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A FORECAST OF INDUSTRIAL AND OCCUPATIONAL EMPLOYMENT IN ALASKA

Prepared by Human Resources Planning Institute

Institute of Social, Economic and Government Research
University of Alaska

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A FORECAST OF INDUSTRIAL AND OCCUPATIONAL EMPLOYMENT IN ALASKA

PREPARED FOR

MAN IN THE ARCTIC PROGRAM

INSTITUTE OF SOCIAL, ECONOMIC, AND GOVERNMENT RESEARCH

UNIVERSITY OF ALASKA

PREPARED BY

HUMAN RESOURCES PLANNING INSTITUTE

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PREFACE

The research in this report was carried out by Human Resources Planning Institute (HRPI) as part of the Man in the Arctic Program (MAP), a major research program funded by the National Science Foundation at the Institute of Social, Economic and Government Research (ISEGR), University of Alaska. MAP is a long-range research effort intended to develop a basic understanding of the forces of change in Alaska and to apply this understanding in dealing with the critical problems of social and economic development. The principal objectives of MAP are to:

- Measure and analyze basic patterns of change in the economy, population, and environment of Alaska.
- Identify significant interactions between outside economic and social forces and Alaska conditions and institutions.
- Identify specific problems associated with these interactions and analyze policy alternatives for dealing with them.
- Provide information and analysis to assist decision makers in solving critical economic, social, and environmental problems of concern to both state and nation.

The objectives of MAP are defined on an ambitious scale, and necessarily so, given the breadth and magnitude of the problems and policies with which it is concerned.

As part of MAP, ISEGR contracted with HRPI to construct a forecast of industry and occupational employment in Alaska through 1983. Particular attention was to be given to the methodology by which the demands for specific occupational categories were linked to industry employment levels.

Although intended primarily to provide information to a larger research program, the HRPI study has produced results which seem useful in their own right. ISEGR has, therefore, elected to publish this work, essentially as received from HRPI, in the belief that the information is of immediate relevance and potential usefulness to many persons and agencies in Alaska. The results of the HRPI have not been subjected to detailed critical review nor have they as yet been integrated into the larger MAP research design. The results are presented here to contribute to informed public discussion of the matters involved. ISEGR cannot, however, confirm or refute the validity of the specific projections developed by the HRPI study.

David T. Kresge
Director, MAP

Victor Fischer
Director, ISEGR

June 1974

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PART I

SUMMARY OF FINDINGS

INTRODUCTION

As part of a multi-year, National Science Foundation supported research program, the Institute of Social, Economic and Government Research, University of Alaska, contracted with Human Resources Planning Institute (HRPI) to conduct a forecast of industry and occupational employment in the state of Alaska through the year 1983.

Under its contract, Human Resources Planning Institute staff of Theodore Lane, Eric Swanson, and Marc Reeder developed a disaggregated economic base model[1] for the state of Alaska. Next, HRPI obtained the occupational employment statistics (OES) tape for the state of Alaska from the Bureau of Labor Statistics, U. S. Department of Labor. The OES tape was developed from the 1970 Census and presents a matrix giving the number of persons employed in each of the 227 industries for 440 occupations. HRPI developed the necessary programs to convert the OES matrix into a matrix of occupations and industries for which employment forecasts could be generated. Finally, the HRPI models were modified to generate both a "most probable" forecast and an uncertainty envelope (95% confidence) around that forecast.

[1]The disaggregated base model is a refined and updated version of the model developed by Human Resources Planning Institute as a subcontractor to Mathematical Sciences Northwest in studying the impact of the Alyeska Pipeline under a master contract let by the Alyeska Pipeline Service Company.

The study effort is presented in two parts -

Part I: Summary of Findings,

Part II: The Structure of Alaska's Labor Market.

The first report is a summary discussion of the results of the study. Statewide forecasts are presented for 12 industry categories as well as for total employment, civilian labor force, and total population. Historical data are presented for the period 1966-1972 and forecast data are presented for the period 1973-1983. Regional forecasts of employment are also discussed for the seven Man in the Arctic study regions shown in Figure 1:

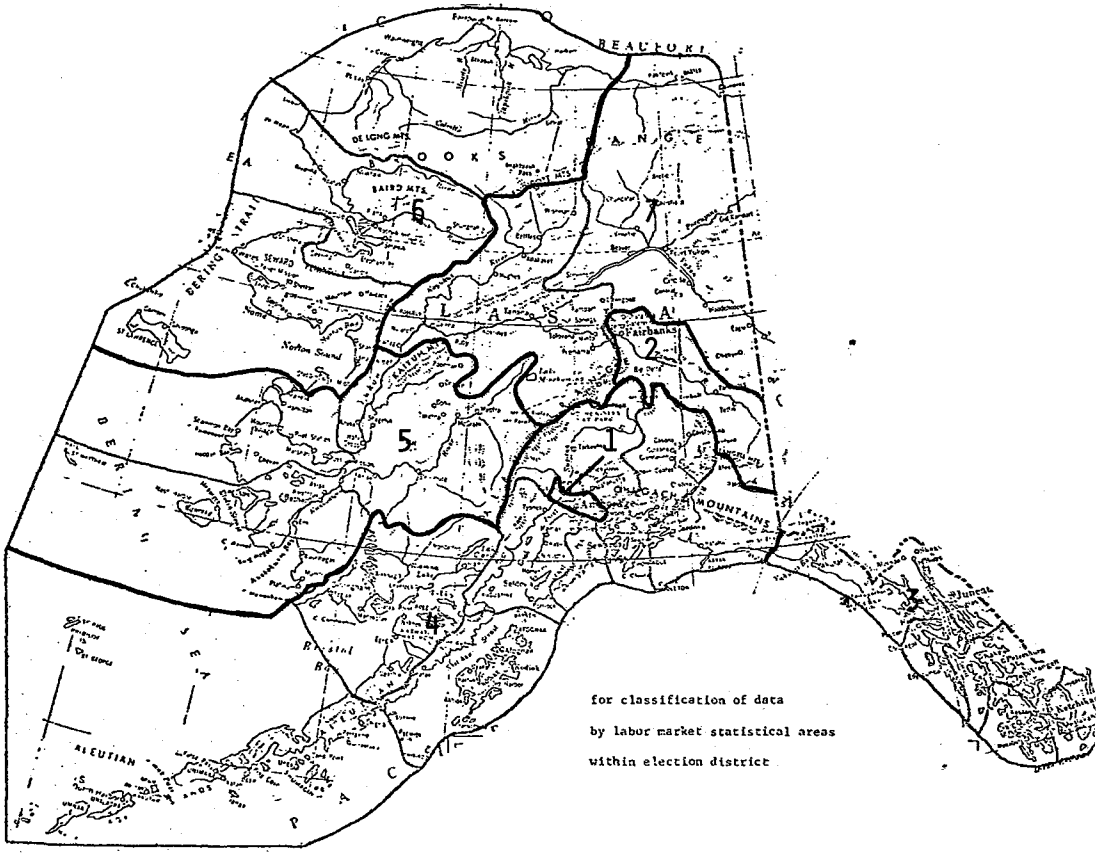
- Anchorage;
- Fairbanks;
- Southeast;
- Southcentral;
- Southwest;
- Northwest; and
- Northern.

The first report concludes with a presentation of expected occupational employment in 440 categories for the year 1983 and a discussion of the trends in occupational employment during the decade, 1973-1983.

FIGURE 1

MAN IN ARCTIC PROJECT STUDY REGIONS
BY LABOR MARKET STATISTICAL AREA

1. Anchorage
2. Fairbanks
3. Southeast
   - Prince of Wales
   - Ketchikan
   - Wrangell
   - Sitka
   - Juneau
   - Lynn Canal
4. Southcentral
   - Cordova
   - Valdez
   - Palmer
   - Seward
   - Kenai
   - Kodiak
   - Aleutians
   - Bristol Bay
5. Southwest
   - Bethel
   - Kuskokwim
   - Wade-Hampton
6. Northwest
   - Barrow
   - Kobuk
   - Nome
7. Northern
   - Yukon-Koyukuk
   - Upper Yukon



Part II is a technical discussion of the methodology used to generate the results presented in Part I. There is a section on the economic base model used to make the statewide and regional forecasts of industry employment. The forecast equations derived through linear regression analysis are presented, and the approach used to make occupational employment forecasts is discussed. There is a mathematical presentation of the sensitivity analysis used to derive the uncertainty (errors) envelopes accompanying the statewide forecasts of industry and occupational employment.

The second report concludes with an outline of the system of computer programs developed by HRPI for the Man in the Arctic Program. The interaction of programs within the system, the input data each program requires and the results presented on the various output tables are discussed in this section.

Throughout the course of this study, the entire Man in the Arctic Program (MAP) staff at the Institute of Social, Economic and Government Research at the University of Alaska offered continuing advice, comment, and suggestion. In particular, we would like to extend our thanks to Mr. Dave Kresge and Mr. Neville Beharie of ISEGR. Bob Richards and Vince Wright of the National Bank of Alaska provided us with many helpful comments. In addition, they were of great assistance to us in making contact with many business and industry leaders

for discussions of their particular industry trends. Paul Engleman of the Alaska State Department of Economic Development gave us substantial assistance, as did Larry Heppenbach of the Alaska State Department of Revenue. We would also like to thank Naomi Smith of the Research Division of the Alaska Department of Labor for providing special data which otherwise would not have been available.

SECTION 1

STATEWIDE EMPLOYMENT AND POPULATION

Introduction

This section of the report will discuss forecasts of Alaskan employment for the decade running through 1983. These forecasts were generated by an economic base model, the structure and operation of which will be covered in a Volume II of the report. The following topics will be covered in this section:

1. Forecast of labor force, and population;
2. Forecast of employment in Alaska's basic industries;
3. Forecast of employment in Alaska's non-basic industries; and
4. Tables and graphs of the statewide forecasts.

At the close of this section, tables and graphs supporting the discussion are presented. The forecasts of statewide industries include an uncertainty envelope surrounding the path of the "most probable" employment. This envelope represents the region containing 95% of the errors accumulated by the economic base model. These errors came about because of uncertainty assigned by the economist to each basic industry forecast. Additional uncertainty arises due to the fact that equations used to make the non-basic forecasts were generated by linear regression analysis and thus were "best estimates" of the future, base on the trends

of the past. The details of how the uncertainty envelopes were determined are discussed in a section called Sensitivity Analysis of Forecast Results in Volume II. The main thing to keep in mind here is that these errors represent the range of forecasts possible given the basic assumptions of the economic base model and should not be interpreted as a measure of the integrity of the basic assumptions themselves.

The graphs included at the end of this section show trends in annual employment averaged from the quarterly forecasts of the base model. The quarterly equations used in the base model are presented in Table 4 of Volume II. Annual versions of these equations are presented with their respective graph. Variable abbreviations are explained in the Time Series Variable List given in the Appendix to this volume. Input data for the annual equations should be the average of the four quarterly values for each independent variable. The operation of the quarterly equations as a system is discussed in Section 1 of Volume II.

Table 1 presents the basic and non-basic industries to be discussed in this section.

TABLE 1

BASIC AND NON-BASIC INDUSTRIES

Basic Industries	SIC Code
Mining	10 - 14
Petroleum mining	13
Other mining	10, 12, 14
Construction (pipeline)*	15 - 17
Manufacturing	19 - 39
Food Products	20
Forest Products	24 - 26
Other Manufacturing	
Communications and Utilities (including public utilities)	48, 49
Federal Government	91
Non-Basic Industries	
Construction (Total)*	15 - 17
Transportation services	40 - 47
Wholesale Trade	50
Retail Trade	52 - 59
Finance, Insurance, and Real Estate	60 - 69
Services	70 - 89
State and Local Government	92 - 93
Non-categorized, including agriculture	01 - 09, and other

*Construction has both a basic and a non-basic component. Pipeline construction is basic and determined exogenously. All other construction is non-basic and determined within the model. Total construction is the sum of both components.

Part 1: Forecasts of Labor Force, and Population

Total Civilian Employment (Figure 14)

Forecasts of total civilian employment is derived from a simple summation of employment in the basic and non-basic industries. The industry employment will be discussed in Parts 2 and 3 of this section.

Total employment in the state of Alaska is expected to increase over the period 1973 to 1983, inclusive, from approximately 113,000 workers to approximately 217.5 thousand workers - an increase of 104.5 thousand workers or 92%. Approximately two-thirds of this increase will occur between the years 1973 and 1976, inclusive, when the major impact of the construction of the Trans-Alaska Pipeline will be felt. The growth rate is expected to slow down somewhat between the period 1976 and 1980 and rise more sharply during the period 1982 to 1983.

This forecast of total employment includes the assumption that the Trans-Alaskan pipeline will begin construction during the second quarter of 1974 and that a gas pipeline will be constructed immediately following completion of the oil pipeline. It does not, however, include any estimated impacts that might result from the construction of either a second oil pipeline or a second gas pipeline.

Unemployment (Figure 15)

The rate of unemployment was estimated at 10% of the labor force in 1972 and is expected to decline to approximately 9.5% by 1975. Within the range of uncertainty the unemployment rate in 1975 could fall anywhere from a low of 8% to a high of 11%. After completion of the Trans-Alaska pipeline unemployment is expected to rise somewhat reaching a high of approximately 11.5% in 1980 and declining slightly to approximately 11.3% by 1983.

Despite the fact that the rate of employment is expected to decline during the pipeline construction and increase thereafter, the total number persons who will be unemployed is expected to increase steadily throughout the period. In 1972, an estimated 13,300 workers were unemployed. This number is expected to increase to 17,300 workers in 1975 and 27,700 in 1983. Despite the fact that the number of persons who are expected to be unemployed will more than double over the 11 year forecast period, the labor force will also be rising sharply. Consequently, changes in the rate of unemployment will be moderate.

The concept of unemployment which is being measured in these forecasts conforms to that used by the Federal and state departments of labor. This means that to be unemployed, a person must be out of work, able to work, and actively

seeking legitimate employment. It a person is either incapacitated or has stopped actively seeking work, that person is no longer considered part of the labor force and, therefore, is not considered unemployed.

Civilian Labor Force (Figure 16)

The labor force is the summation of the total number of civilian workers and the total number of unemployed persons in the labor market. Consequently, with both the number of persons employed and the number unemployed rising, the labor force also rises very significantly between the years 1973 and 1983, inclusive. In 1972, the civilian labor force was estimated at 126,000 persons. By 1976, it increases to 203,000 workers, an increase of 77,000 persons or 64%.

Military Population

Estimates of future military activity in Alaska are difficult to make. During the historical period military employment (active duty personnel) declined steadily from 33,200 in 1966 to 26,500 in 1972. In addition, there were 29,600 military dependents in Alaska in 1972. Without a valid means to second-guess the Department of Defense, the 1972 military population of 56,100 was applied to forecasts of total population throughout the 1973-1983 forecast period.

Total Population (Figure 17)

Total population is the summation of civilian labor force, civilian dependents, active duty military personnel, and military dependents. Alaska's population was an estimated 313,600 persons in 1972. By 1983, the population is expected to increase to a level of 546,300 persons. This figure includes a civilian labor force of 245,200, 245,000 civilian dependents, 26,500 active duty military personnel and 29,600 military dependents. This represents an increase of 232,700 persons or almost 75%. Uncertainty in the population estimate, could allow population to rise as high as 575,000 by 1983.

Underlying the population forecast is an assumption that the civilian dependency ratio (total population over civilian labor force) will decline from 2.04 to 1.99 during the forecast period as dependents become workers. This represents a slight increase (about 2%) in the proportion of all civilian persons in the population who are actively participating in the state civilian labor market. The major factor underlying this assumption of a declining civilian dependency ratio is the increasing number of women who are expected to participate in the labor force. An additional assumption, mentioned above, is that military population will remain at the 1972 level through 1983.

Part 2: Forecasts of Employment in Alaska's Basic Industries

Construction (Pipeline)*

During the 1970's construction employment is expected to show some dramatic changes. The greatest of these changes will occur as a result of construction of the Trans-Alaska pipeline. Assuming that pipeline construction begins by the end of the 2nd quarter of 1974 and requires three years of continuous effort, pipeline construction employment is expected to rise to approximately 4,200 average annual workers in 1974 and a second quarter peak of 11,000 workers in 1975. There will be a decline of approximately 1,600 workers in the construction industry between 1975 and 1976, and by 1977 pipeline construction employment will have dropped to a forecasted level of 800 average annual workers.

This forecast of construction activity on the Trans-Alaska pipeline is based upon the latest "Manning schedule" available from the Alyeska Pipeline Company. It is significantly higher than the original Manning schedule contained in the impact study published by Mathematical Sciences Northwest. At the time of the original analysis, the Alyeska plans contained a three-phase work plan. The first phase had oil flowing at approximately 0.6 million barrels per day; the second phase,

*Pipeline construction is the exogenous component of total construction which is discussed with the non-basic industries in Part 3 of this section.

oil throughput was increased to approximately 1.2 million barrels per day; while the third phase would increase the throughput to approximately 2 million barrels per day. The new work schedule apparently calls for a two phase work plan. Phase one will have the oil flowing at approximately 0.6 million barrels per day for a 30-90 day period which will act as the "shakedown period" for the pipeline. Immediately following the shakedown period the throughput will be increased to 1.2 million barrels per day. As a result of this collapsing of the work schedule, the storage capacity and terminal facilities at Valdez will have to be brought up to the original phase two level during the initial three year construction period. Alyeska also anticipates construction of an additional three to four pumping stations along the pipeline route. As a result, the number of workers employed by Alyeska during the three year construction phase has been increased substantially from a quarterly peak of approximately 8,000 workers to a new forecasted peak of approximately 11,000 workers*.

We are forecasting that a natural gas pipeline will be constructed with completion scheduled for 1979. We are forecasting that the first natural gas pipeline to be constructed will be the McKenzie Valley pipeline route currently being proposed by the Alaska Arctic (Canada Arctic) Pipeline Consortium. This pipeline will run from the north slope of Alaska

*Recent press releases from Alyeska forecast peak employment as high as 12,500.

through the McKenzie Valley and across Canada into the general area of Chicago. It will probably be a 48" diameter pipe with a carrying capacity of approximately 3-3.5 billion cubic feet of natural gas per day. An estimated 275 miles of the gas pipeline construction will occur within the state of Alaska and this will give rise to an estimated average annual employment in the range of 2,000 to 3,000 workers (with a peak quarterly employment during the third quarter of 1978 of about 6,300 workers). It is our feeling that the proposed El Paso pipeline (which would parallel the TAPS route) is of doubtful economic feasibility at the present time. This is particularly true because it would require the construction of a liquified natural gas (LNG) terminal (including a plant and storage area) requiring a minimum of 640 acres for its construction. A LGN plant of sufficient capability to accommodate the capacity of the proposed El Paso pipeline would cost an estimated half a billion dollars a year to operate (in addition to requiring an estimated one million horsepower compressor capacity). Also the building of one or two LGN tankers would add significantly to the costs of the projects.

The forecasts of employment in pipeline construction discussed above are summarized in Table 2 at the end of this section.

Total Mining (Figure 2)

Total mining is the sum of oil and gas mining and other mining. A discussion of these components follow.

Oil and Gas Mining

Upon the initiation of construction activity for the Trans-Alaska pipeline system, a resurgence of oil and gas exploration activity is expected to begin. During the 1974-1975 winter seasons it is expected that at least 19 exploration rigs will be active in the North Slope area. Of this number, 16 will probably be wildcat rigs employing between 60 and 80 workers per rig while three will be development rigs employing approximately 40 workers per rig. The exploration will probably occur to the east and west of the existing field and there will be, in addition, some off-shore activity. Over the next few years, several oil companies currently which have Federal leases on fields which lie to the south of the Prudue Bay area must complete their exploratory activities on these properties because their leases will be running out. Consequently, exploration activity is expected to rise to a high of approximately 2,500 workers by 1975 and remain at that level through 1977. Thereafter the time pressure for exploration activities will be reduced somewhat causing a slight initial decline and a stable longer term level of employment at 2,400 workers. Many of the workers employed after 1978

will be in the lower Cook Inlet, North Slope, and Gulf of Alaska exploration areas.

Other Mining

Other mining activity in the State of Alaska has been declining steadily since 1963 employing an estimated 300 workers in 1972. These workers are all employed by small firms; at the present time there is no mine operating in the state of Alaska which employs over ten workers. Most of the employment in this sector is by small mines operating with a work force of two to five men, or else is produced by the employment of geologists and other exploration crews who are seeking to determine the existence of mineral resources within the state.

While the development of Alaska's mineral resources (particularly copper resources in the Kennicott region of the Wrangell Mountains) may have strong potential in the long run, it is doubtful that activity in this sector will increase significantly over the forecast period. By 1983, it is expected that total employment in the other mining sector will be equal to 500 workers.

Total Manufacturing (Figure 3)

Total manufacturing is the sum of logging, lumber and pulp; food processing; and other manufacturing. These components are discussed below.

Logging, Lumber, and Pulp

The forest products industry has two major components, the production of pulp and the production of lumber. These two components of the industry, however, are quite closely related in their production pattern. Both the production of pulp and the production of lumber are centered in southeast Alaska where there are currently four timber "working circles". One of these working circles is centered around Ketchikan, another around Sitka, another around Juneau, and a fourth around Wrangell. As a result of a suit brought by the Sierra Club, the creation of a fifth working circle (and the entry of Champion U. S. Plywood Pulp Mill) in southeast Alaska has been stopped; and, for purposes of the forecast, it is assumed that no further working circles will be developed.

The vast majority of both the pulp and lumber output of Alaska is sold to Japan. A significant segment of the pulp output, however, is marketed primarily in the eastern half of the United States. These marketing patterns are expected to continue throughout the forecast period.

Representatives of the lumber and wood products industry see a growing shortage of timber as a result of the issues raised by (a) the filing of environmental impact statements and (b) the requirement for sustained yield harvesting. Consequently, they see limited U. S. Forest Service timber sales in the future. While the demand (primarily foreign demand) for Alaska forest products has been high, particularly during the last year, this is not expected to produce any new boom period for the long term growth of the industry.

Japan buys forest products from Canada, Russia, Asia, and the western part of the lower United States - as well as from Alaska. There is some evidence that the Japanese demand is price sensitive and, consequently, the recent devaluation of the U. S. dollar should help the competitive position of the Alaska forest products industry. However, two factors act to mitigate this trend. First, Japan is sufficiently scarce of resources that in the past it was willing to purchase all forest products that were available to them. Thus the relative price advantage of U. S. forest products will not produce any sharp increase in the demand for the Alaska forest products in international markets. Second, over the next several years Japan is expected to feel the adverse effects of the international energy crisis. If this results in a slowing down of the rate of growth of the Japanese economy (as is probable) this will result in

a lessening of the Japanese demand for Alaska forest products.

For forecasting purposes, the long term trend evidenced by the Alaska forest products industry over the decade of the 1960's is expected to continue throughout the forecast (through 1983).

The continuance of the ten year trend of the Alaska forest products industry results from the net effects of several trends. First, both the state of Alaska and the U. S. Forest Service require that the harvesting of timber from Alaska forests "working circles" be limited to that which can be maintained on a sustained yield basis. As a result, the ability of the pulp and lumber mills to obtain increasing amounts of standing timber is limited. Counterbalancing this trend, however, is the development of better logging techniques which will increase the sustained yield limit capable of being harvested from the existing working circles. This is mainly the result of improved techniques for moving the cut timber from otherwise inaccessible sites to the mills - thereby opening up stands of timber which were not available for harvesting until very recently. At this time, existing plants are consistently instituting

small technological changes which have the affect of increasing plant capacity with existing plant size. Additionally, the development of improved mill techniques is leading to better utilization of logs and, the production of products from what had been considered waste materials of the milling process.

These increases in plant capacity, and the better utilization of logs at the mills, have the overall effect of reducing the capital labor ratio in both the pulp and lumber mills and thereby producing slightly increased employment and output within the industry.

It is expected that employment in the logging, lumber, and pulp industry will decline slightly from its forecasted 1973 annual average of 3,300 workers to approximately 3,100 workers by 1974. The '74 employment level is expected to be constant through 1975 and to increase by approximately 150 workers by 1976. Thereafter, the industry is expected to show a steady long term pattern of growth (an estimated 100 workers per year) reaching a high of 4,000 workers by 1983.

Food Processing

Food processing in Alaska is mainly involved with the

processing of seafood. During the 1960's, the food processing industry showed a general upward trend. However, employment tended to fluctuate quite significantly around that trend. Though a sharp rise in employment occurred between 1969 and 1970 and was sustained during the period 1970 and 1971; employment within the industry declined by approximately 300 workers between 1971 and 1972 and is expected to show an only slight increase of approximately 150 workers between 1972 and 1973. Between 1973 and 1975, employment in the industry is expected to be very stable. This will result from several factors.

A number of the food processing plants and their related fishing fleets, as well as independent fishermen, are expected to develop larger vessels capable of harvesting seafood from areas as far away as the Bering Sea. The shellfish industry (shrimp and crab) is expected to be strong and steady throughout the period. However, the harvesting of red salmon in the Bristol Bay area is expected to remain depressed. This will act as a downward pressure on employment in the food processing industry. The situation in Bristol Bay is expected to continue for the next four to five years before improved harvests are evident. The situation in Prince William Sound is highly unstable. The impact of large oil tankers moving in and out of the Sound, in order to ship oil from the southern

terminus of TAPS at Valdez, is not known at this time.

The strong demand for fisheries production generated by foreign (particularly Japanese) markets appears to be causing a shift in the composition of the industry's output. Preliminary reports of 1973 production indicate the total pack of canned salmon will be the lowest since the turn of the century. However, the 1973 record export of fresh and frozen salmon to Japan from the U. S. was a major factor in 1973's record breaking production of frozen and cured salmon in Alaska (the old record - set in 1970 - was exceeded by almost 50%).

Finally, the recent devaluation of the U. S. dollar should increase the demand for food products of all sorts produced in the state of Alaska. At the current time, the United States imports approximately two-thirds of its fish products from other countries. As a result of devaluation, the price of fish products inported into the United States will rise. This should lead to some redirection of U. S. demand away from imported fish products and to domestically produced ones. Part of this redirection is expected to benefit Alaska's food processing industry. Beginning in 1977, it is expected that the food processing industry will show a long term pattern of slight

employment increases (averaging 100 workers per year) reaching a high of 4,500 workers in 1983.

Other Manufacturing

Other manufacturing is a catch-all category into which are lumped all of the manufacturing firms in Alaska which are too small to be separately classified under their own individual industry codes. An SIC definition of the workers involved in the transmission of oil and natural gas would place them under the category "transportation services" not in the "other manufacturing" category. However, in our model the transportation services category is treated as an induced (or non-basic) industry. The impact of the workers related to the production and transmission of oil and natural gas clearly represent an autonomous (or basic) increase in employment and should be treated as part of the basic employment sector. Consequently, we have chosen to include the oil pipeline and gas pipeline workers, once production begins, in the "other manufacturing category" - recognizing that this constitutes a violation of the SIC coding system.

It is expected that by 1976 oil production will begin and that by 1977 the "other manufacturing" category will have increased by approximately 400 workers - all of whom will be related to production and transmission of oil, including

the maintenance and operation of the terminal at Valdez. The production and transmission of natural gas is expected sometime during 1979, thus the other manufacturing category will increase by another 100 workers who are related to the maintenance of the gas fields and the operation of the pumping stations for the natural gas pipeline.

Excluding the major jumps in other manufacturing related to oil production between 1976 and 1977 and gas production between 1979 and 1980, the other manufacturing category is expected to increase by a long term trend of approximately 100 workers per year reaching a forecasted high of 3,150 workers by 1983.

Communications and Utilities (Figure 4)

The communications and utilities industry was exceedingly stable throughout the 1960's fluctuating at or around 2,500 workers throughout the period. Between 1970 and 1971, however, there was a massive increase in industry employment jumping from 2,600 workers to 3,700 workers. This shift occurred on January 10, 1971 as a result of the transfer of workers from Federal payrolls to RCA payrolls when RCA took over the Alaska Communications System from the military. The institution of certain operating economies subsequently led to a slight reduction of 100 workers between 1971 and 1972. The 1972 level is expected to be constant through 1973.

After 1973, several divergent trends are expected in the industry. First, the RCA company, the largest single company in this industry, is expected to show a stable or slightly declining employment. This will result from the institution of direct dialing systems throughout all of Alaska which will reduce the demand for operators. The subsequent development of automatic number identification (ANI) equipment in local areas which will further reduce the demand for operators. For example, Anchorage now has an estimated 35-40% of its telephones with ANI equipment and within two years will have gone to 100%. ANI equipment is expected to be instituted in Juneau within the next three to five years and in the rest of Alaska within the next ten years. Secondly, RCA plans to shift from its current micro-wave systems to satellite communication systems within the next ten years. This will act to reduce the number of engineering staff required, and will further provide some downward pressure on employment patterns within the industry. Other parts of the communications segment of this industry, particularly the radio and television segments, are expected to grow as a result of increasing population growth throughout Alaska. In addition, employment in private utilities throughout the state is expected to show some slight increase. This increase might be significantly affected

if there is developed a private transit system within Alaska. At the present time, however, it is expected that any transit systems which are developed will be municipally or state-owned and operated and consequently would not be part of this industry.

Overall, employment in the industry is expected to grow by approximately 40-50 workers per year over the forecast period beginning in 1974 and reaching a forecasted high of 4,000 workers by 1983.

Federal Government (Figure 5)

Throughout the 1960's, Federal government employment (excluding military employment) was highly stable - fluctuating in the range of 16,500 workers to 17,500 workers. During the last four years (1970 through 1973 inclusive) employment fluctuated within the range of 17,000 to 17,300 workers. In the future, Federal government employment is expected to grow very slowly to a level of 17,800 in 1983.

The stability in Federal government employment will result from several counterbalancing patterns expected in Federal activity. First, the amount of civilian, military related employment is expected to diminish somewhat throughout Alaska during the forecast period. In addition, the civilian

employment by the Federal government in such areas as the Public Health Service and the Natives Health Service are expected to diminish during the forecast period as a result of more aggressive action taken by state and local governments (including the Native Corporations) in the area of delivering social and health services to the Alaska population. At the same time, administrative employment in Alaska is expected to increase upon completion of the Federal administrative buildings and courthouse complex in Anchorage. Bureau of Land Management personnel will probably be either constant or increasing slightly during the period as a result of continued action in the withdrawal and settlement of lands between the Federal government and state of Alaska, and between the Federal government and the native corporations. Finally, some Federal employment is expected to increase as a result of inspection and related activities generated by the construction and operation of the Trans-Alaska oil pipeline and the subsequent natural gas pipeline across the northern part of Alaska.

Part 3: Forecasts of Employment in Alaska's Non-Basic Industries

Total Construction (Figure 6)

Total construction in Alaska was estimated to employ 7,500 persons in 1972. During the peak of pipeline construction, 1974, 1975, contract construction employment is expected to increase to a high of approximately 18,300 workers. Immediately following the completion of the Trans-Alaska pipeline, construction will decline significantly to a low of 14,000 workers and will bounce upward again to just under 17,000 workers in 1978 as a result of construction of a gas pipeline. Upon completion of the gas pipeline, and under the assumption that no other pipelines are built, construction employment will decline to approximately 14,400 workers in 1980 and then after rise to a 1983 high of an estimated 15,700 workers.

The growth of construction employment is, of course, heavily influenced by construction of the oil and gas pipelines (pipeline construction employment is discussed separately under the Basic Industry Section). However, another major determinant of construction employment is the growth of population in the state. The building of an increasing number of residences required to house the state's growing population, coupled with the construction demands that will be exerted as a result of increasing population densitities* will act to keep non-pipeline

*For example, the construction of water systems, sewage systems, schools, paved streets and roads, etc.

construction strong throughout the forecast period. Additionally, should the state of Alaska elect to use a significant portion of its oil revenues in an aggressive program of capital improvements throughout the state, the construction employment forecast could move closer to the top of the uncertainty envelope (see Figure 6) than to the "most probable" forecast.

State and Local Government (Figure 7)

State and local government in Alaska employed 22,400 persons in 1972. By 1980, state and local government employment is expected to rise to approximately 50,200 workers and is expected to increase by another 6.4 thousand workers between 1980 and 1983, inclusive. This represents a total growth of just over 150% in state and local government employment between 1973 and 1983, inclusive.

The increase in state and local government employment is expected to occur primarily as a result of the increasing demands for service generated by Alaska's growing population and the expected increase in state tax revenues. Several Alaskan economists have expressed doubt that state and local government employment will rise as rapidly as our forecast during the period 1974 through 1976, inclusive. They feel that the limitations on state revenues and the unwillingness of the state to go into debt during the period of pipeline construction will combine to reduce the rate of growth which we are forecasting. Should this occur, however,

we would expect that the backlog in the demand for state and local government services created during the period of pipeline construction will be made up for during the period immediately following construction thus when oil revenues begin coming to the state, state and local government should grow rapidly, matching HRPI forecast by 1980.

Additionally, several Federal agencies, such as the Department of Labor and the Department of Health, Education and Welfare have scheduled significant increases in Federal expenditure going into the state of Alaska to help alleviate problems caused by the pipeline construction period. Such Federal participation in Alaska will most probably be made through the granting of funds for special pipeline impact programs in the state. Consequently, the increased Federal activity in Alaska during the period of pipeline construction will act to support increases in the employment of persons by state and local governments.

Retail Trade (Figure 8)

Reflecting the increase in the state's basic employment and its increase in population, retail trade is expected to grow rapidly with employment rising from 12,900 persons in 1972 to a level of 23,000 persons in 1976 - an increase of slightly

over 78% in four years. After the oil pipeline peak in 1976 retail trade is expected to remain fairly strong and then show another period of growth during the gas pipeline construction. Thereafter it is expected to grow at a steady rate somewhat approximating the growth pattern which was evidenced during the period 1966 through 1972, inclusive.

During the last several years, the growth of retail trade activity has reflected the growth of tourism as an important industry in Alaska. This factor is implicitly incorporated into the regression analysis which went into the forecast. Consequently, significant changes in the pattern of tourist growth as a result of the energy crisis are not incorporated into this analysis. Because of the relatively large number of factors that affect the growth of retail trade, the uncertainty interval around the "most probable" forecast is quite large and, by 1983, the interval encompasses as much as plus or minus 5,000 workers.

Wholesale Trade (Figure 9)

Paralleling the growth of retail trade, wholesale trade is expected to increase rapidly over the forecast period. The industry's employment is expected to increase from a 1972 level of 3,200 to a 1976 level of 5,900. After 1976 its growth rate is fairly steady reaching a high of 7.3 thousand workers in 1983.

The growth of wholesale trade in Alaska is primarily determined by the growth of retail trade. However, a significant relationship also exists between wholesale trade employment and employment in the mining (including petroleum mining) industry. As a result of this interaction, wholesale trade is expected to increase more rapidly than retail trade during the period between 1974 and 1976, as the oil pipeline is completed.

The uncertainty interval around the "most probable" forecast is quite large for wholesale trade. It represents a range of about one-fourth of the "most probable" forecast.

Finance, Insurance and Real Estate (Figure 10)

Finance, insurance and real estate which grew from less than 2,500 workers in 1966 to a level of 3,500 workers in 1972 is expected to grow to a high of 6,100 workers by the year 1976. Significant increases are expected to occur in the real estate component of this industry although both financial, and insurance institutions are expected to show strong growth also.

After 1976, the growth in this industry is expected to be moderate rising by 1,000 workers to a level of 7,100 in 1980, and reaching an employment of 7,800 workers in 1983. While the growth of several basic industries was important for the growth of the finance, insurance and real estate industry,

the most important relationship existed between this industry and the growth of Alaska's population. Consequently, industry growth strongly approximates the pattern of population growth.

Transportation (Figure 11)

The transportation industry was found to have a significant relationship with employment levels in the construction, mining (including petroleum mining), manufacturing and with state and local government. Because all of these industries are exhibiting growth throughout the forecast period, the transportation industry also exhibits a period of steady growth. Particularly influenced by the growth of construction activity and the predicted increase in state and local government employment, the rate of growth for this industry is greatest between 1973 and 1976, inclusive.

The industry employed approximately 6,400 workers in 1972. It is expected to double by 1976 and reach a level of 12,800 workers. The uncertainty interval however is quite large and it is possible that the transportation industry could employ as many as 15,300 workers during the period of peak pipeline construction.

After pipeline construction is completed, the industry will decline slightly and begin increasing again so that by 1980

the level of employment will be the same as it was in 1976. The "most probable" 1980 forecast is 12,800. Between 1980 and 1983, inclusive, employment is expected to grow again reaching a 1983 high of 13,800 workers.

Services (Figure 13)

Service employment is expected to more than double between 1973 and 1976, inclusive, going from 13,000 to 27,100 workers. Thereafter, the growth in service employment is expected to be much more moderate, increasing to a level of 31,100 workers in 1980, and reaching a high of 34,700 workers in 1983. After 1976, however, the uncertainty interval becomes significantly larger for the service employment forecast. Business services of all sorts are expected to remain strong throughout the forecast period. Personal services will show a very strong growth during the period 1973 to 1976, inclusive, and growing somewhat more slowly thereafter.

Non-Categorized (Figure 13)

Non-categorized employment consists of workers who are not classified in the other industry categories. The category includes workers who are employed, domestic workers, unpaid family workers, and workers in the agriculture, forestry and fishing industries. Data on this group of workers is difficult to interpret and, in effect, our forecast represents

a continuation of past time trends. Consequently, any possible expansion in the number of non-classified workers as a result of the pipeline is not incorporated in the forecast.

Part 4: Tables and Figures of the Statewide Forecasts

List of Tables and Figures Included

A. Employment estimates for pipeline construction, Table 2.

B. Employment by industry for the historical period (1966-1972), Table 3.

C. Employment by industry for the forecast period (1973-1983), Table 3a.

D. Graphs of statewide employment in basic industries for 1966-1983, Figures 2-5.

E. Graphs of statewide employment in non-basic industries for 1966-1983, Figures 6-13. *

F. Graphs of total employment, unemployment, civilian labor force and total population (1966-1983), Figures 14-17.*

*Each graph presents an annual equation that can be used to generate the forecast. The equations are discussed briefly on page 7 of this section and in detail in section I of Volume II. The abbreviations given for the variable names are explained in the Time Series Variable List, given in the appendix to this volume.

TABLE 2

EMPLOYMENT ESTIMATES FOR PIPELINE CONSTRUCTION

1974	Q1	0	1977	Q1	1100
	Q2	5900		Q2	1000
	Q3	5900		Q3	700
	Q4	5300		Q4	400
Average		4200	Average		800
1975	Q1	4000	1978	Q1	900
	Q2	11000		Q2	4400
	Q3	9500		Q3	6400
	Q4	4300		Q4	1400
Average		7200	Average		3200
1976	Q1	4200	1979	Q1	1900
	Q2	6500		Q2	2900
	Q3	7800		Q3	3400
	Q4	4000		Q4	1200
Average		5600	Average		2300

The above estimates are for the Trans-Alaska oil pipeline (1974-1976) and the Alaska-Arctic gas pipeline (1977-1979). At this time there are no forecasts of pipeline construction for the period 1980-1983.

