MARINE & COASTAL HABITAT MANAGEMENT
ALASKA DEPT. OF FISH & GAME
333 Raspberry Road
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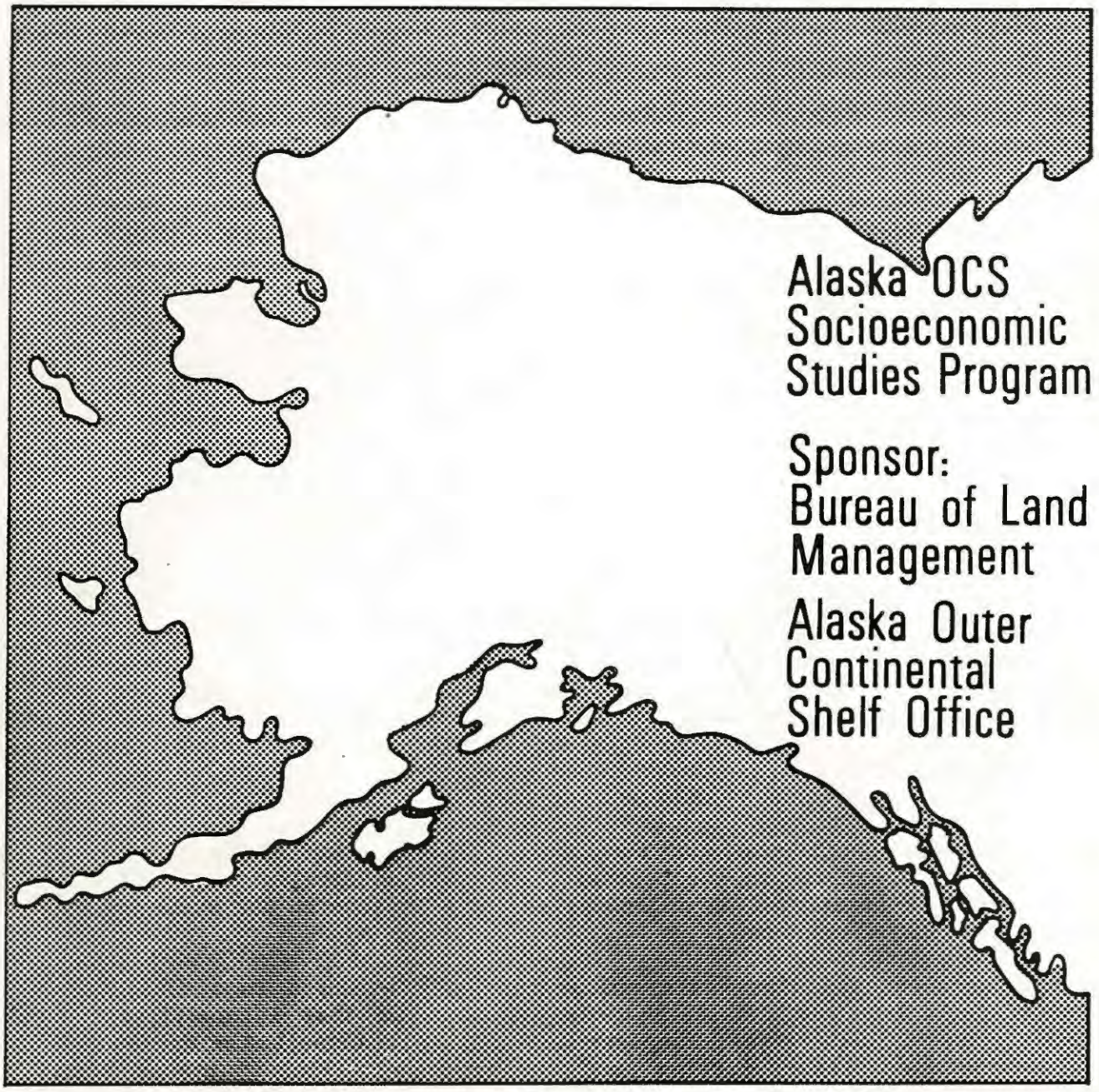
Technical Report Number 50



Alaska OCS Socioeconomic Studies Program

Sponsor:
Bureau of Land Management

Alaska Outer Continental Shelf Office

Bering–Norton Petroleum Development Scenarios Economic and Demographic Analysis

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

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

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

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

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

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TECHNICAL REPORT NO. 50

CONTRACT NO. AA550-CT6-61

ALASKA OCS SOCIOECONOMIC STUDIES PROGRAM

BERING-NORTON 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
BERING-NORTON PETROLEUM DEVELOPMENT SCENARIOS
ECONOMIC AND DEMOGRAPHIC ANALYSIS

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June 1980

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

Background

The progressive depletion of U.S. domestic petroleum reserves and increased concern over the reliability of foreign supplies have led to growing concern in the United States about future energy sources. The federal government has begun to establish policies aimed at increasing domestic energy supplies. The U.S. Outer Continental Shelf (OCS) has drawn considerable attention as a future source of petroleum supplies. These areas, because of their high potential as a source of oil and gas, figure importantly in the future energy program of the United States.

Historically, the role of Alaska in supplying energy has been small; total cumulative production in Alaska through 1974 was less than 1 percent of the U.S. total. Alaska has played a more important part in OCS production; petroleum production in the Upper Cook Inlet accounted for about 7.6 percent of cumulative U.S. Outer Continental Shelf oil production by the end of 1978 (U.S. Geological Survey, 1979).

Alaska accounts for over one-fourth of the identified oil and gas reserves in the United States. The search for new domestic reserves will center importantly on Alaska since it is estimated that more than one-third of all undiscovered recoverable domestic oil reserves are in the state. Alaska's importance in the OCS program is a result of the fact that over 60 percent of the undiscovered OCS reserves are expected to be found in the Alaska OCS (U.S. Geological Survey, 1975).

Alaska's new role as a major U.S. energy supplier has already brought significant changes to the Alaska economy and society. The prospect of even further transformation looms large in the state's future as planned development extends to Alaska coastal waters. The first steps toward development of Alaska's coastal resources have already been taken with past federal lease sales in the Northern Gulf of Alaska, Lower Cook Inlet, and the Beaufort Sea.

Changes produced by past petroleum development in the state have been major. The rapid changes in the Alaska economy and population associated with the development in Upper Cook Inlet and Prudhoe Bay have created strains on the Alaska society and environment. At the same time, these petroleum developments generated the most prosperous economic period in the state's history and produced prospects of continued prosperity throughout the next decade.

The nature of the changes induced by prospective new developments, however, will not necessarily resemble those characteristic of developments of the recent past. The technology, resource levels, and institutional arrangements surrounding Bering Sea developments are subject to a wide range of uncertainty. Consequently, the implications of Bering Sea development for Alaskan economic and demographic processes can be accurately assessed only by an analysis which incorporates both these unique institutional and technological features, as well as the uncertainty surrounding them.

The objective of this report is to provide the information needed to anticipate the major dimensions of the economic and social impacts of proposed oil and gas developments in the Bering Sea-Norton Sound Basin. The Institute of Social and Economic Research, as part of the Bureau of Land Management's (BLM's) OCS Studies Program, has provided a series of economic and population forecasts through the year 2000 under several alternative scenarios for Bering Sea/Norton Sound petroleum development. By contrasting these forecasts with a base case forecast, which does not include the proposed developments, it is possible to assess four major dimensions of the impacts of OCS development--population, employment, income, and state government fiscal impacts. This report will provide an assessment of these impacts.

Scope

This study consists of three major components. First, a baseline study examines the existing and historical structure of economic and demographic change within the regions most directly affected by the proposal, the Norton Sound and Anchorage regions, as well as in the state as a whole. Second, a set of forecasts are developed through the year 2000, based on the assumption that the proposed development does not occur. This base case then serves as a benchmark for comparison with an alternative set of forecasts premised on the occurrence of the proposed Bering-Norton OCS development. The final section presents an analysis of the impacts of these developments, measured as the difference between base case and OCS case forecast values.

Methodology for OCS Impact Assessment

The methodology to be used in assessing the impacts of the proposed federal OCS developments in the Bering Sea-Norton Sound area involves comparing two sets of economic and demographic projections--one contingent on the occurrence of the proposed development, and a second based on assumptions which omit the development. The impact of the development is measured as the difference between the two projections.

Because these projections are long range, there is a considerable degree of uncertainty associated with them. The specific future value of each and every forecast variable is unknown. However, certain such variables may be estimated from their statistical relationships to other such variables during the historical period. An econometric model is used to summarize these estimated structural relationships. Other variables, on the other hand, may not be estimated from historical data, either because they are determined by factors outside of the scope of the system under study or because they represent unique new situations not captured by historical data. While such variables (called exogenous) are neither known nor estimable with any degree of precision, the plausible range of values for such variables is quite often known. As a consequence, it is then feasible to develop a set of alternative forecasts, each contingent on assumed values of the exogenous variables, which span the plausible range of such variables and thus bracket the range of forecast variables. This section describes the models and exogenous assumptions required to develop a set of contingent forecasts, and it describes a methodology for utilizing such forecasts in assessing the impact of OCS development.

THE ECONOMETRIC MODELS

Two econometric models--a statewide model and a regional model designed to disaggregate the statewide results--are utilized in the analysis.

The Statewide Model

The principal model being utilized in the analysis of the proposed federal OCS development is the statwide econometric model developed by the Man-in-the-Arctic Program (MAP) at the University of Alaska Institute of Social and Economic Research. The model consists of three interrelated components: an economic model, a fiscal model, and a demographic model. The basic structure of the model is as shown in Figure 1.

The economic model is divided into exogenous or basic sectors and endogenous or nonbasic sectors. The level of output in the exogenous sectors is determined outside the state's economy. The primary reason for the nonbasic sector is to serve local Alaskan markets, so the level of output is determined within the Alaskan economy. The basic industries in the model are mining, agriculture-forestry-fisheries, manufacturing, federal government, and the export component of construction. The nonbasic industries are transportation-communication-utilities, wholesale and retail trade, finance-insurance-real estate, services, and the remainder of construction.

Industrial production in nonbasic industries determines the demand for labor and employment; employment is that level needed to produce the

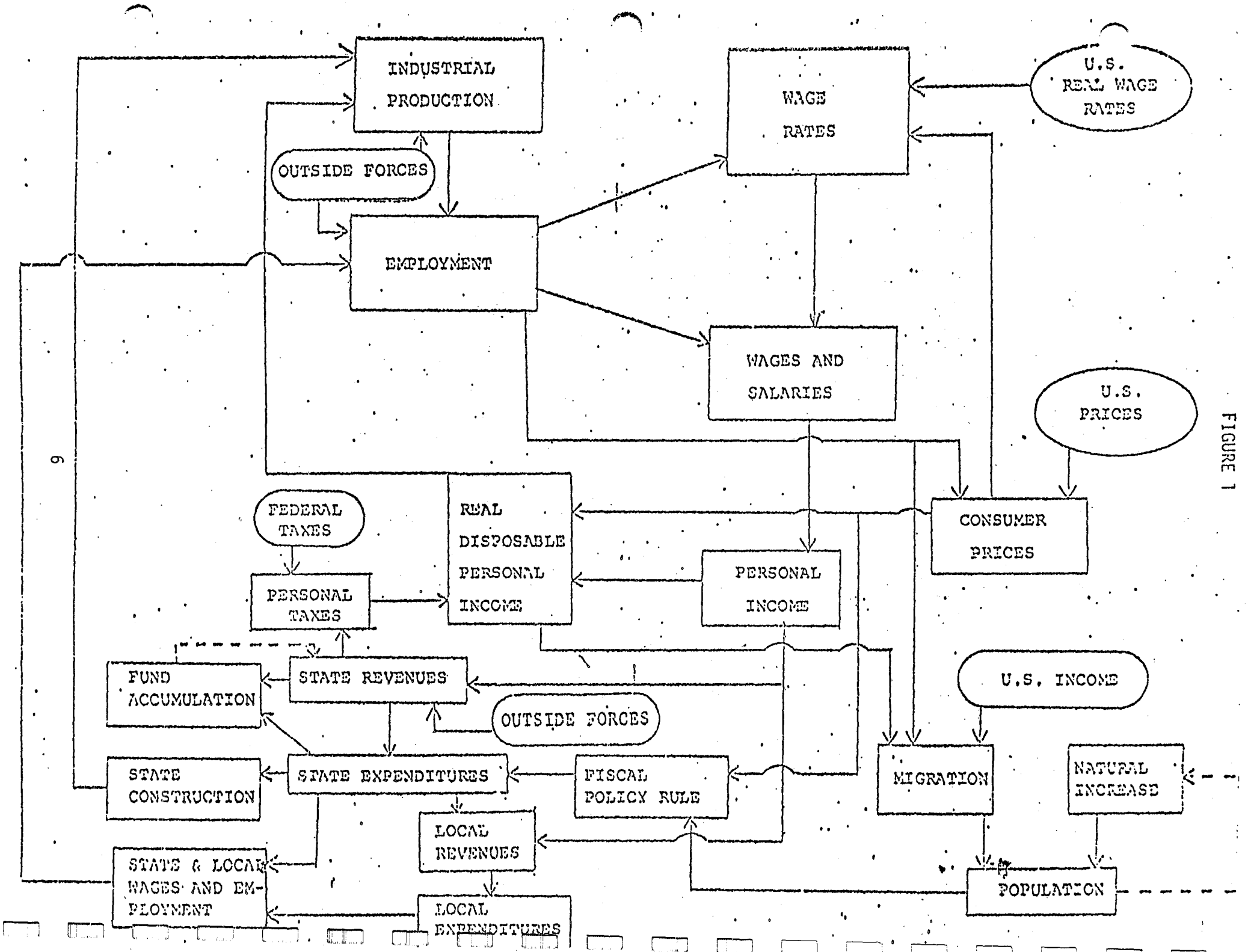

INDUSTRIAL PRODUCTION
WAGE RATES
U.S. REAL WAGE RATES
OUTSIDE FORCES
EMPLOYMENT
WAGES AND SALARIES
U.S. PRICES
FEDERAL TAXES
REAL DISPOSABLE PERSONAL INCOME
CONSUMER PRICES
PERSONAL TAXES
PERSONAL INCOME
FUND ACCUMULATION
STATE REVENUES
U.S. INCOME
OUTSIDE FORCES
STATE CONSTRUCTION
STATE EXPENDITURES
FISCAL POLICY RULE
MIGRATION
NATURAL INCREASE
LOCAL REVENUES
STATE & LOCAL WAGES AND EMPLOYMENT
POPULATION
LOCAL EXPENDITURES

FIGURE 1

required output. The product of employment and the wage rate determine wages and salaries by industry. Aggregate wages and salaries are the major component of personal income. By assumption, the Alaska labor market is open to in- or out-migration from the Lower 49. In either case, labor demand is always satisfied. Wage rates in Alaska are determined in part by U.S. wage rates. Thus, both the supply and price of labor are linked to economic activity in the Lower 49. An estimate of disposable personal income is made by adding an estimate of nonwage income to wages and salaries and adjusting this by deducting income taxes. The level of real disposable income is found by deflating disposable personal income by a relative price index; the major determinants of Alaskan prices are U.S. prices, the size of the economy, and the growth rate of the economy. Incomes determine the demand for local production; incomes and output are simultaneously determined.

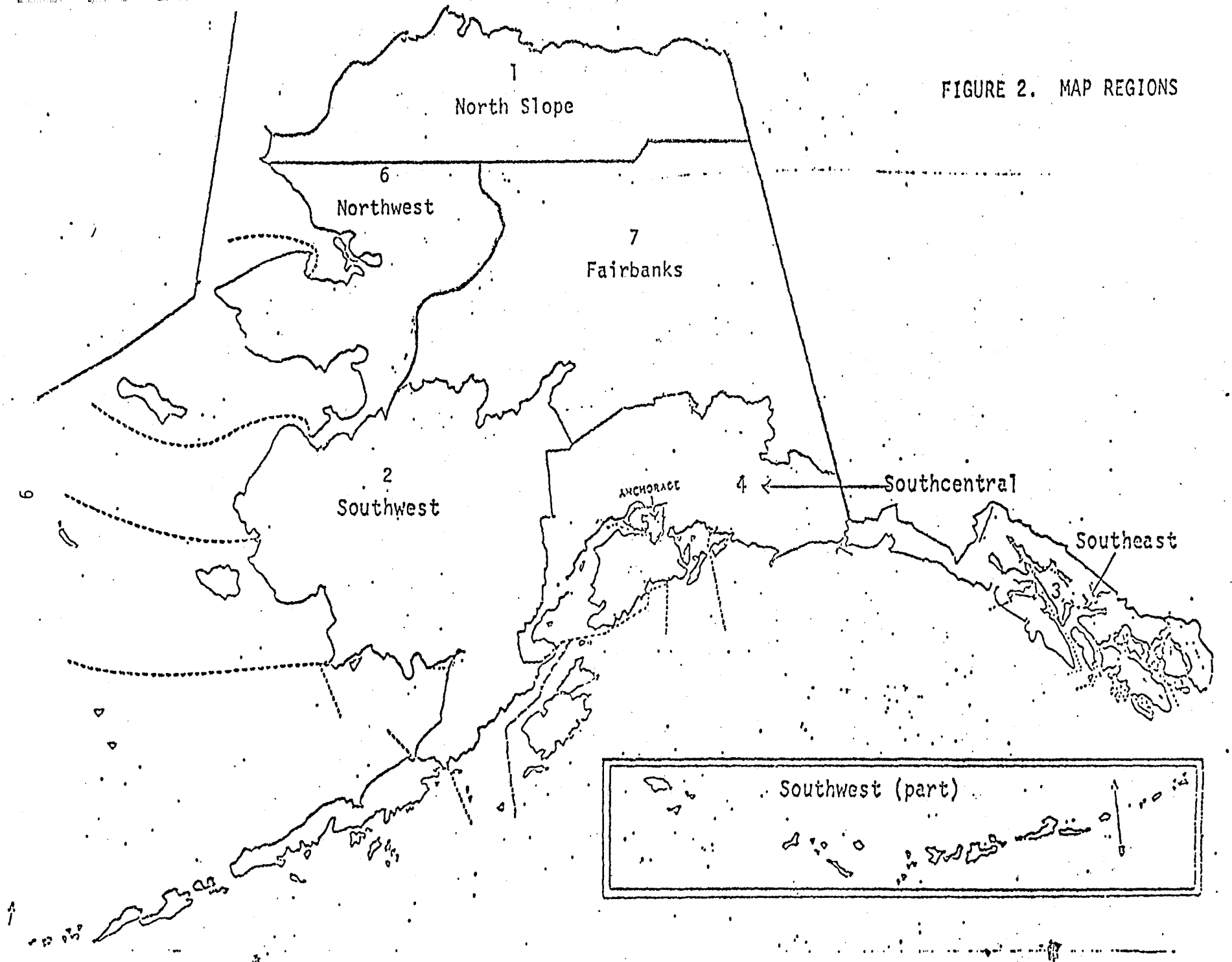
Population is determined based upon a projection of each of its components--births, deaths, and migration. The model uses age-sex-race-specific survival rates and age-race-specific fertility rates to project births and deaths of the civilian population. Total civilian population is found by adding civilian net migration to the natural increase. Net migration is determined by the relative economic opportunities in Alaska. In the model, these are described by employment changes and the Alaskan real per capita income relative to the real per capita income of the United States. An exogenous estimate of military population is added to determine total population.

The fiscal model, which provides important pieces of information for the economic model, also provides a framework for analyzing the effects of alternate fiscal policies. The fiscal model calculates personal tax payments in order to derive disposable personal income. The fiscal model, based on an assumed state spending rule, also calculates personnel expenditures, state government employment, and the amount spent on capital improvements which determines a portion of employment in the construction industry. All three submodels are linked through their requirement for information produced by the other submodels.

The Regional Model

The regional model provides an allocation of employment, income, and population in the state to seven regions of the state. These regions are shown in Figure 2. The economic component is similar in each region to that of the state model. The major difference is that some regional economies are influenced by economic activity in other regions; the most notable of these is Anchorage. The demographic component of the regional model is much simpler than that component of the state model. Regional population is estimated as a function of employment. Regional population is estimated in two components--enclave and nonenclave population. A weighted average of the nonenclave population to nonenclave employment ratio for the state and the lagged value in the region is multiplied by the nonenclave employment to estimate nonenclave population in the current year. The weights are based on the proportion of state population in the region. Enclave employment is added to nonenclave to determine total regional population. Enclave employment includes the military and

FIGURE 2. MAP REGIONS



major construction projects such as the trans-Alaska pipeline. Estimates of the regional model are constrained to total to equivalent state model results.

USE OF THE MODELS FOR IMPACT ASSESSMENT

In order to properly assess the impact of proposed federal OCS development, a plausible range of OCS development scenarios should be used to produce a set of contingent forecasts, each of which should then be compared to a plausible range of corresponding base case forecasts, to bracket a range of potential impacts. However, insofar as such an approach leads to a proliferation of cases which planners are seldom prepared to evaluate, an alternative approach is utilized. Each of a range of plausible OCS development scenarios serves as the basis for a set of forecasts, each to be compared to a single mid-range base case forecast. This gives a single impact for each development scenario, rather than the range of impacts which would be preferable in principle. Then, by varying the key base case assumptions, the sensitivity of this measure to those assumptions is tested to gauge the reliability of the measured impact.

LIMITATIONS OF THE PROPOSED METHODOLOGY

The methodology suggested above is designed to extract a maximum amount of information from historical data using accepted econometric techniques. As such, it can reasonably be expected to reduce the uncertainty associated with the impacts of the proposed developments. However, to suggest that it can completely eliminate such uncertainty or in some cases even

significantly reduce it may be to exaggerate the capabilities of the technique, the information contained in historical data, or both. For example, no such model can possibly capture radical structural change, and any such model is limited by the quality and reliability of the data used in its specification and estimation.

At the state level, the major sources of uncertainty which place limitations on such a method are twofold: first, there is a great deal of speculation built into the development of a base case scenario, as will be seen below; and second, the state policy response to the OCS development is both unpredictable and a potentially major determinant of the impact of such development. On the other hand, a reasonably sized data base such as that used in the estimation of the state model can be expected to result in accurate contingent forecasts; and in those cases where measured impacts prove insensitive to base case assumptions, to reliable uncontingent impact measures.

The regional results are subject to far greater limitations and possess far fewer strengths for several reasons. First, the available data is far sparser than on a statewide basis, and the potential specifications are far more complex. As a consequence, estimated relationships in the regional model are less reliable than their statewide counterparts. Furthermore, especially in remote regions such as those analyzed here, the susceptibility of the region to major structural change as a consequence of OCS development is far greater than that encountered at a statewide level. As a consequence, while the techniques proposed here

extract the maximum information likely to be gained econometrically, such results necessarily must be interpreted as only a first approximation rather than a detailed analysis of the regional economies. An accurate assessment must incorporate detailed microlevel analysis of such economies. Econometric techniques cannot and should not replace such analysis.

II. HISTORICAL STATEWIDE AND REGIONAL GROWTH PATTERNS: THE BASELINE STUDY

The Alaskan Economy, 1965-1978

The period from 1965 to 1978 witnessed rapid changes in the Alaskan economy, largely induced by the introduction and maturation of the petroleum industry within the state and a changing role of state government in the economy. By 1965, oil and gas developments in the area of Upper Cook Inlet were getting underway, developments which would supply about 2 percent of domestic oil in the United States by the turn of the decade. But far more significantly, the exploration activity also begun in the mid-1960s in the state would, in 1968, yield the largest oil and gas discovery in North America. The Prudhoe Bay discovery, accounting for nearly a fourth of domestic oil reserves, promised to make Alaska a dominant domestic oil supplier by the onset of 1980. The discovery had two major effects, one short-term and one long-term. In the short term, development of the Prudhoe resources required construction of a major pipeline. This construction effort, peaking in 1976, raised employment by 42 percent and income by nearly 75 percent during a span of three years, only to be followed by the most precipitous drop in basic sector employment since statehood, as construction was completed in 1977. The onset of production from Prudhoe in 1977, however, began to reveal the nature of the true long-term significance of oil and gas development in the state. Because of the capital intensive nature of petroleum development, this significance was not to be found in the generation of any substantial long-term direct employment. Rather, the long-term effect would be to alter radically the role of state government in the economy. The

Prudhoe discovery occurred on state-owned lands. Revenues from the initial sale of drilling rights and prospective royalty and production taxes broadly expanded the set of policy options available to state government, placing the Alaskan government in a role unique among the American states in its ability to control its own future development.

This section attempts to map out the major development patterns which have emerged during this period and which promise to shape the course of future economic growth within the state.

DIMENSIONS OF GROWTH

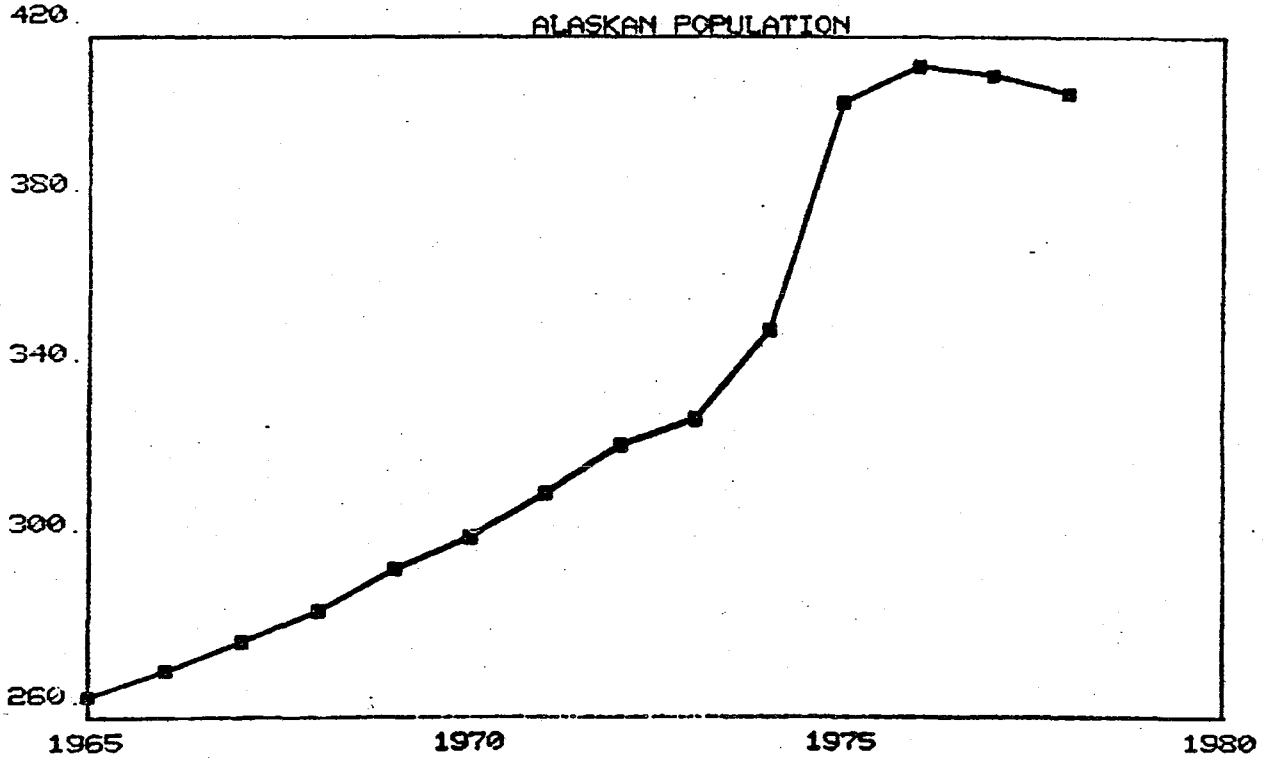
Alaskan Population, 1965-1978

Figure 3 presents the growth of Alaskan population during the period 1965-1978. As is apparent from the figure, there have been three distinct sub-periods in which population growth varied dramatically. From 1965 to 1973, population growth proceeded at a relatively stable rate, averaging 2.8 percent annually. The pipeline buildup from 1973 to 1975 produced an explosion in state population which expanded over 22 percent in the two-year period. As the construction effort peaked in 1976, and fell off abruptly thereafter, population began dropping slightly in 1977 and again in 1978 for an average rate of decline of less than 1 percent annually in the 1976-78 period.

Population growth is composed of two components: natural increase (the excess of births over deaths) and net migration (total in-migration less

FIGURE 3. STATE POPULATION, 1965-1978

(thousands of persons)



1965	265.192
1966	271.505
1967	277.906
1968	284.88
1969	294.56
1970	302.361
1971	312.93
1972	324.281
1973	330.365
1974	351.159
1975	404.634
1976	413.289
1977	411.211
1978	406.956

SOURCE: Alaska Department of Labor

total out-migration). Figure 4 breaks down the changes in Alaskan population since 1965 into its two components.

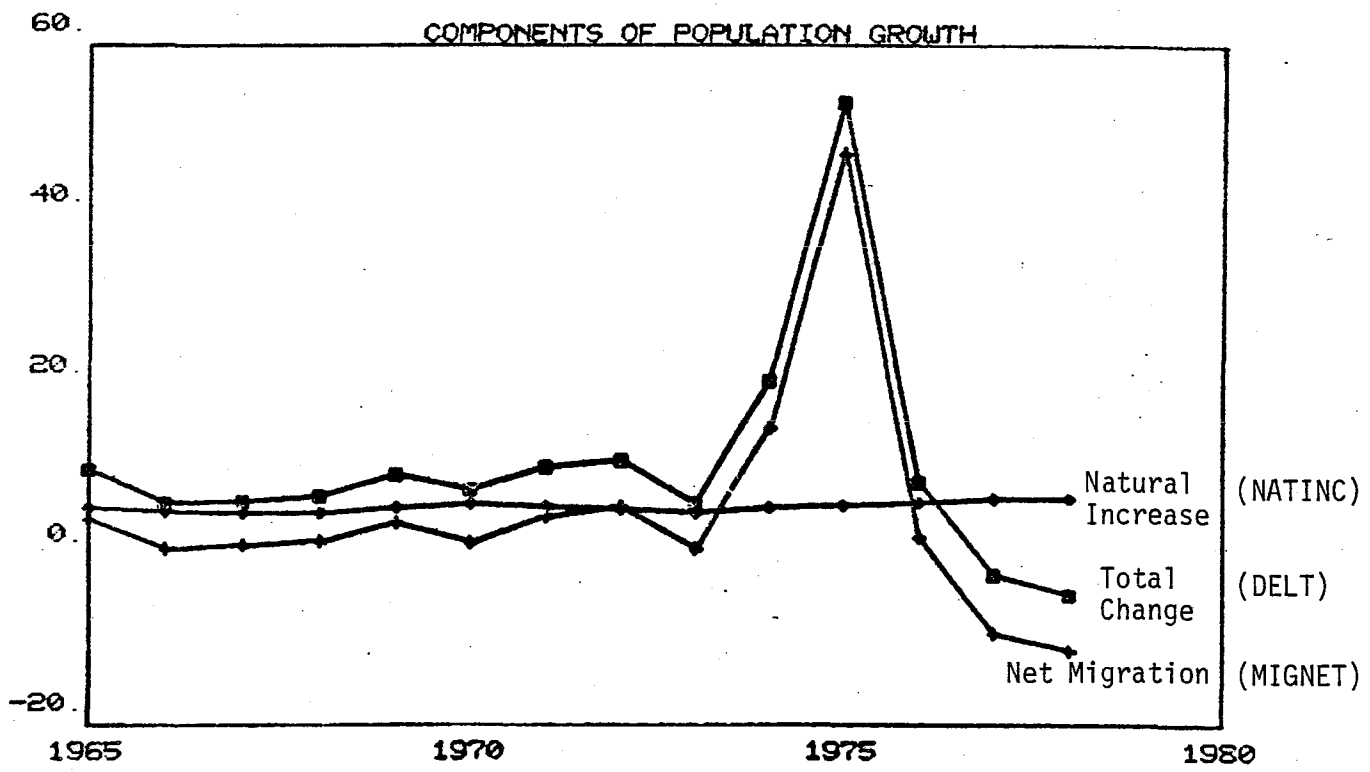
Historically, Alaska has exhibited a rate of natural increase (excess of births over deaths per 1,000 persons) higher than any other state. This reflects both the highest birth rate and the lowest death rate among the states. Both features stem from the youthfulness of the Alaskan population, with the bulk of that population falling into the 14-to-30-year-age brackets, the area of both highest fertility and lowest death rates. Because of the high rate of turnover of the Alaskan population, this somewhat abnormal age distribution has remained fairly stable over time, as shown in Table 1. Natural increase has accounted for slightly under half of total population growth since 1965 and has occurred at a relatively stable rate, growing at an average rate of 1.5 percent annually.

The major source of population growth since 1965, however, has been net migration. While the stability of the age distribution reflects a rapid turnover among the population, on balance there has historically been a tendency for in-migration to more than offset out-migration, as seen in Figure 4. Only the precipitous construction employment drop following completion of the pipeline has been of sufficient magnitude to generate negative net migration (from 1977 to 1978).

Net migration has been found empirically to increase with the rate of employment growth in Alaska and with the differential between Alaskan and U.S. average real per capita incomes. This observation can best

FIGURE 4. COMPOSITION OF STATE POPULATION GROWTH, 1965-1978

(thousands of persons)



	NATINC	DELT	MIGNET
1965	5.662	10.201	4.539
1966	5.273	6.313	1.04
1967	5.026	6.401	1.375
1968	5.098	6.974	1.876
1969	5.613	9.68	4.067
1970	6.127	7.801	1.674
1971	5.857	10.569	4.712
1972	5.479	11.351	5.872
1973	5.147	6.084	0.937
1974	5.609	20.794	15.185
1975	5.948	53.475	47.527
1976	6.295	8.655	2.36
1977	6.772	-2.078	-8.85
1978	6.702	-4.255	-10.957

SOURCE: Alaska Department of Labor

TABLE 1. ALASKA POPULATION
AGE-SEX DISTRIBUTION
1970, 1976

	1970			1976		
	Males	Females	Total	Males	Females	Total
Age						
All Ages	54.2	45.7		51.6	48.4	
0-13	16.5	15.7	32.2	14.1	13.2	27.3
14-19	5.7	5.2	10.9	6.6	6.0	12.6
20-29	12.4	8.7	21.1	11.2	10.4	21.6
30-39	7.7	6.5	14.2	7.8	7.8	15.6
40-54	8.1	6.6	14.7	7.7	7.2	14.9
55-64	2.5	2.0	4.5	3.1	2.6	5.7
65 +	1.3	1.0	2.3	1.1	1.2	2.3

SOURCES: U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population.

U.S. Department of Commerce, Bureau of the Census, 1976 Survey of Income and Education Microdata Tape.

be understood by viewing the migration decision as a choice made by an individual in the face of uncertainty. The probability that any individual will choose to move will depend on the expected gain to be realized by such a move. As the expected gain rises, the individual becomes more likely to migrate. The expected gain from a move is simply the product of the wage differential to be realized as a consequence of the move and the probability of actually securing employment at that higher wage. Thus, either a change in the rate of employment growth in Alaska (by increasing the probability of being hired) or an increase in the absolute income differential between Alaska and the United States will, by raising the expected gain from in-migration, attract increasing numbers of new migrants to the state.

Unlike natural increase, however, migration into Alaska has created a great deal of volatility in the dynamics of statewide population growth. Net migration reached over +47,000 in 1975 and as low as nearly -9,000 in 1977. Of the total contribution of nearly 78,000 made by net migration to population growth over the period, over 72 percent occurred since 1973.

This volatility of population can create major strains on local infrastructure when the growth occurs at too rapid a rate for adjustment. Such strains produce adverse effects on prices and unemployment, as will be discussed below. Further, it creates a somewhat characteristic Alaskan policy problem--namely that state policies aimed at the promotion of growth objectives may be doomed to failure by their own success. That is, any policy producing substantial, rapid growth in the Alaskan economy

may also, by its attraction of temporary migrants, have benefits which flow disproportionately to non-Alaskans. Thus, a major concern over growth-oriented policies must be the sustainability of such policies. As will be seen later, this is of particular concern when the state's major wealth is a depletable resource.

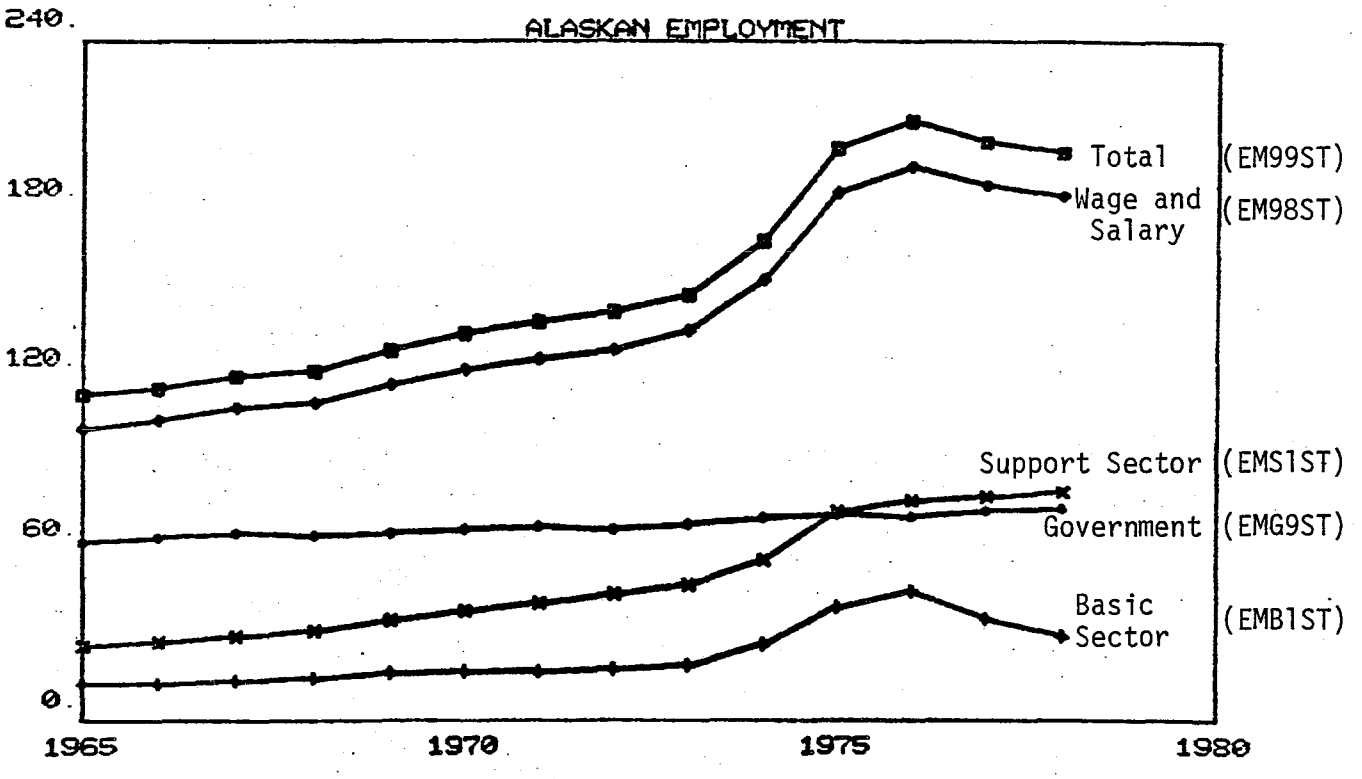
Alaskan Employment, 1965-1978

Figure 5 presents the growth of Alaskan employment during the period 1965 to 1978. As in the case of population growth, three distinct sub-periods are clearly discernible. In the pre-pipeline period from 1965 to 1973, employment grew steadily at an average rate of 3.6 percent. During the buildup and construction of the pipeline between 1973 and 1976, total employment expanded over 42 percent, an annual average rate of over 12.5 percent. After the 1976 peak, total employment fell off, but much less radically than the decline in construction employment. While 1978 construction employment dropped by nearly 60 percent from its 1976 peak, total employment fell by less than 4 percent.

Total wage and salary employment in the state can be divided into three major categories: government, basic employment, and support sectors. Basic employment will be defined as those private sectors in which production is aimed primarily at the satisfaction of export demands. In Alaska, such sectors include agriculture, forestry, and fisheries; mining (primarily petroleum); construction; and manufacturing. Support sector employment is engaged in activity aimed primarily at the satisfaction of local demands and includes utilities, transportation, communications, trade, finance, and services.

FIGURE 5. STATEWIDE EMPLOYMENT, 1965-1978

(thousands of persons)



	EM99ST	EM98ST	EMS1ST	EMG9ST	EMB1ST
1965	115.143	103.543	26.901	62.68	13.962
1966	117.601	106.401	28.26	64.105	14.036
1967	121.667	110.467	30.244	65.49	14.733
1968	123.629	112.429	32.102	64.804	15.523
1969	130.817	118.917	35.891	65.68	17.346
1970	136.397	123.897	38.998	66.978	17.921
1971	140.671	127.671	41.76	68.029	17.882
1972	144.096	130.696	44.847	66.948	18.901
1973	150.308	137.308	48.165	68.951	20.192
1974	169.652	155.652	56.74	71.224	27.688
1975	201.84	186.649	73.867	72.479	40.303
1976	211.412	195.561	78.107	71.816	45.638
1977	204.127	189.106	79.237	73.779	36.09
1978	200.49	185.84	81.011	74.756	30.073

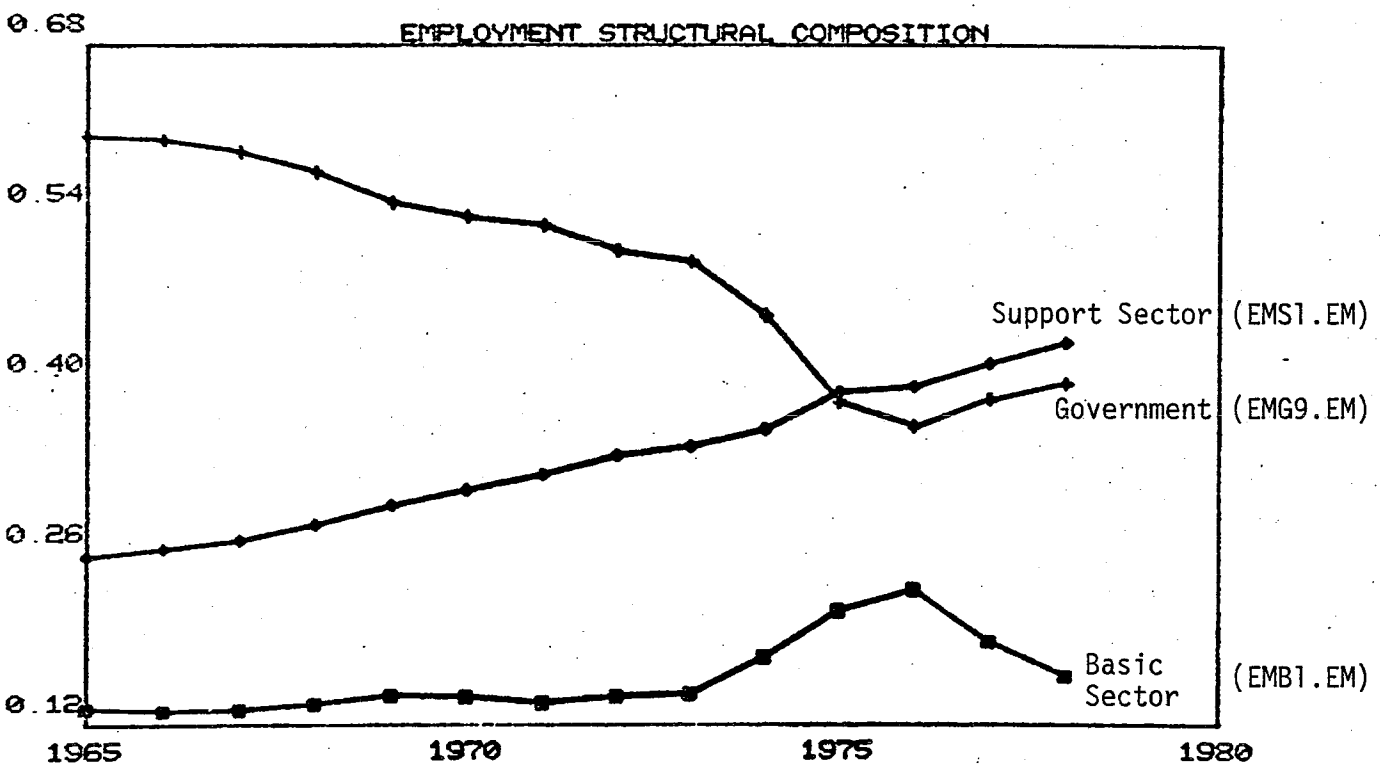
SOURCE: Alaska Department of Labor, Statistical Quarterly, various issues.

One of the most significant historical trends identifiable from the data is the changing role of government in the Alaskan economy. As shown in Figure 6, the share of government employment in total Alaskan wage and salary employment has fallen from over 60 percent in 1965 to about 40 percent in 1978. In addition, there has been a fairly dramatic shift in the composition of such employment. Historically, federal employment has been the mainstay of the Alaskan economy. In 1965, nearly 49 percent of Alaskan employment consisted of federal employees, over 65 percent of whom were military. By 1978, the federal share of employment was more than cut in half, and the military share of that employment had fallen to 52 percent. Nonetheless, total government employment in Alaska has risen, due to a steadily growing state and local government sector which has more than offset the declining military presence in Alaska. As seen in Figure 7, by 1969 state and local employment had exceeded federal civilian employment. By 1975, it exceeded military employment; and by 1978, it had reached a level approaching 84 percent of total federal employment.

Basic employment in Alaska consists primarily of construction and manufacturing (primarily food processing) employment, as shown in Figure 8. Pipeline construction caused employment in the Alaskan construction industry to nearly quadruple between 1973 and 1976. Interestingly, however, despite the 60 percent drop by 1978 from the 1976 peak, 1978 construction employment remained over 64 percent higher than its 1973 level. In addition, development and production employment at Prudhoe Bay, North Slope exploration, oil industry administration employment in

FIGURE 6. COMPOSITION OF STATEWIDE EMPLOYMENT, 1965-1978

(proportion of total employment)

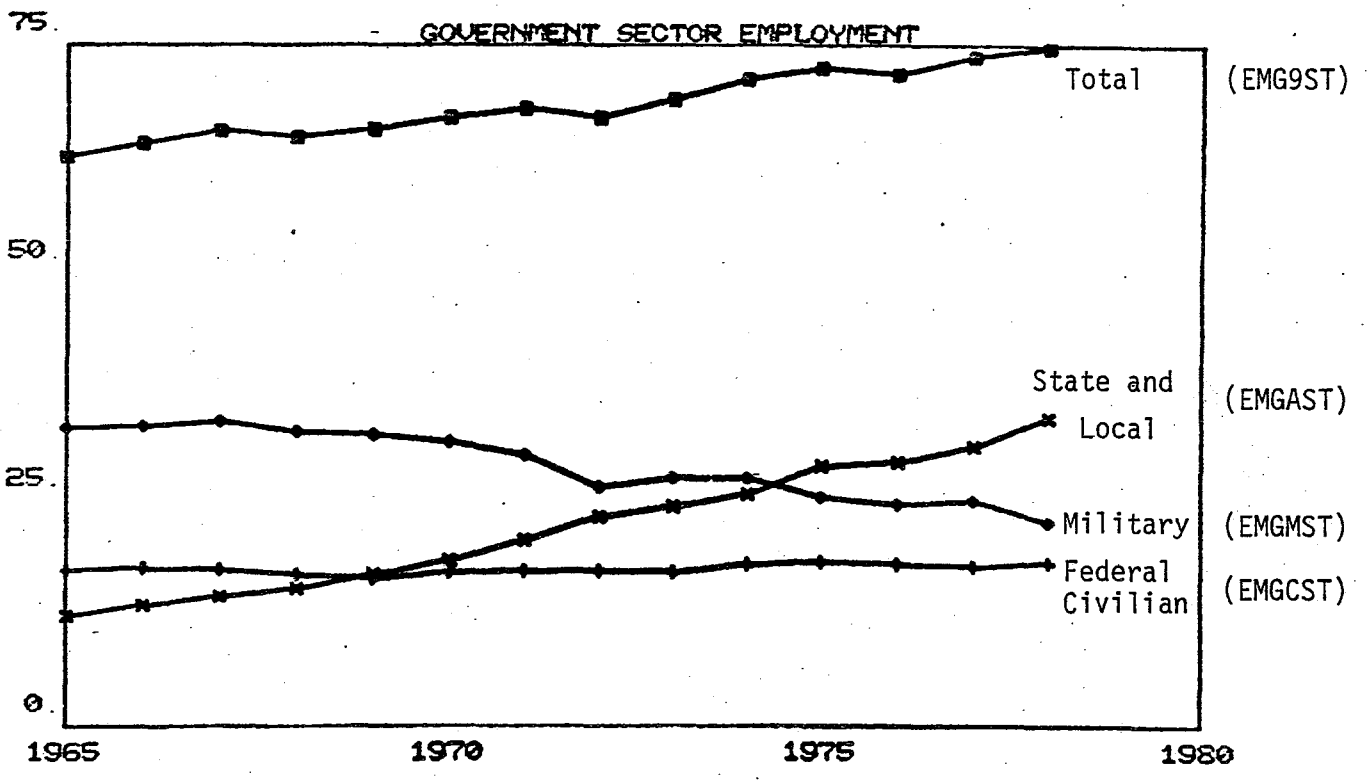


	EMS1.EM	EMG9.EM	EMB1.EM
1965	0.26	0.605	0.135
1966	0.266	0.602	0.132
1967	0.274	0.593	0.133
1968	0.286	0.576	0.138
1969	0.302	0.552	0.146
1970	0.315	0.541	0.145
1971	0.327	0.533	0.14
1972	0.343	0.512	0.145
1973	0.351	0.502	0.147
1974	0.365	0.458	0.178
1975	0.396	0.388	0.216
1976	0.399	0.367	0.233
1977	0.419	0.39	0.191
1978	0.436	0.402	0.162

SOURCE: Alaska Department of Labor, Statistical Quarterly, various issues.

