

Coastal Zone  
Information  
Center

COASTAL ZONE  
INFORMATION CENTER

APPENDIX 19  
Economic and  
Demographic Studies

GREAT LAKES BASIN FRAMEWORK STUDY

GB  
705  
.G73  
G74  
1976  
appendix  
v.19

1977 100

04332

U. S. DEPARTMENT OF COMMERCE NOAA  
COASTAL SERVICES CENTER  
2234 SOUTH HOBSON AVENUE  
CHARLESTON, SC 29405-2413

JUN 13 1975

# Great Lakes Basin Framework Study

## APPENDIX 19

# ECONOMIC AND DEMOGRAPHIC STUDIES

[Property of CSC Library]

COASTAL ZONE  
INFORMATION CENTER

GREAT LAKES BASIN COMMISSION

---

Prepared by Economic and Demographic Studies Work Group

Sponsored by U.S. Army Corps of Engineers, North Central Division

GAB 705, G-73 W54 1976 appendix v. 19

JUL 24 1997

Published by the Public Information Office, Great Lakes Basin Commission, 3475  
Plymouth Road, P.O. Box 999, Ann Arbor, Michigan 48106. Printed in 1975.

Cover photo by Kristine Moore Meves.

---

This appendix to the *Report of the Great Lakes Basin Framework Study* was prepared at field level under the auspices of the Great Lakes Basin Commission to provide data for use in the conduct of the Study and preparation of the *Report*. The conclusions and recommendations herein are those of the group preparing the appendix and not necessarily those of the Basin Commission. The recommendations of the Great Lakes Basin Commission are included in the *Report*.

The copyright material reproduced in this volume of the *Great Lakes Basin Framework Study* was printed with the kind consent of the copyright holders. Section 8, title 17, United States Code, provides:

The publication or republication by the Government, either separately or in a public document, of any material in which copyright is subsisting shall not be taken to cause any abridgement or annulment of the copyright or to authorize any use or appropriation of such copyright material without the consent of the copyright proprietor.

The Great Lakes Basin Commission requests that no copyrighted material in this volume be republished or reprinted without the permission of the author.

## OUTLINE

### Report

- Appendix 1: Alternative Frameworks
  - Appendix 2: Surface Water Hydrology
  - Appendix 3: Geology and Ground Water
  - Appendix 4: Limnology of Lakes and Embayments
  - Appendix 5: Mineral Resources
  - Appendix 6: Water Supply—Municipal, Industrial, and Rural
  - Appendix 7: Water Quality
  - Appendix 8: Fish
  - Appendix C9: Commercial Navigation
  - Appendix R9: Recreational Boating
  - Appendix 10: Power
  - Appendix 11: Levels and Flows
  - Appendix 12: Shore Use and Erosion
  - Appendix 13: Land Use and Management
  - Appendix 14: Flood Plains
  - Appendix 15: Irrigation
  - Appendix 16: Drainage
  - Appendix 17: Wildlife
  - Appendix 18: Erosion and Sedimentation
  - Appendix 19: Economic and Demographic Studies
  - Appendix F20: Federal Laws, Policies, and Institutional Arrangements
  - Appendix S20: State Laws, Policies, and Institutional Arrangements
  - Appendix 21: Outdoor Recreation
  - Appendix 22: Aesthetic and Cultural Resources
  - Appendix 23: Health Aspects
- Environmental Impact Statement

## SYNOPSIS

This appendix contains economic and demographic data and projections for the total United States, economic areas of the Great Lakes Region, and Great Lakes Basin planning subareas as compiled by the Economic and Demographic Work Group with the help of the Federal and State organizations listed in the Foreword.

It contains data and projections concerning both general and specific areas of economic and demographic activity in the Basin and throughout the nation. The data are summarized by decade from 1940 through 1970. Projections are displayed by decade from 1980 through 2020. In addition to projections of population, employment, income, earnings, and selected industry output for the nation and Basin, detailed studies on agriculture, mining, and forestry in the Basin are presented. The Basin's important role in manufacturing is discussed in each of the sections of the report.

The first section, prepared by the U.S. Army Corps of Engineers, includes tables summarizing historical data and projections for the United States, the Great Lakes Basin, and Basin planning subareas, as well as capsule discussions of the economic outlook for each.

The Office of Business Economics (OBE) of the U.S. Department of Commerce prepared the second section, which deals with projections and indexes of population, employment,

and income and earnings for the United States, OBE economic areas, and planning subareas. Population data and projections for portions of States within economic areas and planning subareas are included, as are details of national and regional projection methodologies.

The complete inventory and analysis of the Basin's agricultural economy, given in the third section, was prepared by the Economic Research Service (ERS) of the U.S. Department of Agriculture. Projections for the United States and total Great Lakes Basin land use and agricultural production requirements are given for 1980, 2000, and 2020. The crop acreage, production, and farm employment by planning subarea were developed from the ERS Linear Programming Model for the same years.

The fourth section, prepared by the Forest Service of the U.S. Department of Agriculture, is a complete draft of existing and projected forest resources for Great Lakes Basin plan areas and planning subareas.

For the fifth section, the Bureau of Mines of the U.S. Department of the Interior compiled a similar inventory and analysis of mineral resources and production. It encompasses the Basin plan areas and planning subareas projecting mineral production and employment for 1980, 2000, and 2020.

## FOREWORD

The Economic and Demographic Studies Work Group under the chairmanship of Howard E. Olson, North Central Division, U.S. Army Corps of Engineers, held an initial organization meeting in November 1968 and met regularly thereafter in the process of developing three drafts of this appendix of the *Great Lakes Basin Framework Study*.

Specifications for this appendix were developed by representatives from the Bureau of Mines (BOM), Bureau of Outdoor Recreation (BOR), and the Bureau of Sport Fisheries and Wildlife (BSF&W) of the U.S. Department of the Interior (USDI); the Environmental Protection Agency (EPA) and its predecessors; the Economic Research Service (ERS), Forest Service (FS), and the Soil Conservation Service (SCS) of the U.S. Department of Agriculture (USDA); the Office of Business Economics (OBE) of the U.S. Department of Commerce (USDC); U.S. Department of Housing and Urban Development (HUD); and the North Central Division, Corps of Engineers (NCD, CE), U.S. Department of the Army. Also of help were the work groups on water quality, water supply, navigation, and outdoor recreation, which used economic-demographic data. The Great Lakes States, Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin, provided valuable counsel, data, and review.

In addition to the chairman, members who regularly attended work group sessions, contributing information and performing review functions, were: G. Anderson, State of Michigan; F. J. Baker, BOR; A. J. Benzmann, SCS; L. D. Bronder, State of Michigan; L. Christensen, ERS; H. DeGraff, OBE; J. M. Furman, State of Indiana; E. Harned, State of Pennsylvania; J. Hostetler, ERS; R. L. Kerr, FS; D. F. Klyce, BOM; R. W. Pope, State of Wisconsin; and J. J. Waelti, State of Minnesota.

Members of the work group were:

C. Aldrich, Ill.  
G. Anderson, Mich.  
G. Atkins, BOR  
F. J. Baker, BOR  
R. Barlowe, Mich.  
T. E. Beers, Ohio  
A. J. Benzmann, SCS  
R. J. Bernhagen, Ohio  
W. F. Bradford, Mich.  
L. D. Bronder, Mich.  
L. Christensen, ERS  
M. Clark, Ohio  
K. Colman, HUD  
L. Craine, Mich.  
J. F. Davis, N.Y.  
A. Dean, N.Y.  
H. DeGraff, OBE  
W. J. Dupps, Ohio  
J. M. Furman, Ind.  
Charles Guinn, N.Y.  
E. Harned, Pa.  
S. P. Hart, N.Y.  
R. D. Hennigan, N.Y.  
I. Hess, Ohio  
L. Hoffman, Ohio  
J. E. Hostetler, ERS  
F. L. Huffman, Ohio  
J. P. Kavanagh, Mich.  
R. L. Kerr, FS  
I. Kievat, Mich.  
D. F. Klyce, BOM  
R. MacLauchlin, CE (NCD)  
E. Maslan, HUD  
H. E. Olson, CE (NCD), Chairman  
J. C. Peterson, BSF&W  
R. W. Pope, Wis.  
S. R. Quackenbush, Mich.  
W. T. Schuck, EPA  
T. Trott, OBE  
J. J. Waelti, Minn.  
I. Wolpert, N.Y.  
P. H. Yackey, Ohio

## TABLE OF CONTENTS

	Page
OUTLINE .....	iii
SYNOPSIS .....	v
FOREWORD .....	vi
LIST OF TABLES .....	xi
LIST OF FIGURES .....	xxii
INTRODUCTION .....	xxiii
Purpose .....	xxiii
<b>1 SUMMARY OF TRENDS AND PROJECTIONS FOR THE UNITED STATES AND THE GREAT LAKES BASIN .....</b>	<b>1</b>
1.1 Population .....	1
1.2 Employment .....	1
1.3 Income .....	1
1.4 Production .....	1
1.5 Notes for Interpretation of 1970 Economic and Demographic Data on Great Lakes Basin and Planning Subarea Tables .....	5
1.6 Existing Economy and Outlook for the Future .....	13
1.6.1 Great Lakes Basin .....	13
1.6.2 Planning Subarea 1.1, Lake Superior West .....	15
1.6.3 Planning Subarea 1.2, Lake Superior East .....	15
1.6.4 Planning Subarea 2.1, Lake Michigan Northwest .....	18
1.6.5 Planning Subarea 2.2, Lake Michigan Southwest .....	21
1.6.6 Planning Subarea 2.3, Lake Michigan Southeast .....	25
1.6.7 Planning Subarea 2.4, Lake Michigan Northeast .....	27
1.6.8 Planning Subarea 3.1, Lake Huron North .....	30
1.6.9 Planning Subarea 3.2, Lake Huron South .....	33
1.6.10 Planning Subarea 4.1, Lake Erie Northwest .....	36
1.6.11 Planning Subarea 4.2, Lake Erie Southwest .....	39
1.6.12 Planning Subarea 4.3, Lake Erie Central .....	39
1.6.13 Planning Subarea 4.4, Lake Erie East .....	42
1.6.14 Planning Subarea 5.1, Lake Ontario West .....	45
1.6.15 Planning Subarea 5.2, Lake Ontario Central .....	45
1.6.16 Planning Subarea 5.3, Lake Ontario East .....	48
1.7 Projected Population by State for Great Lakes Basin Planning Subareas .....	51
<b>2 OVERALL ECONOMIC AND DEMOGRAPHIC TRENDS AND PROJECTIONS .....</b>	<b>63</b>

	Page
2.1 Projection Methodology and Assumptions .....	63
2.1.1 Introduction .....	63
2.1.2 Nature of Projections .....	63
2.1.3 Assumptions .....	64
2.1.4 Economic Measures Used in Projections .....	64
2.1.5 Terms .....	65
2.1.5.1 Export Base Theory .....	65
2.1.5.2 Employment Shift Analysis .....	65
2.1.5.3 National Growth Component .....	65
2.1.5.4 Industrial Mix Component .....	65
2.1.5.5 Regional Share Component .....	66
2.1.5.6 Land Resource Area .....	66
2.1.5.7 Soil Resource Group .....	66
2.1.5.8 Personal Income .....	66
2.1.5.9 Private Wages and Salaries and Other Labor Income ..	68
2.1.5.10 Government Payrolls .....	68
2.1.5.11 Proprietors' Income .....	68
2.1.5.12 Property Income .....	68
2.1.5.13 Transfer Payments .....	69
2.1.6 An Overview of the Projection Procedure .....	69
2.1.7 National Projections .....	70
2.1.7.1 Total Population .....	70
2.1.7.2 Population of Working Age .....	70
2.1.7.3 Total Labor Force Including Armed Forces .....	70
2.1.7.4 Civilian Labor Force .....	71
2.1.7.5 Civilian Employment .....	71
2.1.7.6 Hours Worked per Year per Man .....	71
2.1.7.7 Gross Product per Man Hour .....	71
2.1.7.8 Aggregate Private Gross National Product .....	71
2.1.7.9 Government Gross Product .....	71
2.1.7.10 Gross National Product .....	71
2.1.7.11 Personal Income .....	71
2.1.8 Industrial Composition of National Projections .....	72
2.1.8.1 Gross Product Originating (GPO) by Industry .....	72
2.1.8.2 Persons Engaged in Production .....	72
2.1.8.3 Employment on a Decennial Census Basis .....	73
2.1.8.4 Domestic Personal Income by Type of Payment .....	73
2.1.8.5 Earnings by Industry .....	73
2.1.8.6 Impact of Alternative Projections of Lower Total Popu- lation .....	74
2.1.9 Economic Area Projections .....	74
2.1.9.1 Regional Classification .....	74
2.1.9.2 Delineation Procedures .....	75
2.1.9.3 Basic Industry Projections .....	75
2.1.9.4 Residentiary Industry Projections .....	76
2.1.9.5 Population Projections .....	76
2.1.10 Water Resource Planning Subarea projections .....	77
2.2 Statistical Tables .....	77
2.2.1 Trends and Projections for the Nation and Great Lakes Region Economic Areas .....	77
2.2.2 Population by State for Economic Areas .....	77
 3 THE AGRICULTURAL ECONOMY .....	 107
3.1 Introduction .....	107
3.1.1 Objective and Scope .....	107
3.1.2 Relationships to Other Work Groups .....	107

	Page
3.2 Methods and Assumptions .....	107
3.2.1 Basic Geographic Organization .....	107
3.2.2 Methodological Approach .....	107
3.2.3 General Assumptions and Limitations .....	110
3.2.3.1 Assumptions Affecting Demand for Food and Fiber ...	110
3.2.3.2 Assumptions Affecting Supply of Food and Fiber .....	110
3.2.3.3 General Assumptions .....	111
3.2.3.4 Assumptions Embodied in Determination on National and Regional Requirements .....	111
3.3 Agricultural Characteristics of the Basin .....	114
3.3.1 Climate and Topography .....	114
3.3.2 A General Description of Agriculture in the Great Lakes Basin	115
3.3.2.1 Major Land Use .....	116
3.3.2.2 Types of Farms .....	116
3.3.2.3 Distribution by Farm Size .....	116
3.3.2.4 Value of All Farm Products Sold .....	116
3.3.2.5 Average Size and Value of Farms .....	117
3.3.2.6 Commercial Farms by Economic Class .....	118
3.3.2.7 Commercial Fertilizer Used .....	118
3.3.2.8 Irrigated Acreage .....	118
3.3.2.9 Crop Production .....	118
3.3.2.10 Livestock Production .....	120
3.3.3 Agriculture in the Planning Subareas .....	121
3.3.3.1 Planning Subarea 1.1 .....	121
3.3.3.2 Planning Subarea 1.2 .....	121
3.3.3.3 Planning Subarea 2.1 .....	122
3.3.3.4 Planning Subarea 2.2 .....	122
3.3.3.5 Planning Subarea 2.3 .....	122
3.3.3.6 Planning Subarea 2.4 .....	122
3.3.3.7 Planning Subarea 3.1 .....	122
3.3.3.8 Planning Subarea 3.2 .....	123
3.3.3.9 Planning Subarea 4.1 .....	123
3.3.3.10 Planning Subarea 4.2 .....	123
3.3.3.11 Planning Subarea 4.3 .....	123
3.3.3.12 Planning Subarea 4.4 .....	123
3.3.3.13 Planning Subarea 5.1 .....	123
3.3.3.14 Planning Subarea 5.2 .....	124
3.3.3.15 Planning Subarea 5.3 .....	124
3.4 Agricultural Production Potential .....	124
3.4.1 Agricultural Land Resource Base .....	124
3.4.2 Production Technology .....	124
3.4.2.1 Future Technological Developments .....	124
3.4.2.2 Technological Developments for Individual Crops .....	151
3.4.3 Crop Yield Projections .....	152
3.4.4 Production Costs .....	153
3.5 Projections of Crop and Livestock Production .....	153
3.5.1 Crop Production .....	153
3.5.2 Livestock Production .....	157
3.5.3 Fertilizer Use .....	157
3.5.4 Production Costs .....	157
3.6 Rural Farm Population, Employment, and Income .....	159
3.6.1 Farm Income .....	159
3.6.2 Agriculture Employment .....	159
3.6.3 Rural Farm Population .....	160
3.7 Implications for Water Resource Development .....	162
4 FOREST RESOURCES .....	163

	Page
4.1 Forest Resources .....	163
4.1.1 Historical Development .....	163
4.1.2 Present Description .....	164
4.1.3 Present and Projected Production .....	164
4.1.4 Value of Forest Production .....	165
4.2 Major Forest Industry .....	165
4.2.1 General .....	165
4.2.2 Present and Projected Employment .....	165
4.2.3 Present and Projected Income .....	175
4.2.4 Present and Projected Value Added by Timber-Based Economic Activities .....	175
4.2.5 Present and Projected Domestic Timber Demand .....	175
4.3 Summary of Forest Resources and Industrial Data for the United States and Great Lakes Basin .....	175
4.3.1 Forest Resources .....	175
4.3.2 Forest Industry .....	175
4.4 General Methods and Assumptions for Forestry Projections .....	176
4.4.1 Projection Techniques .....	176
4.4.2 Projections for the Basin and Planning Subareas .....	177
4.4.3 Value of Production and Value Added in Timber-Based Activities	181
4.4.4 Projections of Domestic Timber Demand .....	182
5 MINERAL INDUSTRIES .....	185
5.1 Introduction .....	185
5.2 Existing and Projected Mineral Reserves in the Basin .....	185
5.3 Projections of Selected Mineral Commodities, 1980-2020 .....	185
5.4 Productivity .....	185
5.5 Summary of Selected Mineral Industries, 1960 and 1968 .....	186
GLOSSARY .....	211
LIST OF ABBREVIATIONS .....	215
LIST OF REFERENCES .....	217