TABLE 3

EMPLOYMENT BY INDUSTRY FOR THE HISTORICAL PERIOD (1966-72)

Year	Federal Govern.	State & Local Govern.	Total Construction	Mfrg.	Mining	Communications Utilities	Retail Trade	Wholesale Trade
1966	17500	13300	5800	6600	1400	2700	8700	2100
1967	17400	14400	6000	6600	2000	2400	9400	2400
1968	16900	15300	6000	6900	2500	2500	10000	2500
1969	16500	16900	6600	7000	3500	2300	11000	2900
1970	17100	18400	6900	8000	2900	2700	12000	3200
1971	17300	20700	7400	7800	2500	3700	13000	3200
1972	17200	23200	7900	8000	2100	3600	13800	3300

Year	Finance Insurance Real Est.	Transportation	Service	Non-Categorized	Total Employment	Unemployment	Civilian Labor Force	Total Population
1966	2300	4500	7900	11400	84600	8400	93200	276100
1967	2300	5000	8700	11600	88000	8400	96400	283700
1968	2500	5300	9300	11300	91100	9100	100200	290500
1969	2700	6300	10500	12400	98700	9400	108200	301800
1970	3100	6400	11400	12600	104900	12000	116800	313000
1971	3200	6100	12500	13000	110600	12200	122700	319900
1972	3700	6400	14000	14200	117600	13600	131200	313600

TABLE 3a

EMPLOYMENT BY INDUSTRY FOR THE FORECAST PERIOD(1973-83)

Year	Federal Govern.	State & Local Govern.	Total Construction	Mfrg.	Mining	Communication Utilities	Retail Trade	Wholesale Trade	Finance Insurance Real Est.
1973	17000	24800	7700	8800	2100	3700	13800	3400	3700
1974	17200	28500	12300	8700	2600	3700	15700	3900	4200
1975	17500	36000	18200	8800	2900	3700	19800	4900	5200
1976	17500	41700	18300	9000	3000	3700	23000	5700	6100
1977	17500	44500	14000	9500	3000	3800	24300	6000	6400
1978	17600	46400	16800	10000	2800	3800	25000	6200	6600
1979	17600	49000	16500	10300	2900	3800	26400	6500	6900
1980	17700	50300	14400	10700	2900	3900	26900	6600	7100
1981	17700	51600	14600	11000	2900	3900	27300	6700	7200
1982	17800	53900	15100	11300	2900	4000	28400	7000	7500
1983	17800	56600	15700	11600	2900	4000	29700	7300	7800

TABLE 3a (Continued)
EMPLOYMENT BY INDUSTRY FOR FORECAST PERIOD (1973-83)

Year	Transportation	Service	Non-Categorized	Total Workers	Unemployment	Civilian Labor Force	Total Population
1973	6800	14300	13400	119600	13300	132900	328500
1974	8500	17300	13600	136300	14100	150400	363600
1975	11300	23300	13800	165600	17300	183000	427800
1976	12500	27100	14100	181600	21400	203000	467300
1977	12200	28000	14300	183600	23500	207100	475000
1978	12800	29400	14500	191900	23800	215600	489900
1979	13100	30900	14700	198600	25100	223800	504800
1980	12900	31100	15000	199400	25900	225300	506400
1981	12900	31700	15200	202800	26000	228800	513500
1982	13300	33000	15400	209500	26700	236200	528200
1983	13800	34700	15700	217500	27700	245200	546300

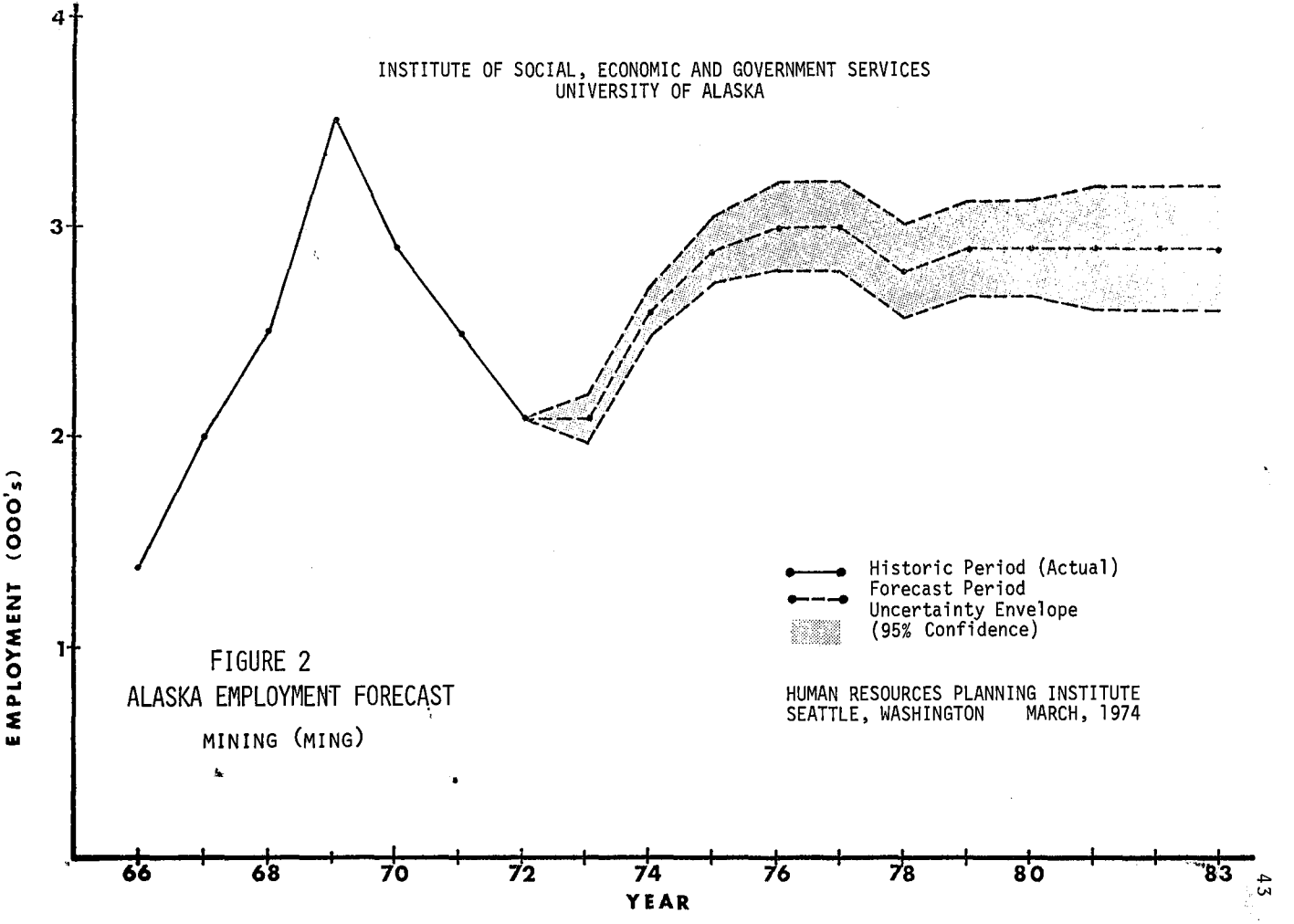


FIGURE 2
ALASKA EMPLOYMENT FORECAST

MINING (MING)

FORECAST EQUATION: MING is an exogenously forecasted basic industry.

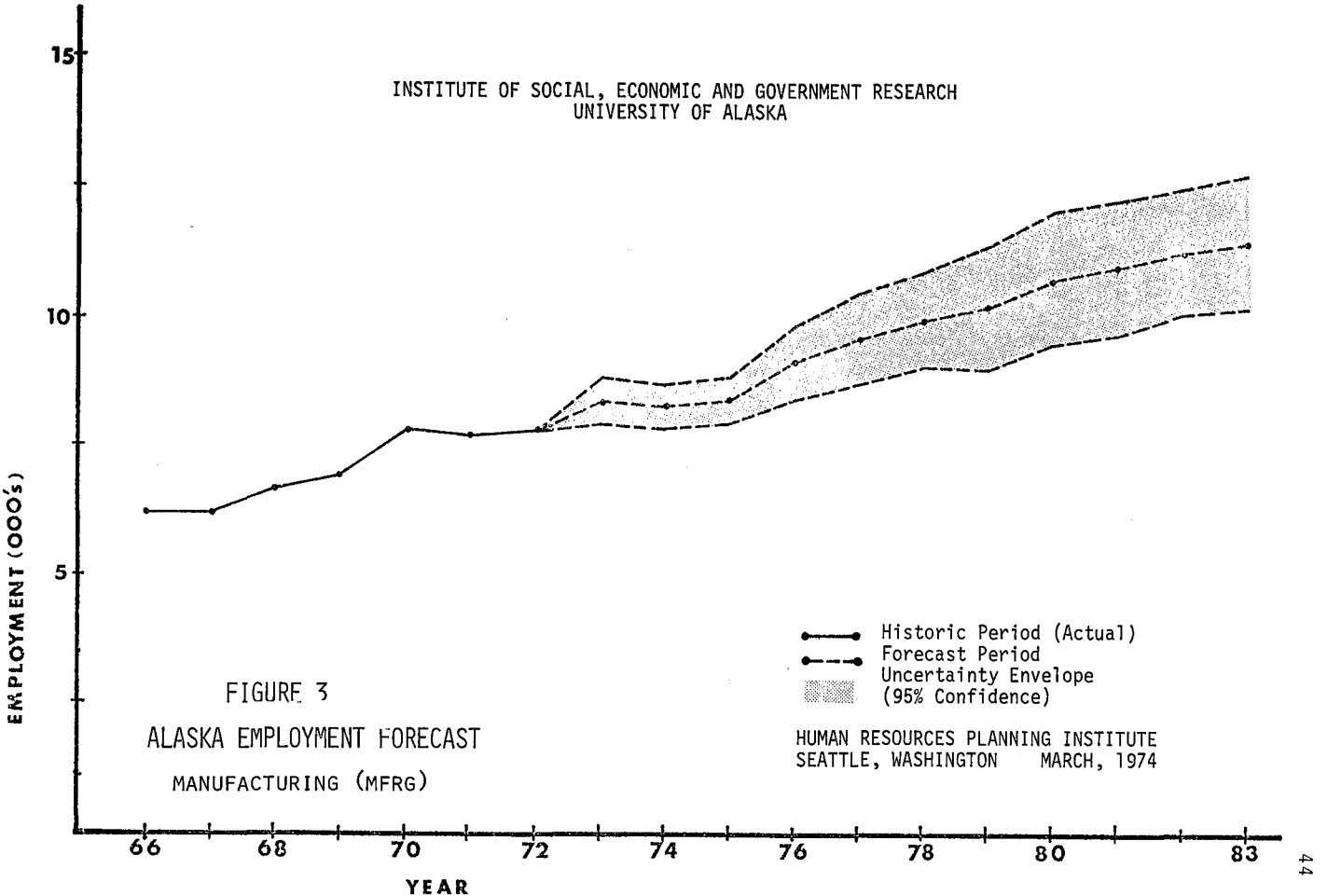


FIGURE 3

ALASKA EMPLOYMENT FORECAST

MANUFACTURING (MFRG)

FORECAST EQUATION: MFRG is an exogenously forecasted basic industry.

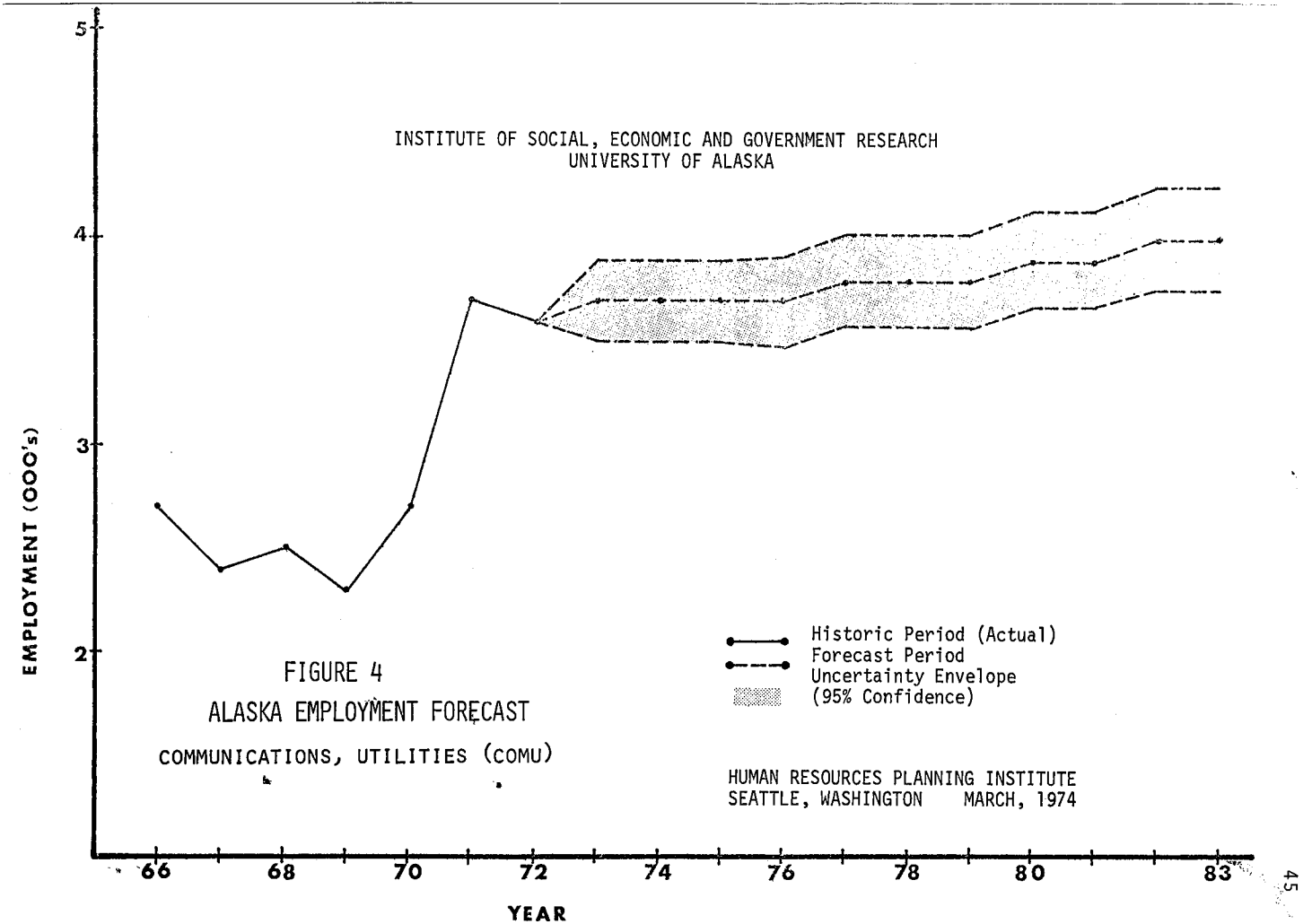
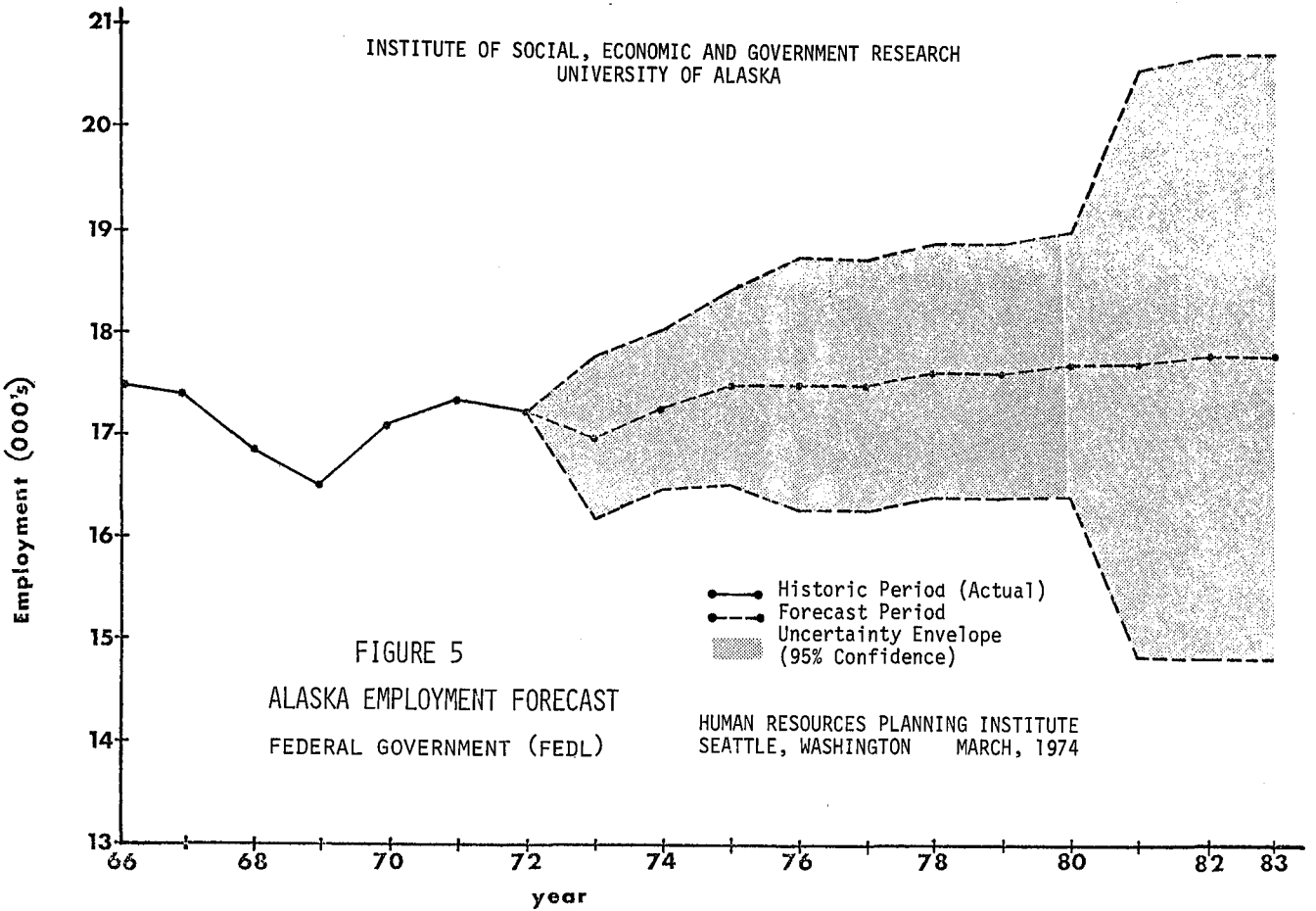


FIGURE 4

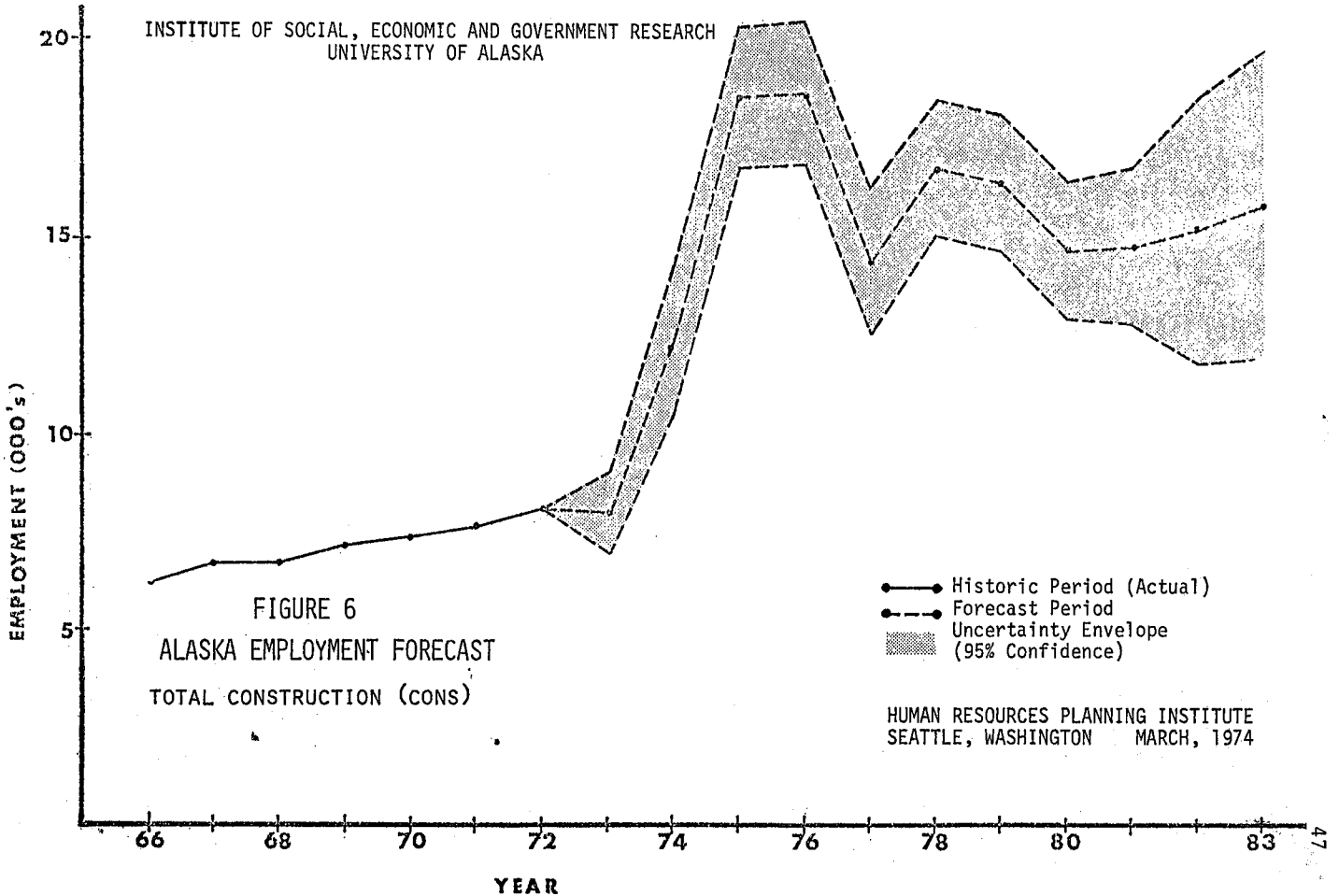
ALASKA EMPLOYMENT FORECAST

COMMUNICATIONS, UTILITIES (COMU)

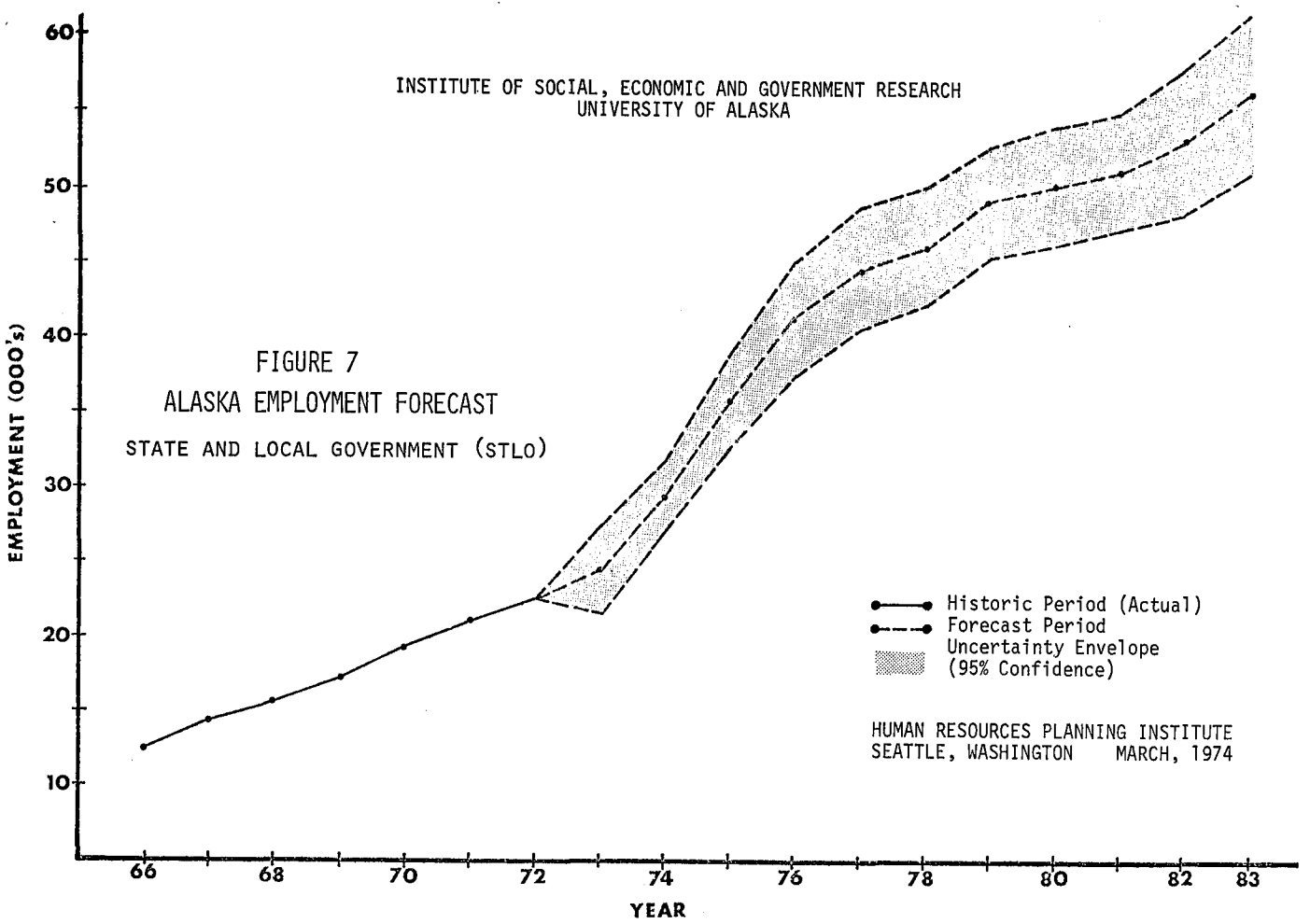
FORECAST EQUATION: COMU is an exogenously forecasted basic industry.



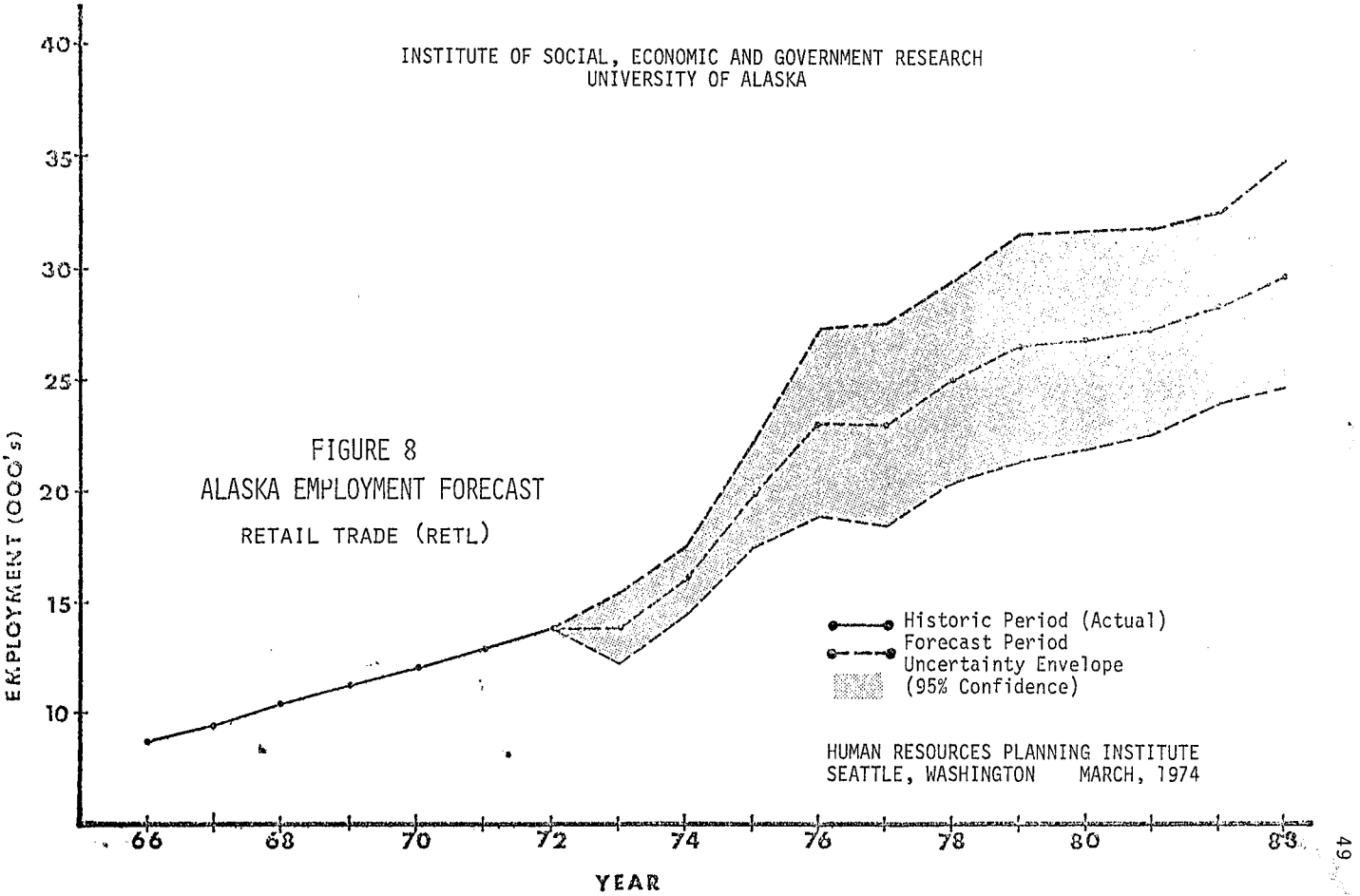
FORECASTED EQUATION: FEDL is an exogenously forecasted basic industry.



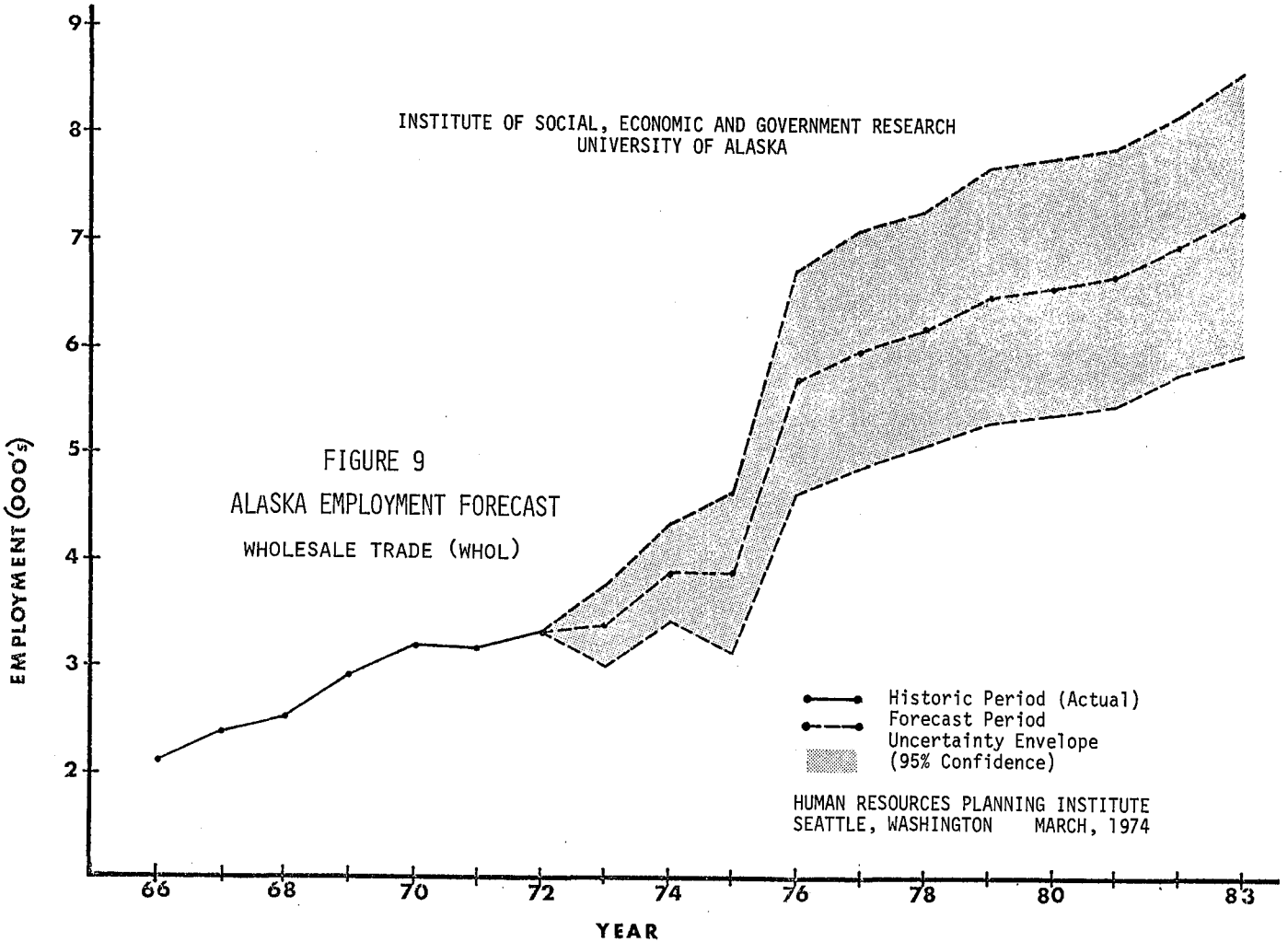
FORECAST EQUATION: CONS = -13480.4 + .034313 POPL -1 +.59379 FEDL. + PIPELINE CONS.



FORECAST EQUATION: STLO = -15055.0 + .092922 POPL-1 + 18.2519 STEX



FORECASTED EQUATION: RETL = -11451.0 + .362468MFRG + .180601MING + .064513 POPL-1 + 15.1 TIME



FORECAST EQUATION: WHOL = -160.6 + .143862 MING + .236687 RETL .

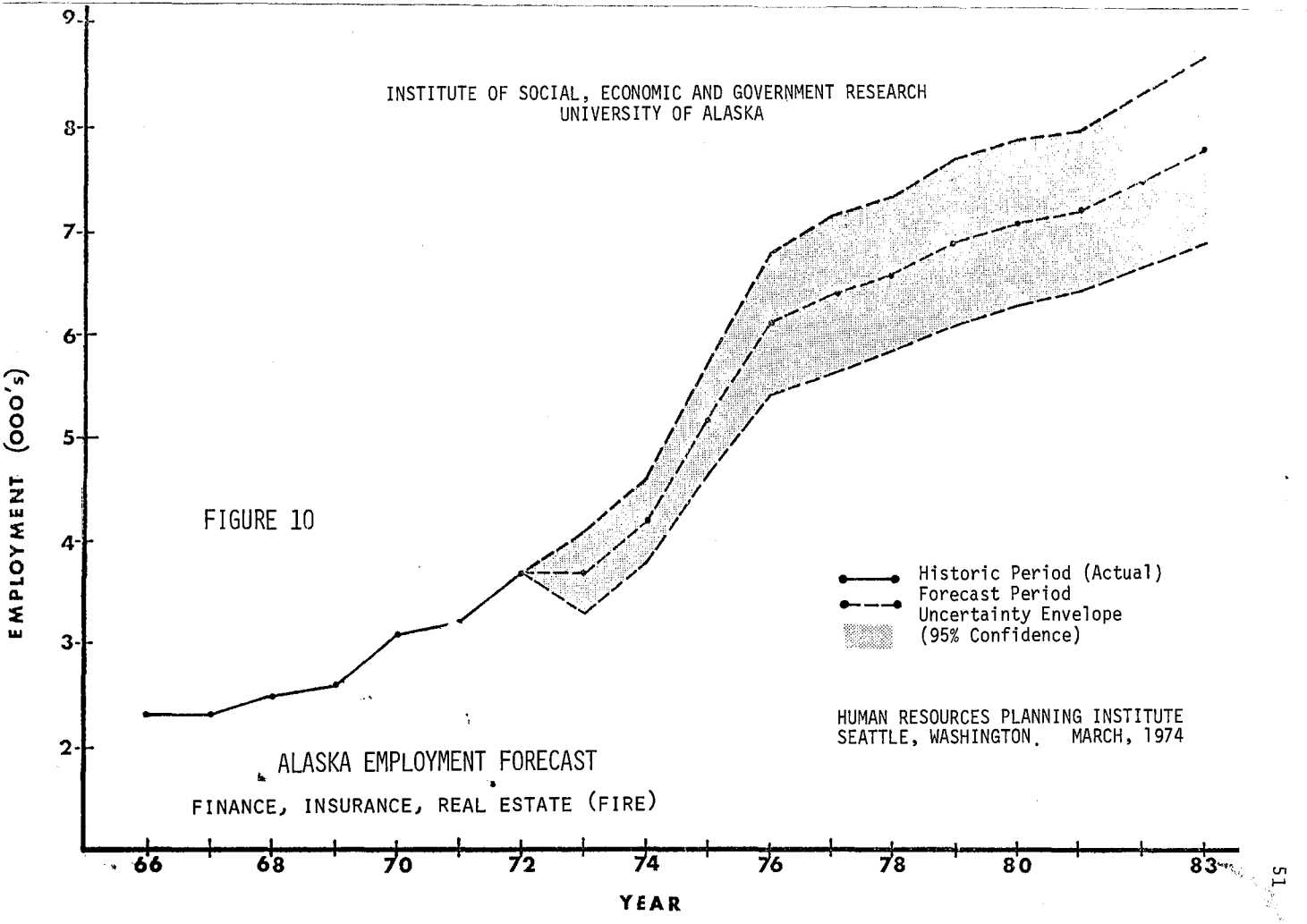

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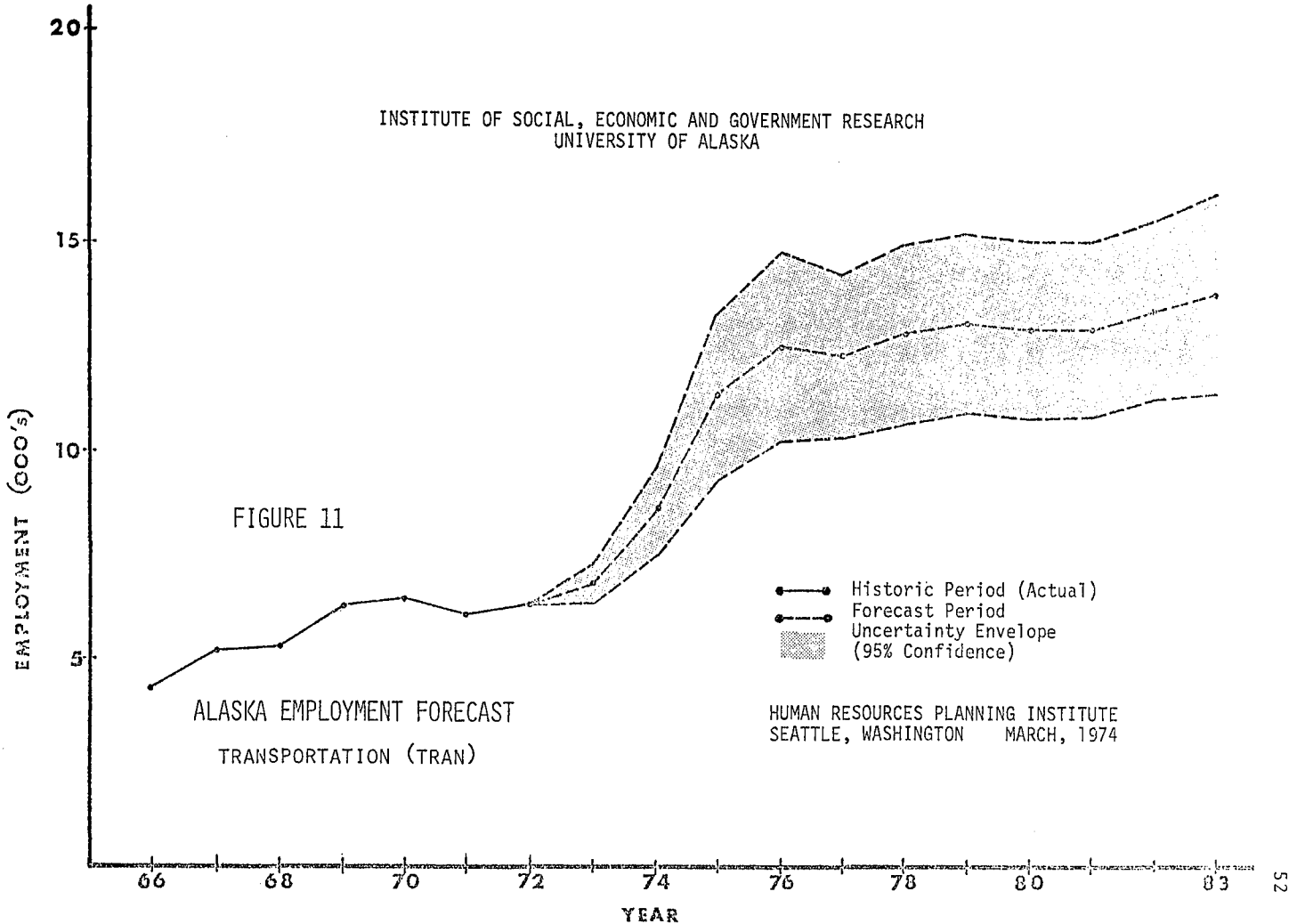
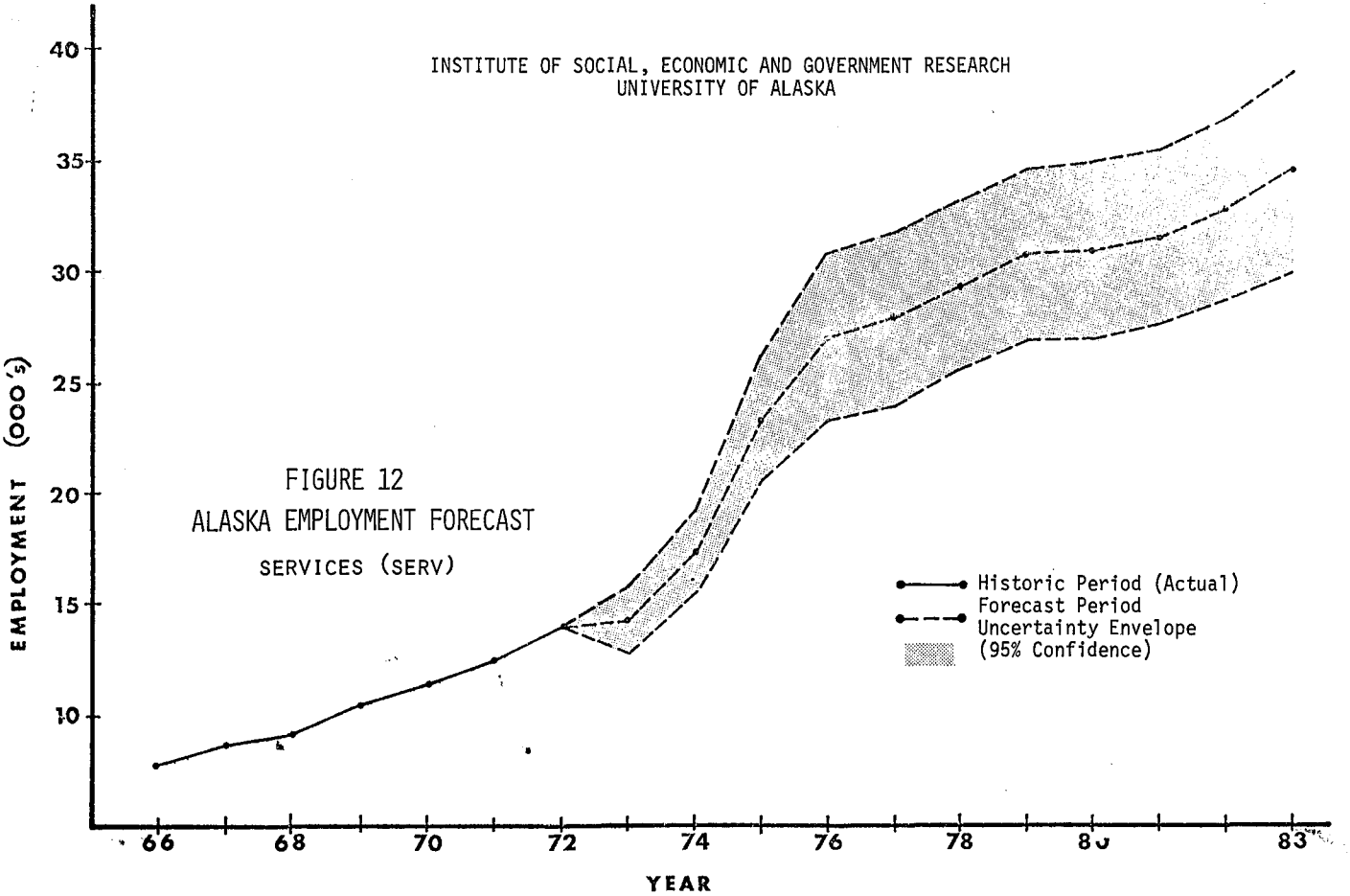
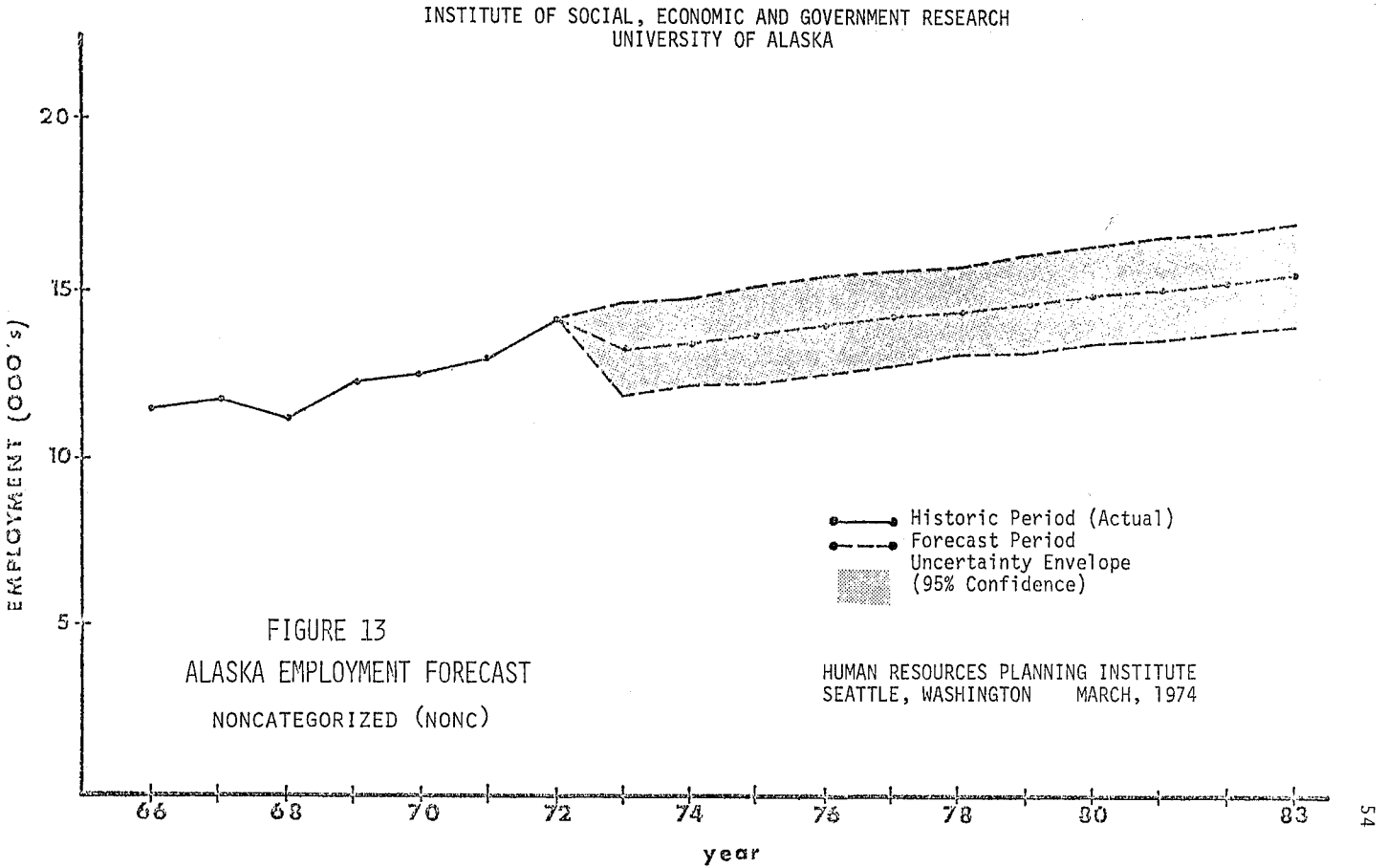
FIGURE 10
EMPLOYMENT (000's)
9
8
7
6
5
4
3
2
66
68
70
72
74
76
78
80
83
YEAR
Historic Period (Actual)
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON. MARCH, 1974
ALASKA EMPLOYMENT FORECAST
FINANCE, INSURANCE, REAL ESTATE (FIRE)