FIGURE 7. COMPOSITION OF GOVERNMENT EMPLOYMENT, 1965-1978

(thousands of persons)

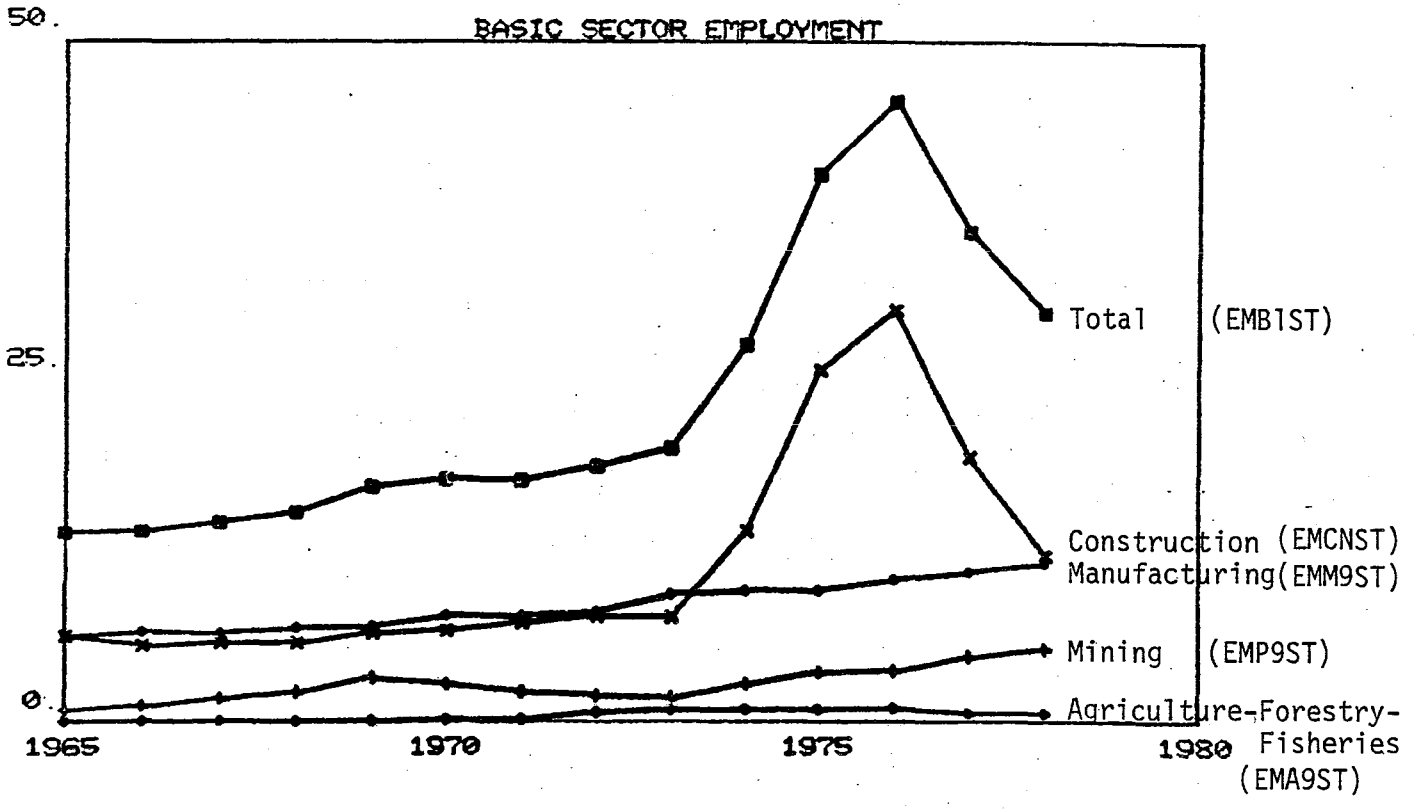


	EMG9ST	EMGAST	EMGMST	EMGCST
1965	62.68	12.234	33.017	17.429
1966	64.105	13.396	33.2	17.509
1967	65.49	14.389	33.679	17.422
1968	64.804	15.324	32.62	16.86
1969	65.68	16.877	32.35	16.453
1970	66.978	18.441	31.425	17.112
1971	68.029	20.686	30.074	17.269
1972	66.948	23.264	26.45	17.234
1973	68.951	24.332	27.453	17.166
1974	71.224	25.755	27.453	18.016
1975	72.479	28.837	25.348	18.294
1976	71.816	29.334	24.539	17.943
1977	73.779	31.061	24.984	17.734
1978	74.756	34.122	22.501	18.133

SOURCE: Alaska Department of Labor, Statistical Quarterly, various issues.

FIGURE 8. COMPOSITION OF BASIC SECTOR EMPLOYMENT, 1965-1978

(thousands of persons)



	EMB1ST	EMCNST	EMM9ST	EMP9ST	EMA9ST
1965	13.962	6.455	6.274	1.088	0.145
1966	14.036	5.864	6.634	1.372	0.166
1967	14.733	5.991	6.621	1.967	0.154
1968	15.523	5.998	6.924	2.455	0.146
1969	17.346	6.653	7.025	3.494	0.174
1970	17.921	6.894	7.839	2.995	0.193
1971	17.882	7.445	7.78	2.431	0.226
1972	18.901	7.893	8.06	2.113	0.835
1973	20.192	7.837	9.349	1.966	1.04
1974	27.688	14.068	9.612	2.977	1.031
1975	40.303	25.88	9.639	3.795	0.989
1976	45.638	30.235	10.334	3.967	1.102
1977	36.09	19.546	10.895	4.958	0.691
1978	30.073	12.24	11.595	5.562	0.676

SOURCE: Alaska Department of Labor, Statistical Quarterly, various issues.

Anchorage, and a vigorous growth in manufacturing have at least partially offset the decline in basic sector employment during the post-pipeline period.

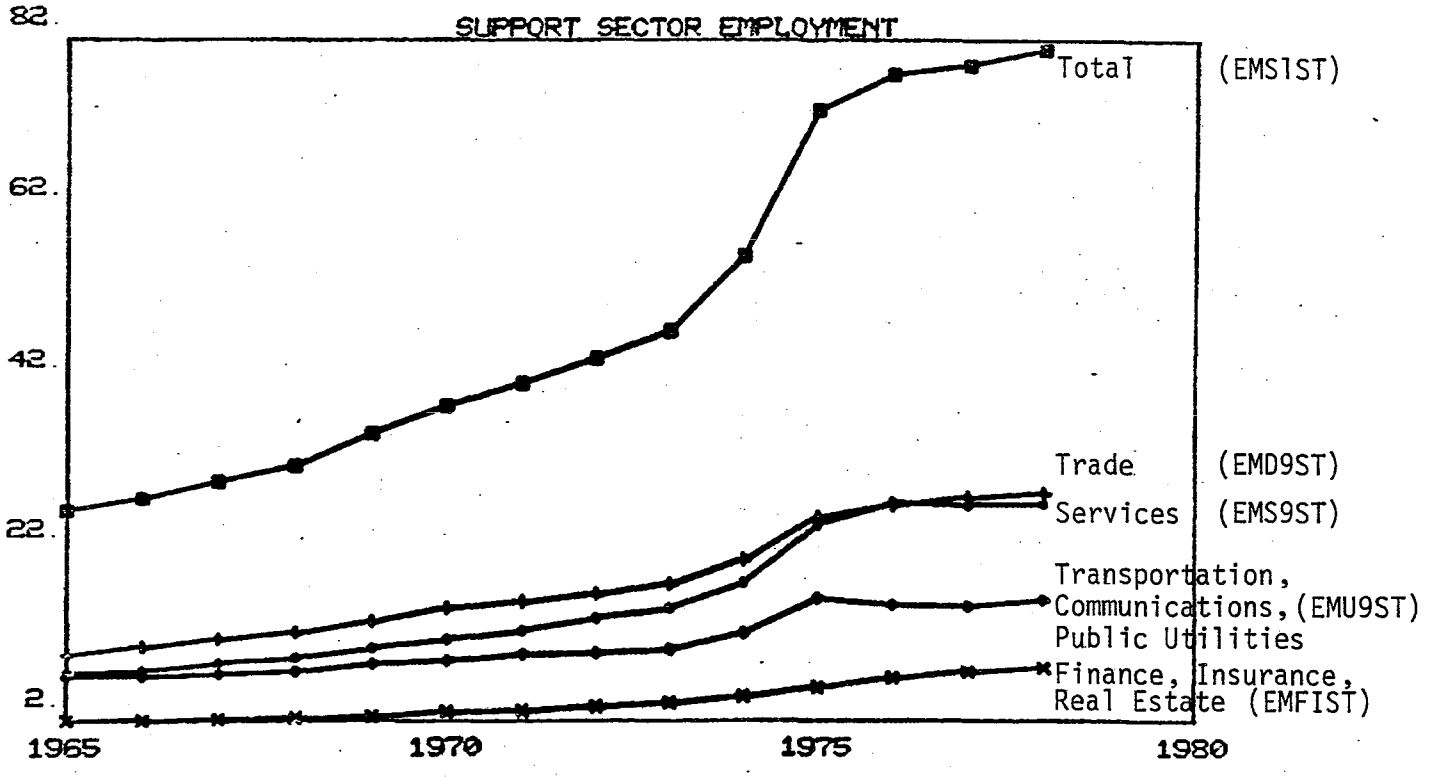
Growth in the Alaskan support sector since 1965 is shown in Figure 9. In the stable growth period before the pipeline (1965-1973), the support sector grew at well over twice the rate (7.6 percent) of total employment (3.6 percent). Services employment led this growth, at a rate of 9.1 percent. Finance and trade followed closely behind (8.7 percent and 7.9 percent, respectively), while transportation, communications, and public utilities grew at only 4.6 percent annually. Services employment responded most vigorously to pipeline construction, growing over 37 percent between 1974 and 1975. As a whole, the support sector expanded by over 62 percent between 1973 and the peak of pipeline construction. Interestingly, however, employment in the support sector did not decline with completion of the pipeline, but rather has continued to grow, although at a rate (3.7 percent) below that of the pre-pipeline period (4.6 percent).

Alaskan Personal Income

Alaskan personal income growth, as employment and population, can be divided into the same three subperiods. As shown in Figure 10, in the pre-pipeline years from 1965 to 1974, income grew steadily, averaging about 12.3 percent annually. Accompanied by inflation and population growth, however, this represented only about a 4.4 percent average annual growth in real per capita income, as shown in Figure 11. From 1974 to the peak of pipeline construction in 1976, income rose by

FIGURE 9. COMPOSITION OF SUPPORT SECTOR EMPLOYMENT, 1965-1978

(thousands of persons)

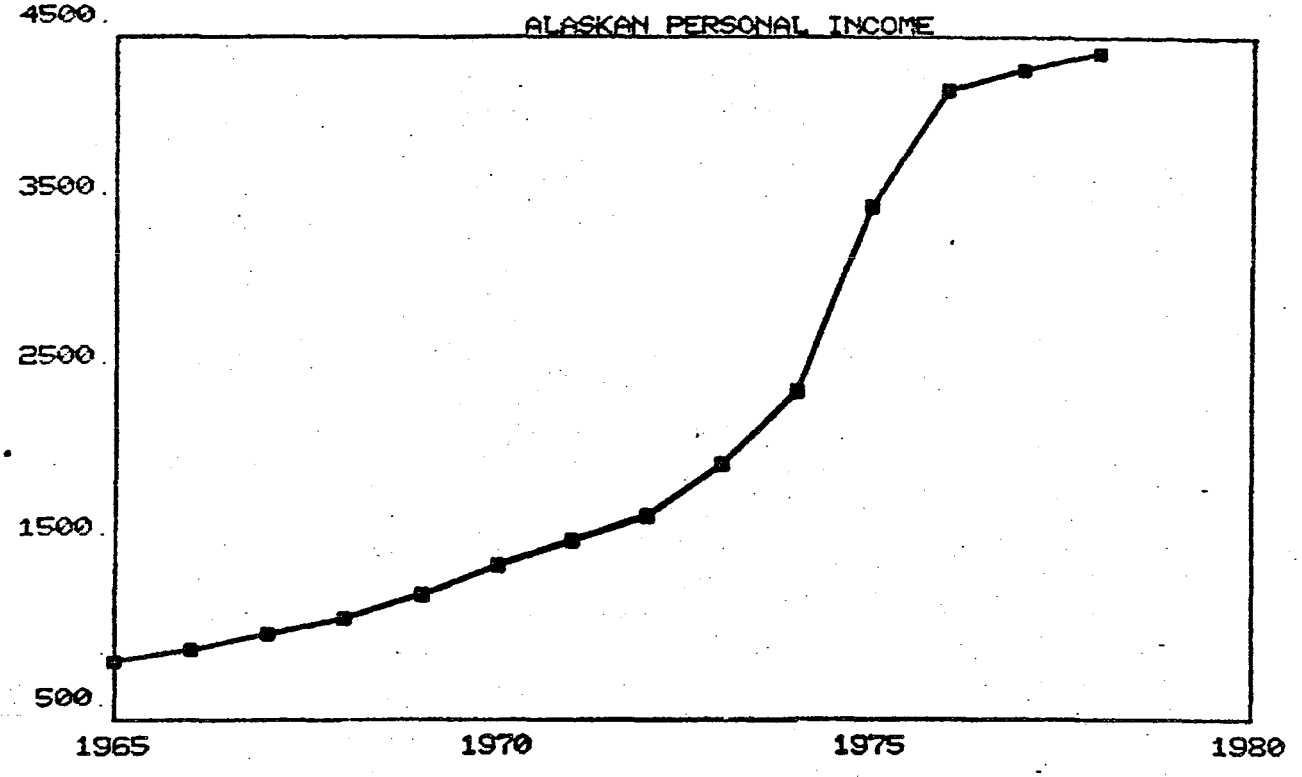


	EMS1ST	EMD9ST	EMS9ST	EMU9ST	EMFIST
1965	26.901	9.95	7.513	7.267	2.171
1966	28.26	10.806	7.89	7.279	2.285
1967	30.244	11.754	8.692	7.483	2.315
1968	32.102	12.519	9.289	7.811	2.483
1969	35.891	13.946	10.486	8.807	2.652
1970	38.998	15.365	11.435	9.1	3.098
1971	41.76	16.148	12.559	9.808	3.245
1972	44.847	17.107	14.034	9.993	3.713
1973	48.165	18.337	15.182	10.403	4.243
1974	56.74	21.135	18.313	12.398	4.894
1975	73.867	26.198	25.134	16.489	6.046
1976	78.107	27.569	27.673	15.76	7.105
1977	79.237	28.453	27.441	15.569	7.774
1978	81.011	28.848	27.566	16.369	8.228

SOURCE: Alaska Department of Labor, Statistical Quarterly, various issues.

FIGURE 10. STATEWIDE PERSONAL INCOME, 1965-1978

(millions of current dollars)

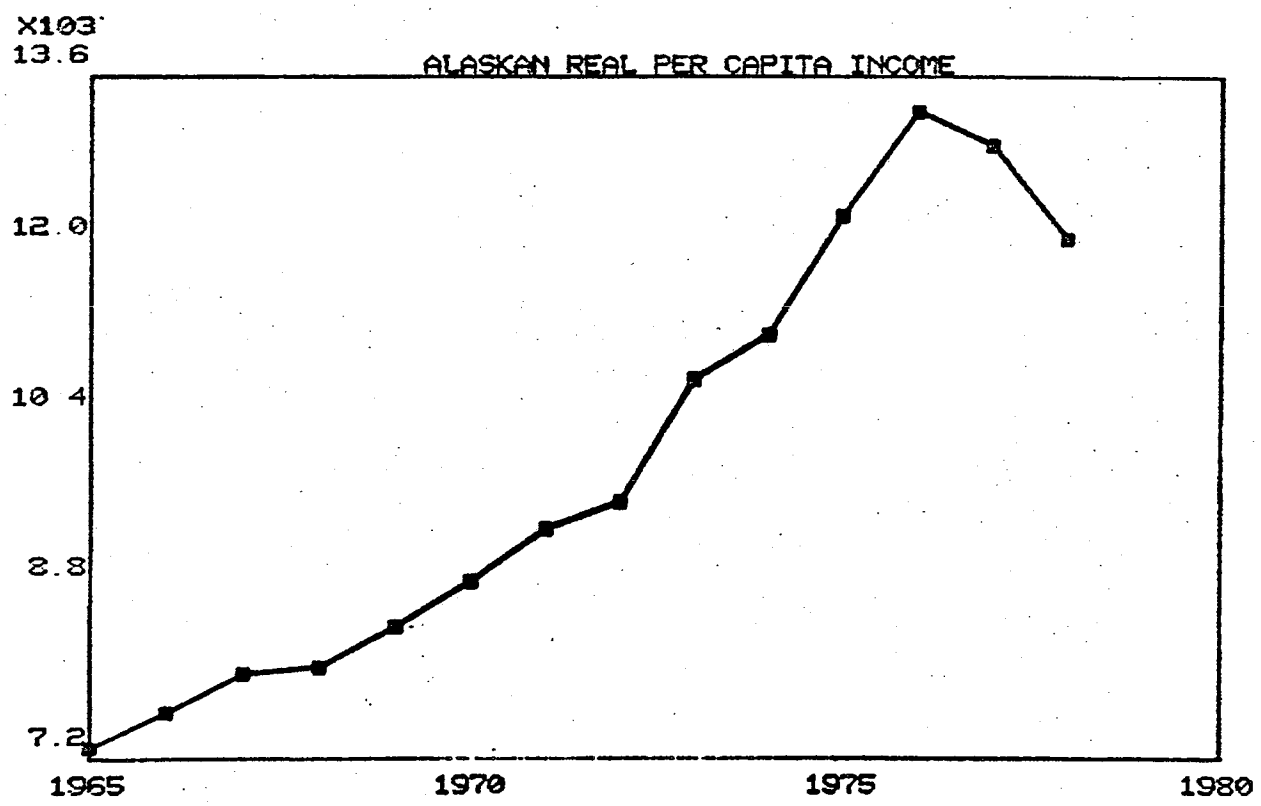


1965	857.
1966	926.
1967	1016.
1968	1110.
1969	1245.
1970	1412.
1971	1557.
1972	1698.
1973	2002.
1974	2437.
1975	3528.
1976	4195.
1977	4315.
1978	4415.

SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business, August 1979.

FIGURE 11. REAL PER CAPITA INCOME, 1965-1978

(thousands of 1979 dollars)



1965	7317.63
1966	7650.87
1967	8016.97
1968	8084.73
1969	8455.59
1970	8881.79
1971	9371.82
1972	9630.57
1973	10783.9
1974	11198.6
1975	12321.3
1976	13278.1
1977	12959.2
1978	12105.9

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

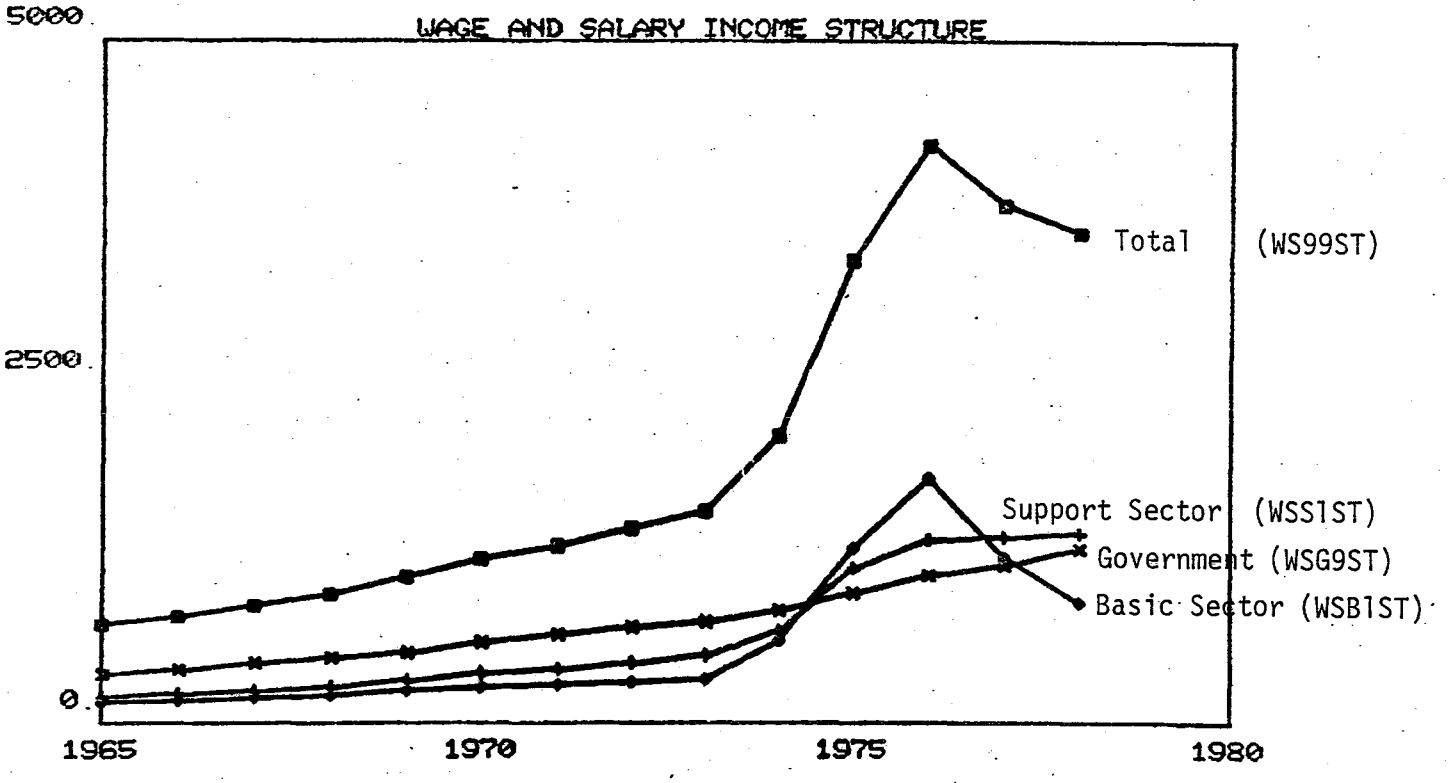
72 percent in nominal terms and 46 percent in real per capita terms. After the peak of pipeline construction, between 1976 and 1978, personal income continued to rise modestly, about 2.6 percent annually. However, these gains were more than offset by inflation and population, with real per capita incomes falling about 5.6 percent annually after the 1976 peak.

These figures, however, do not capture the full magnitude of the pipeline and post-pipeline experience, inasmuch as they are adjusted by the Bureau of Economic Analysis to reflect the incomes of resident Alaskans only. A substantial share of income during pipeline construction was earned by nonresidents. As shown in Figure 12, the growth of wages and salary payments grew roughly parallel to personal income in the 1965-to-1974 period. (More precisely, personal income growth followed wage and salary growth, inasmuch as such payments are the major component of personal income--between 80 and 90 percent, historically). Because of wages and salaries earned by nonresidents, the growth of wages and salaries during pipeline construction was more dramatic than resident personal income growth, with wages and salaries more than doubling between 1974 and 1976. Furthermore, unlike resident personal income, which continued to rise modestly even after the peak of pipeline construction, wage and salary payments actually declined by 16 percent in the 1976-to-1978 period.

Because wages and salaries dominate the personal income received by Alaskans, the sources of such payments reveal the underlying structure of income growth during the period, as shown in Figure 12. Wages and

FIGURE 12. COMPOSITION OF WAGES AND SALARIES
1965-1978

(millions of current dollars)



	WS99ST	WSS1ST	WSG9ST	WSB1ST
1965	722.3	201.645	363.507	157.15
1966	777.285	218.22	395.005	164.06
1967	867.176	243.033	442.88	181.264
1968	947.335	269.04	475.023	203.273
1969	1080.86	319.055	516.293	245.515
1970	1217.74	359.985	593.559	264.195
1971	1315.2	392.598	646.625	275.974
1972	1447.06	444.356	708.574	294.135
1973	1564.03	496.207	747.916	319.905
1974	2106.06	673.77	830.269	602.024
1975	3402.94	1152.82	960.558	1289.56
1976	4247.18	1362.48	1089.32	1795.37
1977	3804.95	1380.42	1166.39	1226.2
1978	3606.58	1404.49	1291.58	881.358

SOURCE: Alaska Department of Labor, Statistical Quarterly, various issues.

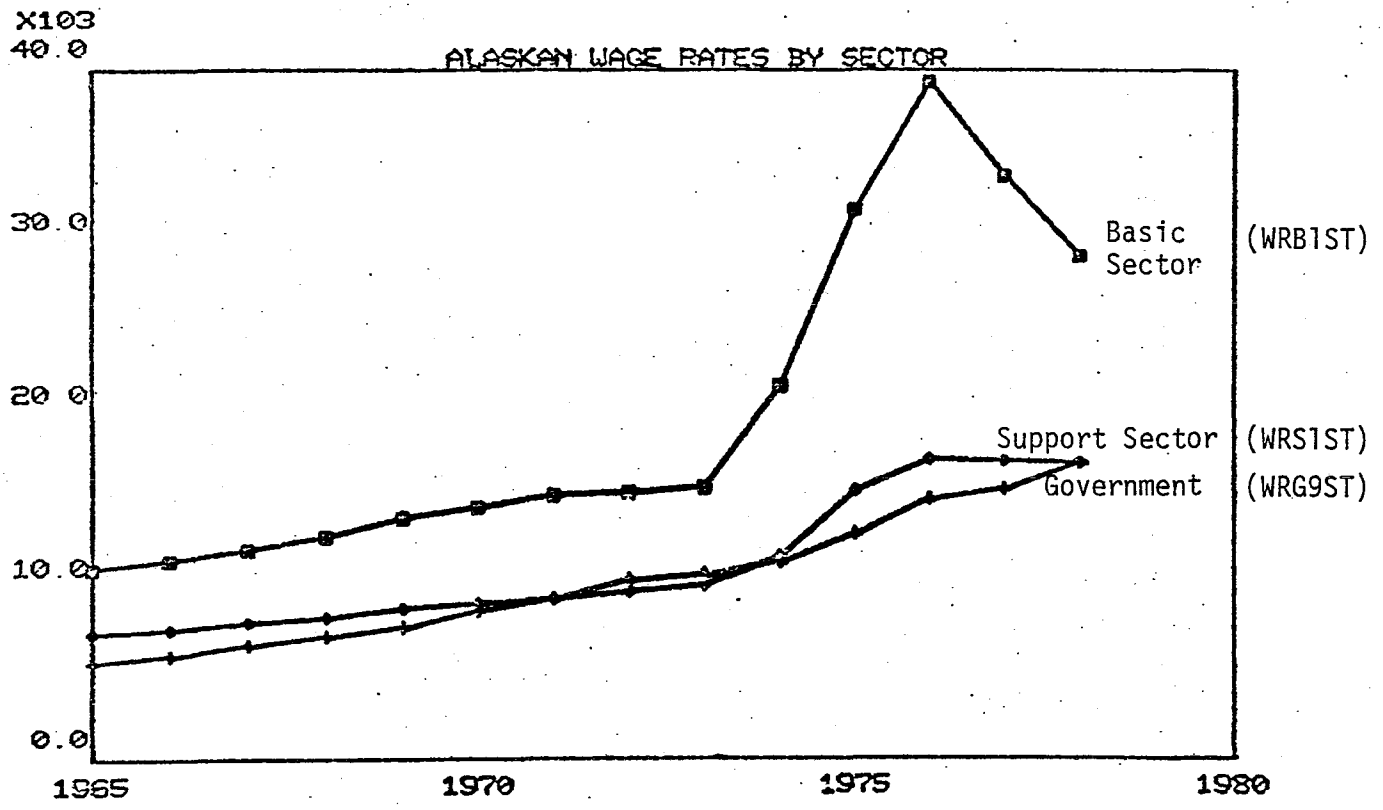
salaries were composed primarily of government wages (50.3 percent) in 1965. By 1978, the government share had fallen to 36 percent, although generally government wages and salaries grew steadily throughout the period at about 10 percent annually. The income "explosion" in 1975 and 1976 was due primarily to wage and salary payments in construction and to a lesser extent in the support sector, primarily transportation. However, the "explosion" was due as much to an increase in wage rates as to increased employment. Between 1974 and 1976, basic sector employment rose 65 percent, while wages and salaries in the basic sector nearly tripled, due to a more than 80 percent increase in average wage rates in the sector, as shown in Figure 13. In the support sector, wages and salaries more than doubled in the two-year period, reflecting a 38 percent rise in employment and a 47 percent increase in wage rates. However, while both basic employment and wage rates dropped in the period following the peak of pipeline construction, causing over a 50 percent decline in basic sector wages and salaries, neither employment nor wage rates in the support sector fell significantly during the 1976-to-1978 period. Thus, by 1978, the support sector had become the dominant source of both income (39 percent of wages and salaries) and employment (49.5 percent) in the Alaskan economy.

Special Features

The Alaskan economy exhibits several major characteristics unique among the states. We now turn to consider each of the four major distinguishing characteristics of the Alaskan economy: its typically high unemployment levels, the seasonality of employment, its price level, and the unique role of state government.

FIGURE 13. ALASKAN WAGE RATES, 1965-1978

(thousands of current dollars)

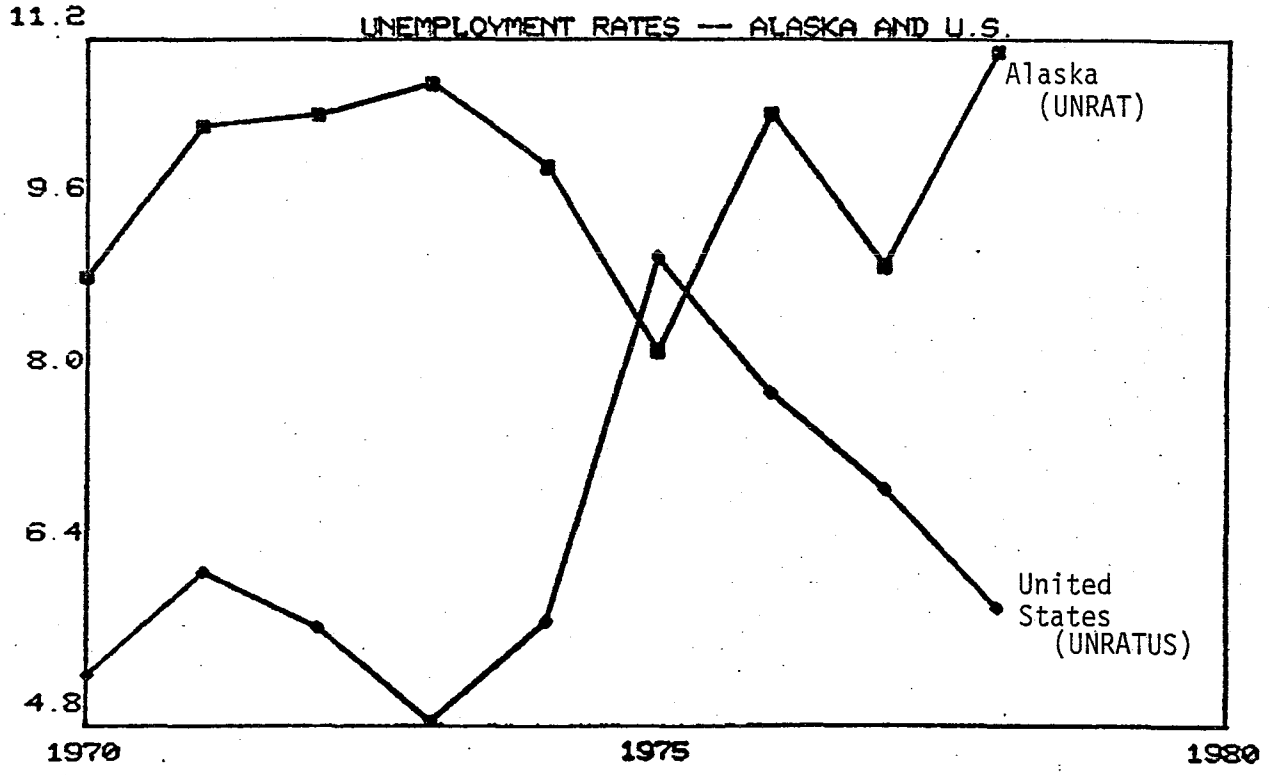


	WRB1ST	WRS1ST	WRG9ST
1965	11255.5	7495.82	5799.41
1966	11688.5	7721.87	6161.85
1967	12303.2	8035.74	6762.56
1968	13094.9	8380.78	7330.15
1969	14154.	8889.56	7860.73
1970	14742.2	9230.87	8862.
1971	15433.1	9401.29	9505.13
1972	15561.9	9908.26	10583.9
1973	15843.1	10302.2	10847.1
1974	21743.2	11874.7	11657.2
1975	31996.6	15606.7	13252.9
1976	39339.4	17443.8	15168.3
1977	33976.2	17421.4	15809.2
1978	29307.3	17337.	17277.2

SOURCE: Alaska Department of Labor, Statistical Quarterly, various issues.

Unemployment. Unemployment has traditionally been a serious problem in Alaska. Despite generally vigorous growth since 1975, unemployment rates have remained considerably above the national level, as shown in Figure 14. In only a single year, 1975, did Alaskan unemployment dip below that of the United States. Unemployment rates can be a misleading indicator of economic conditions, however, for the following reason. Defined as the ratio of unemployed persons seeking employment to the total labor force, it may fall due to either of two reasons--an increase in employment or a decrease in search by unemployed workers. In the first case, a decrease in unemployment indicates rising employment levels; but in the second, it may indicate precisely the opposite since it is precisely at times of falling employment when workers get discouraged from searching and leave the labor force (by definition). For example, as shown in Figure 15, generally unemployment rates move opposite the direction of employment growth, as would be expected. However, on occasion such as in 1977, the year following the peak of pipeline construction, the unemployment rate fell despite falling employment. The reason for the apparent anomaly is made clear by the labor force participation rate behavior, also depicted. In 1977, labor force participation fell drastically, by about 20 percent, sufficient to reduce the unemployment rate despite a falling employment level. Nonetheless, despite its peculiarities in use as an economic indicator, its high level does illustrate a unique Alaskan dilemma. Even at the peak of pipeline hiring, Alaskan unemployment dipped only slightly below the national rate, and then only because the national economy was in the depths of a particularly severe recession. By 1976, at the peak of

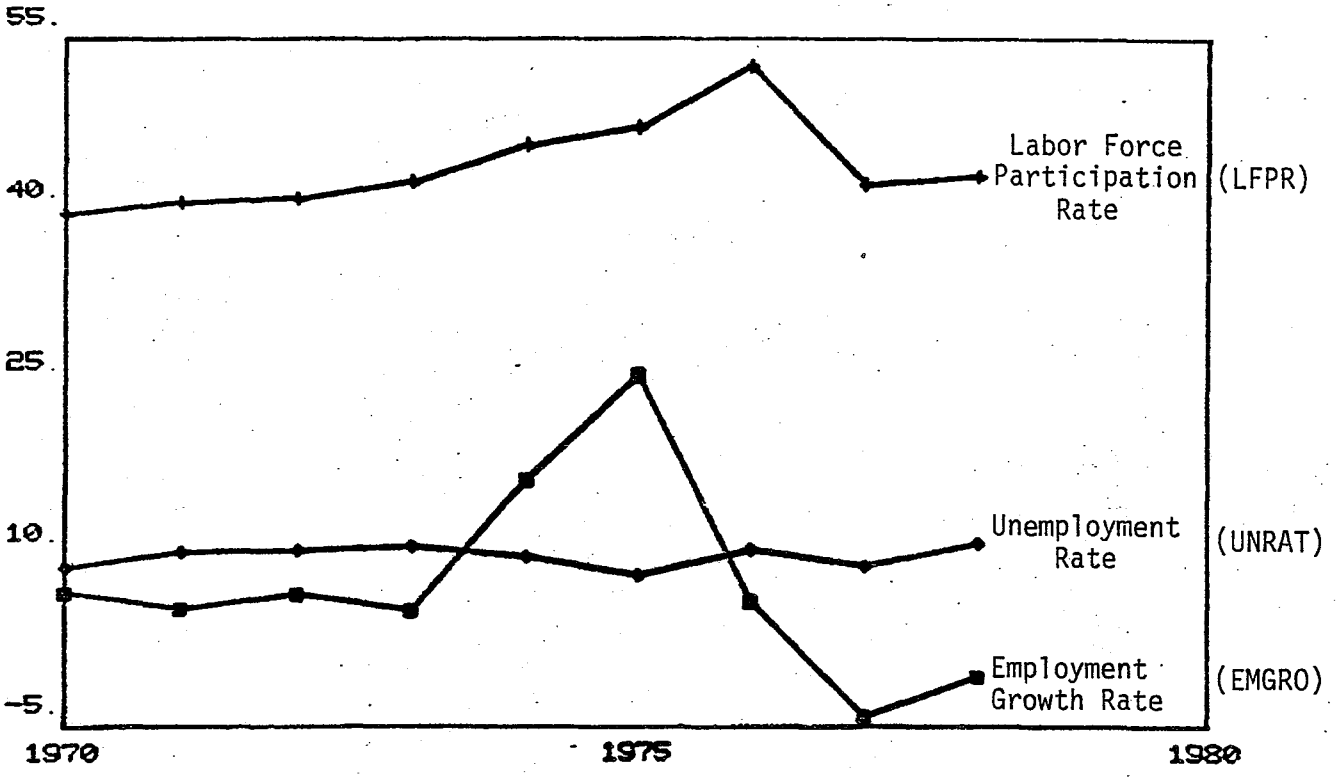
FIGURE 14. ALASKAN AND U.S. UNEMPLOYMENT, 1970-1978



	UNRAT	UNRATUS
1970	9.	5.283
1971	10.4	6.242
1972	10.5	5.717
1973	10.8	4.842
1974	10.	5.758
1975	8.3	9.175
1976	10.5	7.9
1977	9.1	7.008
1978	11.1	5.892

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, and Alaska Department of Labor.

FIGURE 15. UNEMPLOYMENT, EMPLOYMENT GROWTH, AND LABOR FORCE PARTICIPATION RATES, 1970-1978



	LFPR	UNRAT	EMGRO
1970	39.94	9.	6.821
1971	40.97	10.4	5.542
1972	41.27	10.5	6.813
1973	42.78	10.8	5.381
1974	46.	10.	16.698
1975	47.4	8.3	25.821
1976	52.65	10.5	6.027
1977	42.55	9.1	-4.035
1978	43.23	11.1	-0.477

SOURCE: Alaska Department of Labor.

pipeline construction, unemployment in Alaska had surged to over 10.5 percent. The problem is a fundamental feature of the Alaskan economy which stems largely from the volatility of migration discussed above. As employment rises, the attraction of migrants from the Lower 48 raises the labor force by even more, forcing a rise in the unemployment rate. Furthermore, rising employment has typically resulted in increased labor force participation rates, reducing still further any tendency of employment increases to lower unemployment rates significantly.

Seasonality. A second feature characteristic of Alaskan employment and also closely related to the unusually high Alaskan unemployment rate is the seasonality of employment in certain sectors of the economy. Economies dependent on natural resources often have seasonal cycles, but the effect is particularly accentuated by the severity and length of Alaskan winters. One measure of seasonality is the ratio of fourth-to-third-quarter employment. The closer the index to one, the less seasonal the industry. Table 2 shows the seasonality of Alaskan industries. Seasonality has decreased in importance over time, owing to several factors. First, the shifting structure of the economy toward the support sectors has resulted in increasing concentration in nonseasonal employment such as services and trade. Second, technology became available during the period to permit winter construction activity, and market conditions made it profitable to employ these technologies in Alaska.

TABLE 2. SEASONALITY OF EMPLOYMENT IN ALASKA
SELECTED YEARS, 1950 TO 1978

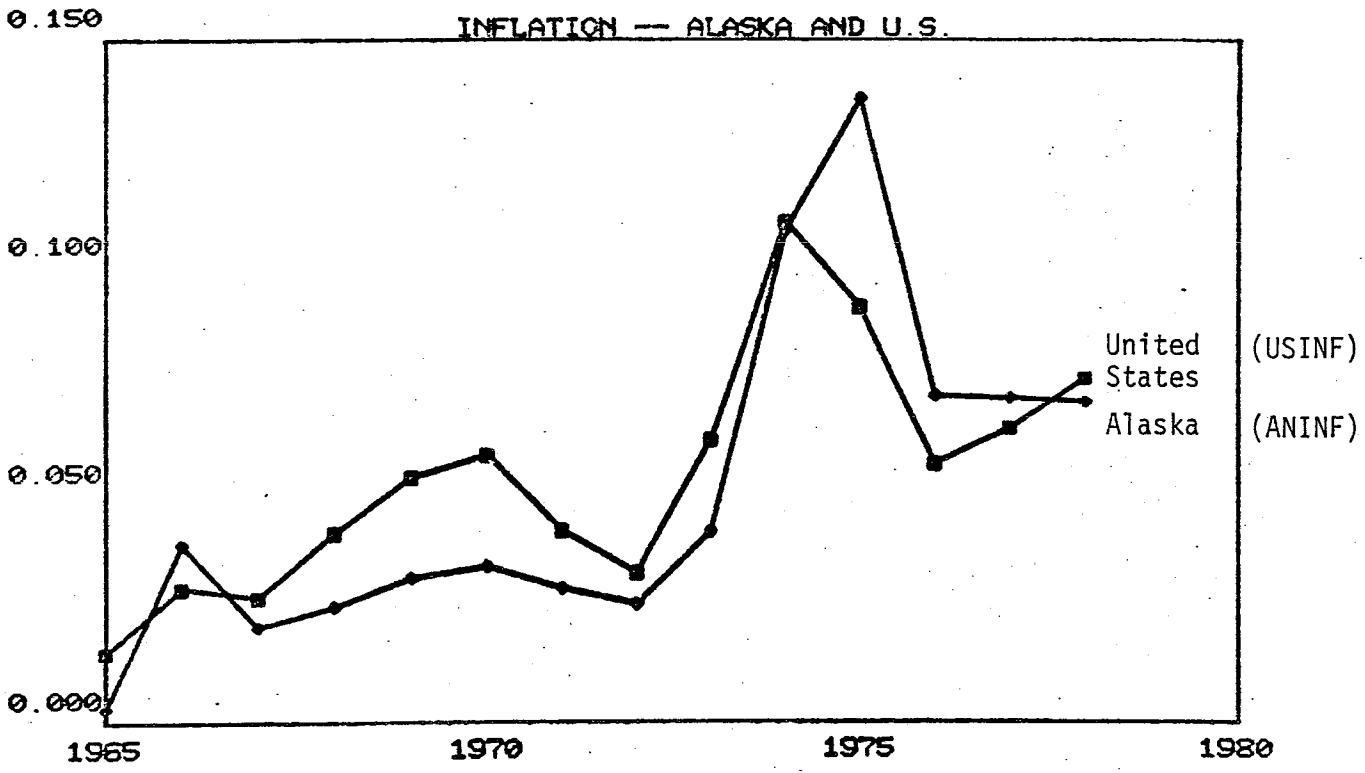
SECTOR	1950	1960	1965	1970	1975	1976	1977	1978
Mining	.6267	.7143	.7949	.8556	.9009	.9690	.9190	.9459
Construction	.79	.5862	.6460	.7279	.8374	.6906	.720	.766
Manufacturing	.2440	.5137	.6531	.5457	.6886	.6714	.650	.596
Transportation, Communication, Public Utilities	.8248	.9683	.9125	.8851	.9887	.8871	1.035	.908
Trade	.9226	.9718	.9905	.9733	1.0048	.9120	.985	.961
Finance, Insurance, and Real Estate	1.0	1.0	.9706	.8942	1.0	.927	1.040	.979
Services	.9583	.9123	.9664	.9716	.9812	.9387	.936	.923
Government	.9632	.9815	.9617	.9810	1.0049	.9689	1.005	1.112
Total	.7505	.8313	.8718	.88	.9402	.8733	.935	.940

SOURCE: State of Alaska, Alaska Labor Force Estimates, various years.

Price Levels and Inflation. Perhaps the most commonly recognized characteristic of the Alaskan economy is its high price level relative to the United States. Cost-of-living differences have been estimated at between 37 and 66 percent between Anchorage residents and U.S. urban dwellers on average. Price differences are much more accentuated in rural areas, possibly as high as 70 percent more than Anchorage (see Scott, 1978). This price differential is attributable to a wide variety of causes including high transport costs to and within Alaska, high construction costs, uncertainties and delays in shipping, and rapid fluctuations in both private and government activity that create shortages and bottlenecks within the state.

What is less commonly recognized than the high level of Alaskan prices is their tendency to increase at a rate less than that of the United States. Figure 16 shows the rate of inflation in Alaska and the United States as a whole. Generally, there has been an historical tendency of Alaskan inflation to remain below the U.S. level. This effect is to be expected in a developing economy, as expansion of markets permits realization of economies of scale in transportation and distribution and improved infrastructure generally reduces the costs of market transactions. There is a notable exception to this principle, however, namely when the growth occurs at a rate so fast as to create bottlenecks and shortages before the existing infrastructure can adjust to the new capacity requirement. Price increases then serve as the adjustment mechanism; and in such cases, Alaskan inflation has actually run ahead of that in the United States. However, as seen in the figure, this has

FIGURE 16. ALASKAN AND U.S. INFLATION, 1965-1978



	USINF	ANINF
1965	0.016	0.003
1966	0.03	0.039
1967	0.028	0.021
1968	0.042	0.026
1969	0.054	0.032
1970	0.059	0.035
1971	0.042	0.03
1972	0.033	0.027
1973	0.062	0.042
1974	0.11	0.108
1975	0.091	0.137
1976	0.057	0.072
1977	0.065	0.072
1978	0.076	0.071

SOURCE: Based on U.S. consumer price index and Anchorage consumer price index estimated by U.S. Department of Labor, Bureau of Labor Statistics.

happened in only four of the years since 1965; and three of these years (1975 to 1977) reflected the effects of the pipeline construction. Thus, while periods of rapid expansion may generate adverse price effects, the general tendency of stable growth is characterized by rates of increase lower than the United States, implying a long-term tendency toward equalization of price levels.

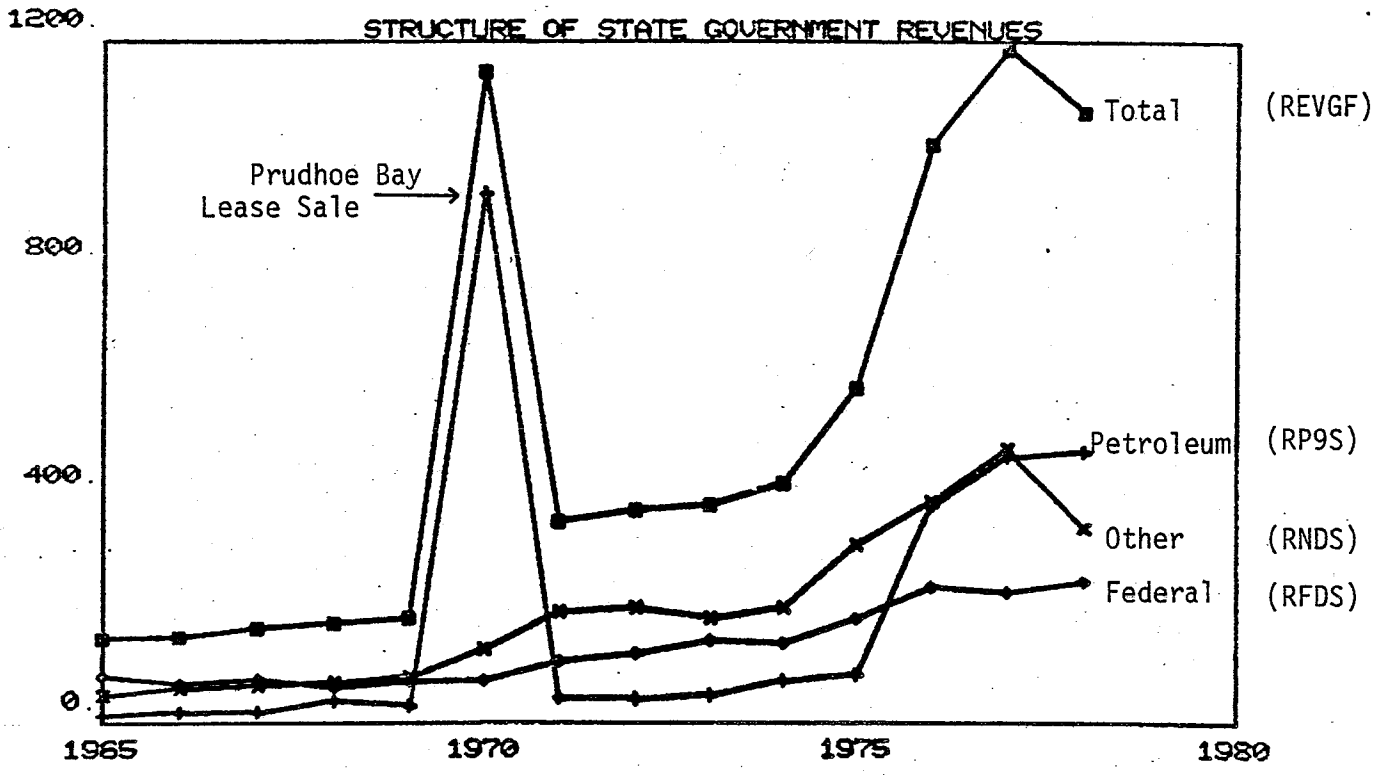
The Role of State Government. Probably the most significant long-term structural change induced by Alaskan petroleum development will be the alteration in the role of state government in the economy. Part of this change had already been realized during the historical period, but much of the change will occur in the future.

As shown in Figure 17, the state's annual general fund revenues by 1978 had risen to more than seven times their 1965 levels. These revenues can be divided into three broad groups: petroleum revenues such as production taxes, royalties, and property taxes; federal grants; and revenues from a variety of nonpetroleum state taxes such as income and corporate taxes.

Federal grants in aid were the major source of state revenues through most of the 1960s, accounting for over 55 percent of general fund revenues in 1965. After 1970, growth in such grants expanded rapidly, growing at over 15 percent annually. Because they are tied closely to population, such grants are likely to continue to grow into the future. However, as a share of total revenues, their contribution has fallen over time, to about a fifth of total revenues by 1978.

FIGURE 17. STATE GOVERNMENT REVENUES, 1965-1978

(millions of current dollars)



	REVGF	RP9S	RNDS	RFDS
1965	150.987	16.473	51.209	83.305
1966	152.564	21.601	61.545	69.418
1967	168.507	21.466	67.837	79.204
1968	177.628	42.967	72.944	61.717
1969	188.119	32.841	81.829	73.449
1970	1146.22	936.182	133.525	76.513
1971	355.991	47.702	197.76	110.529
1972	376.236	45.308	206.771	124.157
1973	385.462	51.249	188.624	145.589
1974	424.578	76.838	206.428	141.312
1975	588.82	87.49	315.125	186.205
1976	1017.83	385.756	391.375	240.703
1977	1186.5	472.596	484.285	229.624
1978	1073.37	480.81	344.756	247.8

SOURCE: Alaska Department of Revenue, Revenue Sources, various issues.

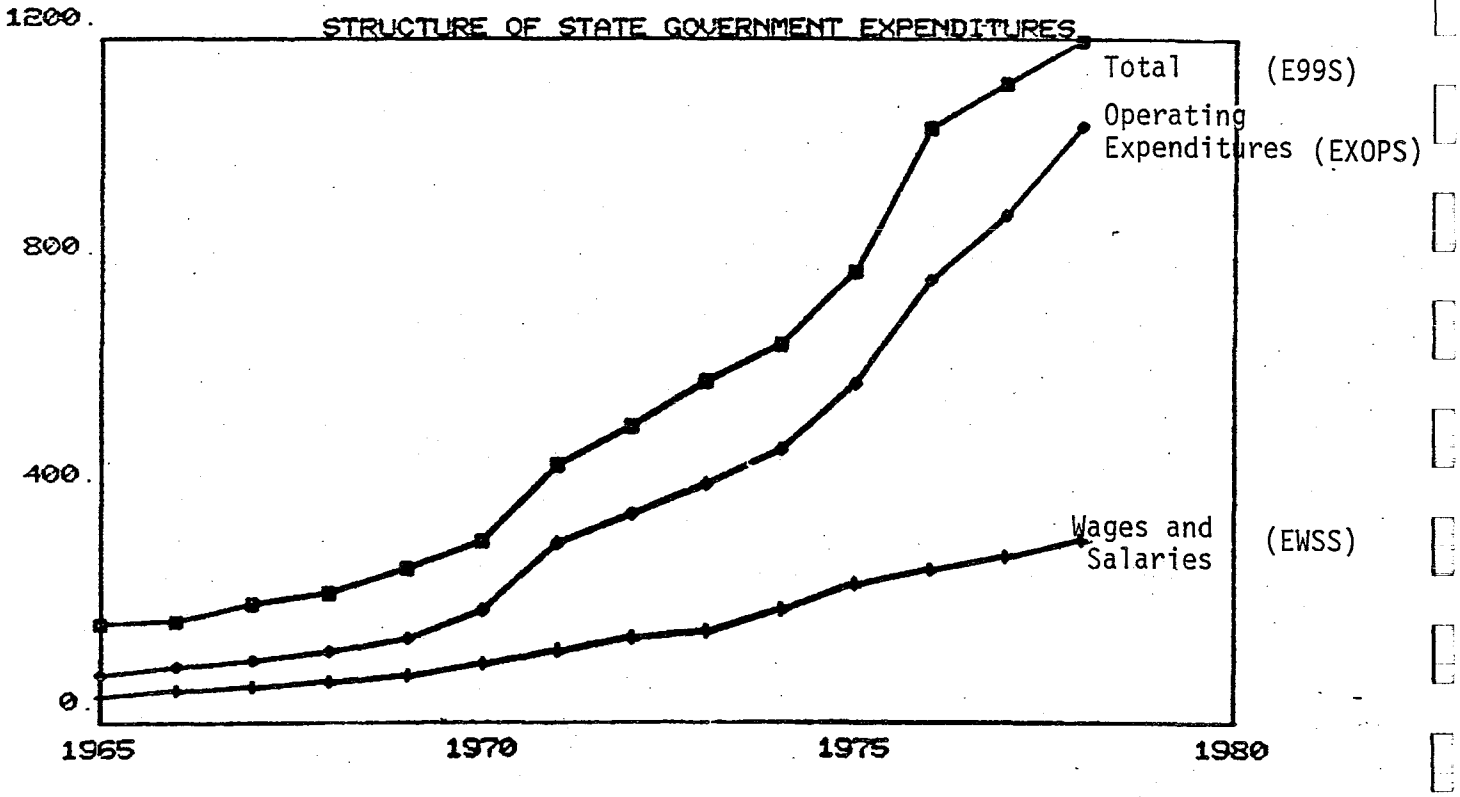
A variety of nonpetroleum-related state revenues such as the corporate and personal income taxes, interest earnings, and a variety of license and various other fees contributed greatly to the growth of state revenues over the period. Between 1970 and 1979, such revenues grew at an annual rate of 14.5 percent, contributing nearly a third of state revenues by 1979.