## LIST OF TABLES

Table	Page
19-1 Population, Employment, Total Personal Income, and Per Capita Personal Income, United States and Great Lakes Basin .....	2
19-2 Population of Great Lakes Basin by Plan Area and Planning Subarea, Number of Persons and Percent of Basin .....	3
19-3 SMSAs in the Great Lakes Basin .....	4
19-4 Per Capita Personal Income, Great Lakes Basin by Planning Subarea, and Ratio to Basin .....	5
19-5 Rank and Value Added by Manufacture in 1967 for Major Industry Groups within the Great Lakes Basin .....	6
19-6 Raw Steel Production by States, 1966-1971 .....	7
19-7 Raw Steel Production by Districts .....	8
19-8 Great Lakes Basin Economic Development .....	9
19-9 Great Lakes Basin Total Population .....	13
19-10 Population, Personal Income and Earnings (Thousands \$58), and Employment—Great Lakes Basin .....	14
19-11 Economic Data by County for Planning Subarea 1.1 .....	15
19-12 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 1.1 .....	17
19-13 Economic Data by County for Planning Subarea 1.2 .....	18
19-14 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 1.2 .....	20
19-15 Economic Data by County for Planning Subarea 2.1 .....	21
19-16 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.1 .....	23
19-17 Economic Data by County for Planning Subarea 2.2 .....	25
19-18 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.2 .....	26
19-19 Economic Data by County for Planning Subarea 2.3 .....	27
19-20 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.3 .....	29

Table	Page
19-21 Economic Data by County for Planning Subarea 2.4 .....	30
19-22 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.4 .....	32
19-23 Economic Data by County for Planning Subarea 3.1 .....	33
19-24 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 3.1 .....	35
19-25 Economic Data by County for Planning Subarea 3.2 .....	36
19-26 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 3.2 .....	38
19-27 Economic Data by County for Planning Subarea 4.1 .....	39
19-28 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.1 .....	40
19-29 Economic Data by County for Planning Subarea 4.2 .....	42
19-30 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.2 .....	43
19-31 Economic Data by County for Planning Subarea 4.3 .....	45
19-32 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.3 .....	47
19-33 Economic Data by County for Planning Subarea 4.4 .....	48
19-34 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.4 .....	50
19-35 Economic Data by County for Planning Subarea 5.1 .....	51
19-36 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 5.1 .....	53
19-37 Economic Data by County for Planning Subarea 5.2 .....	54
19-38 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 5.2 .....	56
19-39 Economic Data by County for Planning Subarea 5.3 .....	57
19-40 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 5.3 .....	59
19-41 Total Population for Great Lakes Area States and Population by State for Great Lakes Basin Planning Subareas .....	60
19-42 Population Index for Great Lakes Area States and Population by State for Great Lakes Basin Planning Subareas .....	61
19-43 Selected National Aggregates .....	70

Table		Page
19-44	Domestic Personal Income (Millions \$58) by Type of Payment .....	73
19-45	Alternative Population and Labor Force Projections as a Percent of the OBERS Population .....	74
19-46	Population, Personal Income and Earnings, United States, Excluding Overseas .....	78
19-47	Employment by Selected Industries, United States, Excluding Overseas	79
19-48	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 01007, Plattsburgh, New York .....	80
19-49	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 01008, Syracuse-Utica, New York ....	81
19-50	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 01009, Rochester, New York .....	82
19-51	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 01010, Buffalo, New York .....	83
19-52	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 01011, Erie, Pennsylvania .....	84
19-53	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05064, Cleveland, Ohio .....	85
19-54	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05065, Lima, Ohio .....	86
19-55	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05066, Toledo, Ohio .....	87
19-56	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05067, Detroit, Michigan .....	88
19-57	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05068, Bay City, Michigan .....	89
19-58	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05069, Grand Rapids, Michigan .....	90
19-59	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05070, Lansing-Battle Creek- Kalamazoo, Michigan .....	91
19-60	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05071, Fort Wayne, Indiana .....	92
19-61	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05072, South Bend, Indiana .....	93
19-62	Population, Personal Income and Earnings (Thousands \$58), and Em- ployment—OBE Economic Area 05073, Chicago, Illinois .....	94

Table	Page
19-63 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05080, Milwaukee, Wisconsin .....	95
19-64 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05081, Green Bay, Wisconsin .....	96
19-65 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05083, Duluth-Superior, Wisconsin ...	97
19-66 Economic Areas of the State of Illinois—Total Population .....	98
19-67 Total United States and Economic Areas of the State of Illinois—Indexes of Change for Total Population .....	98
19-68 Economic Areas of the State of Indiana—Total Population .....	99
19-69 Total United States and Economic Areas of the State of Indiana—Indexes of Change for Total Population .....	99
19-70 Economic Areas of the State of Michigan—Total Population .....	100
19-71 Total United States and Economic Areas of the State of Michigan—Indexes of Change for Total Population .....	100
19-72 Economic Areas of the State of Minnesota—Total Population .....	101
19-73 Total United States and Economic Areas of the State of Minnesota—Indexes of Change for Total Population .....	101
19-74 Economic Areas of the State of New York—Total Population .....	102
19-75 Total United States and Economic Areas of the State of New York—Indexes of Change for Total Population .....	102
19-76 Economic Areas of the State of Ohio—Total Population .....	103
19-77 Total United States and Economic Areas of the State of Ohio—Indexes of Change for Total Population .....	103
19-78 Economic Areas of the State of Pennsylvania—Total Population .....	104
19-79 Total United States and Economic Areas of the State of Pennsylvania—Indexes of Change for Total Population .....	104
19-80 Economic Areas of the State of Wisconsin—Total Population .....	105
19-81 Total United States and Economic Areas of the State of Wisconsin—Indexes of Change for Total Population .....	105
19-82 Total Land in Urban and Built-up Area, Great Lakes Basin Planning Subareas .....	109
19-83 Population and Personal Income, United States .....	110
19-84 Per Capita Use of Major Farm Products, United States .....	112
19-85 Imports and Exports of Major Farm Products, United States .....	113

Table	Page
19-86 Crop Requirements with Indexes of Production Requirements, United States and Great Lakes Basin .....	114
19-87 Livestock and Livestock Product Requirements with Indexes of Production Requirements, United States and Great Lakes Basin .....	115
19-88 Great Lakes Basin Share of United States Total (Selected Characteristics) .....	115
19-89 Comparative Distribution of Land in Farms, Great Lakes Basin and United States .....	117
19-90 Comparative Distribution of Total Number of Farms by Type of Farm, Great Lakes Basin and United States .....	117
19-91 Comparative Distribution of Number of Farms by Size of Farm, Great Lakes Basin and United States .....	117
19-92 Planning Subarea Share of Value of Farm Products Sold, Great Lakes Basin .....	118
19-93 Great Lakes Basin Share of United States Production of Selected Crops	119
19-94 Great Lakes Basin Share of Total United States Production of Livestock and Livestock Products .....	120
19-95 Great Lakes Basin Total and Percent of United States Total—Acreage and Production of Principal Crops .....	125
19-96 Great Lakes Basin Total and Percent of United States Total—Number, Size, Value and Types of Farms, and Major Land Use .....	126
19-97 Great Lakes Basin Total and Percent of United States Total—Population, Employment, and Values of Farm Products Sold .....	127
19-98 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 1.1 .....	128
19-99 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 1.1 .....	128
19-100 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 1.1 .....	129
19-101 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 1.2 .....	129
19-102 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 1.2 .....	130
19-103 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 1.2 .....	130
19-104 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 2.1 .....	131
19-105 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.1 .....	131

Table	Page
19-106 Population, Employment and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.1 .....	132
19-107 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production Planning Subarea 2.2 .....	132
19-108 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.2 .....	133
19-109 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.2 .....	133
19-110 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 2.3 .....	134
19-111 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.3 .....	134
19-112 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.3 .....	135
19-113 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 2.4 .....	135
19-114 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.4 .....	136
19-115 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.4 .....	136
19-116 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 3.1 .....	137
19-117 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 3.1 .....	137
19-118 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 3.1 .....	138
19-119 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 3.2 .....	138
19-120 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 3.2 .....	139
19-121 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 3.2 .....	139
19-122 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.1 .....	140
19-123 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.1 .....	140
19-124 Population, Employment, and Value of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.1 .....	141

Table	Page
19-125 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.2 .....	141
19-126 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.2 .....	142
19-127 Population, Employment, and Value of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.2 .....	142
19-128 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.3 .....	143
19-129 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.3 .....	143
19-130 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.3 .....	144
19-131 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.4 .....	144
19-132 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.4 .....	145
19-133 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.4 .....	145
19-134 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 5.1 .....	146
19-135 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 5.1 .....	146
19-136 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 5.1 .....	147
19-137 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 5.2 .....	147
19-138 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 5.2 .....	148
19-139 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 5.2 .....	148
19-140 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 5.3 .....	149
19-141 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 5.3 .....	149
19-142 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 5.3 .....	150
19-143 Projections of Land Requirements for Urban and Associated Uses and the Land Resource Base, Great Lakes Basin Planning Subareas .....	151

Table	Page
19-144 Group Yields for Major Field Crops .....	154
19-145 Group Yields for Selected Specialty Crops .....	155
19-146 Acreage of Major Crop and Pasture Use .....	156
19-147 Projected Shares of Basin Requirements for Livestock Products .....	158
19-148 Feed Conversion Rates, Percent Roughage, by Class of Livestock ....	159
19-149 Value of Farm Products, Great Lakes Basin and Planning Subareas .	160
19-150 Employment in Agriculture in the Great Lakes Basin and the United States .....	161
19-151 Agricultural Employment, Great Lakes Basin and Planning Subareas	161
19-152 Rural Farm Population, Great Lakes Basin and Planning Subareas ..	161
19-153 Forest Land Area in the Great Lakes Basin by Plan Area, Planning Subarea, and State .....	165
19-154 Area of Commercial Forest Land in the Great Lakes Basin by Forest Type .....	166
19-155 Area of Commercial Forest Land in the Great Lakes Basin by Stand-Size Class .....	167
19-156 Area of Commercial Forest Land in the Great Lakes Basin by Stocking Class .....	167
19-157 Volume of Growing Stock, in Million Cubic Feet, and Saw Timber, in Million Board Feet, on Commercial Forest Land in the Great Lakes Basin .....	168
19-158 Area of Commercial Forest Land in the Great Lakes Basin .....	169
19-159 Production of Saw Logs, Veneer Logs, and Miscellaneous Industrial Timber Products in the Great Lakes Basin by Planning Subarea .....	170
19-160 Production of Pulpwood in the Great Lakes Basin by Planning Subarea	170
19-161 Stumpage and Harvested Value of Production of Saw Logs, Veneer Logs, and Miscellaneous Industrial Timber Products in the Great Lakes Basin	171
19-162 Stumpage and Harvested Value of Production in the Great Lakes Basin	172
19-163 Employment of Forest-Based Industries in the Great Lakes Basin ...	173
19-164 Income (Payrolls) of Forest-Based Industries in the Great Lakes Basin	174
19-165 Estimated Value Added in Timber-Based Economic Activities in the Great Lakes Basin .....	176
19-166 Domestic Timber Demand—by Product Class, United States and Great Lakes Basin, with Projections .....	176

Table	Page
19-167 Growing Stock, Saw Timber, and Ownership on Commercial Forest Land and Total Forest Land, United States and Great Lakes Basin .....	177
19-168 Production, Employment, and Income of Forest-Based Industries, United States and Great Lakes Basin .....	179
19-169 Production of Saw Logs, Veneer Logs, Miscellaneous Industrial Timber Products, and Pulpwood, United States and Great Lakes Basin .....	180
19-170 Great Lakes Basin Mineral Production .....	187
19-171 Mineral Production in Plan Area 1.0 .....	188
19-172 Mineral Production in Planning Subarea 1.1 .....	188
19-173 Mineral Production in Planning Subarea 1.2 .....	189
19-174 Mineral Production in Plan Area 2.0 .....	189
19-175 Mineral Production in Planning Subarea 2.1 .....	190
19-176 Mineral Production in Planning Subarea 2.2 .....	190
19-177 Mineral Production in Planning Subarea 2.3 .....	191
19-178 Mineral Production in Planning Subarea 2.4 .....	191
19-179 Mineral Production in Plan Area 3.0 .....	192
19-180 Mineral Production in Planning Subarea 3.1 .....	192
19-181 Mineral Production in Planning Subarea 3.2 .....	193
19-182 Mineral Production in Plan Area 4.0 .....	193
19-183 Mineral Production in Planning Subarea 4.1 .....	194
19-184 Mineral Production in Planning Subarea 4.2 .....	194
19-185 Mineral Production in Planning Subarea 4.3 .....	195
19-186 Mineral Production in Planning Subarea 4.4 .....	195
19-187 Mineral Production in Plan Area 5.0 .....	196
19-188 Mineral Production in Planning Subarea 5.1 .....	196
19-189 Mineral Production in Planning Subarea 5.2 .....	197
19-190 Mineral Production in Planning Subarea 5.3 .....	197
19-191 Clay Production in the Great Lakes Basin in Short Tons .....	198
19-192 Iron Ore Production in the Great Lakes Basin in Long Tons .....	199
19-193 Sand and Gravel Production in the Great Lakes Basin in Short Tons ..	200

Table	Page
19-194 Crushed Stone Production in the Great Lakes Basin in Short Tons ...	201
19-195 Projected Mineral Production by Selected Commodities, Great Lakes Basin .....	202
19-196 Projected Mineral Production by Selected Commodities, Plan Area 1.0	202
19-197 Projected Mineral Production by Selected Commodities, Planning Sub-area 1.1 .....	203
19-198 Projected Mineral Production by Selected Commodities, Planning Sub-area 1.2 .....	203
19-199 Projected Mineral Production by Selected Commodities, Plan Area 2.0	203
19-200 Projected Mineral Production by Selected Commodities, Planning Sub-area 2.1 .....	204
19-201 Projected Mineral Production by Selected Commodities, Planning Sub-area 2.2 .....	204
19-202 Projected Mineral Production by Selected Commodities, Planning Sub-area 2.3 .....	204
19-203 Projected Mineral Production by Selected Commodities, Planning Sub-area 2.4 .....	205
19-204 Projected Mineral Production by Selected Commodities, Plan Area 3.0	205
19-205 Projected Mineral Production by Selected Commodities, Planning Sub-area 3.1 .....	205
19-206 Projected Mineral Production by Selected Commodities, Planning Sub-area 3.2 .....	206
19-207 Projected Mineral Production by Selected Commodities, Plan Area 4.0	206
19-208 Projected Mineral Production by Selected Commodities, Planning Sub-area 4.1 .....	206
12-209 Projected Mineral Production by Selected Commodities, Planning Sub-area 4.2 .....	206
19-210 Projected Mineral Production by Selected Commodities, Planning Sub-area 4.3 .....	207
19-211 Projected Mineral Production by Selected Commodities, Planning Sub-area 4.4 .....	207
19-212 Projected Mineral Production by Selected Commodities, Plan Area 5.0	207
19-213 Projected Mineral Production by Selected Commodities, Planning Sub-area 5.1 .....	208
19-214 Projected Mineral Production by Selected Commodities, Planning Sub-area 5.2 .....	208

Table	Page
19-215 Projected Mineral Production by Selected Commodities, Planning Subarea 5.3 .....	208
19-216 Projected Employment for Selected Commodities, Great Lakes Basin .	209
19-217 Projected Employment for Selected Commodities, Plan Area 1.0 .....	209
19-218 Projected Employment for Selected Commodities, Planning Subarea 1.1	209
19-219 Projected Employment for Selected Commodities, Planning Subarea 1.2	209
19-220 Projected Employment for Selected Commodities, Plan Area 2.0 .....	209
19-221 Projected Employment for Selected Commodities, Planning Subarea 2.1	209
19-222 Projected Employment for Selected Commodities, Planning Subarea 2.2	209
19-223 Projected Employment for Selected Commodities, Planning Subarea 2.3	209
19-224 Projected Employment for Selected Commodities, Planning Subarea 2.4	209
19-225 Projected Employment for Selected Commodities, Plan Area 3.0 .....	209
19-226 Projected Employment for Selected Commodities, Planning Subarea 3.1	209
19-227 Projected Employment for Selected Commodities, Planning Subarea 3.2	210
19-228 Projected Employment for Selected Commodities, Plan Area 4.0 .....	210
19-229 Projected Employment for Selected Commodities, Planning Subarea 4.1	210
19-230 Projected Employment for Selected Commodities, Planning Subarea 4.2	210
19-231 Projected Employment for Selected Commodities, Planning Subarea 4.3	210
19-232 Projected Employment for Selected Commodities, Planning Subarea 4.4	210
19-233 Projected Employment for Selected Commodities, Plan Area 5.0 .....	210
19-234 Projected Employment for Selected Commodities, Planning Subarea 5.1	210
19-235 Projected Employment for Selected Commodities, Planning Subarea 5.2	210
19-236 Projected Employment for Selected Commodities, Planning Subarea 5.3	210

## LIST OF FIGURES

Figure	Page
19-1 OBE Economic Areas .....	xxiii
19-2 Great Lakes Basin Planning Subareas .....	xxiv
19-3 Total Population: United States and Great Lakes Basin .....	4
19-4 Total Employment: United States and Great Lakes Basin .....	4
19-5 Planning Subarea 1.1 .....	16
19-6 Planning Subarea 1.2 .....	19
19-7 Planning Subarea 2.1 .....	22
19-8 Planning Subarea 2.2 .....	24
19-9 Planning Subarea 2.3 .....	28
19-10 Planning Subarea 2.4 .....	31
19-11 Planning Subarea 3.1 .....	34
19-12 Planning Subarea 3.2 .....	37
19-13 Planning Subarea 4.1 .....	41
19-14 Planning Subarea 4.2 .....	44
19-15 Planning Subarea 4.3 .....	46
19-16 Planning Subarea 4.4 .....	49
19-17 Planning Subarea 5.1 .....	52
19-18 Planning Subarea 5.2 .....	55
19-19 Planning Subarea 5.3 .....	58
19-20 National Forests in the Great Lakes Basin .....	163
19-21 Comparison of Domestic Timber Demand and Production Projections in the Great Lakes Basin .....	178

# INTRODUCTION

## Purpose

The objective of the Economic and Demographic Studies Work Group was to develop historical data and projections of the population, employment, income, and production to be used to determine the future requirements for water resource development in the Great Lakes Basin and selected planning subareas. These future water requirements will be guides in the preparation of a Type I Comprehensive Framework Plan for development of water and related land resources to meet Basin needs in a timely and efficient manner. In addition economic and demographic information will be used in the plan formulation effort.