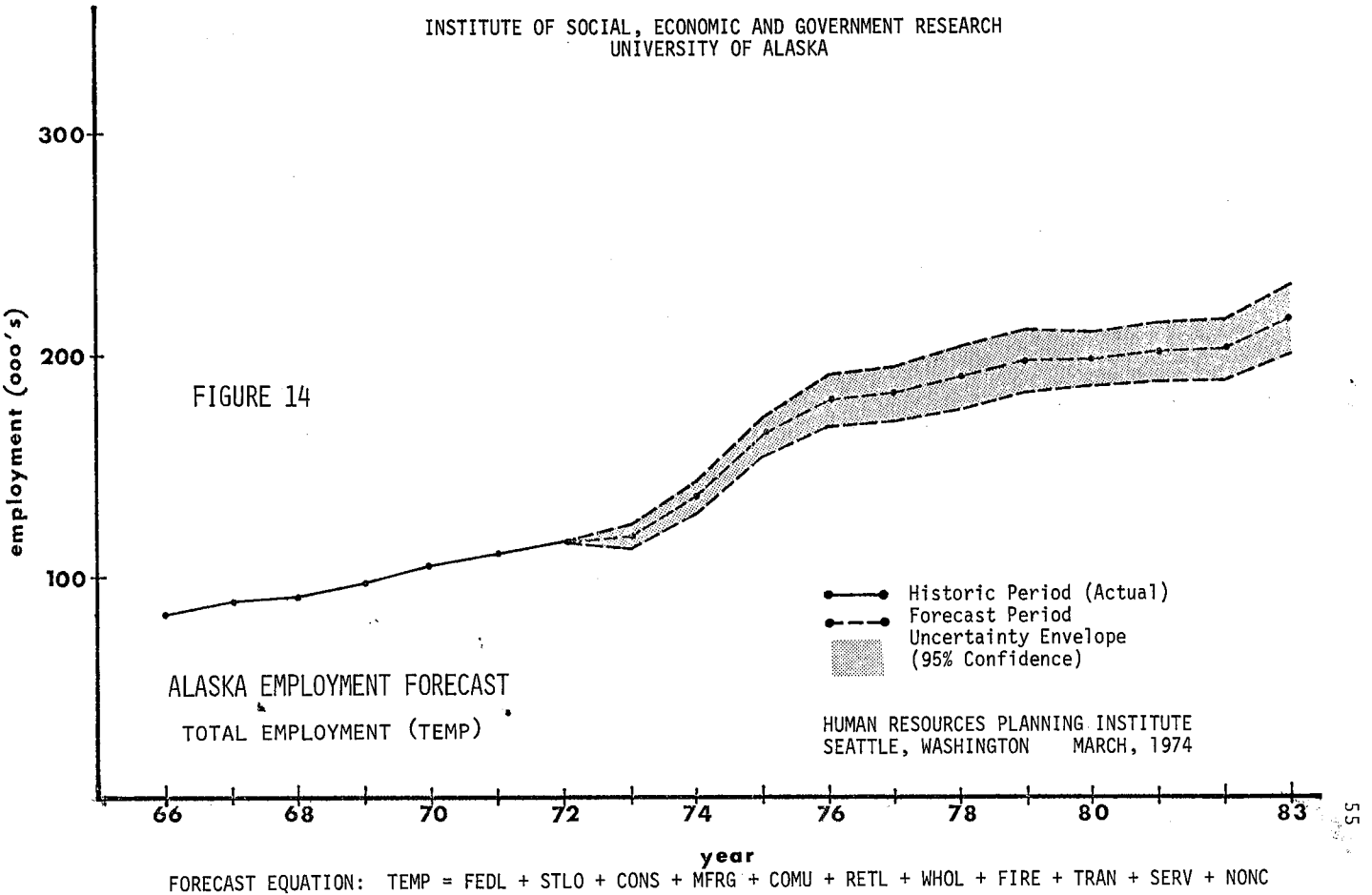
FORECAST EQUATION: TRAN = +901.0 + .162967 CONS + .713466 MING + .174706 MFRG + .256229 STLO - 87.39 TIME.



FORECAST EQUATION: SERV = -1680.5 - 49.27 TIME + .64438 RETL + .16094 CONS + .34271 STLO.



FORECAST EQUATION: NONC = +10288.2 + 2481.6 DUM-1965 + 56.81 TIME.



FORECAST EQUATION: TEMP = FEDL + STLO + CONS + MFRG + COMU + RETL + WHOL + FIRE + TRAN + SERV + NONC

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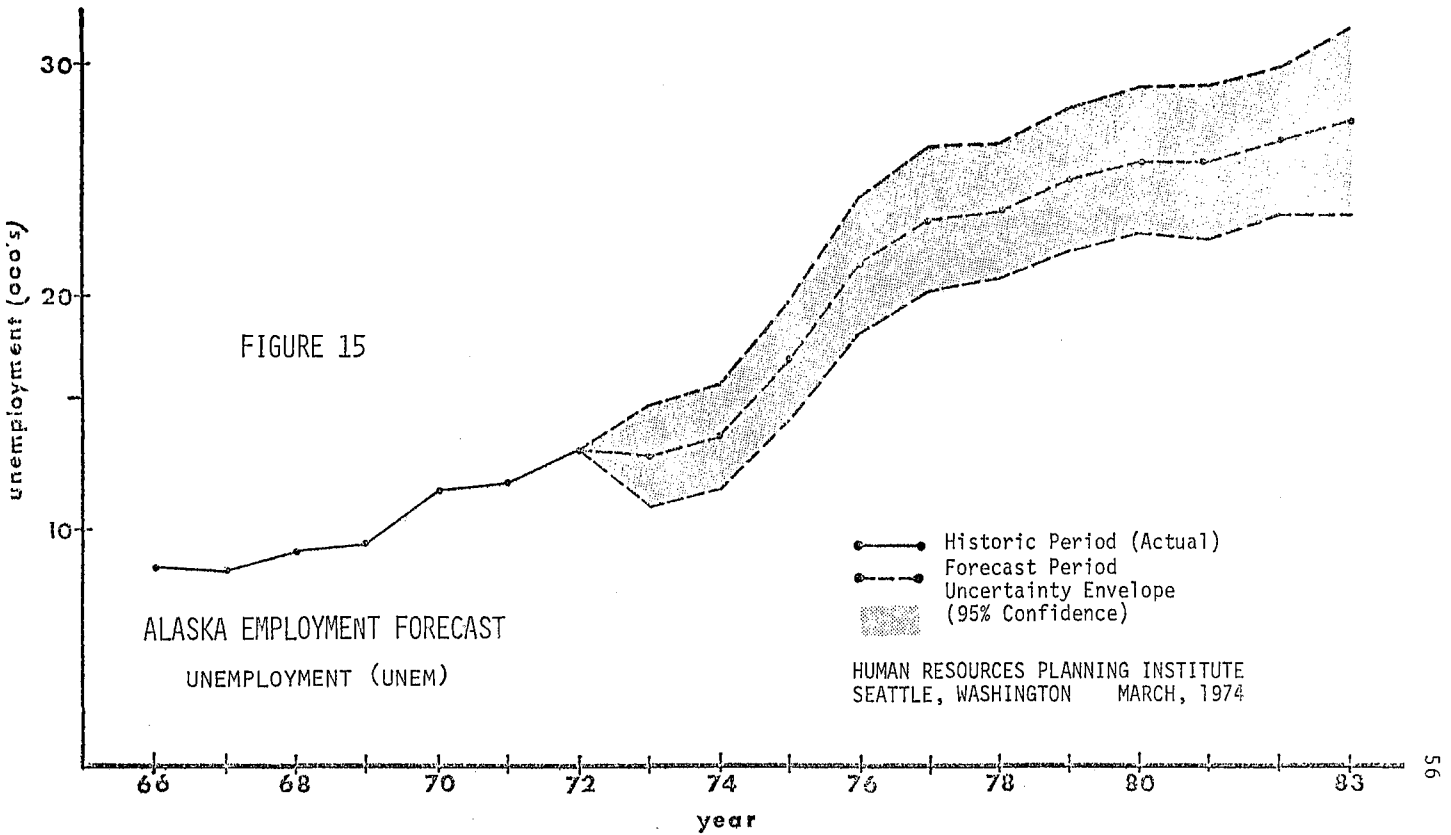
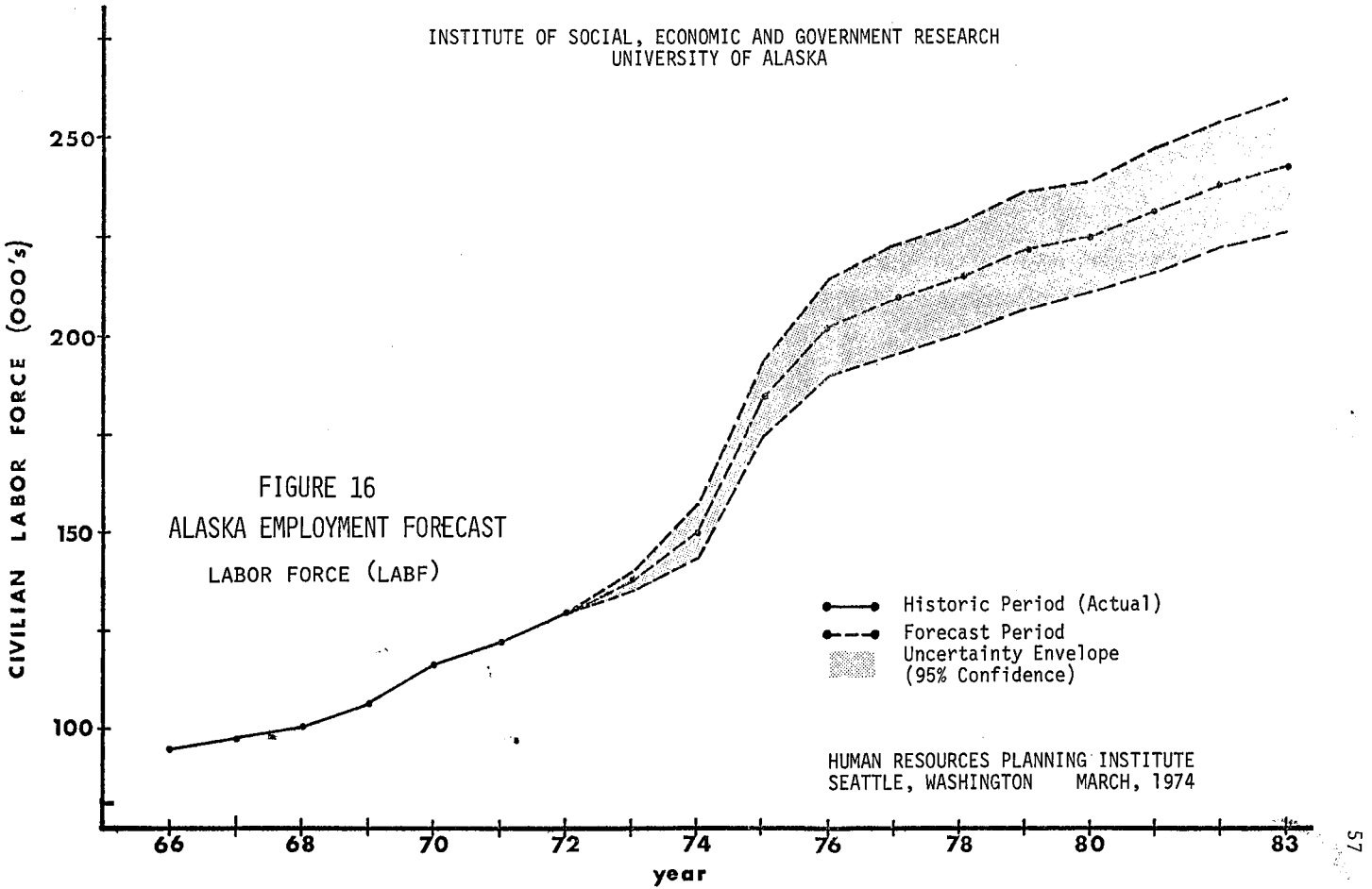
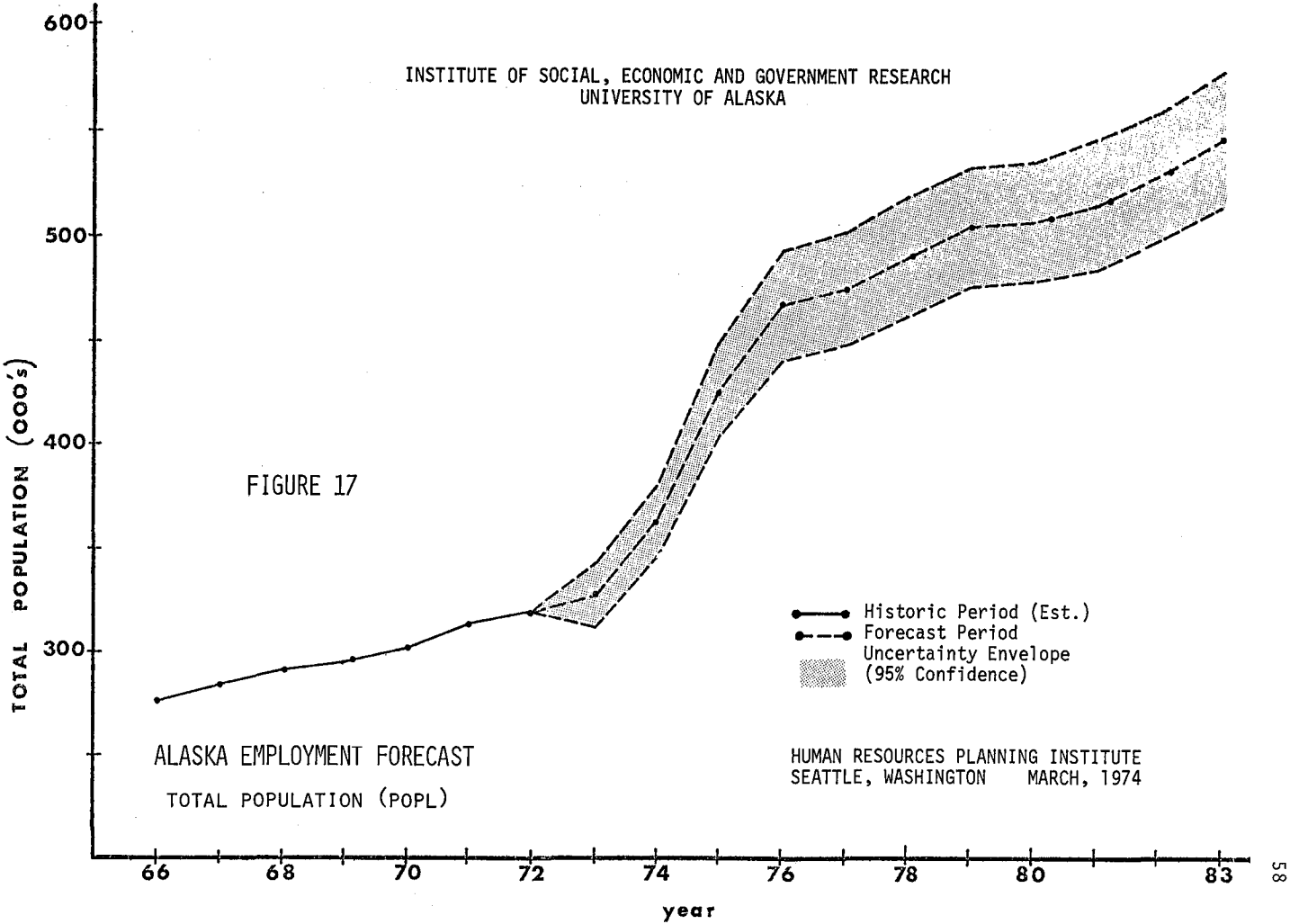


FORECAST EQUATION: UNEM = -964.4 + .060214 TEMP - 21445.4 DELTA TEMP + .576633 UNEM$_{-1}$.



FORECAST EQUATION: LABF = TEMP + UNEM.



FORECAST EQUATION: POPL =(CDRA · LABF)+ MILITARY (CDRA = Civilian Dependency Ratio)

SECTION 2

REGIONAL EMPLOYMENT AND POPULATION

The geographic regions discussed in this section are aggregations of Alaska's statistical labor market areas (SLMA) which have been previously defined in Figure 1 presented in the introduction to this volume.

The regional employment forecasts contained in this section were generated from the same equation set which was used to produce the statewide forecasts. Consequently, the sum of the forecasted employment and population for all of the regions will always add to the forecast of statewide employment and population. The distribution of the employment and population by region is primarily affected by the location of the indepdent forecast of basic industry employment and the manner in which each region responds to these basic industry demands.

For example, a relatively underdeveloped region such as Northern Alaska cannot supply most of the services demanded by the work force residing within the region. Therefore, employment demands generated in Northern Alaska will have important effects on the employment of persons in Fairbanks and Anchorage. A full discussion of the way in which the

statewide forecasts were allocated to the regions is contained in Volume II of this study.*

Overall, the Anchorage region is expected to maintain its dominance within the state of Alaska. In 1972, the Anchorage region contained approximately 45% of total statewide employment.** During the pipeline construction period, Anchorage's share of statewide employment is expected to fall to a low of approximately 44% but will rise after the period of pipeline construction to an estimated 46% by 1980. The Fairbanks regions, on the other hand, is expected to gain in both absolute and relative terms over the forecast period. In 1972, Fairbanks contained approximately 14.7% of the state's total employment. By 1980, this share is expected to rise to 15.3%.

The southeast region will follow a pattern very similar to that of Anchorage declining slightly from its 1972 percentage of 18.5% to a 1975 level of 17.7%. Thereafter, it will increase rising to a level of 18.6% by 1980. The southcentral region, on the other hand is expected to rise from 1972 share of total statewide employment of 13.1% to a high of 14.4% in 1975. Thereafter, it is expected to decline reaching a low of 12.5% by 1980.

*The structure of Alaska's labor market, Volume II.
**Regional shares of total employment are also presented in Table 4 at the end of this section.

The remaining three regions of the state (Southwest, Northwest, and Northern) are all very small - none of them containing more than 3.1% of the state's total employment. The Northwest region is expected to show some slight relative growth both during the pipeline period and thereafter while the Northern region is expected to show the greatest change in its relative share during the period 1978 as a result of our assumed construction of a gas pipeline across Northern Alaska and into the McKenzie Valley

All of the regions, however, are expected to show absolute increases in employment with the greatest increase occurring in the Anchorage region (up 46,000 workers) and the southeast region (up 18,600 workers). The Fairbanks region is expected to increase by an estimated 15,900 workers between 1972 and 1983, inclusive, while the Southcentral region is expected to register a net growth of employment of 11,800 workers over the same period of time.

Tables and figures of regional employment supporting the discussions which follow are included at the end of this section. Table 4 shows total employment by region expressed as a percent of total state employment. Table 5 shows regional shares of statewide employment in each industry category for the year 1972, the year upon which the regional allocation was based. Tables 6 through 16 show the regional

forecasts for each industry, one table for each year of the forecast period (1973-1983). Figures 18 through 24 are plots of total employment for each of the study regions over both the historic period (1966-1972) and the forecast period (1973-1983).

Anchorage Region (Figure 18)

Between 1972 and 1983, inclusive, total employment in the Anchorage region is expected to increase from 51,700 workers to 99,900 workers. As a result of this increase in employment, and labor force, population is expected to increase by slightly over 75% - going from an estimated 1972 level of 143,200 persons to a 1983 level of 251,000 persons. The greatest employment increases over the 11 year forecast period are expected in service employment and state and local government employment. Service employment is expected to more than double between 1972 and 1976 and to grow steadily thereafter reaching a high of 19,100 workers by 1983. State and local government employment is expected to grow somewhat more slowly during the period 1972 to 1976, inclusive, but to increase more rapidly thereafter also reaching a high of 19,100 workers by 1983. Most of this growth (an estimated two-thirds of the total change) is expected to occur in local government employment. This should be the product of several forces. First, the growth of population in the

Anchorage area will require increasing employment at both the city and borough level. In addition, it appears that both the borough and city of Anchorage will be expanding the scope of services provided to the population as well as increasing employment as a result of more people to be served. Secondly, the increasing movement toward federal revenue sharing will mean that the city/borough of Anchorage will be increasingly designated as a "prime grantee" for the administration and delivery of various services heretofore provided by either the Federal government or the state government. Consequently, even though the mix of services which are delivered to the population remains the same the employment of persons will be shifted increasingly to the city or borough level.

Retail trade is also expected to increase quite rapidly rising from a 1972 level of 7,000 workers to an estimated 1983 level of 16,200 workers. The greatest rate of increase will occur during the period 1972 through 1976, inclusive, when employment in retail trade is expected to increase by approximately 5,600 workers. Thereafter, employment will grow at a slower, but steady, rate increasing by approximately 2,100 workers between 1976 and 1980 and by an additional 1,500 workers between 1980 and 1983.

Other industries expected to show rapid gains in employment over the forecast period are wholesale trade (up from a 1972 level of 2,300 workers to a 1983 level of 5,300 workers) and finance, insurance and real estate (up from a 1972 level of 2,200 workers to a 1983 level of 5,100 workers) and transportation services(up from a 1972 level of 2,800 workers to a 1983 level of 6,100 workers).

The employment of workers by the federal government is expected to remain relatively constant over the entire forecast period as is the employment of workers in the mining industry and the communications and utilities industry.

Fairbanks Region (Figure 19)

Total employment in the Fairbanks regions is expected to increase sharply between 1972 and 1976, inclusive, rising from a level of 16,600 workers to a level of 27,200 workers. Thereafter, total employment is expected to increase by 3,300 workers between 1976 and 1980, inclusive, and by an additional 3,400 workers to reach a level of 33,900 workers in 1983. As a result of these increases in employment, and labor force, the total population of the Fairbanks region is expected to increase from its 1972 level of 53,600 persons to a 1983 level of

91,100 persons.* Over half of the total increase in population is expected to occur over the four year period 1972 through 1976, inclusive, when population will increase by 24,100 persons.

As with Anchorage, the most rapid increase in total employment will occur among state and local government workers - an increase of 6,500 workers over the 11 year forecast. This increase in state and local government employment is expected to be balanced between state government and local government with much of the pipeline impact growth occurring between the 1972-1976 period related to state employment. Thereafter, the growth of city and borough government employment will become increasingly important. Construction industry employment is expected to increase by approximately 1,200 workers between 1972 and 1976, inclusive, and then to decline by approximately 200 workers by 1980. However, by 1983 the construction industry's employment will rise again to reach a level of 2,400 workers.

Employment in the manufacturing, mining, communications, and utilities industries will continue to be relatively low and quite stable, all of these industries showing changes of 200 or less employees over the 11 year forecast period and none of them employing more than 600 total workers.

*These estimates of total population include 15,500 active duty military personnel and their dependents.

Retail trade employment in the Fairbanks region will increase steadily throughout the forecast period rising from a level of 2,000 workers in 1972 to 3,600 workers in 1976 and 4,800 workers in 1983. Because of its close linkages to retail trade employment, wholesale trade employment will also increase throughout the forecast period rising from a level of approximately 400 workers in 1972 to a level of 900 workers in 1983. Although the absolute change in employment is only 500 workers, this sector will show an impressive rate of growth exceeding 100% over the 11 year forecast.

Finance, insurance and real estate workers (FIRE) will increase from approximately 500 in 1972 to 900 in 1976. Thereafter, FIRE employment will increase by a moderate 200 workers between 1976 and 1980 and an additional 100 workers between 1980 and 1983 to reach a high of 1,200 workers.

Employment in transportation services is expected to double between 1972 and 1976, inclusive, rising from a level of 900 workers to one of 1,800 workers over that period. Thereafter, transportation employment is expected to be virtually constant, increasing by only 100 workers over the eight year period 1976 to 1983, inclusive.

Service employment, on the other hand, is expected to grow very rapidly throughout the forecast period. This industry employed 2,200 workers in 1972 and is expected to increase by more than 100% over a five year period to reach a level of 4,600 workers in 1976. Service employment will increase by an additional one-third between 1976 and 1983 increasing to a high of 6,100 workers by the end of the forecast period.

Southeast Region (Figure 20)

Total employment in the southeast region is expected to increase by 19,400 workers over the forecast period rising from a 1972 level of 21,000 to a 1983 level of 40,400. As a result of this growth in total employment, and labor force, total population in the region is expected to increase from the 1972 level of 48,400 persons to a level of 92,300 persons by 1983 - an increase of 91% over the 11 year forecast period. The rapid period of population growth in the region will occur between 1972 and 1976 when total population is expected to increase by 26,600 persons or 55%.

The most rapid growth of employment in the Southeast region is expected to occur in the state and local government sector where the number of workers will increase from a 1972 level of 5,600 to a 1983 level of 14,200. Most of the increase in state and local government employment in the southeast region

will be in state government employment and will be centered in the Juneau area.* Most other forms of basic employment are expected to show moderate employment gains with construction increasing by approximately 1,100 workers and manufacturing increasing by 1,000 workers over the total forecast period.

Other non-basic employment is expected to show significant increases also. Retail trade will increase from a 1972 level of 2,100 workers to reach a 1983 high of 4,700. Transportation services will also rise rapidly with most of the growth occurring between 1972 and 1976 when employment is expected to rise by 1,500 workers to a high of 3,100. Thereafter, transportation employment will remain relatively constant increasing by only 200 workers over the eight year period from 1976 to 1983 to reach a forecasted high of 3,400.

Service employment will rise rapidly during the period 1972 to 1976 and will maintain a substantial rate of increase thru 1983. Service employment in 1972 was 1,600 workers. It is expected to rise to 3,300 workers by 1976 and 3,800 workers by 1978. Another 500 workers will be added to reach a level of 4,300 in 1983.

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* This is under the assumption that the state capitol will not be moved as a result of the referendum which is being held in November, 1974.

Southcentral Region (Figure 21)

The southcentral region is expected to grow very rapidly over the period 1972 to 1976, inclusive, as a result of pipeline construction - particularly the construction of terminal facilities in the Valdez area. As a result, total employment is expected to increase from a 1972 level of 14,900 to a 1976 level of 25,400 workers. Over the five year period from 1976 through 1980, inclusive, employment is expected to decline by approximately 500 workers to a level of 24,900. After 1980 it will begin rising again to reach a 1983 level of 27,200. Because of these fluctuations in employment, population is also expected to rise quite rapidly between the period 1972 to 1976, inclusive, growing from a level of 43,700 to a 1976 level of 65,600. Despite the fact that total employment will be declining slightly between 1976 and 1980, total population in the Southcentral region is expected to be virtually constant over the same period of time with the difference being made up by increasing unemployment. Between 1980 and 1983, population will begin rising again, as a result of employment increases, and will reach a forecasted level of 70,600 workers by 1983.

The greatest fluctuation in employment in the Southcentral region will occur among construction workers where employment is expected to rise from a 1972 level of 900 persons

to a 1976 level of 5,000. By 1980, construction employment is expected to decline to 1,700 workers (a loss of 3,300 jobs) and then rise moderately to a level of 1,900 workers by 1983.

As was true elsewhere in Alaska, state and local government employment is expected to show steady employment gains throughout the period rising from a 1972 level of 3,000 workers to a forecasted 1983 level of 7,700 workers. Most of these gains are expected in the area of local government as a result of the growth of local government services provided through such communities as Valdez, Cordova, Seward, etc.

Manufacturing employment in the Southcentral region, particularly employment in fishing and forestry, is expected to show moderate but steady gains in employment rising from an estimated 2,400 workers in 1972 to a forecast of 3,700 workers by 1983. This growth of manufacturing employment occurs at a steady rate of approximately 100 workers per year throughout the forecast period. Mining employment is expected to increase in the Southcentral region rising by approximately 50% from a 1972 level of 600 workers to a 1976 level of 900 workers. After 1976, however, the forecast shows that mining employment will be constant in this region.

Among the non-basic industries, the retail trade employment in the Southcentral region is expected to increase moderately rising from a level of 1,100 workers in 1972 to a high of 2,600 workers in 1983 - a growth of 1,500 workers over the 11 year forecast. Wholesale trade, responding to the growth in retail trade will also grow but will remain relatively small in size employing only 600 workers by 1983. In a similar manner, finance, insurance and real estate employment is expected to increase significantly in percentage terms but will remain a relatively small industry growing from a 1972 level of 200 workers to a forecasted 1983 level of 500 workers.

Transportation employment is expected to double between 1972 and 1980, inclusive, rising from 500 workers to 1,000 workers. Between 1980 and 1983, however, transportation employment in the region is expected to be constant. Service employment is expected to more than double between 1972 and 1976 growing from 1,200 workers to 2,500 workers. Thereafter, it is expected to increase moderately to a level of 2,800 workers in 1980 and 3,200 workers in 1983.

Southwest Region (Figure 22)

The Southwest region had a total employment of only 3,600 workers in 1972. This total is expected to rise moderately

over the entire forecast period, but by 1983 the region's total employment will still be only 6,300 workers. Reflecting this moderate rate of growth in employment, and labor force, the region's population is expected to grow from its 1972 level of 9,800 workers to a forecasted 1983 level of 15,800 workers. Most of this growth will occur during the period 1972 to 1976 , inclusive.

In 1972 the only industries in the Southwest region to employ more than 750 workers were Federal government and state and local government. Federal government employment is expected to remain virtually constant throughout the forecast period while state and local government is expected to be the region's "growth industry" - rising from a level of 800 workers in 1972 to a level of 2,000 workers in 1983.

This growth of state and local government could very well be high for the Southwest region. The general lack of population in the area would seem to indicate a much slower growth rate in the state and local government sector. Consequently, it is most probable that the growth of state and local government employment in this region is related to the inability of our regional allocation system to deal with such small employment levels as are evident in the Southwest. With respect to non-governmental parts of the economy, employment throughout is expected to be highly stable with some

slight growth occurring in the service, transportation, finance, insurance and real estate, and retail trade sectors. In none of these industries, however, will employment be increasing by more than 400 workers over the 11 year forecast period.

Northwest Region (Figure 23)

Total employment in the Northwest region was 3,600 persons in 1972. This is forecasted to increase to 6,600 workers by 1976 and to 7,300 workers by 1978. Reflecting the growth of employment, and labor force, population in the Northwest region is expected to climb from its 1972 level of 9,100 persons to a 1983 level of 17,200 workers. Eighty percent of this growth of population is expected to occur between the period 1972 and 1976 with most of it attributable to the growth of construction employment and local government employment. As was discussed above with respect to the Southwest region, the growth of state and local government employment most probably results from the inability of our regional allocation system to deal with such slightly populated regions as the Northwest. Consequently, the region may not grow nearly as rapidly as the forecasts indicate. On the other hand, the forecast for mining employment shows an increase of 400 workers between 1972 and 1976 and a decrease of 100 workers thereafter to reach a 1983 level of 700. There has been some speculation that

hard rock mining will develop in the Northwest region. If it does, it could cause significant increases in employment in the mining sector and could cause population and employment in this region to grow more rapidly.

Northern Region (Figure 24)

The Northern region is the least densely populated region throughout Alaska. In 1972, its employment level was 1,800 workers and its population level was 5,700 persons. By 1976, the total employment in the Northern region is expected to grow to 3,700 workers and its population is expected to increase to 9,200 persons. Approximately 58% of the total growth in employment between 1972 and 1976, inclusive, results from the addition of 1,100 workers in the construction industry. This growth of construction employment in the region is related to the growth of the Trans-Alaska pipeline and the subsequent forecasted construction of an natural gas pipeline across Northern Alaska.

By 1980, the pipeline construction is expected to be over and construction employment will decline from its 1976 level of 1,100 workers to a 1980 level of 100 workers - all of whom will be employed as maintenance workers under contract to one or the other pipeline companies. As a result, total employment in the region is expected to decline

from its 1976 level of 3700 workers to a 1980 level of 3000 workers - and this will produce a drop in population of approximately 500 persons to a level of 8700 in 1980. Between 1980 and 1983, both employment and population are expected to increase moderately with employment adding an additional 200 workers to reach a level of 3200 and population to increase by 200 persons to reach a level of 8900.

State and local government is expected to rise between 1972 and 1976, inclusive, by 400 workers to reach a high of 800. Thereafter, it is expected to grow moderately reaching a level of 1100 workers in 1983. Almost all of the growth of state and local government employment is expected to occur at the local government level as a result of increased employment by the North Slope Borough.