However, the major structural change in the pattern of state revenues is the growing dominance of petroleum revenues due to the development of Prudhoe Bay. The first major impact of such development occurred in fiscal 1970 when the sale of drilling rights brought the state over 900 million dollars in revenue, over 4.5 times the level of revenues from all other sources in 1970. This surplus was used largely to finance expanded services through the mid-seventies, before production from Prudhoe would initiate the flow of royalty and severance tax revenues. Production began in 1977, and by 1979 associated revenues were contributing over 48 percent of total general fund revenues.

State government expenditures, as shown in Figure 18, also grew nearly sevenfold between 1965 and 1978. Generally, three distinct subperiods can be identified during the period--the pre-Prudhoe sale period from 1965 until 1970, the pre-production period in the interim between the sale and the onset of Prudhoe production (1971-76), and the production period from 1977 to 1978. Before the Prudhoe sale, expenditure growth was constrained by the availability of revenues. Expenditure growth between 1965 and 1970 averaged 12.6 percent annually. Between 1970 and

FIGURE 18. STATE GOVERNMENT EXPENDITURES, 1965-1978

(millions of current dollars)



	E99S	EXOPS	EWSS
1965	175.531	88.4	52.244
1966	179.837	100.5	59.82
1967	211.124	113.6	67.6
1968	228.245	129.3	76.688
1969	271.559	152.1	88.125
1970	318.386	199.	107.75
1971	455.044	315.8	131.019
1972	524.41	366.5	154.192
1973	601.833	421.8	163.747
1974	665.766	482.3	200.747
1975	793.386	597.6	244.023
1976	1043.46	778.9	269.357
1977	1122.13	895.1	290.933
1978	1200.	1047.	322.493

SOURCE: Alaska Office of the Governor, The Executive Budget, various issues.

1976, the growth of expenditures accelerated to nearly 22 percent annually, spurred by increased demands for public services throughout the pipeline construction and financed by the surplus from the Prudhoe sale and later by a tax on reserves in place at Prudhoe. Since 1976, expenditure growth has stabilized at an average 7.3 percent annual rate of increase.

As shown in Figure 18, wages and salaries paid to state workers maintained a stable share of total expenditures, varying only between a third and a fourth of total expenditures during the period. Growth in such wage and salary payments averaged 15 percent annually over the period, although employment grew at only about 8 percent until peaking in 1975, then actually declined until 1978 when it began to grow modestly again. The more rapid growth in wages financed a growth in real wages at over 7 percent annually. While real wages for the civilian sector as a whole fluctuated wildly during the period immediately prior to and after the peak of pipeline construction, by 1978 real civilian wage rates generally were only 21 percent higher than their 1965 levels. Real wage rates in state government, on the other hand, were 48 percent higher by 1978.

Limiting the analysis to state employees, however, understates the full impact of the expansion of state expenditures on the economy. As shown in Figure 18, while state government wages and salaries occupied a fairly stable share of state expenditures, total operating expenditures did not. In fact, operating expenditures rose from less than half (46 percent) of the budget in 1965 to over 87 percent of the budget in 1978, reflecting largely the transfer of functions to a rapidly expanding

local government sector. Largely financed by state transfers, local employment nearly quadrupled during the period, growing at an average 10.8 percent annual rate.

Over the period, combined state and local government grew from 11.8 percent to 18.4 percent of total wage and salary employment and raised its share of total wage and salary payments from 12.7 percent to 19 percent. Even more significantly, the revenue claims on future production at Prudhoe alone promise to accelerate the state government role in the economy, both as an employer and as a provider of direct investment. The overtaking of expenditures by state revenues and their expected rapid growth provide the state with a wide range of future expenditure options, which will be discussed below.

The Regional Economies of Anchorage and the Norton Sound Area

The impacts of proposed federal OCS developments in the Norton Sound area are likely to be concentrated in two areas of the state: Anchorage, because of its role as a statewide support center; and the area surrounding Norton Sound, because of its proximity to production operations. Consequently, this section examines the historical development of these two local economies in order to provide a point of reference for development of the base case forecasts to be presented below.

ANCHORAGE

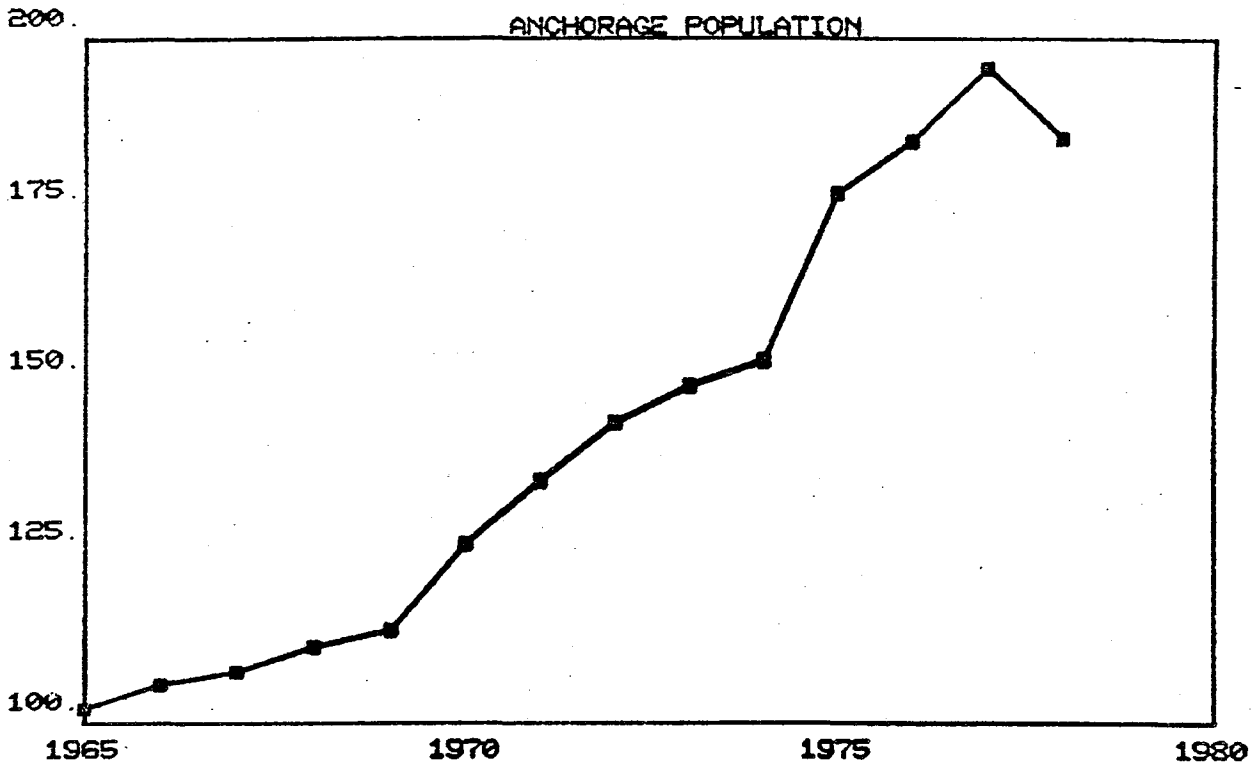
At least in recent history, Anchorage has occupied a central role in Alaskan economic growth, as a transportation and support center for the state. Because of its size relative to the statewide economy, statewide activity both mirrors and is mirrored by economic activity in Anchorage. Consequently, the development process of Anchorage has generally been quite similar to the growth of the state as a whole. However, there have been some significant differences in growth patterns which have led to an increasing concentration of state activity in Anchorage. We now turn to an examination of the major features of this process.

Dimensions of Growth

Population. Figure 19 presents the growth of Anchorage population since 1965. In 1965, 38.6 percent of Alaskan population was located in Anchorage. By 1978, over 45.6 percent of statewide population was located in Anchorage. Between 1965 and 1969, Anchorage population grew at almost exactly the rate of statewide population increase (2.7 percent). From 1969 until the start of the pipeline buildup, however, the average growth rate of Anchorage population more than doubled, to 6 percent; while the statewide rate rose, but to only 3.6 percent. The population response to the pipeline construction effort was somewhat different in Anchorage than statewide. Between 1974 and the peak of construction in 1976, statewide population expanded 17.7 percent, while Anchorage population grew 20.1 percent. However, while statewide population declined after

FIGURE 19. ANCHORAGE POPULATION, 1965-1978

(thousands of persons)



	POPTR5
1965	102.337
1966	105.925
1967	107.817
1968	111.6
1969	114.15
1970	126.333
1971	135.777
1972	144.215
1973	149.44
1974	153.112
1975	177.817
1976	185.179
1977	195.826
1978	185.5

SOURCE: Alaska Department of Labor

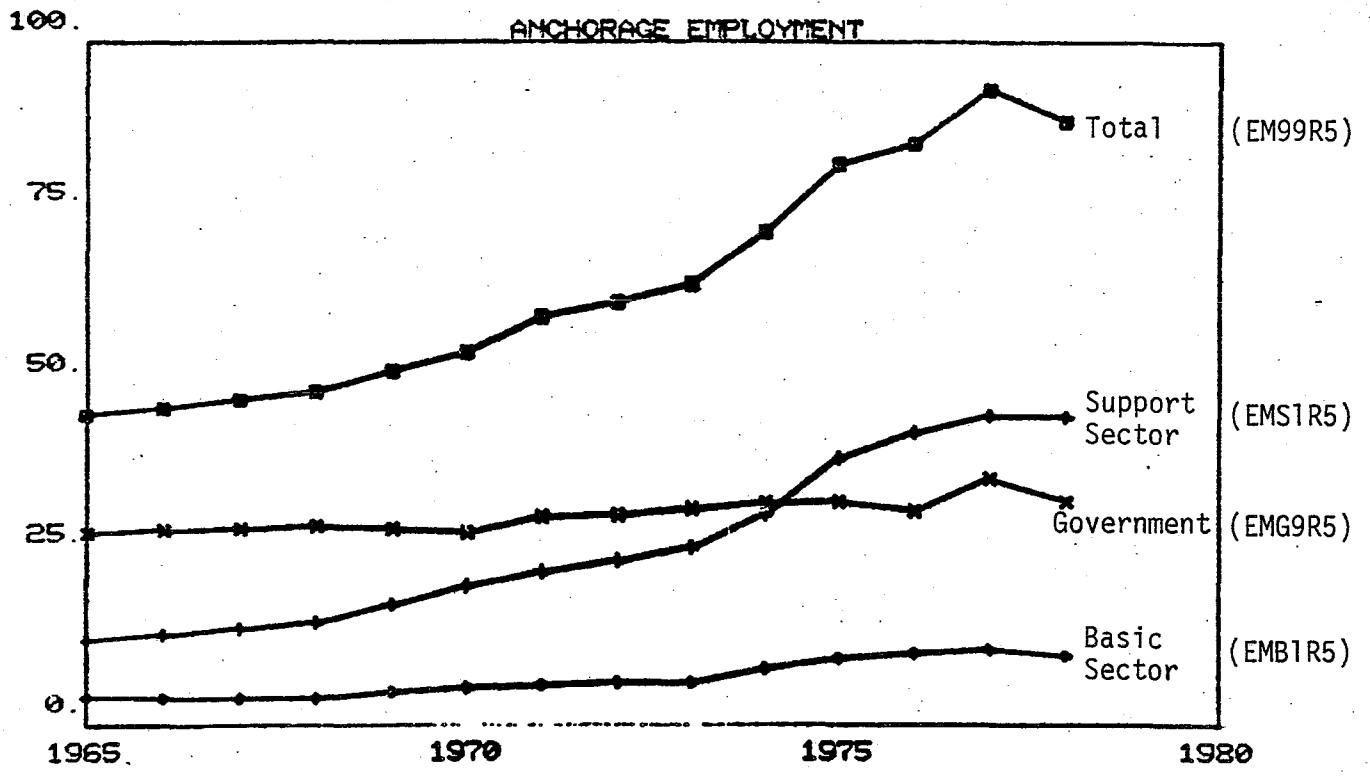
1976, Anchorage population did not peak until 1977, reflecting a greater concentration of production-oriented activities in Anchorage.

Employment. Figure 20 presents the growth of Anchorage employment since 1965. Total employment in the period 1965-1978 grew at an average annual rate of 5.2 percent, higher than the statewide average (4.4 percent). Basic sector employment, as shown in Figure 21, grew at a 6.9 percent annual average rate, compared to 6.1 percent statewide. This growth was driven by an increasing concentration of petroleum industry headquarters in Anchorage, as well as by rapid growth in construction employment associated with the location of new support facilities in Anchorage. The support sector grew even more rapidly, at an average annual rate of over 10.1 percent, compared to 8.9 percent statewide. As shown in Figure 22, trade and services comprise over 70 percent of support sector employment throughout the period. The greatest growth came in the service sector, which grew at an average annual rate of 11.5 percent, while trade lagged at 9.3 percent. Within the government sector, as shown in Figure 23, there were dramatic structural changes during the period, with state and local government rising from 14 percent of total government employment in 1965 to over 34 percent of the total by 1978.

The overall structural composition of Anchorage employment differs significantly from the rest of the state, insofar as over half of the Anchorage workforce is employed in the support sector; while outside of Anchorage only 37 percent of total employment is in that sector. This structural difference explains a great deal of the resiliency of the Anchorage economy

FIGURE 20. ANCHORAGE EMPLOYMENT, 1965-1978

(thousands of persons)

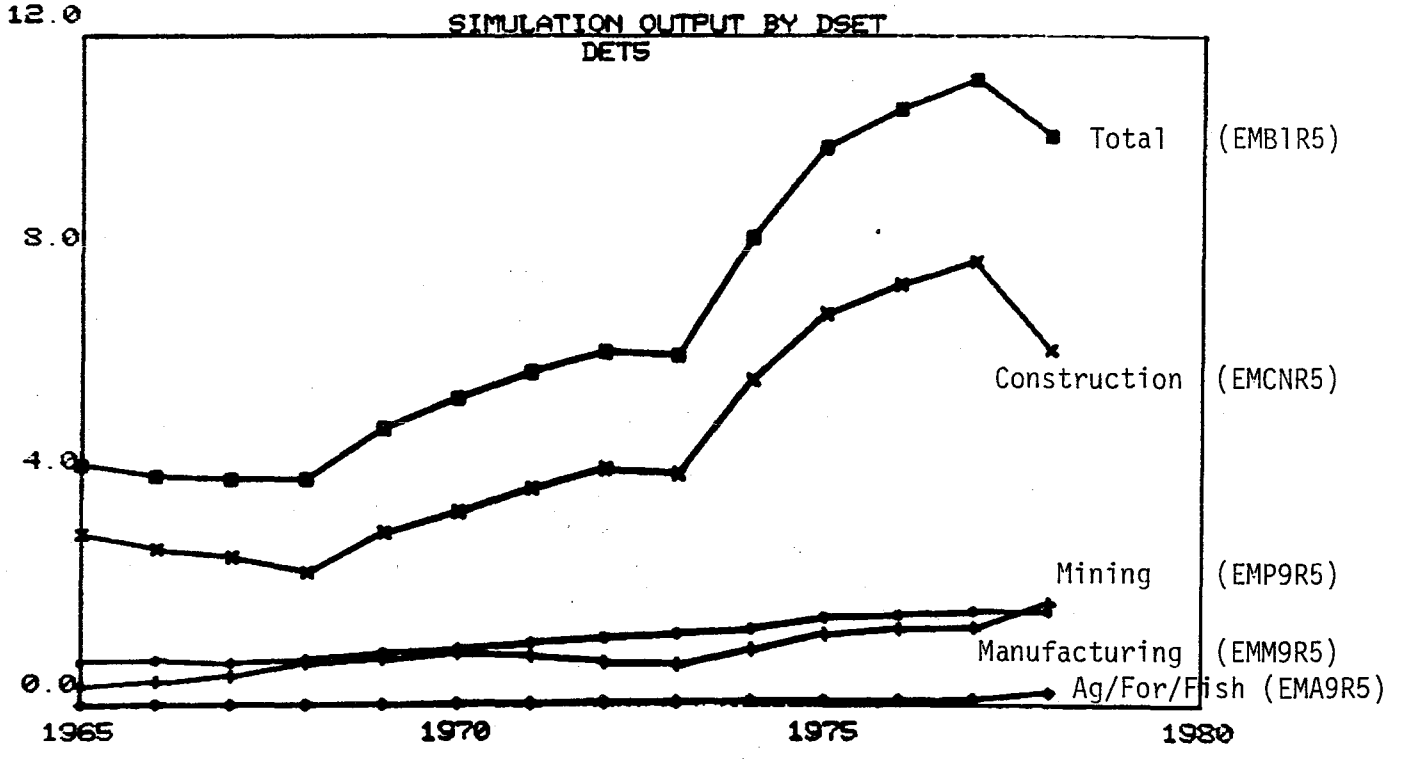


	EM99R5	EMS1R5	EMG9R5	EMB1R5
1965	45.826	12.959	28.546	4.321
1966	46.679	13.755	28.81	4.114
1967	47.943	14.727	29.135	4.081
1968	49.22	15.702	29.438	4.08
1969	52.237	18.212	29.037	4.988
1970	54.878	20.907	28.429	5.542
1971	59.905	23.039	30.846	6.02
1972	61.956	24.61	30.977	6.369
1973	64.676	26.41	31.952	6.314
1974	72.248	31.151	32.7	8.397
1975	82.277	39.351	32.899	10.027
1976	85.256	43.074	31.457	10.725
1977	93.046	45.487	36.32	11.239
1978	88.478	45.372	32.878	10.228

SOURCE: Alaska Department of Labor

FIGURE 21. ANCHORAGE BASIC SECTOR EMPLOYMENT
1965-1978

(thousands of persons)

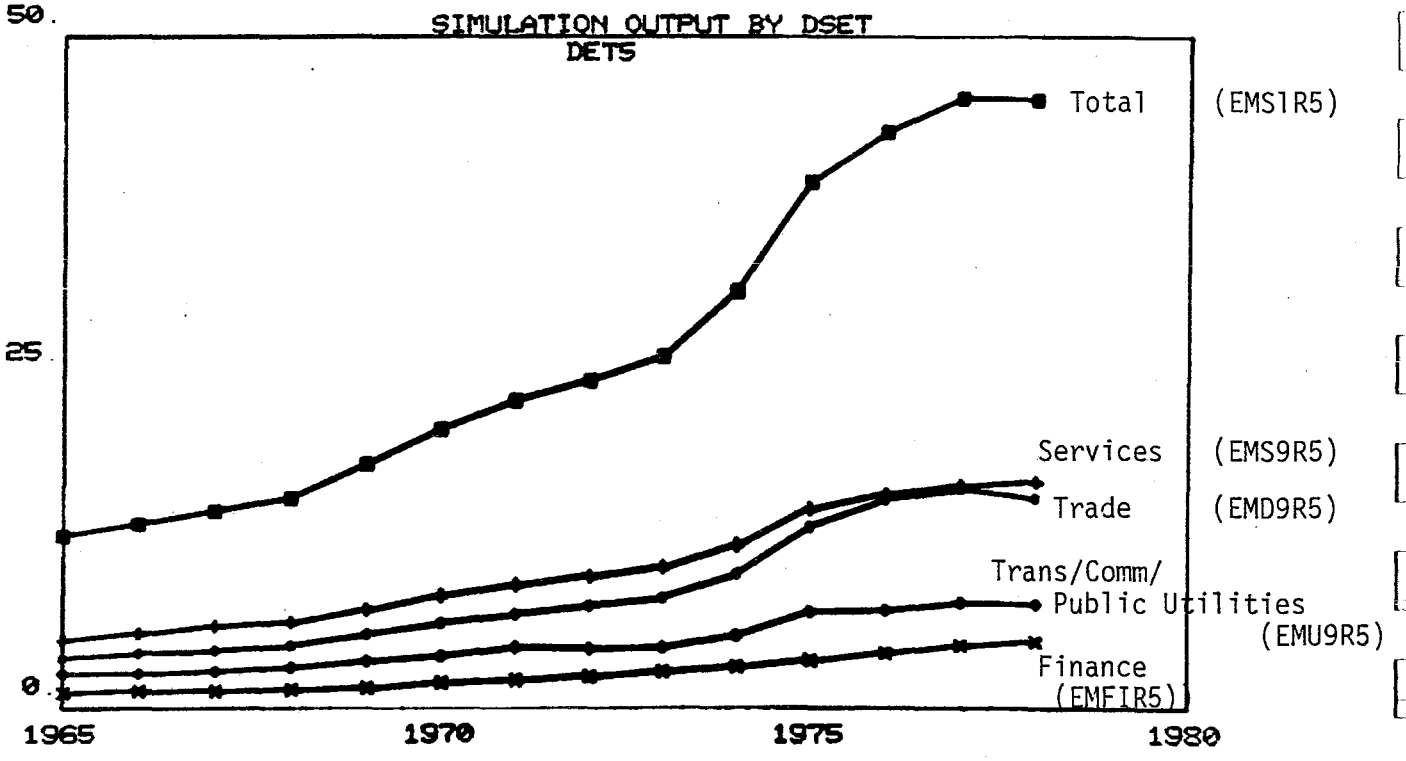


	EMA9R5	EMP9R5	EMCNR5	EMM9R5	EMB1R5
1965	0.033	0.371	3.126	0.791	4.321
1966	0.023	0.448	2.846	0.797	4.114
1967	0.029	0.562	2.722	0.768	4.081
1968	0.027	0.781	2.438	0.834	4.08
1969	0.036	0.858	3.142	0.952	4.988
1970	0.052	0.958	3.514	1.018	5.542
1971	0.063	0.916	3.924	1.117	6.02
1972	0.076	0.806	4.272	1.215	6.369
1973	0.082	0.768	4.178	1.286	6.314
1974	0.1	1.036	5.882	1.379	8.397
1975	0.099	1.301	7.054	1.573	10.027
1976	0.1	1.409	7.587	1.629	10.725
1977	0.133	1.424	7.995	1.687	11.239
1978	0.24	1.874	6.431	1.683	10.228

SOURCE: Alaska Department of Labor

FIGURE 22. ANCHORAGE SUPPORT SECTOR EMPLOYMENT
1965-1978

(thousands of persons)

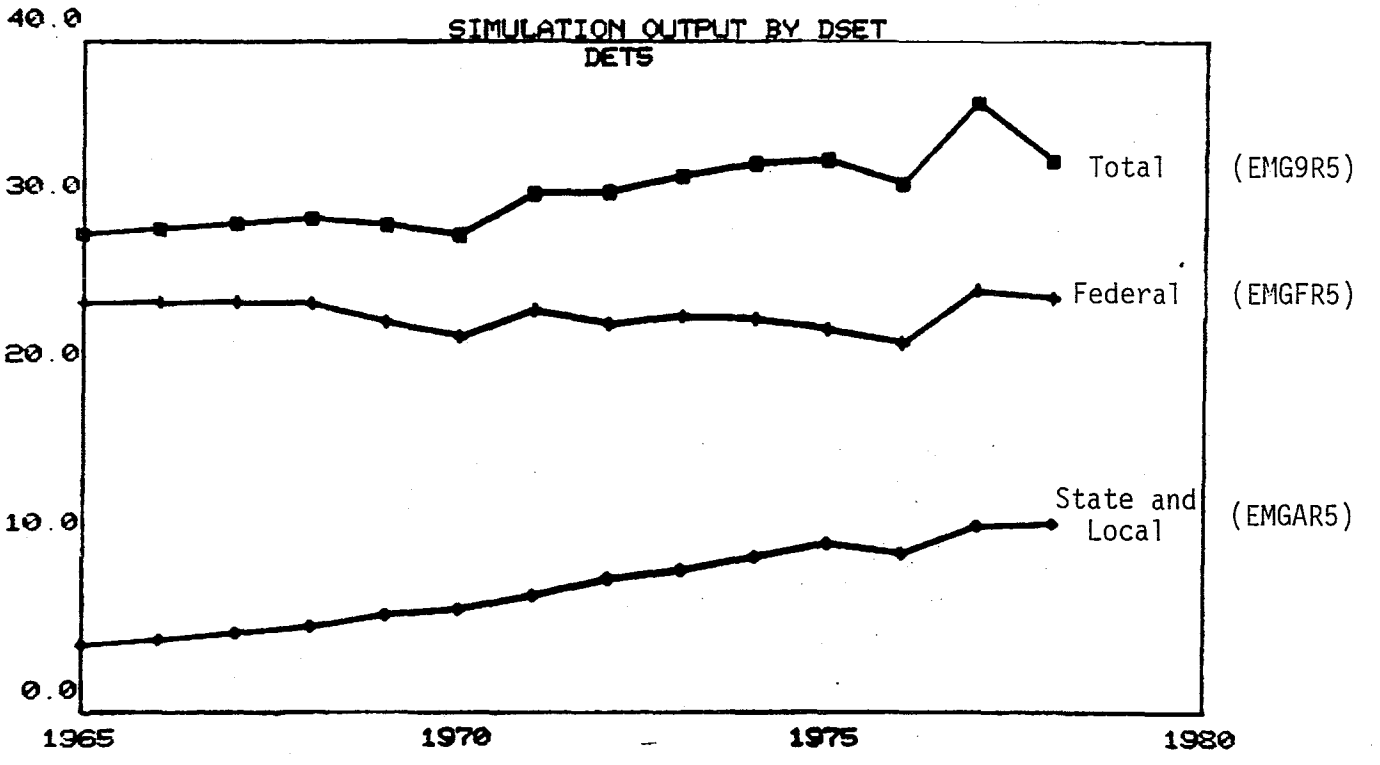


	EMU9R5	EMD9R5	EMFIR5	EMS9R5	EMS1R5
1965	2.618	5.279	1.295	3.767	12.959
1966	2.619	5.695	1.359	4.082	13.755
1967	2.771	6.261	1.363	4.332	14.727
1968	3.046	6.552	1.452	4.652	15.702
1969	3.515	7.548	1.604	5.545	18.212
1970	3.907	8.617	1.98	6.403	20.907
1971	4.591	9.334	2.087	7.027	23.039
1972	4.522	9.948	2.415	7.725	24.61
1973	4.625	10.663	2.803	8.319	26.41
1974	5.583	12.298	3.151	10.119	31.151
1975	7.343	14.928	3.615	13.465	39.351
1976	7.409	15.958	4.257	15.45	43.074
1977	7.961	16.576	4.743	16.207	45.487
1978	7.95	16.865	5.019	15.538	45.372

SOURCE: Alaska Department of Labor

FIGURE 23. ANCHORAGE GOVERNMENT SECTOR EMPLOYMENT
1965-1978

(thousands of persons)



	EMGAR5	EMGFR5	EMG9R5
1965	4.001	24.545	28.546
1966	4.289	24.521	28.81
1967	4.664	24.471	29.135
1968	5.022	24.416	29.438
1969	5.712	23.325	29.037
1970	6.036	22.393	28.429
1971	6.866	23.98	30.846
1972	7.839	23.138	30.977
1973	8.345	23.607	31.952
1974	9.242	23.458	32.7
1975	10.035	22.864	32.899
1976	9.465	21.992	31.457
1977	11.101	25.219	36.32
1978	11.266	24.713	32.878

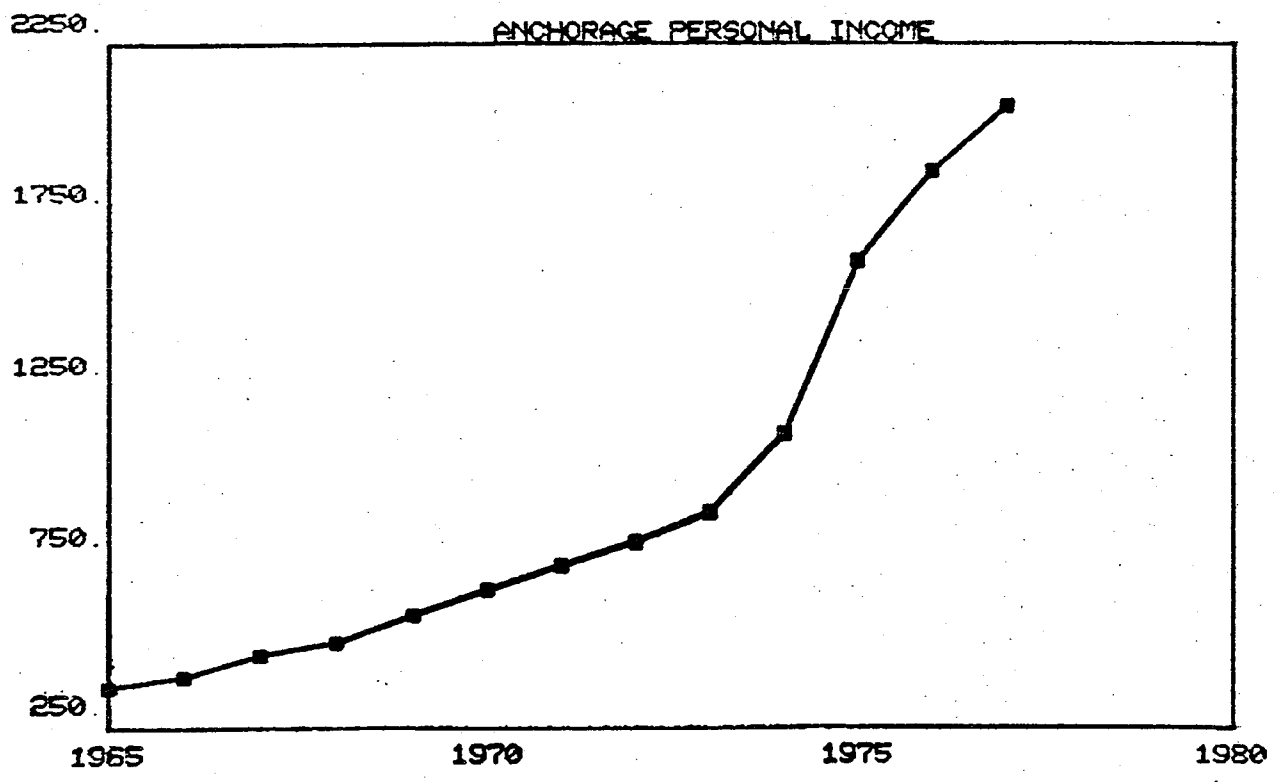
SOURCE: Alaska Department of Labor

in the wake of construction employment declines following pipeline completion. Because Anchorage is much more dominated by support sector activities than the rest of the state and because such activities appear to have fallen off very modestly in the post-pipeline years, Anchorage has been less hard hit by the decline than other regions more dependent on basic sector employment.

Income. In the period 1965-1974, Anchorage income growth closely followed that of the state. As shown in Figures 24 and 25, personal income grew steadily during the 1965-1974 period, averaging nearly 13 percent annually, slightly higher than the statewide rate (12.6 percent). From the beginning of the pipeline buildup to the peak of construction in 1976, Anchorage income grew 69.3 percent, as opposed to a statewide growth of 72 percent. In real per capita terms, Anchorage income expanded 13.5 percent during the two-year buildup from 1974 to 1976; while statewide income expanded 18.6 percent during the same two years. On the other hand, the Anchorage income behavior in the post-pipeline period has been far different from the statewide response. In nominal terms, statewide personal income growth slowed to 2.6 percent annually; and although 1978 data for Anchorage is not yet available, the 1977 income figure registers a 16.6 percent growth over the 1976 level. As in the case of employment, this difference is due to two structural features of the Anchorage economy. First, the concentration of petroleum industry administrative personnel in Anchorage maintained basic sector incomes even as the pipeline was completed; and second, the concentration of the more resilient support sector in Anchorage maintained support sector incomes in the face of the construction decline.

FIGURE 24. ANCHORAGE PERSONAL INCOME, 1965-1977

(millions of current dollars)

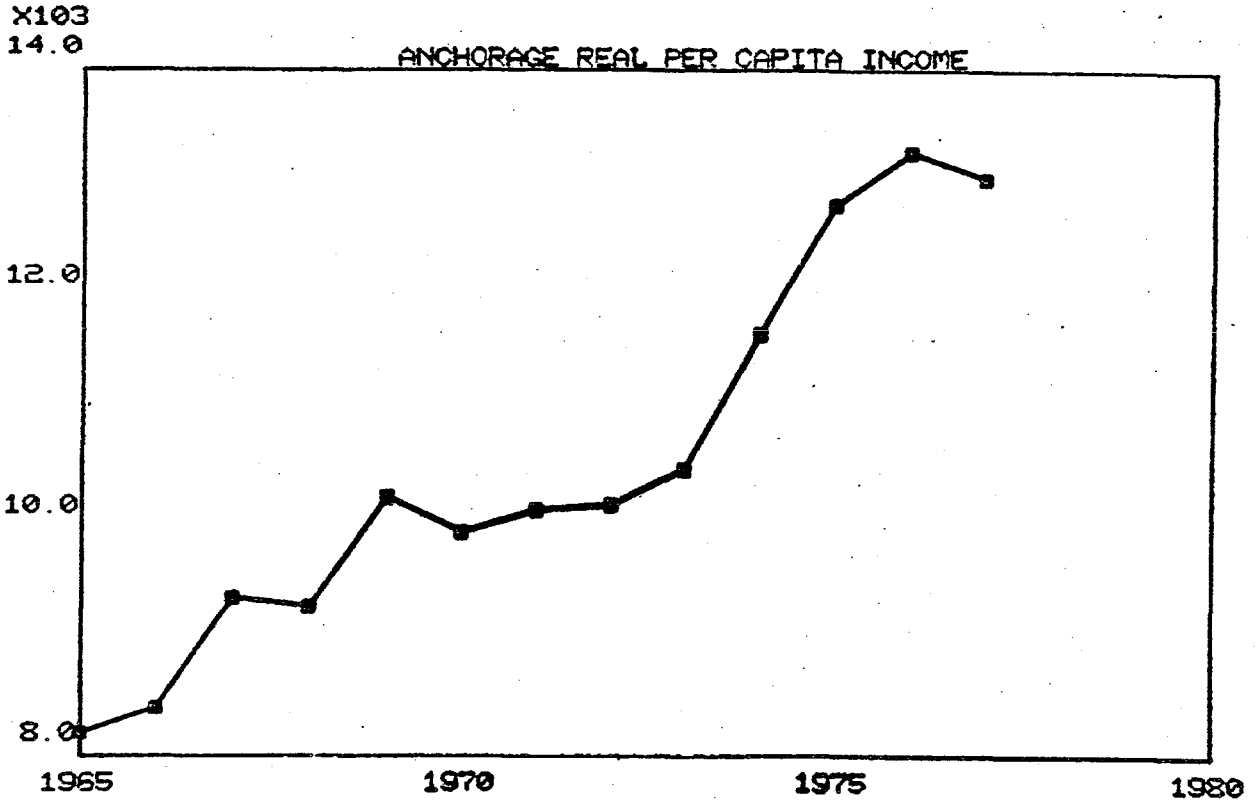


	PIR5
1965	371.
1966	398.
1967	462.2
1968	501.6
1969	586.2
1970	662.7
1971	732.9
1972	800.2
1973	883.1
1974	1111.6
1975	1614.4
1976	1882.5
1977	2073.8

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

FIGURE 25. ANCHORAGE REAL PER CAPITA INCOME, 1965-1977

(thousands of 1979 dollars)



	PIRPCR5
1965	8209.02
1966	8428.73
1967	9400.62
1968	9326.04
1969	10273.5
1970	9976.8
1971	10167.2
1972	10205.2
1973	10515.9
1974	11715.2
1975	12830.1
1976	13298.5
1977	13078.5

SOURCE: Population from Alaska Department of Labor, Personal Income from U.S. Department of Commerce, Bureau of Economic Analysis.

Summary of the Growth Process

The Anchorage economy, like the state as a whole, has undergone a period of rapid growth since 1965. Generally, during the pre-pipeline period, this growth mirrored statewide growth, although a significant structural difference--the concentration of support sector employment in Anchorage--kept Anchorage growth slightly ahead of the statewide average in the pre-pipeline years, increasing the concentration of Alaskan economic activity in the Anchorage area. The concentration of support sector activity in Anchorage led to different economic responses to the pipeline boom and its aftermath in Anchorage than in the state as a whole. Generally, the boom in Anchorage during the 1974-1976 period was slightly less pronounced than in the state as a whole, largely because support sector income variation during the boom was less variable than that of the basic sectors, especially construction. Furthermore, and perhaps of greater significance, the decline of economic activity in the state since 1976 has been much less severe in Anchorage than elsewhere for two reasons. The portion of basic sector employment located in Anchorage is largely administrative, and such employment has declined much less drastically than field construction employment since 1976. Second, the statewide support sector has maintained its peak level, at least through 1978, and the concentration of the sector in Anchorage has limited the post-pipeline decline in the region.

NORTON SOUND

Two census divisions, Nome and Wade Hampton, comprise the area along the perimeter of Norton Sound. Unlike the Anchorage economy, whose growth

is directly tied to statewide activity, the Norton Sound region is a very small economy, largely isolated from the bulk of statewide activity.

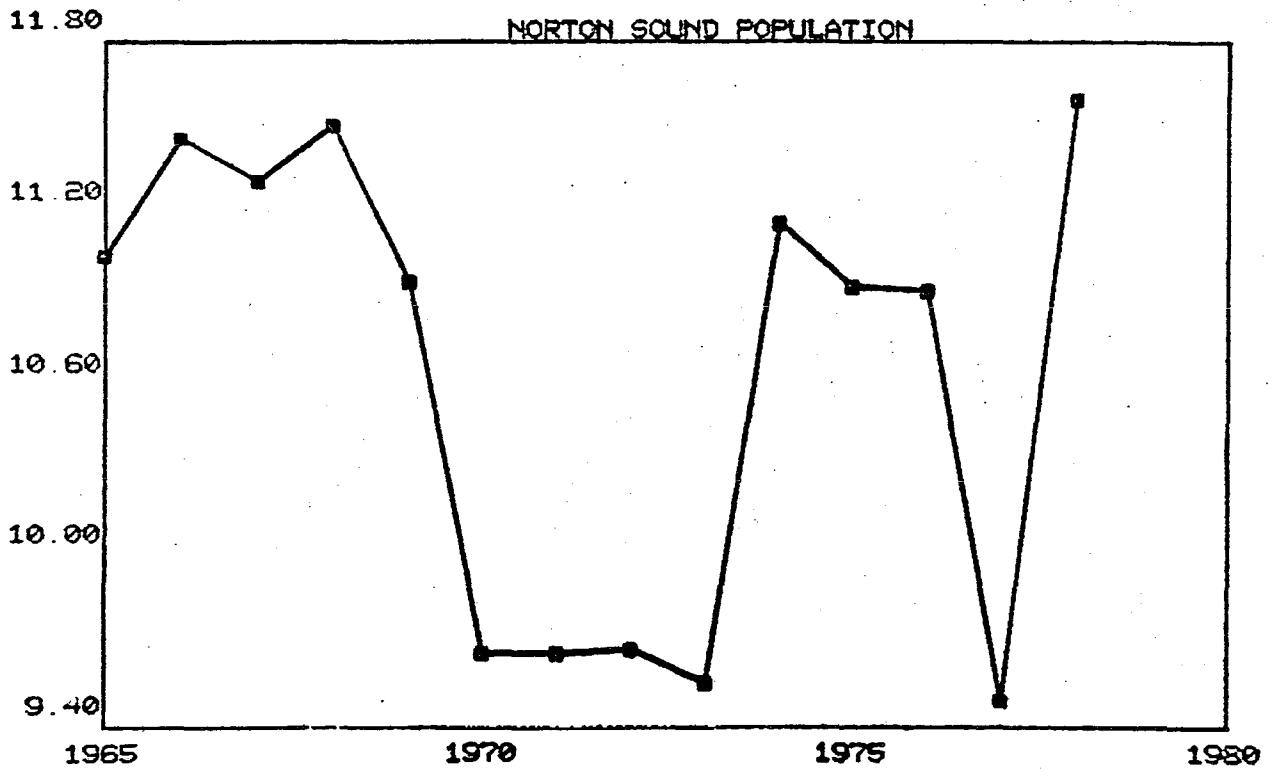
Dimensions of Growth

Population. Figure 26 presents the growth of Norton Sound population during the 1965-1978 period. Population fluctuates substantially throughout the period, although such fluctuations are due at least in part to measurement error. The Alaska Department of Labor acknowledges such problems and cautions users that such problems are most serious for the smaller census divisions. The census years, however, are thought to be reliable, as is the 1978 value, calculated as a change from the 1970 census. Using these points, the 1978 population in the area reflects an average growth of 2.3 percent annually since 1970, well above the 0.4 percent average annual growth experienced in the region between 1960 and 1970. Because of its slow growth relative to the state as a whole, the region declined from approximately 4 percent of Alaskan population in 1960 to less than 3 percent in 1978.

Employment. The growth and composition of Norton Sound employment is presented in Figure 27. While employment fluctuation has been much less than population (possibly due to better quality data than to any real behavioral phenomenon), there has been some fluctuation, with three periods clearly identifiable. From 1965 to 1971, total employment was relatively stable. Within the basic sector, there were wide fluctuations in construction and manufacturing employment, but these fluctuations

FIGURE 26. NORTON SOUND POPULATION, 1965-1978

(thousands of persons)

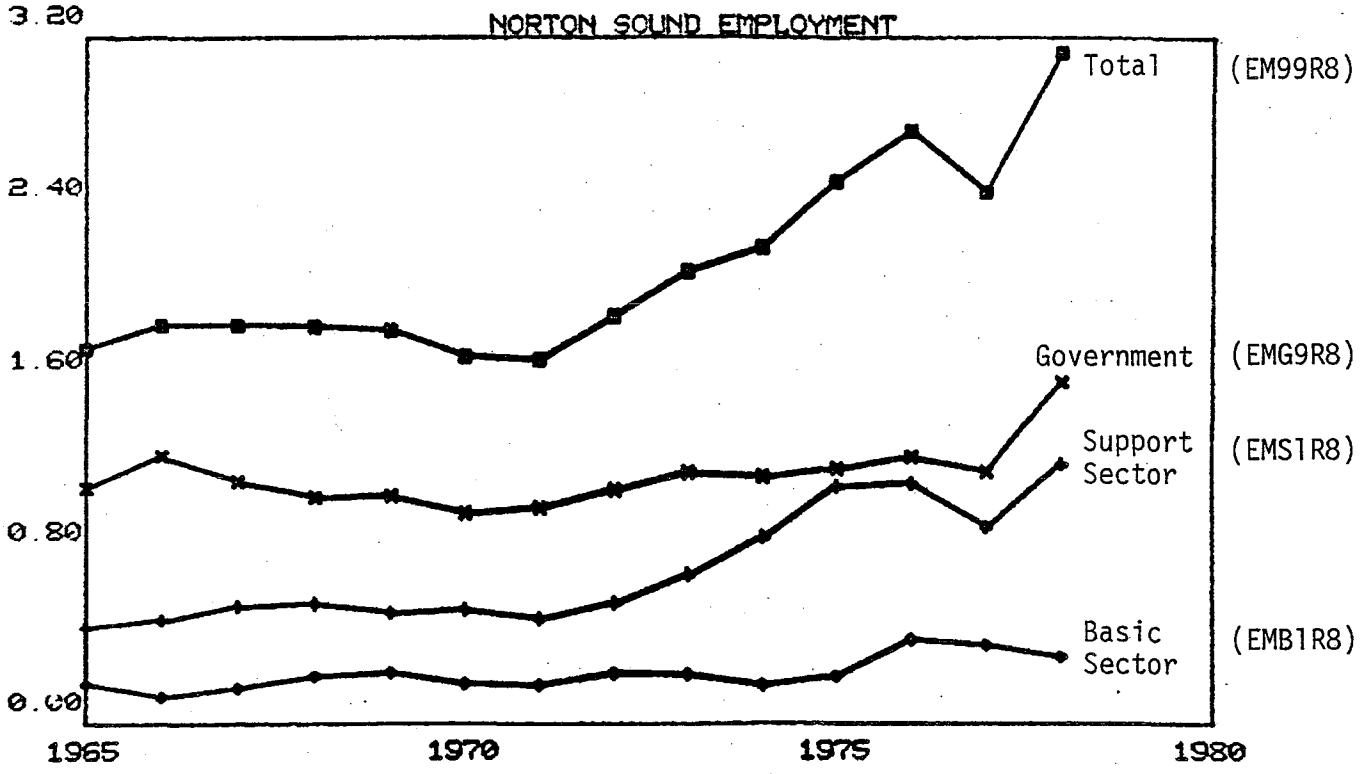


	POPTR8
1965	11.054
1966	11.464
1967	11.314
1968	11.51
1969	10.96
1970	9.666
1971	9.667
1972	9.68
1973	9.56
1974	11.165
1975	10.944
1976	10.931
1977	9.498
1978	11.6

SOURCE: Alaska Department of Labor

FIGURE 27. NORTON SOUND EMPLOYMENT, 1965-1978

(thousands of persons)



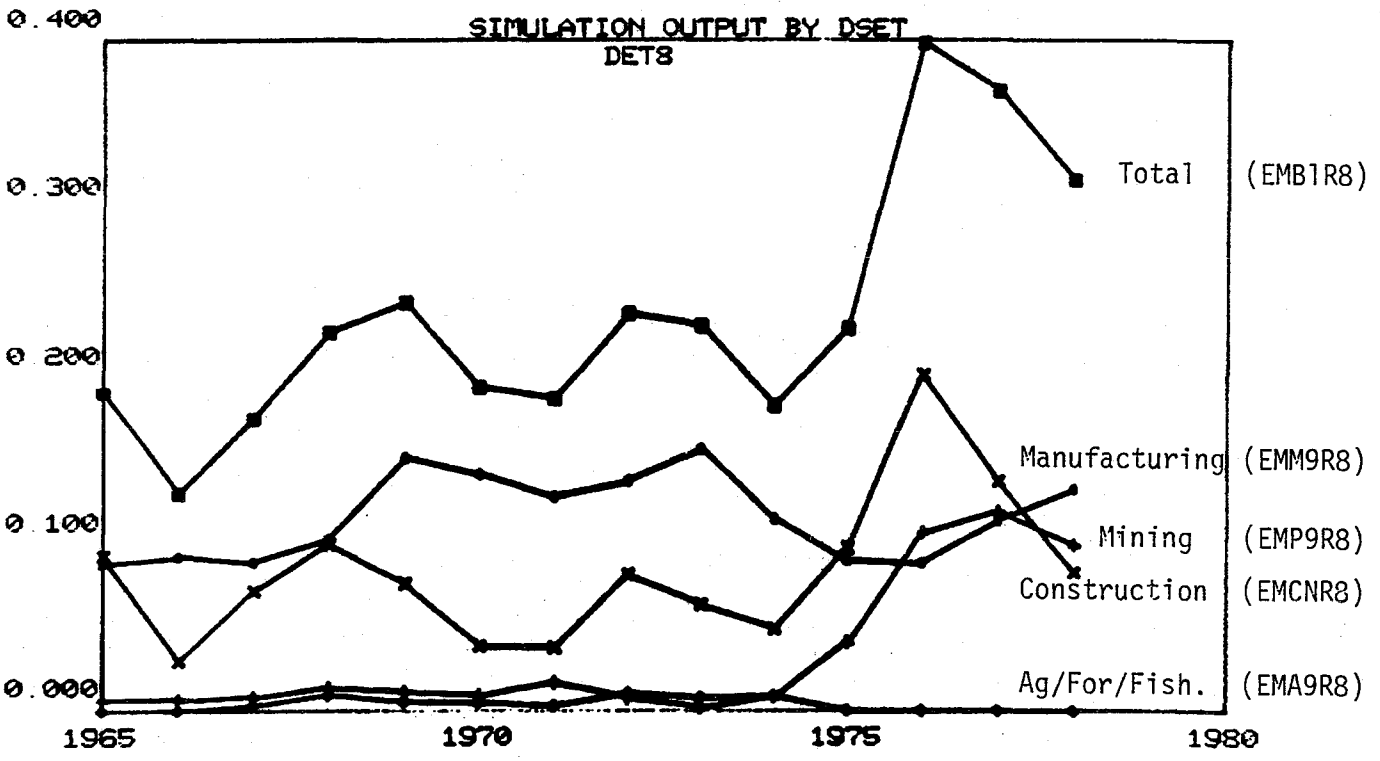
	EM99R8	EMG9R8	EMS1R8	EMB1R8
1965	1.759	1.108	0.461	0.19
1966	1.869	1.248	0.491	0.13
1967	1.868	1.134	0.56	0.174
1968	1.866	1.065	0.573	0.228
1969	1.848	1.072	0.531	0.245
1970	1.726	0.99	0.543	0.193
1971	1.704	1.014	0.503	0.187
1972	1.907	1.096	0.572	0.238
1973	2.113	1.174	0.708	0.231
1974	2.22	1.155	0.883	0.182
1975	2.528	1.188	1.109	0.23
1976	2.77	1.244	1.126	0.399
1977	2.482	1.178	0.933	0.371
1978	3.135	1.602	1.216	0.317

SOURCE: Alaska Department of Labor

acted to at least partially offset one another, as shown in Figure 28. Support sector employment remained somewhat stable at about 500 persons, as shown in Figure 29. Government sector employment was undergoing substantial structural change, with state and local employment growth largely offsetting a substantial decline in federal (primarily military) employment, as shown in Figure 30. By 1971, growth in state and local government and a mild construction boom spurred a round of growth and structural change which continued through 1975. Between 1971 and 1975, support sector employment grew by over 120 percent, with most of this growth occurring in services and finance. By 1975, the support sector comprised 44 percent of total employment, compared to 39 percent in 1971. By 1976, support sector growth had moderated and actually declined in 1977. By 1978, however, a large increase in state and local government employment, as well as more modest growth in manufacturing, acted to more than offset a sharp construction decline to trigger new growth in the support sector, almost wholly in services. By 1978, total employment had reached a level 78 percent higher than in 1965, and a substantial amount of structural change had occurred within and between the major sectors of the economy. Basic sector employment by 1978 was much more heavily composed of mining and construction activity than in the earlier years when manufacturing dominated the basic industries. Services now dominated the support sector, and state and local government had completely reversed roles with the federal government as a source of government sector employment. The support sector had risen to nearly 39 percent of total employment, as opposed to 26 percent in 1965, making the local economy resemble more closely the statewide economy by the end of the period.