Economic and demographic data pertaining to the economic base of the Basin have been developed to reveal trends. Relationships between the variables, as well as the relationships between the Basin, the planning sub-

areas, and the nation, have been indicated. Data are based on selected base years, 1960 through 1970, and projections have been developed for the years 1980, 2000, and 2020.

Economic and demographic projections that have been developed for economic regions and planning subareas of the Great Lakes Basin include national aggregates. For selected industries, certain multi-State regions were developed. The complete OBE program will develop projections by States. During the course of the study, projections were made but not published of such small areas as counties or urban areas. Figures 19-1 and 19-2 outline economic areas designated by the Office of Business Economics, U.S. Department of Commerce, as well as Great Lakes Basin plan areas and planning subareas. A list of counties in the Great Lakes Basin, arranged by plan areas and planning subareas, is contained in Section 1 of Appendix 1, *Alternative Frameworks*.

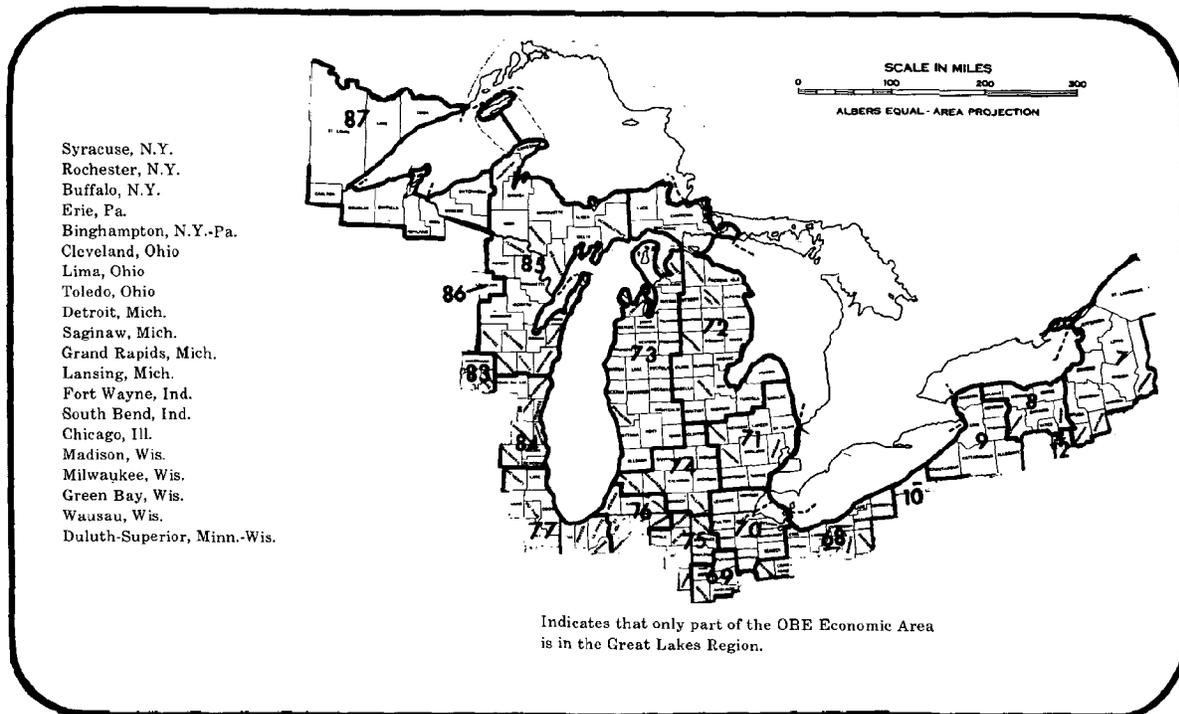


FIGURE 19-1 OBE Economic Areas, September 29, 1967. Delineated by the Regional Economics Division, OBE, USDC.

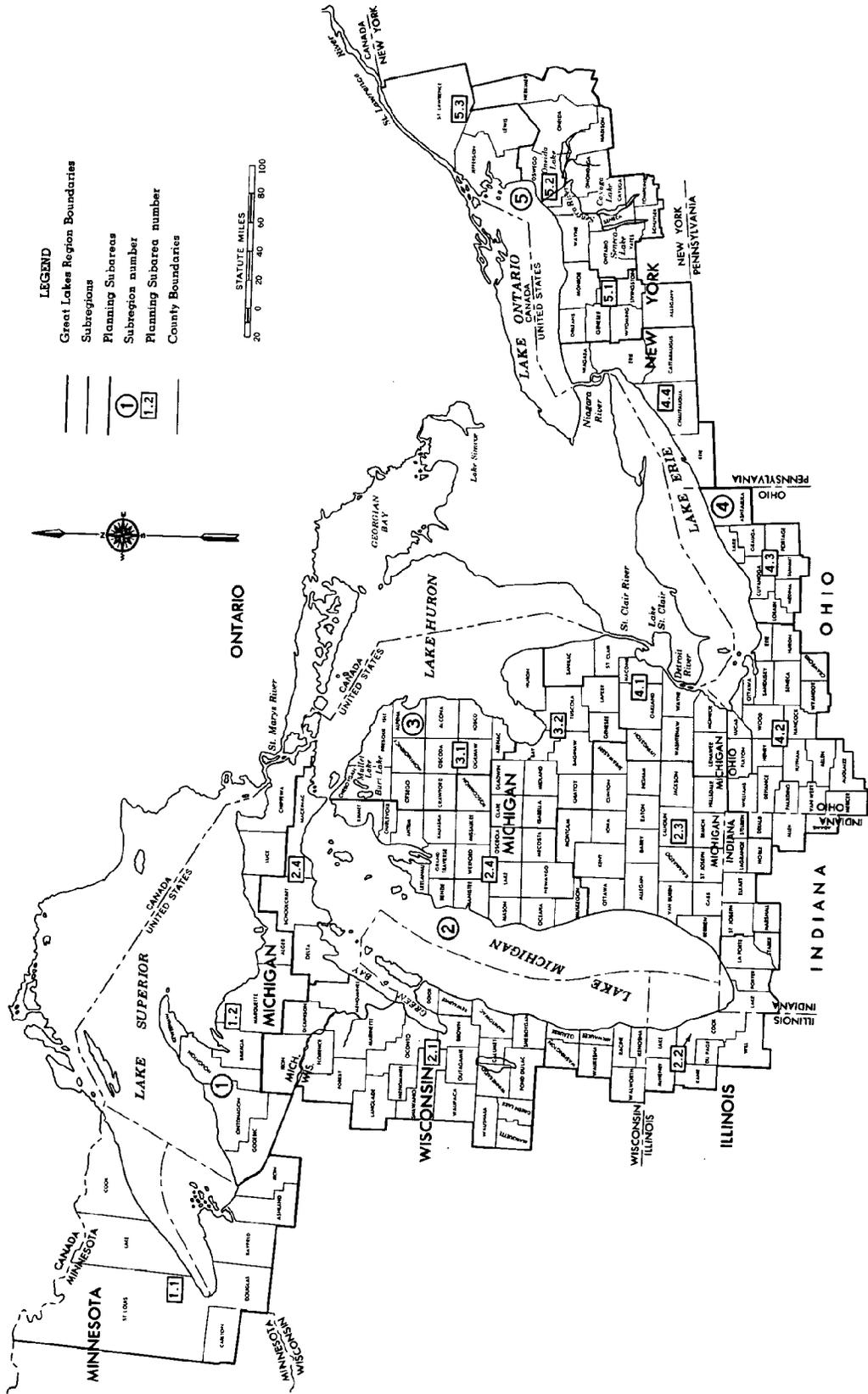


FIGURE 19-2 Great Lakes Basin Planning Subareas

## Section 1

# SUMMARY OF TRENDS AND PROJECTIONS FOR THE UNITED STATES AND THE GREAT LAKES BASIN

### 1.1 Population

The Great Lakes Basin has contained 14 to 15 percent of the United States population in each census from 1940 to 1960. During that time the Lake Michigan Plan Area contained approximately 46 percent, and the Lake Erie Plan Area contained approximately 39 percent of the total population in the Great Lakes Basin. Plan areas making up the remaining 15 percent are Lake Ontario (nine percent), Lake Huron (four percent), and Lake Superior (two percent).

As shown in Table 19-1, the Basin's share of total U.S. population in 1980 through 2020 is projected to decline slightly from approximately 14.3 percent in 1980 to 13.5 percent in 2020. Table 19-2 shows that each plan area's share of the Basin total is projected to remain near the 1960 level. Figure 19-3 shows total population for 1940 through 2020 for the United States and the Great Lakes Basin. Nearly 25 million of the Basin's 29 million residents in 1970 lived in standard metropolitan statistical areas (SMSAs). Five of the Basin's 32 SMSAs contain more than a million people. They are Chicago, 7.0 million; Detroit, 4.2 million; Cleveland, 2.1 million; Milwaukee, 1.4 million; and Buffalo, 1.4 million (Table 19-3).

### 1.2 Employment

Table 19-1, which summarizes existing and projected employment for the nation and the Basin, shows the Basin's share declining slightly from approximately 15 percent of total U.S. employment from 1940 through 1960 to a low of 13.6 percent in 2020. A summary of employment by selected industries from 1940 through 1960 and projections by industry group by decade for 1980 through 2020 are included in planning subareas profiled below. Figure 19-4 shows the total employment for the United States and the Great Lakes Basin from 1940 through 2020.

### 1.3 Income

Heavy concentration of industrial activity in the Great Lakes Basin is evidenced by the Basin's position with respect to the nation's total income and per capita personal income. As shown in Table 19-1, the Basin personal income per capita from 1940 to 1960 averaged 20 percent higher than the nation's. As shown in Table 19-4, planning subareas that lead the Basin in per capita income are 2.2, Lake Michigan Southwest (Chicago); 4.1, Lake Erie Northwest (Detroit); 4.3, Lake Erie Central (Cleveland); and 5.1, Lake Ontario West (Rochester).

The rate of growth of total personal and per capita income in the Basin, following trends of population and employment, will decline relative to the nation in the 1970 through 2020 study period. The Basin's share of the nation's total personal income is projected to decline from 17 to 18 percent in 1940 through 1960 to less than 14 percent in 2020. The 1959 index of per capita personal income in the Basin, which was 113 percent in 1959, is expected to drop to 103 percent in 2020.

### 1.4 Production

A production analysis was made to determine which industries contribute significantly to the economic development of the Region while having an impact on water use and water quality. Industries investigated in the study were iron and steel, petroleum refining, selected bulk chemicals, paper, and selected food products. The relative importance of major manufacturing groups in the Great Lakes Basin is shown in Table 19-5. The Great Lakes States (excluding the western portions of New York and Pennsylvania) produced 61 million tons of steel in 1970, which was 47 percent of the national production (Table 19-6). Steel producing districts with counties immediately adjacent to the Great Lakes pro-

**TABLE 19-1 Population, Employment, Total Personal Income, and Per Capita Personal Income, United States and Great Lakes Basin, 1940-2020**

Item and Year	United States	Great Lakes Basin	Percentage <sup>a</sup>
<u>Total Population</u>			
1940 <sup>b</sup>	132,164,569	18,791,175	14.2
1950 <sup>b</sup>	151,325,798	21,772,152	14.4
1960 <sup>b</sup>	179,323,175	26,364,598	14.7
1970 <sup>b</sup>	203,212,000	29,332,295	14.4
1980	234,193,000	33,566,246	14.3
2000	306,757,000	42,338,176	13.8
2020	397,562,000	53,496,561	13.5
<u>Total Employment</u>			
1940	45,375,815	6,744,158	14.9
1950	57,475,606	8,706,002	15.1
1960	66,372,649	9,841,841	14.8
1970	78,627,000	11,302,302	14.4
1980	92,712,000	13,494,973	14.6
2000	122,663,000	17,175,526	14.0
2020	159,178,000	21,662,292	13.6
<u>Total Personal Income<sup>c</sup></u>			
1940	172,235,431	30,936,107	18.0
1950	274,097,374	47,146,585	17.2
1959	377,928,456	63,298,020	16.7
1980	963,000,000	149,469,406	15.5
2000	2,196,684,000	318,222,055	14.5
2020	4,934,146,000	682,297,827	13.8
<u>Per Capita Personal Income<sup>c</sup></u>			
1940	1,300	1,640	126.2
1950	1,805	2,157	119.5
1959	2,134	2,420	113.4
1980	4,112	4,453	108.3
2000	7,161	7,516	105.0
2020	12,411	12,754	102.8

<sup>a</sup>Great Lakes Basin in relation to total U.S.

<sup>b</sup>Figures as of April 1

<sup>c</sup>Value of the dollar in 1958

SOURCE: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population, 1940-1970.

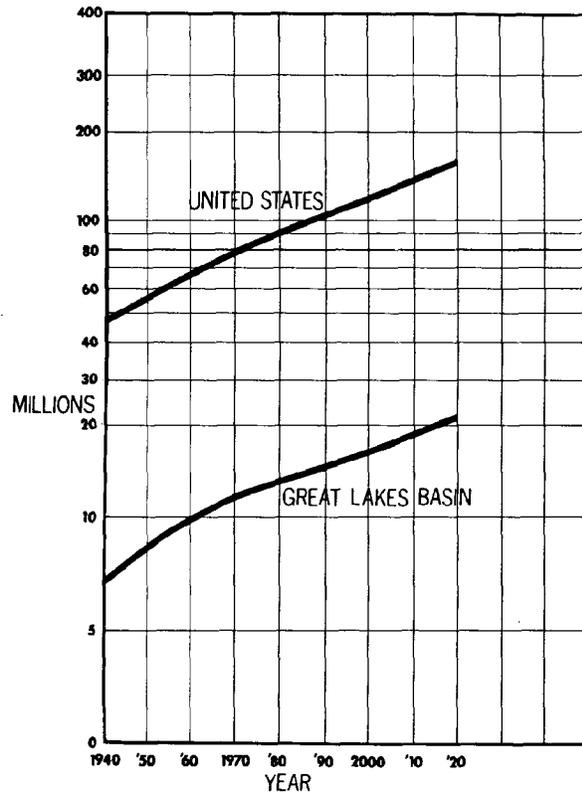
TABLE 19-2 Population of Great Lakes Basin by Plan Area and Planning Subarea, Number of Persons and Percent of Basin, 1940-2020

	Total Population (Thousands)						
	Census Final Count				Projections		
	1940	1950	1960	1970	1980	2000	2020
Great Lakes Basin Total	18,791	21,772	26,364	29,332	33,566	42,338	53,497
Plan Area 1.0	533	513	545	533	538	594	669
PSA 1.1	336	330	359	345	367	417	475
PSA 1.2	197	183	186	188	171	177	194
Plan Area 2.0	8,673	9,953	12,041	13,517	15,542	19,645	24,830
PSA 2.1	771	817	896	1,005	1,082	1,358	1,726
PSA 2.2	6,034	6,919	8,481	9,493	10,999	13,844	17,386
PSA 2.3	1,499	1,807	2,211	2,523	2,914	3,772	4,876
PSA 2.4	369	410	453	496	547	671	842
Plan Area 3.0	732	840	1,056	1,236	1,411	1,810	2,324
PSA 3.1	94	102	119	142	164	209	267
PSA 3.2	638	738	937	1,094	1,247	1,601	2,057
Plan Area 4.0	7,095	8,520	10,466	11,514	13,299	16,794	21,281
PSA 4.1	2,697	3,440	4,292	4,848	5,802	7,425	9,568
PSA 4.2	1,176	1,325	1,566	1,725	1,963	2,474	3,116
PSA 4.3	1,887	2,233	2,825	3,099	3,476	4,389	5,527
PSA 4.4	1,335	1,522	1,783	1,842	2,058	2,506	3,070
Plan Area 5.0	1,758	1,946	2,256	2,532	2,776	3,495	4,393
PSA 5.1	620	682	798	946	978	1,222	1,538
PSA 5.2	940	1,057	1,236	1,362	1,572	2,016	2,556
PSA 5.3	198	207	222	224	226	257	299
	Percent of Basin						
Plan Area 1.0	2.8	2.4	2.1	1.8	1.6	1.4	1.3
PSA 1.1	1.8	1.5	1.4	1.2	1.1	1.0	0.9
PSA 1.2	1.0	0.9	0.7	0.6	0.5	0.4	0.4
Plan Area 2.0	46.2	45.7	45.7	46.1	46.3	46.4	46.4
PSA 2.1	4.1	3.7	3.4	3.4	3.2	3.2	3.2
PSA 2.2	32.1	31.8	32.2	32.4	32.8	32.7	32.5
PSA 2.3	8.0	8.3	8.4	8.6	8.7	8.9	9.1
PSA 2.4	2.0	1.9	1.7	1.7	1.6	1.6	1.6
Plan Area 3.0	3.9	3.9	4.0	4.2	4.2	4.3	4.3
PSA 3.1	0.5	0.5	0.5	0.5	0.5	0.5	0.5
PSA 3.2	3.4	3.4	3.5	3.7	3.7	3.8	3.8
Plan Area 4.0	37.8	39.1	39.7	39.3	39.6	39.7	39.7
PSA 4.1	14.4	15.8	16.3	16.5	17.3	17.5	17.9
PSA 4.2	6.3	6.1	5.9	5.9	5.8	5.9	5.8
PSA 4.3	10.0	10.2	10.7	10.6	10.4	10.4	10.3
PSA 4.4	7.1	7.0	6.8	6.3	6.1	5.9	5.7
Plan Area 5.0	9.3	8.9	8.5	8.6	8.3	8.2	8.3
PSA 5.1	3.3	3.1	3.0	3.2	2.9	2.9	2.9
PSA 5.2	5.0	4.9	4.7	4.6	4.7	4.7	4.8
PSA 5.3	1.0	0.9	0.8	0.8	0.7	0.6	0.6