TABLE 4

TOTAL EMPLOYMENT BY REGION

Year		Anchorage	% State	Fairbanks	% State	Southeast	% State	Southcentral	% State
1966	(Historical)	36000	42.5	13300	15.7	16300	19.3	12500	14,8
1967		37100	42.2	13400	15.3	16800	19.3	14100	16.1
1968		38200	41.9	14000	15.4	17500	19.2	14700	16.2
1969		42500	43.1	15500	15.7	17700	17.9	14500	14.7
1970		47100	44.9	16100	15.4	18900	18.0	13800	13.2
1971		51000	46.1	16300	14.8	19600	17.7	15000	13.6
1972		51700	45.8	17300	14.7	21800	18.5	15400	13.1
1973	(Forecast)	54100	45.3	17700	14.7	22600	18.9	15800	13.2
1974		60500	44.4	20200	14.8	24800	18.2	18100	13.3
1975		72900	44.0	24900	15.0	29300	17.7	23800	14.4
1976		81200	44.7	27200	14.9	32400	17.9	25400	14.0
1977		84000	45.7	27900	15.1	33700	18.4	23500	12.8
1978		86700	45.2	28800	15.0	34900	18.2	23700	12.3
1979		90200	45.4	30000	15.1	36300	18.3	24600	12.4
1980		91500	45.9	30500	15.3	37000	18.6	24900	12.5
1981		93100	45.9	30900	15.2	37700	18.6	25400	12.5
1982		96200	45.9	31900	15.2	38900	18.6	26200	12.5
1983		99900	45.9	33200	15.3	40400	18.6	27200	12.5

TABLE 4
TOTAL EMPLOYMENT BY REGION
(Continued)

Year	Southwest	% State	Northwest	% State	Northern	% State
1966 (Historical)	2500	3.0	2100	2.4	1800	2.1
1967	2500	2.8	2300	2.6	1600	1.9
1968	2600	2.8	2600	2.8	1600	1.7
1969	3000	3.0	4000	4.1	1500	1.5
1970	3400	3.3	3900	3.7	1500	1.5
1971	3400	3.1	3500	3.2	1600	1.5
1972	3700	3.1	3700	3.1	1800	1.5
1973 (Forecast)	3700	3.1	3800	3.1	1900	1.5
1974	4100	3.0	4800	3.5	3900	2.0
1975	4700	2.8	5900	3.6	4100	2.5
1976	5200	2.8	6600	3.6	3700	2.0
1977	5300	2.9	6400	3.5	2800	1.5
1978	5500	2.9	6800	3.5	5700	3.0
1979	5700	2.9	6900	3.5	4900	2.5
1980	5800	2.9	6700	3.4	3000	1.5
1981	5900	2.9	6800	3.4	3000	1.5
1982	6100	2.9	7000	3.4	3100	1.5
1983	6300	2.9	7300	3.4	3200	1.5

TABLE 5

ALASKA EMPLOYMENT BY INDUSTRY AND REGIONAL SHARES, 1972

	ANCH	FAIR	SE	SC	SW	NW	N	Total Alaska	Share of Total Emp.
Federal Government	.54	.17	.11	.07	.05	.04	.02	17200	.14
State & Local Govern.	.34	.18	.25	.13	.04	.04	.02	23200	.20
Construction	.54	.15	.14	.12	.01	.03	.01	7900	.07
Manufacturing	.15	.03	.44	.30	.07	.01	*	8000	.07
Mining	.38	.05	.03	.30	.02	.17	.05	2100	.02
Communication, Utilities	.47	.15	.12	.10	.01	.03	.12	3600	.03
Retail Trade	.55	.15	.16	.09	.02	.02	.01	13800	.12
Wholesale Trade	.72	.13	.07	.08	*	*	*	3300	.03
Finance, Insure, Real Est.	.65	.15	.12	.06	.01	.01	*	3700	.03
Transportation	.44	.14	.25	.07	.04	.05	.01	6400	.05
Service	.55	.17	.12	.09	.03	.03	.01	14000	.12
Non-Categorized	.40	.12	.19	.23	.03	.02	.01	14200	.12
Total Workers	.46	.15	.18	.13	.03	.03	.02	117400	1.00
Unemployment	.37	.15	.15	.19	.07	.05	.02	13600	
Civilian Labor Force	.45	.16	.18	.14	.03	.03	.02	131200	

*Less than 0.01

TABLE 6

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

ALASKA EMPLOYMENT FORECAST

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1973

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9200	2900	1850	1200	850	700	350	17000
STATE + LOCAL GOVERNMENT	8400	4500	6250	3350	900	550	500	24800
CONSTRUCTION (TOTAL)	4150	1150	1100	950	100	250	50	7700
MANUFACTURING	1300	250	3950	2650	550	100	0	8800
MINING	700	150	50	700	50	300	200	2100
COMMUNICATION,UTILITIES	1700	550	450	350	50	100	450	3700
RETAIL TRADE	7550	2150	2200	1200	300	300	100	13800
WHOLESALE TRADE	2450	450	250	250	0	0	0	3400
FINANCE,INSURE,REAL EST	2400	550	450	250	50	50	0	3700
TRANSPORTATION	3000	1000	1700	500	250	300	50	6800
SERVICE	7850	2450	1750	1300	350	450	150	14300
NON-CATEGORIZED	5350	1650	2600	3100	350	250	100	13400
TOTAL WORKERS	54100	17700	22600	15800	3700	3800	1900	119600
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	6100	1950	2450	1750	400	400	200	13300
CIVILIAN LABOR FORCE	60200	19600	25000	17600	4200	4200	2100	132900
CIVILIAN DEPENDENTS	63300	20600	26300	18500	4400	4400	2200	139500
CIVILIAN POPULATION	123500	40200	51300	36000	8500	8600	4200	272400
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	149300	55700	52500	45500	10200	9400	5900	328500

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 2.05000 INCLUDING MILITARY = 2.06165

TABLE 7

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

ALASKA EMPLOYMENT FORECAST

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1974

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9150	2950	1900	1200	650	650	350	17200
STATE + LOCAL GOVERNMENT	9650	5150	7200	3850	1000	1100	550	28500
CONSTRUCTION (TOTAL)	4850	1750	1250	1900	100	500	1900	12300
MANUFACTURING	1400	250	3850	2650	550	100	0	8700
MINING	850	150	50	800	50	550	150	2600
COMMUNICATION,UTILITIES	1700	550	450	350	50	100	450	3700
RETAIL TRADE	8600	2450	2500	1400	350	350	100	15700
WHOLESALE TRADE	2850	500	250	300	0	0	0	3900
FINANCE,INSURE,REAL EST	2700	650	500	250	50	50	0	4200
TRANSPORTATION	3750	1200	2100	650	300	400	50	8500
SERVICE	9550	2950	2150	1600	450	550	150	17300
NON-CATEGORIZED	5450	1650	2600	3150	350	250	100	13600
TOTAL WORKERS	60500	20200	24800	18100	4100	4800	3900	136300
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	6500	2100	2650	1850	450	450	150	14100
CIVILIAN LABOR FORCE	67000	22300	27500	19900	4500	5200	4000	150400
CIVILIAN DEPENDENTS	70700	24200	29000	20600	4800	5400	2400	157100
CIVILIAN POPULATION	137700	46400	56500	40500	9300	10600	6400	307500
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	163500	62000	57600	50000	10900	11500	8100	363600

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 2.04451 INCLUDING MILITARY = 2.05582

TABLE 8

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

A L A S K A E M P L O Y M E N T F O R E C A S T

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1975

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9250	3000	1550	1100	500	500	500	17500
STATE + LOCAL GOVERNMENT	12200	6500	9050	4900	1300	1400	700	36000
CONSTRUCTION (TOTAL)	6300	2700	1600	5200	100	700	1700	18200
MANUFACTURING	1400	250	3800	2850	450	100	0	8800
MINING	800	100	50	850	50	750	250	2900
COMMUNICATION,UTILITIES	1750	550	450	350	50	100	450	3700
RETAIL TRADE	10850	3100	3150	1750	450	450	100	19800
WHOLESALE TRADE	3600	600	350	400	0	0	0	4900
FINANCE,INSURE,REAL EST	3400	800	600	300	50	50	0	5200
TRANSPORTATION	5000	1600	2800	850	400	550	100	11300
SERVICE	12850	3950	2850	2100	600	700	200	23300
NON-CATEGORIZED	5550	1700	2650	3200	350	250	100	13800
TOTAL WORKERS	72500	24900	29300	23800	4700	5500	4100	165600
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	7700	2600	3100	2300	500	600	500	17300
CIVILIAN LABOR FORCE	80600	27500	32400	26200	5200	6500	4600	183000
CIVILIAN DEPENDENTS	84500	29100	34000	25700	5400	6600	3400	188800
CIVILIAN POPULATION	165100	56600	66400	51900	10700	13100	8000	371700
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	500	400	500	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	190900	72200	67600	61300	12300	14000	9600	427800

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 2.03164 INCLUDING MILITARY = 2.04282

TABLE 9

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

A L A S K A E M P L O Y M E N T F O R E C A S T

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1976

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9250	3000	1950	1100	900	900	500	17500
STATE + LOCAL GOVERNMENT	14100	7550	10500	5650	1500	1600	800	41700
CONSTRUCTION (TOTAL)	7200	2250	1800	5000	150	800	1100	18300
MANUFACTURING	1450	350	3800	2900	450	100	0	9000
MINING	750	100	50	850	50	850	250	3000
COMMUNICATION,UTILITIES	1750	550	450	350	50	100	450	3700
RETAIL TRADE	12600	3600	3650	2000	550	500	150	23000
WHOLESALE TRADE	4150	700	400	450	0	0	0	5700
FINANCE,INSURE,REAL EST	3950	900	700	350	50	50	0	6100
TRANSPORTATION	5500	1800	3100	950	450	600	100	12500
SERVICE	14950	4600	3350	2450	700	800	250	27100
NON-CATEGORIZED	5600	1750	2700	3300	350	250	100	14100
TOTAL WORKERS	81200	27200	32400	25400	5200	6600	3700	181600
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	9550	3200	3800	3000	600	750	450	21400
CIVILIAN LABOR FORCE	90800	30400	36200	28400	5800	7300	4200	203000
CIVILIAN DEPENDENTS	94200	31800	37600	27800	6000	7400	3400	208200
CIVILIAN POPULATION	185000	62200	73800	56200	11700	14800	7500	411300
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	210800	77700	75000	65600	13400	15600	9200	467300

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 2.03561 INCLUDING MILITARY = 2.03661

TABLE 10

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

ALASKA EMPLOYMENT FORECAST

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1977

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9250	3000	1950	1100	500	500	500	17500
STATE + LOCAL GOVERNMENT	15050	8050	11200	6050	1600	1700	850	44500
CONSTRUCTION (TOTAL)	7250	1950	1900	2200	150	500	50	14000
MANUFACTURING	1550	400	3900	3150	500	50	50	9500
MINING	750	150	50	900	50	850	250	3000
COMMUNICATION,UTILITIES	1750	550	450	400	50	100	450	3800
RETAIL TRADE	13300	3800	3900	2150	550	550	150	24300
WHOLESALE TRADE	4350	750	400	450	0	0	0	6000
FINANCE,INSURE,REAL EST	4150	950	750	400	50	50	0	6400
TRANSPORTATION	5400	1750	3050	900	450	600	100	12200
SERVICE	15450	4750	3450	2550	700	850	250	28000
NON-CATEGORIZED	5700	1750	2750	3350	350	250	100	14300
TOTAL WORKERS	84000	27900	33700	23500	5300	6400	2800	183600
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	10600	3550	4200	3200	650	850	450	23500
CIVILIAN LABOR FORCE	94600	31400	37500	26700	6000	7200	3200	207100
CIVILIAN DEPENDENTS	96900	32200	38900	27100	6200	7400	3300	211900
CIVILIAN POPULATION	191500	63600	76800	53800	12200	14600	6500	418900
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	217200	79100	78000	63200	13800	15400	8200	475000

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 2.02312 INCLUDING MILITARY = 2.03411

TABLE 11

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

ALASKA EMPLOYMENT FORECAST

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1978

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9250	3000	1950	1100	900	900	500	17600
STATE + LOCAL GOVERNMENT	15650	6400	11650	6300	1650	1800	900	46400
CONSTRUCTION (TOTAL)	7450	2000	1950	1650	150	700	2950	16800
MANUFACTURING	1700	400	4000	3300	450	100	50	10000
MINING	700	100	50	850	50	800	250	2800
COMMUNICATION,UTILITIES	1750	550	450	400	50	100	450	3800
RETAIL TRADE	13700	3500	4000	2200	550	550	150	25000
WHOLESALE TRADE	4450	800	400	500	0	0	0	6200
FINANCE,INSURE,REAL EST	4300	1000	750	400	50	50	0	6600
TRANSPORTATION	5650	1850	3150	950	450	600	100	12800
SERVICE	16200	5000	3600	2650	750	900	250	29400
NON-CATEGORIZED	5800	1800	2800	3400	350	250	100	14500
TOTAL WORKERS	86700	28800	34900	23700	5500	6700	5700	191900
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	10850	3600	4350	3000	700	850	450	23800
CIVILIAN LABOR FORCE	97500	32400	39200	26700	6200	7600	6100	215600
CIVILIAN DEPENDENTS	99400	34300	39900	27200	6300	7600	3500	218200
CIVILIAN POPULATION	196900	66600	79100	53800	12500	15200	9700	433800
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	222700	82200	80300	63300	14100	16000	11300	489900

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 2.01209 INCLUDING MILITARY = 2.02369

TABLE 12

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

ALASKA EMPLOYMENT FORECAST

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1979

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9250	3000	1950	1100	900	900	500	17600
STATE + LOCAL GOVERNMENT	16550	8850	12300	6650	1750	1900	950	49000
CONSTRUCTION (TOTAL)	7600	2100	2050	1700	150	650	2050	16500
MANUFACTURING	1750	400	4100	3400	450	100	50	10300
MINING	700	150	50	900	50	750	250	2900
COMMUNICATION,UTILITIES	1800	550	450	400	50	100	450	3800
RETAIL TRADE	14450	4100	4200	2300	600	550	150	26400
WHOLESALE TRADE	4700	800	450	500	0	0	0	6500
FINANCE,INSURE,REAL EST	4500	1050	800	400	50	50	0	6900
TRANSPORTATION	5800	1900	3250	1000	450	600	100	13100
SERVICE	17000	5250	3800	2800	800	950	300	30900
NON-CATEGORIZED	5500	1800	2850	3450	400	300	100	14700
TOTAL WORKERS	90200	30000	36300	24600	5700	6500	4900	198600
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	11400	3800	4550	3100	700	900	650	25100
CIVILIAN LABOR FORCE	101600	33800	40900	27700	6400	7400	5600	223800
CIVILIAN DEPENDENTS	102700	35100	41300	28000	6500	7800	3700	225000
CIVILIAN POPULATION	204300	68800	82200	55600	12900	15200	9300	448700
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	230100	84400	83400	65100	14500	16400	11000	504800

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 2.00536 INCLUDING MILITARY = 2.01750

TABLE 13

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

ALASKA EMPLOYMENT FORECAST

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1980

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9300	3000	2000	1100	500	500	500	17700
STATE + LOCAL GOVERNMENT	17000	9100	12650	6600	1800	1950	1000	50300
CONSTRUCTION (TOTAL)	7800	2150	2050	1750	150	450	100	14400
MANUFACTURING	1950	450	4300	3450	500	100	50	10700
MINING	700	150	50	900	50	750	250	2900
COMMUNICATION,UTILITIES	1800	600	450	400	50	100	450	3500
RETAIL TRADE	14700	4200	4300	2350	600	600	150	26900
WHOLESALE TRADE	4800	850	450	500	0	0	0	6600
FINANCE,INSURE,REAL EST	4600	1050	850	450	50	50	0	7100
TRANSPORTATION	5700	1850	3200	950	450	600	100	12900
SERVICE	17150	5300	3850	2850	800	950	300	31100
NON-CATEGORIZED	6000	1850	2500	3500	400	300	100	15000
TOTAL WORKERS	91500	30500	37000	24900	5800	6700	3000	199400
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	11800	3950	4750	3200	750	900	550	25900
CIVILIAN LABOR FORCE	103300	34400	41800	28100	6500	7600	3500	225300
CIVILIAN DEPENDENTS	103200	34400	41700	28100	6500	7600	3500	225000
CIVILIAN POPULATION	206500	68800	83500	56200	13000	15300	7000	450300
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	232300	84300	84700	65700	14700	16100	8700	506400

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 1.99500 INCLUDING MILITARY = 2.01173

TABLE 14

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

ALASKA EMPLOYMENT FORECAST

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1981

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9300	3000	2000	1100	900	900	500	17700
STATE + LOCAL GOVERNMENT	17450	9350	13000	7000	1650	2000	1000	51600
CONSTRUCTION (TOTAL)	7900	2150	2100	1750	150	450	100	14600
MANUFACTURING	2100	350	4400	3550	500	100	50	11000
MINING	750	200	50	900	50	700	200	2900
COMMUNICATION,UTILITIES	1850	600	450	400	50	100	450	3900
RETAIL TRADE	14950	4250	4350	2400	600	600	150	27300
WHOLESALE TRADE	4850	850	450	500	0	0	0	6700
FINANCE,INSURE,REAL EST	4700	1100	850	450	50	50	0	7200
TRANSPORTATION	5750	1850	3200	950	450	600	100	12900
SERVICE	17450	5400	3900	2900	800	950	300	31700
NON-CATEGORIZED	6100	1850	2550	3550	400	300	100	15200
TOTAL WORKERS	93100	30900	37700	25400	5900	6800	3000	202800
LABOR FORCE AND POPULATION DATA --								
UNEMPLOYMENT	11950	4000	4800	3250	750	900	400	26000
CIVILIAN LABOR FORCE	105000	34900	42600	28700	6600	7700	3400	228800
CIVILIAN DEPENDENTS	104900	34800	42500	28600	6600	7700	3400	228600
CIVILIAN POPULATION	209900	69700	85100	57300	13200	15400	6800	457400
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	235700	85300	86200	66700	14900	16200	8500	513500

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 1.99500 INCLUDING MILITARY = 2.01155

TABLE 15

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

A L A S K A E M P L O Y M E N T F O R E C A S T

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

ANNUAL AVERAGE FOR 1982

FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9400	3000	2000	1100	900	900	500	17800
STATE + LOCAL GOVERNMENT	18200	9750	13550	7300	1950	2050	1050	53900
CONSTRUCTION (TOTAL)	8150	2250	2150	1800	150	500	100	15100
MANUFACTURING	2150	350	4450	3650	550	100	100	11300
MINING	750	200	50	900	50	700	200	2900
COMMUNICATION,UTILITIES	1850	600	450	400	50	100	450	4000
RETAIL TRADE	15500	4400	4500	2500	650	600	150	28400
WHOLESALE TRADE	5050	900	500	550	0	0	0	7000
FINANCE,INSURE,REAL EST	4850	1100	900	450	100	50	0	7500
TRANSPORTATION	5900	1900	3300	1000	450	650	100	13300
SERVICE	18200	5600	4050	3000	850	1000	300	33000
NON-CATEGORIZED	6150	1900	2950	3600	400	300	100	15400
TOTAL WORKERS	96200	31900	38900	26200	6100	7000	3100	209500
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	12250	4050	4950	3350	750	900	400	26700
CIVILIAN LABOR FORCE	108400	36000	43900	29500	6900	7900	3500	236200
CIVILIAN DEPENDENTS	108300	36000	43800	29500	6900	7900	3500	235900
CIVILIAN POPULATION	216800	72000	87700	59100	13800	15800	7000	472100
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	242600	87500	88800	68500	15400	16700	8700	528200

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 1.99900 INCLUDING MILITARY = 2.01120

TABLE 16

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA COLLEGE, ALASKA

A L A S K A E M P L O Y M E N T F O R E C A S T

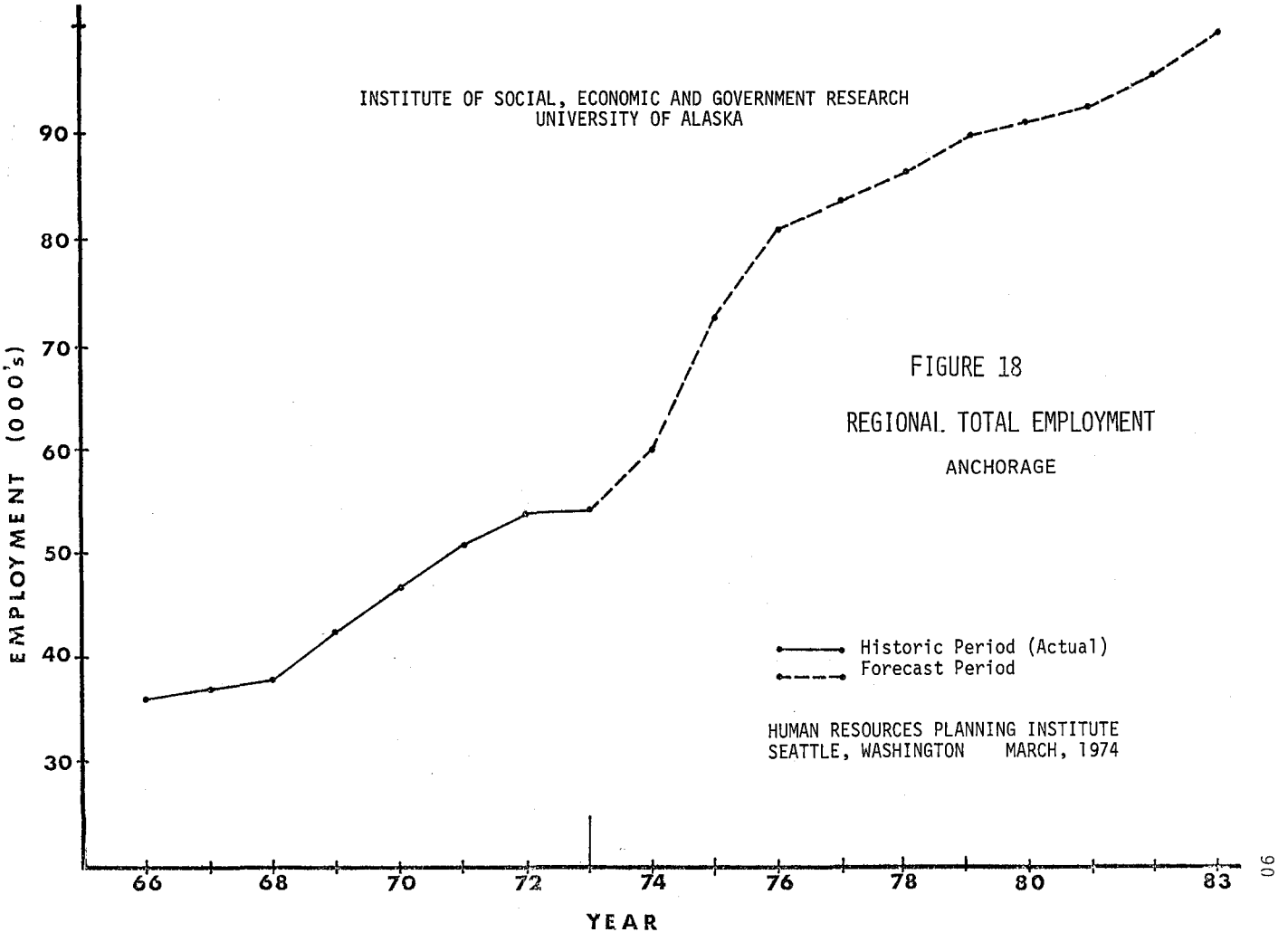
PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON

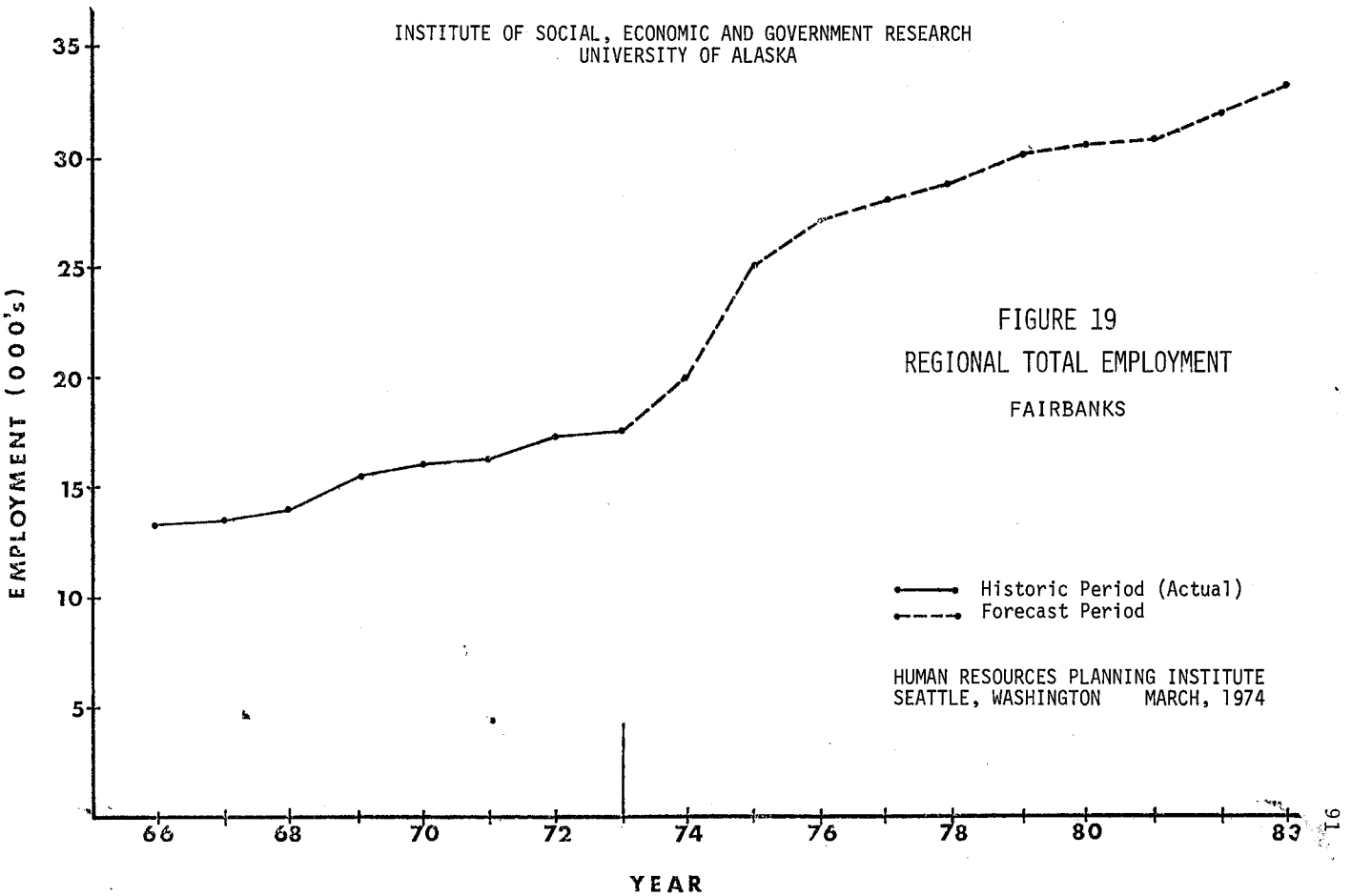
ANNUAL AVERAGE FOR 1983

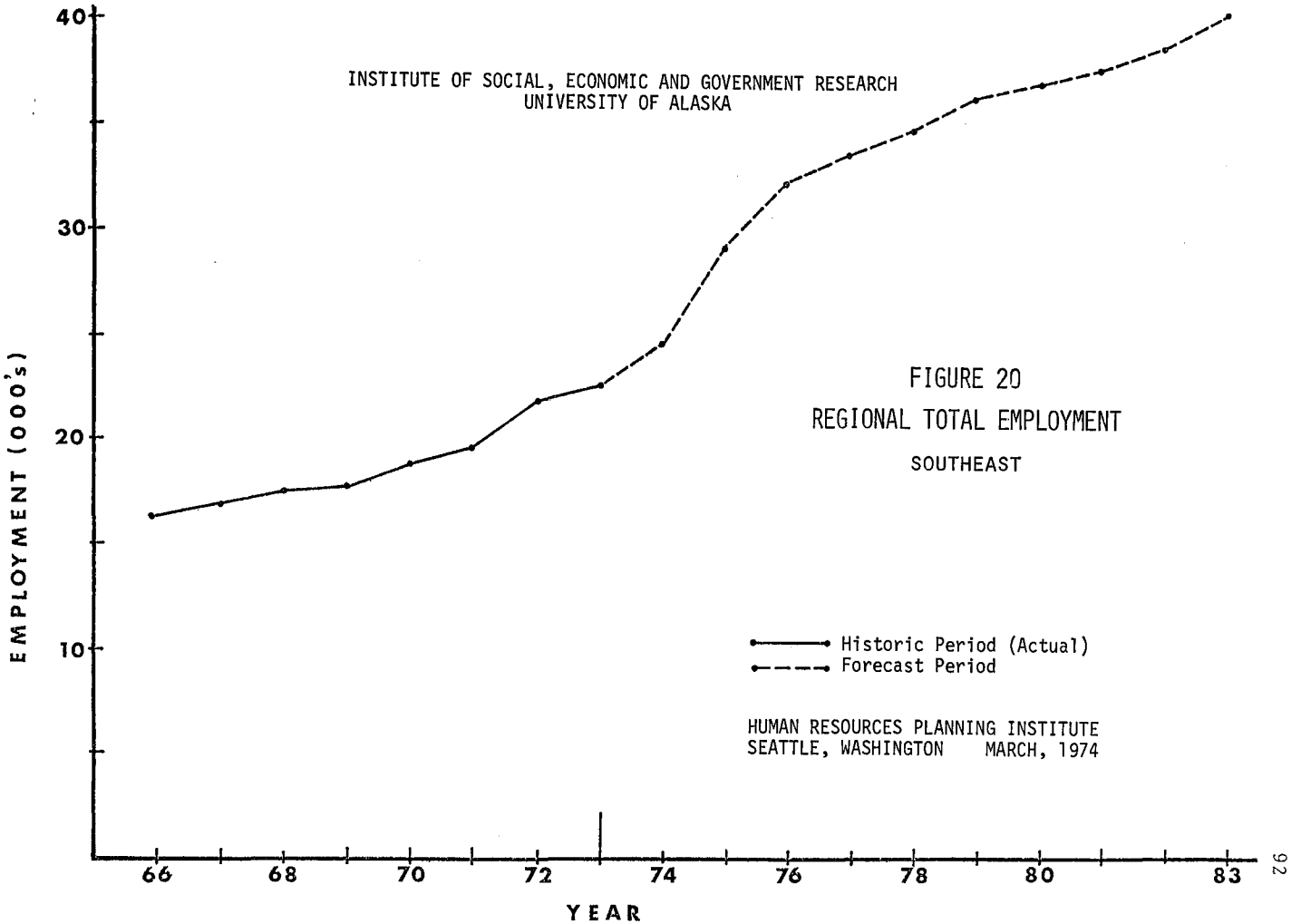
FORECAST, RUN 30 MARCH 1974

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
FEDERAL GOVERNMENT	9400	3000	2000	1100	900	900	500	17800
STATE + LOCAL GOVERNMENT	19150	10250	14250	7700	2050	2200	1100	56600
CONSTRUCTION (TOTAL)	8500	2300	2250	1900	150	500	100	15700
MANUFACTURING	2200	350	4550	3750	600	100	100	11600
MINING	750	200	50	900	50	700	200	2900
COMMUNICATION,UTILITIES	1900	600	500	400	50	100	500	4000
RETAIL TRADE	16250	4600	4750	2600	700	650	150	29700
WHOLESALE TRADE	5250	900	500	550	0	0	0	7300
FINANCE,INSURE,REAL EST	5050	1200	900	450	100	100	0	7800
TRANSPORTATION	6100	2000	3400	1050	500	650	100	13800
SERVICE	19100	5900	4300	3150	900	1050	300	34700
NON-CATEGORIZED	6250	1900	3000	3650	400	300	100	15700
TOTAL WORKERS	99500	33200	40400	27200	6300	7300	3200	217500
LABOR FORCE AND POPULATION DATA ---								
UNEMPLOYMENT	12750	4250	5150	3450	800	950	400	27700
CIVILIAN LABOR FORCE	112600	37500	45600	30600	7100	8200	3600	245200
CIVILIAN DEPENDENTS	112500	37400	45500	30600	7100	8200	3600	245000
CIVILIAN POPULATION	225200	74900	91100	61200	14300	16400	7300	490200
MILITARY EMPLOYMENT	12200	7300	600	4400	800	400	800	26500
MILITARY DEPENDENTS	13600	8200	600	5000	900	400	900	29600
MILITARY POPULATION	25800	15500	1200	9400	1600	800	1700	56100
TOTAL POPULATION	251000	90400	92300	70600	15900	17200	8900	546300

EFFECTIVE DEPENDENCY RATIOS (POPULATION/LABOR FORCE) EXCLUDING MILITARY = 1.99500 INCLUDING MILITARY = 2.01075


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
FIGURE 18
REGIONAL TOTAL EMPLOYMENT
ANCHORAGE
Historic Period (Actual)
Forecast Period
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974
EMPLOYMENT (000's)
90
80
70
60
50
40
30
66
68
70
72
74
76
78
80
83
YEAR


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
FIGURE 19
REGIONAL TOTAL EMPLOYMENT
FAIRBANKS
Historic Period (Actual)
Forecast Period
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974
EMPLOYMENT (000's)
35
30
25
20
15
10
5
66
68
70
72
74
76
78
80
83
YEAR


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
FIGURE 20
REGIONAL TOTAL EMPLOYMENT
SOUTHEAST
Historic Period (Actual)
Forecast Period
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974
EMPLOYMENT (000's)
40
30
20
10
66
68
70
72
74
76
78
80
83
YEAR

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA

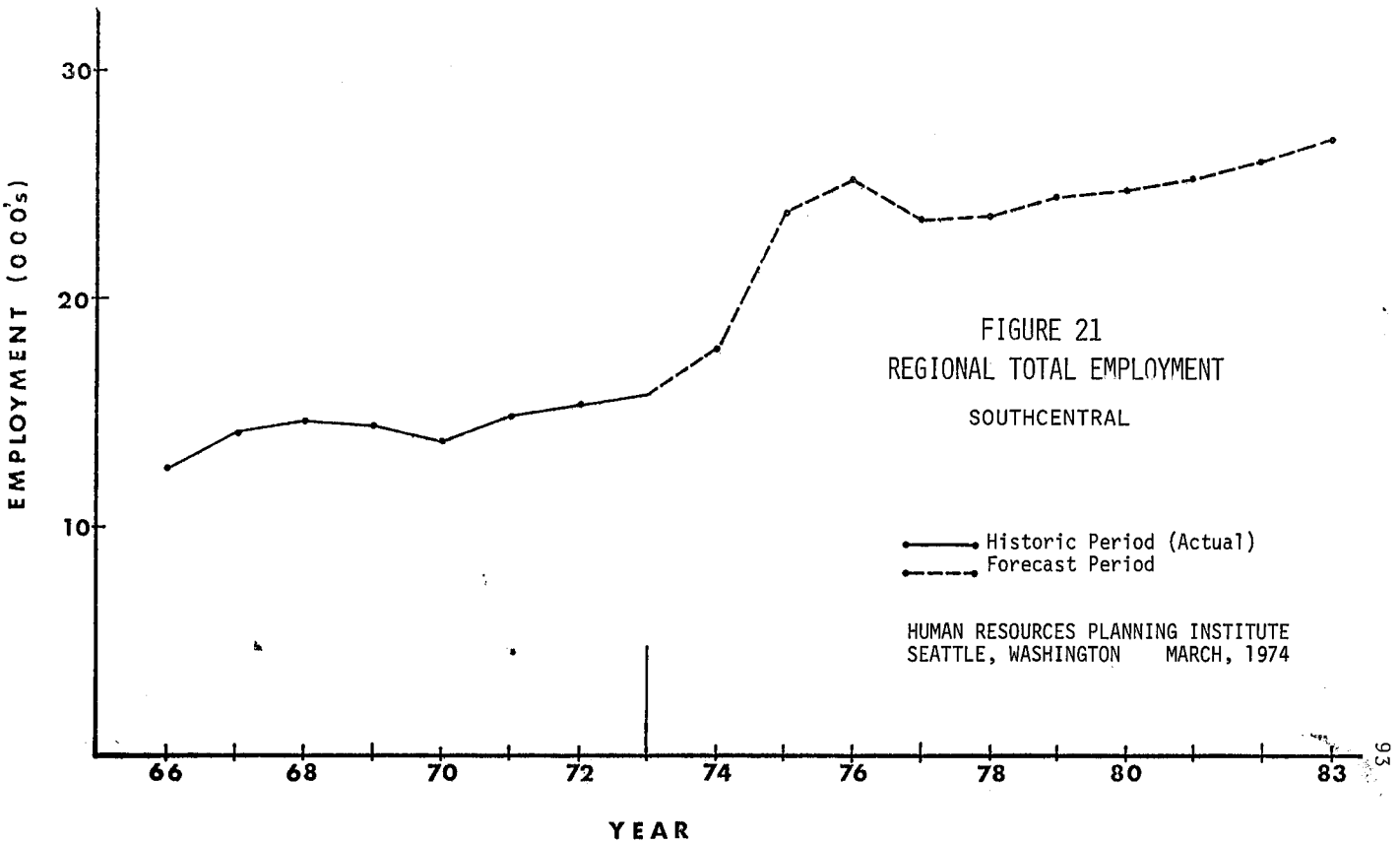
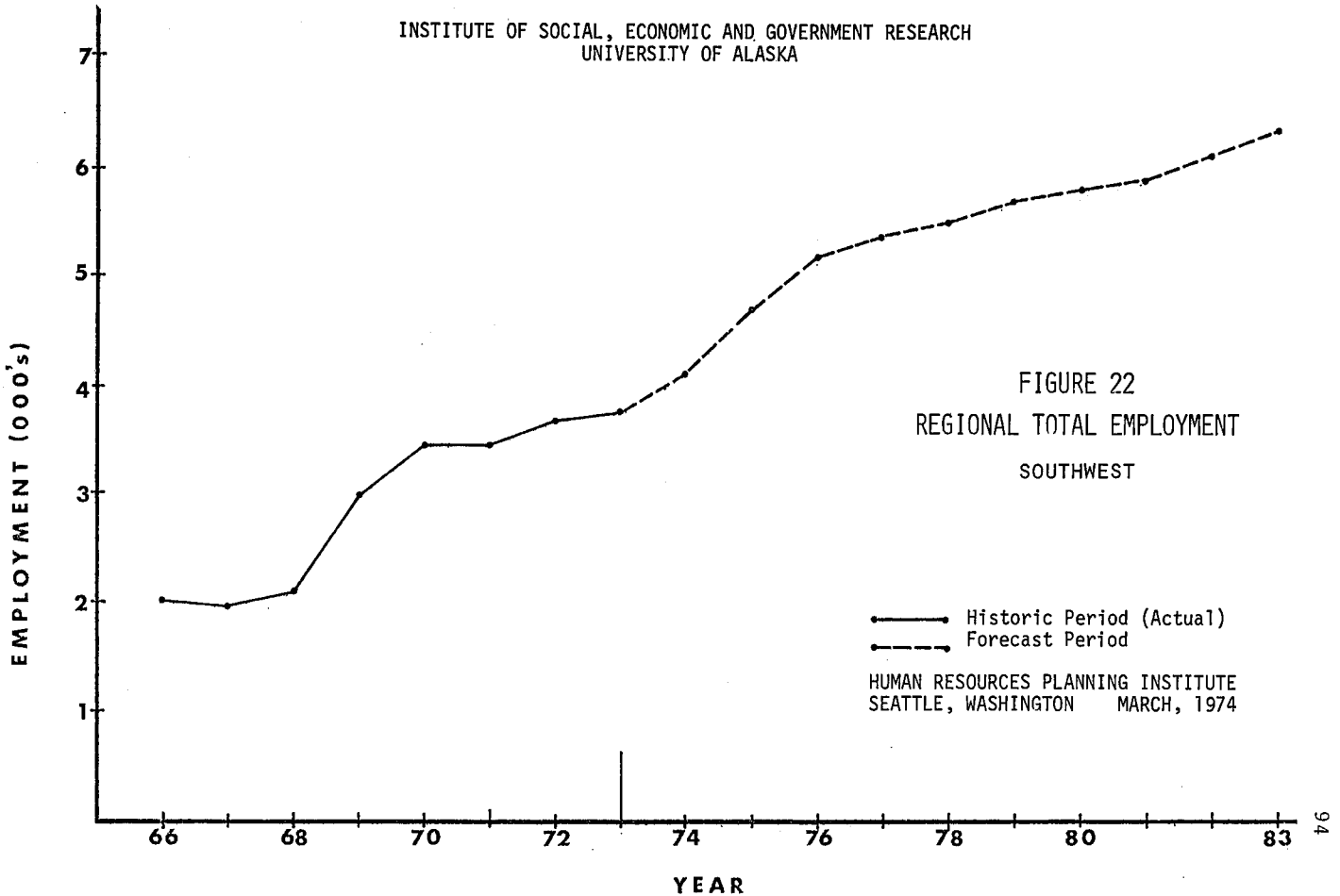
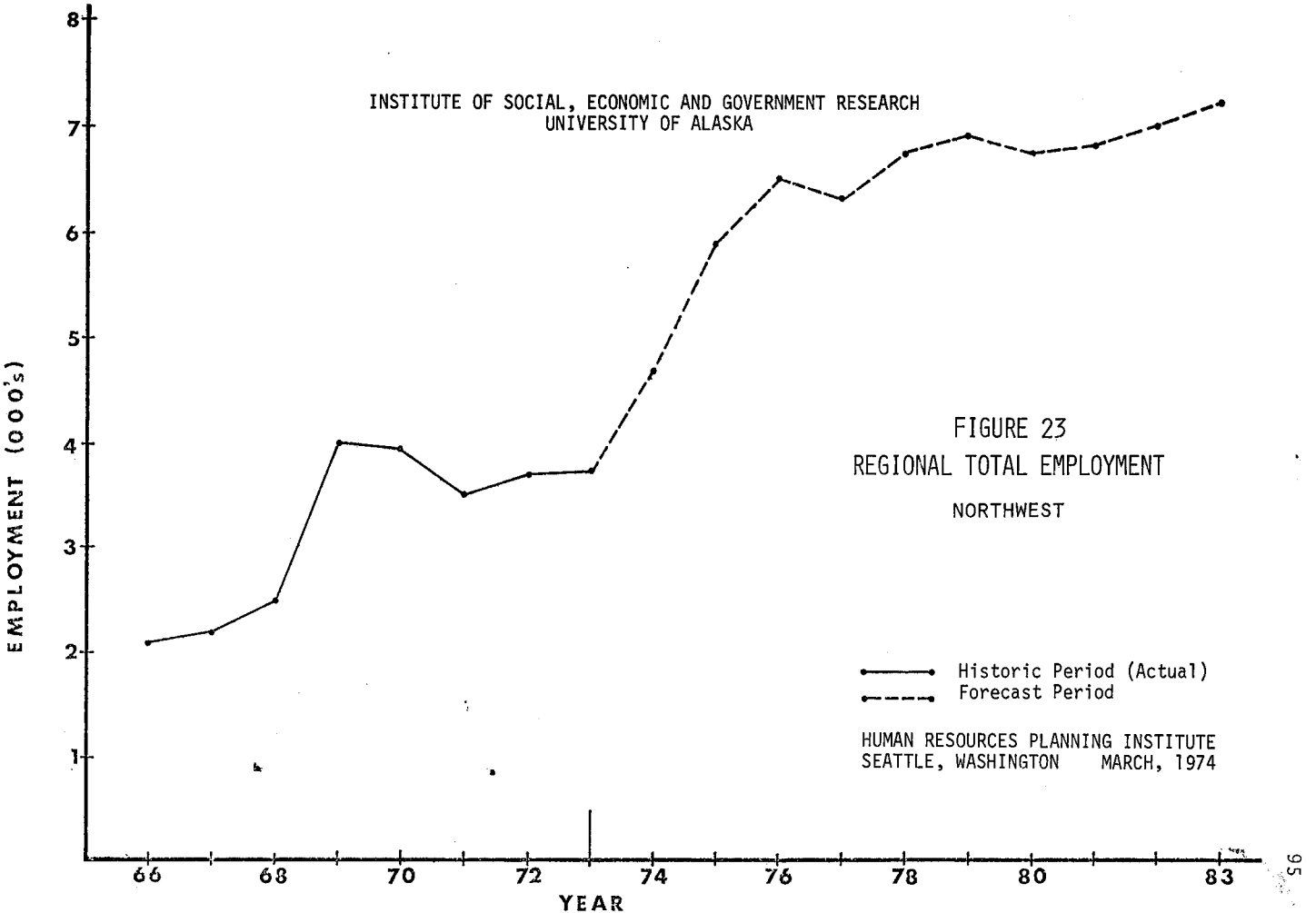


FIGURE 21
REGIONAL TOTAL EMPLOYMENT

SOUTHCENTRAL


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
EMPLOYMENT (000's)
7
6
5
4
3
2
1
66
68
70
72
74
76
78
80
83
YEAR
FIGURE 22
REGIONAL TOTAL EMPLOYMENT
SOUTHWEST
Historic Period (Actual)
Forecast Period
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
EMPLOYMENT (000's)
8
7
6
5
4
3
2
1
66
68
70
72
74
76
78
80
83
YEAR
FIGURE 23
REGIONAL TOTAL EMPLOYMENT
NORTHWEST
Historic Period (Actual)
Forecast Period
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA

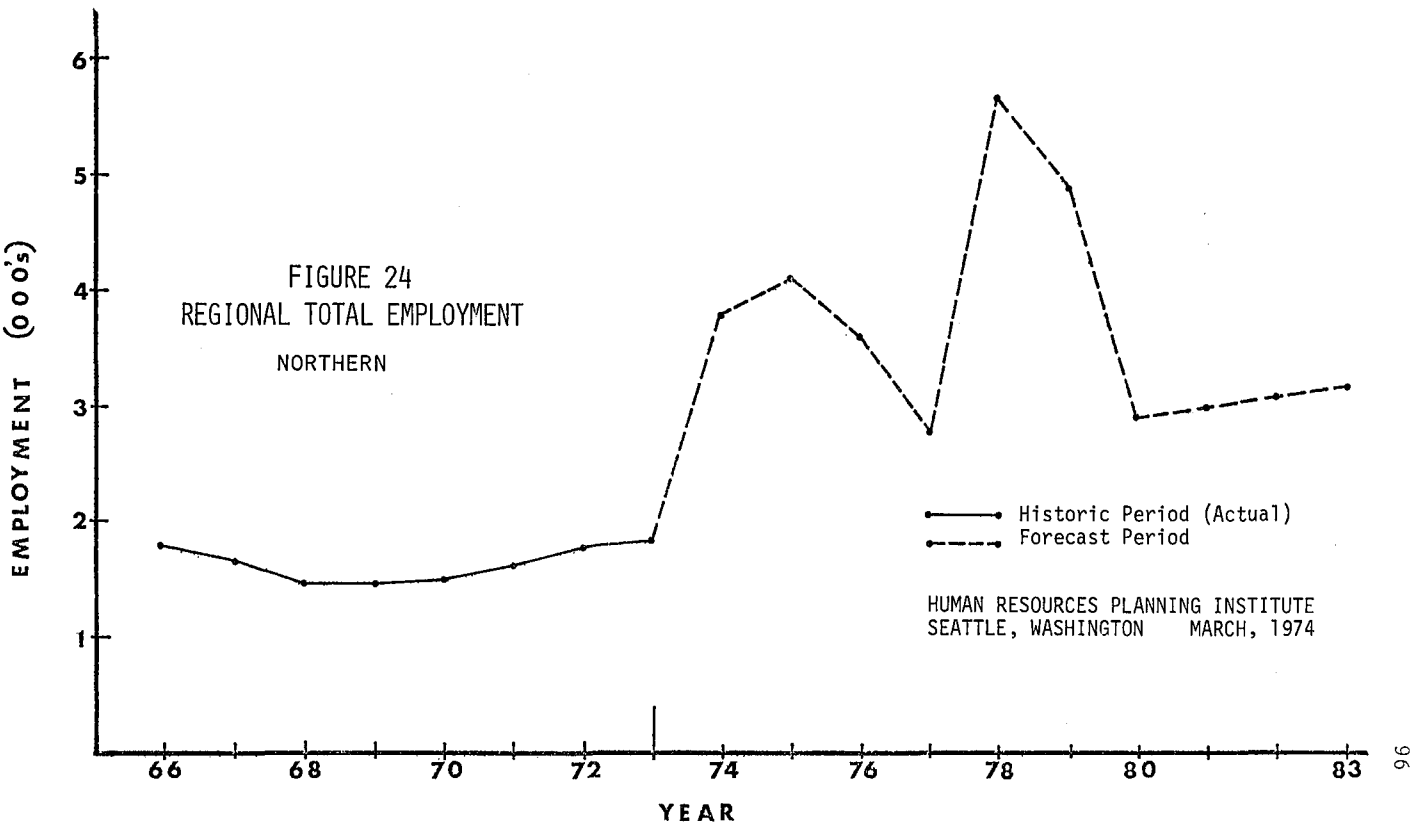


FIGURE 24
REGIONAL TOTAL EMPLOYMENT

NORTHERN

SECTION 3

OCCUPATIONAL EMPLOYMENT

The industry employment forecasts generated by the statewide economic base model and discussed in Section 1 were used to estimate future employment in 440 occupational categories. The basis of the occupational forecasts was the industry-occupation employment mix reported in the 1970 census. The Bureau of Labor Statistics has released a magnetic tape file of census manpower tallies for each state. The data on this tape is also referred to as the occupational employment statistics (OES) matrix. The Alaska tape file is described with some detail in Section 3 of Volume II. Basically it gives statewide employment for 440 occupations in 227 industries by 12 workers categories, all reported in the census of April, 1970. At the current time, the Employment Security Division, Alaska Department of Labor, is using survey research techniques to update the matrix to reflect changing patterns of occupational employment within each industry. At the time this report was prepared, the updated information was not available. Consequently, the forecasts presented below were made under the implicit assumption that the occupational distribution within each industry would remain constant over the forecast period.