FIGURE 28. NORTON SOUND BASIC SECTOR EMPLOYMENT
1965-1978

(thousands of persons)

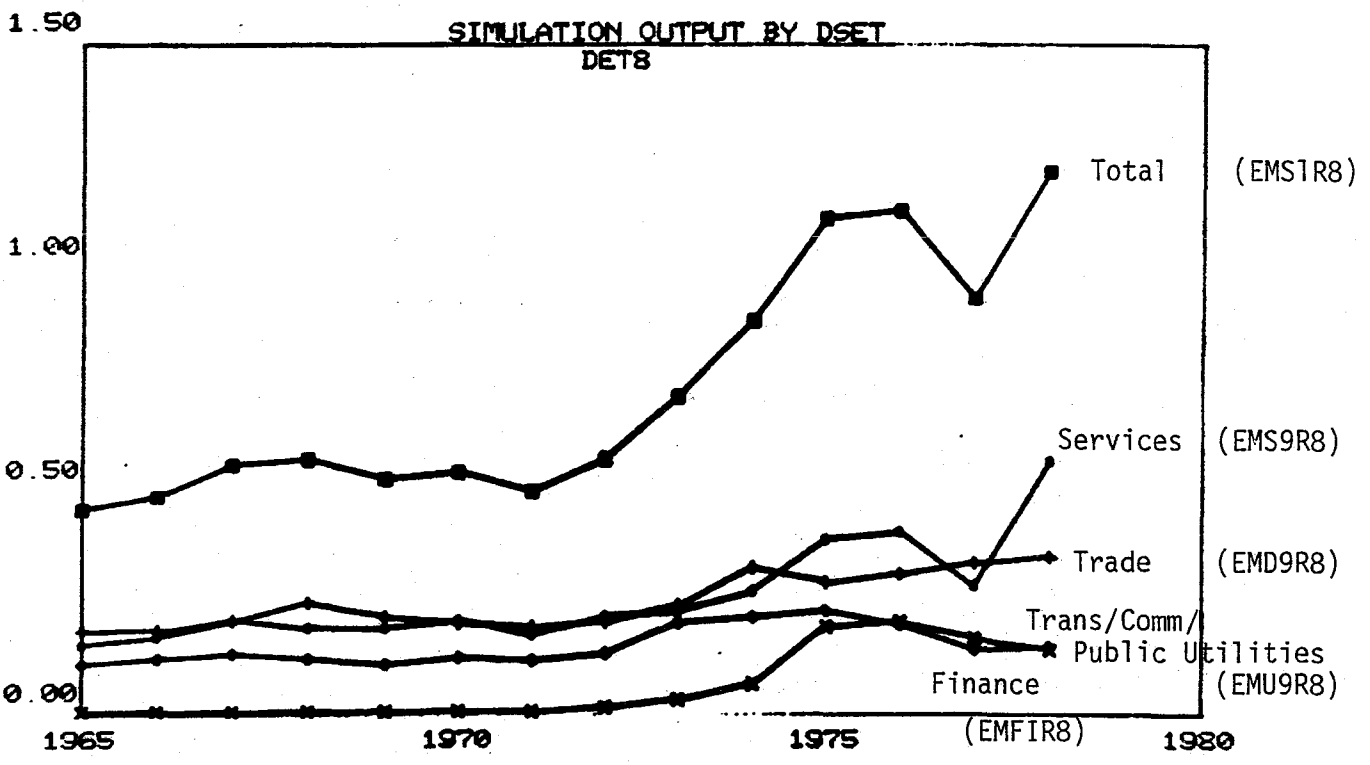


	EMA9R8	EMP9R8	EMCNR8	EMM9R8	EMB1R8
1965	0.	0.007	0.094	0.088	0.19
1966	0.	0.007	0.03	0.093	0.13
1967	0.003	0.009	0.073	0.09	0.174
1968	0.009	0.014	0.101	0.103	0.228
1969	0.005	0.012	0.078	0.15	0.245
1970	0.005	0.009	0.039	0.14	0.193
1971	0.003	0.017	0.038	0.128	0.187
1972	0.01	0.008	0.083	0.137	0.238
1973	0.008	0.003	0.065	0.156	0.231
1974	0.008	0.009	0.049	0.115	0.182
1975	0.	0.041	0.099	0.09	0.23
1976	0.	0.108	0.202	0.089	0.399
1977	0.	0.12	0.137	0.114	0.371
1978	0.	0.1	0.084	0.132	0.317

SOURCE: Alaska Department of Labor

FIGURE 29. NORTON SOUND SUPPORT SECTOR EMPLOYMENT
1965-1978

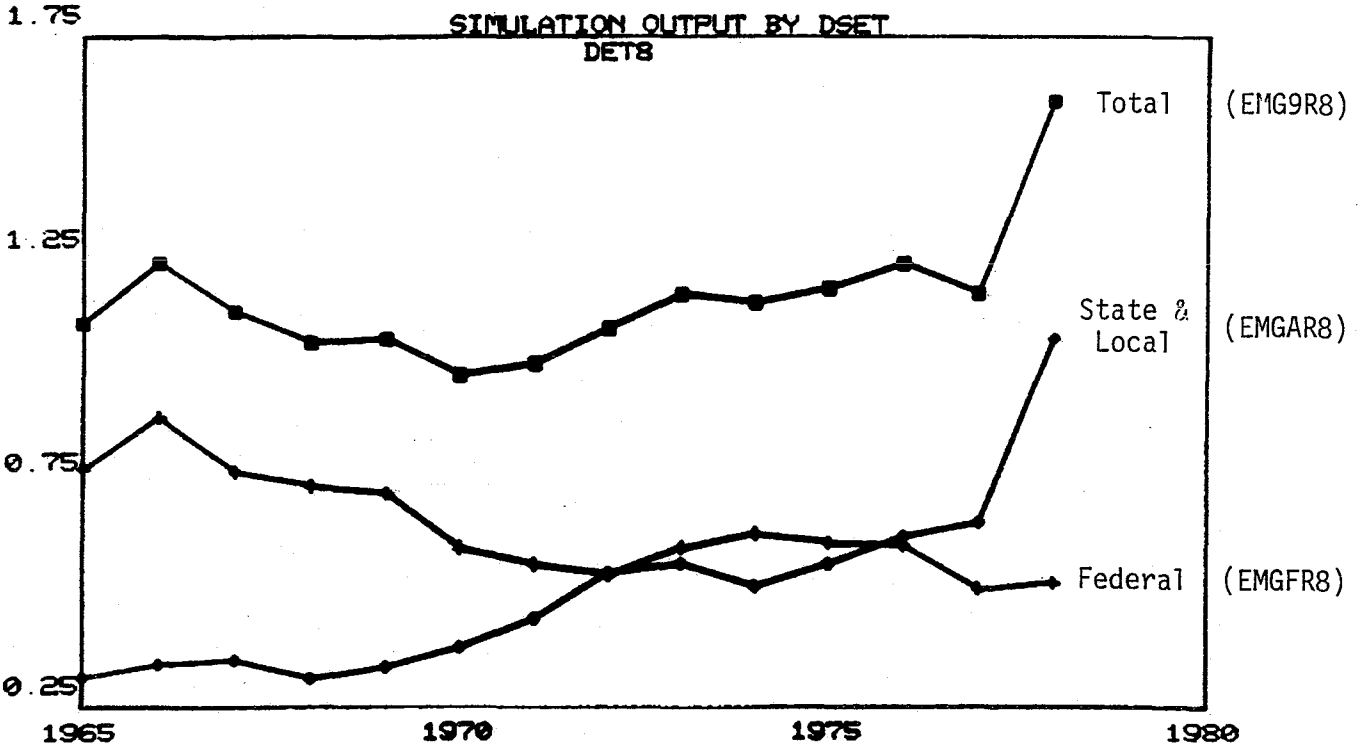
(thousands of persons)



	EMU9R8	EMD9R8	EMFIR8	EMS9R8	EMS1R8
1965	0.112	0.187	0.01	0.151	0.461
1966	0.124	0.186	0.011	0.17	0.491
1967	0.135	0.209	0.01	0.205	0.56
1968	0.123	0.249	0.011	0.19	0.573
1969	0.112	0.218	0.009	0.19	0.531
1970	0.125	0.202	0.009	0.207	0.543
1971	0.121	0.195	0.011	0.176	0.503
1972	0.134	0.206	0.018	0.214	0.572
1973	0.202	0.244	0.036	0.225	0.708
1974	0.214	0.328	0.069	0.271	0.883
1975	0.229	0.295	0.194	0.391	1.109
1976	0.197	0.315	0.206	0.408	1.126
1977	0.142	0.339	0.168	0.283	0.933
1978	0.15	0.354	0.144	0.567	1.216

SOURCE: Alaska Department of Labor

FIGURE 30. NORTON SOUND GOVERNMENT SECTOR EMPLOYMENT
1965-1978



	EMGAR8	EMGFR8	EMG9R8
1965	0.319	0.789	1.108
1966	0.348	0.9	1.248
1967	0.355	0.778	1.134
1968	0.317	0.747	1.065
1969	0.341	0.73	1.072
1970	0.384	0.606	0.99
1971	0.446	0.568	1.014
1972	0.549	0.548	1.096
1973	0.568	0.606	1.174
1974	0.519	0.637	1.155
1975	0.569	0.619	1.188
1976	0.633	0.611	1.244
1977	0.664	0.514	1.178
1978	1.073	0.529	1.602

SOURCE: Alaska Department of Labor

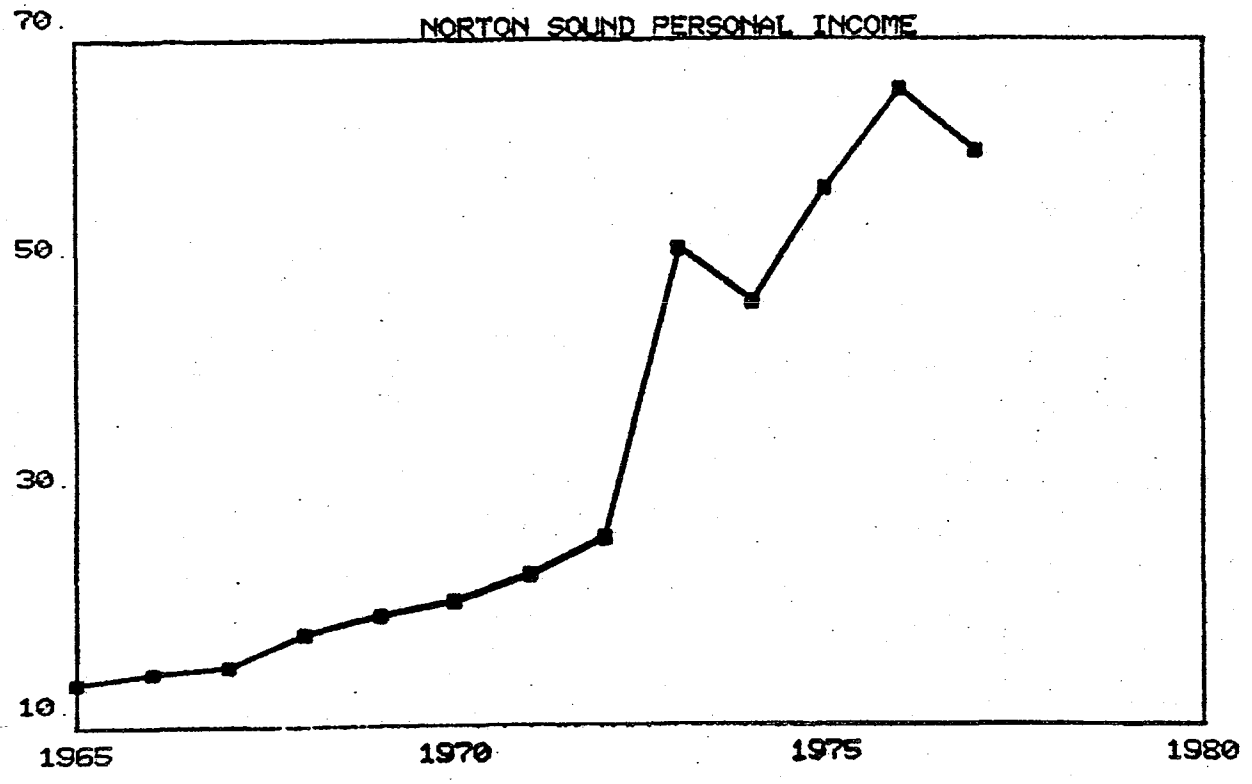
Income. Figures 31 and 32 present the growth of Norton Sound personal income in nominal and real per capita terms, respectively. In nominal terms, income grew steadily throughout the period, at an average annual rate of 13 percent. Real per capita income grew at an average rate of 8.8 percent annually.

Summary of the Growth Process

The Norton Sound area, while having undergone substantial growth during the 1965-1978 period, has followed a development pattern quite different from that of Anchorage or the state as a whole. Unlike the rest of the state, in which the major driving force of the growth process has been growth of basic sector employment, the source of growth in Norton Sound has been growth of the support sector itself, fueled in part by payments made under the Alaska Native Claims Settlement Act and a variety of other income transfer programs, but primarily by a rapid increase in government employment toward the end of the period. This development has altered the structure of the regional economy radically over the period, creating an increased dominance of support sector employment which, by 1978, much more closely resembled the structure of the state-wide economy.

FIGURE 31. NORTON SOUND PERSONAL INCOME

(millions of current dollars)

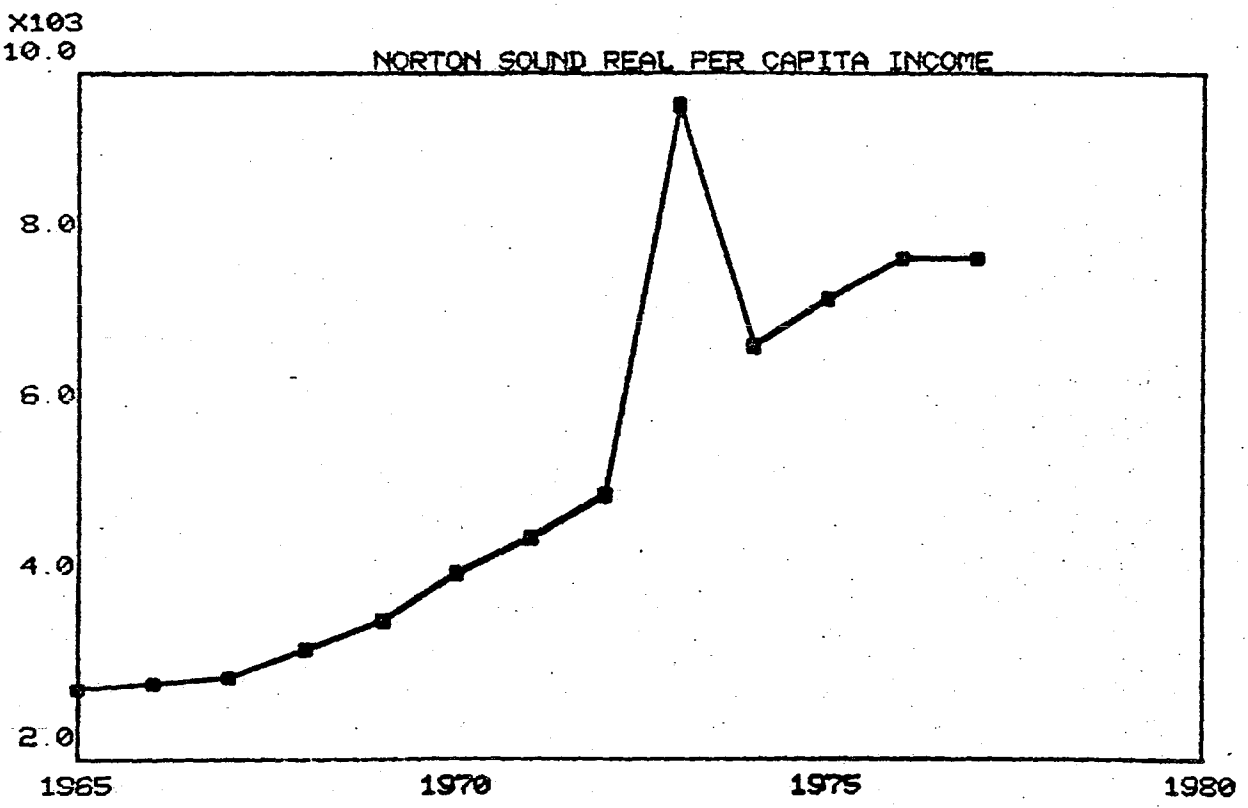


	PIR8
1965	13.9
1966	14.8
1967	15.4
1968	18.4
1969	20.
1970	21.3
1971	23.6
1972	26.8
1973	51.8
1974	47.2
1975	57.1
1976	65.7
1977	60.4

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

FIGURE 32. NORTON SOUND REAL PER CAPITA INCOME, 1965-1977

(thousands of 1979 dollars)



	PIRPCR8
1965	2847.38
1966	2896.03
1967	2984.83
1968	3317.01
1969	3650.63
1970	4191.06
1971	4598.36
1972	5092.08
1973	9642.21
1974	6821.73
1975	7373.12
1976	7862.55
1977	7853.53

SOURCE: Population from Alaska Department of Labor; personal income from U.S. Department of Commerce, Bureau of Economic Analysis.

Summary

The period from 1965 to 1978 was one of significant growth and structural change within both the statewide economy and the regional economies of Anchorage and the Norton Sound.

Statewide, the period was characterized by stable growth stimulated largely by a growing petroleum industry and state and local government prior to 1974, after which an "explosion" in incomes, wages, employment, and population accompanied the construction buildup during the building of the trans-Alaska pipeline. Following the peak of pipeline construction in 1976, despite a precipitous drop in construction employment, support sector employment and incomes remained at near their peak levels. This, combined with maintained growth in government incomes, served to dampen greatly the severity of the economic decline following pipeline completion. Furthermore, the onset of production from Prudhoe Bay by the end of the period was providing the state government with a new and rapidly growing revenue source with which it could control its future growth.

Anchorage came increasingly to be the center of economic activity within the state over the historical period. Furthermore, much of the growth in the support sector was concentrated in Anchorage along with the administrative component of basic sector employment. As a consequence, the Anchorage economy showed a much more stable response to the pipeline boom than any other region of the state.

The Norton Sound area underwent structural changes during the period somewhat different from those of the state as a whole. Personal income transfers and later government sector growth triggered a substantial growth in the support sector, so that by 1978 the regional economy was altered to a structure much more closely resembling that of the state as a whole.

III. STATEWIDE AND REGIONAL GROWTH WITHOUT THE PROPOSAL: THE BASE CASE

Background

Having examined the historical patterns of growth in the statewide and regional economies, it is now necessary to utilize the above information in developing a set of forecasts of statewide and regional activity through the year 2000. Generally, this information has been incorporated into the calibration of statewide and regional econometric models, as described in Chapter I. However, such models require the development of scenarios--sets of assumptions about exogenous activity--upon which contingent forecasts may be made. This section has two purposes: first, to present the scenario upon which the forecasts are contingent; and second, to present the forecasts of the major economic variables through the year 2000 in the absence of the proposed Bering-Norton OCS development. This forecast will then serve as a benchmark from which to measure the impacts of the proposal in a later section.

Assumptions: The Base Case Scenario

The base case scenario consists of three sets of assumptions--those concerned with national variables which directly or indirectly affect Alaskan economic activity, those describing development in the exogenous sectors of the Alaskan economy, and those affecting state fiscal policy.

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 capita 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 7.56 percent. Real disposable per capita income is forecast to increase at a 2.12 percent average annual rate. Hourly earnings are forecast to increase at 8.73 percent, while average hours worked are forecast to decline slowly at -0.23 percent.

Consequently, average weekly earnings may be expected to grow at an annual rate of 8.5 percent (i.e. 8.73 percent minus 0.23 percent). These long-term average growth rates were adopted as the three national variable assumptions utilized in the analysis.

EXOGENOUS INDUSTRY ASSUMPTIONS

Several industries in the Alaskan economy grow largely or entirely in response to forces external to the Alaskan economy. These sectors include the federal government, mining, manufacturing, agriculture-forestry-fisheries, and portions of the construction and transportation industries. The assumptions affecting these sectors are of two types: industry-wide assumptions as to growth in federal government, agriculture-forestry-fisheries, and manufacturing; and special project assumptions affecting mining, construction, manufacturing, and transportation.

Industry-Wide Assumptions

Federal Employment. In 1978, federal employment in Alaska was 40,691, consisting of 55 percent military and 45 percent civilian personnel. Since 1972, civilian employment has increased at about 1 percent annually, while military employment has fallen at an annual rate of over 5 percent, reflecting an acceleration of a long-term downward trend. In the next several years, increased employment required to implement new federal land-use legislation is expected to accelerate the growth rate of civilian employment, at least temporarily; while military employment is expected to remain constant, as shown in Table 3.

Agriculture-Forestry-Fisheries. About a thousand persons statewide make up the sector which is designated agriculture-forestry-fisheries. New proposals for dramatic increases in bottomfishing have been suggested as a means to shift the Alaskan economy toward renewable resource industries. Thus, employment in agriculture, forestry, and fisheries during the

TABLE 3. FEDERAL EMPLOYMENT, BASE CASE

(Thousands of Workers)

Year	Civilian[1]	Military[2]	Total
1977	17.734	24.984	42.718
1978	18.19	22.501	40.691
1979	18.955	22.501	41.456
1980	19.345	22.501	41.846
1981	19.535	22.501	42.036
1982	19.712	22.501	42.213
1983	19.891	22.501	42.392
1984	20.072	22.501	42.573
1985	20.254	22.501	42.755
1986	20.438	22.501	42.939
1987	20.623	22.501	43.124
1988	20.81	22.501	43.311
1989	20.999	22.501	43.5
1990	21.19	22.501	43.691
1991	21.382	22.501	43.883
1992	21.576	22.501	44.077
1993	21.772	22.501	44.273
1994	21.970	22.501	44.471
1995	22.169	22.501	44.67
1996	22.37	22.501	44.871
1997	22.574	22.501	45.075
1998	22.778	22.501	45.279
1999	22.985	22.501	45.486
2000	23.193	22.501	45.694

[1]1977 actual value from Alaska Department of Labor, Statistical Quarterly, Second Quarter, 1978.

1978 value from Alaska Department of Commerce and Economic Development, The Alaska Economy: Year End Performance Report, 1978, p. 43.

1979 to 1981 forecasts from Alaska Department of Commerce and Economic Development, The Alaska Information and Reporting System, Quarterly Report, July 1979, Table I.

1981 to 2000 forecasts based on historical rate of increase over the 1961 to 1978 period.

[2]1977 to 1978 values from Alaska Department of Commerce and Economic Development, The Alaska Economy: Year End Performance Report, 1978, p. 43. Assumed to remain at 1978 value throughout forecast period.

forecast period consists of two components--those persons engaged in bottomfishing and those persons engaged in activities which have historically characterized the sector (primarily also fishing activities). The Southcentral Water Study (Scott, 1979) estimated a 15 percent growth in conventional fisheries employment by the year 2000 over its 1978 level (implying an annual rate of growth of .637 percent). Thus, the conventional agriculture-forestry-fisheries employment was assumed to expand by 15 percent by the end of the forecast period. Bottomfishing by Alaskans, on the other hand, is assumed to replace foreign bottomfishing entirely by the year 2000 so that a growing employment begins in 1980 and accelerates throughout the forecast period, requiring over 2,000 persons by the year 2000 (see Table 4).

Manufacturing. The manufacturing sector consists of four components: food manufacturing (primarily seafood processing), lumber and wood products manufacturing, pulp and paper manufacturing, and other manufacturing. The assumed increase in bottomfishing would result in an increase of 11,061 in food manufacturing employment by the year 2000. In addition, existing fisheries are expected to require a 15 percent increase in food processing employment by 2000 (see Report of Economics Task Force, Southcentral Alaska Water Resources Study, p. AD-4, 1/31/79). The remaining components of manufacturing are forecast to grow through 1981 at rates forecast by the Alaska Department of Commerce and Economic Development (see The Alaska Economic Information and Reporting System, Quarterly Report, July 1979, Table 1). After 1981, these components grow at the historical growth rate of the manufacturing sector, or 4 percent.

TABLE 4. AGRICULTURE-FORESTRY-FISHERIES EMPLOYMENT FORECAST

Year	Bottomfishing[1]	Other[2]	Total
1977	0	1.1	1.1
1978	0	1.1	1.1
1979	0	1.107	1.107
1980	.015	1.114	1.129
1981	.018	1.121	1.139
1982	.021	1.128	1.149
1983	.026	1.136	1.162
1984	.032	1.143	1.175
1985	.039	1.150	1.189
1986	.049	1.157	1.206
1987	.062	1.165	1.227
1988	.079	1.172	1.251
1989	.102	1.180	1.282
1990	.132	1.187	1.319
1991	.171	1.195	1.366
1992	.223	1.202	1.425
1993	.292	1.210	1.502
1994	.383	1.218	1.601
1995	.505	1.225	1.730
1996	.667	1.233	1.900
1997	.882	1.241	2.123
1998	1.169	1.249	2.418
1999	1.551	1.257	2.808
2000	2.060	1.265	3.325

[1]Alaska OCS Office.

[2]Actual 1978 value, increasing thereafter at .637 percent annually (see text).

TABLE 5. MANUFACTURING EMPLOYMENT FORECAST

Year	Lumber[1]	Paper[1]	Food		Other[1]
			Bottomfishing[2]	Other[3]	
1977	2.081	1.248	0	5.447	1.943
1978	1.684	1.076	0	5.983	2.852
1979	2.079	1.135	0	5.906	2.683
1980	1.808	1.146	.055	6.129	2.791
1981	1.742	1.245	.067	6.234	2.818
1982	1.812	1.295	.081	6.267	2.931
1983	1.884	1.347	.101	6.299	3.048
1984	1.960	1.400	.126	6.332	3.170
1985	2.038	1.456	.159	6.365	3.297
1986	2.119	1.515	.203	6.398	3.429
1987	2.204	1.575	.261	6.431	3.566
1988	2.292	1.638	.339	6.465	3.708
1989	2.384	1.704	.443	6.498	3.857
1990	2.479	1.772	.583	6.532	4.011
1991	2.579	1.843	.772	6.566	4.171
1992	2.682	1.917	1.026	6.6	4.338
1993	2.789	1.993	1.369	6.635	4.512
1994	2.901	2.073	1.834	6.669	4.692
1995	3.017	2.156	2.463	6.704	4.880
1996	3.137	2.242	3.315	6.739	5.075
1997	3.263	2.332	4.471	6.774	5.278
1998	3.393	2.425	6.039	6.809	5.489
1999	3.529	2.522	8.168	6.844	5.709
2000	3.670	2.623	11.061	6.880	5.937

[1]Actual 1978 value, AEIRS forecast through 1981 (see text), historical 4 percent growth thereafter.

[2]Alaska OCS Office.

[3]AEIRS forecast through 1981. After 1981, constant growth rate of 0.52 percent annually (constant rate producing a 15 percent rise in year 2000 employment over 1978 level [see text]).

Special Project Assumptions

Upper Cook Inlet. Petroleum sector employment in the Kenai-Cook Inlet Census Division was 705 in 1977 (4 quarter average employment, taken from Alaska Department of Labor, Statistical Quarterly, 1977 issues), consisting of exploration, development, and production employment surrounding the Kenai oil and gas fields. While oil production is expected to decline drastically over the forecast period in the absence of new discoveries, gas production is expected to rise even without new discoveries. It is assumed that these increases, coupled with continued exploration activity and enhanced recovery generated by rising prices, will be sufficient to keep Upper Cook Inlet employment constant over the forecast period, as shown in Table 6.

Prudhoe Bay. Prudhoe Bay developments include employment associated with primary recovery operations from the Sadlerochit formation, secondary recovery operations using water flooding of that formation, new developments of the Kuparuk formation west of Prudhoe Bay, and the permanent work force of ARCO and BP at the main Prudhoe base headquarters. The key assumptions serving as the basis for the forecasts in Table 7 are as follows:

- Five rigs (3 ARCO, 2 BP) continue development drilling at a rate of 10 wells per year per rig through 1985 (based on estimated activity presented in OGJ 2/26/79).
- The proposed Prudhoe water flooding project begins in 1982. Employment from 1982-84 is 2231, 2917, and 2467 on the project (estimates provided by Phillips, Alaska Division of Minerals and Energy Management, 3/6/79).

TABLE 6. UPPER COOK INLET EMPLOYMENT FORECAST

Year	Petroleum[1]
1977	705
1978	705
1979	705
1980	705
1981	705
1982	705
1983	705
1984	705
1985	705
1986	705
1987	705
1988	705
1989	705
1990	705
1991	705
1992	705
1993	705
1994	705
1995	705
1996	705
1997	705
1998	705
1999	705
2000	705

[1] 1977 value from Alaska Department of Labor, Statistical Quarterly, 1977 issues.

Assumption of constant employment based on Alaska Consultants, Inc., Baseline Conditions and Non-OCS Forecast Lower Cook Inlet Socioeconomic Systems, OCS Studies Program Technical Memorandum LCI-17.

TABLE 7. PRUDHOE BAY EMPLOYMENT FORECAST[1]

Year	Petroleum
1979	1772
1980	2044
1981	2155
1982	4337
1983	5134
1984	4684
1985	2217
1986	1802
1987	1802
1988	1802
1989	1802
1990	1802
1991	1802
1992	1802
1993	1802
1994	1802
1995	1802
1996	1802
1997	1802
1998	1802
1999	1802
2000	1802

[1]Includes development of Sadlerochit and Kuparuk formations. See text for assumptions.

- The Kuparuk formation west of Prudhoe is developed, with drilling of production wells beginning in 1980. Production at a rate of 60,000 barrels per day begins in 1982, rising to 120,000 barrels per day by 1984 (OGJ, 4/2/79).

- Permanent ARCO and BP employment on the North Slope rises from 1,000 in 1977 to 1,667 in 1983, then remains constant throughout the period (based on information contained in Prudhoe Bay Case Study, OCS Studies Program Technical Report No. 4).

Trans-Alaska Pipeline Service (TAPS). TAPS employment through 1977 included only the exogenous construction employment engaged in the initial construction of the pipeline. After completion of the line in 1977, employment is of two types. First, there is additional construction of four pump stations; and second, there is exogenous transportation sector employment associated with the operation of the line. These employment schedules are given in Table 8.

ALCAN Natural Gas Pipeline. ALCAN pipeline construction is assumed to begin in 1981, with construction of an associated gas conditioning facility located on the North Slope beginning in 1980. Both facilities are assumed to be completed by 1985, when a staff of 400 petroleum and 200 transportation workers takes over operation of the facility, as shown in Table 9.

Lower Cook Inlet OCS Sale CI. For purposes of scenario development, BLM recommended that in its analysis of the second proposed lease sale in Lower Cook Inlet (Sale 60), Dames and Moore should assume that two-thirds of existing Lower Cook Inlet resources are located on tracts

TABLE 8. EMPLOYMENT FORECASTS, TAPS PROJECT

Year	Construction[1]	Transportation[2]
1977	5,300	1,500
1978	0	1,500
1979	90	1,500
1980	90	1,500
1981	90	1,500
1982	90	1,500
1983	0	1,500
1984	0	1,500
1985	0	1,500
1986	0	1,500
1987	0	1,500
1988	0	1,500
1989	0	1,500
1990	0	1,500
1991	0	1,500
1992	0	1,500
1993	0	1,500
1994	0	1,500
1995	0	1,500
1996	0	1,500
1997	0	1,500
1998	0	1,500
1999	0	1,500
2000	0	1,500

[1] 1977 construction estimate by Alaska Department of Labor 1979 to 1982 construction employment based on addition of four pump stations adding capacity of .15 million barrels per day each, from Beaufort OCS Development Scenarios, Dames and Moore, 1978.

[2] Operations employment from Alaska Economic Trends, Alaska Department of Labor, October 1978.

TABLE 9. EMPLOYMENT FORECASTS, ALCAN PROJECT

Year	Construction[1] (Pipeline)	Construction[2] (Plant)	Petroleum	Transportation
1977	0	0	0	0
1978	0	0	0	0
1979	0	0	0	0
1980	0	500	0	0
1981	1,795	1,000	0	0
1982	6,823	1,000	0	0
1983	6,038	1,000	0	0
1984	563	1,000	0	0
1985	0	0	400	200
1986	0	0	400	200
1987	0	0	400	200
1988	0	0	400	200
1989	0	0	400	200
1990	0	0	400	200
1991	0	0	400	200
1992	0	0	400	200
1993	0	0	400	200
1994	0	0	400	200
1995	0	0	400	200
1996	0	0	400	200
1997	0	0	400	200
1998	0	0	400	200
1999	0	0	400	200
2000	0	0	400	200

[1]From Alaska Economic Outlook to 1985, Alaska Department of Labor, July 1978.

[2]From Prudhoe Bay Project: Draft EIS, Federal Energy Regulatory Commission, July 1979.

[3]Same as note 2.

[4]Informal estimate by N.W. Alaska Pipeline Company, August 15, 1979.

leased in Sale CI. Based on this recommendation, 400 mmb of oil and 400 bcf of gas are assumed to be discovered on tracts leased in Sale CI. For their Sale 60 analysis, Dames and Moore have developed a scenario close to these assumptions (400 mmb oil, 363 bcf gas); and it is this scenario which is utilized here. The employment estimates associated with this scenario are shown in Table 10.

Beaufort Sea Federal/State Lease Sale. Development of oil and gas resources in the Beaufort Sea are assumed to follow the development scenario described as the "intermediate case" in the Beaufort Sea Final Environmental Impact Statement. Such a scenario assumes the discovery of 750 million barrels of oil and 1.625 trillion cubic feet of gas, with employment requirements as shown in Table 11.

Northern Gulf of Alaska OCS Sale 55. A second sale of federal OCS oil and gas leases in the Northern Gulf of Alaska has been proposed for late 1980. The mean development scenario is taken from employment estimates supplied by the BLM-Alaska OCS Office for use in the simulations done for the Draft Environmental Impact Statement for Sale 55 and is shown in Table 12.

Western Gulf of Alaska OCS Sale 46. In preparing the Draft Environmental Impact Statement for the proposed federal OCS lease sale near Kodiak in 1980, the BLM-Alaska OCS Office has developed a moderate development scenario assuming the discovery of 176 million barrels of oil and 5,350 billion cubic feet of gas in the Western Gulf of Alaska. The

TABLE 10. LOWER COOK OCS SALE CI EMPLOYMENT FORECASTS

Year	Construction[1]	Petroleum[2]	Transportation[3]	Headquarters
1978	0	196	62	21
1979	0	160	103	37
1980	0	169	103	32
1981	0	166	108	37
1982	136	132	87	24
1983	72	61	128	24
1984	309	226	182	37
1985	351	898	251	77
1986	57	1,224	196	134
1987	0	1,239	144	153
1988	0	1,103	165	141
1989	0	963	165	135
1990	0	923	165	133
1991	0	936	165	133
1992	0	974	165	133
1993	0	974	165	133
1994	0	913	151	133
1995	0	860	137	133
1996	0	825	135	133
1997	0	825	135	133
1998	0	825	135	133
1999	0	825	135	133
2000	0	825	135	133

[1]Based on "High-Find Scenario" in Lower Cook Inlet and Shelikof Strait OCS Lease Sale No. 60 Petroleum Development Scenarios, Draft Report, Dames and Moore, March, 1979.

[2]Includes drilling, operations, some support, and headquarters personnel.

[3]Includes boat and helicopter support personnel.

TABLE 11. BEAUFORT SEA EMPLOYMENT FORECASTS[1]

Year	Construction	Petroleum
1977	0	0
1978	0	0
1979	0	0
1980	0	0
1981	62	66
1982	188	197
1983	135	197
1984	211	230
1985	150	66
1986	305	112
1987	383	276
1988	466	479
1989	466	616
1990	155	595
1991	155	524
1992	77	503
1993	155	432
1994	155	435
1995	77	438
1996	22	440
1997	0	417
1998	0	393
1999	0	394
2000	0	394

[1]From Beaufort Sea, Final Environmental Impact Statement.

TABLE 12. NORTHERN GULF OF ALASKA OCS SALE 55[1]
EMPLOYMENT FORECASTS

Year	Construction	Petroleum	Transportation
1981	0	45	17
1982	0	90	35
1983	0	90	35
1984	38	83	26
1985	12	38	9
1986	93	0	0
1987	98	90	86
1988	37	179	86
1989	0	340	100
1990	0	333	107
1991	0	343	107
1992	0	292	42
1993	0	305	42
1994	0	307	42
1995	0	310	42
1996	0	310	42
1997	0	310	42
1998	0	310	42
1999	0	310	42
2000	0	310	42

[1]From BLM-Alaska OCS Office.

direct employment requirements for such a development program are shown in Table 13.

Lower Cook Inlet OCS Sale 60. Dames and Moore have developed scenarios for use in the OCS Studies Program to describe a moderate level of development in which 198 million barrels of oil are found in Lower Cook Inlet and 500 million barrels of oil are found in Shelifkof Strait. The employment required for such a development program is shown in Table 14.

Alpetco. On June 18, 1978, Alaska Petrochemical Company entered into a contract with the State of Alaska to purchase a portion of the state's royalty oil for use in a proposed 150,000 barrel a day petrochemical facility near Valdez. According to the terms of the contract, construction is to begin by the end of 1981. Since the contract has been in effect, several changes have been made in the initial proposal, which has been modified to a configuration primarily intended for refinery rather than petrochemical operations (Progress Report from Alpetco to Commissioner Robert LeResche, March 15, 1979). Once completed in 1983, current plans call for the employment of a permanent work force of 518, as shown in Table 15.

Pacific Alaska LNG. Pacific Alaska LNG Associates, a partnership consisting of Pacific Lighting Company and Pacific Gas and Electric Company, has proposed an LNG facility on the Kenai Peninsula to liquify gas from the Cook Inlet for shipment to Southern California markets. Construction is currently scheduled to begin in 1980, with the plant in operation by 1984. Direct employment requirements are as shown in Table 16.

TABLE 13. WESTERN GULF OF ALASKA OCS SALE 46[1]
EMPLOYMENT FORECASTS

Year	Construction	Petroleum	Transportation
1981	0	42	8
1982	0	97	59
1983	310	124	224
1984	13	110	128
1985	231	98	62
1986	254	57	46
1987	52	233	173
1988	6	304	217
1989	6	407	261
1990	0	113	192
1991	0	103	192
1992	0	89	192
1993	0	89	192
1994	0	89	192
1995	0	89	192
1996	0	89	192
1997	0	89	192
1998	0	89	192
1999	0	89	192
2000	0	89	192

[1]Scenarios provided by BLM-Alaska OCS Office.

TABLE 14. LOWER COOK INLET OCS SALE 60[1]
EMPLOYMENT FORECASTS

Year	Construction	Petroleum	Transportation
1981	0	0	0
1982	0	120	62
1983	0	151	82
1984	0	164	82
1985	104	83	43
1986	33	16	0
1987	92	95	128
1988	166	228	74
1989	0	455	19
1990	0	502	55
1991	0	504	55
1992	0	351	55
1993	0	330	55
1994	0	406	55
1995	0	406	55
1996	0	406	55
1997	0	406	55
1998	0	406	55
1999	0	406	55
2000	0	406	55

[1]Based on "medium-find scenario" in Lower Cook Inlet and Shelikof Strait OCS Lease Sale No. 60 Petroleum Development Scenarios, Draft Report, Dames and Moore, March 1979.

TABLE 15. ALPETCO PROJECT EMPLOYMENT FORECAST

Year	Construction[1]	Manufacturing[2]
1979	0	0
1980	900	0
1981	900	0
1982	900	0
1983	0	518
1984	0	518
1985	0	518
1986	0	518
1987	0	518
1988	0	518
1989	0	518
1990	0	518
1991	0	518
1992	0	518
1993	0	518
1994	0	518
1995	0	518
1996	0	518
1997	0	518
1998	0	518
1999	0	518
2000	0	518

[1]Construction employment estimates are not currently available for the new Alpetco proposal. However, the new configuration resembles a proposed facility found in Alaska Petrofining Corp Proposal for Utilization of Alaskan State Royalty Oil, Vol. I, from which the construction estimates are taken.

[2]Operations employment estimated by Alpetco in personal communication dated 9/17/79.

TABLE 16. PACIFIC ALASKA LNG PROJECT
EMPLOYMENT FORECASTS

Year	Construction[1]	Manufacturing[2]	Transportation[3]
1980	146	0	0
1981	844	0	0
1982	1,323	0	0
1983	420	0	0
1984	0	60	40
1985	0	60	40
1986	0	60	40
1987	0	60	40
1988	0	60	40
1989	0	60	40
1990	0	60	40
1991	0	60	40
1992	0	60	40
1993	0	60	40
1994	0	60	40
1995	0	60	40
1996	0	60	40
1997	0	60	40
1998	0	60	40
1999	0	60	40
2000	0	60	40

[1]Construction employment estimates based on letter to Alaska Department of Natural Resources from Southern California Gas, dated 3/17/78.

[2]Plant operation employment from Western LNG Project: Final EIS, Federal Energy Regulatory Commission, October 1978.

[3]Pipeline operation employment, also from Western LNG Project: Final EIS, Federal Energy Regulatory Commission, 10/78.

Susitna Hydoelectric. A major hydroelectric project has been proposed by the Corps of Engineers for the Susitna Valley, consisting of two dams (Watana and Devil's Canyon) construction of which is expected to begin in 1984. Table 17 presents construction and operations employment for the project.

Bradley Lake Hydroelectric. The Corps of Engineers plans soon to begin the award of contracts for engineering and environmental studies for a $156 million dollar hydroelectric installation near Homer. Table 18 presents employment requirements for the project.

PETROLEUM REVENUE ASSUMPTIONS

Petroleum revenues to the state consist of royalties, production taxes, property taxes, the corporate income tax, and miscellaneous revenues.

Royalties and Production Taxes

Royalties and production taxes arise from three sources--those associated with production of oil and gas from Upper Cook Inlet, those associated with existing and planned production at Prudhoe Bay and vicinity, and the revenues expected from state-owned properties in the Beaufort Sea. Royalties are calculated as 12.5 percent of wellhead value (net of field costs for oil), while production taxes are levied as a fraction of non-royalty value, with the rate dependent upon the productivity of the average well in the field.

TABLE 17. SUSITNA HYDROELECTRIC PROJECT
EMPLOYMENT FORECAST

Year	Construction[1]	Operation[2]
1984	164	0
1985	574	0
1986	616	0
1987	854	0
1988	1,176	0
1989	1,162	0
1990	1,344	0
1991	1,400	19
1992	1,414	19
1993	1,400	19
1994	812	19
1995	742	19
1996	784	19
1997	854	19
1998	700	19
1999	0	38
2000	0	38

[1]Average annual employment is 1,000 over 14-year period (Alaska Annual Planning Information, FY 1980, Alaska Department of Labor). Distribution of employment over time based on estimates by U.S. Corps of Engineers in Supplemental Feasibility Report: Susitna Hydroelectric Project, March 1979.

[2]Operations employment from Upper Susitna River Project Power Market Analysis, U.S. Department of Energy, Alaska Power Administration, March 1979.

TABLE 18. BRADLEY LAKE HYDROELECTRIC PROJECT EMPLOYMENT FORECAST

Year	Construction[1]	Operation[2]
1981	60	0
1982	190	0
1983	300	0
1984	160	0
1985	60	0
1986	0	10
1987	0	10
1988	0	10
1989	0	10
1990	0	10
1991	0	10
1992	0	10
1993	0	10
1994	0	10
1995	0	10
1996	0	10
1997	0	10
1998	0	10
1999	0	10
2000	0	10

[1]Memo to Mike Scott, ISER, from Alaska Power Administration, dated 4/6/78.

[2]Author's estimate based on installation capacity.

Upper Cook Inlet. Because assumptions as to future development around Upper Cook Inlet do not vary in any of the cases to be examined and because such revenues are small relative to other sources, revenue estimates for Upper Cook Inlet are taken directly from Alaska Department of Revenue forecasts, as shown in Tables 19 and 20.

Prudhoe Bay Revenues. Because of its size and its relevance to other assumptions made in both the base case and possibly the OCS scenarios, Prudhoe Bay revenues are estimated directly rather than taken from Alaska Department of Revenue computations. To arrive at such estimates, estimates of production and wellhead value are needed. Production estimates are those derived by simulations of reservoir behavior by the Alaska Division of Oil and Gas Conservation for the Department of Revenue. Wellhead value of oil is derived explicitly from the following assumptions:

- West coast market price is $21.50 per barrel in FY 1980. Real market price is assumed to remain constant throughout the forecast period.
- Tanker costs from Valdez to the West Coast are $1/bbl in FY 1980. These costs remain constant in real terms through 2000.
- Field processing and gathering costs are 75¢/bbl in FY 1980, also remaining constant in real terms through 2000.
- TAPS pipeline tariff is assumed to be $5.25 in FY 1980. The nominal tariff is assumed to remain constant through 1990 when increased operating costs are assumed to dominate decreasing capital costs. After 1990, the tariff remains constant in real terms.

TABLE 19. STATE PRODUCTION TAX REVENUES

(Millions of Current Dollars)

Year	Upper Cook Inlet[1]		Prudhoe Bay[2]		Beaufort Sea[2]		Total
	Oil	Gas	Oil	Gas	Oil	Gas	
1979	14.8	9.7	149.3	0	0	0	173.8
1980	13.2	10.2	399.4	0	0	0	422.8
1981	11.5	10.7	997.9	0	0	0	1,020.1
1982	10.2	15.9	1,164.7	0	0	0	1,190.8
1983	8.9	20.9	1,292.6	0	0	0	1,322.4
1984	7.5	31.8	1,417.1	0	0	0	1,456.5
1985	6.3	32.5	1,549.5	98.5	0	0	1,686.8
1986	5.3	33.7	1,695.3	113.2	0	0	1,847.6
1987	4.3	34.4	1,846.8	121.8	0	0	2,007.3
1988	3.4	34.1	2,009.7	131.0	0	0	2,178.2
1989	2.5	34.8	2,184.9	140.9	29.3	1.0	2,393.4
1990	1.7	36.0	2,135.8	151.5	77.9	2.9	2,405.8
1991	.9	36.7	2,196.4	163.0	113.1	4.3	2,514.3
1992	.1	37.8	2,101.0	175.3	123.9	4.6	2,442.7
1993	0	36.3	1,763.0	188.6	133.2	5.0	2,126.1
1994	0	37.5	1,563.4	202.8	143.3	5.3	1,952.4
1995	0	38.2	1,823.9	218.2	151.3	5.7	1,837.2
1996	0	38.2	1,320.3	234.7	159.8	6.0	1,758.8
1997	0	38.2	1,183.4	252.4	168.6	6.3	1,648.8
1998	0	38.2	1,018.3	271.5	167.4	6.3	1,501.6
1999	0	38.2	821.4	292.0	161.3	6.0	1,318.9
2000	0	38.2	589.0	314.1	153.3	5.8	1,100.4

[1]From Alaska Department of Revenue, Petroleum Production Revenue Forecast, September 1979.

[2]1979-81 from Alaska Department of Revenue, op. cit.; thereafter, calculated as explained in text.

TABLE 20. STATE ROYALTY REVENUES

(Millions of Current Dollars)

Year	Upper Cook Inlet[1]		Prudhoe Bay[2]		Beaufort Sea[2]		Total
	Oil	Gas	Oil	Gas	Oil	Gas	
1979	32.2	5.6	295.2	0	0	0	333.0
1980	30.1	6.2	773.9	0	0	0	810.2
1981	27.7	6.7	1,132.2	0	0	0	1,166.5
1982	25.3	10.7	1,322.7	0	0	0	1,358.7
1983	23.2	16.5	1,469.1	0	0	0	1,508.8
1984	21.2	26.2	1,612.0	0	0	0	1,659.4
1985	19.5	27.4	1,763.7	138.5	0	0	1,949.0
1986	17.9	28.3	1,931.0	159.1	0	0	2,136.4
1987	16.4	29.1	2,104.7	171.2	0	0	2,321.4
1988	15.1	30.1	2,291.6	184.1	0	0	2,520.9
1989	13.9	30.9	2,492.5	198.0	32.3	1.2	2,768.9
1990	12.9	32.0	2,659.1	213.0	93.6	3.5	3,014.1
1991	11.9	32.8	2,734.6	229.1	135.9	5.1	3,149.4
1992	11.0	33.8	2,615.8	246.4	148.9	5.5	3,061.4
1993	10.2	34.6	2,195.0	265.1	160.1	5.9	2,670.8
1994	9.2	35.6	1,946.5	285.1	172.3	6.3	2,455.0
1995	8.3	36.4	1,772.7	306.6	181.9	6.8	2,312.8
1996	8.3	36.4	1,643.7	329.8	192.0	7.2	2,217.5
1997	8.3	36.4	1,473.3	354.8	202.7	7.5	2,083.0
1998	8.3	36.4	1,267.8	381.6	201.2	7.5	1,902.8
1999	8.3	36.4	1,022.7	410.4	193.9	7.1	1,678.9
2000	8.3	36.4	733.4	441.5	184.3	7.0	1,410.8

[1]From Alaska Department of Revenue, Petroleum Production Revenue Forecast, September 1979.

[2]1979-81 from Alaska Department of Revenue, op. cit.; thereafter, calculated as explained in text.

Wellhead value of gas is derived by the following assumptions:

- Under the interim rules of the Natural Gas Policy Act of 1978, the ceiling price of Prudhoe gas as of December 1, 1978, is $1.63 per MMBTU, or $1.78 per MCF. Since recent sales by Exxon (OGJ, 4/2/79) reflect this ceiling, the ceiling price, kept constant in real terms, is assumed throughout the period.

- Prudhoe Bay gas must be treated in a conditioning plant, at a cost of 80¢/MCF which, according to recent rulings by FERC, will be deducted from the ceiling price received by producers for the gas. This cost remains constant in real terms.

Production taxes are computed as follows. The production tax is a fraction of nonroyalty value, with the fraction dependent on the productivity of the average well in the field. The tax rate on oil is assumed to equal 12 percent through 1989, after which the rate falls to 11 percent. For gas, the 12 percent rate is assumed throughout the period. Production tax estimates are shown in Table 19.

Royalties for oil are computed as 12.5 percent of the value of production net of field costs; while for gas, royalties are 12.5 percent of wellhead value received by the producer. Royalty estimates are shown in Table 19.

Beaufort Sea Revenues. Beaufort Sea revenues are calculated as in the Prudhoe case, with one exception--namely that an additional 60¢ per barrel for oil and 15¢ per MCF for gas are subtracted from wellhead value, representing additional transport costs from offshore areas.

Furthermore, it is assumed that only 50 percent of such production falls under state ownership. Royalty and production tax estimates are shown in Tables 19 and 20.

Property Tax Revenues. The state levies a 20 mill property tax on certain categories of oil and gas property within the state such as seismic equipment, drilling rigs, wells, platforms, pipelines, pump stations, and terminal facilities. Estimates of these revenues are shown by development in Table 21.

Corporate Income Tax Revenues. In 1978, the state passed new legislation levying a 9.4 percent tax on net income from oil and gas production and transportation in the state. While no detailed modeling of this tax has yet been done by the Department of Revenue, currently available estimates through FY 1981 project such revenues to be about 10 percent of the level of estimated production taxes and royalties. It is assumed that this relationship continues to hold throughout the forecast period.

STATE FISCAL POLICY ASSUMPTIONS

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

TABLE 21. STATE PETROLEUM PROPERTY TAX REVENUES

(Millions of Current Dollars)

Year	TAPS	ALCAN	Lower Cook Inlet OCS I	Beaufort Sea	Northern Gulf OCS	Kodiak OCS	Lower Cook Inlet OCS II	Total
1979	161.0	0	0	0	0	0	0	161.0
1980	175.0	0	0	0	0	0	0	175.0
1981	177.3	0	0	.3	0	.4	0	178.0
1982	199.3	0	0	.4	0	.7	0	200.4
1983	204.6	0	0	.7	0	.8	0	206.1
1984	209.6	0	19.7	.7	0	.8	0	230.8
1985	214.2	133.2	19.7	.8	0	.8	0	368.6
1986	218.3	137.5	19.6	3.0	0.1	.8	0	379.3
1987	221.7	141.7	19.4	6.2	2.0	.7	0	391.7
1988	224.4	145.8	19.2	11.0	2.4	.7	0	403.6
1989	226.3	149.7	18.9	16.2	7.8	.7	9.8	429.4
1990	227.2	153.4	18.6	18.5	7.8	.7	9.7	435.9
1991	226.9	156.7	18.1	20.7	7.8	.6	9.7	440.5
1992	225.3	159.7	17.5	22.1	7.8	.6	9.6	442.6
1993	221.1	162.2	16.8	24.2	7.8	.6	9.4	443.2
1994	217.2	164.2	15.9	26.4	7.7	.4	9.2	441.0
1995	210.3	165.6	14.9	27.6	7.7	.4	9.0	435.5
1996	201.0	166.2	14.0	28.0	7.5	.4	8.7	425.9
1997	189.2	166.0	13.0	28.0	7.4	.4	8.3	412.3
1998	174.4	164.9	12.0	27.8	7.2	.2	7.9	394.4
1999	156.4	162.5	11.0	27.5	7.0	.2	7.4	372.0
2000	134.5	158.9	10.0	27.1	6.7	.1	6.8	344.2

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. As shown in Figure 33, nominal expenditures have grown at an average annual rate of 15.2 percent over the 1964-77 period; while real per capita expenditures have grown at about 5.7 percent annually.