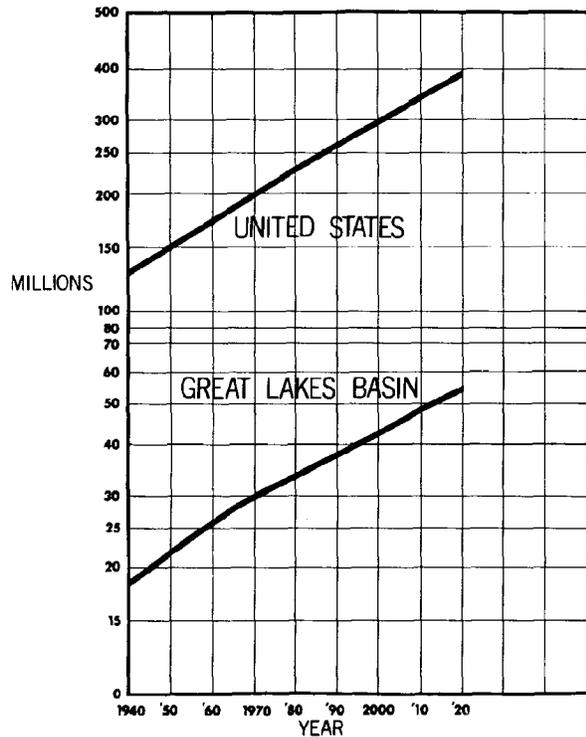
**TABLE 19-3 SMSAs in the Great Lakes Basin, 1970**

SMSA and State	Population
Total Great Lakes Basin	29,332,295
Total 32 SMSAs in Great Lakes Basin	24,974,257
Illinois	6,978,947
Chicago	6,978,947
Indiana	1,193,853
Fort Wayne	280,455
Gary-Hammond-East Chicago	633,367
South Bend	280,031
Michigan	6,806,151
Ann Arbor	234,103
Bay City	117,339
Detroit	4,199,931
Flint	496,658
Grand Rapids	539,225
Jackson	143,274
Kalamazoo	201,550
Lansing	378,423
Muskegon-Muskegon Heights	157,426
Saginaw	219,743
Toledo	118,479
Minnesota	265,350
Duluth-Superior, Minn.-Wis.	265,350
New York	3,209,055
Buffalo	1,349,211
Rochester	882,667
Syracuse	636,507
Utica-Rome	340,670
Ohio	3,864,319
Akron	679,239
Cleveland	2,064,194
Lima	171,472
Lorain-Elyria	256,843
Toledo, Ohio-Mich.	692,571
Pennsylvania	263,654
Erie	263,654
Wisconsin	2,392,928
Appleton-Oshkosh	276,891
Duluth-Superior, Minn.-Wis.	265,350
Green Bay	158,244
Kenosha	117,917
Milwaukee	1,403,688
Racine	170,838

Note: State totals are only for the SMSAs listed.  
 SOURCE: 1970 Census of Population, U.S. Department of Commerce, Bureau of the Census, for the above States.



**FIGURE 19-3 Total Population: United States and Great Lakes Basin, 1940-2020**



**FIGURE 19-4 Total Employment: United States and Great Lakes Basin, 1940-2020**

**TABLE 19-4 Per Capita Personal Income, Great Lakes Basin by Planning Subarea and Ratio to Basin, 1940-2020**

	Per Capita Personal Income <sup>a</sup>					
	1940	1950	1959	1980	2000	2020
Great Lakes Basin Total	1,640	2,157	2,420	4,453	7,516	12,754
Plan Area 1.0						
PSA 1.1	1,094	1,613	1,839	3,767	6,720	11,814
PSA 1.2	841	1,307	1,539	3,427	6,422	11,828
Plan Area 2.0						
PSA 2.1	1,024	1,570	1,885	3,728	6,646	11,755
PSA 2.2	1,930	2,446	2,778	4,849	7,999	13,280
PSA 2.3	1,246	1,920	2,130	3,985	6,961	12,201
PSA 2.4	870	1,456	1,681	3,271	5,860	10,415
Plan Area 3.0						
PSA 3.1	823	1,146	1,495	2,700	4,963	8,776
PSA 3.2	1,185	1,828	2,092	4,205	7,446	12,953
Plan Area 4.0						
PSA 4.1	1,857	2,334	2,425	4,607	7,613	12,745
PSA 4.2	1,346	1,985	2,170	4,178	7,267	12,612
PSA 4.3	1,782	2,263	2,519	4,508	7,502	12,847
PSA 4.4	1,681	2,066	2,303	4,253	7,321	12,483
Plan Area 5.0						
PSA 5.1	1,733	2,047	2,540	4,713	8,046	13,613
PSA 5.2	1,413	1,785	2,057	3,993	6,989	12,126
PSA 5.3	1,167	1,514	1,841	3,557	6,477	11,640
	Ratio to Basin					
Plan Area 1.0						
PSA 1.1	66.7	74.8	76.0	84.6	89.4	92.6
PSA 1.2	51.3	60.6	63.6	77.0	85.4	92.7
Plan Area 2.0						
PSA 2.1	62.4	72.8	77.9	83.7	88.4	92.2
PSA 2.2	117.7	113.4	114.8	108.9	106.4	104.1
PSA 2.3	76.0	89.0	88.0	89.5	92.6	95.7
PSA 2.4	53.0	67.5	69.5	73.5	78.0	81.7
Plan Area 3.0						
PSA 3.1	50.2	53.1	61.8	60.6	66.0	68.8
PSA 3.2	72.3	84.7	86.4	94.4	99.1	101.6
Plan Area 4.0						
PSA 4.1	113.2	108.2	100.2	103.5	101.3	99.9
PSA 4.2	82.1	92.0	89.7	93.8	96.7	98.9
PSA 4.3	108.7	104.9	104.1	101.2	99.8	100.7
PSA 4.4	102.5	95.8	95.2	95.5	97.4	97.9
Plan Area 5.0						
PSA 5.1	105.7	94.9	105.0	105.8	107.1	106.7
PSA 5.2	86.2	82.8	85.0	89.7	93.0	95.1
PSA 5.3	71.2	70.2	76.1	79.9	86.2	91.3

<sup>a</sup>Dollar Value in 1958

duced 50 million tons of steel, or 39 percent of the national total, in 1970. Steel producing districts partially served by Great Lakes ports produced approximately one-third of the nation's steel in 1970 (Table 19-7). The Great Lakes Basin also contains significant concentrations of petroleum refining and manufacturing of chemicals, paper, and food products. These manufacturing industries account for approximately 80 percent of the Basin's industrial water requirements and water quality problems. Great Lakes Basin county economic development data, including land area, population, and manufacturing infor-

mation concerning employees, value added, and capital expenditures, are shown in Table 19-8.

### 1.5 Notes for Interpretation of 1970 Economic and Demographic Data on Great Lakes Basin and Planning Subarea Tables

Usually OBE-ERS employment statistics for total employment and major industry sectors can be compared, but the variety of sources and changes in Bureau of Census data-gathering procedures described below hinder comparison of 1940 through 1960 individual industry employment data with 1970 data.

Employment figures for 1970 are preliminary values from Bureau of Census, U.S. Department of Commerce, and Bureau of Labor Statistics, U.S. Department of Labor. All projections of economic and demographic parameters are subject to review by the Great Lakes Basin Commission in periodic post-study evaluation and updating to determine if anomalies between 1940 through 1960 trend lines and 1970 preliminary data represent a temporary aberration or signal a departure from the established trend. The latter would have a major impact on projections of future economic and demographic conditions.

The U.S. Department of Commerce, Office of Business Economics—U.S. Department of Agriculture, Economic Research Service (OBE-ERS) projections furnished in this report were completed in 1969, which was three years before the 1970 Census of Population data on employment became available. The 1970 data include total employed aged 16 years and over. Other years include total employed aged 14 years and over.

Industry group detail for the manufacturing sector was not shown in tables for 1970 because the 1970 Census of General Social and Economic Characteristics did not separate textile mill products from textiles and fabricated textile products; paper and allied products from printing, publishing and allied products; and primary metals from metal industries. Petroleum refining also was not listed. The Office of Business Economics derived the data from a variety of sources for 1960. To obtain comparable data for 1970 the Office of Business Economics allocators would have to be applied.

The 1970 data shown in this appendix combine Federal Military with other Federal employment.

TABLE 19-5 Rank and Value added by Manufacture in 1967 for Major Industry Groups within the Great Lakes Basin

SIC Code No.	Industry Group Description	Value Added by Manufacture within the Great Lakes Basin Counties <sup>1</sup>										Total	Total Great Lakes Basin Counties as a Percent of Eight States & U.S.	
		Ill.	Ind.	Mich.	Minn.	N. Y.	Ohio	Pa.	Wis.	(8)	U.S.			
35	Machinery, except elec.	8,311.6	293.2	2,750.4	7.3	999.6	1,365.6	78.1	1,182.1	48.4	29.9			
37	Transportation equipment	7,588.6	631.1	5,805.8	---	---	971.6	---	11.4	53.1	26.9			
34	Fabricated metal prod.	5,746.7	1,494.2	1,987.7	---	402.4	1,168.8	87.7	447.0	55.6	31.8			
33	Primary metal industries	4,885.4	1,034.2	1,481.7	---	590.2	908.6	73.0	331.1	38.3	24.4			
20	Food and kindred prod.	4,304.3	1,617.2	926.0	27.6	533.1	453.9	38.2	547.0	40.0	16.2			
36	Electrical machinery	4,042.1	1,916.1	539.5	---	462.6	469.8	91.2	530.9	33.2	16.5			
28	Chemicals & allied prod.	3,028.5	1,084.2	1,039.6	---	421.2	346.0	---	52.4	36.6	12.9			
27	Printing & publishing	2,538.2	1,386.7	464.0	13.3	134.9	266.9	10.7	205.0	31.5	17.7			
38	Instruments & rel. prod.	2,416.9	511.2	141.4	---	1,714.2	---	---	42.4	61.8	37.6			
30	Rubber & plastic prod.	1,503.8	343.8	290.7	---	10.0	721.7	34.0	39.4	45.1	22.1			
26	Paper & allied products	1,463.4	419.2	367.0	---	200.8	25.7	---	422.3	36.6	15.0			
32	Stone, clay & glass prod.	1,162.3	269.8	410.3	---	157.5	252.7	---	35.3	30.9	13.9			
25	Furniture and fixtures	676.9	227.7	275.0	---	48.1	48.0	16.9	15.0	38.9	16.2			
23	Apparel & related prod.	625.9	217.3	254.9	---	101.9	20.6	---	22.0	12.8	6.2			
39&19	Misc. mfg. - Ordinance	595.1	323.4	137.0	---	23.3	38.5	6.5	25.6	24.1	5.8			
29	Petroleum and coal prods.	401.5	188.9	---	---	---	126.1	---	---	31.8	7.4			
24	Lumber and wood prod.	270.5	60.6	131.6	6.5	15.6	---	---	50.5	29.3	5.4			
31	Leather & leather prod.	130.1	6.0	47.9	---	3.8	---	---	72.4	13.2	5.0			
22	Textile mill products	98.7	35.5	37.8	---	6.3	---	---	19.1	6.9	1.2			
21	Tobacco products	---	---	---	---	---	---	---	---	---	---			
TOTAL ALL INDUSTRY GROUPS		58,126.6	13,755.3	3,786.9	17,241.6	157.1	8,225.3	9,129.1	575.1	5,256.2	47.0	22.2		

<sup>1</sup>In Millions of Dollars

SOURCE: U.S. Bureau of the Census, Census of Manufactures, 1967 Area Series: by State, MC67(3), U.S. Government Printing Office, Washington, D.C. 1970.

TABLE 19-6 Raw Steel Production by States, 1966-1971

Area or State	Total Production (Thousands of Net Tons)						Percent					
	1966	1967	1968	1969	1970	1971	1966	1967	1968	1969	1970	1971
<b>States bordering Great Lakes</b>												
Ohio	22,984	20,378	22,606	24,202	21,684	20,064	17.1	16.0	17.2	17.2	16.5	16.7
Indiana	18,044	17,610	17,911	19,386	18,528	17,306	13.4	13.7	13.6	13.7	14.1	14.4
Illinois	10,960	10,649	10,510	11,873	11,738	10,896	8.2	8.3	8.0	8.4	8.9	9.1
Michigan	10,004	9,245	9,218	10,036	9,547	9,069	7.5	7.3	7.0	7.1	7.3	7.5
Minnesota <sup>a</sup>	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Wisconsin <sup>b</sup>	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
<b>Total</b>	<b>61,992</b>	<b>57,882</b>	<b>60,245</b>	<b>65,497</b>	<b>61,497</b>	<b>57,335</b>	<b>46.2</b>	<b>45.3</b>	<b>45.8</b>	<b>46.4</b>	<b>46.8</b>	<b>47.7</b>
<b>States bordering both the Great Lakes and North Atlantic</b>												
New York	7,725	7,298	7,228	7,522	5,824	4,321	5.8	5.7	5.5	5.3	4.5	3.6
Pennsylvania	32,122	29,881	31,018	32,791	30,031	27,653	23.9	23.5	23.6	23.2	22.8	23.0
<b>Total</b>	<b>39,847</b>	<b>37,179</b>	<b>38,246</b>	<b>40,313</b>	<b>35,855</b>	<b>31,974</b>	<b>29.7</b>	<b>29.2</b>	<b>29.1</b>	<b>28.5</b>	<b>27.3</b>	<b>26.6</b>
<b>Other States</b>												
R.I., Conn., N.J., Del., Md.	8,252	8,132	8,025	8,949	8,296	6,947	6.2	6.4	6.1	6.3	6.3	5.8
Kentucky	2,467	2,410	2,478	2,575	2,378	2,291	1.8	1.9	1.9	1.8	1.8	1.9
Va., W.Va., Ga., Fla., N.C., S.C.	4,196	4,268	4,453	4,674	4,629	4,578	3.1	3.3	3.4	3.3	3.5	3.8
Ala., Tenn., Miss., Ark.	4,265	4,444	4,611	5,115	5,044	4,504	3.2	3.5	3.5	3.6	3.8	3.7
Minn., Mo., Okla., Texas	4,528	4,644	4,810	5,300	5,198	4,806	3.4	3.7	3.7	3.8	4.0	4.0
Ariz., Ore., Colo., Utah, Wash., Hawaii	4,443	4,154	4,383	4,595	4,609	4,153	3.3	3.3	3.3	3.3	3.5	3.5
California	4,111	4,100	4,210	4,244	4,008	3,623	3.1	3.2	3.2	3.0	3.1	3.0
<b>Total</b>	<b>32,262</b>	<b>32,152</b>	<b>32,970</b>	<b>35,452</b>	<b>34,162</b>	<b>30,902</b>	<b>24.1</b>	<b>25.3</b>	<b>25.1</b>	<b>25.1</b>	<b>26.0</b>	<b>25.7</b>
<b>Total United States</b>	<b>134,101</b>	<b>127,213</b>	<b>131,461</b>	<b>141,262</b>	<b>131,514</b>	<b>120,211</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

<sup>a</sup>The data for the State of Minnesota were grouped with Missouri, Oklahoma, and Texas.

<sup>b</sup>Data for Wisconsin were not reported.

SOURCE: American Iron and Steel Institute, Annual Statistical Reports for the above stated years, Washington, D.C.

TABLE 19-7 Raw Steel Production by Districts (Net Tons)

OBE Economic Area		Actual Population							
No.	Name	1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	7,606,000	7,905,000	8,738,000	9,986,000	10,260,000	10,654,000	10,787,000	10,887,000
54	Evansville, Ind. <sup>1</sup>	170,504	185,092	176,463	153,435	148,389	146,983	150,815	152,454
55	Springfield-Decatur, Ill.	385,822	400,653	423,122	452,376	459,166	464,903	477,035	480,279
56	Champaign-Terre Haute <sup>1</sup>	344,963	355,172	387,571	422,490	431,854	424,876	448,337	452,316
73	Chicago, Ill. <sup>1</sup>	4,759,971	4,911,255	5,553,143	6,568,852	6,787,888	7,118,339	7,152,022	7,214,955
74	Peoria, Ill.	479,065	507,295	552,135	596,984	607,257	612,708	631,247	637,996
75	Davenport, Iowa <sup>1</sup>	247,661	271,017	303,082	332,432	338,789	350,546	361,127	366,624
77	Dubuque, Iowa <sup>1</sup>	20,170	20,009	21,523	21,615	21,752	21,448	21,702	21,886
78	Rockford, Ill. <sup>1</sup>	199,985	207,098	245,204	311,436	325,776	339,328	351,226	357,343
108	Keokuk-Quincy-Hannibal <sup>1</sup>	121,944	125,939	121,410	120,680	121,173	119,357	122,010	123,101
109	St. Louis <sup>1</sup>	779,732	817,045	863,994	931,006	946,146	983,536	998,673	1,006,677
110	Paducah, Ky. <sup>1</sup>	96,183	104,425	90,353	74,694	71,810	71,976	72,806	73,369

OBE Economic Area		Projected Population				
No.	Name	1980	1990	2000	2010	2020
	STATE TOTAL	12,603,722	14,138,078	15,573,564	17,290,841	19,324,040
54	Evansville, Ind. <sup>1</sup>	168,433	183,511	197,757	218,530	244,096
55	Springfield-Decatur, Ill.	614,729	717,920	826,584	949,125	1,087,833
56	Champaign-Terre Haute <sup>1</sup>	563,405	659,070	762,719	883,378	1,022,841
73	Chicago, Ill. <sup>1</sup>	8,407,293	9,394,619	10,268,088	11,317,593	12,573,535
74	Peoria, Ill.	693,117	752,174	812,789	884,370	962,711
75	Davenport, Iowa <sup>1</sup>	384,613	421,474	446,500	482,823	526,154
77	Dubuque, Iowa <sup>1</sup>	25,524	27,877	30,647	34,110	37,984
78	Rockford, Ill. <sup>1</sup>	410,244	464,014	526,396	600,583	690,542
108	Keokuk-Quincy-Hannibal <sup>1</sup>	153,307	170,161	186,497	207,172	229,534
109	St. Louis <sup>1</sup>	1,113,242	1,277,390	1,444,856	1,640,520	1,873,083
110	Paducah, Ky. <sup>1</sup>	69,815	69,868	70,731	72,637	75,727

<sup>1</sup>Part of an economic area.