The computational approach was to develop a matrix of industry-occupation employment coefficients from the census data

and to apply these coefficients to employment forecasts in the 12 industry categories available from the economic base model. A detailed discussion of the methodology used to generate the occupational forecasts is presented at the close of Section 1 of Volume II.

Tables and figures supporting the discussion which follow are included at the close of this section.

Professional, Technical and Kindred Workers

In 1973, there were an estimated 23,300 professional, technical, and kindred workers employed in the state of Alaska. This number is expected to increase by 20,900 additional workers to reach a 1983 level of 44,200 - an increase of 90%.

Not all of the 124 occupations classified as professional, technical, and kindred will grow at the same rate. The employment of accountants is expected to increase by over 1,000 workers during the 11 year forecast period going from a 1973 level of 1,300 workers to a 1983 level of 2,300 workers. Accountants are employed in a wide variety of businesses and industries throughout all sectors of Alaska's economy and, consequently, their increased employment is a general reflection of the overall increase in economic activitiy expected within the state. While there will be

a slight spurt in the employment of accountants during the construction of the Trans-Alaska pipeline, the general increase in their employment is expected to be quite steady throughout the forecast period.

Computer specialists and computer systems analysts will both increase by over 100% during the forecast period. However, the employment of these computer related professionals was at a very low level (approximately 110 workers) in 1973 and the rapid percentage increase still implies a total employment of such workers at under 250 jobs by 1983.

Engineers of all sorts will increase in employment between 1973 and 1983. The greatest gains are expected in the area of civil engineers, increasing by over 700 workers, mechanical engineers, increasing by over 110 workers, and engineers, nec.* increasing by over 130 workers. Petroleum engineers are expected to increase by an estimated 32% with almost all of this increase occurring during the period 1973 through 1977, inclusive.

There will be substantial increase in the employment of judges and lawyers over the forecast period with these categories increasing from approximately 560 workers in 1973 to approximately 1,000 workers in 1983. It is expected that there will be between 140 and 150 additional judges required in the

*Not elsewhere classified.

Alaska (including Federal) judicial system and there will be an additional employment of approximately 300 practicing attorneys. Since most of the new judges who will be employed by 1983 will be drawn from the ranks of practicing attorneys, the total demand for practicing attorneys should increase by almost 450 workers by the end of the forecast period.

The number of librarians employed in Alaska will more than double over the 11 year period rising from an estimated 230 workers in 1973 to an estimated 490 workers in 1983 - an increase of 260 librarians. At the present time, there are a large number of persons acting as volunteer workers at libraries in small communities throughout the state of Alaska. Part of this growth in the employment of librarians is expected to occur as local government finances are increased and many of the persons currently spending time as volunteer workers will become paid employees in local government.

The number of persons employed in occupations classified as scientists will increase very moderately over the forecast period. The greatest increase will occur among geologists where occupational employment levels are expected to rise from a 1973 level of 270 to a 1983 level of approximately 450 - an increase of 173 workers. Professional,

technical, and kindred personnel classified as biological scientists will also increase by approximately 200 workers in the period rising from approximately 220 workers in 1973 to 420 workers in 1983. In percentage terms, however, the increase in employment of natural and biological scientists will be less than the overall increase in the professional and technical category by about one-third.

The employment of physicians, pharmacists, dentists, and other related health practioners will increase only moderately during the forecast period - with the highest percentage rate of increase occurring among pharmacists. The number of pharmacists is expected to increase by approximately 80%. However, this forecast is made under the assumption that the level of medical service available in Alaska will be the same in 1983 as it was in 1973. In 1973, the availability of medical care in the state was very low. A large number of Alaskans regularly go outside of the state for major medical care. In large part, this appears to be the result of the unwillingness of physicians to locate in the state of Alaska and the fact that the University of Alaska does not have a medical school. At the current time Alaska is participating in the Washington - Alaska-- Montana - Idaho joint medical program for the training of physicians. If this program is successful and the supply

of physicians to Alaska increases, our forecast will undoubtedly be on the low side. In a real sense, this part of the forecast is conditioned by a bottleneck in the supply of medical personnel rather than a low level of demand for medical service.

Also related to this shortage of health practioners in the state of Alaska, the forecast indicates a rapid growth in the employment of health technicians of various sorts throughout the state. It appears that this rapid growth of health technicians (most of the occupations will be increasing by more than 100%) reflects a substition of technical and paraprofessional personnel to compensate for the lack of fully trained professional and technical workers in the health sciences. The growth of registered nurses is particularly dramatic, rising from a level of 1,200 persons in 1973 to a level of 2,500 persons in 1983 - an increase of 110%, or 1,300 additional workers.

The growth of population coupled with the expected increase in state and local government are both reflected in the increased employment of urban and regional planners, recreational workers, and social workers. All three of these occupational categories are expected to more than double with an estimated additional 40 planners being employed by

1983. Social workers will rise by an estimated 520 additional workers growing from the current occupational level of 500 to a 1983 level of 1,020, while recreational workers are expected to increase from their current employment of approximately 100 workers to a 1983 level of 210 workers.

The employment of teachers of all types, and at all levels, is expected to increase substantially in the state of Alaska over the forecast period. At the level of college and university teaching, the total increase is expected to be in excess of 850 additional persons employed between 1973 and 1983. A substantial amount of this college and university increase is expected to occur in the Anchorage area where the growth of college and university education will be furthered by the increasing concentration of persons of all ages. This will be further reinforced by a growing tendency (noted throughout the United States) of persons over the age of 30 to participate in college or university education. However, much of this adult education will occur in the areas of supplementary training or other "non-degree related" education. It is further expected that the Alaska State Community College system will grow significantly over the next decade following a pattern evidenced in other states in the west during the last ten years. This should lead to some dispersion of college and university teaching,

although the greatest growth of the community college system will probably occur in the Anchorage area. The University of Alaska at College is expected to grow in total enrollment, and consequently in faculty. However, it is not expected to be one of the leaders in the growth of college and university employment of professional and technical workers.

At the level of kindergarten through 12th grade education, very rapid increases are expected in the area of pre-kindergarten, kindergarten, and elementary school employment. Between 1973 and 1983, employment of professional and technical workers in these areas is expected to increase from an estimated 1973 level of 4,100 workers to a 1983 level of 9,100 workers - an increase of 5,000 additional pre-kindergarten, kindergarten, and elementary school professional and technical workers. This forecast is based upon the implicit assumption that the ratio of pre-kindergarten, kindergarten, and elementary school teachers per thousand students will remain roughly the same throughout the forecast period. This assumption implies that sufficient financing will be available to local governments to allow for the expansion of their school systems to reflect the growth of local populations. Perhaps a more realistic assumption is that the level of service (as measured by the ratio of teachers to students) will decline during the rapid growth of population associated with the construction of the Trans-Alaska pipeline. However, it

is expected that any reductions in the level of teaching services in local areas will be more than compensated for during the post-pipeline construction period when oil revenues begin to flow and there is a realistic expectation of state shared revenues going to local communities. Consequently, the growth of employment in these occupations is expected to be somewhat slow during the initial years of the forecast period but is expected to grow rapidly during the latter half of the 1970's and the beginning of the 1980's to reach the forecasted levels.

Over the 11 year forecast period, the employment of secondary school teachers is expected to climb from its 1973 level of 2,000 teachers to a 1983 level of 4,600 teachers,a growth of approximately 2,600 additional workers. This increase of almost 125% is expected to occur by the 1983 time period but is expected to be affected by the same reasoning discussed in the paragraph above.

It is expected that there will be a rapid growth of such engineering support occupations as draftsmen and surveyors during the forecast period. Draftsmen are expected to increase from a 1973 level of 390 workers to a 1983 level of 760 (an increase of 94%) and surveyors are expected to increase from a 1973 level of 310 workers to a 1983 level

of 640 workers (a growth of 104%). The growth of both of these occupations will be exceedingly rapid during the period 1973 through 1977, inclusive, and thereafter will grow at a very moderate rate. However, the construction of additional pipelines not taken account of in our forecast would affect these occupations and would cause them to grow more rapidly than the forecast discussed here.

Finally, the expected growth of activity in all forms of air transportation services, and particularly the continued growth of the Anchorage International Airport, will cause the increased employment of airplane pilots, air traffic controllers, flight engineers, and radio operators. The number of employed airplane pilots is expected to grow most rapidly showing an increase of approximately 600 additional workers employed by 1983. This sector is expected to grow particularly with respect to the use of air taxi services, charter airline companies, and other related activity. Pipeline and pipeline related activity is expected to cause a significant increase in the number of pilots employed in the state of Alaska; and consequently an estimated 75% of the total increase in airplane pilots is expected to occur during the period 1973 through 1977, inclusive. Thereafter, the growth of airpline pilot employment is expected to slow down significantly growing at just a moderate rate during the latter part of the forecast period.

Managers and Administrators, Except Farm

The number of non-farm managers and administrators in the state of Alaska is expected to grow approximately 75% during the forecast period rising from a 1973 level of 14,300 workers to a 1983 level of 25,000 workers.

A significant increase in the employment of bank officers, bank managers, and financial managers is expected to occur with this occupational category rising from approximately 600 workers in 1973 to approximately 1,220 workers in 1983, inclusive. This increase reflects the expected rapid growth in the state's finance, insurance, and real estate sector.

The growth of local government will also contribute significantly to the overall increase in this occupational category with the employment of local public administrators, assessors, and officials in public administration, nec., increasing from a 1973 level of approximately 1,600 workers to a 1983 level of 2,800 - an increase of approximately 1,200 additional workers. Once again, this forecast is predicated on the assumption that sufficient funds are available to local government to allow for the increase in service that would seem to be indicated by the growth of population in cities and towns throughout the state of Alaska. It may well be that the growth of this occupational employment area will be less than the forecasted amount

during the period 1973 through 1977, inclusive, as a result of financial limitations placed upon state and local government. However, it is expected that the employment in this occupational area will increase with sufficient rapidity from the period 1978 through 1983, inclusive, to allow the forecast to be achieved.

Reflecting the growth of teachers, at all levels, discussed above, it is expected that the employment of elementary, secondary, and college school administrators will increase from the 1973 level of approximately 460 workers to a 1983 level of 1,030 workers - an increase of 570 additional workers. The possible financial limitations imposed on state and local government during the construction of the pipeline may also cause a slow rate of growth in this occupational category through 1973. After 1978, it is expected that the availability of funds to local government, including state shared revenue, will cause this category to increase rapidly and achieve its forecasted level.

Finally, the expected rapid rate of increase in all forms of retail trade throughout the state of Alaska will produce a substantial increase in the number of managers and administrators in such areas of restaurant, cafeteria, and bar management; and variety stores, department stores, and other forms of retail trade. Overall, the number of retail trade

managers and administrators is expected to climb from a 1973 level of 900 workers to a 1983 level of 1200 workers - an increase of 500 persons. This will be supplemented by a further increase of almost 400 workers classified as purchasing agents, retail buyers, etc. who are related to the retail trade sector.

Sales Workers

The growth of total economic activity throughout Alaska's economy over the next ten years is reflected in the increase of approximately 5,900 additional sales workers (93% increase) who are expected to be employed in Alaska between 1973 and 1983, inclusive.

Over half of the total increase in sales workers (55%) is expected to be accounted for by the growth of retail sales workers - an occupational category which employed approximately 3,300 workers in 1973 and which is expected to employ approximately 6,600 workers by 1983 - an increase of approximately 3,300 workers during the forecast period.

The growth of the finance, insurance and real estate industry is also reflected in the growth of sales workers with insurance agents, brokers, and underwriters expected to increase from a 1973 level of 370 workers to a 1983 level of approximately

750 workers - a growth of approximately 380 additional workers. Also reflecting the growth of the same industry is the increase in the number of real estate agents and brokers whose numbers are expected to grow from a 1973 level to 440 workers to a 1983 level of 760 workers - a growth of 320 additional persons employed.

Sales workers in the areas of services and construction are expected to increase by approximately 360 workers (97%) going from a 1973 level of 370 to a 1983 level of 730. During the early part of the forecast period most of this growth is expected to occur among sales workers in the area of construction activity; while this occupational category is expected to increase most rapidly in the area of sales workers connected with service activities in the latter part of the forecast.

A substantial growth of approximately 690 additional workers are expected to be employed as sales representatives among wholesale trade firms in Alaska. The 1973 level was estimated at 700 and the 1983 level is estimated at almost 1,400 workers. Most of this increase is expected to occur during the first five years of the forecast period with growth being somewhat moderated during the latter part of the 1970's and the early 1980's. It should be remembered, again, that the forecast has the implicit assumption that the state of technology with respect to the occupational distribution of

each of the industries in Alaska is constant. There is some evidence that the growth of a wholesale trade infra-structure will occur in Alaska as the level of economic activity increases. If this occurs, the number of wholesale trade representatives classified as sales workers will increase beyond that indicated in the forecast.

Clerical and Kindred Workers

There were an estimated 21,600 clerical and kindred workers in Alaska in 1973. By 1983 this number is expected to rise to 39,500 workers - an increase of approximately 17,800 additional workers. This represents a growth of 82% in the employment of clerical and kindred workers over the forecast period.

The most rapid growth in clerical and kindred occupations will occur in those jobs associated with office work. The number of general secretaries in the state of Alaska is expected to increase from a 1973 level of 4,300 workers to a 1983 level of 8,300 workers - an increase of approximately 400 additional persons employed in this occupation. In addition, another 340 persons are expected to be employed as either legal or medical secretaries with almost three-quarters of the total occurring in the employment of legal secretaries.

An additional 2,200 workers are expected to be employed in bookkeeping occupations with the total increasing from a 1973 level of 2,600 to a 1983 level of 4,800. The employment of cashiers, primarily cashiers who are related to retail trade activity, is expected to increase substantially from its 1973 level of 1,050 workers to a 1983 level of 2,100 workers - a growth of 1,050 additional workers employed.

The only other clerical and kindred occupation which is expected to increase by a 1,000 or more workers over the forecast period is that of typists where the number of persons employed in 1973 (1,700 workers) is expected to rise by 1,200 additional persons to reach a 1983 level of 2,900.

Reflecting the growth of finance, insurance and real estate, the number of bank tellers in Alaska is expected to increase from an estimated 400 persons in 1983 to a forecasted 803 persons in 1983 - an increase of 432 workers or 110%. The employment of counter clerks and accepting clerks employed in eating and drinking places, is expected to increase by 500 workers rising from its 1973 level of 410 to a 1983 level of 910 - a growth of 123% percent over the forecast period. Also growing by approximately 500 workers over the 11 year forecast period is the occupational classification of receptionists which grows from an estimated 450 workers in 1973 to a forecasted 950 workers by 1983.

Because the employment of clerical and kindred workers occurs throughout all sectors of the economy, these occupations are expected to grow in a fairly smooth pattern throughout the 11 year forecast period. There will be some exceleration in the growth of these workers during the early part of the forecast period as a result of the excelerated economic pace related to pipeline construction. However, the incremental gains in occupational employment for virtually all clerical workers will continue over the entire period 1973 through 1983, inclusive.

Craftsmen and Kindred Workers

In 1973 there were an estimated 18,400 craftsmen and kindred workers employed in the state of Alaska. By 1983, the number of persons employed in this occupational category is expected to rise to 31,300 - a growth of 12,900 workers or an increase of 70% over the forecast period. Approximately two-thirds of the total growth of occupational employment in the craftsmen and kindred worker category is expected to occur during the period 1973 through 1977, inclusive. This reflects the expected major increase in the employment of craftsmen as a result of excelerated construction activity related both directly and indirectly to pipeline activity. From 1978 onward, employment in this occupational category is expected to grow quite slowly with a growth of only 4,200 additional persons employed over the six year period 1978 through 1983, inclusive.

The craft and kindred occupations which are expected to increase by 1,000 or more workers over the forecast period include carpenters, construction foremen, and automotive mechanics. The number of carpenters employed in 1973 was approximately 2,100 and the number expected to be employed in 1983 is approximately 3,700 - a growth of approximately 1,600 additional workers. Just under three-quarters of this total increase (72%) will occur in the period 1973 through 1977, inclusive. From 1978 onward, the increased employment of carpenters is expected to proceed at a very moderate pace increasing by only an additional 440 workers over the six year forecast period 1978 through 1983, inclusive.

A similar pattern of rapidly increasing employment during the early years of the forecast period is also experienced for construction foremen. This occupation is expected to increase from an estimated 1973 level of 2,230 workers to a 1983 level of 3,660 workers - a growth of 1,430 workers. However, of the total increase, 66% or 943 additional workers, are expected to be employed between 1973 and 1977, inclusive. From 1978 to 1983, inclusive, this occupation is only expected to increase by an additional 480 workers.

This same pattern is true for the additional employment of automotive mechanics. This occupation is expected to increase

The employment of electricians is expected to rise by an estimated 530 workers to a 1983 level of 1,310. Most of this increase will occur during the early part of the forecast period and is related to the growth of electricians employed in the construction industry. However, the employment of maintenance electricians and electricians related to the residential home construction industry is expected to stay moderately strong even after the construction of the Trans-Alaska pipeline is completed.

Because of the expected rapid growth of the air transportation services industry, the number of aircraft craftsmen, particularly aircraft and engine mechanics, is expected to rise by an estimated 600 workers to reach a 1983 level of 1,400. Most of these workers are expected to be employed by air taxi services, fixed base operators, and other general aviation related activities. However, there will be some increase in the employment of craftsmen in the aircraft occupational category as a result of the expected growth of aircraft activity among scheduled carriers within the state of Alaska.

Related primarily to the growth of employment and the formation of additional households throughout the state of Alaska, it is expected that there will be an increase of

approximately 280 additional persons employed as radio and television repairmen by 1983 - this occupational category increasing from its estimated 1973 level of 3,700 to an expected 1983 level of 7,400.

In a similar manner, the number of telephone installers and repairmen is expected to increase by approximately 290 workers - growing from a 1973 level of 470 workers to a 1983 level of 760 workers. Most of this increase will be related to the installation of telephones produced by the expected growth in Alaska's population.

Finally, it is expected that an additional 240 stationary engineers and 440 plumbers and pipefitters will be employed in the state of Alaska over the forecast period. The growth of employment in the stationary engineer category will bring this occupational category to a level of 750 workers by 1983. Most of the employment growth in this occupation will occur in the early years of the forecast period with occupational growth after 1978 being very slow. With respect to plumbers and pipefitters, growth of employment in this occupation will cause total employment to rise from its 1973 level of 780 workers to a 1983 level of 1,220 workers. While the substantial part of this growth will be during the period 1973 through 1977, inclusive, there is expected that there

will be an ongoing demand for plumbers and pipefitters in the state of Alaska as a result of increasing residential home construction throughout the forecast. Consequently, while this occupational category is expected to decline in its growth rate after 1978, it will maintain a reasonably strong demand throughout the forecast period.

Operatives, Except Transport Workers

The occupational employment of non-transportation operatives is expected to grow from its 1973 level of approximately 7,400 workers to a 1983 level of approximately 12,000 - an increase of 4,600 workers or 62% over the 11 year forecast period.

Reflecting the increase in the general level of consumer and business services which will be demanded throughout Alaska, the occupational employment of garage workers and gas station attendents is expected to increase from its estimated 1973 level of 290 workers to a 1983 level of 620 workers - an increase of 330 workers or 116%. The majority of these workers will be employed in providing garage and gas station services directly to consumers and this occupational category is expected to increase throughout the forecast period roughly in proportion to the state's growth and population. In a similar manner, the number of persons employed in the occupational category laundry and dry

cleaning operators is expected to increase from its estimated 1973 level of 430 workers to a forecasted 1983 level of 820 workers - an increase of 390 workers or 92%. Similarly, meat cutters, except for the employment of meat cutters in the food processing industry, are expected to increase by slightly more than 200 workers reaching a forecasted 1983 level of 440 persons.

The number of persons classified as welders and flame cutters is expected to increase by approximately 290 persons over the period 1973 to 1983, inclusive, to reach a level of 800 workers employed by 1983. This forecast excludes specialized pipeline welders who will be brought into Alaska specifically for the purpose of welding on the construction of the Trans-Alaska pipeline. Nonetheless, this occupational category grows most rapidly during the early part of the forecast. With approximately two-thirds of the total increase being registered during the period 1973 through 1977, inclusive.

An additional 250 operatives are expected to be employed in the occupational classification sailors and deck hands - causing this classification to double over the forecast period reaching a high of 500 persons by 1983. Part of this increase will probably be related to the employment of Alaska residents as sailors and deck hands aboard the tankers which will be used to transport oil from Valdez to the

"Lower '48". However, a substantial part (at least half) of this increase in employment is expected to occur among persons who are employed in off-shore and intercoastal shipping and through continued growth of the Alaska Marine Highway System.

Transport Equipment Operative

The total number of persons employed in transport equipment operative occupations is expected to increase by 3,000 workers to reach a forecasted 1983 level of 6,730 persons. Slightly over three-quarters of this total increase in the transport equipment operative category will occur in three occupations. The largest increase will occur among truck drivers who are expected to increase their employment from an estimated 1973 level of 1,480 persons to a 1983 level of 2,700 persons - an increase of 1,220 workers. Over two-thirds of this increase will occur during the period 1963 through 1977, inclusive, with the rate of growth of truck driver employment slowing down appreciably in the last six years of the forecast period. However, it is expected that many of the truck drivers who are employed in construction related activities which are connected with the building of the Trans-Alaska pipeline will also find ongoing employment as a result of the general growth of trucking activity related to increased population and increased wholesale trade activity in the Alaska economy.

The other two major categories where occupational increases will occur are in the employment of bus drivers and the employment of delivery and route men. Bus drivers are expected to increase from their estimated 1973 level of 440 workers to a 1983 level of 910 workers - an increase of 470 workers or a more than doubling of the occupational work force. Underlying this forecast is the assumption that with the growth of population in Alaska, there will be a parallel growth of urban bus services such that the level of bus service available to residents of Alaska will either be at the level it was in 1970 or greater.

The growth of delivery and route men between 1973's level of 730 workers to the 1983 forecasted level of 1,400 workers - an increase of 670 workers or 92% - will occur primarily in the Anchorage and Fairbanks area. This increase will relate to the growth of the urbanized population and the expected parallel increase in wholesaling activities.

Laborers and Farm Workers

The employment of non-farm laborers is expected to increase from approximately 7,180 workers in 1973 to a level of 11,850 workers in 1983 - an increase of 4,670 workers or 65%. The employment of farm workers, including farm owners and managers, is expected to increase from its estimated 1973 level

of 590 workers to a 1983 level of 730 workers - an increase of 140 workers or 24%.

The greatest increase among laborers is expected to occur among construction laborers and among stock handlers. Construction laborers are expected to increase from their estimated 1973 level of 830 workers to an estimated 1983 level of 1,640 workers - an increase of 820 persons. This increase does not include construction laborers who will be employed during the early part of the forecast period by Alyeska Pipeline Service Company in construction of the Trans-Alaska pipeline. It is expected that there will be an additional five to six thousand construction laborers, of all classifications, employed directly on the pipeline work. Consequently, as pipeline employment phases out it is expected that there will be a substantial surplus of persons trained as construction laborers who will not find similar employment available once the pipeline construction period is over.

The employment of persons in the stock handler occupation is expected to grow from its 1973 level of 830 persons to a 1983 level of 1,700 persons - an increase of 870. The stock handlers will primarily be employed as stock boys in the retail and wholesale trade industries in the state. Because these industries are expected to grow significantly

and be located primarily in the population dense areas of the state, this form of labor is also expected to grow throughout the forecast period and be primarily concentrated in the more urbanized areas.

Service Workers

Service workers are expected to increase their employment from a 1973 level of 15,400 persons to a forecasted 1983 level of 31,000 persons - an increase of 15,600 persons - as a result of the overall growth of population and the increase in economic activity between 1973 and 1983, inclusive. In addition, it is expected that approximately 1,820 additional persons will be employed as private household workers by 1983 - with this occupational category increasing from its 1973 level of 1,300 persons to a 1983 level of 3,100 persons.

Among private household workers, approximately two-thirds of the total increase will occur in the area of child care workers employed within the household. With the overall increase in economic activity and the increasing availability of employment for skilled and trained persons throughout the economy, it is expected that an increasing number of women will enter the labor force and an increasing number of households with young children will have two persons

employed. This will cause the increased employment of persons whose primary source of income is from private household child care. This occupation is expected to grow from its estimated 1973 level of 910 persons to a forecasted 1983 level of 2,200 persons - an increase of 1,300 workers.

In the non-private household category, two of the most rapidly growing occupations are those associated with eating and drinking places. These occupations are part of the retail trade category. The employment of cooks is expected to increase from its 1973 level of 1,940 workers to a 1983 level of 3,770 workers - an increase of 1,830 persons employed. At the same time, the number of waiters is expected to increase from 1,480 workers to 3,150 workers - an increase of 1,660 persons. Additional occupations which are affected by the same category of employment, but which are expected to increase less rapidly, include bus boys (increasing by approximately 100 workers to a level of 180), bartenders (increasing by 640 workers to a level of 1,340), dishwashers (increasing by 390 to a level of 720), and food counter and fountain workers (increasing by 220 to a level of 420).

Service workers in the delivery of health services are also expected to grow in employment with the number of nurses aides, orderlies, and attendants increasing from an estimated 1973

level of 540 persons to a 1983 level of 1,060 persons - an increase of 520 persons. Practical nurses are expected to find increased employment within Alaska with their numbers growing from an estimated 1973 level of 240 to a 1983 level of 460 - an increase of 220 workers.

Paralleling the growth of household child care workers, institutional child care workers are expected to increase by approximately 85% with an additional 460 persons employed by 1983 to reach a level of 1,000 workers in the state of Alaska. If there is passage of some of the legislation currently pending in Congress for Federal support of child care centers, this estimate could be on the conservative side.

Reflecting the growth of population in the state, and the need to extend various local services to this growing population, the employment of both firemen and policemen is expected to grow rapidly over the forecast period. The employment of firemen is expected to grow from an estimated 1973 level of 520 workers to a 1983 level of 1,020 workers - an increase of 500 workers or slightly less than a doubling of this occupation. The number of policemen and detectives employed is expected to more than double over the forecast period going from a 1973 level of 700 workers to a 1983 level of 1,530 workers - an increase of 830 persons employed or 119%.

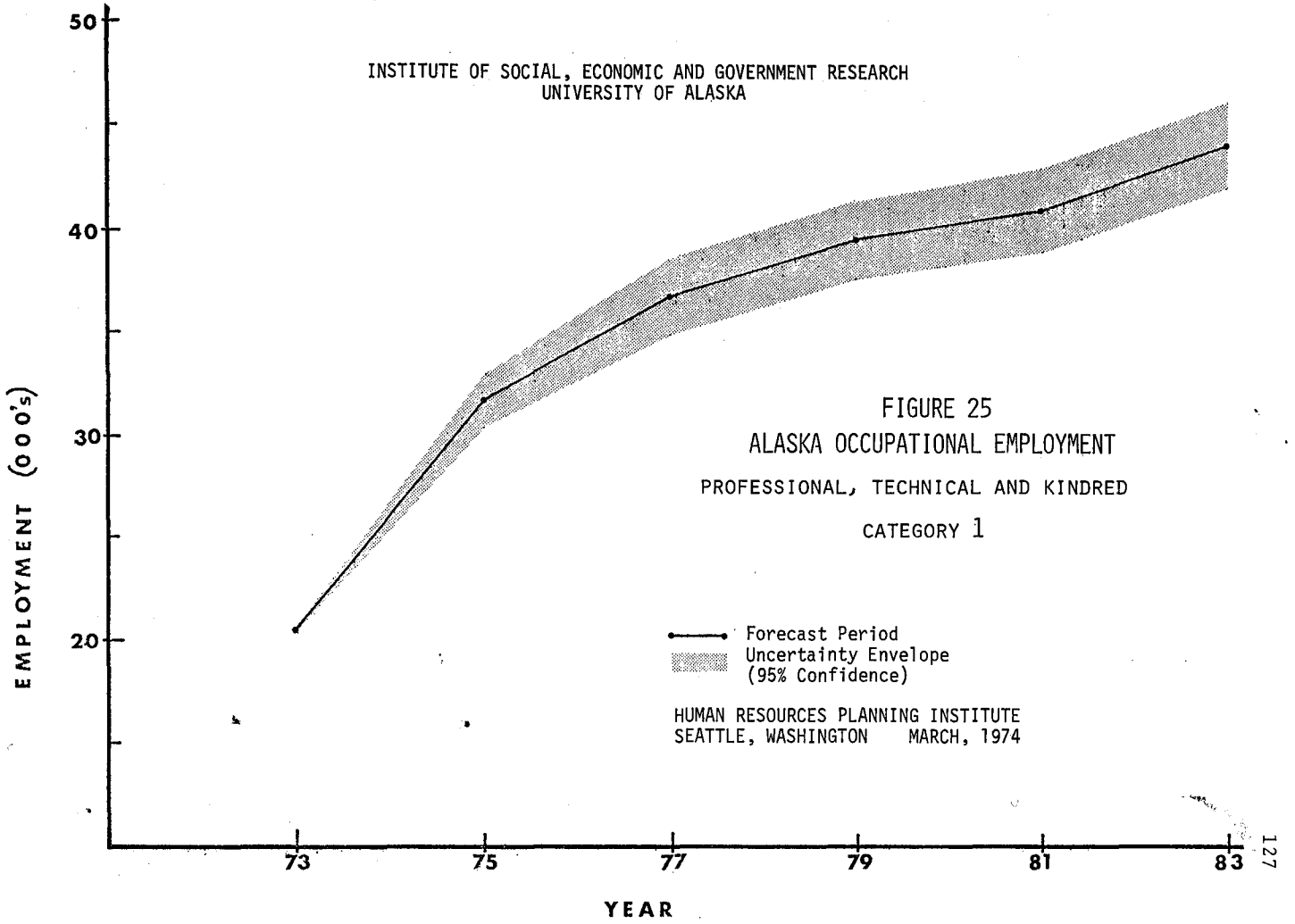
Finally, reflecting the growth of population and the increase of availability of personal services in the Alaska economy, the number of hairdressers and cosmologists is expected to slightly more than double, growing from an estimated 1973 level of 490 persons to a 1983 level of 1,000 persons - an increase of 510 persons employed. Most of this growth of hairdressers and cosmologists is expected to occur in the urbanized parts of the state with the most rapid growth being evidenced in the Anchorage and Fairbanks metropolitan area.

TABLE 17

ALASKA OCCUPATIONAL EMPLOYMENT BY CATEGORY

OVER FORECAST PERIOD (1973-1983)

		1973	1975	1977	1979	1981	1983
1.	Professional, Technical and Kindred	23300	31700	36700	39600	41000	44200
2.	Managers and Administrators, Exc. Farm	14300	19400	21300	22900	23300	25000
3.	Sales Workers	6400	8600	10200	11000	11400	12300
4.	Clerical and Kindred Workers	21600	29400	33300	35900	36800	39500
5.	Craftsman and Kindred Workers	18400	27200	27100	29700	29300	31300
6.	Operatives, Exc. Transport	7400	9700	10300	11100	11300	12000
7.	Transport Equipment Operatives	3700	5400	5800	6300	6300	6700
8.	Laborers, Exc. Farm	7200	9700	10200	11000	11100	11800
9.	Farm Owners, Mgrs. and Workers	590	620	660	680	700	730
10.	Service Workers, Exc. Prvt. Household	15400	21600	25500	27700	28600	31000
11.	Private Household Workers	1300	2100	2500	2800	2800	3100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UNIVERSITY OF ALASKA
50
40
30
20
EMPLOYMENT (000's)
73
75
77
79
81
83
YEAR
FIGURE 25
ALASKA OCCUPATIONAL EMPLOYMENT
PROFESSIONAL, TECHNICAL AND KINDRED
CATEGORY 1
Forecast Period
Uncertainty Envelope
(95% Confidence)
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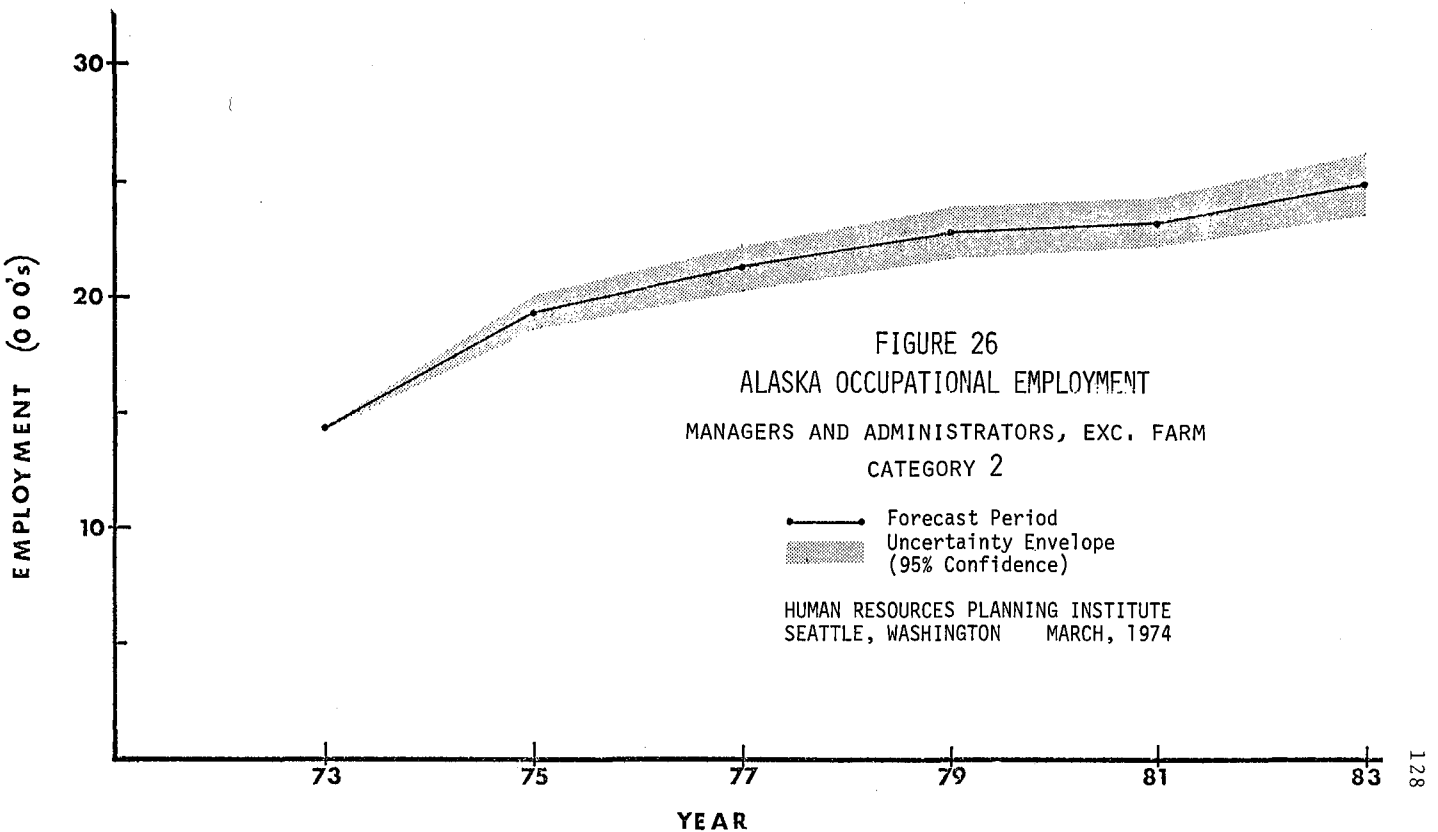

FIGURE 26
ALASKA OCCUPATIONAL EMPLOYMENT

MANAGERS AND ADMINISTRATORS, EXC. FARM

CATEGORY 2

Forecast Period
Uncertainty Envelope
(95% Confidence)