Secondly, historical data gives at least some indication of state fiscal policy response to surplus petroleum revenues. As shown in Figure 33, 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. Furthermore, the response appears to be one of strictly increasing expenditure levels, rather than one of using the surplus to reduce other taxes, as seen in Figure 34. After the sale, built-in progressivity in the existing tax structure actually increases nonpetroleum real per capita revenues.

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

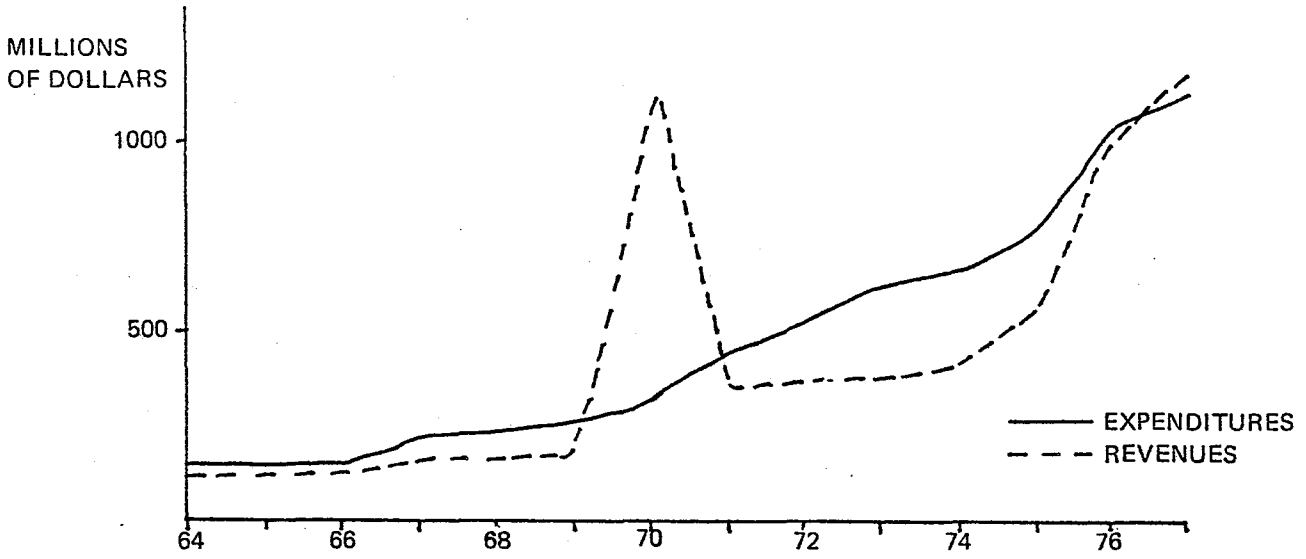


Figure 33. Nominal State Expenditures and Revenues

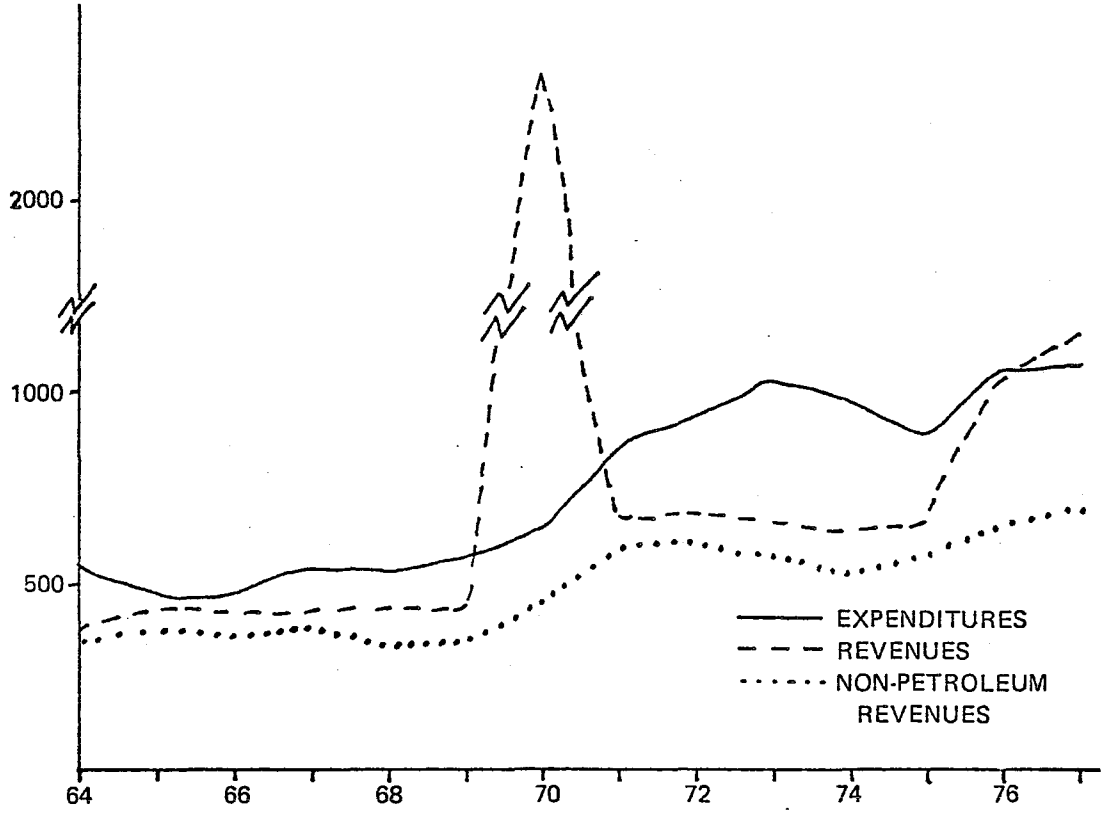


Figure 34. Real Per Capita State Expenditures and Revenues

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.

Having estimated revenues as described above, several forecasts were made, spanning the range of feasible policies. A rate of growth of expenditures was then selected to fall approximately mid-way between the extremes. A 10 percent growth rate in nominal state expenditures would be approximately the minimum rate which would prevent real per capita expenditures from falling. A 16 percent rate would represent close to the maximum allowable spending limit from petroleum revenues. A 13 percent rate was selected as a middle-range policy which both appears sustainable throughout the period and permits about 3 percent growth in real per capita expenditures annually within the range observed historically. Under such a policy, the state will accumulate 25 billion dollars by the mid-1990s but will be drawing down this balance rapidly by the end of the period as declining resource revenues are overtaken by rising state expenditures.

Base Case Forecasts

Using the assumptions comprising the above scenario as input, a set of forecasts through the year 2000 was developed using the MAP statewide and regional econometric models. This section presents these base case forecasts which will be used in Technical Memorandum BN-7 as a benchmark from which to measure the impacts of proposed federal OCS developments in the Bering Sea/Norton Sound area.

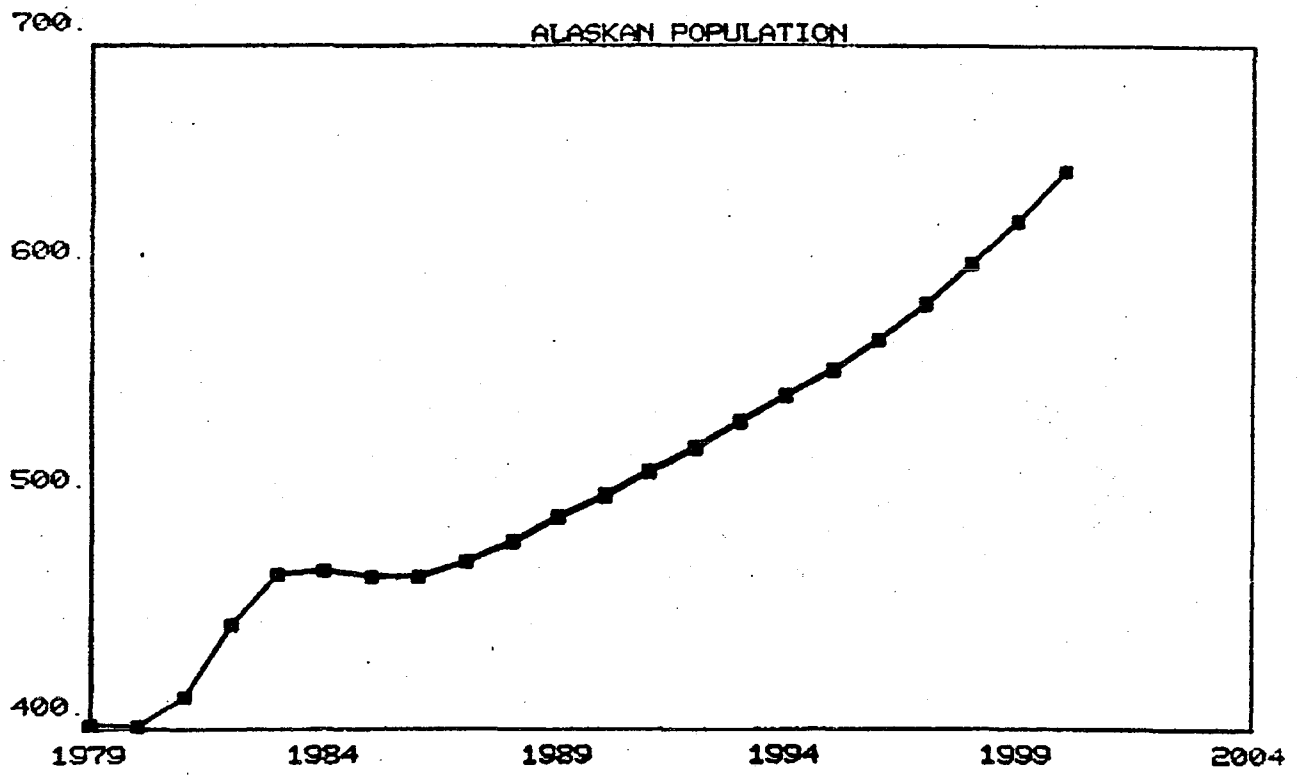
STATEWIDE

Population

Figure 35 presents the forecast of statewide population growth under the assumptions described in the above scenario. The post-Prudhoe decline ends in 1980 as a new "boom" period gets underway in preparation for the gas pipeline construction from Prudhoe. This new boom peaks in 1984, with state population reaching over 470,000, over 17 percent higher than its 1980 level. The post-construction decline, however, like the decline following the TAPS construction effort, causes little decline in statewide population. As shown in Figure 36, net out-migration occurs through 1988 but is overtaken by natural increase by 1986, causing a resumption in state population growth spurred by a variety of employment expansions in mining, construction, and state and local government. By the year 2000, statewide population reaches 623,151, a level 55 percent higher than in 1980, representing an average annual growth of about 2.2 percent. As shown in Figure 37, continued turnover of the population keeps the age structure virtually unchanged throughout the forecast period.

FIGURE 35. ALASKAN POPULATION FORECAST, 1979-2000
BASE CASE

(thousands of persons)

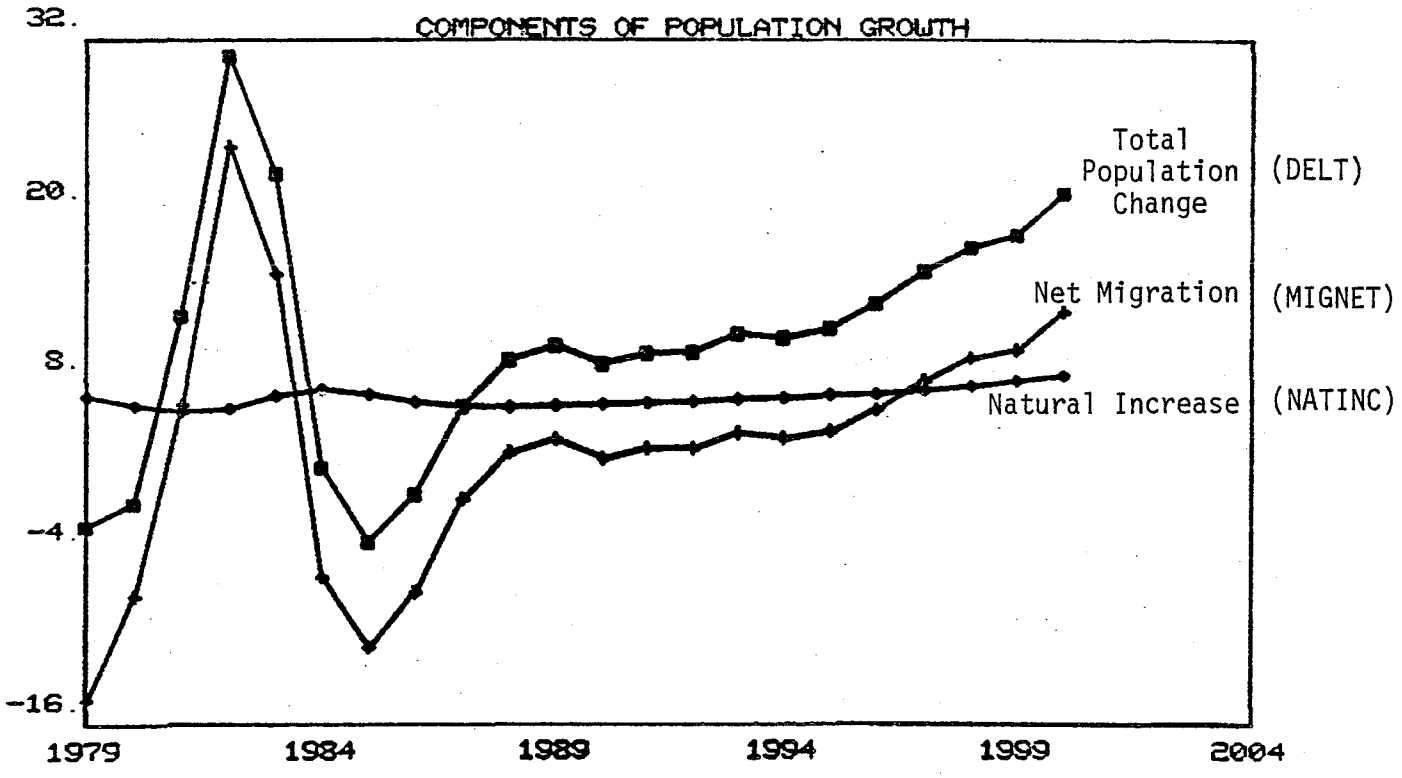


	POPTST
1979	402.374
1980	401.928
1981	414.601
1982	445.52
1983	468.325
1984	470.451
1985	467.301
1986	467.498
1987	473.881
1988	483.469
1989	494.023
1990	503.309
1991	513.399
1992	523.574
1993	534.978
1994	546.142
1995	557.921
1996	571.402
1997	587.159
1998	604.698
1999	623.151
2000	644.595

SOURCE: MAP Model

FIGURE 36. COMPONENTS OF POPULATION GROWTH, 1979-2000
BASE CASE

(thousands of persons)

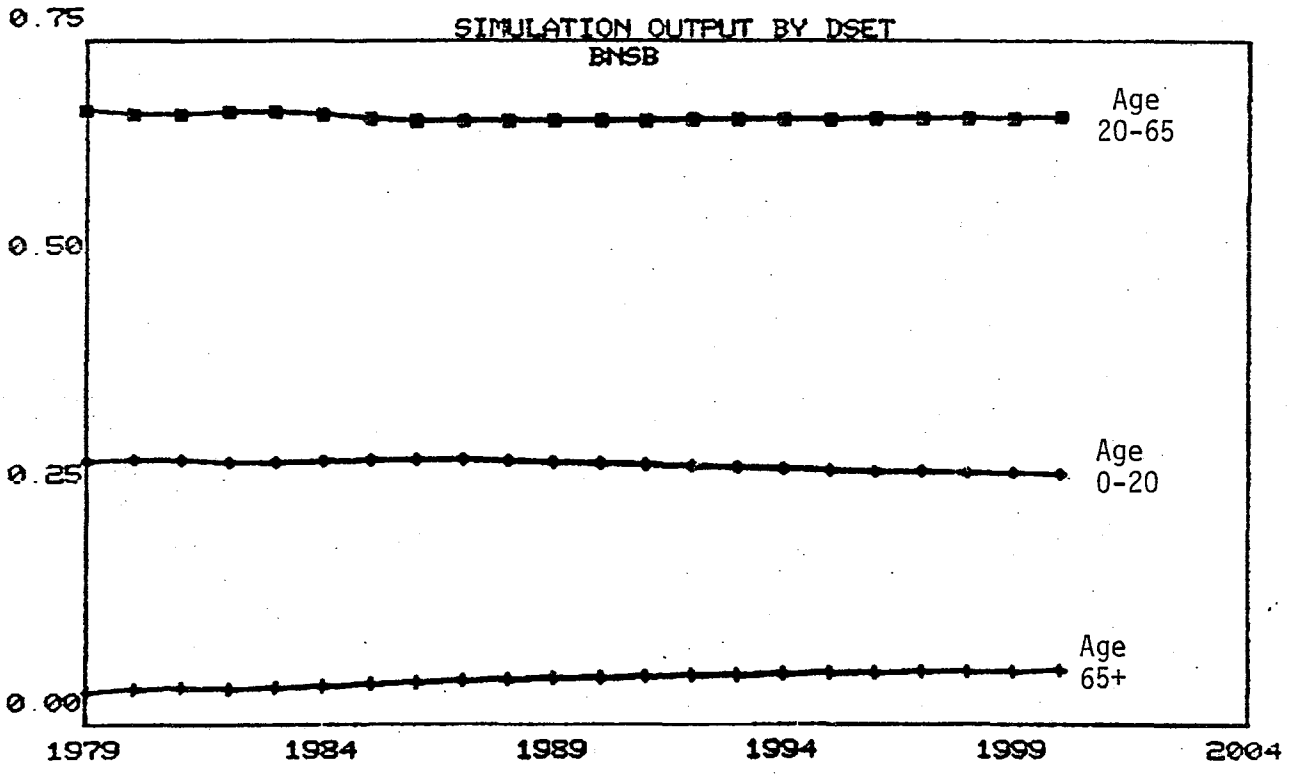


	DELT	MIGNET	NATINC
1979	-2.062	-14.172	7.088
1980	-0.445	-6.869	6.395
1981	12.672	6.62	6.035
1982	30.92	24.697	6.226
1983	22.805	15.708	7.131
1984	2.126	-5.47	7.615
1985	-3.15	-10.408	7.24
1986	0.197	-6.547	6.718
1987	6.383	-0.022	6.386
1988	9.588	3.246	6.334
1989	10.554	4.134	6.416
1990	9.287	2.747	6.537
1991	10.089	3.479	6.605
1992	10.176	3.459	6.712
1993	11.404	4.577	6.821
1994	11.164	4.183	6.977
1995	11.78	4.66	7.115
1996	13.481	6.205	7.272
1997	15.757	8.267	7.488
1998	17.539	9.76	7.779
1999	18.452	10.335	8.12
2000	21.444	12.977	8.47

SOURCE: MAP Model

FIGURE 37. AGE STRUCTURE OF ALASKAN POPULATION, 1979-2000, BASE CASE

(proportion of total population)



	20-65	0-20	65+
1979	0.673	0.289	0.038
1980	0.669	0.29	0.041
1981	0.668	0.29	0.042
1982	0.671	0.288	0.041
1983	0.671	0.288	0.041
1984	0.668	0.289	0.043
1985	0.664	0.29	0.046
1986	0.662	0.291	0.048
1987	0.661	0.29	0.049
1988	0.661	0.289	0.05
1989	0.661	0.287	0.051
1990	0.661	0.286	0.052
1991	0.662	0.285	0.053
1992	0.662	0.283	0.054
1993	0.663	0.282	0.055
1994	0.663	0.281	0.056
1995	0.663	0.28	0.057
1996	0.664	0.278	0.058
1997	0.664	0.277	0.059
1998	0.664	0.276	0.059
1999	0.665	0.276	0.06
2000	0.665	0.275	0.06

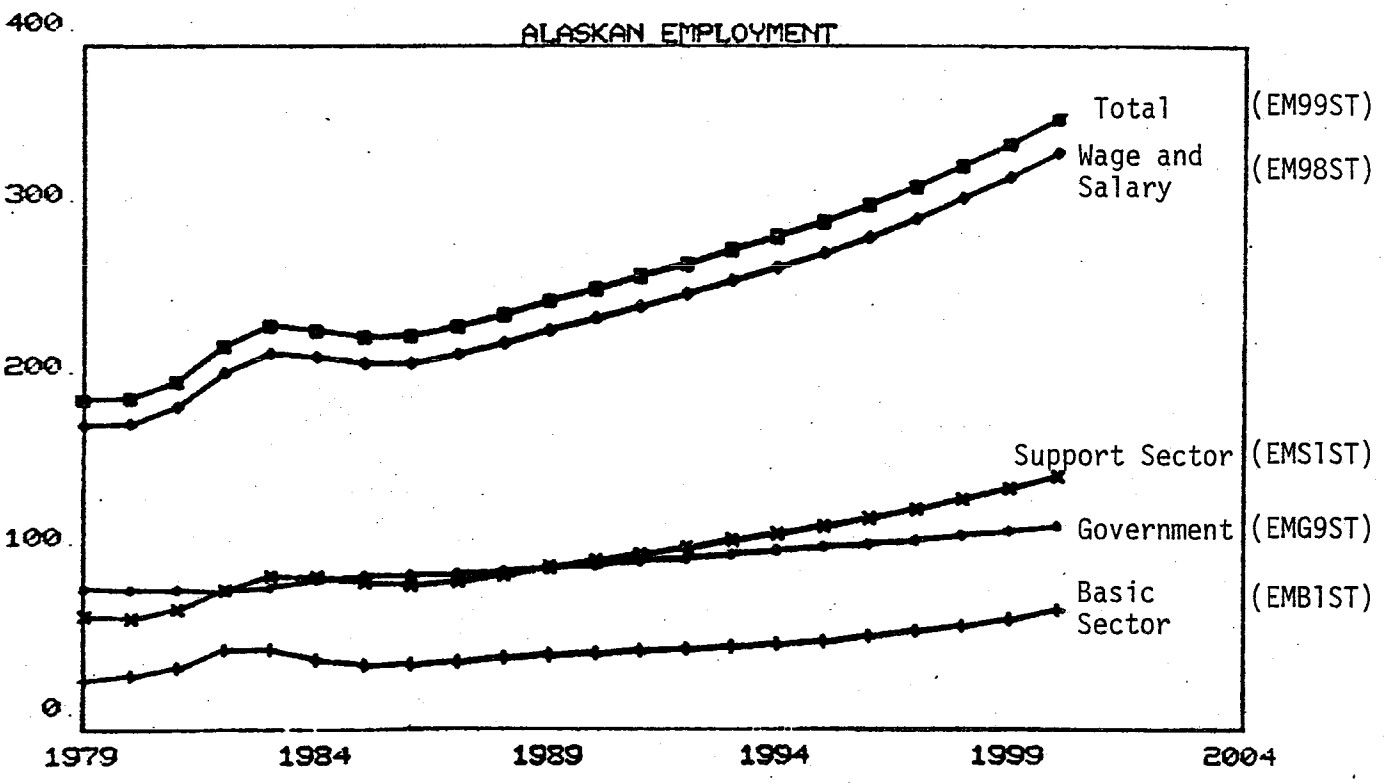
SOURCE: MAP Model

Employment

Alaskan employment, as shown in Figure 38, has begun to recover from the TAPS construction decline by 1980. By 1981, basic sector employment has begun to rise, peaking in 1983 at over 47,000 workers. This rise, due largely to the construction of the gas pipeline, triggers a boom-bust cycle in total employment similar qualitatively to that accompanying the TAPS construction cycle, although of lesser severity. Total employment at the peak of construction in 1983 is 22.5 percent above its 1980 level. The downside of the gasline cycle witnesses a 3 percent drop in total employment from its peak level by 1985, despite a much more significant decline (over 18 percent) in basic sector employment. As in the case of the post-TAPS decline, the resiliency of the economy can be traced to resiliency in the support sectors, which decline less than 5 percent from their peak employment levels by 1985. After the gasline cycle, growth resumes at more or less stable rates resembling historical growth. However, this entails a significant long-run change in the structure of the state economy, as the support sector eventually overtakes government as the primary source of Alaskan employment by the late 1980s. By 2000, total employment reaches nearly 358,000, 84 percent higher than its 1980 level, for an average annual growth of 3.1 percent. The support sector share of employment rises from 36 percent in 1980 to over 44 percent in 2000. This, combined with the growth in basic industries, causes the government share of total employment to fall substantially, from nearly 46 percent in 1980 to 35 percent in 2000, as shown in Figure 39.

FIGURE 38. ALASKAN EMPLOYMENT, 1979-2000
BASE CASE

(thousands of persons)

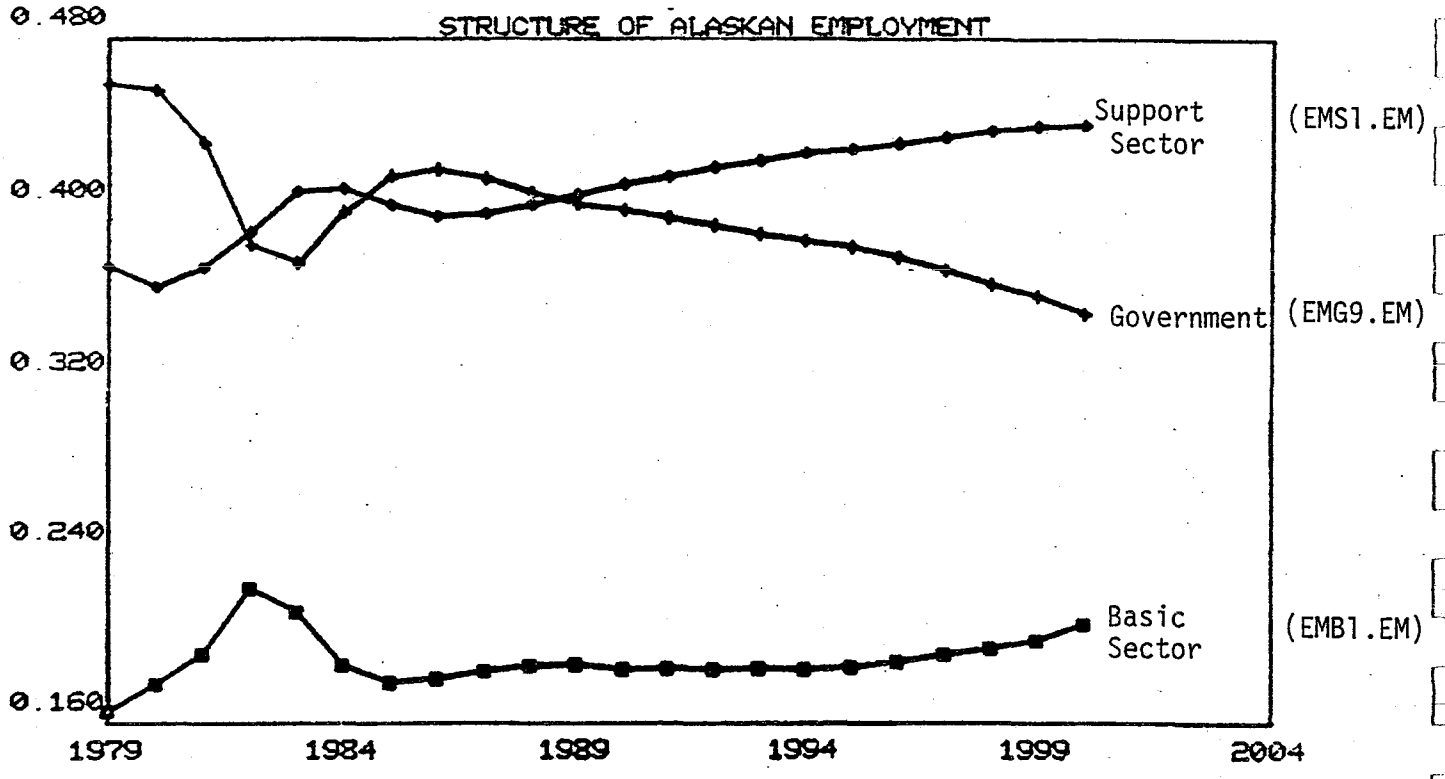


	EM99ST	EM98ST	EMS1ST	EMG9ST	EMB1ST
1979	193.277	178.421	66.773	82.011	29.638
1980	193.983	179.099	65.308	81.765	32.026
1981	203.911	188.645	70.458	81.64	36.547
1982	225.698	209.626	81.928	80.619	47.079
1983	237.653	221.157	90.71	83.223	47.224
1984	234.721	218.328	89.745	87.452	41.131
1985	230.945	214.686	86.534	89.523	38.629
1986	231.19	214.922	85.574	90.314	39.034
1987	236.406	219.953	87.782	91.462	40.708
1988	243.879	227.166	91.588	92.966	42.611
1989	251.781	234.795	95.849	94.819	44.128
1990	258.569	241.354	99.656	96.81	44.888
1991	265.934	248.473	103.538	98.656	46.279
1992	273.249	255.548	107.491	100.577	47.479
1993	281.395	263.43	111.757	102.522	49.15
1994	289.228	271.012	115.876	104.752	50.384
1995	297.541	279.063	119.87	106.933	52.261
1996	307.069	288.295	124.568	109.056	54.672
1997	318.133	299.022	130.08	111.276	57.666
1998	330.293	310.818	136.12	113.672	61.026
1999	342.93	323.084	142.093	116.393	64.599
2000	357.688	337.417	148.513	118.952	69.951

SOURCE: MAP Model

FIGURE 39. COMPOSITION OF ALASKAN EMPLOYMENT, 1979-2000
BASE CASE

(proportion of total employment)



	EMS1.EM	EMG9.EM	EMB1.EM
1979	0.374	0.46	0.166
1980	0.365	0.457	0.179
1981	0.373	0.433	0.194
1982	0.391	0.385	0.225
1983	0.41	0.376	0.214
1984	0.411	0.401	0.188
1985	0.403	0.417	0.18
1986	0.398	0.42	0.182
1987	0.399	0.416	0.185
1988	0.403	0.409	0.188
1989	0.408	0.404	0.188
1990	0.413	0.401	0.186
1991	0.417	0.397	0.186
1992	0.421	0.394	0.186
1993	0.424	0.389	0.187
1994	0.428	0.387	0.186
1995	0.43	0.383	0.187
1996	0.432	0.378	0.19
1997	0.435	0.372	0.193
1998	0.438	0.366	0.196
1999	0.44	0.36	0.2
2000	0.44	0.353	0.207

SOURCE: MAP Model

Personal Income and Prices

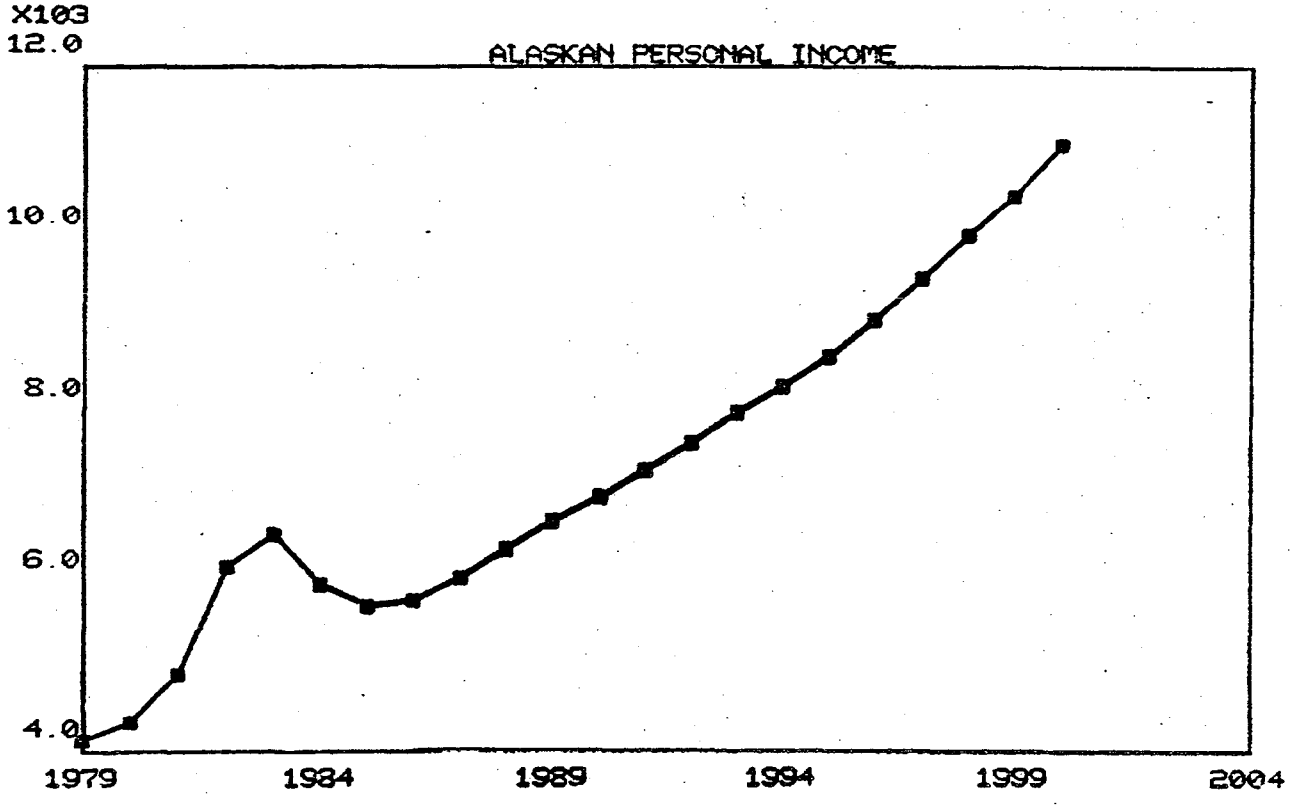
Figures 40 and 41 present the growth of Alaskan personal income over the forecast period. As shown in Figures 40 and 41, the post-TAPS decline in real personal income as well as real per capita personal income has ended by 1979, as the gas pipeline boom sends incomes rapidly to a new peak in 1983. By the peak, real income is over 50 percent higher than its 1980 level, and real per capita income is over 29 percent higher than its 1980 level. Real income drops nearly 13 percent; and real per capita income, by nearly the same amount by 1985, following the decline of gas pipeline construction activity. After 1985, a period of steady income growth brings real personal income to over 10.5 billion dollars in 2000, over 141 percent higher than its 1980 level, for an average annual growth of 4.5 percent. Real per capita income, on the other hand, grows by about 56 percent by the end of the period, reflecting an average annual rate of growth of 2.2 percent.

Despite the structural changes in employment that reduce the government share of employment, as shown in Figure 42, government continues to be the major source of income throughout the period, due to sustained higher growth in state and local wage rates than in support or basic sector wage rates, as shown in Figure 43.

The tendency toward equalization of Alaskan and U.S. prices continues throughout the forecast period. As shown in Figure 44, the rate of Alaskan inflation remains lower than the U.S. rate in all but three years--at the peak of gas pipeline construction and in the initial stages of recovery from the gas pipeline construction decline.

FIGURE 40. ALASKAN PERSONAL INCOME, 1979-2000
BASE CASE

(millions of 1979 dollars)

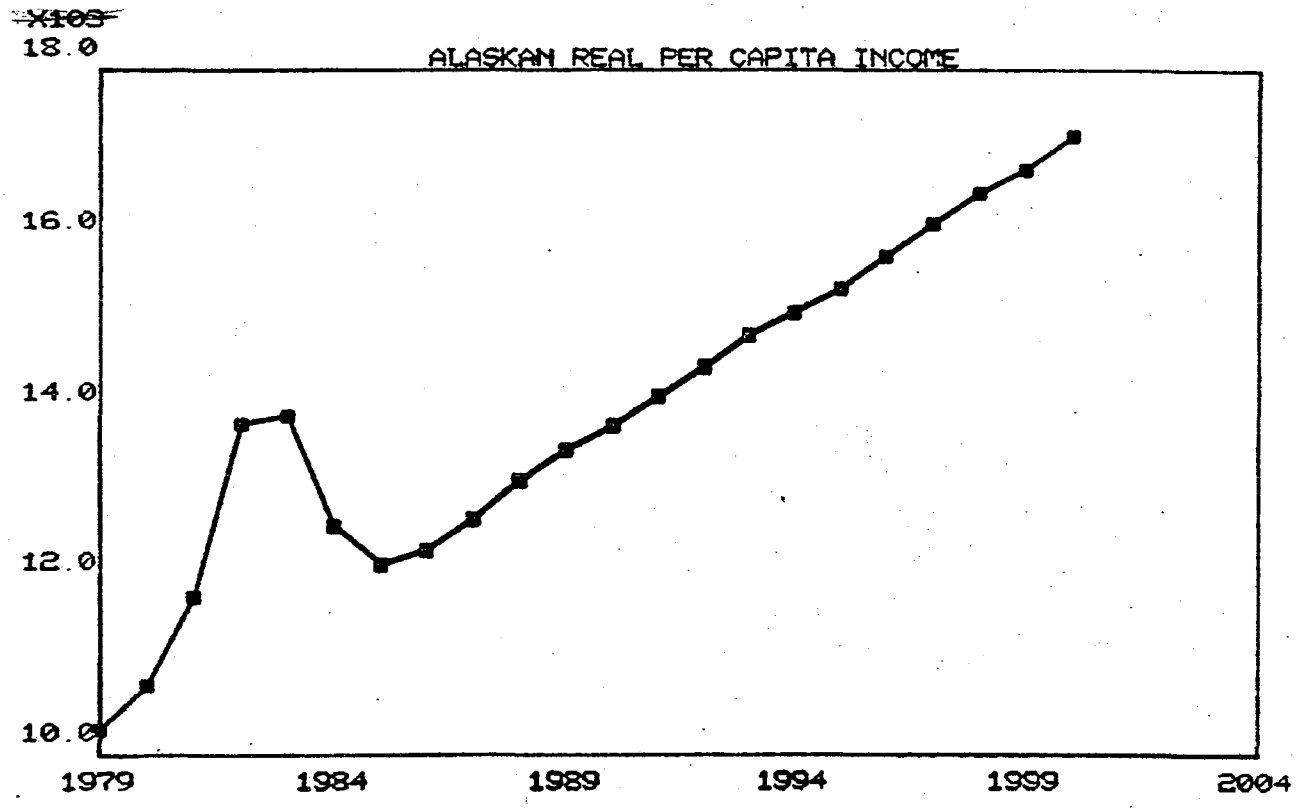


	PIRST
1979	4147.05
1980	4353.43
1981	4923.46
1982	6195.7
1983	6550.92
1984	5972.05
1985	5719.02
1986	5794.35
1987	6050.2
1988	6388.87
1989	6709.1
1990	6982.95
1991	7300.54
1992	7619.03
1993	7976.68
1994	8284.05
1995	8630.45
1996	9047.86
1997	9529.4
1998	10036.9
1999	10513.5
2000	11114.4

SOURCE: MAP Model

FIGURE 41. ALASKAN REAL PER CAPITA INCOME, 1979-2000, BASE CASE

(thousands of 1979 dollars)

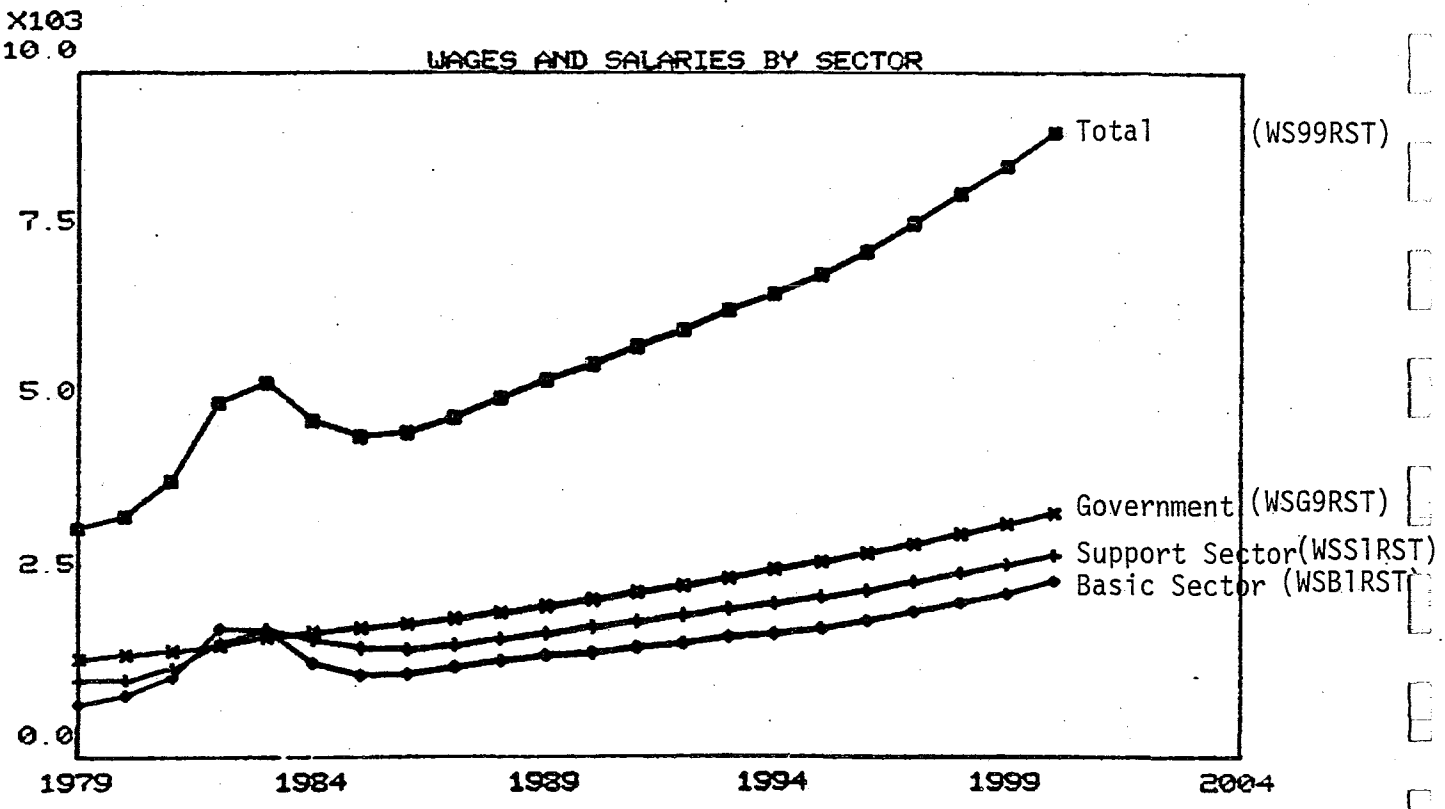


	PIRPCST
1979	10306.5
1980	10831.4
1981	11875.2
1982	13906.6
1983	13988.
1984	12694.3
1985	12238.4
1986	12394.4
1987	12767.3
1988	13214.7
1989	13580.5
1990	13874.1
1991	14220.
1992	14552.
1993	14910.3
1994	15168.3
1995	15468.9
1996	15834.5
1997	16229.7
1998	16598.1
1999	16871.6
2000	17242.4

SOURCE: MAP Model

FIGURE 42. ALASKAN WAGES AND SALARIES, 1979-2000
BASE CASE

(millions of 1979 dollars)

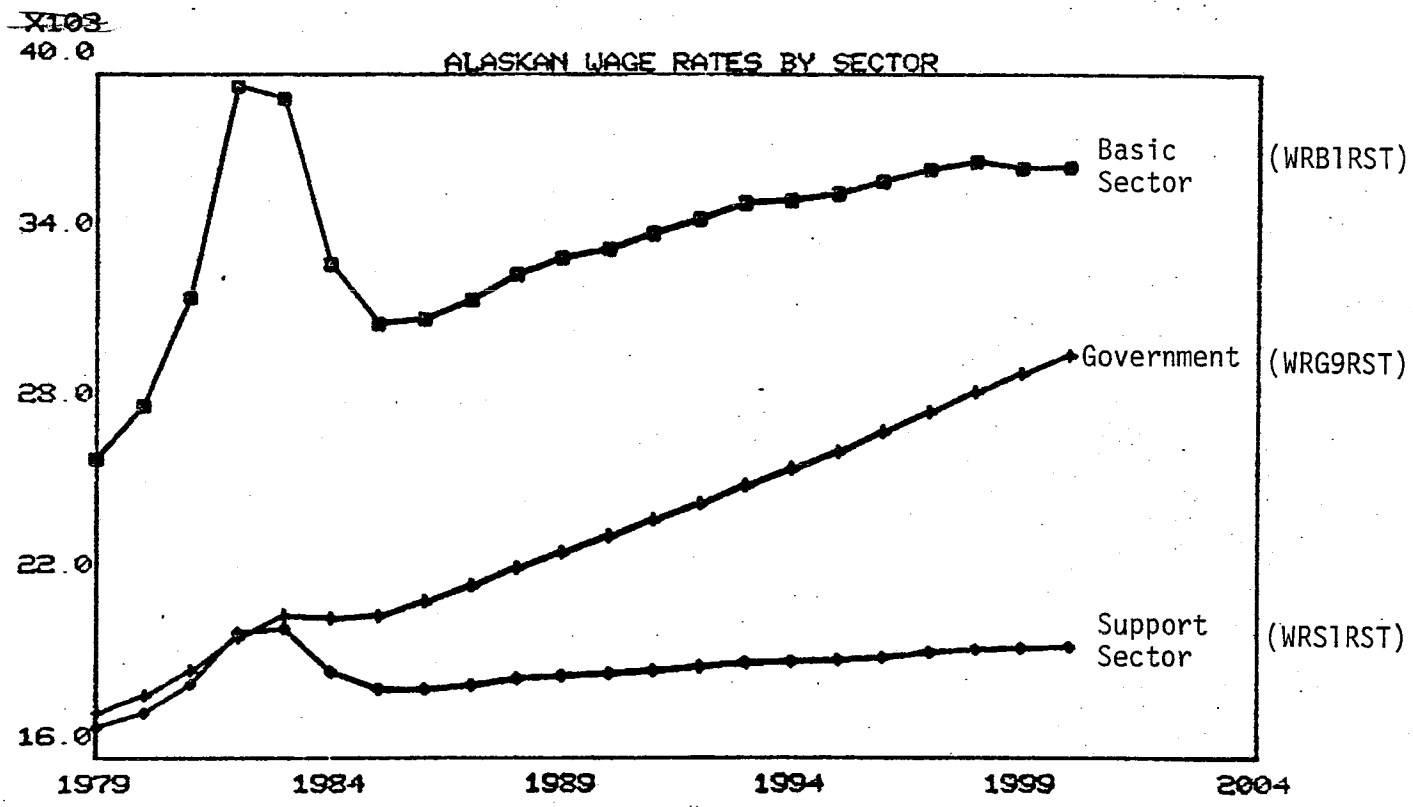


	WS99RST	WSG9RST	WSS1RST	WSB1RST
1979	3386.03	1450.57	1146.28	789.183
1980	3559.88	1496.35	1153.51	910.011
1981	4056.28	1562.85	1316.13	1177.3
1982	5177.59	1636.8	1674.78	1866.01
1983	5463.94	1747.76	1865.98	1850.21
1984	4915.4	1829.42	1712.86	1373.13
1985	4686.4	1881.48	1596.95	1207.98
1986	4749.66	1942.7	1580.71	1226.26
1987	4960.82	2019.42	1634.56	1306.85
1988	5240.43	2109.08	1724.03	1407.33
1989	5503.79	2206.43	1814.7	1482.65
1990	5724.84	2306.82	1894.29	1523.73
1991	5986.03	2409.66	1980.75	1595.62
1992	6246.84	2518.17	2069.02	1659.66
1993	6542.17	2631.24	2165.95	1744.98
1994	6795.01	2750.48	2249.75	1794.78
1995	7079.01	2871.42	2334.14	1873.45
1996	7421.78	2999.8	2440.4	1981.58
1997	7817.92	3136.8	2566.45	2114.67
1998	8235.82	3281.77	2701.07	2252.98
1999	8628.5	3433.75	2822.62	2372.13
2000	9123.63	3588.91	2962.95	2571.77

SOURCE: MAP Model

FIGURE 43. ALASKAN WAGE RATES, 1979-2000
BASE CASE

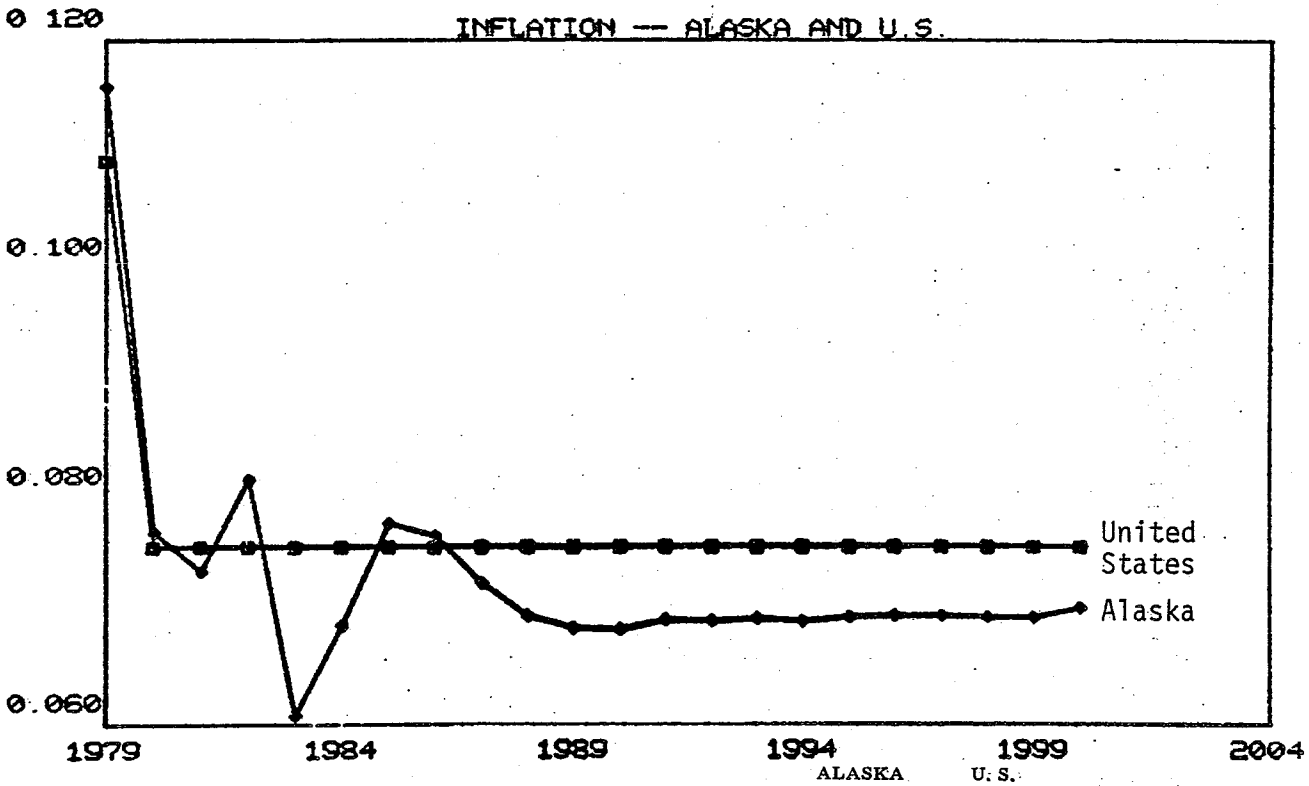
(thousands of 1979 dollars)



	WRB1RST	WRG9RST	WRS1RST
1979	26627.5	17687.5	17166.9
1980	28414.4	18300.7	17662.6
1981	32213.	19143.2	18679.7
1982	39635.9	20302.8	20442.
1983	39179.6	21001.	20570.7
1984	33384.3	20919.	19085.9
1985	31271.3	21016.7	18454.6
1986	31414.8	21510.6	18471.9
1987	32102.7	22079.3	18620.6
1988	33027.1	22686.6	18823.7
1989	33598.9	23270.	18933.
1990	33944.8	23828.4	19008.2
1991	34478.5	24424.8	19130.5
1992	34955.6	25037.2	19248.2
1993	35502.8	25665.	19380.9
1994	35622.	26257.	19415.2
1995	35848.1	26852.5	19472.3
1996	36245.	27507.	19590.9
1997	36671.1	28189.4	19729.7
1998	36918.4	28870.6	19843.3
1999	36721.	29501.4	19864.7
2000	36765.3	30170.9	19950.7

SOURCE: MAP Model

FIGURE 44. ALASKAN AND U.S. INFLATION, 1979-2000
BASE CASE



	ALASKA	U.S.
1979	0.116	0.109
1980	0.077	0.076
1981	0.073	0.076
1982	0.082	0.076
1983	0.061	0.076
1984	0.069	0.076
1985	0.078	0.076
1986	0.076	0.076
1987	0.072	0.076
1988	0.07	0.076
1989	0.069	0.076
1990	0.068	0.076
1991	0.069	0.076
1992	0.069	0.076
1993	0.069	0.076
1994	0.069	0.076
1995	0.07	0.076
1996	0.07	0.076
1997	0.07	0.076
1998	0.07	0.076
1999	0.07	0.076
2000	0.07	0.076

SOURCE: United States based on long-term trend in Data Resources, Inc., TRENDLONG79 forecast; Alaska from MAP Model.