		Index Based on 1959 = 100												
OBE Economic Area		Actual Change							Projected Change					
No.	Name	1929	1940	1950	1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF ILLINOIS	76	79	88	100	103	103	108	109	126	142	156	173	194
54	Evansville, Ind. <sup>2</sup>	111	121	115	100	97	96	98	99	110	120	129	142	159
55	Springfield-Decatur, Ill.	85	89	94	100	102	103	105	106	136	159	183	210	240
56	Champaign-Terre Haute <sup>2</sup>	82	84	92	100	102	101	106	107	133	156	181	209	242
73	Chicago, Ill. <sup>2</sup>	72	75	85	100	103	108	109	110	128	143	156	172	191
74	Peoria, Ill.	80	85	92	100	102	103	106	107	116	126	136	148	161
75	Davenport, Iowa <sup>2</sup>	74	82	91	100	102	105	109	110	116	127	134	145	158
77	Dubuque, Iowa <sup>2</sup>	93	93	100	100	101	99	100	101	118	129	142	158	176
78	Rockford, Ill. <sup>2</sup>	64	66	79	100	105	109	113	115	132	149	169	193	222
108	Keokuk-Quincy-Hannibal <sup>2</sup>	101	104	101	100	100	99	101	102	127	141	155	172	190
109	St. Louis <sup>2</sup>	84	88	93	100	102	106	107	108	120	137	155	176	201
110	Paducah, Ky. <sup>2</sup>	129	140	121	100	96	96	97	98	93	94	95	97	101

<sup>1</sup>Excluding overseas.

TABLE 19-8 Great Lakes Basin Economic Development

County	Land Area in Square Miles-1970	Total 1970 Population	Manufacturing - 1967		
			Number of Employees <sup>a</sup>	Value Added <sup>b</sup>	Capital Expenditures <sup>b</sup>
Total United States	2,963,998	203,212,000	19,323.2	261,983.8	21,503.0
Total Eight States	416,187	74,092,922	8,929.4	123,619.3	9,233.7
Total Great Lakes Basin	129,753	29,332,295	3,962.6	58,138.4	4,177.5
Illinois Portion	3,719	6,978,947	983.1	13,755.3	870.9
Indiana Portion	5,716	1,575,143	248.3	3,786.9	119.8
Michigan (State)	56,817	8,875,083	1,134.1	17,241.6	1,360.2
Minnesota Portion	10,362	265,539	14.6	160.1	10.3
New York Portion	21,414	4,109,855	519.6	8,225.3	634.8
Ohio Portion	12,125	4,485,701	635.9	9,129.1	797.9
Pennsylvania Portion	813	263,654	42.3	575.1	33.5
Wisconsin Portion	18,787	2,778,373	384.7	5,265.0	350.1
Illinois Portion					
Cook	954	5,492,369	831.1	11,640.4	687.7
DuPage	331	491,882	24.5	308.3	40.3
Kane	520	251,005	39.4	561.4	32.7
Lake	457	382,638	41.4	566.5	43.0
McHenry	610	111,555	16.6	216.6	13.9
Will	847	249,498	30.1	462.1	53.3
Indiana Portion					
Adams	345	26,871	4.0	49.2	3.2
Allen	671	280,455	42.9	617.5	41.2
DeKalb	366	30,837	4.2	52.3	4.1
Elkhart	468	126,529	31.3	481.7	21.1
Lagrange	381	20,890	1.2	16.5	.7
Lake	513	546,253	98.0	1,698.4	----- <sup>c</sup>
LaPorte	607	105,342	17.6	224.6	14.4
Marshall	443	34,986	3.4	37.0	5.0
Noble	412	31,382	4.7	46.9	1.7
Porter	425	87,114	7.0	108.2	----- <sup>c</sup>
St. Joseph	466	245,045	31.6	421.4	26.1
Starke	310	19,280	.7	7.7	.7
Steuben	309	20,159	1.7	25.5	1.6
Michigan (State)					
Alcona	678	7,113	.2	1.5	----- <sup>d</sup>
Alger	905	8,568	----- <sup>c</sup>	----- <sup>c</sup>	----- <sup>c</sup>
Allegan	826	66,575	5.6	67.3	4.6
Alpena	565	30,708	3.2	62.2	2.7
Antrim	476	12,612	1.1	11.9	.6
Arenac	367	11,149	.5	4.1	1.2
Baraga	901	7,789	.7	7.8	.5
Barry	554	38,166	3.1	47.8	1.8
Bay	447	117,339	12.3	189.7	19.3
Benzie	316	8,593	.7	6.8	.5
Berrien	580	163,875	29.3	363.9	25.8
Branch	506	37,906	3.8	38.4	2.2
Calhoun	709	141,963	22.4	473.4	21.8
Cass	491	43,312	3.7	38.0	2.4
Charlevoix	414	16,541	2.0	23.3	10.2
Cheboygan	721	16,573	.8	9.6	----- <sup>c</sup>
Chippewa	1,590	32,412	.3	2.0	.2
Clare	571	16,695	1.0	11.2	.4

TABLE 19-8(continued) Great Lakes Basin Economic Development

County	Land Area in Square Miles-1970	Total 1970 Population	Manufacturing - 1967		
			Number of Employees <sup>a</sup>	Value Added <sup>b</sup>	Capital Expenditures <sup>b</sup>
Clinton	572	48,492	1.4	23.3	1.3
Crawford	561	6,482	.4	5.1	.4
Delta	1,177	35,924	2.8	37.4	1.4
Dickinson	757	23,753	1.4	17.1	1.4
Eaton	571	68,892	2.9	34.5	3.3
Emmet	461	18,331	.8	9.4	2.6
Genesee	642	444,341	---- <sup>c</sup>	---- <sup>c</sup>	---- <sup>c</sup>
Gladwin	503	13,471	.4	4.5	.3
Gogebic	1,107	20,676	.9	7.3	.4
Grand Traverse	462	39,175	2.8	31.8	1.5
Gratiot	566	39,246	3.5	53.5	3.7
Hillsdale	600	37,171	2.9	39.6	1.8
Houghton	1,017	34,652	.8	8.9	.3
Huron	819	34,083	2.0	24.0	1.9
Ingham	559	261,039	32.0	675.0	43.5
Ionia	575	45,848	4.1	58.7	1.9
Iosco	544	24,905	.6	6.7	.7
Iron	1,171	13,813	.2	1.7	.1
Isabella	572	44,594	.6	7.5	.5
Jackson	698	143,274	19.4	277.9	16.8
Kalamazoo	562	201,500	30.2	510.2	41.5
Kalkaska	566	5,272	---- <sup>c</sup>	---- <sup>c</sup>	---- <sup>c</sup>
Kent	857	411,044	59.8	864.2	43.2
Keweenaw	538	2,264	---- <sup>d</sup>	.1	---- <sup>d</sup>
Lake	571	5,661	.1	.4	---- <sup>d</sup>
Lapeer	658	52,317	2.3	26.5	1.1
Leelanau	345	10,872	.2	2.0	.3
Lenawee	753	81,609	13.5	196.6	16.7
Livingston	572	58,967	2.9	36.2	4.5
Luce	906	6,789	.2	2.1	.2
Mackinac	1,014	9,660	.1	.4	---- <sup>d</sup>
Macomb	480	625,309	94.1	1,131.9	109.4
Manistee	553	20,094	2.7	41.9	5.6
Marquette	1,828	64,686	1.6	15.5	1.0
Mason	490	22,612	2.4	31.9	1.8
Mecosta	560	27,992	1.7	20.8	.9
Menominee	1,038	24,587	2.5	26.2	1.2
Midland	520	63,769	---- <sup>c</sup>	---- <sup>c</sup>	---- <sup>c</sup>
Missaukee	565	7,126	.1	.5	---- <sup>d</sup>
Monroe	557	118,479	7.1	121.0	13.8
Montcalm	712	39,660	5.4	69.3	3.5
Montmorency	555	5,247	.4	5.0	.2
Muskegon	501	157,426	28.5	384.9	39.5
Newaygo	849	27,992	1.6	35.1	1.1
Oakland	867	907,871	94.1	1,475.4	99.9
Oceana	536	17,984	.6	5.0	.4
Ogemaw	571	11,903	.3	7.1	.2
Ontonagon	1,316	10,548	---- <sup>c</sup>	---- <sup>c</sup>	---- <sup>c</sup>
Osceola	581	14,838	1.9	19.4	.8
Oscoda	563	4,726	.1	.6	.1
Otsego	527	10,422	.8	9.5	.6
Ottawa	563	128,181	15.9	227.2	12.0
Presque Isle	648	12,836	.3	1.9	.4
Roscommon	521	9,892	.2	1.4	---- <sup>c</sup>

TABLE 19-8(continued) Great Lakes Basin Economic Development

County	Land Area in Square Miles-1970	Total 1970 Population	Manufacturing - 1967		
			Number of Employees <sup>a</sup>	Value Added <sup>b</sup>	Capital Expenditures <sup>b</sup>
Saginaw	814	219,743	32.0	560.0	67.8
St. Clair	734	120,175	10.2	165.1	10.3
St. Joseph	506	47,392	9.3	126.8	9.1
Sanilac	961	34,889	3.5	40.1	1.6
Schoolcraft	1,181	8,226	.3	4.1	.2
Shiawassee	540	63,075	6.0	58.7	6.0
Tuscola	815	48,603	2.5	31.4	3.0
Van Buren	603	56,173	5.5	70.0	2.9
Washtenaw	711	234,103	35.0	568.0	61.7
Wayne	605	2,666,751	396.2	5,908.8	458.5
Wexford	559	19,717	2.1	24.7	1.2
Minnesota Portion					
Carlton	862	28,072	3.7	43.1	2.3
Cook	1,346	3,423	.1	1.0	.1
Lake	2,062	13,351	.2	2.0	----- <sup>c</sup>
St. Louis	6,092	220,693	10.6	114.0	7.9
New York Portion					
Allegany	1,047	46,458	3.6	43.0	1.9
Cattaraugus	1,318	81,666	10.6	130.7	7.6
Cayuga	698	77,439	7.6	79.0	2.2
Chautauqua	1,081	147,305	20.3	230.3	29.9
Erie	1,058	1,113,491	134.1	1,896.5	151.4
Genesee	501	58,722	7.6	97.1	4.2
Herkimer	1,435	67,633	12.4	239.0	5.0
Jefferson	1,294	88,508	6.6	77.7	4.8
Lewis	1,291	23,644	1.8	20.3	2.8
Livingston	638	54,041	3.9	69.3	3.6
Madison	661	62,864	1.7	13.0	1.5
Monroe	675	711,917	132.8	2,709.0	204.0
Niagara	532	235,720	42.0	756.9	72.2
Oneida	1,223	273,037	30.4	388.9	28.4
Onondaga	794	472,746	59.1	792.8	59.3
Ontario	651	78,849	4.9	65.2	10.1
Orleans	396	37,305	1.9	47.3	2.4
Oswego	964	100,897	7.4	135.3	9.8
St. Lawrence	2,768	111,991	8.2	143.7	11.8
Schuyler	330	737	1.1	17.4	1.6
Seneca	330	35,083	4.1	66.1	6.2
Tompkins	482	76,879	6.1	67.1	4.5
Wayne	606	79,404	7.0	89.4	7.3
Wyoming	598	37,688	3.4	41.8	1.6
Yates	343	19,831	1.0	8.5	.7
Ohio Portion					
Allen	410	111,144	16.4	244.6	32.8
Ashtabula	700	98,237	11.0	174.5	14.1
Auglaize	400	38,602	5.3	72.7	3.8
Crawford	404	50,364	11.0	141.3	8.1
Cuyahoga	456	1,721,300	277.3	3,911.7	306.0
Defiance	412	36,949	6.6	107.2	4.1
Erie	264	75,909	10.8	160.7	22.2
Fulton	407	33,071	4.6	55.6	4.2
Geauga	407	62,977	4.2	50.2	1.6
Hancock	532	61,217	6.9	70.4	19.2

TABLE 19-8(continued) Great Lakes Basin Economic Development

County	Land Area in Square Miles-1970	Total 1970 Population	Manufacturing - 1967		
			Number of Employees <sup>a</sup>	Value Added <sup>b</sup>	Capital Expenditures <sup>b</sup>
Henry	416	27,058	3.5	83.7	4.7
Huron	497	49,587	6.2	90.6	7.3
Lake	231	197,200	20.3	273.0	19.9
Lorain	495	256,843	33.8	533.8	65.6
Lucas	343	484,370	62.4	942.0	101.9
Medina	425	82,717	4.9	62.1	3.5
Mercer	444	35,365	4.7	61.7	3.2
Ottawa	261	37,099	3.5	44.2	4.6
Paulding	417	19,329	1.3	18.3	2.0
Portage	495	125,868	8.6	119.0	9.7
Putnam	486	31,134	2.9	57.0	2.4
Sandusky	409	60,983	7.9	136.8	12.7
Seneca	551	60,696	10.1	159.3	28.5
Summit	408	553,371	92.5	1,281.8	86.8
Van Wert	409	29,194	3.3	53.1	5.6
Williams	421	33,669	5.9	64.9	6.6
Wood	619	89,722	8.2	137.8	15.6
Wyandot	406	21,826	1.8	21.1	1.2
Pennsylvania Portion					
Erie	813	263,654	42.3	575.1	33.5
Wisconsin Portion					
Ashland	1,038	16,743	1.4	16.1	.7
Bayfield	1,460	11,683	.7	11.7	.5
Brown	524	158,244	16.2	282.4	29.3
Calumet	322	27,604	4.3	58.1	4.6
Door	492	20,106	1.5	15.6	.6
Douglas	1,305	44,657	1.4	23.6	1.0
Florence	487	3,298	.1	.3	.1
Fond du Lac	725	84,567	10.4	150.7	9.1
Forest	1,007	7,691	.6	5.0	.4
Green Lake	354	16,878	2.1	23.4	1.3
Iron	747	6,533	.4	2.6	.1
Kenosha	272	117,917	16.3	209.8	10.2
Kewaunee	330	18,961	2.4	20.1	1.0
Langlade	856	19,220	1.3	8.9	.6
Manitowoc	590	82,294	13.1	147.0	6.5
Marquette	1,378	35,810	4.9	72.0	3.8
Marquette	455	8,865	.4	3.5	.3
Menominee <sup>e</sup>	360	2,607	.2	2.4	.1
Milwaukee	237	1,054,063	181.1	2,464.6	154.6
Oconto <sup>e</sup>	1,001	25,553	1.6	22.0	1.0
Outagamie	634	119,356	13.6	193.0	26.2
Ozaukee	236	54,421	7.4	106.6	7.0
Racine	337	170,838	26.2	425.0	29.8
Shawano <sup>e</sup>	919	32,650	1.5	14.2	.6
Sheboygan	505	96,660	16.2	203.3	13.8
Walworth	557	63,444	5.6	61.2	3.6
Washington	429	63,839	8.4	107.7	6.7
Waukesha	554	231,365	19.6	303.6	19.4
Waupaca	751	37,780	3.5	33.9	1.6
Waushara	627	14,795	.6	5.8	.3
Winnebago	448	129,931	21.6	270.9	22.3

<sup>a</sup>In Thousands. <sup>b</sup>In \$Millions. <sup>c</sup>Withheld to avoid disclosing individual company figures. <sup>d</sup>Less than \$50 Thousand (or under 50 employees). <sup>e</sup>Menominee County organized from parts of Oconto and Shawano Counties.

SOURCE: 1967 Census of Manufacturers and 1970 Census of Population, U.S. Dept. of Commerce, Bureau of the Census.

## 1.6 Existing Economy and Outlook for the Future

### 1.6.1 Great Lakes Basin

Population and employment growth in the Great Lakes Basin has paralleled national trends since 1929. The Basin's population in 1970 was 29,332,295 (Table 19-9), 14.4 percent of the United States total. Employment in the Basin of 11,302,000 people similarly accounted for 14.4 percent of total U.S. employment. In 1970 nearly four million people, approximately 35 percent of all persons employed in the Basin, were employed in manufacturing, the primary industry (Table 19-10). Major manufacturing group employers are primary metals and food and kindred products. Agriculture accounted for approximately 4.4 percent of the nation's employment in 1970, and mining accounted for another 0.8 percent. In the Basin agriculture accounted for 1.8 percent of the total employment, while mining accounted for 0.3 percent. Agricultural employment decreased 50 percent between 1940 and 1960 in both the nation and the Great Lakes Basin. By 1970 it had decreased another 34 percent in

the Basin, leaving only 200,000 employed. The number employed in mining, which decreased in the national economy, has remained fairly constant at approximately 39,000 people in the Great Lakes Basin.