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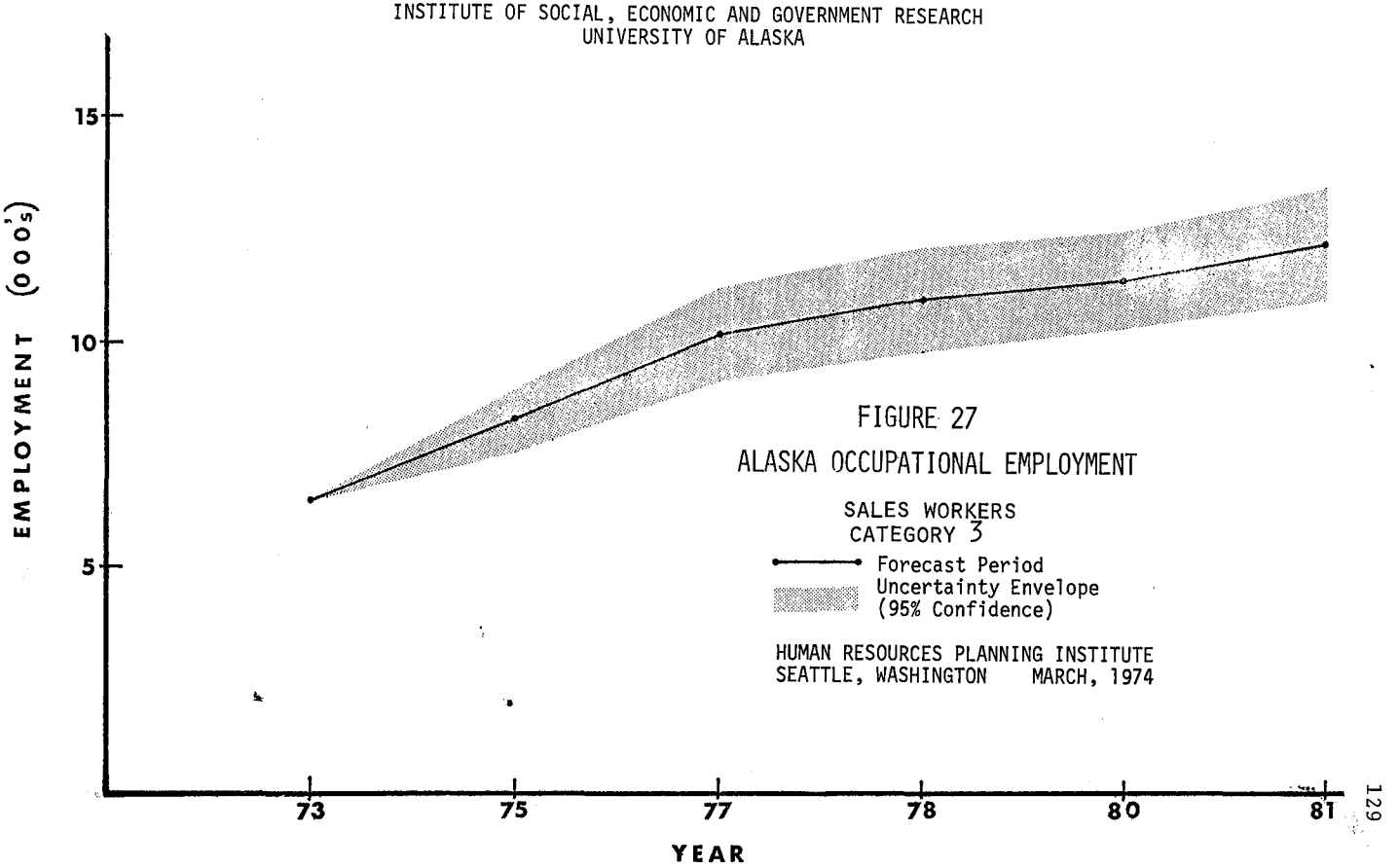
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UNIVERSITY OF ALASKA
EMPLOYMENT (000's)
15
10
5
73
75
77
78
80
81
YEAR
FIGURE 27
ALASKA OCCUPATIONAL EMPLOYMENT
SALES WORKERS
CATEGORY 3
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
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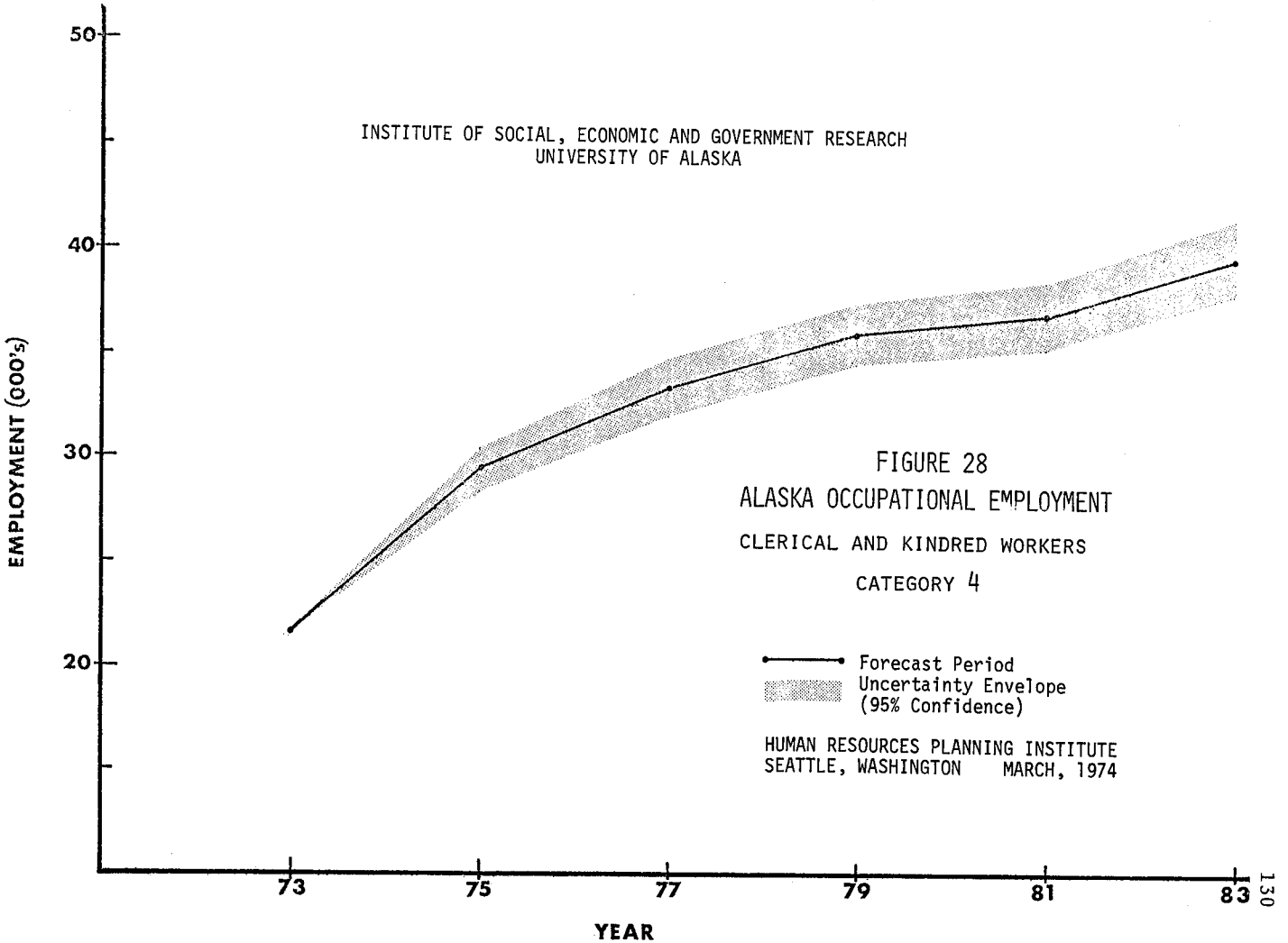
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UNIVERSITY OF ALASKA
EMPLOYMENT (000's)
50
40
30
20
73
75
77
79
81
83
YEAR
FIGURE 28
ALASKA OCCUPATIONAL EMPLOYMENT
CLERICAL AND KINDRED WORKERS
CATEGORY 4
Forecast Period
Uncertainty Envelope
(95% Confidence)
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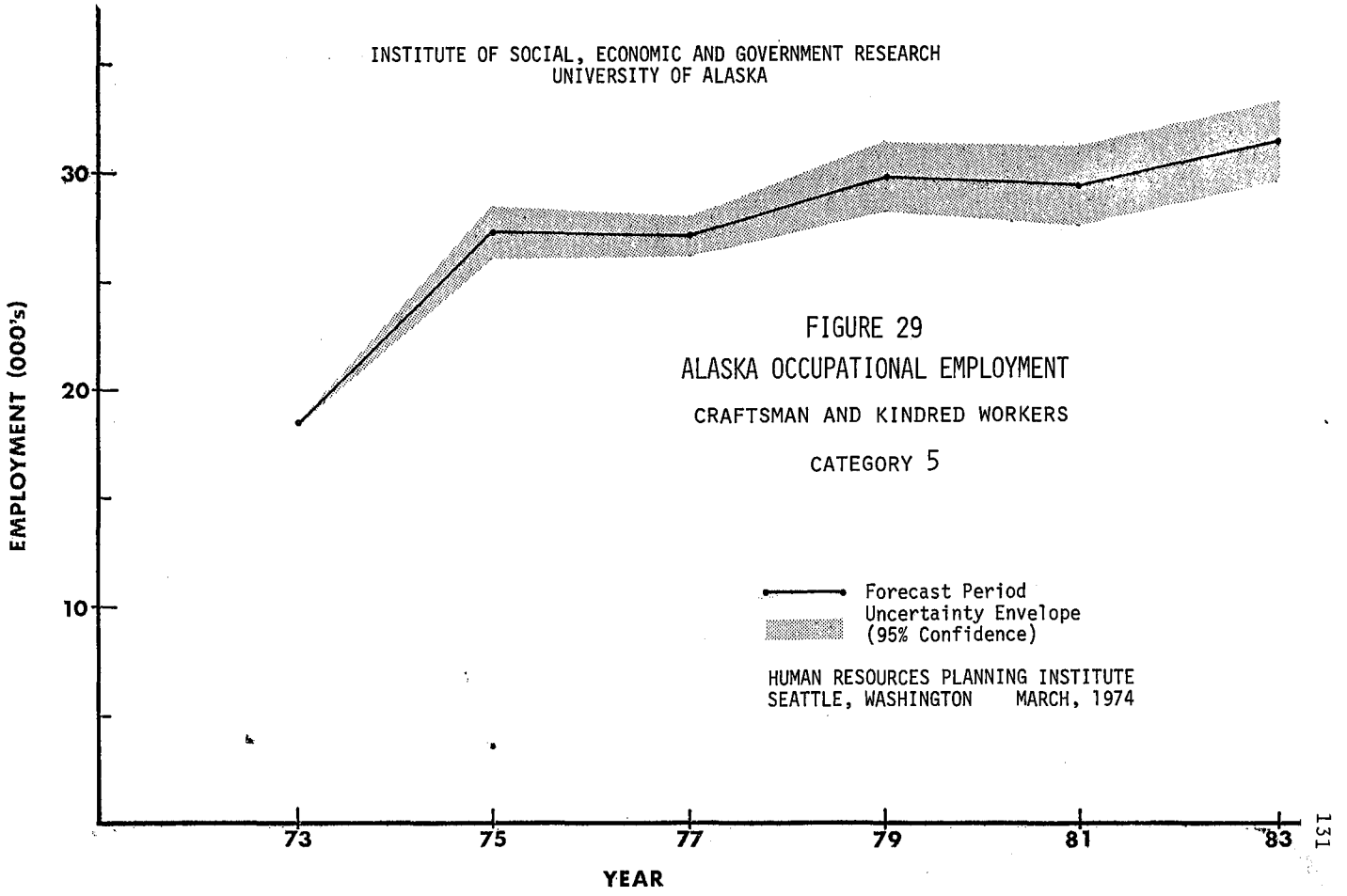
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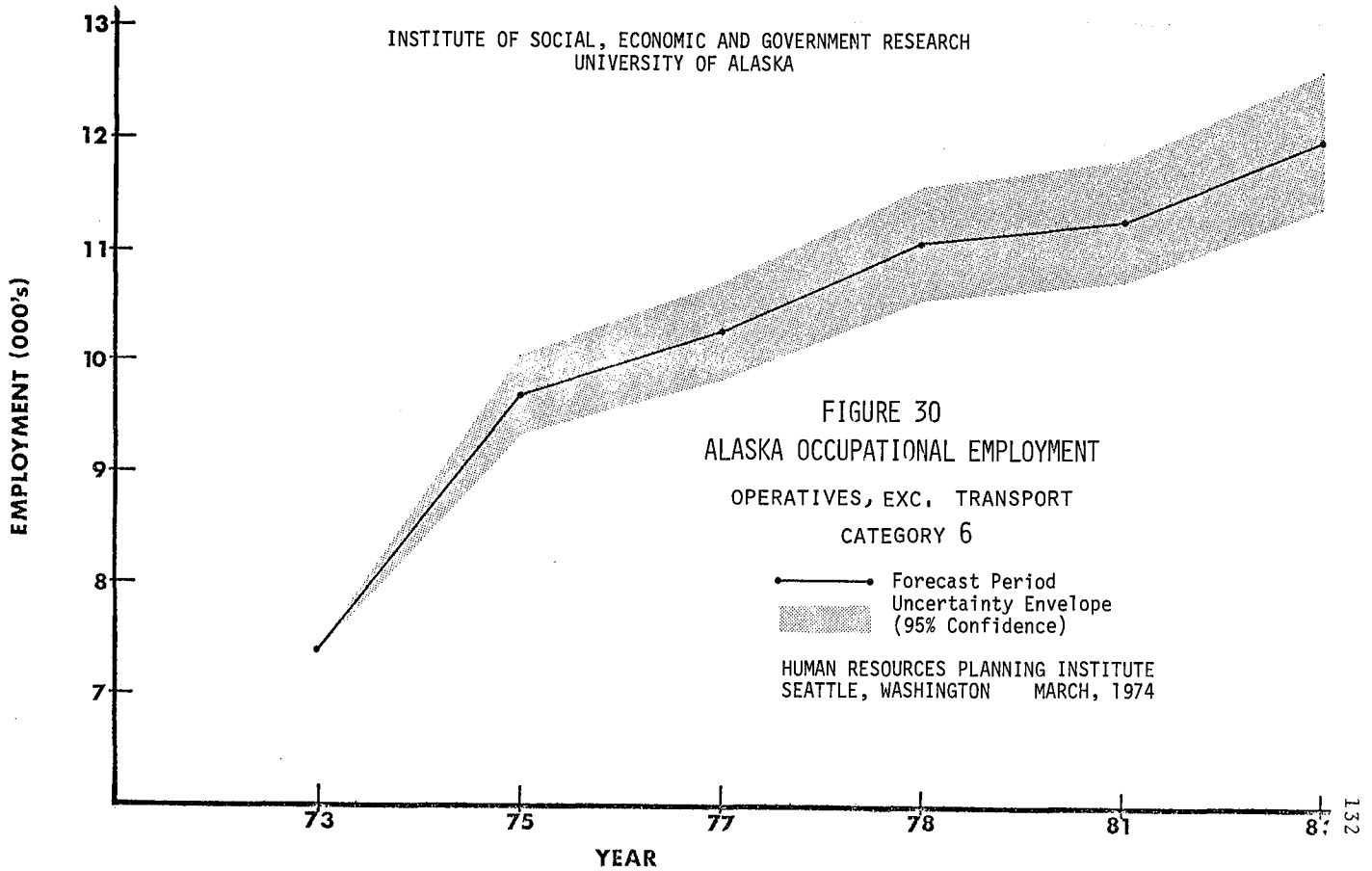
FIGURE 29
ALASKA OCCUPATIONAL EMPLOYMENT
CRAFTSMAN AND KINDRED WORKERS
CATEGORY 5
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974
EMPLOYMENT (000's)
30
20
10
73
75
77
79
81
83
YEAR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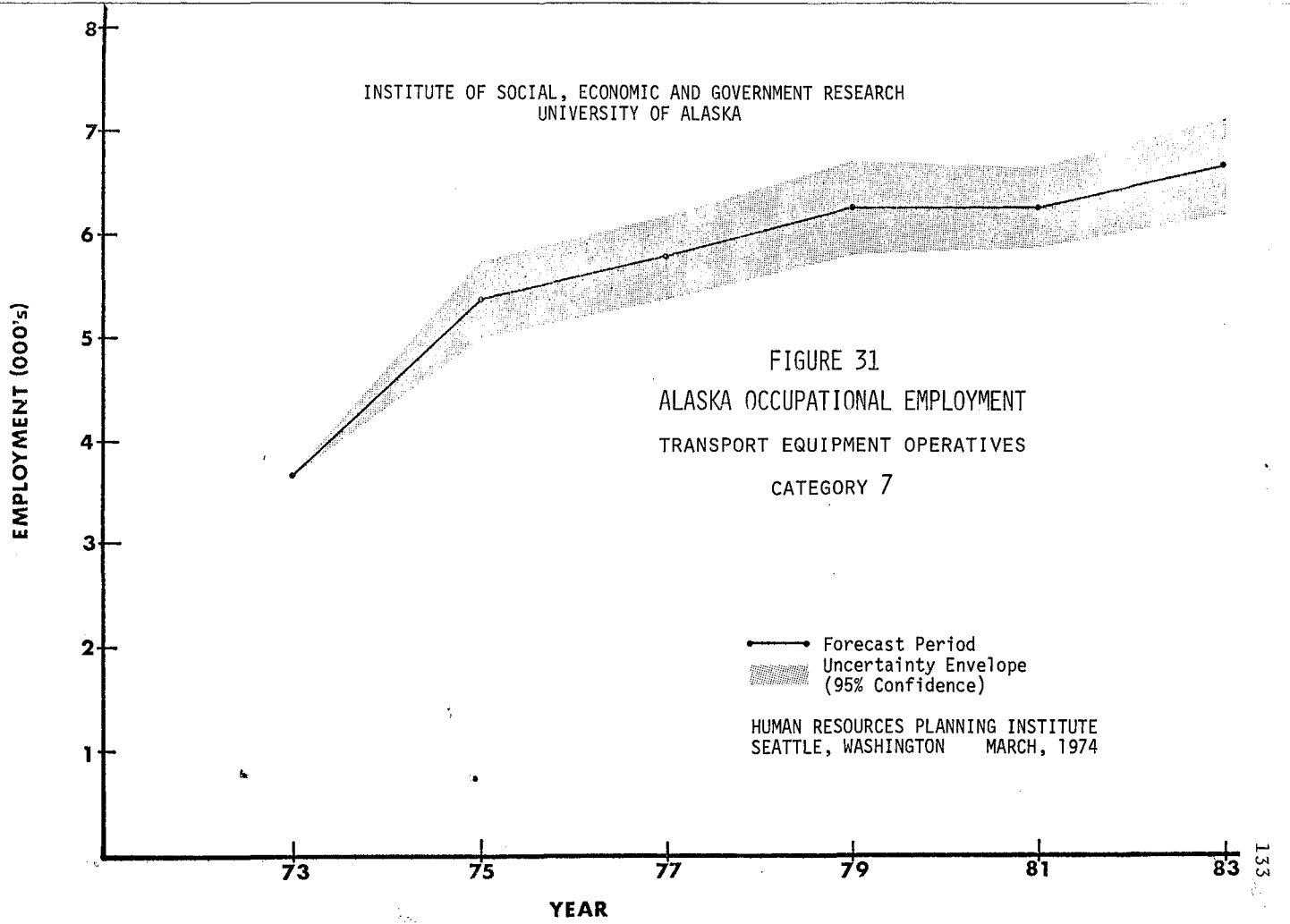
UNIVERSITY OF ALASKA
EMPLOYMENT (000's)
13
12
11
10
9
8
7
73
75
77
78
81
YEAR
FIGURE 30
ALASKA OCCUPATIONAL EMPLOYMENT
OPERATIVES, EXC. TRANSPORT
CATEGORY 6
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974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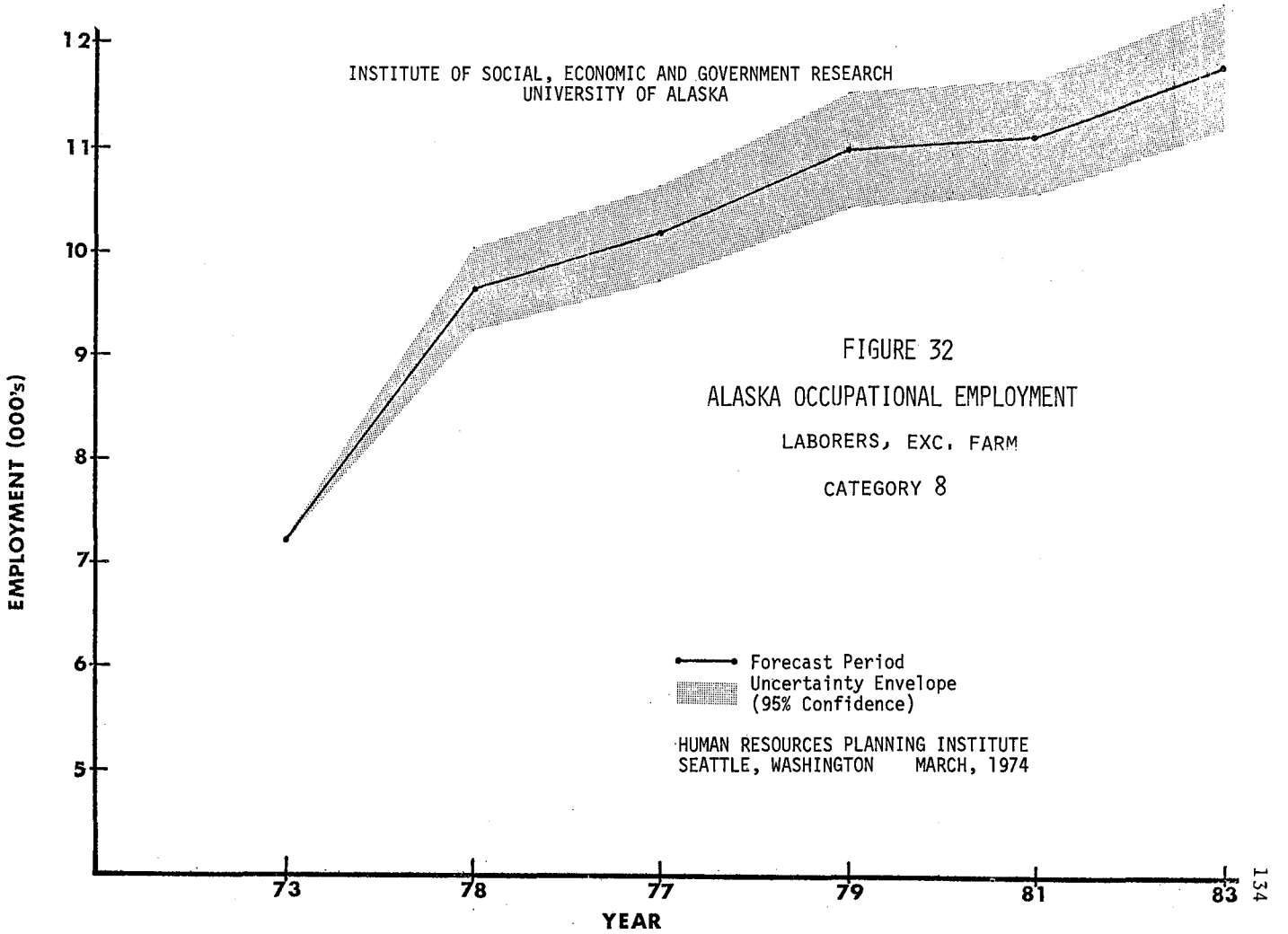
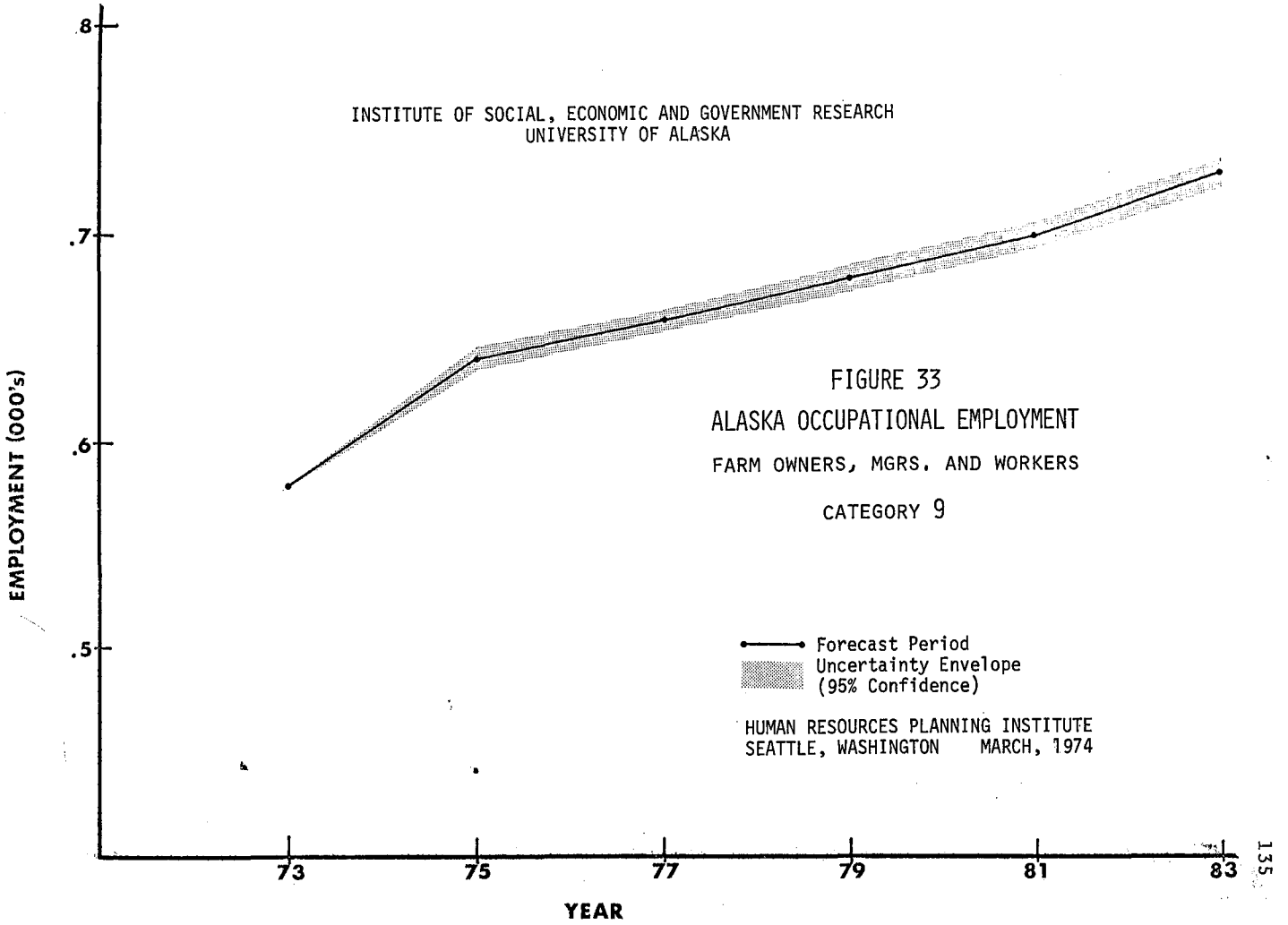
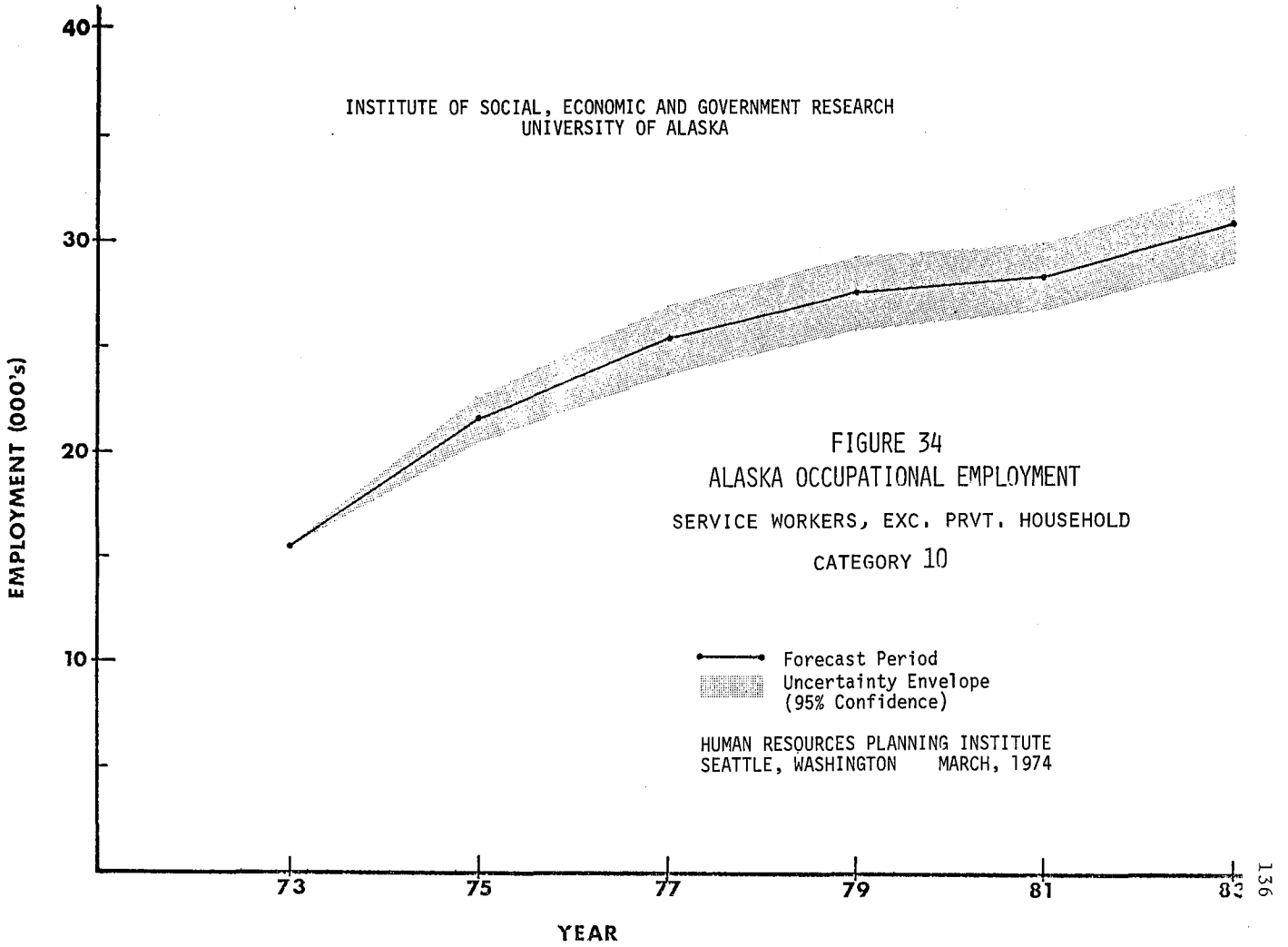
UNIVERSITY OF ALASKA
EMPLOYMENT (000's)
8
7
6
5
4
3
2
1
73
75
77
79
81
83
YEAR
FIGURE 31
ALASKA OCCUPATIONAL EMPLOYMENT
TRANSPORT EQUIPMENT OPERATIVES
CATEGORY 7
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
FIGURE 32
ALASKA OCCUPATIONAL EMPLOYMENT
LABORERS, EXC. FARM
CATEGORY 8
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974
EMPLOYMENT (000's)
12
11
10
9
8
7
6
5
73
78
77
79
81
83
YEAR


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
FIGURE 33
ALASKA OCCUPATIONAL EMPLOYMENT
FARM OWNERS, MGRS. AND WORKERS
CATEGORY 9
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974
EMPLOYMENT (000's)
.8
.7
.6
.5
73
75
77
79
81
83
YEAR


INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
40
30
20
10
EMPLOYMENT (000's)
73
75
77
79
81
83
YEAR
FIGURE 34
ALASKA OCCUPATIONAL EMPLOYMENT
SERVICE WORKERS, EXC. PRVT. HOUSEHOLD
CATEGORY 10
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974

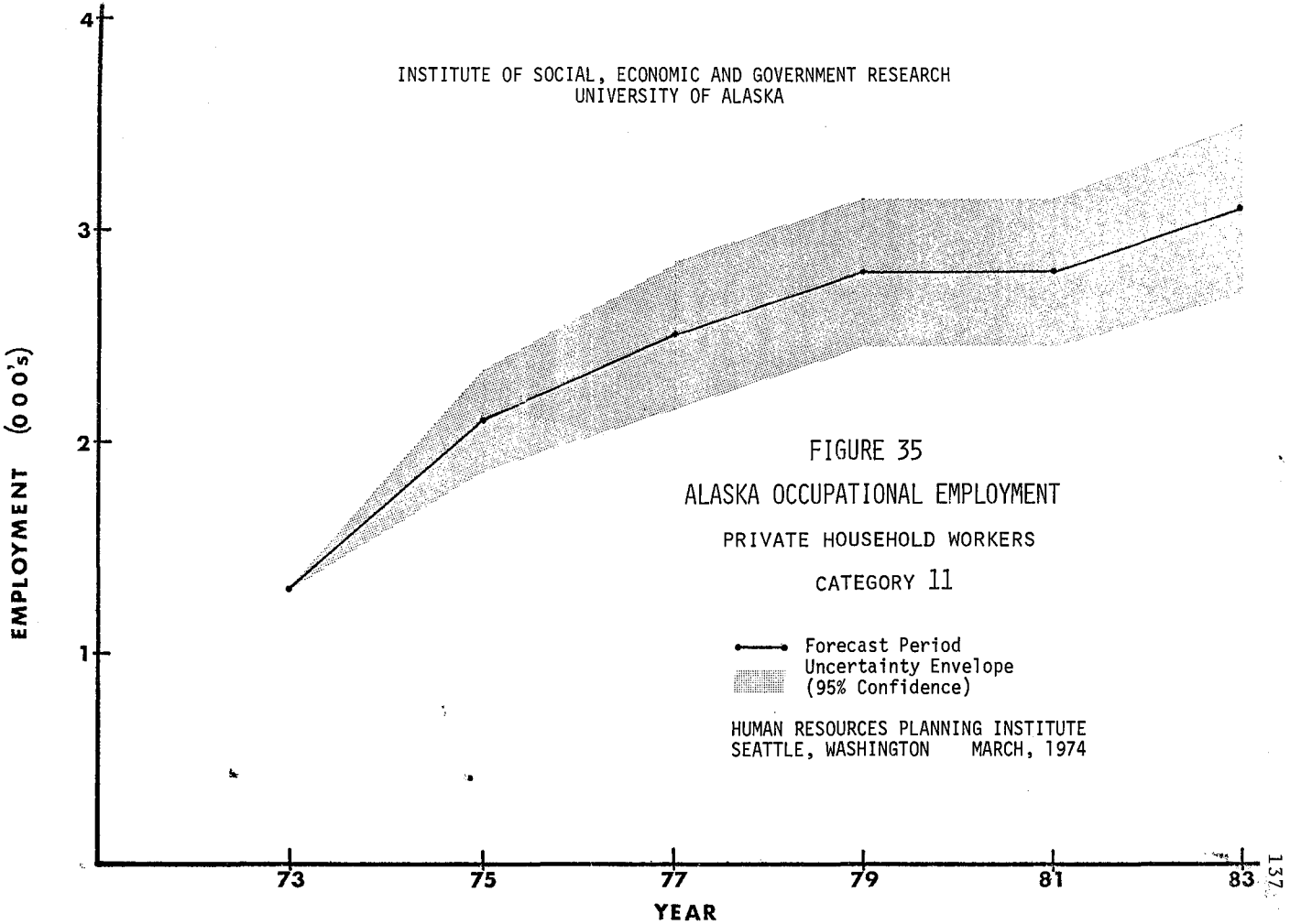

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA
EMPLOYMENT (000's)
4
3
2
1
73
75
77
79
81
83
YEAR
FIGURE 35
ALASKA OCCUPATIONAL EMPLOYMENT
PRIVATE HOUSEHOLD WORKERS
CATEGORY 11
Forecast Period
Uncertainty Envelope
(95% Confidence)
HUMAN RESOURCES PLANNING INSTITUTE
SEATTLE, WASHINGTON MARCH, 1974

TABLE 18

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 1 PROFESSIONAL, TECHNICAL AND KINDRED

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
1. ACCOUNTANTS	2330	97.0	4.2
2. ARCHITECTS	207	12.7	6.2
3. COMPUTER PROGRAMMERS	381	18.7	4.9
4. COMPUTER SYSTEMS ANALYSTS	147	8.1	5.5
5. COMPUTER SPECIALISTS, N.E.C.	83	5.4	6.4
6. AERONAUTICAL AND ASTRONAUTICAL ENG	20	2.1	10.3
7. CHEMICAL ENGINEERS	19	1.5	8.1
8. CIVIL ENGINEERS	1606	87.7	5.5
9. ELECTRICAL AND ELECTRONIC ENGINEERS	361	20.0	5.5
10. INDUSTRIAL ENGINEERS	207	14.7	7.1
11. MECHANICAL ENGINEERS	259	11.7	4.5
12. METALLURGICAL AND MATERIALS ENG	0	0.0	-0.0
13. MINING ENGINEERS	58	3.2	5.6
14. PETROLEUM ENGINEERS	132	9.8	7.4
15. SALES ENGINEERS	49	3.6	7.4
16. ENGINEERS, N.E.C.	334	16.3	4.9
17. FARM MANAGEMENT ADVISORS	6	.9	15.0
18. FORESTERS AND CONSERVATIONISTS	185	15.4	8.3
19. HOME MANAGEMENT ADVISORS	0	0.0	-0.0
20. JUDGES	263	17.2	6.5
21. LAWYERS	739	50.1	6.8
22. LIBRARIANS	486	27.8	5.7

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 1 PROFESSIONAL, TECHNICAL AND KINDRED

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
23. ARCHITECTS AND CURATORS	29	2.5	8.5
24. ACTUARIES	0	0.0	-0.0
25. MATHEMATICIANS	26	1.8	6.8
26. STATISTICIANS	100	5.7	5.7
27. AGRICULTURAL SCIENTISTS	191	11.1	5.8
28. ATMOSPHERE AND SPACE SCIENTISTS	104	15.6	15.0
29. BIOLOGICAL SCIENTISTS	422	25.5	6.0
30. CHEMISTS	228	16.0	7.0
31. GEOLOGISTS	447	26.0	5.8
32. MARINE SCIENTISTS	99	6.9	6.9
33. PHYSICISTS AND ASTRONOMERS	11	1.1	10.0
34. LIFE AND PHYSICAL SCIENTISTS, N.E.C.	0	0.0	-0.0
35. OPERATIONS AND SYSTEMS RESEARCHERS	69	3.3	4.7
36. PERSONNEL AND LABOR RELATIONS WORKERS	1310	58.8	4.5
37. CHIROPRACTORS	37	2.9	7.9
38. DENTISTS	195	13.7	7.0
39. OPTOMETRISTS	37	3.7	10.0
40. PHARMACISTS	148	17.2	11.6
41. PHYSICIANS,MEDICAL AND OSTEOPATHIC	569	38.1	6.7
42. PODIATRISTS	0	0.0	-0.0
43. VETERINARIANS	28	2.8	10.0
44. HEALTH PRACTITIONERS, N.E.C.	0	0.0	-0.0

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 1 PROFESSIONAL, TECHNICAL AND KINDRED

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
45. DIETITIANS	127	8.8	6.9
46. REGISTERED NURSES	2521	189.0	7.5
47. THERAPISTS	180	10.6	5.9
48. CLINICAL LABORATORY TECH	318	28.3	8.9
49. DENTAL HYGIENISTS	27	3.5	12.7
50. HEALTH RECORD TECH	58	5.8	9.9
51. RADIOLOGIC TECH	165	14.5	8.7
52. THERAPY ASSISTANTS	5	.7	15.0
53. HEALTH TECH N.E.C.	104	6.0	5.7
54. CLERGYMAN	1166	137.1	11.8
55. RELIGIOUS WORKERS, N.E.C.	180	17.2	9.6
56. ECONOMISTS	123	7.0	5.7
57. POLITICAL SCIENTISTS	0	0.0	-0.0
58. PSYCHOLOGISTS	59	4.0	6.8
59. SOCIOLOGISTS	0	0.0	0.0
60. URBAN AND REGIONAL PLANNERS	72	4.9	6.8
61. SOCIAL SCIENTISTS, N.E.C.	29	2.2	7.6
62. SOCIAL WORKERS	1017	56.8	5.6
63. RECREATION WORKERS	211	14.7	7.0
64. AGRICULTURE TEACHERS	21	2.7	12.7
65. ATM, EARTH, MARINE, SPACE TEACHERS	88	6.0	6.8
66. BIOLOGY TEACHERS	65	4.4	6.8

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA , COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 1 PROFESSIONAL, TECHNICAL AND KINDRED

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
67. CHEMISTRY TEACHERS	33	2.2	6.8
68. PHYSICS TEACHERS	36	2.4	6.8
69. ENGINEERING TEACHERS	67	4.4	6.6
70. MATHEMATICS TEACHERS	109	6.6	6.1
71. HEALTH SPECIALTIES TEACHERS	46	5.8	12.7
72. PSYCHOLOGY TEACHERS	0	0.0	-0.0
73. BUSINESS AND COMMERCE TEACHERS	57	4.0	7.1
74. ECONOMICS TEACHERS	20	1.3	6.8
75. HISTORY TEACHERS	32	2.2	7.1
76. SOCIOLOGY TEACHERS	15	1.9	12.7
77. SOCIAL SCIENCE TEACHERS, N.E.C.	0	0.0	-0.0
78. ART, DRAMA, AND MUSIC TEACHERS	31	2.5	7.9
79. COACHES AND P.E. TEACHERS	31	3.9	12.7
80. EDUCATION TEACHERS	16	1.1	6.8
81. ENGLISH TEACHERS	172	10.1	5.9
82. FOREIGN LANGUAGE TEACHERS	55	3.3	6.0
83. HOME ECONOMICS TEACHERS	16	1.1	6.8
84. LAW TEACHERS	0	0.0	-0.0
85. THEOLOGY TEACHERS	0	0.0	-0.0
86. TRADE, INDUS, AND TECH. TEACHERS	0	0.0	-0.0
87. MISC TEACHERS, COLLEGE AND UNIV	33	2.2	6.8
88. TEACHERS, COLL AND UNIV, SUBJ NT SPEC	456	28.5	6.3

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 1 PROFESSIONAL, TECHNICAL AND KINDRED