State Government Fiscal Position

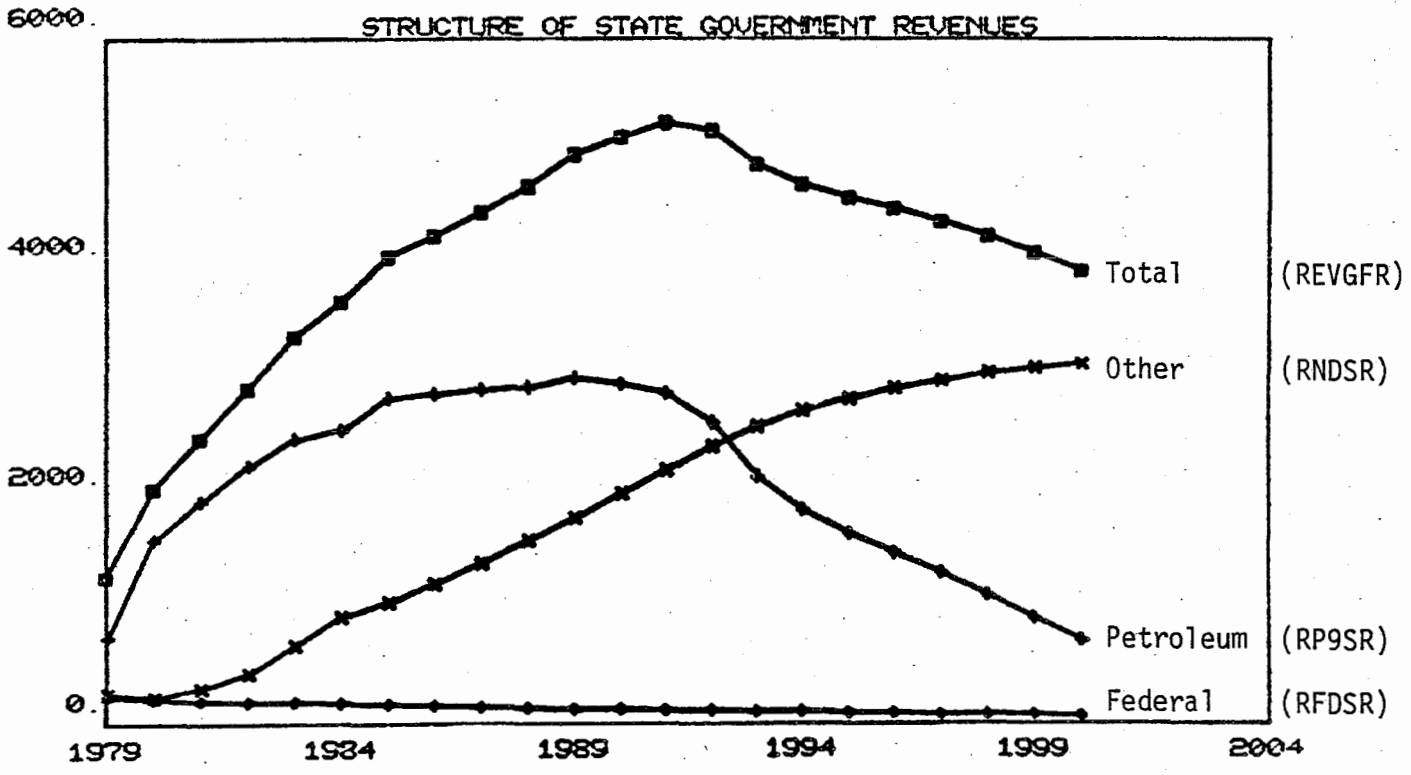
The fiscal position of the state government, due to the receipt of petroleum revenues from Prudhoe Bay, will be altered radically during the forecast period. Real general fund revenues peak at over 5.2 billion dollars annually by 1991, about 153 percent over their 1980 levels, and over 338 percent above their 1978 levels, as shown in Figure 45. The traditional mainstay of Alaskan revenues--federal grants-in-aid--become a nearly insignificant share of total revenues over the period. Petroleum revenues begin to decline after 1989, but interest earnings and other revenues continue to grow throughout the period. By 2000, total general fund revenues are nearly 4.3 billion dollars, nearly 19 percent below their peak levels.

Under the assumed fiscal policy described above, state expenditures grow at 13 percent annually in nominal terms, representing about a 5.5 percent average annual growth in real terms. In real terms, state expenditures in the year 2000 reach nearly 4.2 billion dollars, just overtaking revenues by the end of the period, as shown in Figure 46.

The substantial differences between revenues and expenditures are accumulated in the state's fund balances which, in real terms, peak in 1996 at over 25.4 billion dollars, as shown in Figure 47.

FIGURE 45. STATE GOVERNMENT REVENUES, 1979-2000
BASE CASE

(millions of 1979 dollars)

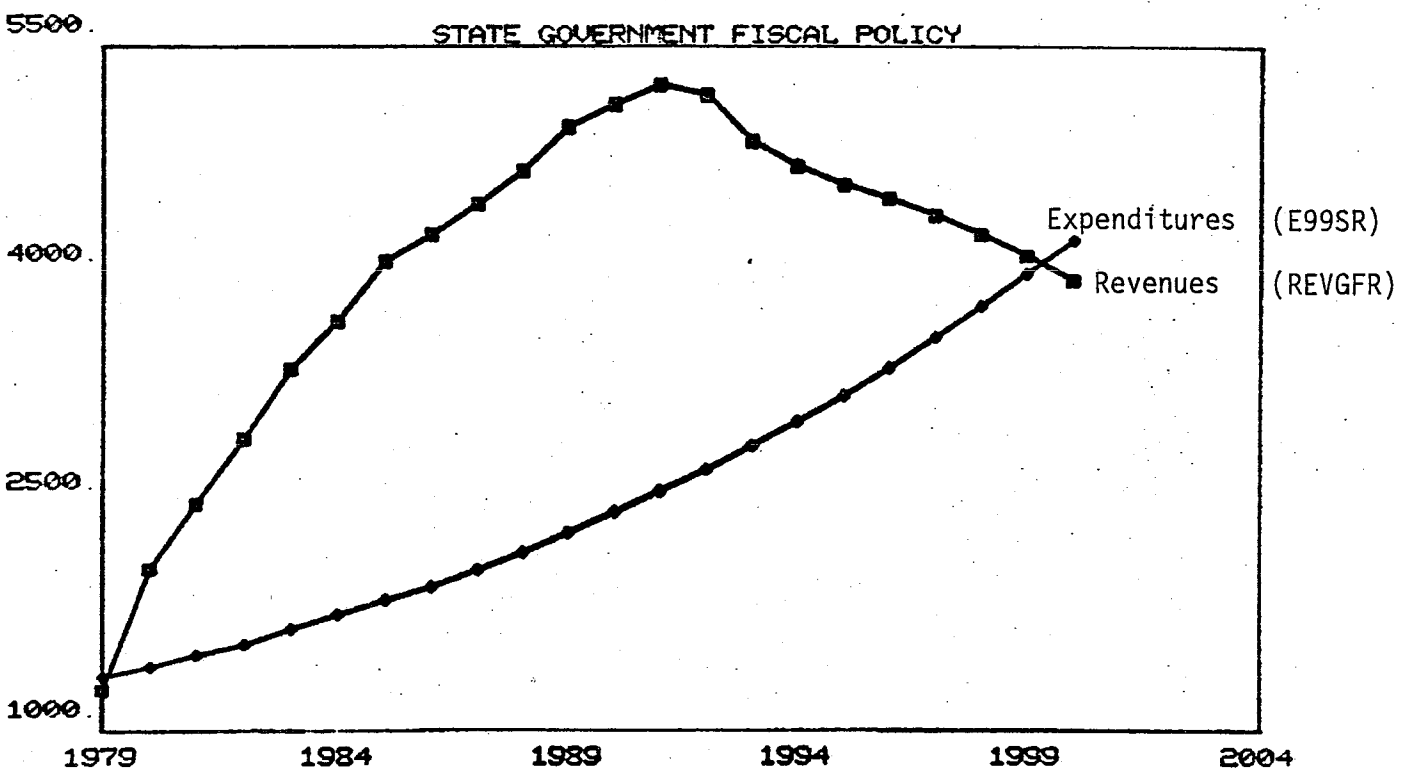


	REVGFR	RNDSR	RP9SR	RFDSR
1979	1287.29	281.119	767.2	238.973
1980	2077.54	240.563	1615.21	221.762
1981	2502.44	322.807	1968.82	210.818
1982	2936.02	452.577	2279.01	204.437
1983	3395.15	692.555	2503.25	199.347
1984	3702.91	935.397	2580.43	187.089
1985	4094.36	1062.55	2859.	172.811
1986	4280.3	1224.56	2895.16	160.579
1987	4480.38	1407.68	2921.58	151.123
1988	4704.63	1607.8	2953.59	143.244
1989	4983.62	1817.91	3029.64	136.073
1990	5129.85	2030.77	2970.06	129.018
1991	5253.86	2235.31	2896.2	122.355
1992	5187.47	2432.88	2638.55	116.04
1993	4890.84	2608.45	2172.2	110.186
1994	4726.11	2742.76	1878.75	104.59
1995	4607.86	2847.73	1660.83	99.302
1996	4516.76	2931.89	1490.41	94.454
1997	4408.6	3007.1	1311.43	90.073
1998	4278.99	3069.41	1123.53	86.056
1999	4132.6	3119.04	931.294	82.267
2000	3966.91	3151.45	736.634	78.828

SOURCE: MAP Model

FIGURE 46. STATE GOVERNMENT FISCAL POLICY, 1979-2000
BASE CASE

(millions of 1979 dollars)

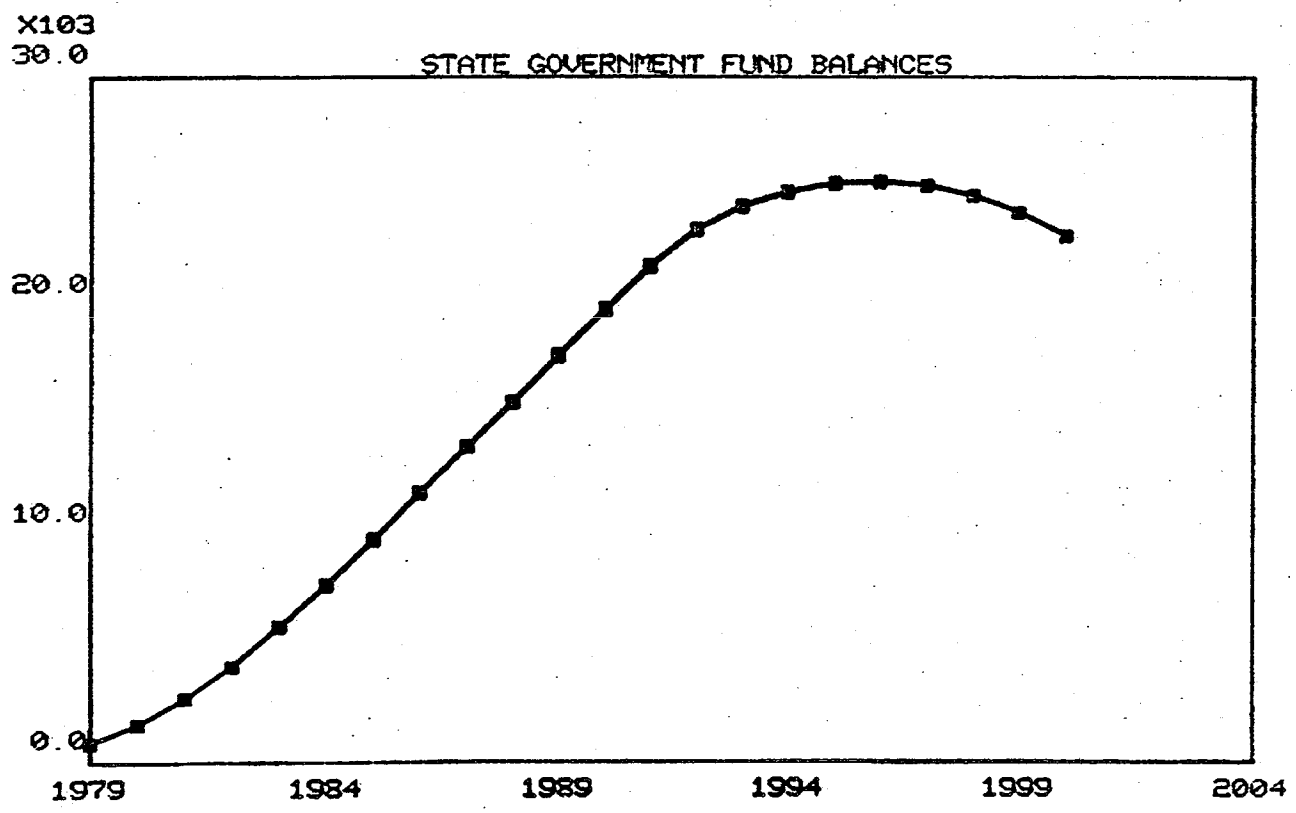


	REVGFR	E99SR
1979	1287.29	1371.84
1980	2077.54	1439.57
1981	2502.44	1515.41
1982	2936.02	1583.08
1983	3395.15	1686.3
1984	3702.91	1782.82
1985	4094.36	1869.41
1986	4280.3	1962.34
1987	4480.38	2067.59
1988	4704.63	2184.24
1989	4983.62	2309.83
1990	5129.85	2442.86
1991	5253.86	2581.72
1992	5187.47	2728.76
1993	4890.84	2883.52
1994	4726.11	3047.65
1995	4607.86	3220.04
1996	4516.76	3401.82
1997	4408.6	3593.92
1998	4278.99	3797.18
1999	4132.6	4011.83
2000	3966.91	4235.72

SOURCE: MAP Model

FIGURE 47. STATE GOVERNMENT FUND BALANCES, 1979-2000
BASE CASE

(millions of 1979 dollars)



1979	861.074
1980	1689.75
1981	2830.04
1982	4248.68
1983	6013.08
1984	7863.71
1985	9856.68
1986	11826.5
1987	13813.2
1988	15830.
1989	17907.5
1990	19892.3
1991	21747.7
1992	23299.8
1993	24327.1
1994	24995.9
1995	25355.7
1996	25450.7
1997	25276.4
1998	24820.2
1999	24075.1
2000	23017.7

SOURCE: MAP Model

REGIONAL

Anchorage

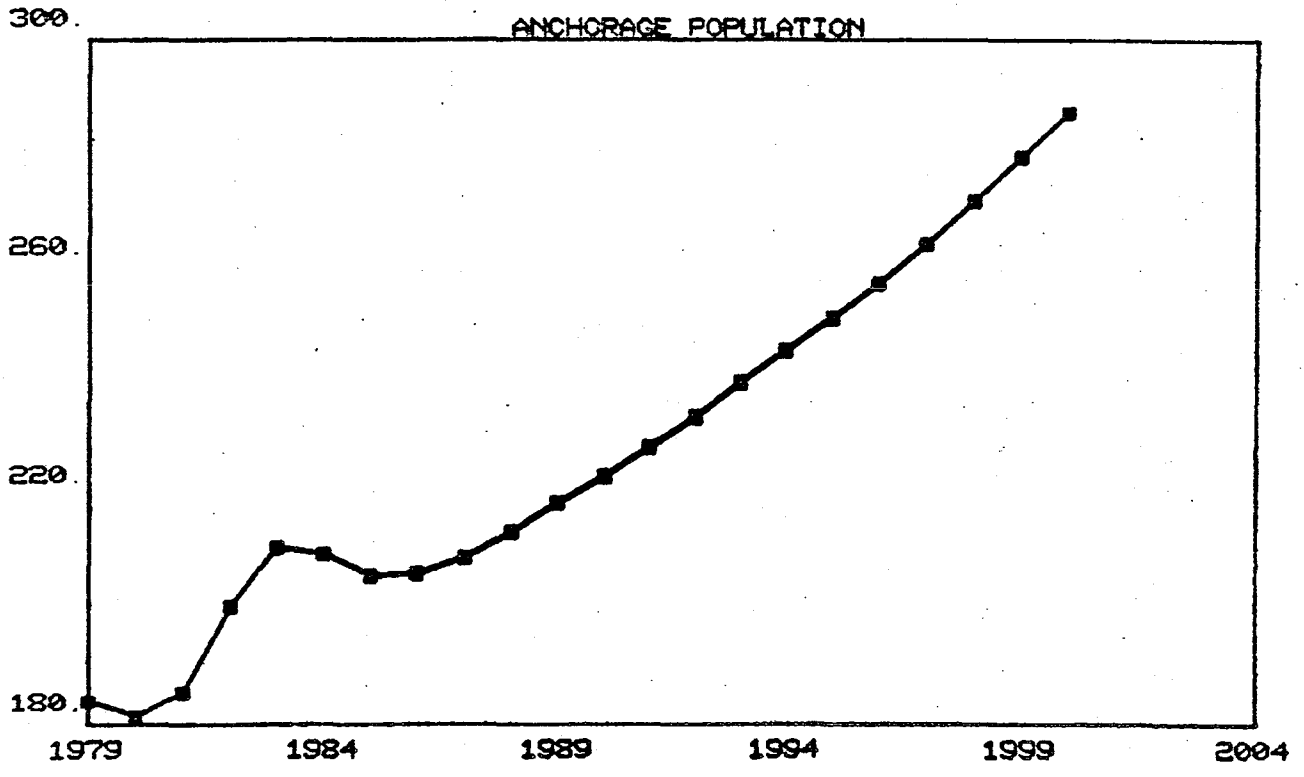
Population. The decline in Anchorage population as a consequence of the post-TAPS recession is forecast to end in 1980, to be followed by three years of rapid population growth in the buildup and construction of the gas pipeline, with peak population in 1983 reaching over 211,000, over 16 percent above its 1980 level, as shown in Figure 48. Following a 2.5 percent drop following completion of the pipeline, steady growth resumes, with 2000 population reaching over 279,000 persons, for a 2.3 percent average annual growth over the 1980-2000 period. The concentration of state population in Anchorage continues over the period, with the Anchorage share of statewide population remaining nearly constant at 45 percent.

Employment. The pattern of Anchorage employment growth, as shown in Figure 49, follows closely the pattern of statewide growth, with one exception--the increased concentration of support sector employment in Anchorage. As a consequence, as in the past, employment fluctuations are less severe in cyclical downturns in Anchorage than statewide; and overall, employment grows slightly faster than statewide.

Basic employment in Anchorage during the forecast period consists of two components. An exogenous employment component consists of agriculture, forestry, fisheries, mining, and manufacturing employment. Agriculture, forestry, and fishery employment rises slowly from 111 persons in 1979

FIGURE 48. ANCHORAGE POPULATION, 1979-2000
BASE CASE

(thousands of persons)

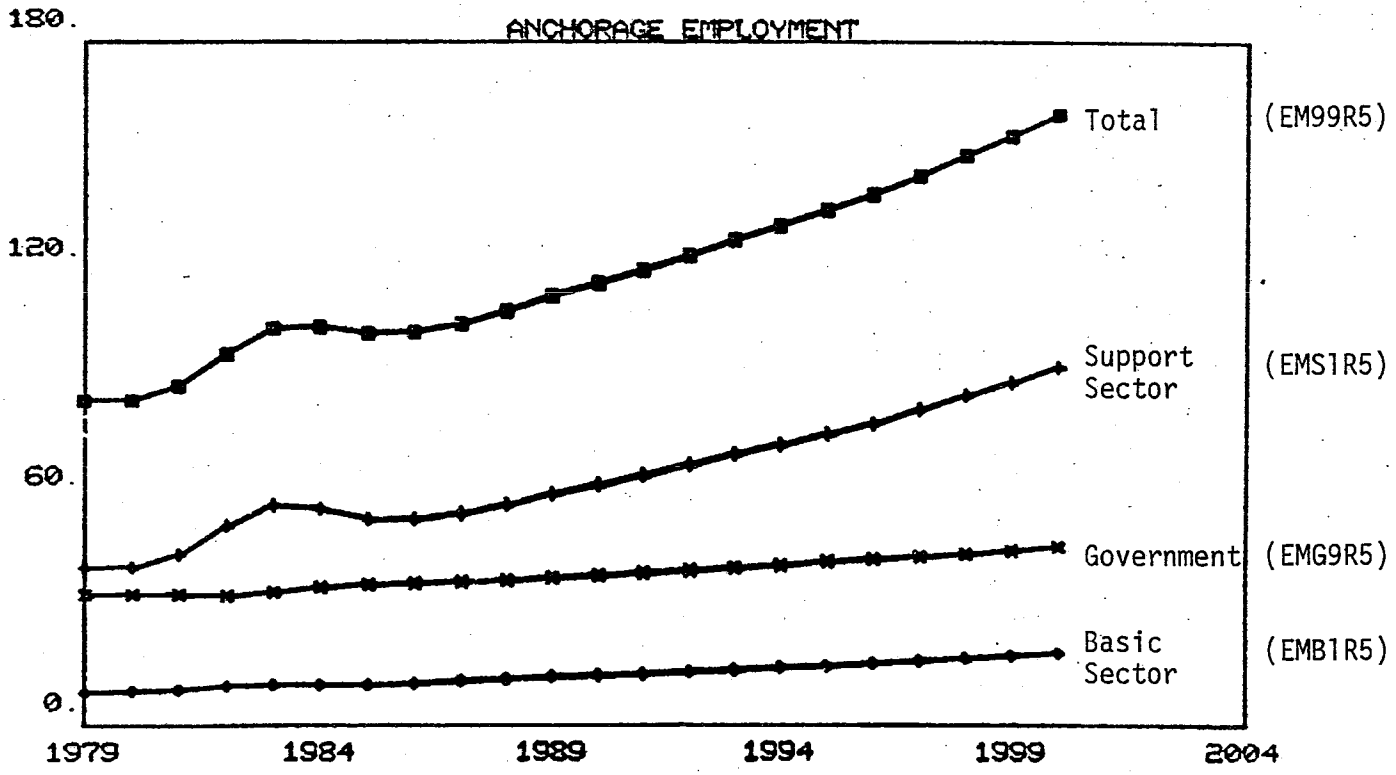


1979	184.418
1980	181.613
1981	186.092
1982	200.876
1983	211.11
1984	209.796
1985	206.018
1986	206.522
1987	209.175
1988	213.839
1989	219.035
1990	223.847
1991	228.875
1992	234.256
1993	240.001
1994	245.597
1995	251.175
1996	257.405
1997	264.412
1998	271.922
1999	279.323
2000	287.256

SOURCE: MAP Model

FIGURE 49. ANCHORAGE EMPLOYMENT, 1979-2000
BASE CASE

(thousands of persons)



	EM99R5	EMS1R5	EMB1R5	EMG9R5
1979	85.694	42.208	8.862	34.624
1980	85.638	41.94	9.074	34.624
1981	89.608	45.494	9.493	34.621
1982	97.975	53.283	10.361	34.332
1983	104.706	58.701	10.865	35.14
1984	105.101	57.736	10.809	36.556
1985	103.305	55.176	10.851	37.278
1986	103.713	54.916	11.202	37.594
1987	105.909	56.28	11.629	37.999
1988	109.368	58.769	12.081	38.518
1989	113.285	61.505	12.628	39.153
1990	116.753	63.857	13.064	39.831
1991	120.309	66.323	13.515	40.471
1992	124.001	68.878	13.994	41.129
1993	127.929	71.603	14.529	41.797
1994	131.852	74.216	15.084	42.553
1995	135.701	76.761	15.643	43.297
1996	140.002	79.734	16.244	44.023
1997	144.87	83.189	16.898	44.783
1998	150.124	86.935	17.59	45.599
1999	155.424	90.589	18.317	46.518
2000	160.986	94.531	19.06	47.395

SOURCE: MAP Model

to 126 in the year 2000. Mining industry employment is held close to its 1979 level, changing only in response to additions of headquarters personnel associated with the various petroleum developments in the base case. From a level of 1,655 in 1979, it rises to 1,873 by the year 2000. Manufacturing employment, also exogenous, is forecast to grow slowly at close to its historical trend of less than 4 percent annually, rising from 2,021 persons in 1979 to 4,157 in 2000. The second component of basic sector employment consists of endogenous employment in construction. Construction employment rises from 4,533 in 1979 to 11,888 in the year 2000. As in the past, such employment is the major source of basic sector growth in the Anchorage area.

Endogenous construction activity and support sector growth are tied closely to statewide economic activity, with this activity being the major source of employment fluctuation in Anchorage.

The gas pipeline boom peaks in 1984, with Anchorage employment reaching a peak of 105,000; it then declines slightly (less than 2 percent) before resuming a steady rate of growth which brings employment to nearly 161,000 by the year 2000, an average growth of 3.2 percent annually over the period.

Personal Income. Figures 50 and 51 present the growth of Alaskan real and real per capita personal incomes. In real terms, personal income by the year 2000 is over 152 percent higher than in 1980, averaging 4.7 percent annual growth. In real per capita terms, personal income expands nearly 60 percent, averaging 2.4 percent annual growth.

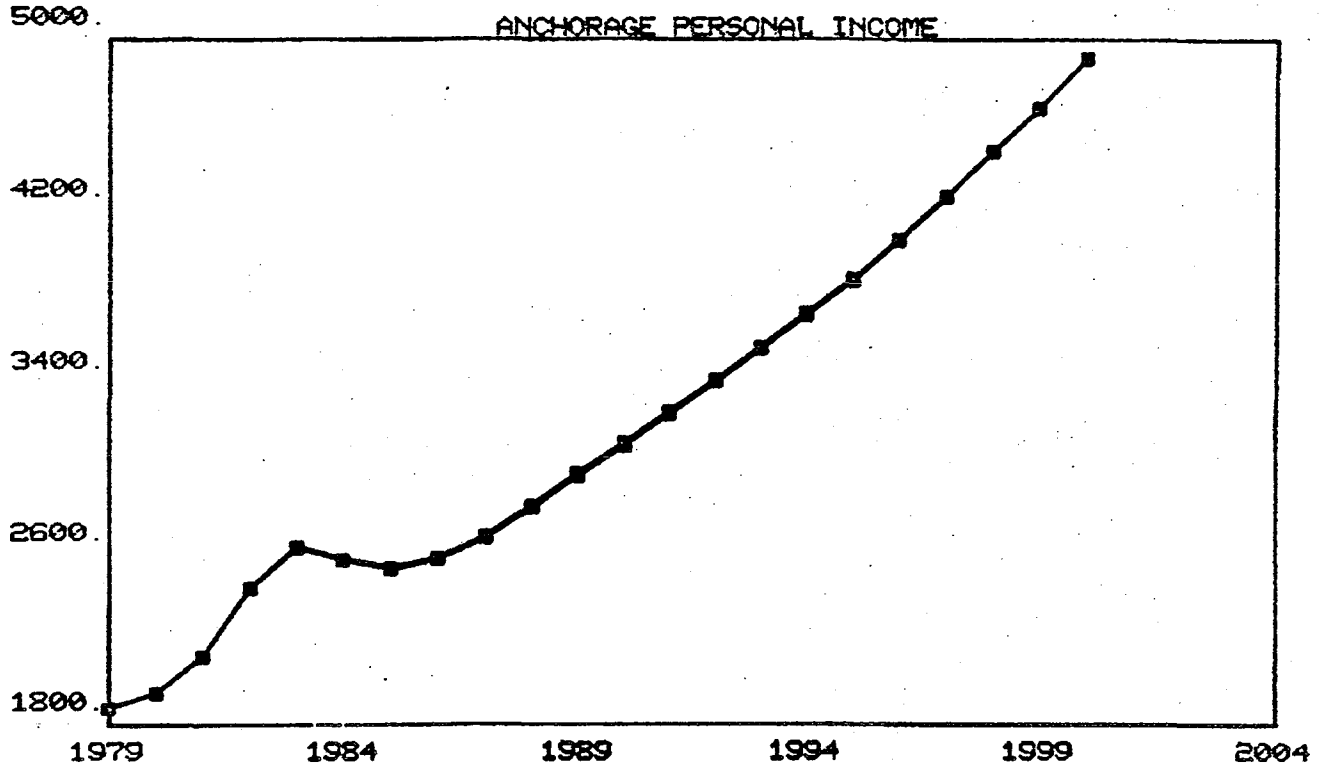
Norton Sound

Population. The growth of Norton Sound population during the forecast period is shown in Figure 52. Declining total employment leads to a decline in regional population which continues through 1982. A rise in government employment thereafter stabilizes support sector employment, stimulating population growth through about 1985. After 1985, growing basic sector employment combines with growth of government employment to keep population growing throughout the period. By the year 2000, total regional population reaches 15,180, about 28 percent above its 1980 level, representing average growth of about 1.2 percent annually.

Employment. Figure 53 presents the base case forecast of Norton Sound employment growth. By 2000, total employment reaches 4,588, about 49 percent higher than its 1980 level, for an average annual growth of 2 percent. Virtually all of the growth is due to increased basic and government sector employment. As in Anchorage, basic sector employment consists of two components--one exogenous, the other endogenous. Exogenous basic employment consists of mining and manufacturing employment. Mining

FIGURE 50. ANCHORAGE PERSONAL INCOME, 1979-2000
BASE CASE

(millions of 1979 dollars)

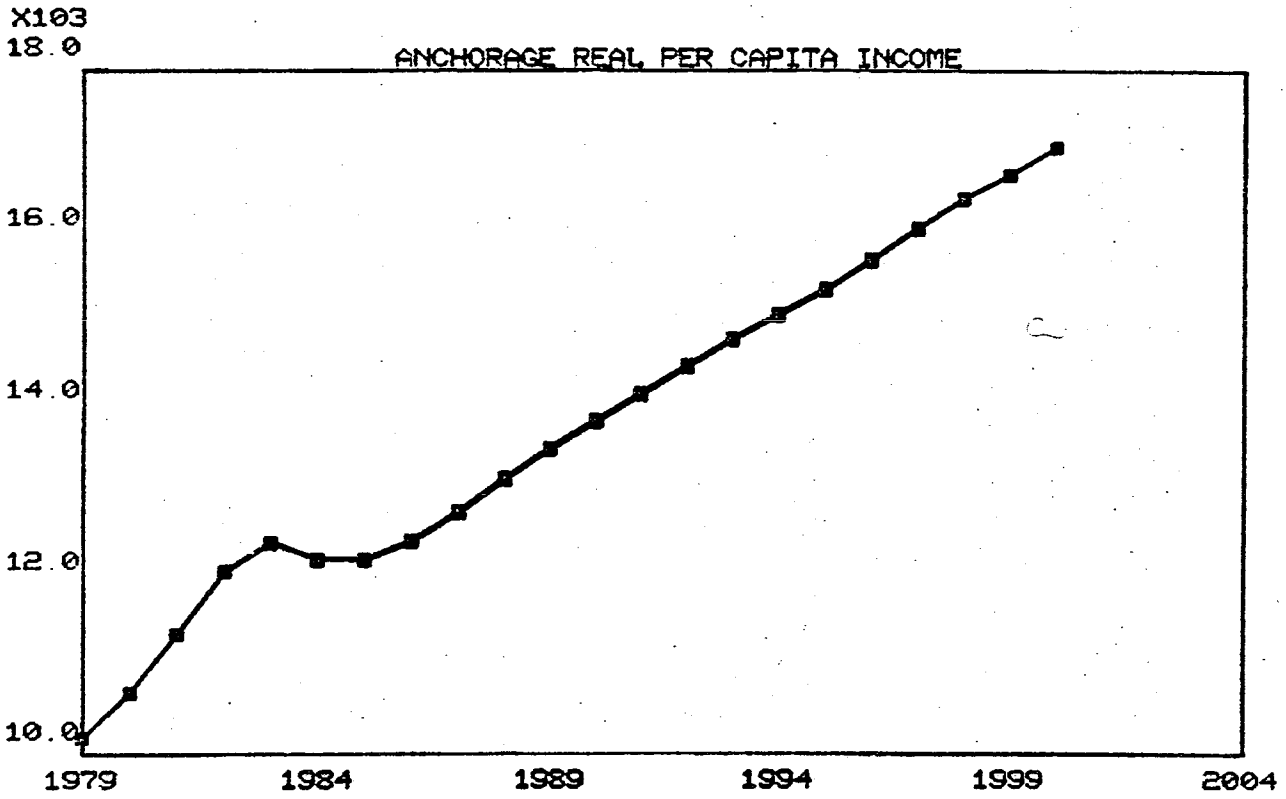


1979	1882.63
1980	1946.97
1981	2120.36
1982	2442.8
1983	2636.94
1984	2579.54
1985	2533.88
1986	2583.87
1987	2687.52
1988	2826.96
1989	2972.8
1990	3112.14
1991	3256.03
1992	3408.19
1993	3569.08
1994	3721.22
1995	3880.27
1996	4063.84
1997	4269.12
1998	4484.08
1999	4688.35
2000	4917.95

SOURCE: MAP Model

FIGURE 51. ANCHORAGE REAL PER CAPITA INCOME, 1979-2000

(thousands of 1979 dollars)

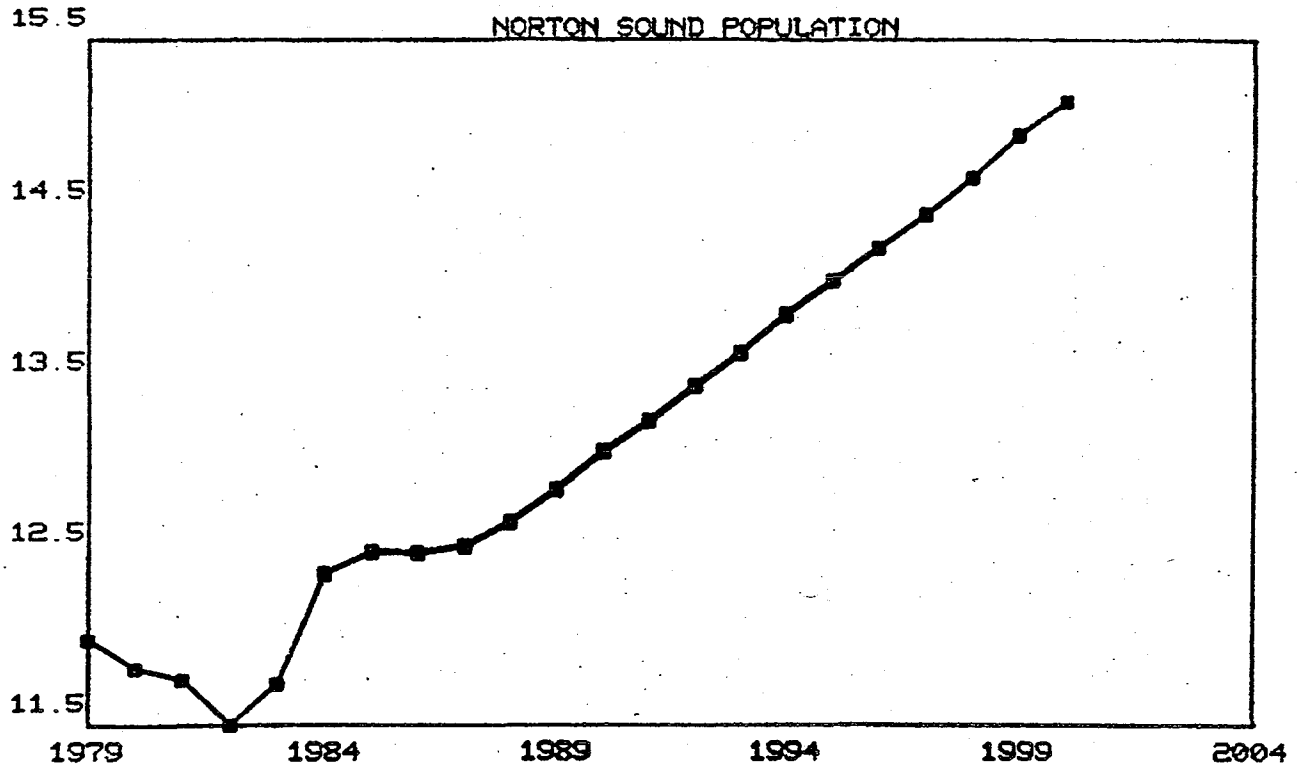


1979	10208.5
1980	10720.4
1981	11394.1
1982	12160.8
1983	12490.8
1984	12295.5
1985	12299.3
1986	12511.3
1987	12848.2
1988	13220.
1989	13572.3
1990	13903.
1991	14226.2
1992	14549.
1993	14871.1
1994	15151.7
1995	15448.5
1996	15787.7
1997	16145.7
1998	16490.3
1999	16784.7
2000	17120.4

SOURCE: MAP Model

FIGURE 52. NORTON SOUND POPULATION, 1979-2000
BASE CASE

(thousands of persons)

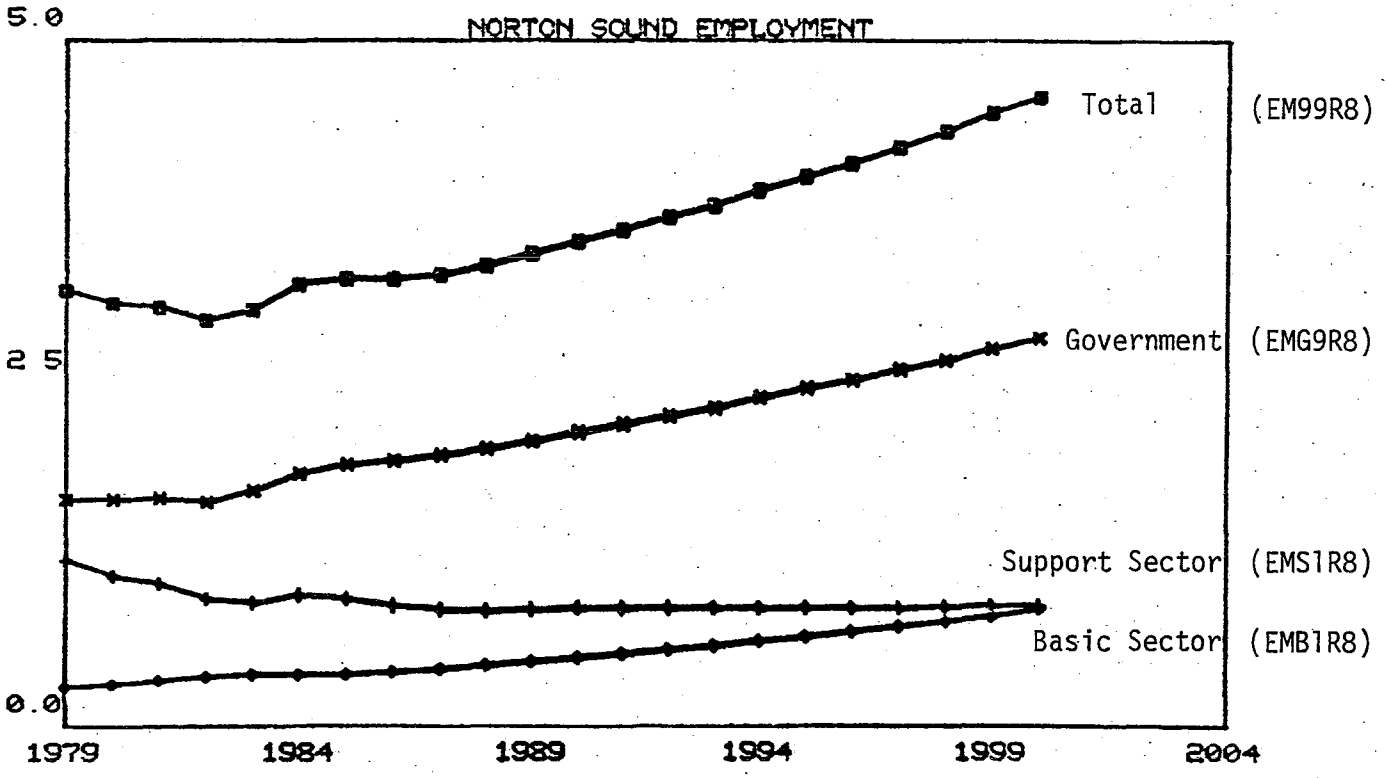


1979	12.016
1980	11.846
1981	11.776
1982	11.511
1983	11.752
1984	12.406
1985	12.525
1986	12.517
1987	12.556
1988	12.69
1989	12.886
1990	13.108
1991	13.292
1992	13.494
1993	13.682
1994	13.909
1995	14.105
1996	14.291
1997	14.491
1998	14.707
1999	14.949
2000	15.14

SOURCE: MAP Model

FIGURE 53. NORTON SOUND EMPLOYMENT, 1979-2000
BASE CASE

(thousands of persons)



	EM99R8	EMG9R8	EMS1R8	EMB1R8
1979	3.182	1.663	1.218	0.301
1980	3.08	1.664	1.102	0.315
1981	3.054	1.67	1.043	0.341
1982	2.962	1.645	0.942	0.376
1983	3.034	1.728	0.912	0.394
1984	3.227	1.859	0.975	0.394
1985	3.26	1.923	0.94	0.397
1986	3.259	1.952	0.895	0.411
1987	3.289	1.991	0.867	0.431
1988	3.356	2.04	0.861	0.456
1989	3.448	2.098	0.866	0.483
1990	3.545	2.161	0.873	0.511
1991	3.631	2.219	0.873	0.54
1992	3.724	2.278	0.875	0.57
1993	3.816	2.338	0.875	0.602
1994	3.922	2.407	0.88	0.635
1995	4.019	2.473	0.879	0.668
1996	4.118	2.537	0.878	0.703
1997	4.225	2.604	0.88	0.741
1998	4.342	2.676	0.885	0.781
1999	4.471	2.758	0.891	0.823
2000	4.588	2.834	0.891	0.863

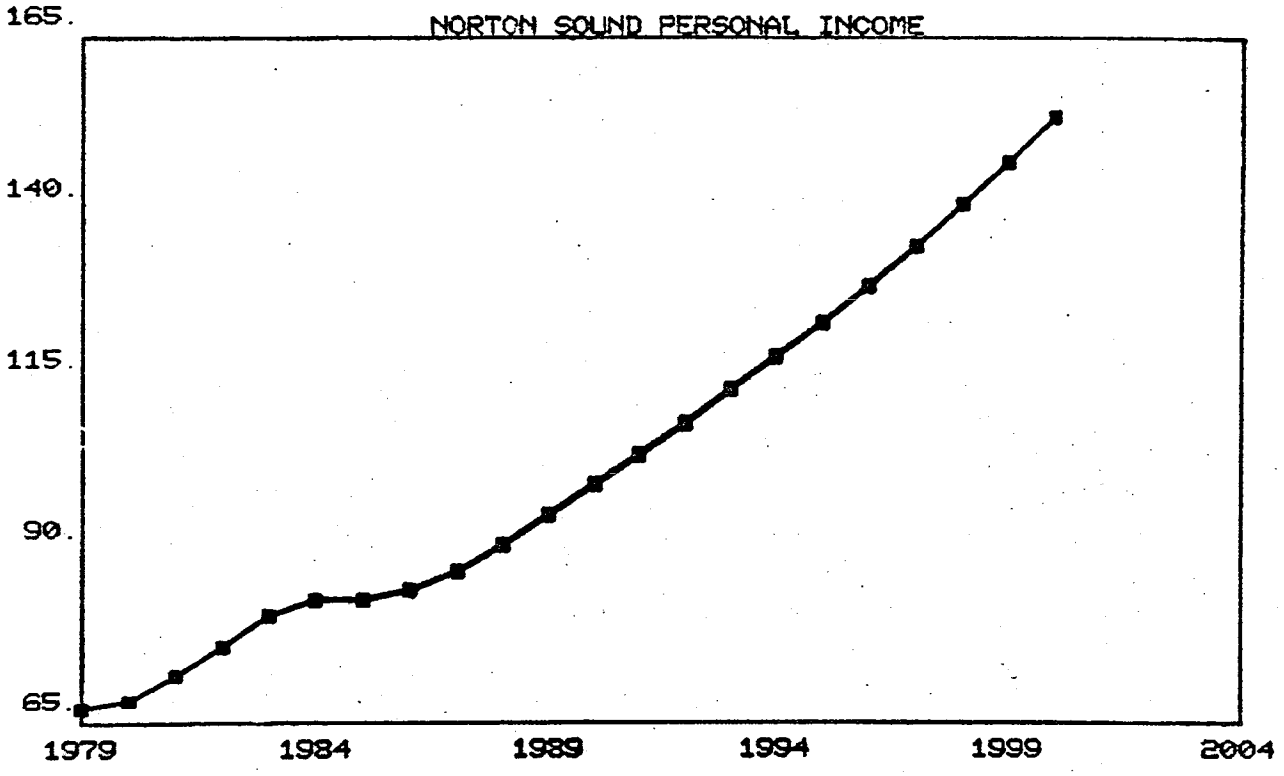
SOURCE: MAP Model

employment is assumed to maintain its 1978 level of 100 persons throughout the period, while manufacturing growth maintains its historical trend of slightly over 3 percent annually. The remaining basic sector employment, responsible for nearly all of the growth in such employment, is endogenous construction. Overall, however, basic sector growth is quite modest, averaging about 5.1 percent annually, slightly above the historical rate of about 4 percent annually. Support sector employment declines in the early years of the forecast period, then stabilizes with the acceleration of government employment growth in the mid-1980s. As in the past, government employment, primarily at the state and local level, is the primary source of employment growth during the forecast period.

Personal Income. Figures 54 and 55 present the forecast growth of Norton Sound real and real per capita personal income. Incomes fluctuate slightly in response to the gas pipeline boom's being experienced in the state, causing a general increase in statewide wages. Personal income reaches 153 million dollars by the year 2000, growing at an average 4.1 percent over the period; while real per capita income exceeds 10,000 dollars by the end of the period, growing at an average 2.8 percent annually.

FIGURE 54. NORTON SOUND PERSONAL INCOME, 1979-2000.
BASE CASE

(millions of 1979 dollars)

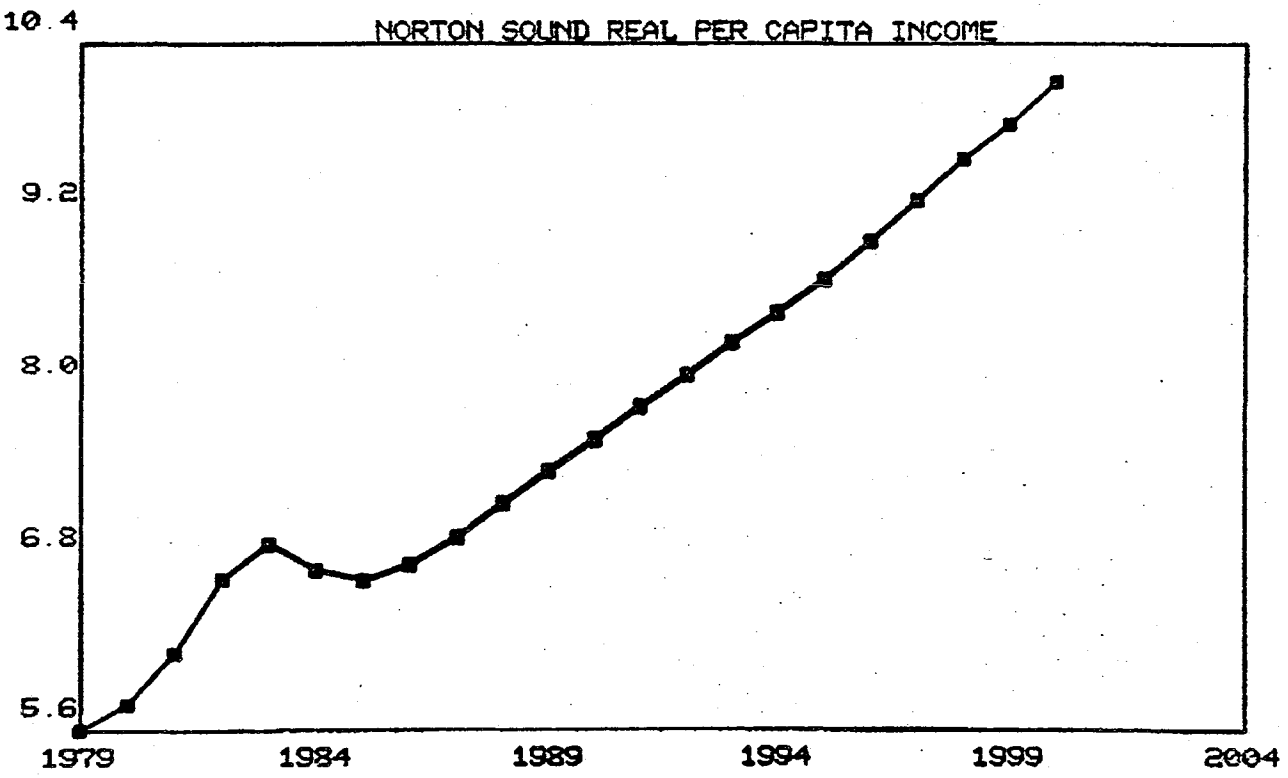


1979	67.454
1980	68.593
1981	72.321
1982	76.726
1983	81.258
1984	83.483
1985	83.379
1986	84.712
1987	87.398
1988	91.283
1989	95.568
1990	100.074
1991	104.425
1992	109.117
1993	113.893
1994	118.699
1995	123.531
1996	128.91
1997	134.839
1998	141.072
1999	147.158
2000	153.49

SOURCE: MAP Model

FIGURE 55. NORTON SOUND REAL PER CAPITA INCOME

(thousands of 1979 dollars)



1979	5613.5
1980	5790.41
1981	6141.45
1982	6665.42
1983	6914.49
1984	6729.21
1985	6657.02
1986	6767.73
1987	6960.84
1988	7193.58
1989	7416.64
1990	7634.34
1991	7856.39
1992	8086.47
1993	8324.35
1994	8534.13
1995	8757.91
1996	9020.15
1997	9305.27
1998	9591.89
1999	9843.96
2000	10138.

SOURCE: MAP Model

IV. STATEWIDE AND REGIONAL IMPACTS OF PROPOSED FEDERAL OCS DEVELOPMENT IN THE NORTON SOUND AREA

Background

The proposed federal OCS developments in the Bering Sea-Norton Sound area will have direct effects on the statewide and regional economies via the creation of new labor demands and the generation of new state and local property tax revenues. These direct effects will depend upon the resource quantities discovered, the technology used in the extraction of the resource, and the timing and logistics of the development plan. Perhaps even more significantly, these direct effects will induce a sequence of indirect effects in the remaining sectors of the economy which will trigger migration and fiscal policy changes by state government which further alter the structure of economic and demographic growth.