Population growth in the Great Lakes Basin is projected to be less rapid in the future than in the recent past, declining from an annual rate of increase of 1.6 percent to 1.2 percent. The labor force participation rate is expected to increase from 37 percent to 40 percent as jobs increase more rapidly than population. The rate of increase of total personal income, which is a measure of total economic growth, is projected to be four percent annually. The differential in per capita income between the nation and the Great Lakes Basin is expected to be only three percent higher than the national average by 2020. It was 11 percent higher in 1962. Total employment is projected to more than double between 1960 and 2020, while employment in manufacturing is expected to increase only 50 percent. Employment in services is projected to more than offset the declines in employment in agriculture and mining and the less than proportional growth in manufacturing. Eighty percent of the people in the Great Lakes Basin

TABLE 19-9 Great Lakes Basin Total Population, 1940, 1950, 1960 and 1970

State	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Sq. Miles 1970
	1940	1950	1960	1970			
<b>Great Lakes Basin</b>							
Illinois	4,569,643	5,177,868	6,220,913	6,978,947	6,710,912	96.0	3,719
Indiana	909,303	1,109,003	1,412,253	1,575,143	1,206,116	76.6	5,716
Michigan	5,256,106	6,371,766	7,823,194	8,875,083	6,553,773	73.8	56,817
Minnesota	241,115	241,327	276,599	265,539	175,612	66.1	10,362
New York	2,912,829	3,248,349	3,788,567	4,109,855	2,851,299	69.3	21,414
Ohio	2,861,605	3,326,382	4,106,043	4,485,701	3,691,014	82.2	12,125
Pennsylvania	180,889	219,388	250,682	263,654	197,659	75.0	813
Wisconsin	1,859,685	2,078,069	2,486,347	2,778,373	2,139,424	77.0	19,937
<b>Total</b>	<b>18,791,175</b>	<b>21,772,152</b>	<b>26,364,598</b>	<b>29,332,295</b>	<b>23,525,809</b>	<b>80.2</b>	<b>130,903</b>
<b>Great Lakes 8 Border States</b>							
Illinois	7,897,241	8,712,176	10,081,158	11,113,976	9,229,821	83.0	55,748
Indiana	3,427,796	3,934,224	4,662,498	5,193,669	3,372,060	64.9	36,097
Michigan	5,256,106	6,371,766	7,823,194	8,875,083	6,553,773	73.8	56,817
Minnesota	2,792,300	2,982,483	3,413,864	3,805,069	2,527,308	66.4	79,289
New York	13,479,142	14,830,192	16,782,304	18,241,266	15,602,486	85.6	47,831
Ohio	6,907,612	7,946,627	9,706,397	10,652,017	8,025,775	75.3	40,975
Pennsylvania	9,900,180	10,498,012	11,319,366	11,793,909	8,430,410	71.5	44,966
Wisconsin	3,137,587	3,434,575	3,951,777	4,417,933	2,910,418	65.9	54,464
<b>Total</b>	<b>52,797,964</b>	<b>58,710,055</b>	<b>67,740,558</b>	<b>74,092,922</b>	<b>56,652,051</b>	<b>76.4</b>	<b>416,187</b>
<b>U.S. Total<sup>1</sup></b>	<b>131,669,275</b>	<b>150,697,361</b>	<b>178,464,236</b>	<b>203,212,000</b>	<b>149,325,000</b>	<b>73.5</b>	<b>2,963,998</b>

<sup>1</sup>Excludes Alaska and Hawaii

SOURCES: U.S. Department of Commerce, Bureau of the Census, County & City Data Book, 1967.  
U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population, 1960.  
U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population, 1970.

**TABLE 19-10 Population, Personal Income and Earnings (Thousands \$58), and Employment—Great Lakes Basin**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	17,789,301	18,862,731	21,857,006	26,153,745	26,969,394	33,566,246	38,074,558	42,338,176	47,436,364	53,496,561
Total Personal Income	29,649,722	30,936,107	47,146,585	63,298,020	67,785,487	149,469,406	216,985,757	318,222,055	466,035,599	682,297,827
Per Capita Income (\$58) <sup>1</sup>	1,667	1,660	2,157	2,420	2,513	4,453	5,699	7,516	9,824	12,754
Per Capita Relative (US=1.00)	1.312	1.262	1.195	1.134	1.113	1.083	1.066	1.050	1.038	1.028
Total Earnings <sup>2</sup>	22,978,894	25,815,897	39,850,853	53,032,815	55,907,818	117,586,325	167,044,042	243,703,645	354,630,929	516,653,190
Per Worker Earnings (\$58)	3,828	4,577	5,389	5,389	5,389	8,713	10,998	14,189	18,371	23,850
Per Worker Relative (US=1.00)	1.249	1.161	1.155	1.155	1.155	1.078	1.059	1.042	1.030	1.021
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	18,791,175	21,772,152	26,364,598	29,332,295	33,566,246	38,074,558	42,338,176	47,436,364	53,496,561	
Total Employment	6,744,158	8,706,002	9,841,861	11,302,302	13,494,973	15,188,990	17,175,526	19,303,902	21,662,292	
Participation Rate (EMPL/POP)	.359	.400	.373	.385	.402	.399	.406	.407	.405	
Agriculture, Forestry, Fisheries	601,621	479,706	305,769	200,710	205,413	169,207	145,187	122,981	102,682	
Mining	32,109	38,726	40,491	39,000	32,669	32,403	32,312	32,137	31,834	
Manufacturing	2,407,892	3,385,116	3,770,981	3,905,526	4,503,788	4,758,315	5,063,756	5,413,582	5,818,400	
Food, Kindred Products	213,274	259,288	301,386	301,386	260,892	246,380	236,489	227,494	220,713	
Textile Mill Products	56,885	54,877	33,352	33,352	30,116	28,431	27,143	26,057	24,995	
Chemicals, Allied Products	83,835	120,974	155,280	155,280	212,444	262,297	292,878	343,385	393,499	
Paper, Allied Products	-----	105,588	118,174	-----	155,692	174,782	196,952	221,048	243,680	
Petroleum Refining	-----	40,719	39,827	-----	26,925	22,035	19,119	15,943	12,930	
Primary Metals	-----	351,839	367,874	-----	381,879	383,123	387,376	388,121	390,362	
Federal Military	12,592	33,271	57,291	-----	63,185	63,185	63,180	63,182	63,182	
Other	3,689,944	4,769,183	5,667,309	7,157,066	8,689,718	10,165,780	11,868,891	13,671,720	15,646,093	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	68	72	83	100	103	128	146	162	181	205
Total Personal Income	46	38	74	100	107	236	343	503	736	1,078
Per Capita Income (\$58)	68	67	89	100	103	184	235	311	406	527
Total Earnings	43	48	75	100	105	222	315	460	669	974
Per Worker Earnings (\$58)	---	71	84	100	---	162	204	263	341	443
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population	71	82	100	111	127	144	161	180	203	
Total Employment	68	88	100	115	137	154	175	196	220	
Agriculture, Forestry, Fisheries	196	156	100	66	67	55	47	40	34	
Mining	79	95	100	96	81	80	80	79	79	
Manufacturing	63	89	100	104	119	126	134	144	154	
Food, Kindred Products	70	86	100	100	87	82	78	75	73	
Textile Mill Products	171	165	100	---	90	85	81	78	75	
Chemicals, Allied Products	54	78	100	---	137	156	189	221	253	
Paper, Allied Products	---	89	100	---	132	148	167	187	206	
Petroleum Refining	---	102	100	---	68	55	48	40	32	
Primary Metals	---	96	100	---	104	104	105	106	106	
Federal Military	22	58	100	---	110	110	110	110	110	
Other	65	84	100	126	153	179	209	241	276	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

TABLE 19-11 Economic Data by County for Planning Subarea 1.1

County Name	Econ Area No.	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Square Mi. 1970
		1940	1950	1960	1970			
<b>TOTAL PLANNING SUBAREA 1.1</b>								
		<u>335,911</u>	<u>329,977</u>	<u>358,722</u>	<u>345,155</u>	<u>217,940</u>	63.0	<u>14,912</u>
<b>Minnesota</b>								
		<u>241,115</u>	<u>241,327</u>	<u>276,599</u>	<u>265,539</u>	<u>175,612</u>	66.0	<u>10,362</u>
Carlton	83	24,212	24,584	27,932	28,072	8,699	31.0	862
Cook	83	3,030	2,900	3,377	3,423	---	---	1,346
Lake	83	6,956	7,781	13,702	13,351	7,941	59.5	2,062
St. Louis	83	206,917	206,062	231,588	220,693	158,972	72.0	6,092
<b>Wisconsin</b>								
		<u>94,796</u>	<u>88,650</u>	<u>82,123</u>	<u>79,616</u>	<u>42,328</u>	53.0	<u>4,550</u>
Ashland	83	21,801	19,461	17,375	16,743	9,615	57.4	1,038
Bayfield	83	15,827	13,760	11,910	11,683	---	---	1,460
Douglas	83	47,119	46,715	45,008	44,657	32,713	73.3	1,305
Iron	83	10,049	8,714	7,830	6,533	---	---	747

were urbanized in 1970, compared to a national proportion of 74 percent. With the number of people employed in agriculture expected to decline 66 percent between 1960 and 2020, the trend toward increased urbanization is expected to continue.

### 1.6.2 Planning Subarea 1.1, Lake Superior West

The population in Planning Subarea 1.1 has fluctuated in recent years, increasing from approximately 336,000 in 1940 to 345,000 in 1970. Total employment in 1970 was 118,000, which was approximately equal to the 1960 level. Employment in agriculture, forestry, and fisheries in 1970 was less than a fifth of the 1940 level. Manufacturing activities employed 19,600 people, approximately 17 percent of the work force, while mining operations employed 10,800, over nine percent of all workers and 11 times the national average.

Projections indicate a moderate increase in population of approximately 38 percent between 1970 and 2020. Agricultural employment will continue to decline to less than one percent of the total by 2020. Mining employment will remain fairly constant but will decline in relative importance. Manufacturing employment will increase but at a slower rate than the growth rate of total employment. The labor force participation rate will increase from 34 percent in 1970 to 37 percent in 2020. Sixty-three percent of the population of Planning Subarea 1.1 lived in urban

areas in 1970, while nationally the proportion was 74 percent; and in the Great Lakes Basin as a whole, the proportion was 80 percent. Urbanization will increase as agricultural employment decreases.

Further information is contained in Tables 19-11 and 19-12 and Figure 19-5.

### 1.6.3 Planning Subarea 1.2, Lake Superior East

Population and employment levels in Planning Subarea 1.2 have been fairly stable during the last 30 years. In 1970 the population was approximately 188,000. Less than 54,000 people were employed, accounting for a labor force participation rate of only 29 percent. Sixty-two hundred workers, almost 12 percent of the work force, were employed in the mining industry. Only 0.3 percent were employed in mining in the entire Great Lakes Basin. Only 5,900 workers, 10.9 percent, were employed in manufacturing. This is less than a third of the percentage employed in manufacturing in the entire Basin. Agriculturally related employment was 2.2 percent of the total, which is less than the national average of 4.4 percent but slightly higher than the Great Lakes Basin's 1.8 percent. Employment in services and all other industries increased from 25,800 in 1940 to 40,500 in 1970. Agricultural employment in 1970 was only one-half of the 1960 level.

Population is projected to decline to a low of approximately 171,000 in 1980, but it will grow

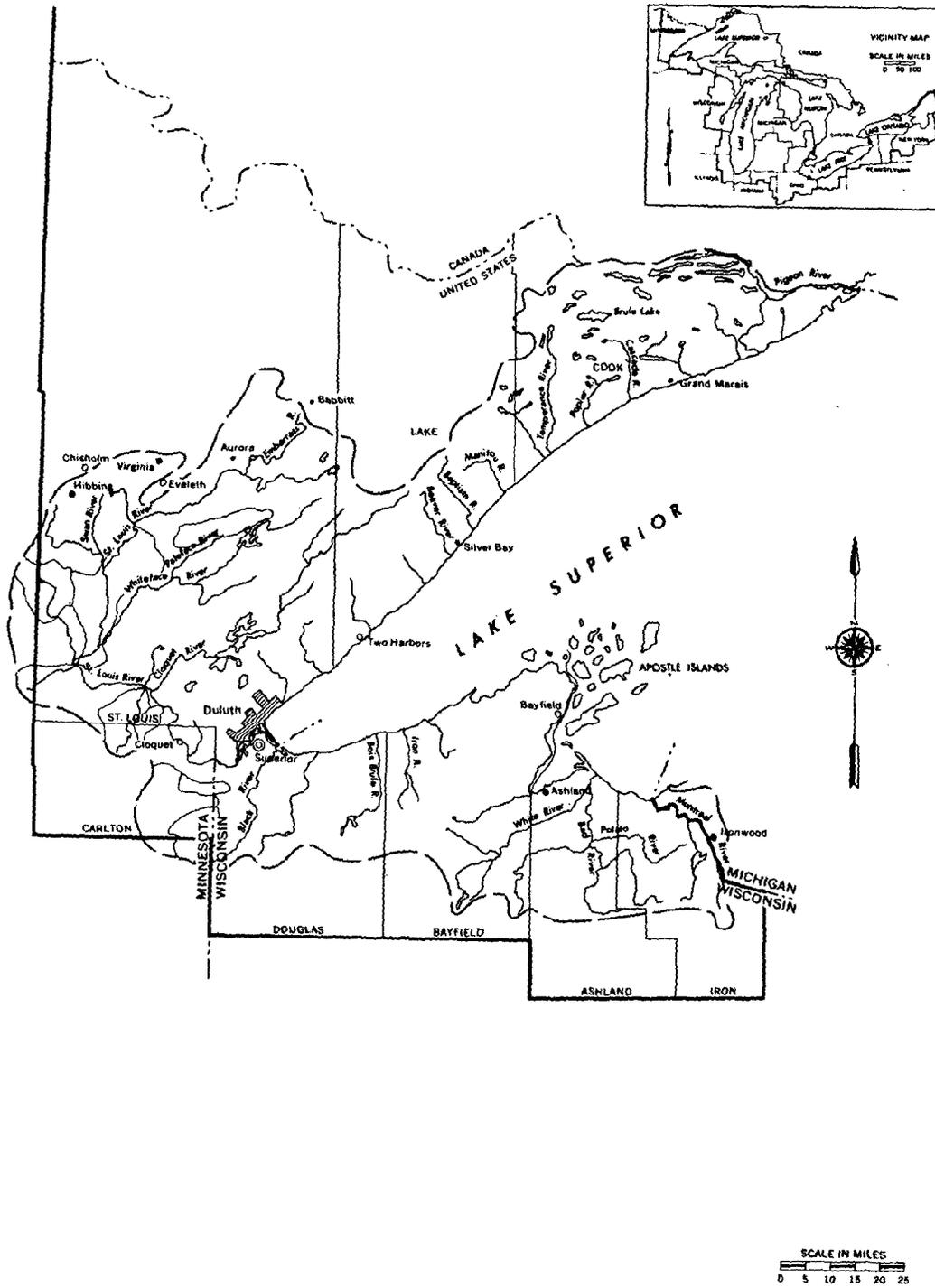


FIGURE 19-5 Planning Subarea 1.1

**TABLE 19-12 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 1.1**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	328,489	335,877	331,241	353,582	353,609	366,600	390,900	417,200	444,900	475,000
Total Personal Income	342,976	367,337	534,341	650,366	694,326	1,380,739	1,934,186	2,803,937	3,976,108	5,612,289
Per Capita Income (\$58) <sup>1</sup>	1,044	1,094	1,613	1,839	1,964	3,767	4,948	6,720	8,937	11,814
Per Capita Relative (US=1.00)	.82	.84	.89	.86	.87	.92	.93	.94	.94	.95
Total Earnings <sup>2</sup>	285,892	301,705	441,777	527,487	550,791	1,057,056	1,454,702	2,102,915	2,969,709	4,179,233
Per Worker Earnings (\$58) <sup>1</sup>	-----	3,099	3,572	4,450	-----	7,793	10,142	13,474	17,794	23,577
Per Worker Relative (US=1.00)	-----	1.01	.91	.95	-----	.96	.98	.99	1.00	1.01
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	335,911	329,977	358,722	345,155	366,600	390,900	417,200	444,900	475,000	
Total Employment	97,371	123,689	118,548	117,956	135,600	143,400	156,100	166,900	177,300	
Participation Rate (EMPL/FOP)	.29	.37	.33	.34	.37	.37	.37	.38	.37	
Agriculture, Forestry, Fisheries	14,494	12,343	5,179	2,595	3,000	2,400	1,900	1,500	1,200	
Mining	5,644	11,283	13,759	10,797	11,900	12,100	12,500	12,800	13,100	
Manufacturing	12,649	21,784	19,979	19,596	22,800	24,100	25,700	27,500	29,400	
Food, Kindred Products	1,960	2,342	2,968	-----	2,600 <sup>3</sup>	2,500 <sup>3</sup>	2,400 <sup>3</sup>	2,300 <sup>3</sup>	2,200 <sup>3</sup>	
Textile Mill Products	243	593	113	-----	400	400	400	400	400	
Chemicals, Allied Products	597	445	368	-----	5,400 <sup>3</sup>	6,400 <sup>3</sup>	7,400 <sup>3</sup>	8,400 <sup>3</sup>	9,300 <sup>3</sup>	
Paper, Allied Products	-----	1,830	3,497	-----	3,300	3,300	3,300	3,300	3,300	
Petroleum Refining	-----	235	445	-----	-----	-----	-----	-----	-----	
Primary Metals	-----	4,217	3,355	-----	2,100	2,100	2,100	2,100	2,100	
Federal Military	55	242	1,803	-----	2,100	2,100	2,100	2,100	2,100	
Other	64,529	78,037	77,828	84,968	95,800	102,700	113,800	122,900	131,500	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	93	95	94	100	100	104	111	118	126	134
Total Personal Income	53	56	82	100	107	212	297	431	611	863
Per Capita Income (\$58)	57	59	88	100	107	205	289	426	611	863
Total Earnings	54	57	84	100	104	200	276	399	563	792
Per Worker Earnings (\$58)	--	70	80	100	---	175	228	303	400	520
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population	94	92	100	96	102	109	116	124	132	
Total Employment	82	104	100	100	114	121	132	141	150	
Agriculture, Forestry, Fisheries	280	238	100	50	58	46	37	29	23	
Mining	41	82	100	78	86	88	91	93	95	
Manufacturing	63	109	100	98	114	121	129	138	147	
Food, Kindred Products	66	70	100	-----	88 <sup>3</sup>	84 <sup>3</sup>	81 <sup>3</sup>	77 <sup>3</sup>	74 <sup>3</sup>	
Textile Mill Products	215	525	100	-----	109	109	109	109	109	
Chemicals, Allied Products	162	121	100	-----	154 <sup>3</sup>	183 <sup>3</sup>	212 <sup>3</sup>	240 <sup>3</sup>	266 <sup>3</sup>	
Paper, Allied Products	---	---	100	---	98	98	98	98	98	
Petroleum	---	---	100	---	116	116	116	116	116	
Primary Metals	---	126	100	---	123	132	146	158	169	
Federal Military	3	13	100	---	116	116	116	116	116	
Other	83	100	100	109	123	132	146	158	169	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-13 Economic Data by County for Planning Subarea 1.2**