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
89. ADULT EDUCATION TEACHERS	175	8.3	4.8
90. ELEMENTARY SCHOOL TEACHERS	8527	532.5	6.2
91. PREKINDERGARTEN AND KIND.TEACHERS	591	34.6	5.9
92. SECONDARY SCHOOL TEACHERS	4568	287.9	6.3
93. TEACHERS, EX COLL AND UNIV, N.E.C.	375	22.7	6.0
94. AGRIC AND BIOLOG TECH, EX HEALTH	71	4.5	6.4
95. CHEMICAL TECHNICIANS	43	2.4	5.6
96. DRAFTSMEN	760	40.3	5.3
97. ELECTRICAL AND ELECTRONIC ENG TECH	983	53.1	5.4
98. INDUSTRIAL ENGINEERING TECHNICIANS	0	0.0	-0.0
99. MECHANICAL ENGINEERING TECHNICIANS	0	0.0	-0.0
100. MATHEMATICAL TECHNICIANS	0	0.0	-0.0
101. SURVEYORS	639	41.7	6.5
102. ENG AND SCIENCE TECHNICIANS, N.E.C.	427	19.9	4.6
103. AIRPLANE PILOTS	1328	192.9	14.5
104. AIR TRAFFIC CONTROLLERS	695	104.2	15.0
105. EMBALMERS	15	1.9	12.7
106. FLIGHT ENGINEERS	29	4.9	17.0
107. RADIO OPERATORS	349	22.3	6.4
108. TOOL PROGRAMMERS, NUMERICAL CONTROL	26	1.7	6.3
109. TECHNICIANS, N.E.C.	167	11.3	6.7
110. VOCATIONAL AND EDUCATIONAL COUNSELORS	544	33.1	6.1

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 1 PROFESSIONAL, TECHNICAL AND KINDRED

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
111. ACTORS	13	.9	6.8
112. ATHLETES AND KINDRED WORKERS	67	6.8	10.1
113. AUTHORS	52	4.4	8.5
114. DANCERS	49	8.7	17.6
115. DESIGNERS	176	11.5	6.6
116. EDITORS AND REPORTERS	355	23.6	6.6
117. MUSICIANS AND COMPOSERS	206	16.9	8.2
118. PAINTERS AND SCULPTORS	174	12.4	7.1
119. PHOTOGRAPHERS	109	6.3	5.8
120. P R MEN AND PUBLICITY WRITERS	209	14.3	6.8
121. RADIO AND TELEVISION ANNOUNCERS	73	4.4	6.0
122. WRITERS, ARTISTS, AND ENTER, N.E.C.	153	7.7	5.0
123. RESEARCH WORKERS, NOT SPECIFIED	377	19.8	5.2
124. PROF, TECH, AND KINDRED--ALLOCATED	2207	112.6	5.1
TOTAL FORECASTED EMPLOYMENT, CATEGORY 1	44216	2072.3	4.7

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 2 MANAGERS AND ADMINISTRATORS, EXC FARM

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
125. ASSESS, CONTROL, TREAS, LOC PUB ADMIN	284	19.3	6.8
126. BANK OFFICERS AND FINANCIAL MANAGERS	1218	112.0	9.2
127. BUYERS AND SHIPPERS, FARM PRODUCTS	0	0.0	-0.0
128. BUYERS, WHOLESALE AND RETAIL TRADE	225	22.4	9.9
129. CREDIT MEN	315	21.3	6.8
130. FUNERAL DIRECTORS	9	.9	10.0
131. HEALTH ADMINISTRATORS	410	43.3	10.5
132. CONSTRUCT INSPECTORS, PUBLIC ADMIN	66	4.2	6.4
133. INSPECTORS, EX CON, PUB ADMIN	134	20.2	15.0
134. MANAGERS AND SUPER, BUILDING	279	15.5	5.6
135. OFFICE MANAGERS, N.E.C.	771	37.4	4.9
136. OFFICERS, PILOTS, AND PURSERS, SHIP	613	51.6	8.4
137. OFFICIALS AND ADMIN, PUB AD, N.E.C.	2511	161.3	6.4
138. OFFICIALS LODGES, SOCIETIES, UNIONS	330	41.9	12.7
139. POSTMASTERS AND RAIL SUPERINTENDENTS	233	34.9	15.0
140. PURCHASING AGENTS AND BUYERS, N.E.C.	932	45.3	4.9
141. RAILROAD CONDUCTORS	106	8.6	8.1
142. RESTAURANT, CAFETERIA, AND BAR MANAG	853	75.0	8.8
143. SALES MANAG AND DEP HEADS, RET TRADE	727	118.1	16.2
144. SALES MANAGERS, EXCEPT RETAIL TRADE	469	43.1	9.2
145. SCHOOL ADMINISTRATORS, COLLEGE	58	3.5	6.1
146. SCHOOL ADMIN, ELEMENTARY AND SECOND	973	60.8	6.2

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 2 MANAGERS AND ADMINISTRATORS, EXC FARM

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
147. MANAGERS AND ADMINISTRATORS, N.E.C.	12482	660.6	5.3
148. MANAG AND ADMIN, EX FARM--ALLOCATED	967	39.7	4.1
TOTAL FORECASTED EMPLOYMENT, CATEGORY 2	24963	1088.4	4.4

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 3 SALES WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
149. ADVERTISING AGENTS AND SALESMEN	58	4.5	7.7
150. AUCTIONEERS	12	1.6	12.7
151. DEMONSTRATORS	173	20.2	11.7
152. HUCKSTERS AND PEDDLERS	368	49.3	13.4
153. INSUR AG, BROKERS, UNDERSRITIERS	745	74.6	10.0
154. NEWSBOYS	61	7.7	12.5
155. REAL ESTATE AGENTS AND BROKERS	756	64.4	8.5
156. STOCK AND BOND SALESMEN	173	19.2	11.1
157. SALES REPRESENTATIVES, MANUFAC INC	186	23.3	12.5
158. SALES REP, WHOLESALE TRADE	1392	224.5	16.1
159. SALES CLERKS, RETAIL TRADE	5287	844.5	16.0
160. SALESMEN, RETAIL TRADE	1287	189.5	14.7
161. SALESMEN OF SERVICES AND CONSTRUCT	731	52.0	7.1
162. SALES WORKERS--ALLOCATED	1047	104.3	10.0
TOTAL FORECASTED EMPLOYMENT, CATEGORY 3	12276	1243.0	10.1

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 4 CLERICAL AND KINDRED WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
163. BANK TELLERS	828	84.6	10.2
164. BILLING CLERKS	330	17.2	5.2
165. BOOKKEEPERS	4771	231.2	4.8
166. CASHIERS	2088	238.9	11.4
167. CLERICAL ASSISTANTS, SOCIAL WELFARE	0	0.0	-0.0
168. CLERICAL SUPERVISORS, N.E.C.	404	43.2	10.7
169. COLLECTORS, BILL AND ACCOUNT	205	13.5	6.6
170. COUNTER CLERKS, EXCEPT FOOD	914	83.6	9.1
171. DISPATCHERS AND STARTERS, VEHICLE	313	28.1	9.0
172. ENUMERATORS AND INTERVIEWERS	199	20.9	10.5
173. ESTIMATORS AND INVESTIGATORS, N.E.C.	927	43.4	4.7
174. EXPEDITERS AND PROD CONTROLLERS	472	28.7	6.1
175. FILE CLERKS	714	32.7	4.6
176. INSURANCE ADJ, EXAMINERS, INVEST	147	13.6	9.3
177. LIBRARY ATTENDANTS AND ASSISTANTS	393	22.8	5.8
178. MAIL CARRIERS, POST OFFICE	192	28.8	15.0
179. MAIL HANDLERS, EXCEPT POST OFFICE	298	13.9	4.7
180. MESSENGERS AND OFFICE BOYS	186	9.0	4.8
181. METER READERS, UTILITIES	42	2.6	6.2
182. BOOKKEEPING AND BILLING MACHINE OP	154	10.2	6.6
183. CALCULATING MACHINE OPERATORS	16	2.2	13.7
184. COMPUTER AND PERIPHERAL EQUIPMENT OP	211	10.4	4.9

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 4 CLERICAL AND KINDRED WORKERS

	OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
185.	DUPLICATING MACHINE OPERATORS	11	1.2	11.1
186.	KEY PUNCH OPERATORS	447	22.2	5.0
187.	TABULATING MACHINE OPERATORS	0	0.0	-0.0
188.	OFFICE MACHINE OPERATORS, N.E.C.	66	4.0	6.0
189.	PAYROLL AND TIMEKEEPING CLERKS	347	17.4	5.0
190.	POSTAL CLERKS	454	68.1	15.0
191.	PROOFREADERS	24	3.0	12.5
192.	REAL ESTATE APPRAISERS	68	3.8	5.5
193.	RECEPTIONISTS	943	73.5	7.8
194.	SECRETARIES, LEGAL	457	44.2	9.7
195.	SECRETARIES, MEDICAL	155	18.6	12.1
196.	SECRETARIES, N.E.C.	8341	341.4	4.1
197.	SHIPPING AND RECEIVING CLERKS	326	26.9	8.2
198.	STATISTICAL CLERKS	632	30.4	4.8
199.	STENOGRAPHERS	361	20.6	5.7
200.	STOCK CLERKS AND STOREKEEPERS	1302	85.7	6.6
201.	SCHOOL AIDES, EXCEPT SCHOOL MONITORS	608	34.3	5.6
202.	TELEGRAPH MESSENGERS	5	.7	15.0
203.	TELEGRAPH OPERATORS	38	3.5	9.1
204.	TELEPHONE OPERATORS	1291	81.3	6.3
205.	TICKET, STATION AND EXPRESS AGENTS	1086	176.7	16.3
206.	TYPISTS	2914	159.2	5.5

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 4 CLERICAL AND KINDRED WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
207. WEIGHERS	44	5.4	12.5
208. MISCELLANEOUS CLERICAL WORKERS	1211	51.1	4.2
209. NOT SPECIFIED CLERICAL WORKERS	2189	99.2	4.5
210. CLERICAL AND KINDRED--ALLOCATED	2363	120.6	5.1
TOTAL FORECASTED EMPLOYMENT, CATEGORY 4	39484	1740.6	4.4

TABLE 18 (Continued)

INSTITUTE OF SOCIAL, ECONOMIC AND GOVERNMENT RESEARCH
UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 5 CRAFTSMAN AND KINDRED WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
211. AUTOMOBILE ACCESSORIES INSTALLERS	0	0.0	-0.0
212. BAKERS	489	39.0	8.0
213. BLACKSMITHS	0	0.0	-0.0
214. BOILERMAKERS	105	8.5	8.1
215. BOOKBINDERS	34	3.8	11.0
216. BRICKMASONS AND STONEMASONS	121	6.8	5.7
217. BRICKMASON AND STONEMASON APPRENTICES	0	0.0	-0.0
218. BULLDOZER OPERATORS	589	51.9	8.8
219. CABINETMAKERS	92	7.2	7.8
220. CARPENTERS	3679	375.6	10.2
221. CARPENTER APPRENTICES	0	0.0	-0.0
222. CARPET INSTALLERS	128	9.7	7.5
223. CEMENT AND CONCRETE FINISHERS	93	15.3	16.5
224. COMPOSITORS AND TYPESETTERS	122	13.2	10.8
225. PRINTING TRADES APPREN, EX PRESSMEN	0	0.0	-0.0
226. CRANEMEN, DERRICKMEN, AND HOISTMEN	381	27.0	7.1
227. DECORATORS AND WINDOW DRESSERS	131	16.2	12.4
228. DENTAL LABORATORY TECHNICIANS	90	9.1	10.1
229. ELECTRICIANS	1307	124.8	9.5
230. ELECTRICIAN APPRENTICES	43	7.9	18.2
231. ELECTRIC POWER LINEMEN AND CABLEMEN	383	16.9	4.4
232. ELECTROTYPERS AND STEREOTYPERS	0	0.0	-0.0

TABLE 18 (Continued)

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UNIVERSITY OF ALASKA, COLLEGE, ALASKA

FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

PREPARED BY HUMAN RESOURCES PLANNING INSTITUTE - SEATTLE, WASHINGTON- 3/12/74

CATEGORY 5 CRAFTSMAN AND KINDRED WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
233. ENGRAVERS, EXCEPT PHOTOENGRAVERS	0	0.0	-0.0
234. ROAD MACHINE OPERATORS, EX BULLDOZER	1910	153.7	8.0
235. FLOOR LAYERS, EXCEPT TILE SETTERS	92	7.1	7.7
236. FOREMEN, N.E.C.	3655	193.9	5.3
237. FORGEMEN AND HAMMERMEN	0	0.0	-0.0
238. FURNITURE AND WOOD FINISHERS	63	5.1	8.0
239. FURRIERS	40	5.7	14.3
240. GLAZIERS	112	14.1	12.6
241. HEAT TREATERS, ANNEALERS, AND TEMP	0	0.0	-0.0
242. INSP, SCALERS, GRADERS- LUMBER	104	10.2	9.8
243. INSPECTORS, N.E.C.	249	11.6	4.6
244. JEWELERS AND WATCHMAKERS	117	9.8	8.4
245. JOB AND DIE SETTERS, METAL	0	0.0	-0.0
246. LOCOMOTIVE ENGINEERS	104	8.5	8.2
247. LOCOMOTIVE FIREMEN	16	2.7	17.0
248. MACHINISTS	335	16.7	5.0
249. MACHINE APPRENTICES	0	0.0	-0.0
250. AIR CONDITIONING, HEATING, AND REFRIG	224	12.1	5.4
251. AIRCRAFT	1376	187.4	13.6
252. AUTOMOBILE BODY REPAIRMEN	301	25.9	8.6
253. AUTOMOBILE MECHANICS	2367	169.3	7.2
254. AUTOMOBILE MECHANIC APPRENTICES	12	2.2	17.6

TABLE 18 (Continued)

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FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

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CATEGORY 5 CRAFTSMAN AND KINDRED WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
255. DATA PROCESSING MACHINE REPAIRMEN	66	6.1	9.2
256. FARM IMPLEMENT	17	3.0	17.8
257. HEAVY EQUIPMENT MACHANICS, INC DIESEL	2288	102.6	4.5
258. HOUSEHOLD APPL INSTALLERS AND MECH	245	16.0	6.6
259. LOOM FIXERS	0	0.0	-0.0
260. OFFICE MACHINE	103	10.6	10.3
261. RADIO AND TELEVISION	644	41.5	6.4
262. RAILROAD AND CAR SHOP	99	9.3	9.5
263. MECHANIC, EXCEPT AUTO, APPRENTICES	27	4.7	17.8
264. MISCELLANEOUS MECHANICS AND REPAIRMEN	270	15.2	5.6
265. NOT SPECIFIED MACHANICS AND REPAIRMEN	362	23.2	6.4
266. MILLERS- GRAIN, FLOUR, AND FEED	0	0.0	-0.0
267. MILLWRIGHTS	262	27.1	10.3
268. MOLDERS, METAL	0	0.0	-0.0
269. MOLDER APPRENTICES	0	0.0	-0.0
270. MOTION PICTURE PROJECTIONIST	73	9.3	12.7
271. OPTICIANS, LENS GRINDERS, POLISHERS	59	10.4	17.6
272. PAINTERS, CONSTRUCTION AND MAIN.	671	55.6	8.3
273. PAINTER APPRENTICES	12	1.6	12.7
274. PAPERHANGERS	17	3.0	17.8
275. PATTERN AND MODEL MAKERS, EX PAPER	0	0.0	-0.0
276. PHOTOENGRAVERS AND LITHOGRAPHERS	10	1.2	12.5

TABLE 18 (Continued)

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CATEGORY 5 CRAFTSMAN AND KINDRED WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
277. PIANO AND ORGAN TUNERS AND REPAIRMEN	0	0.0	-0.0
278. PLASTERERS	14	2.6	18.2
279. PLASTERER APPRENTICES	0	0.0	-0.0
280. PLUMBERS AND PIPE FITTERS	1219	129.2	10.6
281. PLUMBER AND PIPE FITTER APPRENTICES	101	17.4	17.2
282. POWER STATION OPERATORS	242	10.3	4.3
283. PRESSMEN AND PLATE PRINTERS, PRINTING	91	6.5	7.1
284. PRESSMEN APPRENTICES	0	0.0	-0.0
285. ROLLERS AND FINISHERS, METAL	0	0.0	-0.0
286. ROOFERS AND SLATERS	109	19.0	17.4
287. SHEETMETAL WORKERS AND TINSMITHS	172	12.0	7.0
288. SHEETMETAL APPRENTICES	0	0.0	-0.0
289. SHIPLIFTERS	12	1.5	12.5
290. SHOE REPAIRMEN	30	3.0	10.0
291. SIGN PAINTERS AND LETTERERS	0	0.0	-0.0
292. STATIONARY ENGINEERS	748	35.6	4.8
293. STONE CUTTERS AND STONE CARVERS	0	0.0	-0.0
294. STRUCTURAL METAL CRAFTSMEN	190	31.1	16.4
295. TAILORS	22	3.1	14.2
296. TELEPHONE INSTALLERS AND REPAIMEN	765	36.4	4.8
297. TELEPHONE LINEMEN AND SPLICEMEN	154	6.7	4.3
298. TILE SETTERS	14	2.6	18.2

TABLE 18 (Continued)

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CATEGORY 5 CRAFTSMAN AND KINDRED WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
299. TOOL AND DIE MAKERS	0	0.0	-0.0
300. TOOL AND DIE MAKER APPRENTICES	0	0.0	-0.0
301. UPHOLSTERERS	99	6.7	6.8
302. SPECIFIED CRAFT APPRENTICES, N.E.C.	0	0.0	-0.0
303. NOT SPECIFIED APPRENTICES	7	1.3	17.6
304. CRAFTSMEN AND KINDRED WORKERS,N.E.C.	165	10.9	6.6
305. FORMER MEMBERS OF THE ARMED FORCES	0	0.0	-0.0
306. CRAFTSMEN AND KINDRED--ALLOCATED	3014	251.9	8.4
TOTAL FORECASTED EMPLOYMENT, CATEGORY 5	31261	1783.8	5.7

TABLE 18 (Continued)

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CATEGORY 6 OPERATIVES, ETC. TRANSPORT

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
307. ASBESTOS AND INSULATION WORKERS	55	10.0	18.2
308. ASSEMBLERS	74	6.3	8.6
309. BLASTERS AND POWDERMEN	67	5.9	8.7
310. BOTTLING AND CANNING OPERATIVES	514	57.4	11.2
311. CHAIN, ROD, AND AX, SURVEYING	25	2.4	9.7
312. CHECKERS, EXAM INSPEC- MANUFAC	128	14.9	11.6
313. CLOTHING IRONERS AND PRESSERS	281	31.8	11.3
314. CUTTING OPERATIVES, N.E.C.	141	13.4	9.4
315. DRESSMAKERS AND SEAMS, EX FACTORY	208	15.2	7.3
316. DRILLERS, EARTH	414	32.1	7.8
317. DRY WALL INSTALLERS AND LATHERS	185	24.6	13.3
318. DYERS	0	0.0	-0.0
319. FILERS, POLISHERS, SANDERS, BUFFERS	88	7.8	8.8
320. FURNACEMEN, SMELTERMEN, AND POURERS	0	0.0	-0.0
321. GARAGE WORKERS AND GAS STATION ATTEN	621	104.6	16.8
322. GRADERS AND SORTERS, MANUFACTURING	4	.5	12.5
323. PRODUCE GRADERS, EX FAC AND FARM	17	3.0	17.8
324. HEATERS, METAL	0	0.0	-0.0
325. LAUNDRY AND DRY CLEAN OPER, N.E.C.	819	80.5	9.8
326. MEAT CUTTERS, EX MANUFACTURING	441	56.0	12.7
327. MEAT CUTTERS, MANUFACTURING	154	19.3	12.5
328. MEAT WRAPPERS, RETAIL TRADE	121	21.3	17.6

TABLE 18 (Continued)

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CATEGORY 6 OPERATIVES, ETC. TRANSPORT

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
329. METAL PLATERS	0	0.0	-0.0
330. MILLINERS	12	2.2	17.6
331. MINE OPERATIVES, N.E.C.	523	46.1	8.8
332. MIXING OPERATIVES	46	5.7	12.5
333. OILERS AND GREASERS, EXCEPT AUTO	336	29.0	8.6
334. PACKERS, EX MEAT AND PRODUCE	531	38.4	7.2
335. PAINTERS, MANUFACTURED ARTICLES	35	2.4	6.9
336. PHOTOGRAPHIC PROCESS WORKERS	125	8.4	6.8
337. DRILL PRESS OPERATIVES	12	1.5	12.5
338. GRINDING MACHINE OPERATIVES	11	1.1	10.0
339. LATHE AND MILLING MACHINE OPERATIVES	0	0.0	-0.0
340. PRECISION MACHINE OPERATIVES, N.E.C.	0	0.0	-0.0
341. PUNCH AND STAMPING PRESS OPERATIVES	16	2.0	12.5
342. RIVETERS AND FASTENERS	0	0.0	-0.0
343. SAILORS AND DECKHANDS	503	36.3	7.2
344. SAWYERS	114	12.7	11.2
345. SEWERS AND STITCHERS	279	18.7	6.7
346. SHOEMAKING MACHINE OPERATIVES	0	0.0	-0.0
347. SLOGGERS	0	0.0	-0.0
348. STATIONARY FIREMEN	206	11.1	5.4
349. CARDING, LAPPING, AND COMBING OPER	0	0.0	-0.0
350. KNITTERS, LOOPERS, AND TOPPERS	0	0.0	-0.0

TABLE 18 (Continued)

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CATEGORY 6 OPERATIVES, ETC. TRANSPORT

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
351. SPINNERS, TWISTERS, AND WINDERS	0	0.0	-0.0
352. WEAVERS	11	1.1	10.0
353. TEXTILE OPERATIVES, N.E.C.	18	2.2	12.5
354. WELDERS AND FLAME-CUTTERS	802	47.3	5.9
355. WINDING OPERATIVES, N.E.C.	7	1.1	15.0
356. MACHINE OPERATIVES, MISC SPEC	779	80.4	10.3
357. MACHINE OPERATIVES, NOT SPECIFIED	143	11.2	7.8
358. MISCELLANEOUS OPERATIVES	1174	91.4	7.8
359. NOT SPECIFIED OPERATIVES	321	15.1	4.7
360. OPERATIVES, EX TRANSPORT--ALLOCATED	1667	83.2	5.0
TOTAL FORECASTED EMPLOYMENT, CATEGORY 6	12029	608.7	5.1

TABLE 18 (Continued)

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CATEGORY 7 TRANSPORT EQUIPMENT OPERATIVES

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
361. BOATMEN AND CANALMEN	71	3.9	5.4
362. BUS DRIVERS	910	91.5	10.1
363. COND AND MOTORMEN, URBAN RAIL TRANSIT	18	3.1	17.0
364. DELIVERYMEN AND ROUTEMEN	1402	111.6	8.0
365. FORK LIFT AND TOW MOTOR OPERATIVES	314	19.3	6.1
366. MOTORMEN- MINE, FAC, LOG CAMP, ETC.	13	1.3	10.0
367. PARKING ATTENDANTS	0	0.0	-0.0
368. RAILROAD BRAKEMEN	87	8.2	9.4
369. RAILROAD SWITCHMEN	9	1.4	15.0
370. TAXICAB DRIVERS AND CHAUFFERS	653	86.3	13.2
371. TRUCK DRIVERS	2697	207.0	7.7
372. TRANSPORT EQUIP OPERATIVES--ALLOCATED	559	29.1	5.2
TOTAL FORECASTED EMPLOYMENT, CATEGORY 7	6734	457.5	6.8

TABLE 18 (Continued)

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FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

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CATEGORY 8 LABORERS, EXT. FARM

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
373. ANIMAL CARETAKERS, EXCEPT FARM	116	5.6	4.8
374. CARPENTER HELPERS	86	4.8	5.6
375. CONST LABORERS, EX CARPENTER HELP	1645	221.0	13.4
376. FISHERMEN AND OYSTERMEN	1472	141.8	9.6
377. FREIGHT AND MATERIAL HANDLERS	1203	105.1	8.7
378. GARBAGE COLLECTORS	181	8.8	4.9
379. GARDENERS, GROUNDSKEEPERS, EX FARM	274	12.7	4.6
380. LONGSHOREMEN AND STEVEDORES	541	82.6	15.3
381. LUMBERMEN, RAFTSMEN, AND WOODCHOPPERS	1061	119.2	11.2
382. STOCK HANDLERS	1704	233.4	13.7
383. TEAMSTERS	46	4.8	10.5
384. VEHICLE WASHERS AND EQUIP CLEANERS	312	29.9	9.6
385. WAREHOUSEMEN, N.E.C.	788	55.9	7.1
386. MISCELLANEOUS LABORERS	398	27.5	6.9
387. NOT SPECIFIES LABORERS	861	45.6	5.3
388. LABORERS, EXCEPT FARM--ALLOCATED	1162	50.4	4.3
TOTAL FORECASTED EMPLOYMENT, CATEGORY 8	11849	604.0	5.1

TABLE 18 (Continued)

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CATEGORY 9 FARM OWNERS, MGRS. AND WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
389. FARMERS (OWNERS AND TENANTS)	180	18.0	10.0
390. FARM MANAGERS	22	2.2	10.0
391. FARMERS AND FARM MANAGERS--ALLOCATED	69	6.9	10.0
392. FARM FOREMEN	6	.9	15.0
393. FARM LABORERS, WAGE WORKERS	317	23.4	7.4
394. FARM LABORERS, UNPAID FAMILY WORKERS	11	1.1	10.0
395. FARM SERVICE LABORERS, SELF-EMPLOYED	0	0.0	-0.0
396. FARM LABORERS AND FARM FOREMEN--ALLOC	128	12.8	10.0
TOTAL FORECASTED EMPLOYMENT, CATEGORY 9	733	63.9	8.7

TABLE 18 (Continued)

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CATEGORY 10 SERVICE WORKERS, EXC. PRVT. HOUSEHOLD

	OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
397.	CHAMBERMAIDS AND MAIDS, EX HOUSEHOLD	1025	114.9	11.2
398.	CLEANERS AND CHARWOMEN	1134	60.2	5.3
399.	JANITORS AND SEXTONS	5316	262.1	4.9
400.	BARTENDERS	1337	164.1	12.3
401.	BUSBOYS	179	19.2	10.7
402.	COOK, EXCEPT PRIVATE HOUSEHOLD	3772	285.5	7.6
403.	DISHWASHERS	715	53.8	7.5
404.	FOOD COUNTERS AND FOUNTAIN WORKERS	418	34.6	8.3
405.	WAITERS	3146	427.6	13.6
406.	FOOD SERVICE WORK, N.E.C., EX HOUSE	1031	59.8	5.8
407.	DENTAL ASSISTANTS	229	27.2	11.9
408.	HEALTH AIDES, EXCEPT NURSING	226	19.5	8.6
409.	HEALTH TRAINEES	15	1.9	12.7
410.	LAY MIDWIVES	0	0.0	-0.0
411.	NURSING AIDES, ORDERLIES, AND ATTEND	1065	62.6	5.9
412.	PRACTICAL NURSES	460	37.5	8.1
413.	AIRLINE STEWARDESSES	105	15.7	14.9
414.	ATTENDANTS, RECREATION AND AMUSEMENT	231	12.2	5.3
415.	ATTENDANTS, PERSONAL SERVICE, N.E.C.	271	15.5	5.7
416.	BAGGAGE PORTERS AND BELLHOPS	44	4.5	10.2
417.	BARBERS	296	23.1	7.8
418.	BOARDING AND LODGING HOUSEKEEPERS	47	4.8	10.1

TABLE 18 (Continued)

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CATEGORY 10 SERVICE WORKERS, EXC. PRVT. HOUSEHOLD

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
419. BOOTBLACKS	0	0.0	-0.0
420. CHILD CARE WORKERS, EX HOUSEHOLD	1004	64.9	6.5
421. ELEVATOR OPERATORS	0	0.0	-0.0
422. HAIRDRESSERS AND COSMETOLOGISTS	1004	103.9	10.3
423. PERSONAL SERVICE APPRENTICES	0	0.0	-0.0
424. HOUSEKEEPERS, EX PRIVATE HOUSEHOLD	706	36.0	5.1
425. SCHOOL MONITORS	111	7.5	6.8
426. USHERS, RECREATION AND AMUSEMENT	46	5.8	12.7
427. WELFARE SERVICE AIDES	83	5.2	6.2
428. CROSSING GUARDS AND BRIDGE TENDERS	0	0.0	-0.0
429. FIREMEN, FIRE PROTECTION	1018	58.7	5.8
430. GUARDS AND WATCHMEN	1035	49.0	4.7
431. MARSHALLS AND CONSTABLES	16	1.1	6.8
432. POLICEMEN AND DETECTIVES	1532	94.3	6.2
433. SHERIFFS AND BAILIFFS	0	0.0	-0.0
434. SERVICE WORKERS, EX HOUSEHOLD--ALLOC	3342	204.9	6.1
TOTAL FORECASTED EMPLOYMENT, CATEGORY 10	30961	1788.1	5.8

TABLE 18 (Continued)

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FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

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CATEGORY 11 PRIVATE HOUSEHOLD WORKERS

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
435. CHILD CARE WORKERS, HOUSEHOLD	2200	279.4	12.7
436. COOKS, PRIVATE HOUSEHOLD	27	3.5	12.7
437. HOUSEKEEPERS, PRIVATE HOUSEHOLD	134	17.1	12.7
438. LAUNDRESSES, PRIVATE HOUSEHOLD	0	0.0	-0.0
439. MAIDS AND SERVANTS, HOUSEHOLD	519	65.9	12.7
440. PRIVATE HOUSEHOLD WORKERS--ALLOCATED	214	27.1	12.7
TOTAL FORECASTED EMPLOYMENT, CATEGORY 11	3094	393.0	12.7

TABLE 18 (Continued)

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FORECAST OF OCCUPATIONAL EMPLOYMENT IN ALASKA FOR 1983

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CATEGORY 12 TOTAL ALASKA EMPLOYMENT

OCCUPATION	EMPLOYMENT	2X STD ERROR	PERCENT ERROR
TOTAL FORECASTED EMPLOYMENT, ALL CATEGORIES	217600	9460.6	4.3

APPENDIX

STATE TIME SERIES VARIABLE LIST

1.	AIRT	Air Transportation
2.	BUSI	Business
3.	COMU	Communications and Utilities
4.	CONS	Construction
5.	FEDL	Federal
6.	FIRE	Finance, Insurance, Real Estate
7.	FOOD	Food Processing
8.	GOVT	Total Government
9.	HOTL	Hotel, Motels, Lodges
10.	LABF	Total Civilian Labor Force
11.	LOCL	Local Government
12.	LUMB	Logging, Lumber and Pulp
13.	MEDL	Medical Services
14.	MFRG	Manufacturing
15.	MING	Mining
16.	OMFG	Other Manufacturing
17.	OMIN	Other Mining
18.	OSER	Other Services
19.	OTRN	Other Transportation
20.	PERS	Personal Services
21.	PETR	Petroleum Mining
22.	RETL	Retail Trade
23.	SERV	Services
24.	STAT	State Government
25.	TEMP	Total Employment
26.	TRAD	Trade
27.	TRAN	Transportation
28.	TRCU	Transportation, Communications Utilities
29.	UNCL	Miscelleanous and Unclassified
30.	UNEM	Unemployed
31.	WAGE	Non-agricultural Wage and Salary
32.	WHOL	Wholesale Trade
33.	TIME	Quarterly Counter (1 in 1960 Qt. 1)
34.	MILT	Military Population
35.	STLO-GP	State and Local Gross Product (10 Mil. $)
36.	STEX	State Expenditures (million dollars)
37.	S1	Seasonal Switch Function for Quarter 1
38.	S2	" " " " " 2
39.	S3	" " " " " 3
40.	S4	" " " " " 4
41.	LS1	Log Seasonal Switch for Quarter 1
42.	LS2	" " " " " 2
43.	LS3	" " " " " 3
44.	LS4	" " " " " 4
45.	BLANK	Not in use
46.	RATIO 1A	Ratio of Total Population to Civilian Labor Force

STATE TIME SERIES VARIABLE LIST (Continued)

47.	RATIO 4A	Ratio of Total Population to Total Employment
48.	RATIO 1B	Ratio of Civilian Population to Civilian Labor Force
49.	RATIO 4B	Ratio of Civilian Population to Total Employment
50.	POPL 1A	Total Population Based on RATIO 1A
51.	POPL 4A	Total Population Based on RATIO 4A
52.	POPL 1B	Civilian Population Based on RATIO 1B
53.	POPL 1B	Civilian Population Based on RATIO 4B
54.	BLANK	Not in Use

Note: Lagged values, which use the value for the preceding quarter, have abbreviations followed by -1, e.g., POPL-1, TEMP-1, UNEM-1.

A FORECAST OF INDUSTRIAL AND OCCUPATIONAL EMPLOYMENT IN ALASKA

PART II

THE STRUCTURE OF ALASKA'S LABOR MARKET

A TECHNICAL DISCUSSION OF THE METHODOLOGY

USED TO DEVELOP THE RESULTS

SECTION 1

ECONOMIC BASE MODEL OF ALASKA

Theoretical Background

Our model of the Alaskan economy can be classified as a disaggregated economic base model. The phrase economic base model is widely used by researchers into regional and urban problems. The purpose of a base model is to uncover the basic or underlying elements of an area's economy in order to better understand its functioning and to forecast its future trends. Essentially, the construction of an economic base model involves the following logic:

1. The level of output in a region is determined by its level of aggregate demand.
2. A region's aggregate demand can be divided into two sources: that which originates within the region and that which originated outside of it.
3. The final demand generated within a region stems from the consumption needs of its inhabitants and is functionally related to the region's total level of economic activity.
4. The final demand generated outside a region is unrelated to levels of, or changes in, the region's economic activity.
5. A change in the level of a region's non-local demand will cause a change in its output and income; and this initially will cause consumption to change in the same direction, but by a fraction of the change in income.

6. Consequently, any change in a region's non-local (basic) aggregate demand will produce a multiple change in its level of income employment and output.

Explicitly, economic base studies treat an area's economy as two sectors: the exogenous and the endogenous. The exogenous sector consists of those final demand components which are independent of short run changes in the area's level of economic activity. It is usually defined to incude exports, government purchases, and gross private investment. The endogenous sector consists of those final demand components which are functionally related to the area's level of output and income.

In most cases, this is defined as total consumer demand. The total income generated in any region (or state) is equal to the sum of the income generated by these two sectors, or

$$Y = Y_{ex} + Y_{en} \qquad (1)$$

where Y represents total income, Y_{ex} exogenous income, and Y_{en} endogenous income. Since the components of exogenous income are determined by factors not affected by short run fluctuations in an area's level of economic activity, it is specified as a constant with respect to changes in Y, or

$$Y_{ex} = \bar{Y}_{ex} \qquad (2)$$

The generation of endogenous income depends upon the level of total consumer demand (by local residents) in the area. If

such demand were reduced to zero, endogenous income would also be zero. Consequently, endogenous income is taken to be a linear function of current consumption expenditures made by local residents whose intercept is zero; or

$$Y_{en} = hC \qquad (3)$$

where h represents the fraction of total consumption expenditures made by an area's residents which results in the generation of local income.

A clearer picture of the workings of a "base" model can be gained by comparing it with a standard macroeconomic model. To do this, let Y represent the value of an area's output and income (in current value terms) for any given period of time; C the value of current consumption; I the value of gross private local investment; G government purchases of goods and services (at all levels of government); and F net foreign investment. Then,

$$Y = C + I + G + F \qquad (4)$$

Net foreign investment equals the difference between exports (X) and imports (M), or

$$F = X - M \qquad (5)$$

so that

$$Y = C + I + G + X - M \qquad (4a)$$

From the definition of an area's exogenous income, we know that

$$\bar{Y}_{ex} = I + G + X \qquad (7)$$

Combining (1) and (6) we can write

$$Y = Y_{ex} + C - M \qquad (8)$$

or

$$Y_{en} = C - M$$

which states that endogenous income is equal to the value of total consumer expenditures minus the value of imports by consumers. Gross private local investment is assumed to involve only locally produced goods and services requiring no imported materials; this is also true for government purchases.

Since,

$$Y_{en} = C - M = hc \qquad (8a)$$

we can define h as,

$$h = 1 - \frac{M}{C} \qquad (9)$$

In effect, then, an economic base model conceptually divides household consumption into categories: consumption of locally produced goods (L) and consumption of imported goods (M); or

$$C = L + M \qquad (10)$$

Dividing through by C gives

$$1 = \frac{L}{C} + \frac{M}{C} \qquad (10a)$$

$$h = \frac{L}{C} = 1 - \frac{M}{C} \qquad (10b)$$

Consequently, h is equal to the ratio of households' consumption of local goods over total household consumption.

The set of equations (1) through (3), inclusive, used to describe the structure of an area's economic base is incomplete, however. The system requires one more equation to complete it. The additional equation is the consumption function.

Assuming an absolute income hypothesis, the fourth equation becomes

$$C = a + bY \qquad (11)$$

where C and Y are defined as before, a is the function's positive intercept, and b is its slope (both are assumed to be constants.) The value of "a" is greater than one, and the value of "b" ranges between zero and one.*

*It is in this form that economic base studies have traditionally treated the consumption function.

The system of equations (1) through (3) and (11) can be combined to give the equilibrium condition for an area's economy; which is equal to

$$Y = \frac{Y_{ex} + ba}{1 - bh} \qquad (12)$$

The terms in the numberator of equation (12) are autonomous; and hence, a change in the level of government purchases, gross private local investment, exports, or autonomous consumption expenditures will produce a change in an area's level of total income. The magnitude of the change in total income produced by a change in any of the autonomous demand sectors is obtainable by differentiating equation (12) with respect to any of the autonomous terms (the results are the same for all of them; or

$$\frac{dY}{dY_{ex}} = \frac{1}{1 - bh} \quad \Delta Y_{ex} \qquad (13a)$$

The increase in total income will be distributed between the exogenous and the endogenous sectors in the following manner. The change in exogenous income equals the value of the initial change in autonomous spending (ΔY_{ex}) and the change in endogenous income equals the increase in household consumption expenditures minus that part of household consumption which grew for imports. The total change can be represented by

$$\Delta Y = \Delta \tilde{Y}_{ex} + \Delta Y_{en} \qquad (14)$$

A numerical example may give a clearer picture of the operation

of the income multiplier. Assume that each consumer spends 90% of his income on consumption expenditures. Then,

$$b = .9$$

And assume that, as is typical of a small regional economy, only 50% of consumption expenditures are made locally. Then, by (10b),

$$h = .5$$

From (13a) the change in income due to change in Y_{ex} is given by

$$\Delta Y = \frac{1}{1 - .45} \cdot \Delta Y_{ex}$$

$$= 1.82 \cdot \Delta Y_{ex}$$

From (14) the change in Y_{en} is seen to be $0.82.\Delta Y_{ex}$.

In the literature of economic base studies many names have been used to describe this relationship. Commonly the ratio $\Delta Y_{en}/\Delta Y_{ex}$ is referred to as the "regional base multiplier". In the example above the regional base multiplier has a value of .82.

The same conceptual framework may be used in a model where the unit of account is employment instead of income. Again exogenous expenditures, measured by employment in basic industries, are assumed to determine the level of activity, measured by employment, in non-basic industries. Although

the multiplier is conceptually the same, whether income or employment is used to measure aggregate demand; numerically, the results will differ due to differences in productivity (and hence, wages) among workers in different industries. Thus a person employed in a basic industry may spend only 45% of his income locally; but this, in an extreme case, may be enough to employ a full workers in a non-basic industry. Since the non-basic employee also spends 45% of his income locally, the regional base multiplier will be somewhat greater than 1.0.

Total employment in the regional economy can be derived from equation (12) where E's have been substituted for I's and

$$\alpha = \frac{b}{1 - bh} \text{ , and}$$

total employment is given as

$$E = \alpha + \frac{E_{ex}}{1 - bh} \qquad (15)$$

From (1) and (15),

$$E_{en} = \alpha + \frac{E_{ex}}{1 - bh} - E_{ex} \text{ , or} \qquad (16)$$

$$E_{en} = \alpha + \frac{bh}{1 - bh} E_x$$

$$\beta = \frac{bh}{1 - bh}$$

β is the regional base multipler, and we can write an equation which gives employment in the non-basic, or endogenous, sector as a linear function of employment in the basic or

exogenous sector:

$$E_{en} = \alpha + \beta E_{ex} \qquad (17)$$

If there are several exogenous inputs then,

$$E_{en} = \alpha + \beta_1 E_{ex,1} + \ldots \beta_{n1} E_{ex,1}$$

$$E_{en,n} = \alpha_n + \beta_{1n} E_{ex,1} + \ldots \beta_{nn} E_{ex,n} \qquad (19)$$

where

$$\sum_{i=1}^{n} E_{en,i} = E_{en}.$$

Equation (17) presents the fully developed base model as used in Alaska. Levels of employment in each endogenous industry are determined by a constant α, the sets of coefficients, β, and the level of employment in each exogenous industry. Given estimates of the α's and β's and forecasts of each exogenous industry, the model can be used to derive predictions of employment in each non-basic industry. The next sections describe the estimation of the α and β terms and presents the full Alaska base models.

The Statewide Model

The paucity of data for individual regions and the observed interdependence of the regions prohibited the specification of separate regional submodels. Therefore, a statewide model was first specified and estimated. The statewide model was then applied to each region and the differences between model predictions and actual employment in regional industries were reconciled by a set of regional allocation matrices. The allocation process is described later.

The statewide model follows the conceptual framework described in the preceding section. Basic and nonbasic industries were disaggregated to the extent data permitted. Like all other base models, the present one makes several assumptions about the behavior of the economy. The assumptions most crucially affecting its development are:

1. The level of demand generated in the economy can be supplied, i.e., there will be a sufficient expansion in economic activity for all industries so that the demand exerted by consumers will be satisfied by an expansion on the supply side of the economy.

   In this sense, our forecast of employment has an

underlying assumption that the quality of service* will not be reduced as the demand for services increases. While this appears to be a viable assumption for the private economy, there are strong indications that changes will occur in the quality of service, and the techniques of delivering service, in the public sector.