In this chapter, both effects are examined. First, using a set of development scenarios prepared by Dames and Moore, the direct impacts of the proposed developments are assessed. Next, using the same models used earlier to forecast economic and demographic growth in the base case, the base case assumptions are altered to include the direct effects included in the OCS development scenarios, and an alternative set of forecasts is run. The differences between these forecasts and the base case forecast are identified as the impacts of the proposed development.

The Bering-Norton OCS Development Scenarios

The development of federally owned oil and gas resources in the Norton Sound Area will generate direct employment as well as state revenues, with the magnitude of these direct effects dependent upon both the magnitude of resource discoveries and the technology employed in their production. A variety of development scenarios, prepared by Dames and Moore, were designed to attempt to anticipate these direct effects. Four scenarios were developed. In the first, an exploration program beginning shortly after the sale is unsuccessful in yielding any significant discoveries, so that no employment or revenue effects are generated beyond the exploration phase. Three other scenarios begin with exploration programs of varying success and yielding varying quantities of resource discoveries. This section describes the various aspects of these scenarios relevant to their economic impacts.

RESOURCE ASSUMPTIONS

The three scenarios in which commercial discoveries are made correspond to three estimates of resource quantities for the area as prepared by USGS. The "high-find" scenario corresponds to discovery of the maximum field size estimated by USGS. The "medium find" corresponds to the mean, or expected, discovery size for the area. The "low find" corresponds to the minimum commercial find expected for the area. The resource estimates assumed for each scenario are shown in Table 22.

TABLE 22. RESOURCE ESTIMATES[1]
BERING-NORTON OCS DEVELOPMENT SCENARIOS

	Minimum (Low Find)	Mean (Medium Find)	Maximum (High Find)
Oil (Billions of Barrels)	0.38	1.2	2.6
Gas (Trillions of Cu.Ft.)	1.2	2.3	3.2

[1]Includes only resources developed in each scenario, rather than total undiscovered resources.

SOURCE: Dames and Moore, "Norton Basin OCS Lease Sale No. 57 Petroleum Development Scenarios," October 1979.

TECHNOLOGICAL ASSUMPTIONS

The exploration-only scenario assumes only eight wells drilled over three years, conducted primarily in the summer months using both jack-up rigs and drillships for six of the wells and gravel islands for the remaining two. No new onshore facilities are required. Nome serves as the major supply base, with materials stored in freighters and barges and shipped to the rigs via supply boats.

In the high-find scenario, a similar exploration program yields three clusters of commercial discoveries--in inner Norton Sound south of Cape Darby, in the central portion of the Sound south of Nome, and in the outer Sound about 40 miles southwest of Cape Rodney. Production is

brought ashore via pipeline to a crude oil terminal and LNG plant at Cape Nome. Four gravel islands and eleven steel platforms are used for production. All production is tankered to Lower 48 markets.

In the medium-find scenario, five fields are discovered--two in inner Norton Sound, the second two in the central portion of the Sound, and a final field southwest of Cape Rodney. Six steel platforms and two gravel islands support production, which is transported to a single oil terminal and an LNG facility at Cape Nome by pipeline, then transported to Lower 48 markets via tanker.

The low-find scenario consists of discovery of two marginal oil fields southwest of Nome and a single gas field south of Nome. Three steel platforms are installed, and production is transported to terminal and LNG facilities before being tankered to the Lower 48.

EMPLOYMENT ASSUMPTIONS

The direct employment requirements for each of the four scenarios are presented in Tables 23 through 26.

The exploration-only scenario requires less than 100 persons at its peak in 1984, and all activity ends before 1986.

In the low-find scenario, employment peaks at over 1,300 in 1990, during the development phase, eventually falling to a long-term level of 847 persons by 1995.

TABLE 23. DIRECT EMPLOYMENT REQUIREMENTS: EXPLORATION-ONLY SCENARIO

(Thousands of Persons)

Year	Mining	Construction	Transportation	Manufacturing	Headquarters	Total
1980	0	0	0	0	0	0
1981	0	0	0	0	0	0
1982	0	0	0	0	0	0
1983	.021	0	.015	0	.005	.042
1984	.046	.005	.031	0	.010	.092
1985	.025	.005	.016	0	.005	.051
1986	0	0	0	0	0	0
1987	0	0	0	0	0	0
1988	0	0	0	0	0	0
1989	0	0	0	0	0	0
1990	0	0	0	0	0	0
1991	0	0	0	0	0	0
1992	0	0	0	0	0	0
1993	0	0	0	0	0	0
1994	0	0	0	0	0	0
1995	0	0	0	0	0	0
1996	0	0	0	0	0	0
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0

TABLE 24. DIRECT EMPLOYMENT REQUIREMENTS: LOW-FIND SCENARIO

(Thousands of Persons)

Year	Mining	Construction	Transportation	Manufacturing	Headquarters	Total
1980	0	0	0	0	0	0
1981	0	0	0	0	0	0
1982	0	0	0	0	0	0
1983	.043	0	.031	0	.010	.084
1984	.067	.005	.046	0	.016	.134
1985	.094	.011	.099	0	.023	.227
1986	.139	.011	.149	0	.029	.327
1987	.050	.052	.050	0	.013	.166
1988	.075	.124	.138	0	.005	.342
1989	.181	.192	.131	0	.014	.518
1990	1.092	.010	.113	.08	.024	1.319
1991	1.110	0	.082	.08	.026	1.298
1992	.828	0	.082	.08	.008	.998
1993	.622	0	.082	.08	.003	.787
1994	.592	0	.082	.08	.003	.757
1995	.682	0	.082	.08	.003	.847
1996	.682	0	.082	.08	.003	.847
1997	.682	0	.082	.08	.003	.847
1998	.682	0	.082	.08	.003	.847
1999	.682	0	.082	.08	.003	.847
2000	.682	0	.082	.08	.003	.847

TABLE 25. DIRECT EMPLOYMENT REQUIREMENTS: MEDIUM-FIND SCENARIO

(Thousands of Persons)

Year	Mining	Construction	Transportation	Manufacturing	Headquarters	Total
1980	0	0	0	0	0	0
1981	0	0	0	0	0	0
1982	0	0	0	0	0	0
1983	.067	0	.046	0	.016	.129
1984	.153	.005	.108	0	.036	.302
1985	.183	.011	.203	0	.042	.439
1986	.139	.173	.152	0	.031	.495
1987	.079	.445	.108	0	.021	.653
1988	.254	.233	.347	0	.018	.852
1989	.561	.066	.142	.12	.038	.927
1990	2.031	.175	.249	.12	.050	2.626
1991	2.606	.053	.223	.12	.057	3.059
1992	2.441	.035	.219	.12	.045	2.860
1993	1.952	.035	.219	.12	.024	2.350
1994	1.742	.035	.219	.12	.011	2.127
1995	1.743	.035	.219	.12	.009	2.126
1996	1.803	.035	.219	.12	.009	2.186
1997	1.833	.035	.219	.12	.009	2.216
1998	1.833	.035	.219	.12	.009	2.216
1999	1.833	.035	.219	.12	.009	2.216
2000	1.833	.035	.219	.12	.009	2.216

TABLE 26. DIRECT EMPLOYMENT REQUIREMENTS: HIGH-FIND SCENARIO

(Thousands of Persons)

Year	Mining	Construction	Transportation	Manufacturing	Headquarters	Total
1980	0	0	0	0	0	0
1981	0	0	0	0	0	0
1982	0	0	0	0	0	0
1983	.064	0	.046	0	.016	.127
1984	.131	.005	.092	0	.032	.261
1985	.217	.032	.228	0	.048	.524
1986	.228	.264	.254	0	.053	.799
1987	.188	.777	.235	0	.037	1.236
1988	.339	.584	.439	0	.039	1.402
1989	.894	.230	.515	.20	.056	1.895
1990	3.150	.177	.423	.20	.078	4.029
1991	4.113	.069	.415	.20	.103	4.900
1992	4.273	.022	.415	.20	.082	4.992
1993	3.772	.003	.395	.20	.061	4.432
1994	3.339	0	.411	.20	.033	3.983
1995	3.282	0	.411	.20	.025	3.918
1996	3.249	0	.411	.20	.025	3.885
1997	3.280	0	.411	.20	.025	3.916
1998	3.280	0	.411	.20	.025	3.916
1999	3.310	0	.411	.20	.025	3.946
2000	3.310	0	.411	.20	.025	3.946

Development in the medium-find scenario requires over 3,000 workers at the peak of development in 1991. By the late 1990s, a permanent labor force of over 2,200 workers is in place, primarily in the petroleum industry.

REVENUE ASSUMPTIONS

The only direct revenues received by the state as a consequence of the Bering-Norton development would be property taxes from onshore facility construction, such as the Cape Nome oil terminal and LNG facility, and onshore and nearshore pipelines. As shown in Table 27, by the end of the period, such revenues amount to between 0 for the exploration-only scenario to as much as over 80 million dollars annually for the high-find scenario.

Impacts of the OCS Development Scenarios

STATEWIDE IMPACTS

Population

The effect of the proposed Bering-Norton OCS developments on statewide population growth is shown in Figure 56.

In the medium-find scenario, year 2000 population reaches a level over 19,000, or about 3 percent, higher than in the base case.

The low-find developments raise year 2000 population by 7,056, or 1.1 percent; while the high find scenario raises population by 33,240

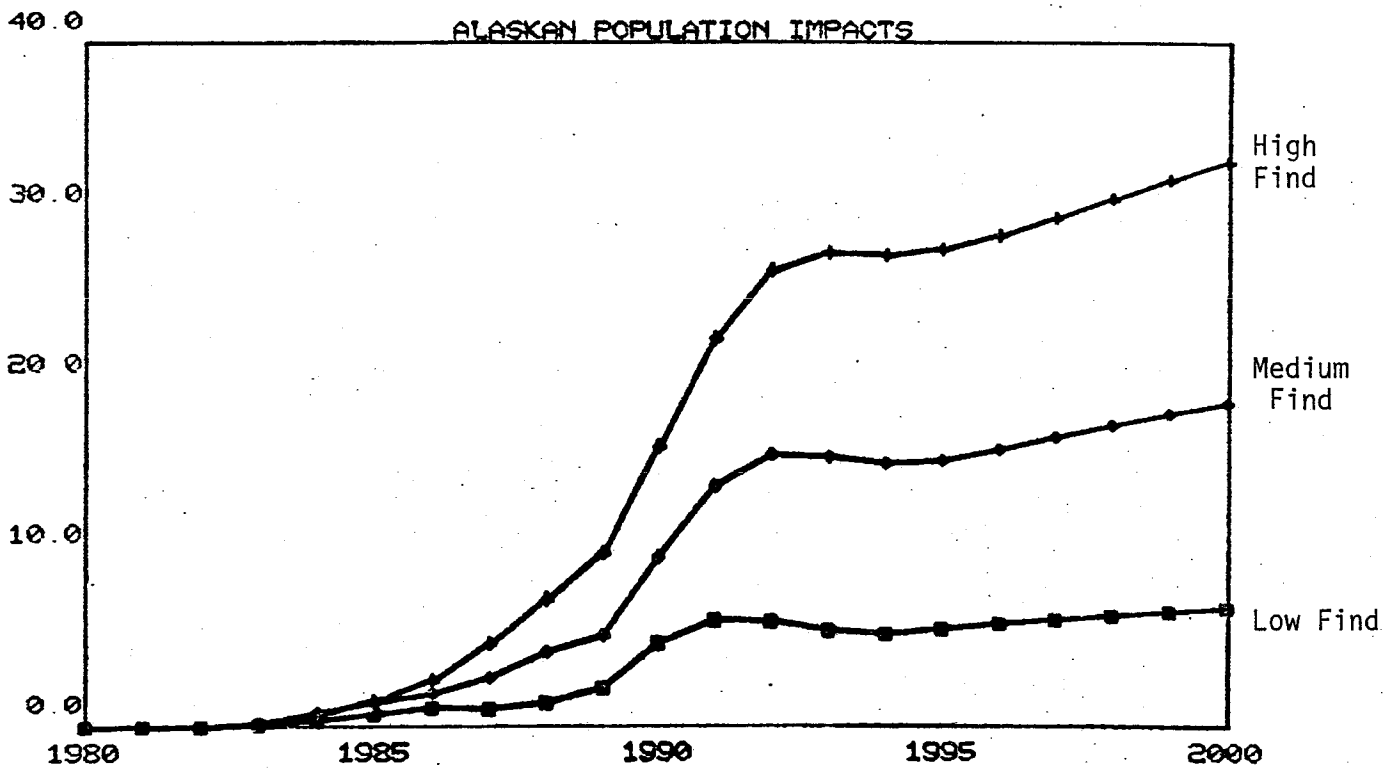
TABLE 27. DIRECT STATE PROPERTY TAX REVENUES:
BERING-NORTON OCS SALE

(Millions of Current $)

Year	Exploration-Only Scenario	Low-Find Scenario	Medium-Find Scenario	High-Find Scenario
1980	0	0	0	0
1981	0	0	0	0
1982	0	0	0	0
1983	0	0	0	0
1984	0	0	0	0
1985	0	0	1.161	2.137
1986	0	0.566	11.192	20.561
1987	0	5.457	22.303	40.968
1988	0	10.875	28.718	51.424
1989	0	14.555	29.586	58.713
1990	0	14.996	39.709	69.086
1991	0	15.421	40.804	72.046
1992	0	15.825	41.838	73.852
1993	0	16.201	42.795	75.702
1994	0	16.544	43.658	77.205
1995	0	16.846	44.406	78.502
1996	0	17.099	45.018	79.555
1997	0	17.294	45.469	80.317
1998	0	17.421	45.731	80.741
1999	0	17.469	45.772	80.769
2000	0	17.424	45.559	80.341

FIGURE 56. ALASKAN POPULATION IMPACTS

(Thousands of Persons)



	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.095	0.191	0.296	0.289
1984	0.269	0.426	0.875	0.775
1985	0.277	0.76	1.494	1.635
1986	0.159	1.182	1.991	2.824
1987	0.097	1.073	2.976	5.012
1988	0.073	1.508	4.526	7.619
1989	0.063	2.383	5.478	10.255
1990	0.057	5.014	9.928	16.521
1991	0.052	6.429	14.107	22.758
1992	0.049	6.331	16.031	26.703
1993	0.045	5.799	15.873	27.768
1994	0.043	5.573	15.471	27.627
1995	0.04	5.854	15.657	27.99
1996	0.038	6.163	16.318	28.798
1997	0.036	6.419	17.094	29.896
1998	0.033	6.647	17.798	31.019
1999	0.031	6.86	18.436	32.178
2000	0.03	7.056	19.017	33.24

SOURCE: MAP Model

by the year 2000, a 5.2 percent increase over the base case. If no commercial discoveries are made during exploration, the peak impact on state population occurs in 1985, at only 277 persons, or 0.1 percent of the base case population.

Employment

As shown in Figure 57, the peak impact on state employment in the medium-find scenario occurs at the peak of development phase activity in 1991 when total employment rises 9,896, or 3.6 percent, above the base case level. As shown in Figure 58, the bulk of this impact occurs in the support sector, where by the year 2000 employment has risen by 4,399, or over 47 percent of the total impact. Another 22 percent of total impact by 2000 is due to increased government sector employment, while 31 percent of the impact is in the basic sector.

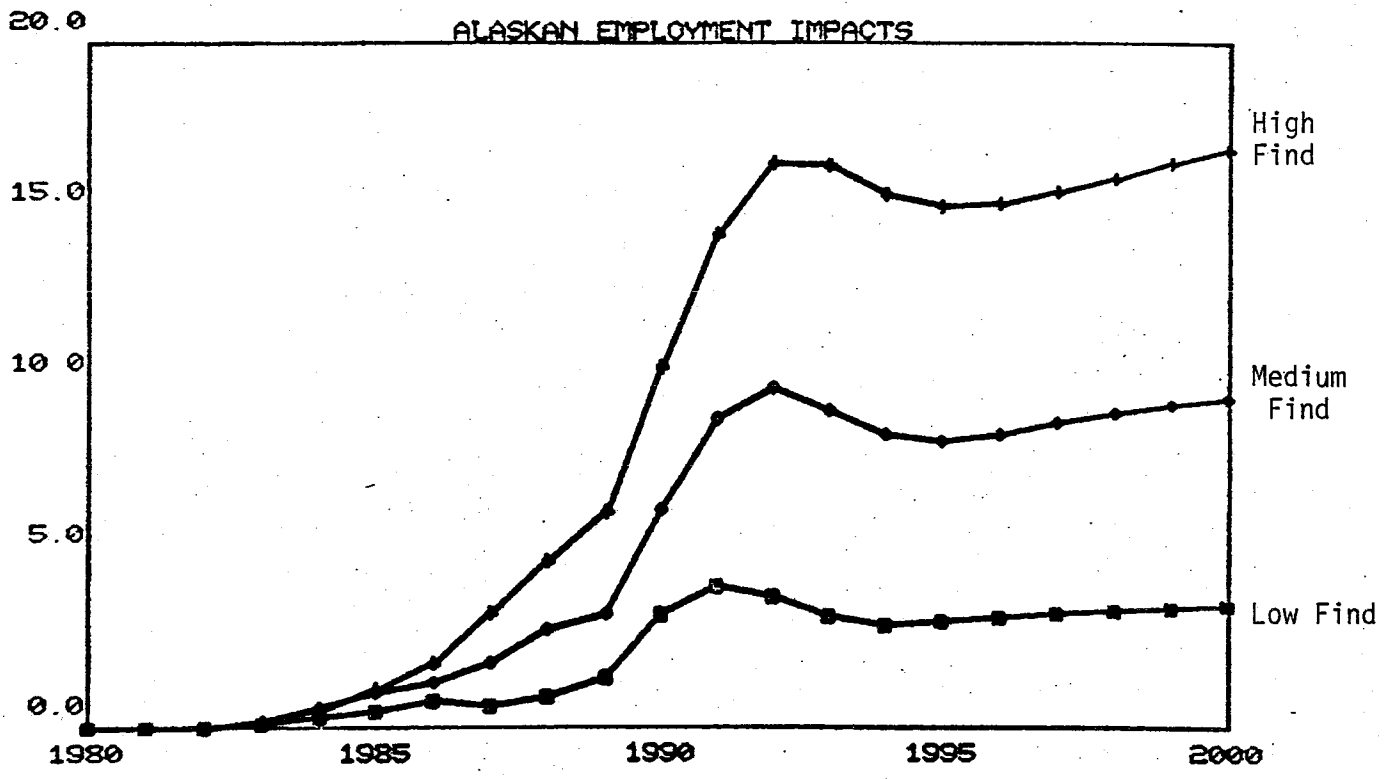
In the high-find scenario, employment impact in the year 2000 reaches 16,875, nearly 76 percent higher than the medium-find impact; while the low-find scenario employment impact reaches only 3,554, or 37 percent of the medium scenario impact. If exploration yields no commercial discoveries, then peak employment impact occurs in 1985 at 183 persons, less than 0.1 percent of statewide employment.

Personal Income Impacts

Figures 59 and 60 present the impacts of the OCS development scenarios on Alaskan real and real per capita personal income.

FIGURE 57. ALASKAN EMPLOYMENT IMPACTS

(Thousands of Persons)

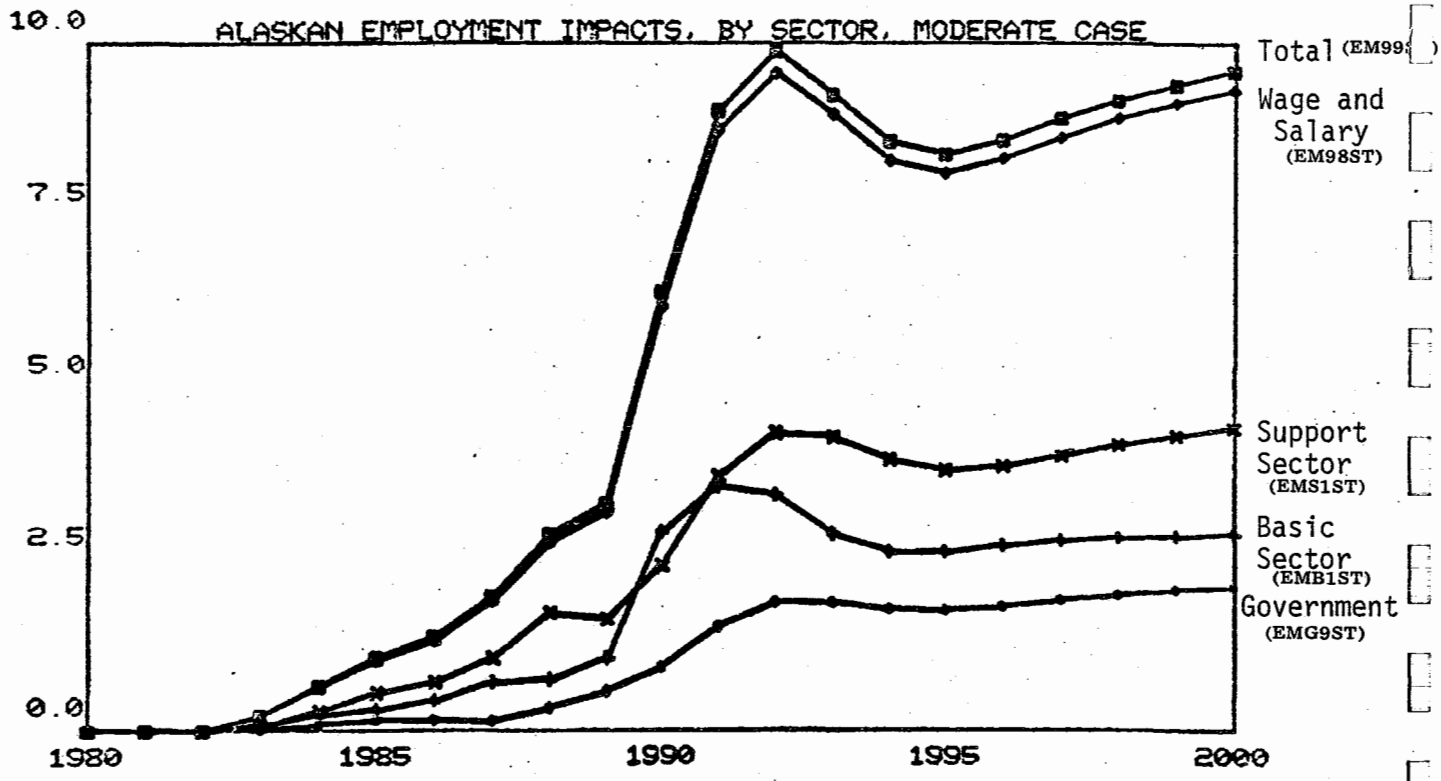


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.072	0.142	0.22	0.215
1984	0.194	0.304	0.628	0.556
1985	0.183	0.526	1.034	1.146
1986	0.083	0.797	1.326	1.932
1987	0.035	0.66	1.928	3.353
1988	0.017	0.935	2.841	4.864
1989	0.011	1.5	3.298	6.338
1990	0.01	3.309	6.391	10.548
1991	0.009	4.118	9.031	14.454
1992	0.008	3.812	9.896	16.506
1993	0.008	3.243	9.261	16.426
1994	0.007	2.96	8.563	15.584
1995	0.007	3.079	8.383	15.25
1996	0.007	3.216	8.591	15.322
1997	0.007	3.318	8.902	15.661
1998	0.007	3.406	9.172	16.051
1999	0.006	3.484	9.405	16.491
2000	0.005	3.554	9.606	16.875

SOURCE: MAP Model

FIGURE 58. ALASKAN EMPLOYMENT IMPACTS, BY SECTOR, MODERATE CASE

(Thousands of Persons)

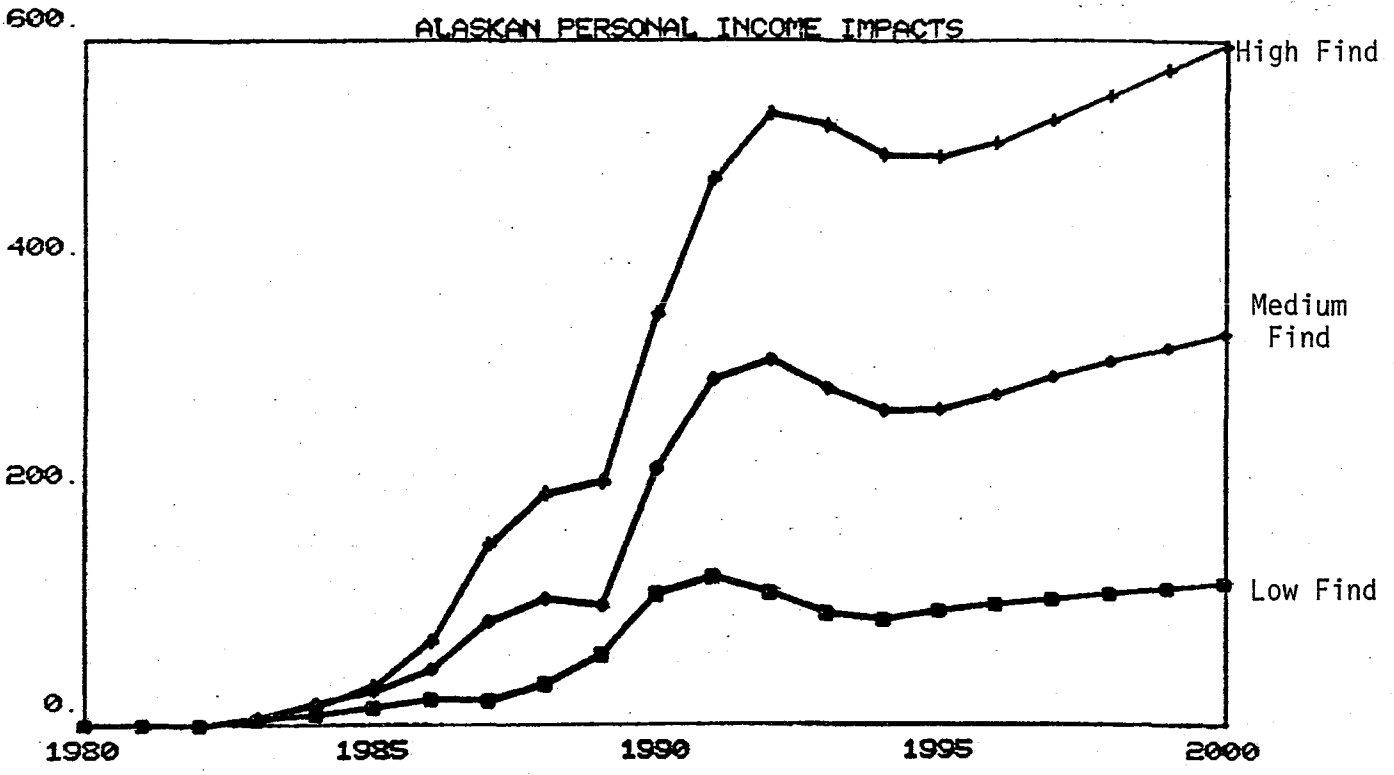


	EM99ST	EM98ST	EMB1ST	EMS1ST	EMG9ST
1980	0.	0.	0.	0.	0.
1981	0.	0.	0.	0.	0.
1982	0.	0.	0.	0.	0.
1983	0.22	0.212	0.101	0.094	0.018
1984	0.628	0.606	0.24	0.289	0.077
1985	1.034	0.997	0.307	0.542	0.147
1986	1.326	1.279	0.44	0.689	0.15
1987	1.928	1.86	0.701	1.041	0.119
1988	2.841	2.743	0.725	1.704	0.314
1989	3.298	3.186	1.029	1.608	0.548
1990	6.391	6.178	2.9	2.399	0.879
1991	9.031	8.734	3.564	3.697	1.472
1992	9.896	9.576	3.429	4.329	1.818
1993	9.261	8.965	2.869	4.269	1.827
1994	8.563	8.294	2.604	3.951	1.738
1995	8.383	8.122	2.607	3.795	1.719
1996	8.591	8.328	2.702	3.849	1.778
1997	8.902	8.635	2.772	4.	1.863
1998	9.172	8.902	2.808	4.152	1.942
1999	9.405	9.133	2.841	4.282	2.01
2000	9.606	9.334	2.871	4.399	2.064

SOURCE: MAP Model

FIGURE 59. ALASKAN PERSONAL INCOME IMPACTS

(Millions of 1979 Dollars)

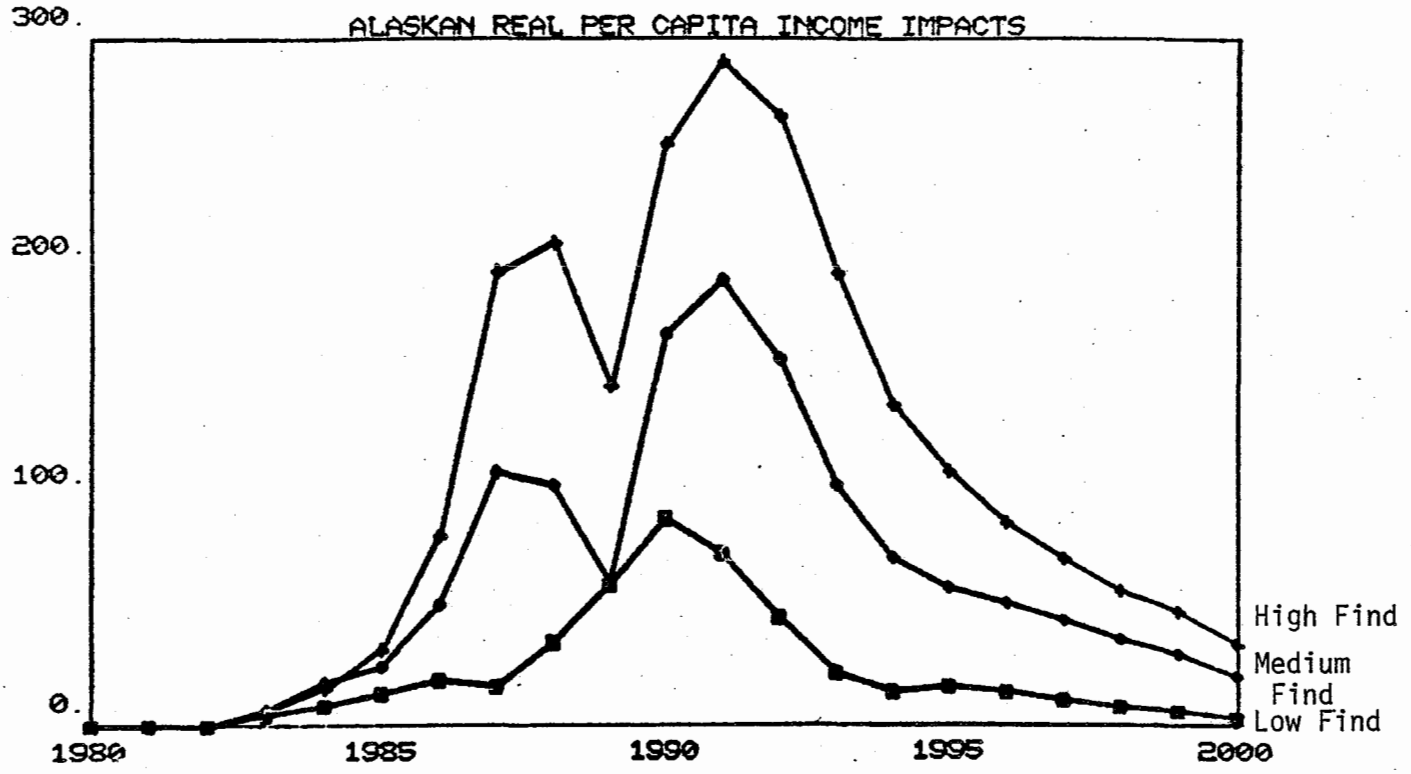


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	2.402	4.844	7.523	7.32
1984	6.324	9.516	19.742	17.402
1985	5.453	15.914	30.168	35.414
1986	2.07	23.754	49.109	74.113
1987	0.828	21.672	90.781	159.
1988	0.445	37.172	110.84	204.406
1989	0.301	62.699	105.508	214.176
1990	0.27	115.547	225.57	361.336
1991	0.246	130.582	303.305	479.297
1992	0.25	116.711	319.652	535.473
1993	0.254	98.609	294.535	525.508
1994	0.246	92.457	275.566	499.348
1995	0.23	100.137	276.18	498.227
1996	0.219	105.848	289.324	509.406
1997	0.234	110.789	304.715	530.277
1998	0.223	115.383	318.223	551.742
1999	0.246	119.73	330.41	575.234
2000	0.207	123.91	342.215	596.867

SOURCE: MAP Model

FIGURE 60. ALASKAN REAL PER CAPITA INCOME IMPACTS

(1979 Dollars)



	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	2.293	4.637	7.211	6.996
1984	6.184	8.719	18.324	16.039
1985	4.414	14.121	25.352	32.832
1986	0.207	19.41	52.035	83.172
1987	-0.875	16.801	110.711	198.383
1988	-1.086	35.539	104.566	211.211
1989	-1.105	61.105	62.297	148.535
1990	-1.02	90.469	171.117	254.172
1991	-0.961	75.34	194.691	290.363
1992	-0.879	46.395	160.043	266.934
1993	-0.785	22.469	105.066	198.102
1994	-0.734	14.371	72.832	139.926
1995	-0.703	17.004	59.234	111.363
1996	-0.66	14.305	52.648	88.992
1997	-0.59	11.141	45.172	73.07
1998	-0.535	8.266	36.629	58.027
1999	-0.457	6.344	30.176	49.352
2000	-0.473	3.461	21.59	35.004

SOURCE: MAP Model

In the medium-find scenario, personal income rises by over 342 million dollars, or 3.1 percent, by the year 2000 as a consequence of OCS developments in the Bering Sea. In real per capita terms, there are two peaks--one during the early development (construction) phase in which real per capita income rises by over $110, or about 1 percent, in 1987; and later a larger peak during the late stages of development in which real per capita income rises by nearly $195, or 1.4 percent, in 1991. By the end of the period, however, the influx of new population has largely offset the growth in income, so that real per capita income impacts by the year 2000 are negligible (about 0.1 percent).

In the high-find scenario, real personal income by the year 2000 reaches a level nearly $597 million higher than in the base case, a 74 percent greater impact than in the medium-find scenario. Real per capita income impacts follow the same pattern as in the medium-find scenario, although the impact peaks at 91 percent higher during early development and 49 percent higher during later development.

In the low-find scenario, real personal income impacts are only 36 percent of their medium-find levels; and the impact on real per capita income has a single peak, occurring in 1990, at less than 47 percent of the peak impact of the medium-find scenario.

If exploration yields no commercial discoveries, real income impacts peak at 6.3 million dollars in 1984, well under 0.1 percent of state real personal income; and real per capita incomes rise by a mere $6.20 in the same year.

Fiscal Effects

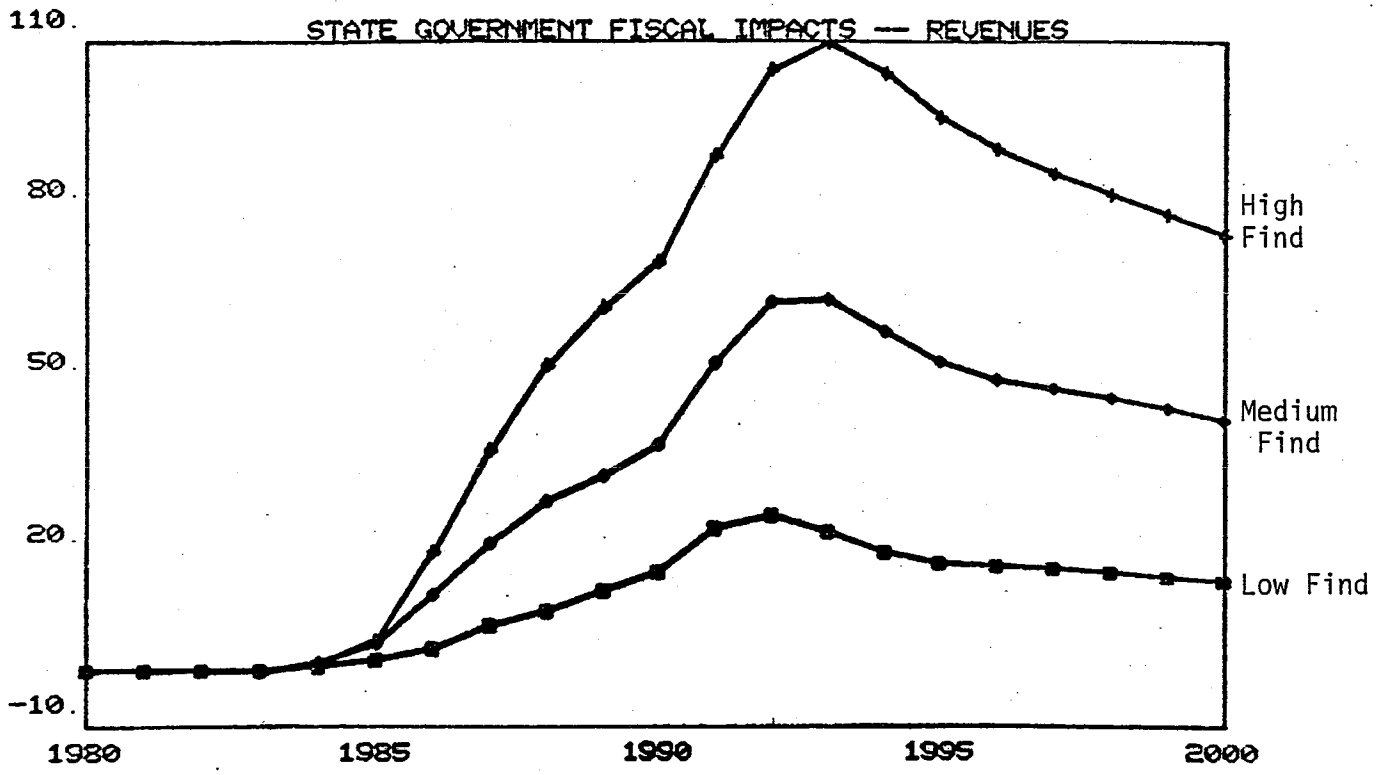
In the medium-find scenario, state government revenues rise by nearly 65 million dollars annually by 1993 as a consequence of the development, as shown in Figure 61. Expenditures, on the other hand, required to maintain real per capita services at their pre-development level, rise by as much as 125 million dollars by the end of the period, as shown in Figure 62. Because the expenditure impacts quickly overwhelm the effect on state revenues, the fund balance held by the state is drawn down by the development by about 200 million dollars, or nearly 1 percent, by the year 2000, as shown in Figures 63 and 64.

The high-find scenario, while generating 69 percent higher state revenues at the peak of development, induces sufficiently higher population growth to require 75 percent greater expenditures by the year 2000, thus drawing down state fund balances by nearly 344 million dollars by the year 2000, 72 percent more than in the medium scenario.

The low-find scenario generates only 42 percent of the peak level revenues of the medium-find scenario but also requires only 37 percent as much of an increase in expenditures as in the medium-find scenario, so that the drawdown of state fund balances is only 42 percent as severe as in the medium-find scenario.

FIGURE 61. STATE GOVERNMENT FISCAL IMPACTS: REVENUES

(Millions of 1979 Dollars)

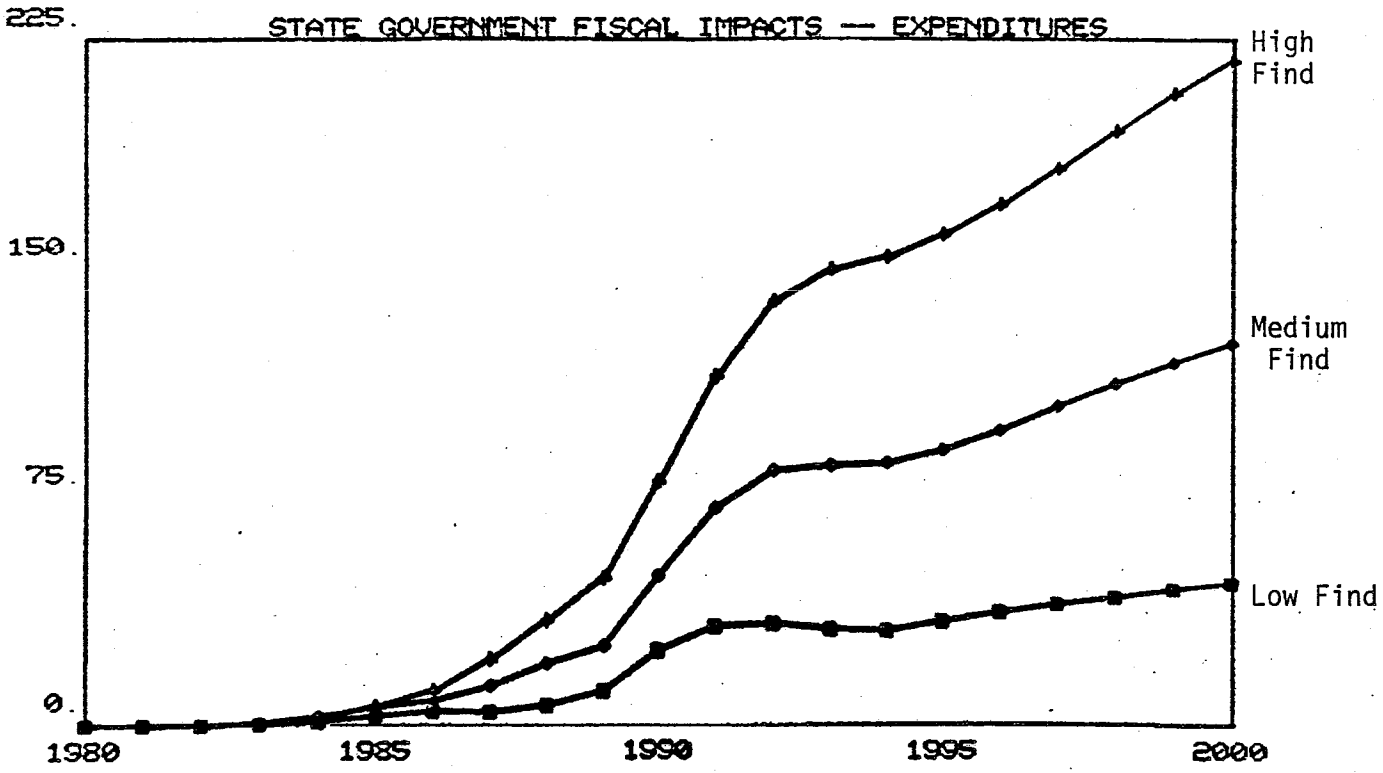


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	-0.085	-0.167	-0.259	-0.256
1984	0.4	0.646	1.285	1.149
1985	0.869	1.609	4.248	4.83
1986	0.523	3.57	12.906	20.824
1987	0.043	7.312	22.102	38.543
1988	-0.188	9.977	29.723	53.258
1989	-0.297	13.602	33.879	63.723
1990	-0.348	16.957	39.234	71.594
1991	-0.383	24.852	53.582	89.816
1992	-0.41	27.117	64.344	105.234
1993	-0.418	24.223	64.992	109.871
1994	-0.434	20.535	59.145	104.551
1995	-0.449	18.461	53.754	96.652
1996	-0.473	18.082	50.594	90.937
1997	-0.492	17.652	48.937	86.723
1998	-0.5	16.926	47.41	83.109
1999	-0.512	16.105	45.598	79.547
2000	-0.525	15.228	43.576	76.166

SOURCE: MAP Model

FIGURE 62. STATE GOVERNMENT FISCAL IMPACTS: EXPENDITURES

(Millions of 1979 Dollars)

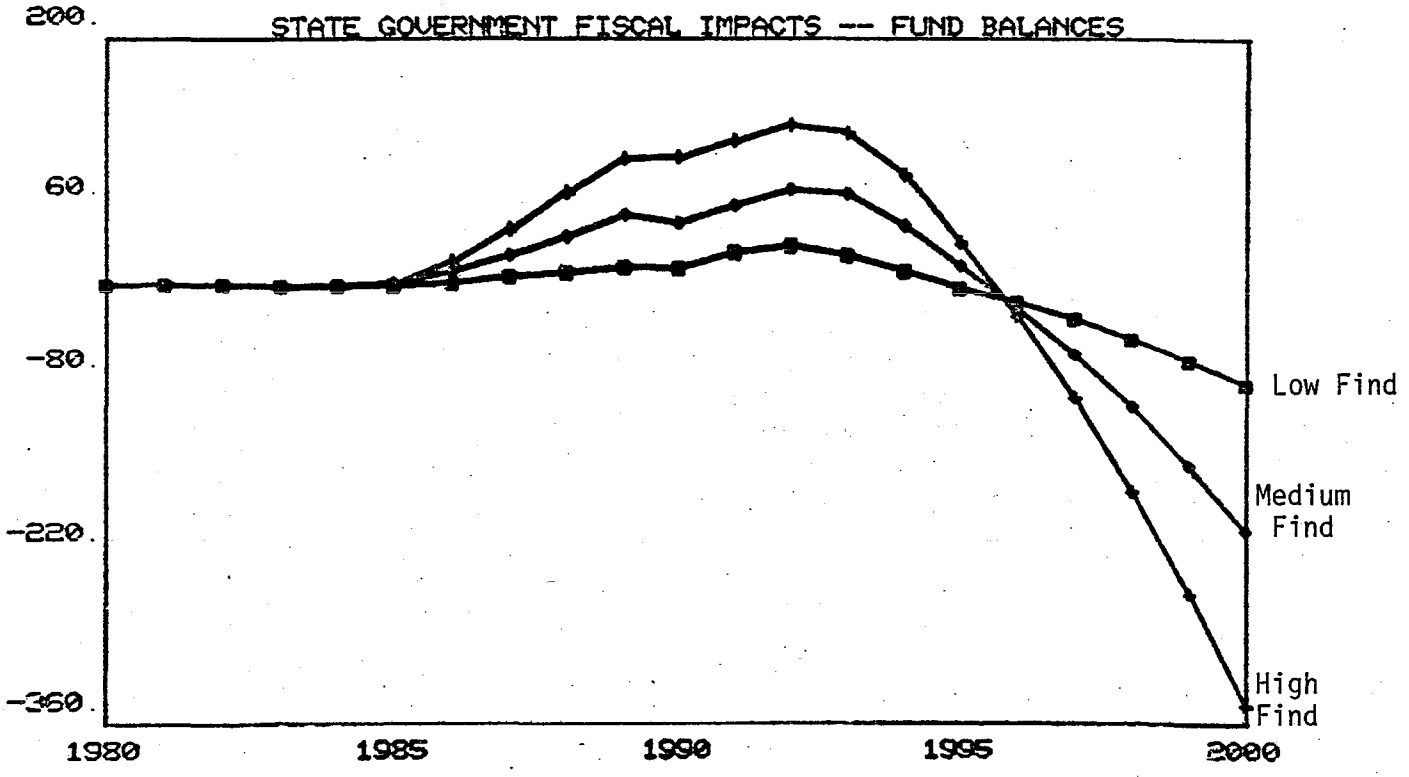


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.346	0.69	1.071	1.045
1984	1.02	1.614	3.311	2.939
1985	1.103	3.037	5.973	6.539
1986	0.664	4.96	8.358	11.847
1987	0.421	4.676	12.981	21.865
1988	0.329	6.81	20.444	34.419
1989	0.295	11.14	25.607	47.948
1990	0.271	24.333	48.189	80.189
1991	0.259	32.323	70.942	114.447
1992	0.253	32.989	83.554	139.162
1993	0.243	31.252	85.548	149.668
1994	0.232	31.094	86.335	154.165
1995	0.231	33.782	90.368	161.545
1996	0.222	36.691	97.139	171.447
1997	0.211	39.295	104.617	182.98
1998	0.214	41.743	111.765	194.782
1999	0.188	44.153	118.681	207.146
2000	0.184	46.367	124.965	218.43

SOURCE: MAP Model

FIGURE 63. STATE GOVERNMENT FISCAL IMPACTS:
FUND BALANCES

(Millions of 1979 Dollars)

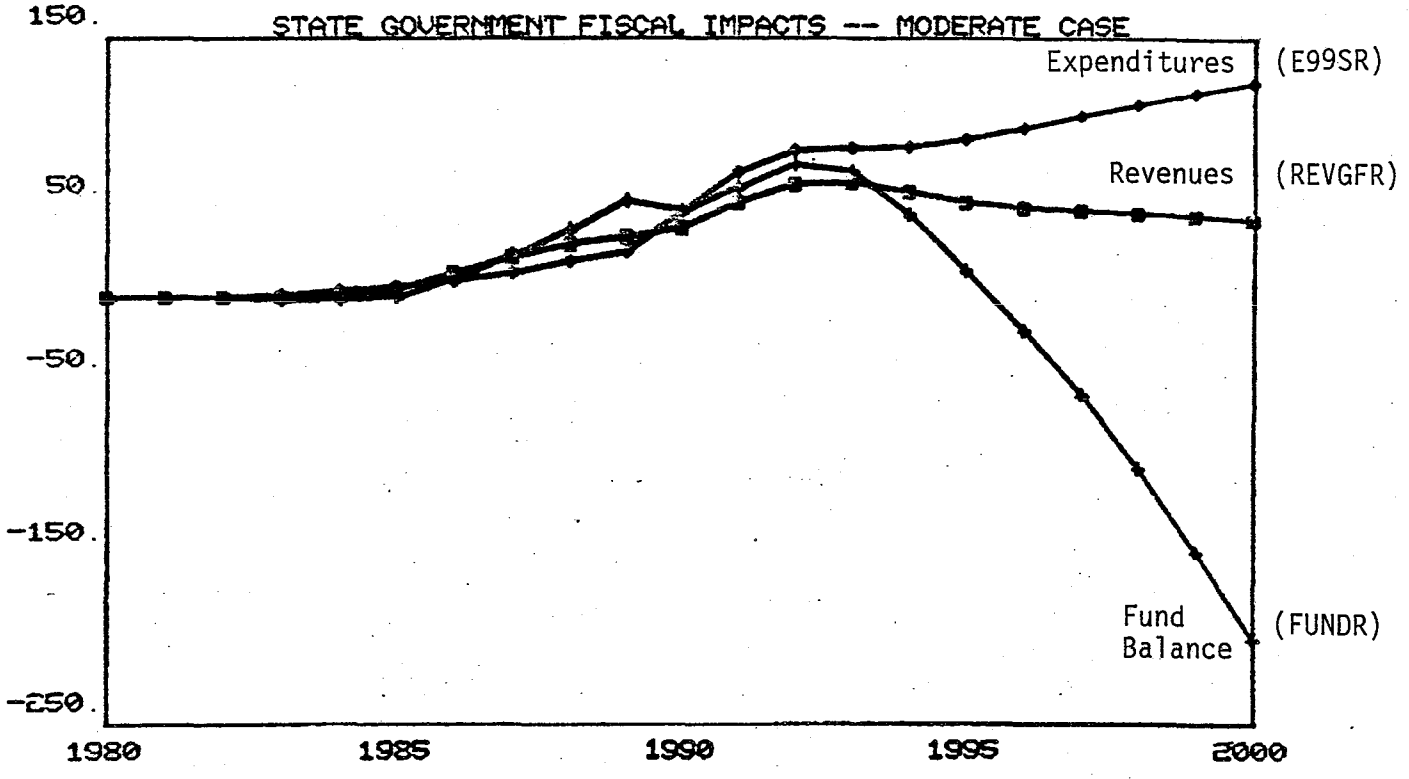


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	-0.504	-1.	-1.555	-1.52
1984	-0.445	-0.852	-1.375	-1.332
1985	0.078	-0.496	0.699	0.992
1986	-0.469	1.645	10.437	19.008
1987	-1.395	6.551	23.77	44.285
1988	-2.078	9.285	38.219	73.965
1989	-2.625	14.273	54.699	101.809
1990	-3.07	13.266	49.203	103.09
1991	-3.488	25.602	62.598	117.238
1992	-3.914	30.562	75.887	129.918
1993	-4.301	23.707	71.883	123.375
1994	-4.652	10.77	46.793	87.703
1995	-4.984	-2.934	14.496	34.301
1996	-5.324	-15.027	-20.289	-25.301
1997	-5.672	-28.953	-58.176	-92.727
1998	-5.945	-45.234	-100.691	-168.191
1999	-6.273	-63.516	-148.574	-252.984
2000	-6.504	-83.172	-200.379	-343.906

SOURCE: MAP Model

FIGURE 64. STATE GOVERNMENT FISCAL IMPACTS:
MODERATE CASE

(Millions of 1979 Dollars)



	E99SR	REVGFR	FUNDR
1980	0.	0.	0.
1981	0.	0.	0.
1982	0.	0.	0.
1983	1.071	-0.259	-1.555
1984	3.311	1.285	-1.375
1985	5.973	4.248	0.699
1986	8.358	12.906	10.437
1987	12.981	22.102	23.77
1988	20.444	29.723	38.219
1989	25.607	33.879	54.699
1990	48.189	39.234	49.203
1991	70.942	53.582	62.598
1992	83.554	64.344	75.887
1993	85.548	64.992	71.883
1994	86.335	59.145	46.793
1995	90.368	53.754	14.496
1996	97.139	50.594	-20.289
1997	104.617	48.937	-58.176
1998	111.765	47.41	-100.691
1999	118.681	45.598	-148.574
2000	124.965	43.576	-200.379

SOURCE: MAP Model

REGIONAL IMPACTS

Anchorage

Population. In the medium-find development scenario, Anchorage population is increased by 7,087, or 2.5 percent, by the year 2000 over its base case level, as shown in Figure 65. This amounts to 37 percent of the total statewide population impact.

