -0. | 0.206 | 0.502 |
| 1984 | 0.01 | 0.197 | 0.589 |
| 1985 | 0.015 | 0.224 | 0.631 |
| 1986 | 0.016 | 0.208 | 0.561 |
| 1987 | 0.016 | 0.147 | 0.368 |
| 1988 | 0.013 | 0.012 | 0.021 |
| 1989 | 0.006 | 0.005 | 0.012 |
| 1990 | 0.004 | 0.003 | 0.009 |
| 1991 | 0.002 | 0.002 | 0.007 |
| 1992 | 0.002 | 0.001 | 0.007 |
| 1993 | 0.001 | 0.001 | 0.007 |
| 1994 | 0.001 | 0.001 | 0.007 |
| 1995 | 0.001 | 0.001 | 0.007 |
| 1996 | 0.001 | 0.001 | 0.007 |
| 1997 | 0.001 | 0.001 | 0.006 |
| 1998 | 0. | 0.001 | 0.006 |
| 1999 | | 0.0 | 0. |

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

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

APPENDIX B

FISHERIES ASSUMPTIONS

# EARL R. COMBS, INC.
## CONSULTANTS IN ECONOMICS AND PLANNING

9725 - S.E. 36th St. • Mercer Island, WA 98040 • (206)232-3991

MEMORANDUM                                    7/17/80

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

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

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

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

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

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Roger Marks
Continued  -2-


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

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

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

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

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

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

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

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

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

Roger Marks
Continued  -4-

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

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

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

Sincerely,

Jeffrey J. Tobolski.
President

JJT:as

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## ON SHORE PROCESSING

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

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

Average trawler annual catch (Sea Grant) 2,700 m.t. Trawler has a crew of six.
    857,009 divided by 2,700 = 318 = vessels needed
    318 vessels x 6 crew = 1,908 = primary employment

We assume that an on shore processing plant will process 60,000 m.t. (132 million lbs) of fish in the round and employ 606 employees.
    No. on shore plants=857,009 divided by 60,000 = 14.3 plants
    No. primary employment=14.3 x 606 = 8,666 employees

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

## AT SEA PROCESSING

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

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

Total primary employment for sea based processing is:
                94 x 80 = 7,520

                    Total Primary Employment = 18,094

Shore Based Processing In The Aleutians

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

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

The Bering Sea and Aleutian Resource Availability

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

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

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

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

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

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

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

### Employment 60,000 m.t. Unit

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

### Cod/Pollock Line (single line*)

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

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

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

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

### Perch/Rockfish Line (single line*)

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

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

* See footnote for cod/pollock line

### Flatfish Line

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

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

### Hand Fillet Line

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

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

## Sea Based Processing In The Aleutians

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

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

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

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

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

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CREW REQUIREMENTS REQUIRED

FOR 250-FOOT CATCHER/PROCESSOR

| Position | Number |
|---|---|
| Ship's Master | 1 |
| 1st Mate | 1 |
| 2nd Mate | 1 |
| Chief Engineer | 1 |
| 1st Asst. Engineer | 1 |
| 2nd Asst. Engineer | 1 |
| Production Superintendent | 1 |
| Production Foreman | 2 |
| Production Crew * | 35 |
| Fishing Superintendent | 1 |
| Fishing/Deck Crew | 10 |
| Chief Cook | 1 |
| Asst. Cook | 2 |
| Steward | 2 |
| | 60 |

* The production crew works two shifts on two production lines

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## Projected Resource Growth Rate