2. The relationships found to exist in the past will continue to exist in the future and differences from past behavior are transitory and random. This is a rather sweeping assumption, but a necessary one before analysis can begin. The Alaska model is essentially an impact model and not a growth model. An impact model assumes that the basic structure of the economy, including its inter-industry relationships and its consumption function, remain constant. That is, an impact model deals in the short run and assumes that any new growth factors, such as the development of new industrial complexes or the growth of entirely new industries, will not appear during the forecast period.

Because the impact of the pipeline operation will be small compared to the impact of its construction and small compared to the state economy, it was not

*Where service is defined as economic activity generated per unit of consumer demand.

> felt that these assumptions were violated by known plans of the pipeline owners. It also appears that while construction will be on an unprecendentedly massive scale, the impact will be qualitatively similar to previous construction projects. While a full growth analysis of Alaska's economy certainly seems warranted, such an analysis lies beyond the mission of this project and outside the scope of our model as it has been developed.

For the purposes of an economic base analysis, basic industries are defined as those whose demand is determined exogenously to the local economy. Hence, changes in local demand will not affect levels of employment in the basic industries. Industries which sell most of their product outside the state are clearly indicated as basic. In Alaska the most important members of this category are the wood products, food processing, other manufacturing, and mining industries. In addition, those industries whose activity is determined over long planning horizons, or by other factors not immediately tied to the level of demand in the state economy, were treated as basic industries. In this category are federal government employment, and the communications and public utilities industries.

The nonbasic industries are defined as those industries which respond to endogenous demand. We defined the following as nonbasic industries: construction, wholesale trade, retail trade, finance, insurance, and real estate (FIRE), services, transportation services, and state and local government and non-categorized. Only transportation service is believed to contain a significant basic component. Ideally, employees serving international carriers stopping in Anchorage and Fairbanks would be treated as basic employees, but that detail was not available.

Table 1 summarizes the basic and nonbasic industries as defined for the purposes of our model. Their Standard Industrail Clarification code is indicated at the right.

TABLE 1

BASIC AND NON-BASIC INDUSTRIES

Basic Industries	SIC Code
Mining	10 - 14
Petroleum mining	13
Other mining	10, 12, 14
Construction (pipeline)*	15 - 17
Manufacturing	19 - 39
Food Products	20
Forest Products	24 - 26
Other Manufacturing	
Communications and Utilities (including public utilities)	48, 49
Federal Government	91
Non-Basic Industries	
Construction (Total)*	15 - 17
Transportation services	40 - 47
Wholesale Trade	50
Retail Trade	52 - 59
Finance, Insurance, and Real Estate	60 - 69
Services	70 - 89
State and Local Government	92 - 93
Non-categorized, including agriculture	01 - 09, and other

*Construction has both a basic and a non-basic component. Pipeline construction is basic and determined exogenously. All other construction is non-basic and determined within the model. Total construction is the sum of both components.

The Econometric Analysis

Employment forecasts generated by the model are based on linear equations which express employment in each nonbasic industry as a function of certain basic industry employment variables, total employment, total state population, and a set of dummy variables which capture the unique effects of seasonal fluctuations in the Alaska economy. In addition, selected non-basic industry employment, computed as the dependent variable in previous equations, become independent variables in the equations of certain other non-basic industries. For each non-basic industry an individual equation was specified and estimated using ordinary least squares regression analysis.*

Each binary variable takes on a value of one in its appropriate quarter; it is zero in the other three quarters. The complete set of binary variables is shown in Table 2. Notice that in this formulation the constant term performs as S_4. In addition to the seasonal binary variables, a time variable was used in the equations for Transportation, Services, and Non-Categorized. The time variable takes the value of 1 at the

*Regression analysis is a technique for finding coefficients for a linear equation which minimize the sum of the squared residuals (error terms.)

start of 1960 and increases by 1 in each quarter. It represents an autonomous time trend found in these industries.

TABLE 2

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
S_1	1	0	0	0
S_2	0	1	0	0
S_3	0	0	1	0

The coefficients were estimated using ordinary least squares regression.[1] Table 3 shows the estimated coefficients, t-statistics, and R^2 statistic. An equation for unemployment was also estimated as shown.

Numbers in parentheses after variable names (eg. POPL (-1)) indicate quarterly lags; (-1) indicates that the value of POPL for the preceding quarter was used. Where no lag is indicated, the current quarter value was used.

The numbers in parentheses beneath the regression coefficients are t-statistics. The t-statistics are used to test whether the regression coefficient differs significantly from 0.

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[1]The time series regression programs developed by Prof. Potluri Rao for use on the University of Washington's CDC 6400 computer were of great value to us.

TABLE 3

NON-BASIC INDUSTRY EQUATIONS FROM STEP-WISE REGRESSION PROGRAM

UNEMPLOYMENT	$-3895.8 + 4283.1S_1 + 5934.8S_2 + 1507.9S_3 + .0602134$ TEMP
R^2=.95127 σ=654.474	*(-3.91) (10.40) (4.13) (1.15) (4.15)
1961:I → 1972:IV	
DF=41 DW=1.68	-21445.4 DELTA TEMP + .576633 UNEM-1
	(-4.0820) (5.4856)
STATE & LOCAL GOVERNMENT	-16496.3 + 1544.7S_1 + 2758.6S_2 + 1461.8S_3 + .092922 POPL-1
R^2=.987 σ=542.8	(-6.3438) (3.8830) (5.933) (7.0217) (8.7514)
1961:I → 1972:IV	
DF=42 DW=1.43	+ 18.2519 STEX
	(7.0217)
TRANSPORTATION	+684.8 + 237.4S_1 - 16.4S_2 + 643.8S_3 + .162967 CONS
R^2=.956 σ=218.0	(1.5094)(1.2591) (-.0991) (-1.5791) (2.6985)
1961:I → 1972:IV	
DF=39 DW 1.42	+.713466 MING + .174706 MFRG + .256229 STLO - 87.39 TIME
	(9.5832) (1.9291) (5.8953) (-4.8491)
RETAIL TRADE	-12039.8 + 1220.6S_1 + 1487.0S_2 - 352.6S_3 + .362468MFRG.
R^2=.979 σ=385.2	(-12.5) (7.8) (3.5) (-.35) (2.25)
1961:I → 1972:IV	
DF=41 DW=.95	+ .180601MING + .064513 POPL-1 + 15.1 TIME
	(1.96) (11.1)
SERVICES	-1926.8 + 783.3S_1 + 482.2S_2 + 280.1S_3 - 49.27 TIME + .64438 RETL
R^2=.995 σ=203.9	(-4.85) (4.57) (5.73) (-1.71) (-3.64) (7.04)
1961:I → 1972:IV	
DF=40 DW=1.19	+ .16094 CONS + .34271 STLO
	(3.179) (7.18)
WHOLESALE TRADE	-217.7 + 134.6S_1 + 61.7S_2 + 32.0S_3 + .143862 MING + .236687 RETL
R^2=.965 σ=98.7	(-3.26) (3.26) (1.51) (.78) (5.38) (26.6)
1961:I → 1972:IV	
DF=42 DW=1.32	

*Figures in ( ) under the coefficients are T values

SUMMARY OF REGRESSION RESULTS (Continued) TABLE 3

CONSTRUCTION (TOTAL) R^2=.948 σ=559.2 1961:I → 1972:IV DF=42 DW=1.16	-14067.6 - 1415.3S_1 + 1046.3S_2 + 2719.0S_3 + .034313 POPL-1 (-6.91) (-5.77) (3.89) (10.4) (9.80) + .59379 FEDL + PIPE (4.20)
FINANCE, INSURANCE, REAL ESTATE R^2=.967 σ=127.68 1961:I → 1972:IV DF=41 DW=.86	- 3742.7 + 423.8S_1 + 399.3S_2 - 174.1S_3 + .229743 COMU (-11.60) (7.26) (2.54) (-.67) (4.12) + .107405 MFRG + .016999 POPL-1 (2.00) (8.43)
NONCATEGORIZED R^2=.884 σ=625.03 1961:I → 1972:IV DF=42 DW 0.60	+ 9717.0 - 903.2S_1 + 649.1S_2 + 2538.9S_3 + 2481.6 DUM-1965 (35.8) (-3.53) (2.54) (9.95) (7.53) + 56.81 TIME (8.62)

Seasonal Switch Functions

S_1 = 1 in first quarter, = 0 in all other quarters
S_2 = 1 in second quarter, = 0 in all other quarters
S_3 = 1 in third quarter, = 0 in all other quarters

Special Functions

DUM-1965 = 1 in 1965, = 0 in all other years

DELTA TEMP = (TEMP-TEMP-1)/TEMP-1, PIPE = PIPELINE CONSTRUCTION

Lagged Values

POPL-1, UNEM-1, etc. are lagged one quarter

The Population Indicator

Our analysis of the Alaskan economy led us to believe that changes in population should have an effect on employment levels in each nonbasic industry. This effect may be viewed in two complementary ways. First, growth in population means growth in market size and diversity. As markets become larger there will be a tendency for firms to locate in Alaska which had previously exported their goods and services from the "lower 48" or abroad. Thus there is an autonomous shift in the nonbasic sector associated with the general development of the Alaskan economy. Second, population is a measure of total spending units. One might expect that a population of only single men would exhibit a different spending pattern than a population made up of family units, retired people, and so forth. Therefore, the population variable serves as a demand indicator.

Our analysis showed that inclusion of a population variable improved the R^2 in all regression equations and in several cases improved the t-statistics associated with other coefficients. Although we have reservations about its operation, discussed below, we decided that its inclusion was justified both statistically and in terms of the models operation.

The difficulty with population is that data are not available at the same detail and level of accuracy as are employment data. Only annual estimates are made for intercensal years;

and these estimates are not broken down by age or ethnic group--characteristics that might significantly affect the analysis. Therefore, we have constructed a population indicator which is meant to serve in the place of a true quarterly population figure. Several formulations were attempted but the one discussed below was chosen as being the best compromise.

The population variable is estimated within the model using the models quarterly labor force forecast, a worker dependency ratio, and an autonomous forecast of military personnel and dependents in Alaska.* POPL, the population indicator is given by the following equation:

$$POPL = D(LABF) + MILT$$

Where D is the workers dependency ratio and MILT are military personnel and dependents on active duty in Alaska, and LABF is the number of people in the labor force.

D was calculated by dividing the annual population estimate by the actual annual labor force figure. Therefore, it

*Originally, military personnel were included as a "right hand" variable in the regression equations but little correlation was found. R. C. Haring found a decline in the multiplier of federal military expenditures as early as 1966, and our results are in keeping with his. Both military and non-military expenditure do affect non-basic employment through the population variable. cf. Robert C. Haring, "The Employment Multiplier Impact of Defense Spending in Alaska," 1966 Papers of the Regional Science Association, Western Sector, pp130-134.

represents an average dependency ratio for each year. D was found to be declining over the period 1960-1969. From 1969-1972 it has remained around 2.1. This indicates 1.1 dependents for each member of the labor force.

D is the reciprocal of what is commonly called the labor force participation rate. A participation rate measures the proportion of the population in the labor force. In most economies the participation rate exhibits some seasonal fluctuation in addition to cyclical change associated with the level of output in the economy. This is particularly true in Alaska which experiences high summer employment levels. During periods of peak employment people, such as students and housewives, enter the labor market and they subsequently drop out as employment opporutnities decline in the winter. At the same time an unknown number of people immigrate in search of work. These people may be expected to have fewer dependents than the resident labor force. All of this means that if we could calculate D for each quarter we would probably find that it delinces in the summer and rises in the winter. There would also be some variation from region to region.

Because D is an annual average figure, the population figure generated by the equation above can be expected to overpredict population in the high employment months and underpredict correspondingly in the winter. The general movement

of the population indicator probably follows actual population which rises in the summer and declines in the winter, but no absolute significance can be attached to its quarterly values. When averaged over the whole year, however, the indicator produces a good estimate of population.

Finally it should be noted too that data on military personnel and dependents are available only on an annual basis. The number and distribution of the military population was assumed to be constant for each quarter over a year.

Seasonal Effects in Alaska

The Alaskan economy shows strong seasonal fluctuations. The precise pattern varies with each industry, but all show a decline in the winter quarter (quarter I) and a strong advance in the summer (quarter III). As the term seasonal suggests this is a recurring phenomenon tied to the weather, the length of the day, but perhaps even to custom and the expectations of workers and businessmen in Alaska.

An average seasonal fluctuation was incorporated in our forecasts of the basic industries. For each industry the quarterly deviation from the annual average was calculated and averaged over the past five years. These rough seasonal coefficients were then applied to the projected annual averages. These forecasts, then, implicitly embody the assumption that the relative magnitude of the seasonal fluctuation will remain

constant over time.

Seasonal variations in the nonbasic industries are simulated through the use of the seasonal binary variables described above. Because of the nature of the regression analysis, the fluctuations in these industries had to be treated as additive rather than multiplicative constants. Therefore, the nonbasic forecasts assume that only the absolute magnitude of the seasonal fluctuation will remain constant. As an industry grows, this specification will result in smaller relative fluctuations.

Over the short run the difference between an additive and a multiplicative model will not be great, but the limitations inherent in each should be kept in mind. It seems likely that in Alaska the introduction of new techniques, particularly in the basic sector, will result in smaller seasonal fluctuations. In this case the additive model is closer to the truth, since it assumes in effect that marginal increases will have no seasonal component. On the other hand the severe conditions encountered in most of Alaska during the winter months will continue to influence the behavior of businesses and consumers: larger expenditures for fuel, decreased mobility, and injury or sickness due to cold are all examples of seasonal effects. If the factors affect new as well as old parts of the economy, then a multiplicative model, possibly showing declining seasonal coefficients, is indicated.

Lagged Relationships

Lagged values of the independent variables were used in several of the regression equations. Theoretically a lag would be used whenever it is suspected that there is a lapse of time between the onset of some activity and the effect stimulated by it. In practice it is hard to know whether a lag of one week or one month or one quarter is appropriate. Since the model deals in units of quarters, it was decided to specify all lags by quarters. The specification resulting in the highest R^2 statistic was used whenever the inclusion of a lag also met a general test of reasonableness.

In the case of the population indicator the use of lagged relationships was analytically necessary. Because the population indicator is derived from the forecast of labor force each quarter, it is not possible at the same time to use it in equations for the constituent parts of the labor force. Therefore a variety of lags for the population variable were tried in each equation and the best fit was selected. In most cases the lagged version produced a better fit with the historical data than did the current version.

Noncategorized Employment

A large but fairly stable fraction of the Alaska labor force is engaged in activities not covered by the state unemployment insurance laws. These people are mostly engaged in fishing or agriculture, family businesses of one sort or

another, or are unpaid workers for charitable institutions.

Because little data is available on this portion of the economy and because, with the exception of fishing, its impact on the rest of the economy seems relatively minor, noncategorized employment does not enter as an independent variable into any of the equations. It does enter as part of total employment. Because this is a residual category, defined, in effect, by the Department of Labor, changes in the coverage of the unemployment insurance system may effect its size and characteristics. Note of this should be made if more current data is introduced to the model in the future.

Unemployment Equation

Unemployment is estimated in the same way as non-basic industry employment, through a linear equation generated by regression analysis techniques. It was found that unemployment is a significant function of both total employment (TEMP) and the rate of increase in total employment (DELTA-TEMP).[1] The rate of increase is expressed as a proportion of total employment lagged one quarter, TEMP(-1):

$$\text{DELTA-TEMP} = (\text{TEMP} - \text{TEMP}(-1))/\text{TEMP}(-1).$$

In the equation the coefficient on TEMP is positive and the coefficient on DELTA-TEMP is negative. Thus as the magnitude of total employment grows, the TEMP component of unemployment grows also. However, during periods of rapid increase in total employment (as is usual between spring and summer quarter) the negative DELTA-TEMP component tends to decrease unemployment. There is an opposite effect during rapid decreases in total employment (as is usual between fall and winter quarter).

The two effects can be summarized as long term and short term. The long term effect is due to increasing employment opportunities inducing people previously not looking for work

[1]The full equation: $\text{UNEM} = -3895.8 + 4283.1S_1 + 5934.8S_2 + 1507.9S_3 + 0.576633\ \text{UNEM}(-1) + 0.060214\text{TEMP} - 21445.4\ \text{DELTA-TEMP}$.

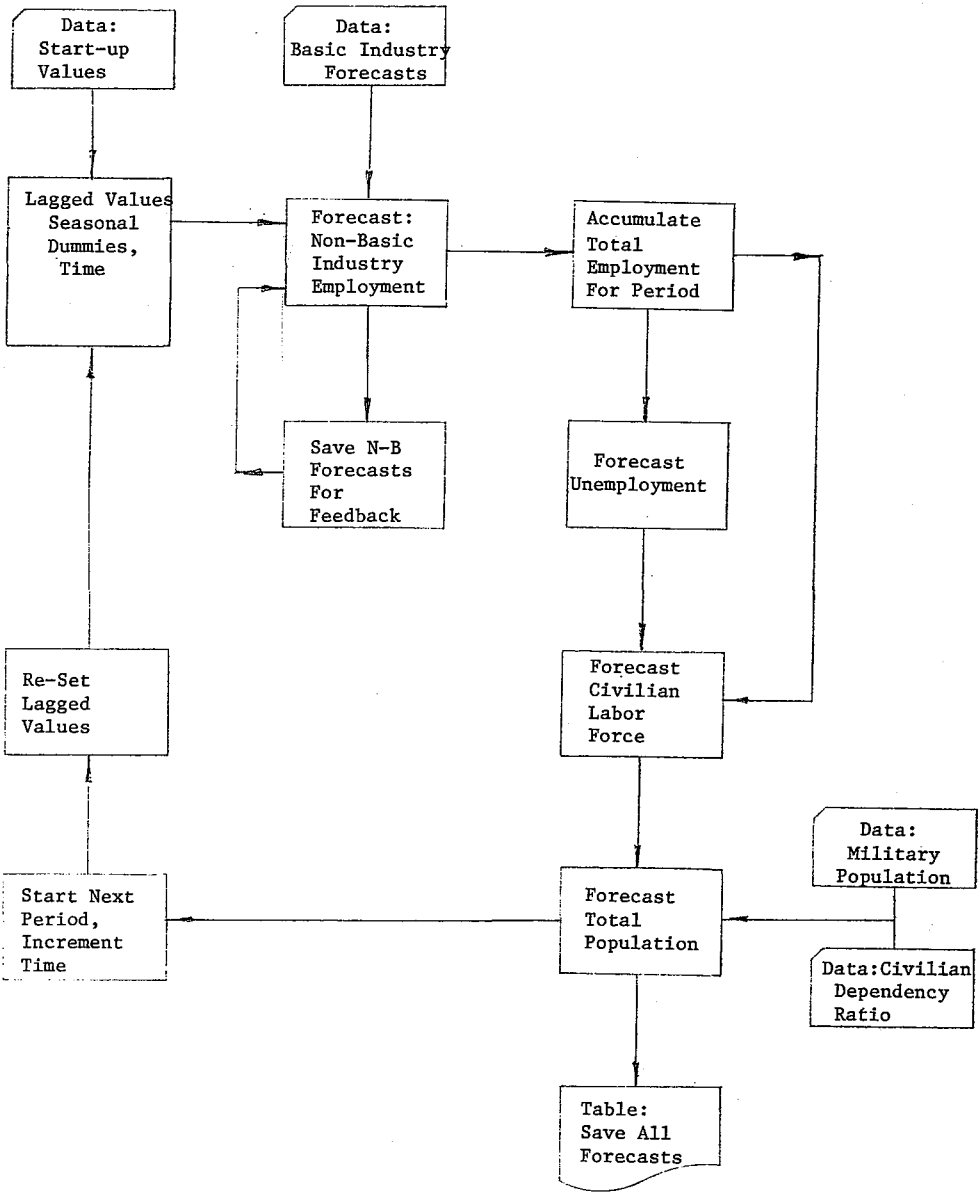
(and thus not classified as unemployed) to enter the labor market to seek employment. Here, growth in unemployment parallels growth in total employment. The short term effect is usually due to seasonal adjustments. Workers are drawn from the ranks of the unemployed during periods of rapid increase in total employment. Workers become unemployed during periods of rapid decrease in total employment. The net effect is that unemployment grows along with total employment but that short seasonal spurts in total employment tend to temporarily decrease the ranks of the unemployed.

Operation of the Model

The operation of the statewide model is outlined in Figure 2 The model is iterated for each quarter's forecast; four quarters are summed to produce an annual average. The same model is applied to each region, with constants scaled in proportion to the region's basic industry employment and population. The regional forecasts are discussed below in the section on the regionalized model.

FIGURE 2

ALASKA STATEWIDE EMPLOYMENT MODEL



The Regional Allocation System

The allocation procedure is a sub-system of the main model. The model generates forecasts of demand in each region, measured in terms of employment. During the allocation procedure these demands - really employment forecasts - are redistributed by a set of regional impact matrices containing coefficients of transfer. A region supplying demand in another region is referred to as an exporter; the demanding region is an importer. These terms are used figuratively and do not indicate physical relocation of workers. A worker is exported when he is employed in one region to satisfy the demand arising in another. In many cases the demand comes to him, as when people from the hinterland come into urban centers to purchase goods and services.

Basic industry employment is distributed autonomously by the model user to each study region. The regional allocation procedure is applied to each nonbasic industry. It is basic industry employment which determines the gross demand for nonbasic employment in each region. The equations used to determine demand in the regions are those applied to the State as a whole. Hence, a fundamental assumption of the regionalized model is that the demand functions in each region are identical. In other words an employee in the Northern region will require the same amount and kinds of goods and services as an employee in the Southeast, although the Northern employee may have to go outside his region to satisfy his demand.

After nonbasic demand has been reallocated to supplying regions, employment in each region is summed, unemployment is estimated, and from this, a total labor force forecast results. Finally, the population variable in each region is derived. The population variable is used in subsequent quarters as an input to the regional demand forecast.

Regional Impact Matrices

At the heart of the regional allocation system are the regional impact matrices. The results of our investigation of regional trade patterns are incorporated in the matrices. In effect each matrix states what proportion of a region's demand for a particular industry's output can be supplied by that region and what percentage will be supplied by each of the other regions. These proportions are referred to as coefficients of transfer. The coefficients for any region must sum to 1.0.

The matrices are 7 x 7 with one column and one row per region. There are eight matrices for each year, one matrix for each nonbasic industry. A generalized sample matrix is shown in Figure 3.

Data on employment in each region over the period 1966-1972 was used as the basis of the regionalized model. Without using the regionalization sub-system the model was used to generate demand forecasts for each region for 1966 through

FIGURE 3

SAMPLE REGIONAL IMPACT MATRIX

	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENTRAL	SOUTHWEST	NORTHWEST	NORTHERN
ANCHORAGE	1.00	0.00	0.00	0.00	0.00	0.00	0.00
FAIRBANKS	0.00	1.00	0.00	0.00	0.00	0.00	0.00
SOUTHEAST	.13	.01	.86	0.00	0.00	0.00	0.00
SOUTHCENTRAL	.46	.01	0.00	.53	0.00	0.00	0.00
SOUTHWEST	.39	.01	0.00	0.00	.60	0.00	0.00
NORTHWEST	.24	.01	0.00	0.00	0.00	.75	0.00
NORTHERN	.66	.01	0.00	0.00	0.00	0.00	.33

DEMAND

SUPPLY

The elements on the principle diagonal are the proportion of self supply for each region. Thus Anchorage supplies 100% of its own demand for this hypothetical industry, and Northern supplies 33% of its own. Entries in the remaining cells of each row are the proportion supplied by the region corresponding to the particular column. Anchorage is shown as supplying 66% of Northern's demand, while Northern supplies no other region but itself.

1972 using actual employment data. The model was run over the historical period using as inputs actual basic industry employment data and the true value of the population variable. The resulting predictions of nonbasic employment were compared with actual data in each industry. Regions having more workers present than the model predicted were identified as "surplus" regions while those with fewer than predicted were identified as "deficit" regions. Totals were normalized so that the sum of actual workers equalled the sum of forecasted workers. These data became the basis for calculating regional impact matrices. Details of the procedure used to calculate the regional allocation matrices follow.

Limitations on the Allocation System

There are many ways to approach the calculation of the regional impact matrices. However most methods involve a great deal of arbitrary judgment and do not lend themselves to a consistent algorithm of the type needed in a computerized model. This is not to say that it might not be desirable to generate the regional impact matrices by "hand" applying economic judgment at every step. However such a "hand" generated method has been used in past regional studies done by HRPI and was found to be tedious, time consuming and yielding results still subject to some question, and thus, perhaps, not justifying the effort required. One

significant problem is that certain regions change from being supplying to being demanding regions during the historical period for some industries. It became quite difficult to estimate when similar reversals would occur during the forecast period, but it seemed quite probable that there would be a few reversals and it would be wrong to ignore them. This presented a difficult judgmental problem.

The approach used for this study was a compromise. It is straight forward and easily adapted to a standard algorithm. Workers are transferred from each region to every other in proportion to the percent of the total state workers actually in the receiving region for a given industry in each year of the historical period. Trends of coefficients computed in this manner were examined for each industry and found to be small. Therefore the 1972 matrix was applied to the entire forecast period.

The matrices are not interactive with the forecast model. This means that changes in employment levels generated by the model will not affect the matrix coefficients. This limitation is in keeping with the treatment of this model as an impact rather than a growth model.

Since the matrices were derived from annual data they do not embody seasonal changes in interregional trade patterns. Consequently, quarterly employment estimates made using the regionalized model contain a larger error than the annual average forecasts.

The regional impact matrices can only claim to be an educated guess at Alaskan trade patterns. They were constructed so as to bring the model results into line with the historical data. This was accomplished "perfectly" for the annual average data in that the errors shown in the Historical Comparison Report between actual and predicted data exactly matched the Total State annual average errors, i.e., the errors inherent in the regression generated equations. This is shown in Tables 4 and 5: typical regional and total state Historical Comparison Reports based on the 1972 Regional Impact Matrix. Note that the errors for the quarterly data were not as small as for the annual average data. In fact, they remained unacceptablely large. However, this is to be expected since the Regional Impact Matrices were based on annual rather than quarterly data. Thus, the quarterly regional forecasts are questionable and have not been included in the report.

A further refinement of this approach to determining the regional impact matrices would be to apply some simple trending to the historical trade patterns and thus compute one matrix for each forecast year. This was considered, but not undertaken at this time.

TABLE 4

HISTORICAL DATA COMPARISON REPORT

INDUSTRY= RETAIL TRADE

REGION= ANCHORAGE

YEAR	QTR	PER	ACTUAL	PROJECTED	DIFFERENCE	% OF ACTUAL
1966						
	1	21	4006	3952	-54	-1.35
	2	22	4194	4323	129	3.09
	3	23	4301	4715	414	9.62
	4	24	4540	4658	118	2.60
	A		4260	4412	152	3.56
1967						
	1	25	4096	4431	335	8.19
	2	26	4571	4677	106	2.33
	3	27	4936	5043	107	2.16
	4	28	5142	5049	-93	-1.81
	A		4686	4800	114	2.43
1968						
	1	29	4493	4696	203	4.52
	2	30	4790	4807	17	.35
	3	31	5067	5378	303	5.98
	4	32	5248	5295	47	.90
	A		4899	5042	142	2.91
1969						
	1	33	5148	5113	-35	-.68
	2	34	5450	5480	30	.55
	3	35	5695	5985	290	5.09
	4	36	6026	5912	-114	-1.90
	A		5580	5622	43	.76
1970						
	1	37	5748	6126	378	6.58
	2	38	6311	6333	22	.35
	3	39	6639	6868	229	3.45
	4	40	6890	6475	-415	-6.03
	A		6397	6451	54	.84
1971						
	1	41	6531	6192	-339	-5.19
	2	42	6988	6644	-344	-4.92
	3	43	7256	7220	-36	-.50
	4	44	7393	7120	-273	-3.69
	A		7042	6794	-248	-3.52
1972						
	1	45	6993	6668	-325	-4.65
	2	46	7365	7075	-290	-3.94
	3	47	7745	7722	-23	-.30
	4	48	7997	7706	-291	-3.63
	A		7525	7293	-232	-3.09

TABLE 5

HISTORICAL DATA COMPARISON REPORT

INDUSTRY= RETAIL TRADE

REGION= TOTAL ALASKA

YEAR	QTR	PER	ACTUAL	PROJECTED	DIFFERENCE	% OF ACTUAL
1966						
	1	21	7929	8086	157	1.98
	2	22	8852	8847	-5	-.06
	3	23	9153	9648	495	5.41
	4	24	8936	9531	595	6.66
	A		8717	9028	311	3.56
1967						
	1	25	8267	8861	594	7.18
	2	26	9332	9353	21	.22
	3	27	10052	10083	31	.31
	4	28	9830	10095	265	2.70
	A		9370	9598	228	2.43
1968						
	1	29	8938	9390	452	5.05
	2	30	9852	9849	-3	-.03
	3	31	10783	11004	221	2.05
	4	32	10586	10851	265	2.50
	A		10040	10273	234	2.33
1969						
	1	33	9959	10107	148	1.49
	2	34	10998	10832	-166	-1.51
	3	35	11585	11831	246	2.12
	4	36	11577	11686	109	.94
	A		11030	11114	84	.76
1970						
	1	37	11005	11516	511	4.64
	2	38	12101	11904	-197	-1.62
	3	39	12380	12911	531	4.29
	4	40	12613	12171	-442	-3.51
	A		12025	12126	101	.84
1971						
	1	41	11873	11365	-508	-4.27
	2	42	12841	12195	-646	-5.03
	3	43	13642	13252	-390	-2.86
	4	44	13345	13069	-276	-2.07
	A		12925	12470	-455	-3.52
1972						
	1	45	12505	12188	-317	-2.53
	2	46	13601	12932	-669	-4.92
	3	47	14520	14115	-405	-2.79
	4	48	14396	14087	-309	-2.15
	A		13755	13331	-425	-3.09

Calculating the Regional Allocation Matrices

1. Run the model for each region using actual data each year for the independent variables. The annual average predictions of nonbasic employment for each region are considered to be the demand generated in the region for each industry.

2. Normalize the predicted employment in each non-basic industry so that the total state demand equals actual employment in the industry. The actual employment in each region is considered to be the supply available in that region to satisfy demands arising within or without the region.

3. Workers are transferred from each region to every other region in proportion to the percent of total state workers actually in the receiving region for a specified industry. This procedure is repeated for each non-basic industry.

4. Calculate the regional impact coefficients. The coefficients of transfer are calculated as the proportions of a region's demand satisfied by each of the seven regions, including itself.

5. The above procedure was repeated for each year of the

historical period (1966-72). Regional trends were examined and found to be small. Therefore, the 1972 matrix was applied to the entire forecast (1973-83).

Table 6 shows a typical table produced by the computer program generating the Regional Impact Matrices.

MATPIX OF TRANSFERS AND TRANSFER-COEFFICIENTS FOR 1972 INDUSTRY- RETAIL TRADE MODE-1

ACTUAL	7526	2137	2194	1210	314	299	75	13755
FORECASTED	5699	2091	2544	2270	522	399	231	13755
SURPLUS	0	0	350	1060	207	100	156	1872
DEFICIT	1826	46	0	0	0	0	0	1872

REGION -TO- / REGION -FROM-	ANCHORAGE	FAIRBANKS	SOUTHEAST	SOUTHCENT	SOUTHWEST	NORTHWEST	NORTHERN	TOTAL ALASKA
ANCHORAGE	3118 .5471	886 .1554	909 .1595	501 .0880	130 .0228	124 .0218	31 .0055	1.0000
FAIRBANKS	1144 .5471	325 .1554	334 .1595	184 .0880	48 .0228	45 .0218	11 .0055	1.0000
SOUTHEAST	1391 .5471	395 .1554	406 .1595	224 .0880	58 .0228	55 .0218	14 .0055	1.0000
SOUTHCENT	1242 5471	353 .1554	362 .1595	200 .0880	52 .0228	49 .0218	12 .0055	1.0000
SOUTHWEST	285 .5471	81 .1554	83 .1595	46 .0880	12 .0228	11 .0218	3 .0055	1.0000
NORTHWEST	218 .5471	62 .1554	64 .1595	35 .0880	9 .0228	9 .0218	2 .0055	1.0000
NORTHERN	126 .5471	36 .1554	37 .1595	20 .0880	5 .0228	5 .0218	1 .0055	1.0000
TOTAL TRANSFERS	7525	2137	2194	1210	314	299	75	13755

Sources of Data

Employment rather than income was chosen as the unit of account because of the availability of accurate regional accounts of the same sort that are maintained for the United States. Although data on wages paid in industries covered by Unemployment Insurance legislation are available, estimates of non-wage income, proprietor's and rental income, dividend income and other "unearned" income are unreliable or unavailable.

The main source for the employment data was the Employment Security Division of the State Department of Labor. The Employment Security Department collects monthly data on the number of establishments, number of employees, total payroll by Standard Industrial Classification (SIC) code and prepares estimates of unemployment and total labor force.

The Employment Security Division collects employment data by SIC categories from the quarterly reports of the employers subject to the State unemployment insurance law and quarterly reports of Federal agencies made in connection with the State administered program for unemployed Federal workers. These data are published in the "Statistical Quarterly" series of the Employment Security Division. In this series data are presented for non-agricultural wage and salary employees, but employment in certain segments of activities, such as self-employed persons, unpaid family help, domestics, and most

persons engaged in agriculture, forestry and fisheries sectors of the economy are excluded. The total civilian labor force and unemployment is estimated by the Employment Security Division and is published yearly (by months) in "Alaska Workforce Estimates by Industry and Area".

The state level employment data in the "Statistical Quarterly" is presented for the most part at the two digit SIC level. In some SIC divisions, employment at the three digit levels are also available, depending upon the number of establishments occurring at each SIC level. The problem here is that the Federal disclosure laws prohibit publishing of employment data if from such publication it would be possible to identify a particular employer unit.

There are 24 LMSA's in Alaska, and in the 1960-72 quarterly series they where coterminus with the Alaska election districts. The employment data, for more populated LMSA's such as Anchorage, Fairbanks and Juneau, can be obtained at the two-digit level for most of the SIC divisions. However, in a number of less populated LMSA's (e.g. Kuskowim, Upper Yukon, etc.) due to the disclosure rules, employment data is not available even at the one digit level.

To circumvent the problems of disclosure rules, the Consultants requested the State Department of Labor to provide employment data at the SIC two-digit level by five Alaska

Manpower Outlook (AMO) regions. This was completed for the years 1966 through 1972. An additional two regions were created for the MAP study by extracting the data for the Anchorage and Fairbanks LMSA's from their respective AMO regions. Employment for these two additional regions was compiled from Alaska Department of Labor's Statistical Quarterly and Industry and Area Workforce Estimates.

Given the employment data by AMO analysis areas, the "Statistical Quarterly" series, "Alaska Workforce Estimates by Industry and Area", and such specific studies as the State Department of Economic Development's "Alaska Industrial Surveys", the consultants were able to create an estimate of employment for the 1966 through 1972 period by MAP Study Regions.

Other Sources of Data

Other pertinent publications found useful in the building of econometric model and regionalization of data include:

1. University of Alaska, Institute of Social, Economic and Government Research "Review of Business and Economic Conditions" monthly.

2. University of Alaska, Institute of Social, Economic and Government Research ISEGR Reports. Occasional.

3. State of Alaska, Department of Education and Labor. Alaska's Manpower Outlook - 1970's, 1972.

4. Tuck, Bradford H. An Aggregate Income Model of A Semi-Autonomous Alaskan Economy prepared for the Federal Field Committee for Development Planning in Alaska, 1967.

5. Overall Economic Development Programs. Prepared by various towns and cities for Economic Development Administration, various dates.

6. Federal Field Committee for Development Planning in Alaska. Community Inventory, 1971.

7. State of Alaska Department of Economic Development. Standard Industrial Surveys, 1970 and 1972.

8. Alaska State Housing Authority. Comprehensive Plans for various communities, various dates.

9. Alyeska Pipeline Service Company. Summary: Project Description of the Trans Alaska Pipeline System, 1971.

The Occupational Model

The industry employment forecasts generated by the statewide economic base model were used to estimate future employment in 440 occupational categories. The basis of the occupational forecasts was the industry-occupation employment mix reported in the 1970 census. The Bureau of Labor Statistics has released a magnetic tape file of census manpower tallies for each state. The Alaska tape file is described with some detail in Section III, Programming Notes. Basically it gives statewide employment for 440 occupations in 227 industries by 12 workers categories, all reported in the census of April, 1970.

The computational approach was to develop a matrix of industry-occupation employment coefficients from the census data and to apply these coefficients to employment forecasts in the 12 industry categories available from the economic base model. To make the coefficient matrix compatible with the industry forecasts the census data was compressed from the original 440 x 12 x 227 breakout, to a new 440 x 12 employment matrix. Note the 12 in the original matrix refers to workers categories (e.g., male, female, unpaid, etc.) while the 12 in the compressed matrix refers to industry categories of the economic base model. This process was a simple aggregation done on a digital computer by Program SQUEEZE. The correspondence between the 227 census industry categories

and the 12 industry categories of the base model for the 12 matrix segments is shown in Table 7. A list of the 440 occupational categories and the 227 industry categories are attached at the end of this report.

From the compressed 440 x 12 employment matrix, E_{ij} (i=1, 12; j=1, 440), a matrix of coefficients was developed. Each coefficient, C_{ij}, represents the ratio of employment in a given industry for a given occupation to the total occupational employment in the given industry, E_i, where:

$$E_i = \sum_j E_{ij}, \qquad j=1, 440.$$

Thus, C_{ij} represents the proportion of employment in the i-th industry devoted to the j-th occupation:

$$C_{ij} = E_{ij}/E_i.$$

Total employment in each occupation was estimated by summing the occupational contribution of each of the 12 industry categories. Thus, the industry forecasts, I_i, for a given year were multiplied by industry-occupation coefficients, C_{ij}, and the resulting employment summed for 12 categories. The result is an estimate of employment in the j-th occupation, F_j, for that same year:

$$F_j = \sum_i C_{ij} I_i, \qquad i=1, 12.$$

TABLE 7

MATRIX SEGMENT-INDUSTRY CORRESPONDENCE

Correspondence of data entries on the state manpower tallies (census) tape and the 12-industry categories of the economic base model.

The following correspondence applys to matrix segments 1-2 only (private employees[1]):

	Base Model Categories	Census Categories[2]
1.	Non-Categorized	1 - 6
2.	Mining	7 - 11
3.	Construction	12 - 16
4.	Manufacturing	17 -101
5.	Transportation	102 -110
6.	Communications and Utilities	111 120
7.	Wholesale Trade	121 -138
8.	Retail Trade	139 -167
9.	Finance, Insurance, Real Estate	168 -173
10.	Service	174 -222
11.	Federal Government	223 -224
12.	State and Local Government	225 -227

The following correspondence applys to matrix segments 3-12 for all 227 census industry categories:

	Matrix Segment	Base Model Category[1]
3-4	Male and Female - Federal Government Employee	11
5-6	Male and Female - State Government Employee	12
7-8	Male and Female - Local Government Employee	12
9-10	Male and Female - Self Employed	1
11-12	Male and Female - Unpaid Family Worker	1

[1]Male workers (odd matrix segments) and female workers (even matrix segments) are aggregated into total workers before applying above correspondence.

[2]Category names are listed in attachment B.

The results of the occupational forecast are presented as tables of employment in 440 categories for each year of interest, selected over the period 1973-1983. Each table includes sub-totals for 11 major occupational categories aggregated from the 440 minor categories. Table 8 shows the correspondence between the major and minor categories. Accompanying the employment entries on each table are estimates of uncertainty (errors) in the forecast of each occupation and each major category sub-total. The methodology for these uncertainty estimates are covered at the end of Section II: Sensitivity Analysis of Forecast Results.

Limitations in the occupational model arise from the fact that the matrix of industry-occupation coefficients could not be trended to show shifts over time in the occupational structure within each industry. The census manpower tallies, although now four years old, represents the most definitive data available on the detailed structure of occupational employment in Alaska. There are presently no comparable data sources more recent upon which to base a trending of the coefficients. Little is known of how fast or even in what direction the coefficients of occupational employment implied by the matrix are changing. In most cases the assumption that over the long run the changes are slow may be a good one. Although shifts in the occupational structure may well be significant in a few occupations, the vast majority of the 1970 occupational coefficients still represent the

TABLE 8

CORRESPONDENCE BETWEEN MAJOR AND MINOR OCCUPATIONAL CATEGORIES

Major Categories	Minor Categories*
1. Professional, Technical and Kindred	1 - 124
2. Managers and Administrators, excluding Farm	125 - 148
3. Sales Workers	149 - 162
4. Clerical and Kindred Workers	163 - 210
5. Craftsmen and Kindred Workers	211 - 306
6. Operatives, excluding Transport	307 - 360
7. Transport Equipment Operatives	361 - 372
8. Laborers, excluding Farm	373 - 388
9. Farm Owners, Managers and Workers	389 - 396
10. Service Workers, excluding Private Household	397 - 434
11. Private Household Workers	435 - 440

*List of 440 occupational names are given in Attachment C.

best available indicator of future industry-occupation employment mix. The forecasts produced by the occupational model do, however, show trends. This is because the economic base model is predicting different rates of growth in each of the 12 industry categories.

This is not the place to review the Census's methodology, but it should be pointed out that the matrix tabulations are based on a sample and therefore can be expected to contain small random errors, and that the classification of each respondent into a particular industry-occupation cell is not perfectly certain. Not only is the judgment of the census tabulator involved, but the industry designation of a particular firm may change abruptly. Similarly individuals do not possess only one skill: they may work mostly in occupation A, but also in occupation B. The census only records the industry which most of a firm's products fall in and the principal occupation of each person. The results of the occupational forecasts should be interpreted accordingly.

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