County Name	Econ Area No.	Total Population				Number	Percent	Land Area
		1940	1950	1960	1970	Urban 1970	Urban 1970	Square Mi. 1970
TOTAL PLANNING SUBAREA 1.2		<u>196,688</u>	<u>183,075</u>	<u>186,062</u>	<u>188,384</u>	<u>97,849</u>	<u>52.0</u>	<u>10,108</u>
Michigan		<u>196,688</u>	<u>183,075</u>	<u>186,062</u>	<u>188,384</u>	<u>97,849</u>	<u>52.0</u>	<u>10,108</u>
Alger	81	10,167	10,007	9,250	8,568	3,677	42.9	905
Baraga	81	9,356	8,037	7,151	7,789	2,538	32.6	901
Chippewa	68	27,807	29,206	32,655	32,412	21,467	66.2	1,590
Gogebic	83	31,797	27,053	24,370	20,676	14,273	69.0	1,107
Houghton	81	47,631	39,771	35,654	34,652	13,755	39.7	1,017
Keweenaw	81	4,004	2,918	2,417	2,264	---	---	538
Luce	68	7,423	8,147	7,827	6,789	---	---	906
Marquette	81	47,144	47,654	56,154	64,686	42,139	65.1	1,828
Ontonagon	83	11,359	10,282	10,584	10,548	---	---	1,316

slowly to reach its 1962 level of approximately 192,000 by 2020. The labor force participation rate is expected to climb to 38 percent with the employment of 74,000 persons in 2020. Per capita income will still be below the national average, but the gap will be narrowed from 73 percent of the U.S. average in 1960 to 95 percent in 2020. Employment in manufacturing will decrease, although it will increase Basin-wide during the study period. Employment in services and other industries will offset the decreasing employment in other sectors and will be responsible for the overall increase in employment in the planning subarea (PSA). In 1970 only 52 percent of the planning subarea population was urbanized. This proportion will increase in the future following the national trend.

Further information is contained in Tables 19-13 and 19-14 and Figure 19-6.

#### 1.6.4 Planning Subarea 2.1, Lake Michigan Northwest

Population in Planning Subarea 2.1 increased from 771,000 persons in 1940 to 1,005,000 in 1970 at an annual rate of approximately one percent, a rate well below the Basinwide average. Between 1940 and 1970 employment increased approximately 50 percent from 252,000 to 371,000 persons, accounting for slightly more than three percent of the total Basin employment. The 29,000 persons employed in agriculturally related work in PSA 2.1 in 1970 made up 7.7 percent of the work force, while the national average was 4.4 percent and the Basin average was 1.8 per-

cent. The 1,200 persons employed in mining made up 0.3 percent of the total in PSA 2.1. Mining employed 9 to 12 percent of the work force in the adjoining Lake Superior areas. Employment in manufacturing included 125,000 persons, or approximately 34 percent, which is nine percent more than the national average but slightly less than the Great Lakes Basin average. Manufacturing has been among the more rapidly growing sectors of the local economy, but the greatest increase in the work force during the last decade was an increase of 54,000 employees in services and related industries. This increase is slightly greater than the absolute increase in total employment.

Population in this planning subarea will increase at slightly less than the Basin average, from 1,005,000 persons in 1970 to 1,726,000 in 2020, an annual increase of approximately 1.1 percent. Employment will also grow at a rate slightly less than the Basin and national rates. Employment in manufacturing will increase to 204,500 persons by 2020, accounting for 30.4 percent of total area employment, which is approximately nine percent higher than the national proportion. The paper and allied products industry will expand from its 1960 work force of 20,700 to 45,700 workers in 2020. Agricultural employment will dwindle to approximately half its 1970 level, comprising 2.3 percent of total employment. In 2020 total personal income will have increased to more than 12 times its value in 1959, and per capita income will have increased 524 percent. Area per capita income will have a higher rate of increase than that of the nation or the Great Lakes Basin, but will remain below national

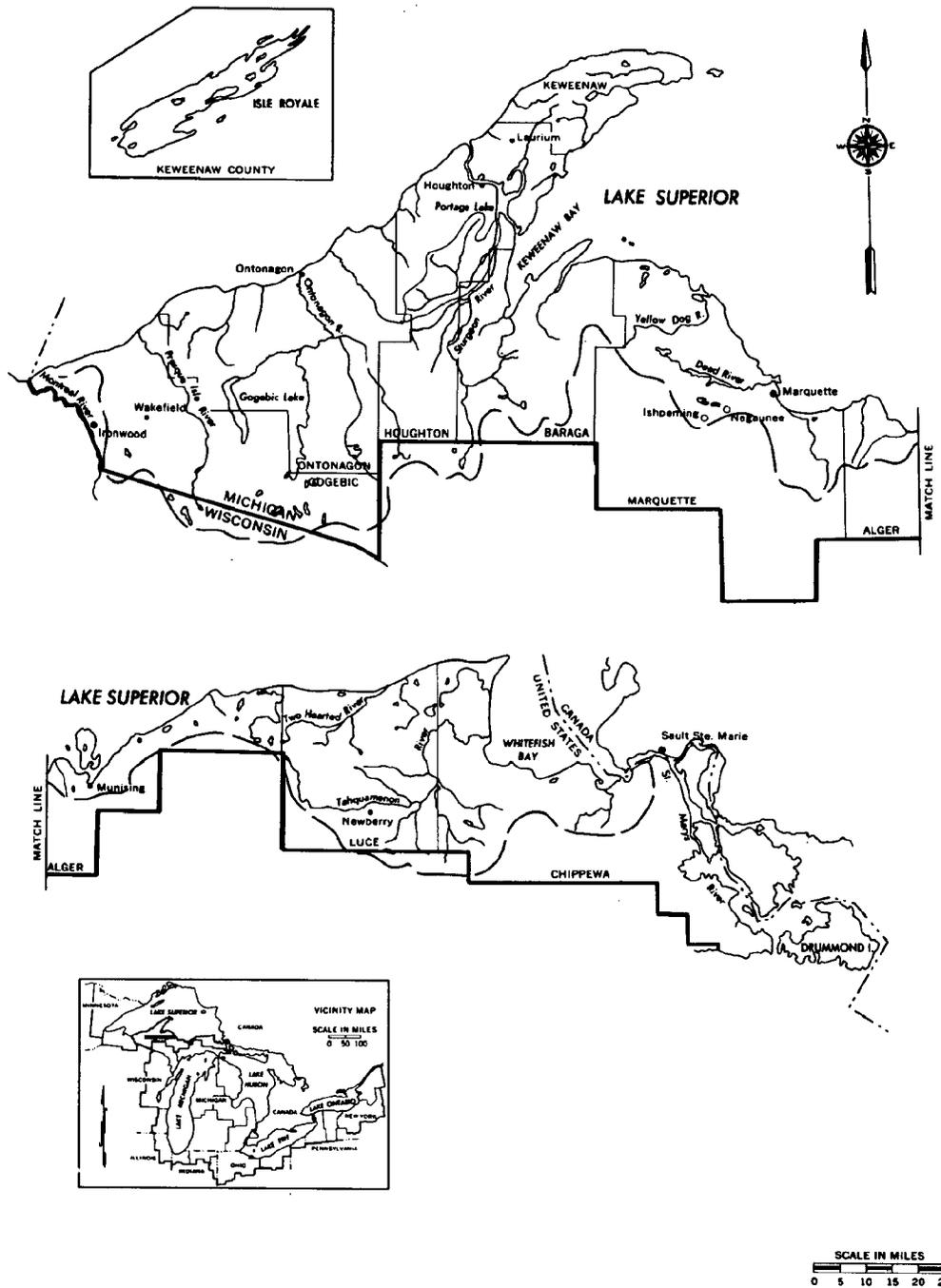


FIGURE 19-6 Planning Subarea 1.2

**TABLE 19-14 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 1.2**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020											
	1929	1940	1950	1959	1962	1970	1980	1990	2000	2010	2020
Population (July 1)	192,858	198,892	184,088	184,727	192,410	171,300	174,900	177,400	183,900	183,900	193,800
Total Personal Income	154,358	167,331	240,625	284,230	321,837	586,961	801,795	1,139,084	1,610,207	2,291,951	
Per Capita Income (\$58) <sup>1</sup>	800	841	1,307	1,539	1,673	3,427	4,585	6,422	8,756	11,828	
Per Capita Relative (US=1.00)	.63	.65	.72	.72	.74	.83	.86	.90	.92	.95	
Total Earnings <sup>2</sup>	113,367	136,184	194,355	226,430	253,940	453,254	609,530	862,172	1,212,752	1,714,321	
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,631	3,439	4,068	-----	7,658	9,864	13,128	17,379	23,096	
Per Worker Relative (US=1.00)	-----	.86	.87	.86	-----	.95	.95	.96	.97	.99	
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020											
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	196,688	183,075	186,062	171,300	188,384	171,300	174,900	177,400	183,900	193,800	
Total Employment	51,752	56,517	55,930	53,862	53,862	59,200	61,800	65,700	69,800	74,200	
Participation Rate (EMPL/POP)	.26	.31	.30	.30	.29	.35	.35	.37	.38	.38	
Agriculture, Forestry, Fisheries	6,559	5,956	2,445	1,206	1,206	1,500	1,200	1,000	800	600	
Mining	8,417	7,987	8,176	6,247	6,247	5,300	4,800	4,300	3,900	3,500	
Manufacturing	10,113	11,652	7,681	5,889	5,889	6,800	6,200	5,800	5,600	5,400	
Food, Kindred Products	784	789	1,046	900	900	800	700	700	700	600	
Textile Mill Products	102	77	4	-----	-----	-----	-----	-----	-----	-----	
Chemicals, Allied Products	922	1,031	861	1,000	1,000	1,000	1,000	1,100	1,100	1,200	
Paper, Allied Products	-----	589	780	-----	-----	-----	-----	2,000	2,400	2,900	
Petroleum Refining	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	
Primary Metals	-----	567	224	-----	-----	-----	-----	-----	-----	-----	
Federal Military	876	362	4,025	-----	-----	4,600	4,600	4,600	4,600	4,600	
Other	25,787	30,540	33,603	40,520	40,520	41,300	45,100	50,000	54,900	60,100	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population	104	108	100	100	104	93	95	96	100	105	
Total Personal Income	54	59	85	100	113	206	282	401	566	806	
Per Capita Income (\$58)	52	55	85	100	109	223	298	417	569	768	
Total Earnings	50	60	86	100	112	200	269	381	536	757	
Per Worker Earnings (\$58)	--	65	85	100	---	189	244	324	429	570	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1960=100)											
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020	
Population	106	98	100	100	101	92	94	95	99	104	
Total Employment	92	101	100	100	96	106	110	117	125	133	
Agriculture, Forestry, Fisheries	268	244	100	100	49	61	49	41	33	25	
Mining	103	98	100	100	76	65	59	53	48	43	
Manufacturing	132	152	100	100	77	86	81	75	73	70	
Food, Kindred Products	75	75	100	100	---	86	76	67	67	57	
Textile Mill Products	2,550	1,925	100	100	---	---	76	67	67	57	
Chemicals, Allied Products	107	120	100	100	---	116	116	128	128	139	
Paper, Allied Products	---	76	100	100	---	167	205	256	308	372	
Petroleum Refining	---	---	---	---	---	---	---	---	---	---	
Primary Metals	---	253	100	100	---	---	---	---	---	---	
Federal Military	22	9	100	100	---	114	114	114	114	114	
Other	77	91	100	100	121	123	134	149	163	179	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

TABLE 19-15 Economic Data by County for Planning Subarea 2.1

County Name	Econ Area No.	Total Population				Number Urban	Percent Urban	Land Area Square Mi.
		1940	1950	1960	1970	1970	1970	1970
TOTAL PLANNING SUBAREA 2.1		<u>771,047</u>	<u>816,636</u>	<u>896,396</u>	<u>1,005,023</u>	<u>582,854</u>	<u>51.0</u>	<u>15,446</u>
Michigan		<u>73,857</u>	<u>67,835</u>	<u>65,786</u>	<u>62,153</u>	<u>30,443</u>	<u>49.0</u>	<u>2,966</u>
Dickinson	81	28,731	24,844	23,917	23,753	17,011	71.6	757
Iron	81	20,243	17,692	17,184	13,813	2,684	19.4	1,171
Menominee	81	24,883	25,299	24,685	24,587	10,748	43.7	1,038
Wisconsin		<u>697,190</u>	<u>748,801</u>	<u>830,610</u>	<u>942,870</u>	<u>552,411</u>	<u>52.0</u>	<u>12,480</u>
Brown	81	83,109	98,314	125,082	158,244	129,105	81.6	524
Calumet	81	17,618	18,840	22,268	27,604	12,332	44.7	322
Door	81	19,095	20,870	20,685	20,106	6,776	33.7	492
Florence	81	4,177	3,756	3,437	3,298	-----	----	487
Fond du Lac	80	62,353	67,829	75,085	84,567	48,319	57.1	725
Forest	81	11,805	9,437	7,542	7,691	-----	----	1,007
Green Lake	79	14,092	14,749	15,418	16,878	5,297	31.4	354
Kewaunee	81	16,680	17,366	18,282	18,961	6,924	36.5	330
Langlade	82	23,227	21,975	19,916	19,220	9,005	46.9	856
Manitowoc	81	61,617	67,159	75,215	82,294	49,533	60.2	590
Marinette	81	36,225	35,748	34,660	35,810	15,532	43.4	1,378
Marquette	79	9,097	8,839	8,516	8,865	-----	----	455
Oconto	81	27,075	26,238	25,110	25,553	7,184	28.1	1,001
Outagamie	81	70,032	81,722	101,794	119,356	81,879	68.6	634
Shawano	81	35,378	35,249	34,351	35,257	6,488	19.9	994
Sheboygan	80	76,221	80,631	86,484	96,660	59,065	61.1	505
Waupaca	81	34,614	35,056	35,340	37,780	13,375	35.4	751
Waushara	79	14,268	13,920	13,497	14,795	41	0.3	627
Winnebago	81	80,507	91,103	107,928	129,931	101,556	78.2	448

and Basin averages. The manufacturing sector of the planning subarea's economy will continue to expand, primarily because of growth in the paper and allied products industry. The largest growth will occur in the service industry, which will have increased its number of employees by 178 percent over the 1960 level by 2020. This planning subarea is 51 percent urbanized, and that percentage will increase following national and Basinwide trends.

Further information is contained in Tables 19-15 and 19-16 and Figure 19-7.

#### 1.6.5 Planning Subarea 2.2, Lake Michigan Southwest

Between 1940 and 1970 the population of Planning Subarea 2.2 increased from approximately 6,034,000 persons to 9,493,000 at approximately the same rate as the Basin population increased. This rate was slightly higher than the national rate. In 1970 this planning

subarea accounted for 32 percent of the total Great Lakes Basin population. Approximately 5,492,000 of that total resided in Cook County, Illinois. The 3,843,000 persons employed in PSA 2.2 amounted to 34 percent of the 1970 employment in the Great Lakes Basin. From 1940 to 1960, manufacturing employment rose from approximately 821,300 to 1,302,300 persons, which was 38.3 percent of total employment. In 1970 employment in manufacturing was reported at 1,284,000 persons. No reason for the apparent decline in manufacturing employment from 1960 to 1970 is found in preliminary data. In 1970 the labor force participation rate in PSA 2.2 was 40 percent, the highest rate of any of the planning subareas. Employment in agriculture, forestry, and fisheries included 30,400 persons, only 0.8 percent of the total, and mining industries employed 4,300, only 0.1 percent of the total.