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

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

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

Therefore, we feel that a typical industry growth curve is approximated by a normal distribution and our projected resource growth for the Aleutians reflects this assumption.
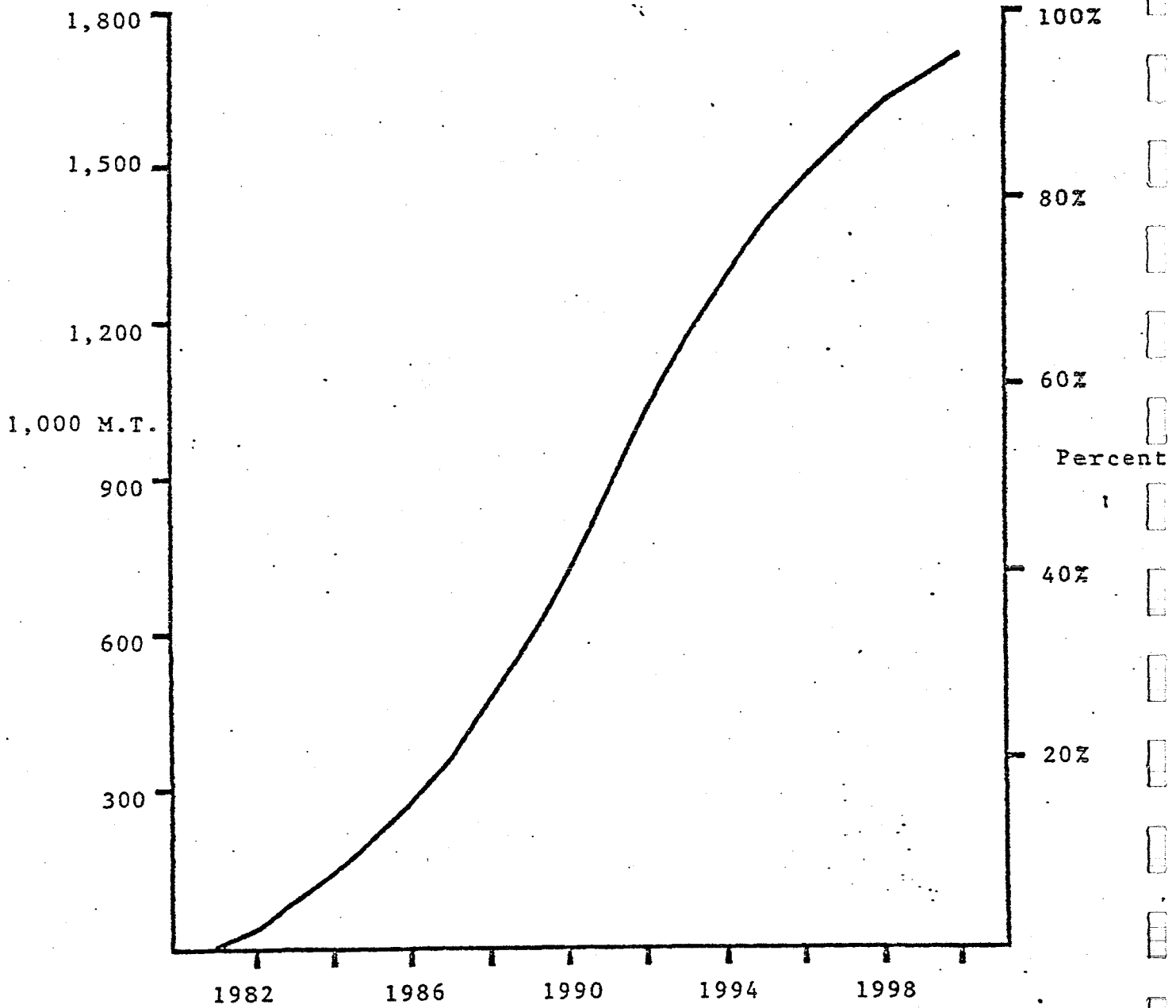
PROJECTED FISHERIES RESOURCE UTILIZATION IN THE
BERING SEA AND ALEUTIAN ISLANDS

## Residency Employment for Groundfish Production
## Aleutian Islands

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

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

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

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

4/ Assumes 6/crew (Combs).

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

6/ Assumes 606/plant (Combs).

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

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

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

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

[8] Assumes 80/crew (Combs).

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

IN REPLY REFER TO

# United States Department of the Interior

3331.5

BUREAU OF LAND MANAGEMENT

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

September 12, 1980

Memorandum

To:      Acting Coordinator, Socioeconomic Studies Program

From:    Socioeconomic Specialist

Subject: Assumptions Regarding Bottomfishery Development

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

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

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

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

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

-   Extended domestic jurisdiction has been established.

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

CONSERVE
AMERICA'S
ENERGY
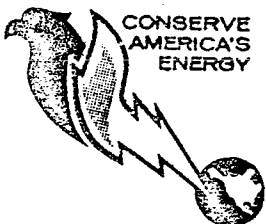
*Save Energy and You Serve America!*
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- Richard Careaga, planner for Dutch Harbor, is planning for 20,000 people by the year 2000.

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

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

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

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

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

APPENDIX C

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

APPENDIX C

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

Exploration Only

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

*No SEAR adjustment performed on headquarters employment.

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

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

Mean Only

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

*No SEAR adjustment performed on headquarters employment.

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

APPENDIX D

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

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

## Exploration Only

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

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

## APPENDIX D

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

Mean Only

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

TABLE NOTES

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

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

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