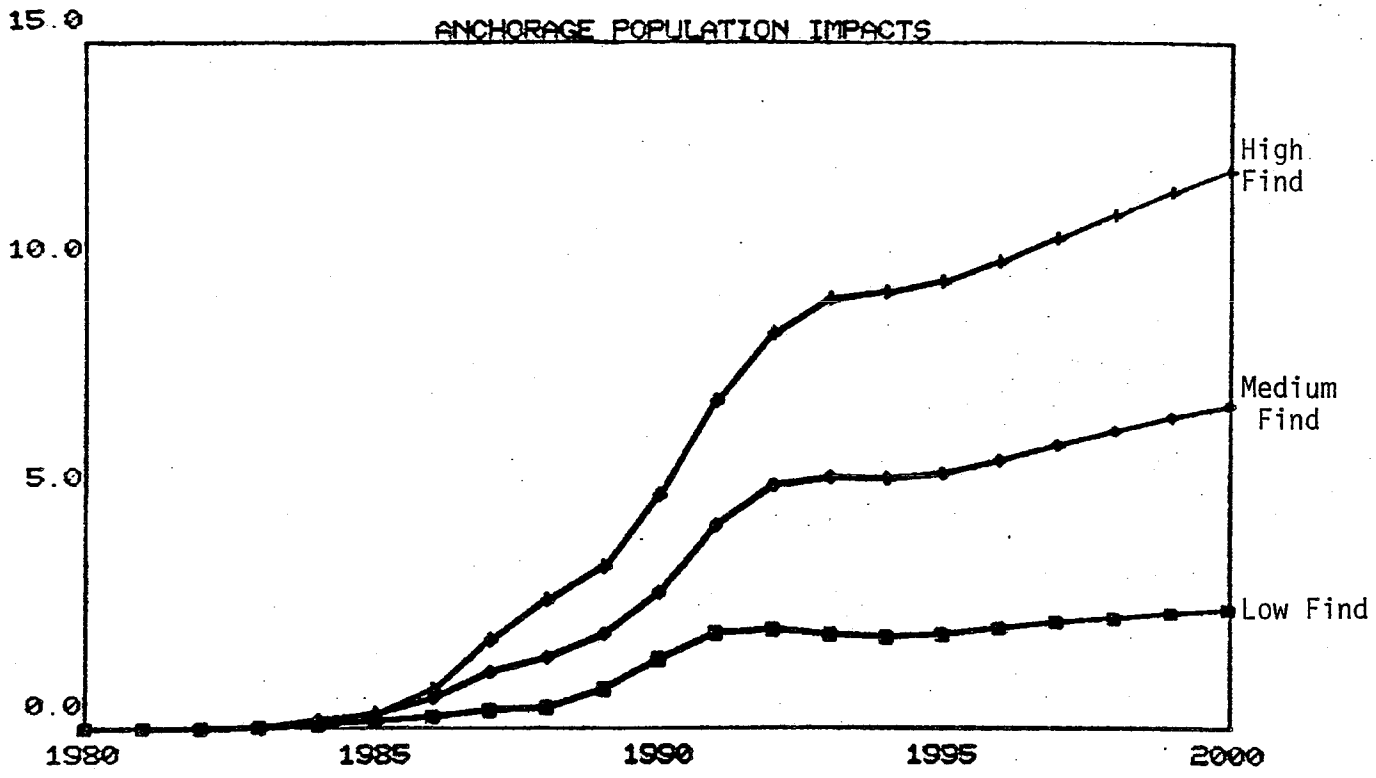
High-find scenario developments raise Anchorage population by 12,262 in 2000, a 73 percent greater impact than associated with the medium find. Low-find scenario impacts on population reach only 2,623, or 37 percent of the medium-find impact. If exploration is unsuccessful, peak Anchorage population impact of 94 persons occurs in 1985.

Employment. As shown in Figure 66, medium-find OCS development raises Anchorage employment by 3,541 by the year 2000, 36 percent of the statewide employment impact. As shown in Figure 67, the bulk of this impact (76 percent) occurs in the support sector, and less than 5 percent occurs in the basic sector, with the remainder due to increased government employment.

In the high-find scenario, employment rises by 6,180 persons by the year 2000, 74.5 percent higher than the medium-find impact. In the low-find scenario, employment by the year 2000 is 1,294 higher than in the base case, less than 37 percent of the medium-find impact. If exploration is unsuccessful, total employment impact in Anchorage peaks at only 70 persons in 1985.

FIGURE 65. ANCHORAGE POPULATION IMPACTS

(Thousands of Persons)

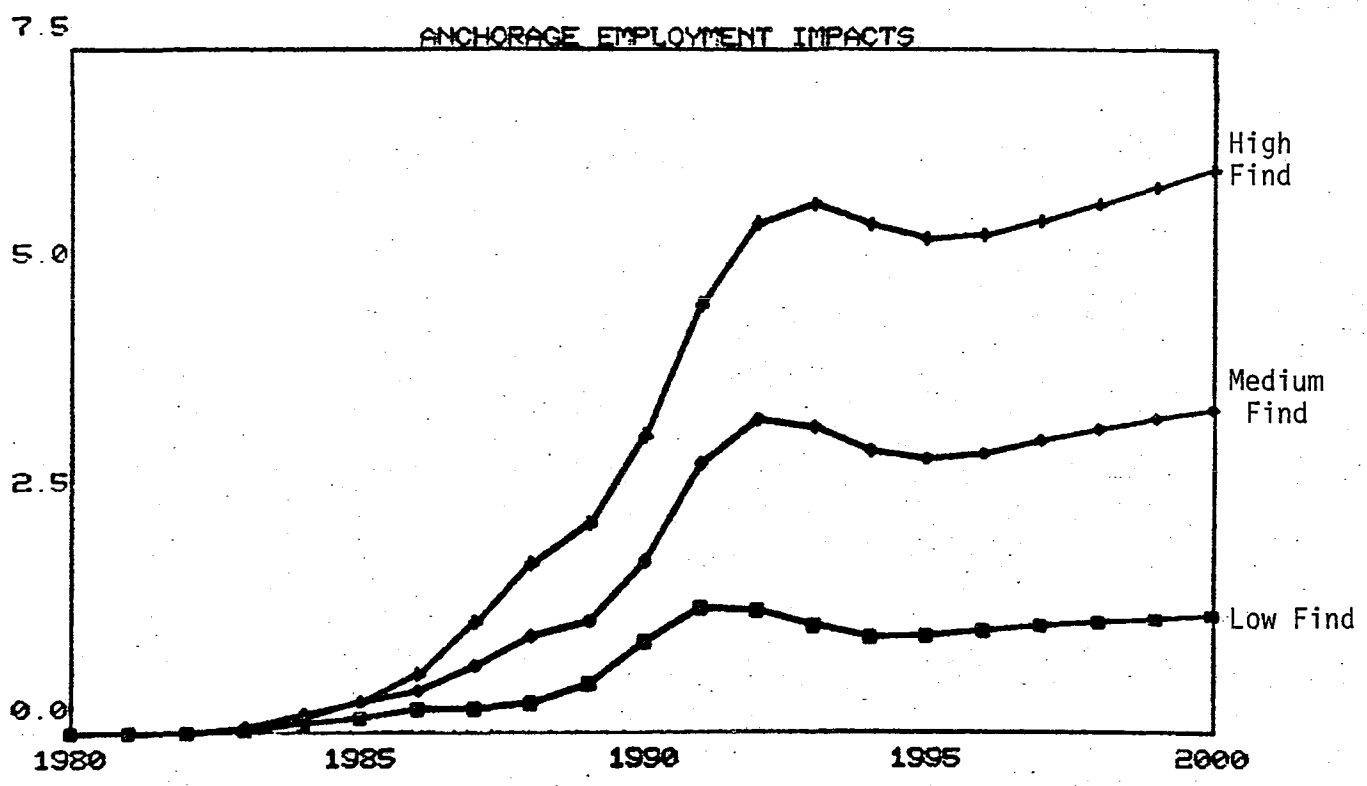


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.015	0.031	0.051	0.049
1984	0.064	0.108	0.2	0.185
1985	0.094	0.177	0.328	0.346
1986	0.073	0.284	0.656	0.872
1987	0.046	0.413	1.233	1.951
1988	0.035	0.477	1.54	2.866
1989	0.03	0.856	2.052	3.598
1990	0.027	1.512	2.992	5.117
1991	0.024	2.079	4.468	7.213
1992	0.023	2.159	5.319	8.709
1993	0.021	2.054	5.505	9.433
1994	0.02	1.991	5.47	9.591
1995	0.018	2.073	5.584	9.827
1996	0.017	2.213	5.865	10.245
1997	0.016	2.332	6.208	10.748
1998	0.015	2.437	6.533	11.269
1999	0.014	2.535	6.826	11.785
2000	0.014	2.623	7.087	12.262

SOURCE: MAP Model

FIGURE 66. ANCHORAGE EMPLOYMENT IMPACTS

(Thousands of Persons)

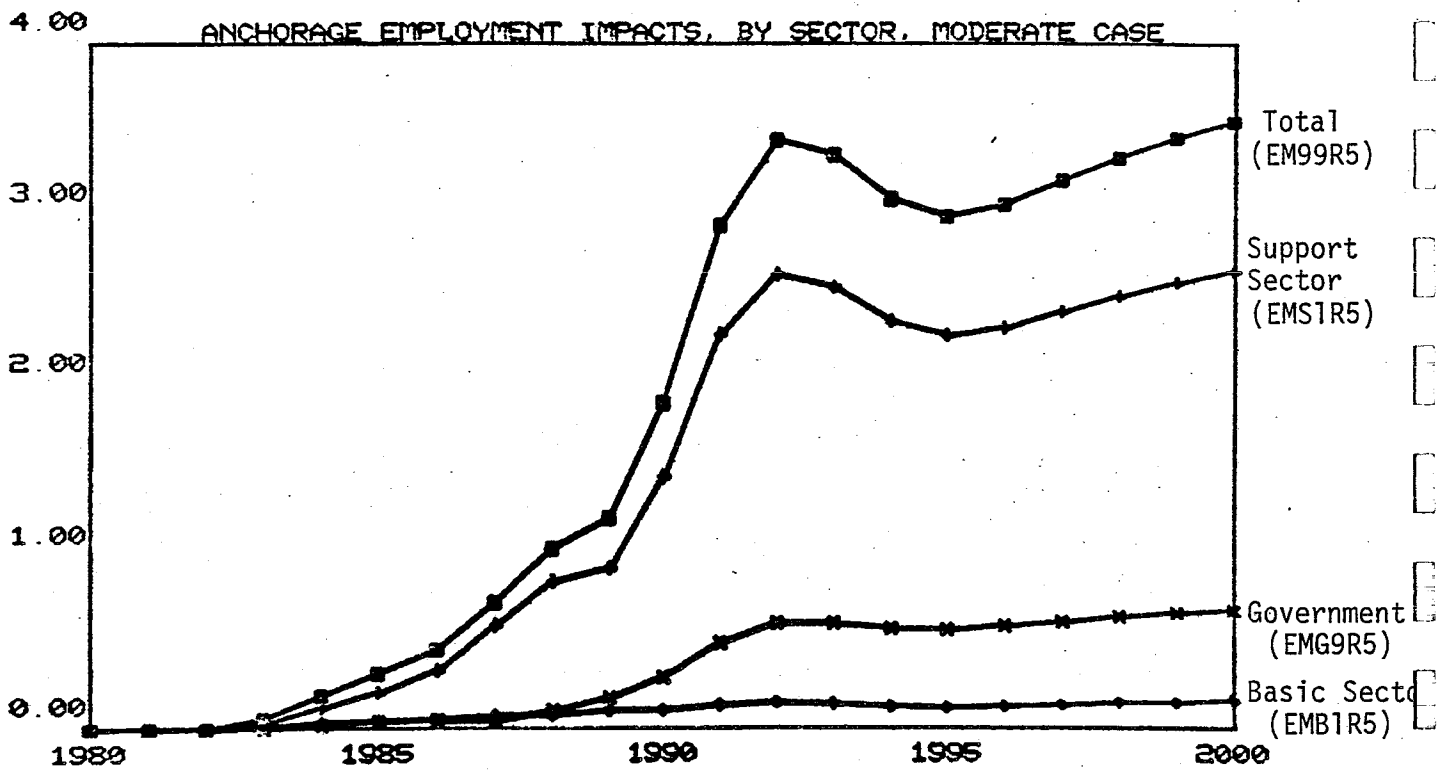


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.021	0.041	0.065	0.064
1984	0.062	0.101	0.2	0.181
1985	0.07	0.169	0.329	0.352
1986	0.04	0.257	0.464	0.651
1987	0.017	0.263	0.736	1.226
1988	0.008	0.315	1.052	1.884
1989	0.005	0.534	1.231	2.312
1990	0.005	0.999	1.895	3.26
1991	0.004	1.381	2.941	4.707
1992	0.004	1.358	3.425	5.595
1993	0.004	1.182	3.343	5.799
1994	0.003	1.057	3.095	5.569
1995	0.003	1.066	3.	5.42
1996	0.003	1.132	3.067	5.465
1997	0.003	1.182	3.201	5.611
1998	0.003	1.224	3.332	5.799
1999	0.003	1.261	3.443	5.994
2000	0.003	1.294	3.541	6.18

SOURCE: MAP Model

FIGURE 67. ANCHORAGE EMPLOYMENT IMPACTS, BY SECTOR, MODERATE CASE

(Thousands of Persons)



	EM99R5	EMB1R5	EMS1R5	EMG9R5
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.065	0.018	0.041	0.005
1984	0.2	0.043	0.132	0.026
1985	0.329	0.053	0.227	0.049
1986	0.464	0.06	0.352	0.053
1987	0.736	0.081	0.608	0.048
1988	1.052	0.081	0.862	0.108
1989	1.231	0.112	0.933	0.186
1990	1.895	0.107	1.482	0.306
1991	2.941	0.139	2.301	0.501
1992	3.425	0.155	2.655	0.615
1993	3.343	0.15	2.576	0.617
1994	3.095	0.132	2.376	0.587
1995	3.	0.128	2.292	0.58
1996	3.067	0.132	2.335	0.599
1997	3.201	0.142	2.433	0.627
1998	3.332	0.152	2.528	0.652
1999	3.443	0.158	2.61	0.675
2000	3.541	0.168	2.681	0.692

SOURCE: MAP Model

Personal Income. As shown in Figure 68, the impact of the medium-find OCS development scenario on Anchorage personal income occurs in the year 2000 and amounts to over 122 million dollars, or a 2.5 percent increase representing 36 percent of the total statewide impact. In real per capita terms, as shown in Figure 69, there are two peaks--an early development peak of 94.7 dollars in 1988 and a later peak of 167 dollars in 1991, followed by an almost complete dissipation of the growth by an expanding population.

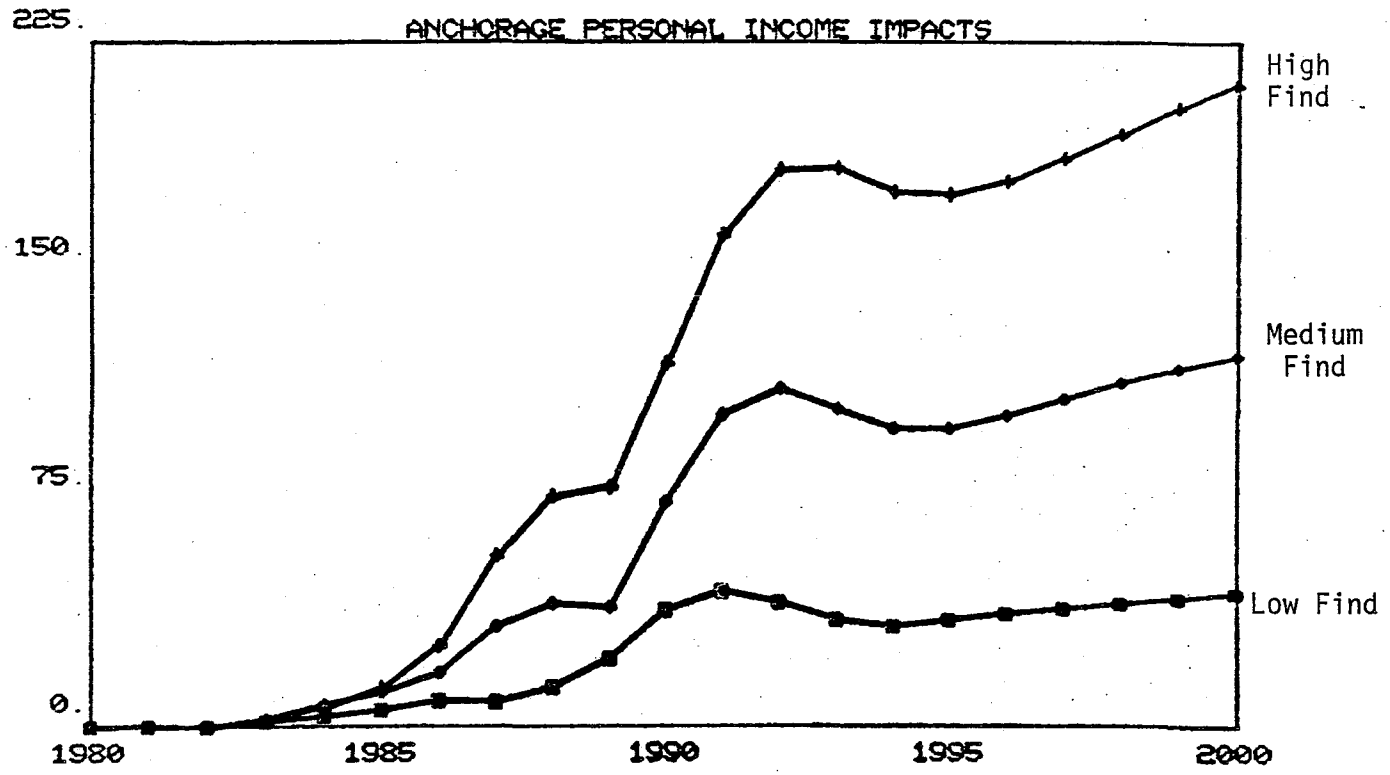
High-find impacts peak at nearly 50 percent higher than in the medium-find scenario, and low-find impacts reach only 39 percent of the impacts of the medium-find case. If exploration yields no commercial discoveries, real income impacts peak at 2.3 million dollars in 1984, when real per capita incomes go up by a mere $7.20.

Norton Sound

Population. Unlike the impacts in Anchorage and the state as a whole, the effect of medium-find developments on the Norton Sound population occur during the drilling rather than production phase of the project. As shown in Figure 70, population impact peaks in 1991 at 5,310 persons, a nearly 40 percent increase in Norton Sound population. By 2000, however, as direct employment declines to a stable operating force, total population impact falls to 3,688 persons, a 24.4 percent increase in the region's population. While this is only 19 percent of the statewide population impact, its concentration in the small Norton Sound area makes it perhaps the most significant impact.

FIGURE 68. ANCHORAGE PERSONAL INCOME IMPACTS

(Millions of 1979 Dollars)

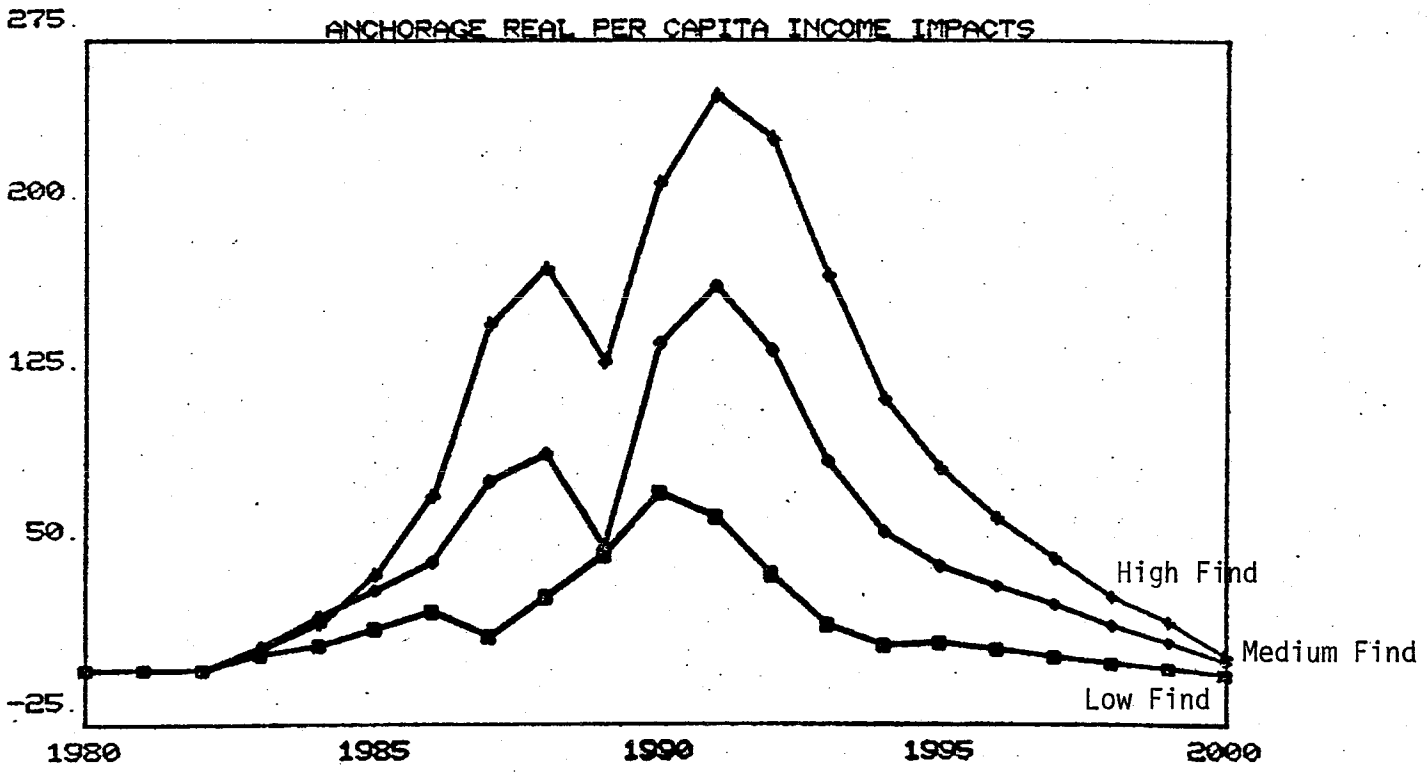


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.852	1.727	2.702	2.647
1984	2.305	3.548	7.302	6.488
1985	2.115	5.889	11.085	12.787
1986	0.911	8.734	17.861	26.703
1987	0.371	8.353	33.069	56.933
1988	0.202	13.03	40.761	75.882
1989	0.142	22.523	39.428	78.922
1990	0.128	38.404	73.859	120.117
1991	0.115	44.824	102.585	161.804
1992	0.116	41.115	110.833	183.178
1993	0.122	35.235	104.284	183.344
1994	0.118	32.823	97.853	175.64
1995	0.112	34.963	97.718	174.942
1996	0.109	37.248	102.166	179.252
1997	0.117	39.148	107.812	186.719
1998	0.109	40.895	113.02	194.848
1999	0.121	42.613	117.875	203.836
2000	0.105	44.117	122.168	211.766

SOURCE: MAP Model

FIGURE 69. ANCHORAGE REAL PER CAPITA INCOME IMPACTS

(1979 Dollars)

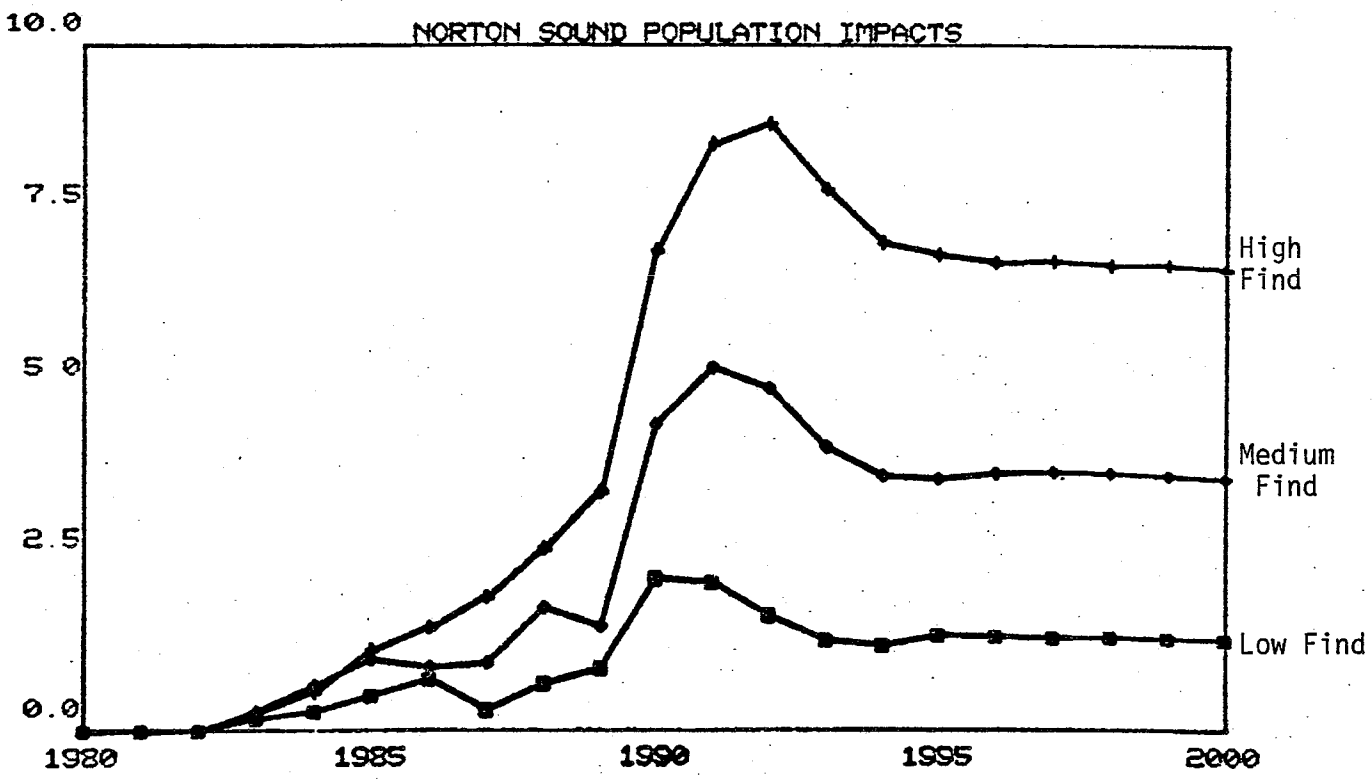


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	3.164	6.367	9.805	9.621
1984	7.203	10.574	23.066	20.09
1985	4.633	18.012	34.195	41.316
1986	-0.016	25.055	46.57	76.125
1987	-1.059	14.566	81.902	150.922
1988	-1.238	31.375	94.715	175.32
1989	-1.203	49.582	52.355	135.117
1990	-1.09	77.113	142.207	213.926
1991	-1.012	66.023	167.258	250.73
1992	-0.918	41.023	139.582	232.437
1993	-0.785	19.352	91.316	172.633
1994	-0.73	10.734	59.645	118.805
1995	-0.676	11.605	44.59	88.625
1996	-0.625	8.93	36.332	65.414
1997	-0.57	5.637	27.992	47.941
1998	-0.5	2.543	18.965	31.816
1999	-0.395	0.223	11.574	20.734
2000	-0.465	-2.758	2.863	6.098

SOURCE: MAP Model

FIGURE 70. NORTON SOUND POPULATION IMPACTS

(Thousands of Persons)



	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.095	0.189	0.289	0.283
1984	0.198	0.294	0.673	0.578
1985	0.108	0.524	1.048	1.206
1986	0.006	0.759	0.942	1.536
1987	0.004	0.308	0.998	2.
1988	0.003	0.7	1.832	2.708
1989	0.003	0.926	1.534	3.504
1990	0.002	2.265	4.473	7.015
1991	0.002	2.211	5.31	8.597
1992	0.002	1.718	5.018	8.874
1993	0.002	1.337	4.146	7.916
1994	0.002	1.262	3.729	7.14
1995	0.002	1.402	3.683	6.961
1996	0.002	1.392	3.756	6.847
1997	0.002	1.382	3.785	6.857
1998	0.002	1.371	3.761	6.816
1999	0.002	1.356	3.726	6.811
2000	0.002	1.341	3.688	6.747

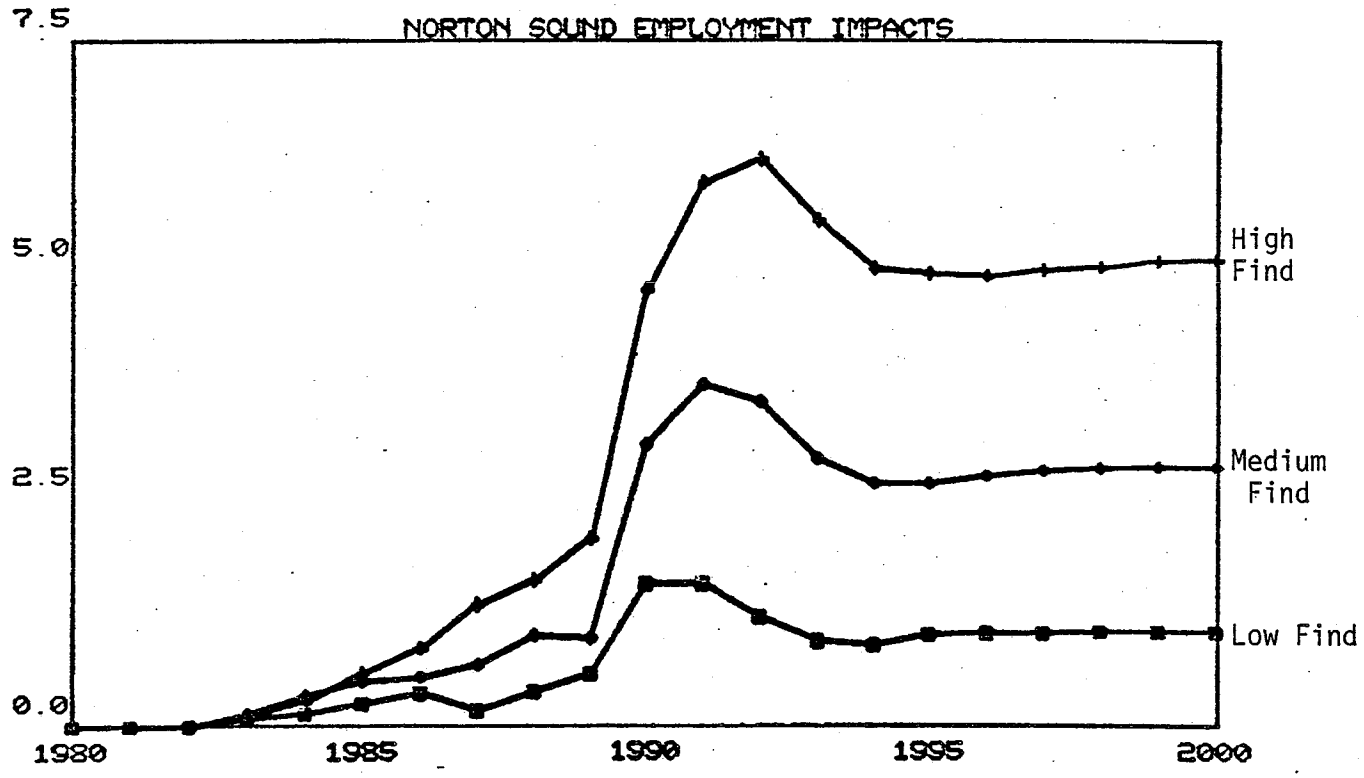
SOURCE: MAP Model

In the high-find scenario, Norton Sound population rises by 8,874 at the peak of development in 1992, a 65.8 percent rise in regional population, and falls eventually to a long-term impact of 6,747, a 44.6 percent rise in regional population over the base case. In the low-find scenario, population impact peaks in 1990 at 2,265 persons, a 17.3 percent increase in regional population, falling to a long-term impact of 1,341, or an 8.9 percent population increase. If exploration is unsuccessful, population impact peaks at 198 persons in 1984.

Employment. As shown in Figure 71, the OCS developments of the medium-find scenario have impacts on Norton Sound employment which peak during drilling operations in 1991 at 3,731 persons, representing a more than doubling of regional employment. By the year 2000, this impact has declined to 2,853 persons, a 62 percent increase in regional employment, constituting 29 percent of the statewide impact of such development. As shown in Figure 72, this employment impact is far different from that associated with Anchorage or the state as a whole, inasmuch as the bulk of the impact is in the basic sector, primarily the direct employment engaged in OCS operations. By 2000, 86 percent of the regional employment impact is in the basic sector. Only 13 percent of the employment impact is in the support sector, reflecting both the enclave nature of development and the traditional propensity for income in the region to be spent elsewhere in the state. The remaining 1 percent of total impact is due to increased government employment.

FIGURE 71. NORTON SOUND EMPLOYMENT IMPACTS

(Thousands of Persons)

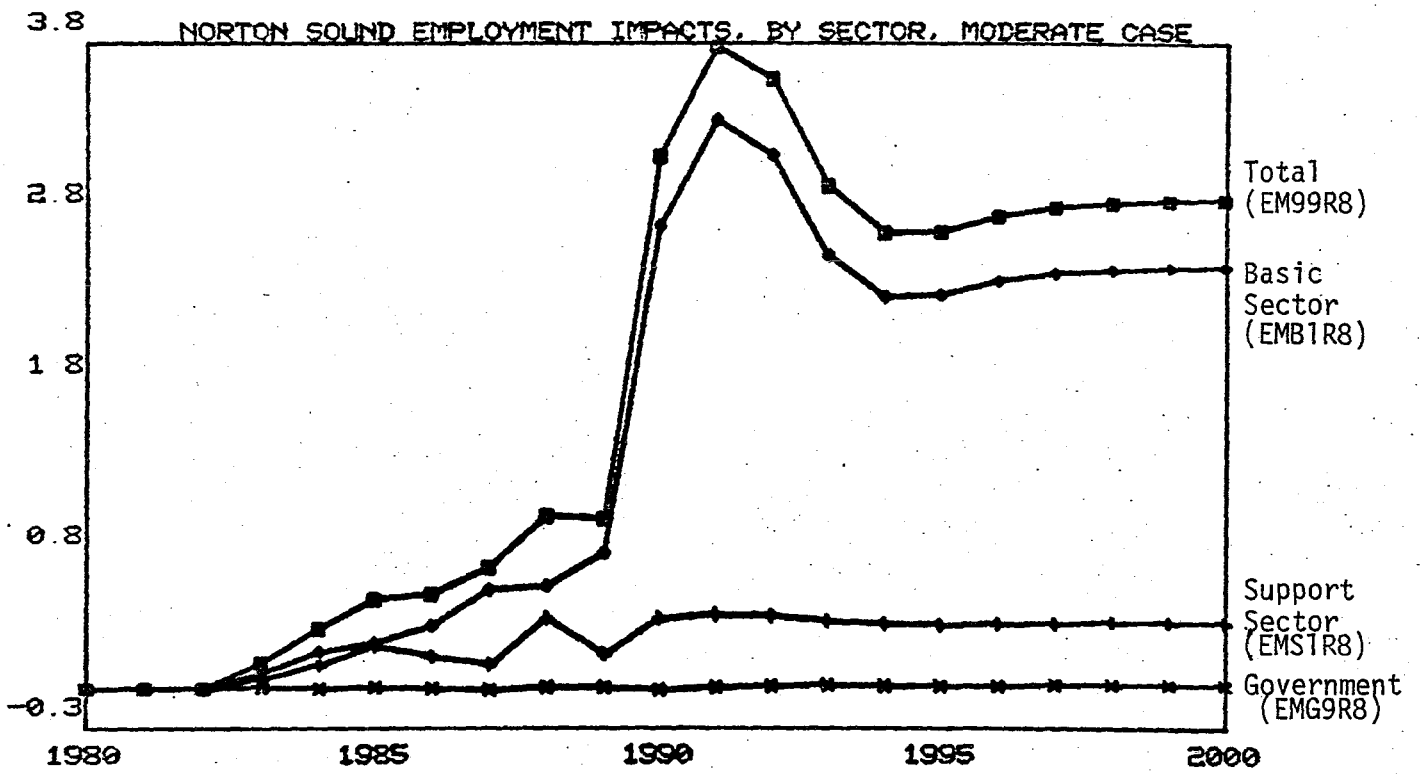


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.047	0.094	0.144	0.14
1984	0.104	0.152	0.343	0.295
1985	0.058	0.259	0.508	0.601
1986	0.001	0.377	0.542	0.877
1987	0.001	0.18	0.694	1.342
1988	0.	0.389	0.998	1.599
1989	0.	0.586	0.978	2.051
1990	0.	1.558	3.094	4.773
1991	0.	1.557	3.731	5.964
1992	0.	1.206	3.539	6.198
1993	0.	0.941	2.927	5.553
1994	0.	0.902	2.659	5.027
1995	0.	1.021	2.664	4.961
1996	0.	1.028	2.754	4.938
1997	0.	1.034	2.811	5.006
1998	0.	1.04	2.828	5.036
1999	0.	1.045	2.842	5.1
2000	0.	1.049	2.853	5.121

SOURCE: MAP Model

FIGURE 72. NORTON SOUND EMPLOYMENT IMPACTS, BY SECTOR, MODERATE CASE

(Thousands of Persons)



	EM99R8	EMB1R8	EMS1R8	EMG9R8
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	0.144	0.088	0.056	0.
1984	0.343	0.206	0.137	-0.
1985	0.508	0.26	0.246	0.002
1986	0.542	0.36	0.185	-0.002
1987	0.694	0.563	0.14	-0.009
1988	0.998	0.588	0.405	0.004
1989	0.978	0.776	0.198	0.004
1990	3.094	2.695	0.408	-0.009
1991	3.731	3.298	0.429	0.004
1992	3.539	3.103	0.422	0.014
1993	2.927	2.519	0.391	0.018
1994	2.659	2.272	0.372	0.015
1995	2.664	2.282	0.368	0.013
1996	2.754	2.367	0.373	0.014
1997	2.811	2.416	0.377	0.017
1998	2.828	2.429	0.38	0.019
1999	2.842	2.444	0.38	0.019
2000	2.853	2.451	0.38	0.021

SOURCE: MAP Model

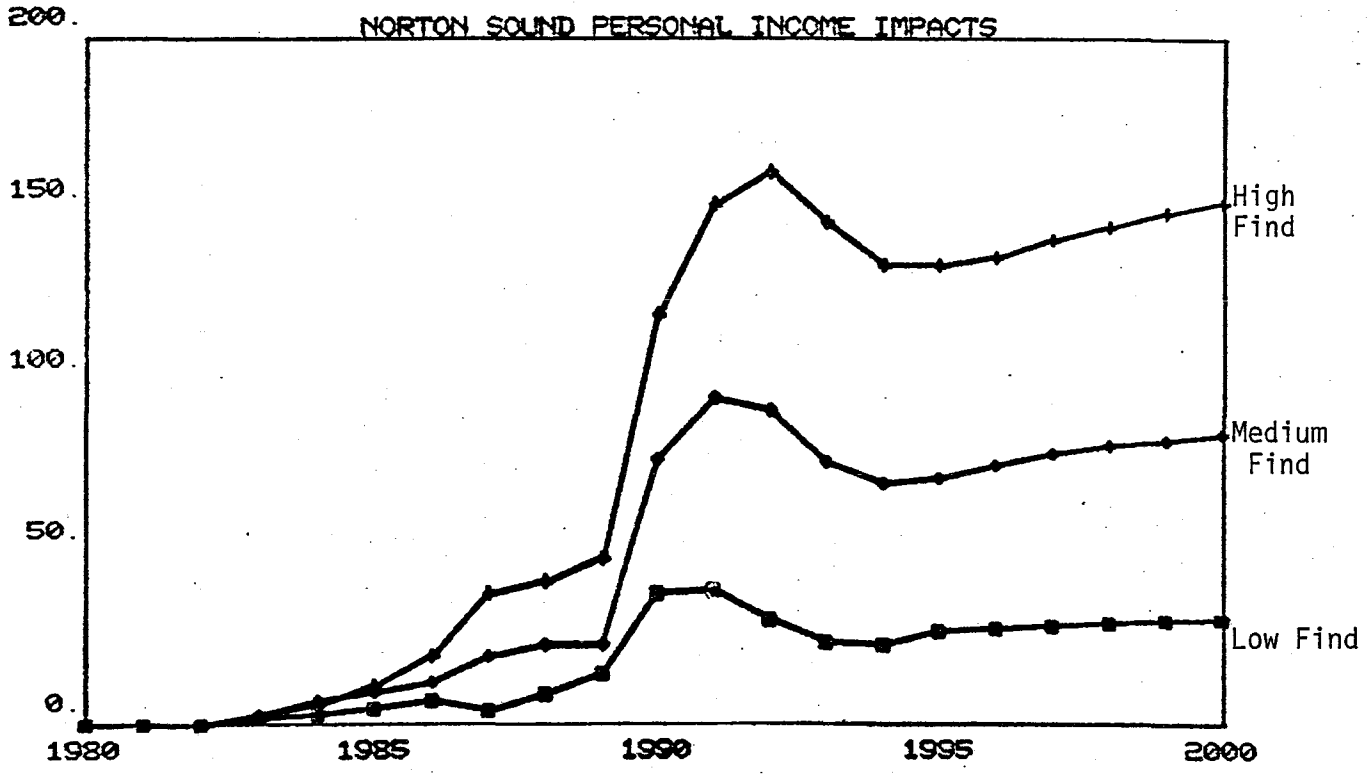
In the high-find scenario, peak employment impact occurs in 1992 and is 66 percent larger than in the medium-find scenario. In the low-find scenario, the peak occurs in 1990, at less than 42 percent the level of the medium-find scenario. Should exploration prove unsuccessful, maximum employment impact of 104 persons occurs in 1984.

Personal Income. Figures 73 and 74 present the impacts of Bering-Norton OCS development on Norton Sound real personal income and real per capita income, respectively.

In the medium-find scenario, personal income increases by 95.2 million dollars, or 91 percent, at the peak of development, falling to a long-run impact of 85.1 million dollars, or a 55.5 percent gain in regional income, constituting about 25 percent of the statewide income impact. In real per capita terms, income rises 2,877 dollars at the peak in 1991, a 36.6 percent rise in real per capita incomes. Unlike the statewide and Anchorage impacts on real per capita income, however, the Norton Sound gains are not dissipated over time for two reasons. First, the excess migration into the region in response to the new employment is much less significant in an isolated area such as Nome than a more open area such as Anchorage. Second, because both the initial peak and the long-run impact consist of highly paid basic sector workers, there is no gradual shift over time toward an increased dominance by lower-paid support sector and government workers in total impact, as is the case both statewide and in Anchorage.

FIGURE 73. NORTON SOUND PERSONAL INCOME IMPACTS

(Millions of 1979 Dollars)

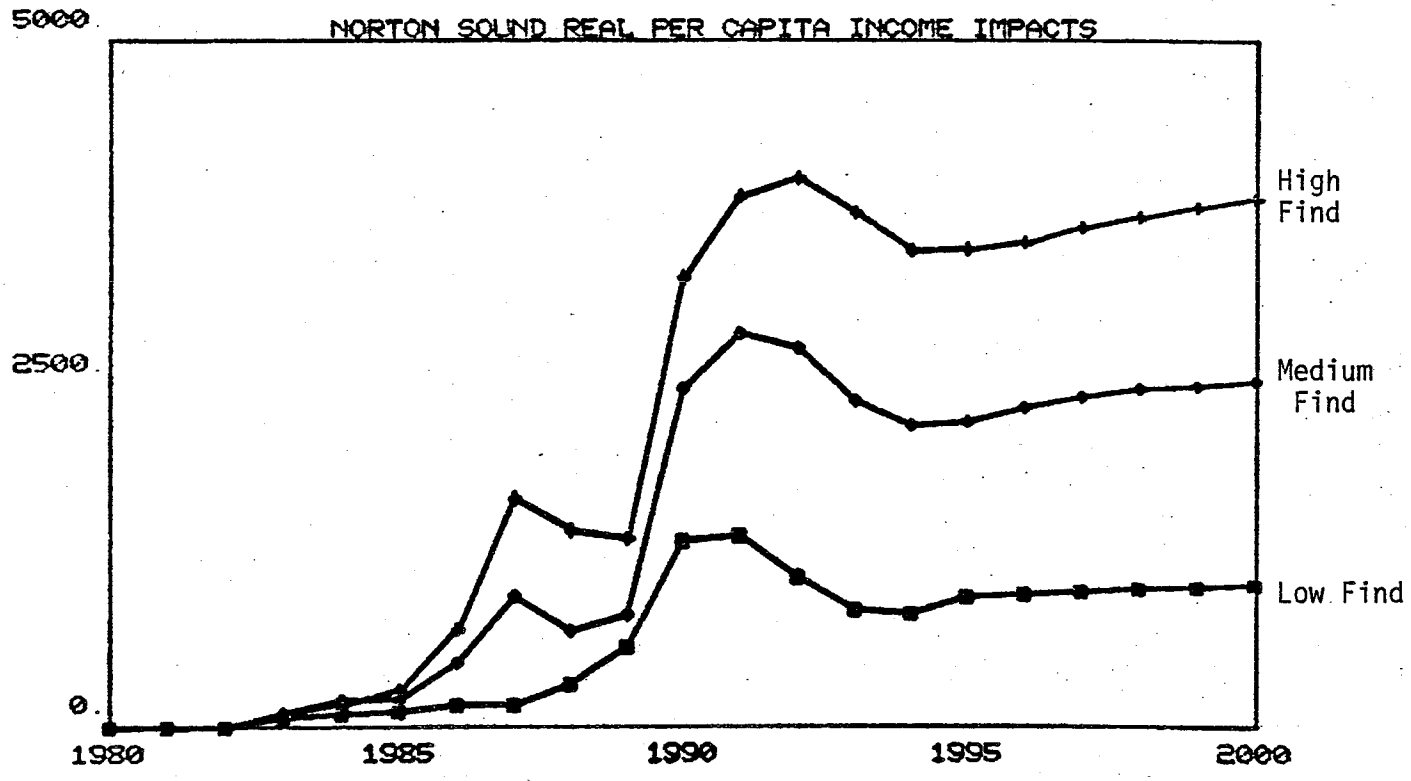


	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	1.082	2.166	3.345	3.249
1984	2.236	3.24	7.218	6.226
1985	1.23	5.085	9.791	11.902
1986	0.033	7.377	12.846	20.658
1987	0.014	4.267	20.145	38.267
1988	0.007	9.344	23.574	41.731
1989	0.005	15.169	23.486	48.653
1990	0.005	38.353	77.735	119.591
1991	0.004	39.204	95.226	152.586
1992	0.004	30.792	91.876	161.627
1993	0.004	24.316	77.074	147.139
1994	0.004	23.637	70.792	134.274
1995	0.004	27.32	72.012	134.454
1996	0.004	28.081	76.113	136.59
1997	0.004	28.925	79.522	141.745
1998	0.003	29.738	81.743	145.669
1999	0.004	30.315	83.311	149.718
2000	0.003	30.985	85.128	153.021

SOURCE: MAP Model

FIGURE 74. NORTON SOUND REAL PER CAPITA INCOME IMPACTS

(1979 Dollars)



	EXPL	LOW	MOD	HIGH
1980	0.	0.	0.	0.
1981	0.	0.	0.	0.
1982	0.	0.	0.	0.
1983	36.203	71.922	111.969	107.102
1984	71.531	99.598	205.707	179.895
1985	40.598	122.551	207.379	282.098
1986	-0.34	168.48	480.969	730.406
1987	-0.941	165.004	973.66	1672.62
1988	-1.07	321.914	715.66	1444.91
1989	-1.117	600.949	839.676	1382.75
1990	-1.098	1370.07	2478.87	3281.5
1991	-1.113	1408.5	2876.82	3885.5
1992	-1.082	1111.2	2771.29	4017.85
1993	-1.047	878.008	2387.55	3761.6
1994	-1.047	848.059	2209.04	3484.51
1995	-1.047	970.242	2235.02	3488.63
1996	-1.051	990.016	2340.2	3539.77
1997	-1.031	1012.14	2424.12	3650.67
1998	-1.027	1031.53	2472.66	3730.23
1999	-1.012	1040.37	2496.91	3799.5
2000	-1.031	1055.5	2535.68	3865.95

SOURCE: MAP Model

In the high-find scenario, personal income impacts peak nearly 70 percent higher than in the medium-find case; while real per capita impacts peak some 40 percent higher than in the medium-find scenario. In the low-find scenario, real income impacts peak at only 41 percent of their medium-find levels; and real per capita incomes rise by less than half the amount in the medium scenario.

V. SUMMARY

The direct effects of the development of OCS resources in the Norton Sound area are twofold--the generation of direct employment and the generation of state property tax revenues. The magnitude of these effects depends primarily on the size of the resource discovery. Employment requirements vary from a peak of less than 100 persons if no resources are discovered to a peak of nearly 5,000 persons if a maximum level of resources is discovered. State revenues may amount to zero in the case of an unsuccessful exploration program to as much as 80 million dollars annually for a high level of discovery.

Generally, the indirect effects of such developments can be expected to constitute the major shares of total impacts, both statewide and in Anchorage, because of the responsiveness of the support sector to such development and the propensity for migrants to enter the state in response to such development. However, such is not the case in the Norton Sound region, where total impact is dominated by the direct employment effects. Moreover, while such impacts are small relative to the economies of Anchorage and the state as a whole, they are by no means insignificant with respect to the Norton Sound area. Such developments may very well double employments and incomes in the region within a very short time span. Furthermore, such radical change may substantially alter the structure of the regional economy in Norton Sound. Such structural changes, to the extent they occur, will almost certainly be in the

direction of increasing the responsiveness of the regional support sector to basic employment and would consequently attract an even larger share of the statewide impacts to the Norton Sound area than is estimated here. While an analysis of such structural change is far beyond the scope of this analysis, the results presented here do clearly signal an impending major change in the character of the Norton Sound economy and population as a consequence of the development.

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