Population in Planning Subarea 2.2, which will be 17,386,000 persons by 2020, will increase by a factor of 2.05 over the 1960 population. Population in the U.S. as a whole will

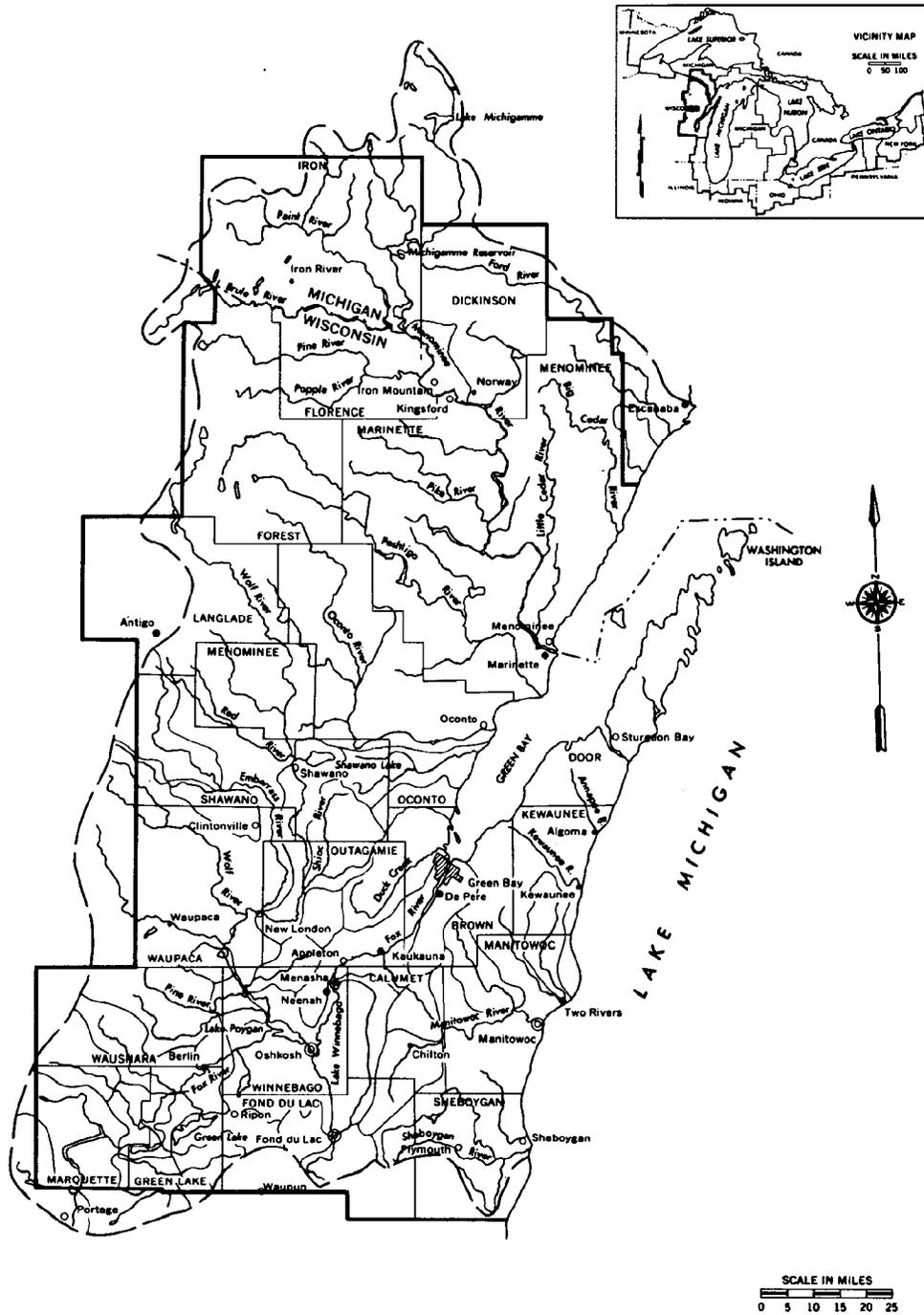


FIGURE 19-7 Planning Subarea 2.1

TABLE 19-16 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.1

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	724,183	773,077	817,758	883,149	907,286	1,082,100	1,220,000	1,357,000	1,527,000	1,726,000
Total Personal Income	742,451	1,283,825	1,664,429	1,808,472	1,808,472	4,034,290	5,958,101	9,022,987	13,555,788	20,289,201
Per Capita Income (\$58) <sup>1</sup>	1,025	1,570	1,885	1,993	1,993	3,728	4,884	6,666	8,877	11,755
Per Capita Relative (US=1.00)	.80	.79	.87	.88	.88	.91	.91	.93	.94	.95
Total Earnings <sup>2</sup>	580,046	649,499	1,072,164	1,369,269	1,458,620	3,128,448	4,534,904	6,842,315	10,231,231	15,262,789
Per Worker Earnings (\$58) <sup>1</sup>	2,575	3,491	4,270	4,270	4,270	7,576	9,800	13,017	17,181	22,700
Per Worker Relative (US=1.00)	.84	.89	.91	.91	.91	.94	.94	.96	.96	.97
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020
Population (April 1)	771,047	816,636	896,396	896,396	1,005,023	1,082,100	1,220,000	1,357,000	1,527,000	1,726,000
Total Employment	252,245	307,131	320,635	320,635	371,022	412,900	462,700	525,700	595,500	672,400
Participation Rate (EMPL/POP)	.33	.38	.36	.36	.37	.38	.38	.39	.39	.39
Agriculture, Forestry, Fisheries	78,630	69,377	45,147	45,147	28,737	31,100	25,600	21,900	18,500	15,300
Mining	1,918	2,405	2,367	2,367	1,275	2,000	2,000	2,000	2,000	1,900
Manufacturing	64,282	93,114	110,522	110,522	125,048	141,100	154,700	169,500	186,400	204,500
Food, Kindred Products	8,891	11,487	14,784	14,784	14,600	13,700	13,400	13,400	13,100	12,900
Textile Mill Products	1,991	3,539	2,907	2,907	3,000	3,000	3,000	3,000	3,000	3,000
Chemicals, Allied Products	407	895	1,514	1,514	2,500	3,100	4,000	4,000	4,000	5,900
Paper, Allied Products	---	17,229	20,664	20,664	28,600	32,400	36,700	36,700	41,300	45,700
Petroleum Refining	---	139	1,155	1,155	---	1,000	800	800	700	600
Petroleum Products	---	---	---	---	---	---	---	---	---	---
Primary Metals	---	2,858	3,273	3,273	---	3,300	3,300	3,300	3,200	3,200
Federal Military	123	428	525	525	---	700	700	700	700	700
Other	107,292	141,807	162,074	162,074	215,962	238,100	279,700	331,500	388,000	450,000
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	82	88	93	100	103	122	138	154	173	195
Total Personal Income	45	48	77	100	109	242	358	542	814	1,219
Per Capita Income (\$58)	54	54	83	100	106	198	259	353	471	624
Total Earnings	42	47	78	100	107	228	331	500	747	1,115
Per Worker Earnings (\$58)	---	60	82	100	---	177	229	305	402	531
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020
Population	86	91	100	100	112	121	136	151	170	192
Total Employment	79	96	100	100	116	129	144	164	186	210
Agriculture, Forestry, Fisheries	174	154	100	100	64	69	57	48	41	34
Mining	81	102	100	100	54	84	84	84	84	80
Manufacturing	58	84	100	100	113	128	140	153	169	185
Food, Kindred Products	60	78	100	100	95	91	93	91	87	87
Textile Mill Products	68	122	100	100	---	103	103	103	103	103
Chemicals, Allied Products	27	59	100	100	---	203	203	264	324	390
Paper, Allied Products	---	138	100	100	---	156	178	178	200	221
Petroleum Refining	---	14	100	100	---	87	69	69	61	52
Petroleum Products	---	---	100	100	---	101	101	101	98	98
Primary Metals	---	87	100	100	---	101	101	101	133	133
Federal Military	23	81	100	100	---	133	133	133	205	239
Other	66	87	100	100	133	147	173	205	239	278

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of Federal military.

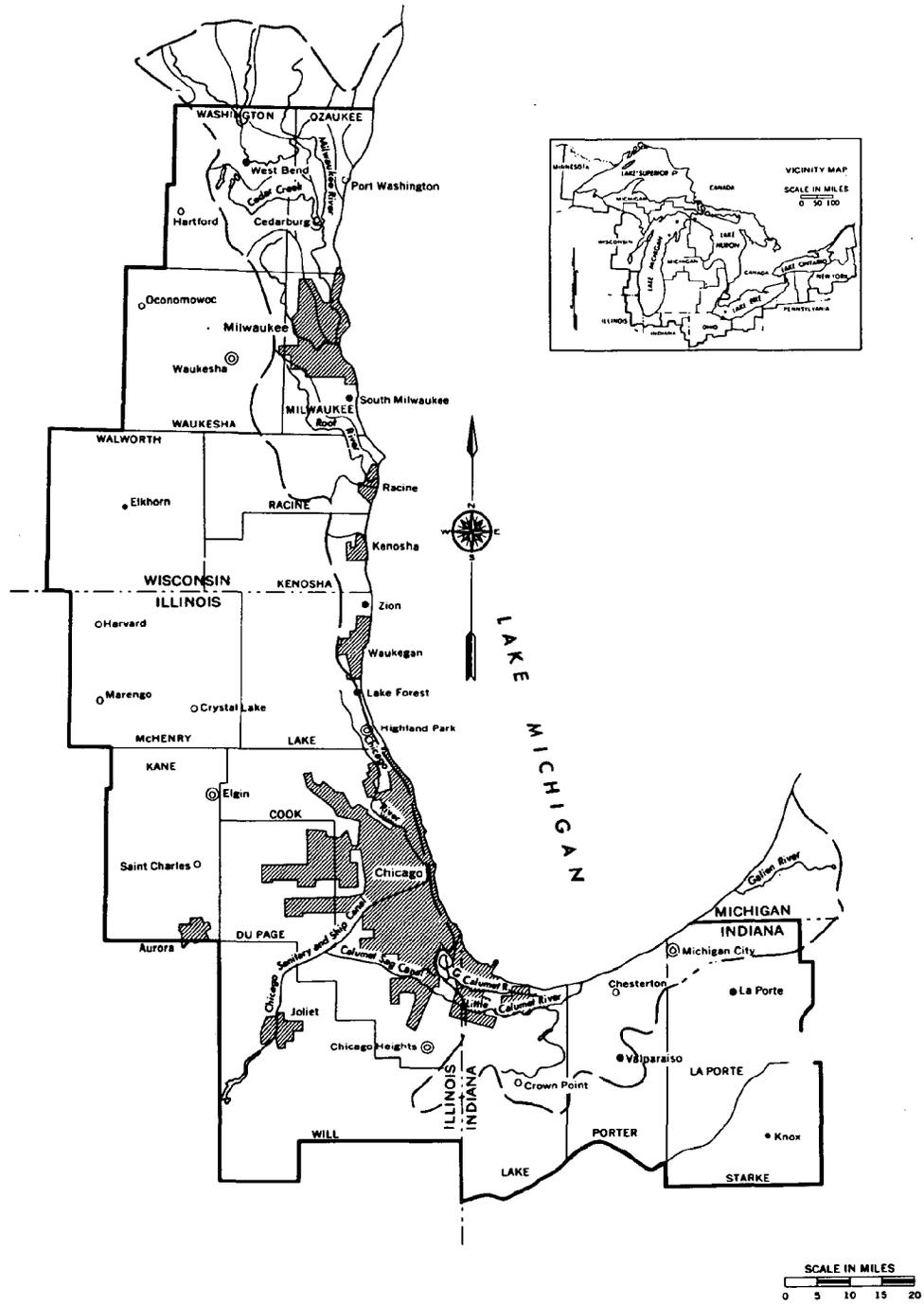


FIGURE 19-8 Planning Subarea 2.2

**TABLE 19-17 Economic Data by County for Planning Subarea 2.2**

County Name	Econ Area No.	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Square Mi. 1970
		1940	1950	1960	1970			
<b>TOTAL PLANNING SUBAREA 2.2</b>		<u>6,034,291</u>	<u>6,918,804</u>	<u>8,481,097</u>	<u>9,492,823</u>	<u>8,900,936</u>	<u>94.0</u>	<u>8,196</u>
<b>Illinois</b>		<u>4,569,643</u>	<u>5,177,868</u>	<u>6,220,913</u>	<u>6,978,947</u>	<u>6,710,912</u>	<u>96.0</u>	<u>3,719</u>
Cook	73	4,063,342	4,508,792	5,129,725	5,492,369	5,473,670	99.7	954
Du Page	73	103,480	154,599	313,459	491,882	468,983	95.3	331
Kane	73	130,206	150,388	208,246	251,005	219,662	87.5	520
Lake	73	121,094	179,097	293,656	382,638	311,414	81.4	457
McHenry	73	37,311	50,656	84,210	111,555	57,420	51.5	610
Will	73	114,210	134,336	191,617	249,498	179,763	72.0	847
<b>Indiana</b>		<u>396,949</u>	<u>500,318</u>	<u>686,570</u>	<u>757,989</u>	<u>644,880</u>	<u>85.0</u>	<u>1,855</u>
Lake	73	293,195	368,152	513,269	546,253	516,075	94.5	513
La Porte	73	63,660	76,808	95,111	105,342	69,560	66.0	607
Porter	73	27,836	40,076	60,279	87,114	55,726	64.0	425
Starke	72	12,258	15,282	17,911	19,280	3,519	18.3	310
<b>Wisconsin</b>		<u>1,067,699</u>	<u>1,240,618</u>	<u>1,573,614</u>	<u>1,755,887</u>	<u>1,545,144</u>	<u>88.0</u>	<u>2,622</u>
Kenosha	80	63,505	75,238	100,615	117,917	84,262	71.5	272
Milwaukee	80	766,885	871,047	1,036,041	1,054,063	1,054,063	100.0	237
Ozaukee	80	18,985	23,361	38,441	54,421	36,730	67.5	236
Racine	80	94,047	109,585	141,781	170,838	130,052	76.1	337
Walworth	80	33,103	41,584	52,368	63,444	24,537	38.7	557
Washington	80	28,430	33,902	46,119	63,839	30,028	47.0	429
Waukesha	80	62,744	85,901	158,249	231,365	185,472	80.2	554

increase by a factor of 2.22 during that time. The labor force participation rate will rise to 42 percent, and total employment will rise to 7,264,000 persons. Manufacturing employment is projected to increase to 1,895,000 persons, but its share of total employment will decline to 26 percent. The largest growth will occur in the chemicals and allied products industries. Employment in services and related industries will rise from 2,024,600 persons (59.5 percent of total employment) in 1960 to 5,319,000 (73.2 percent) in 2020. Per capita income in PSA 2.2 will still be above the United States average, but growth in per capita income will have been less than the United States average. In 2020 per capita income in Planning Subarea 2.2 will be 107 percent of United States per capita income, declining from a 1960 ratio of 130 percent. In 1970 the planning subarea was already 94 percent urbanized. It will approach 100 percent urbanization in the future.

Further information is contained in Tables 19-17 and 19-18 and Figure 19-8.

**1.6.6 Planning Subarea 2.3, Lake Michigan Southeast**

Between 1940 and 1970 population in Planning Subarea 2.3 increased from approximately 1,499,000 to 2,523,000 persons, an increase of 68.3 percent. During that time population in the Great Lakes Basin increased 56.1 percent and population in the U.S. as a whole increased 54.3 percent. The planning subarea population was 8.6 percent of the Basin population. Employment in 1970 was 967,000 persons, approximately 8.5 percent of employment throughout the Great Lakes Basin. Total employment in the planning subarea increased 86 percent from 1940 to 1970, while Great Lakes Basin employment increased 67 percent and United States employment increased 73 percent. Manufacturing industries employed approximately 35.7 percent of the total, or 345,000 persons. There were approximately 29,500 workers, three percent of all those employed in the area, in agriculture, forestry, and fisheries. Almost 2,000, approx-

TABLE 19-18 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.2

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population (July 1)	5,793,546	6,041,224	6,939,559	8,390,889	8,675,453	10,999,000	12,494,300	13,844,500	15,463,800	17,385,700	
Total Personal Income	17,169,714	11,661,477	16,975,350	23,311,193	25,242,003	53,332,797	76,690,620	110,747,323	159,803,928	230,875,565	
Per Capita Income (\$58) <sup>1</sup>	2,101	1,930	2,446	2,778	2,910	4,849	6,138	7,999	10,334	13,280	
Per Capita Relative (US=1.00)	1.65	1.48	1.36	1.30	1.29	1.18	1.15	1.12	1.09	1.07	
Total Earnings <sup>2</sup>	9,249,650	9,619,036	14,419,888	19,689,326	20,967,600	42,057,354	59,145,142	84,959,603	121,770,386	174,991,715	
Per Worker Earnings (\$58) <sup>1</sup>	-----	4,167	4,847	5,796	-----	9,094	11,387	14,561	18,690	24,091	
Per Worker Relative (US=1.00)	-----	1.36	1.23	1.24	-----	1.13	1.10	1.07	1.05	1.03	
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020											
	1940	1950	1960	1970	1980	1990	2000	2010	2020		
Population (April 1)	6,034,291	6,918,804	8,481,097	9,492,823	10,999,000	12,491,300	13,844,500	15,463,800	17,385,700		
Total Employment	2,308,309	2,974,808	3,397,104	3,842,882	4,624,500	5,194,100	5,834,800	6,515,200	7,263,900		
Participation Rate (ENPL/POP)	.38	.43	.40	.40	.42	.42	.42	.42	.42		
Agriculture, Forestry, Fisheries	60,985	53,198	37,842	30,424	29,100	25,000	22,300	19,500	16,900		
Mining	2,194	2,745	2,674	4,283	2,300	2,200	2,200	2,200	2,100		
Manufacturing	821,309	1,147,452	1,302,300	1,283,392	1,515,100	1,587,600	1,674,300	1,776,500	1,895,100		
Food, Kindred Products	102,854	124,605	127,288	-----	103,000	93,500	87,500	82,100	78,500		
Textile Mill Products	17,790	14,910	10,463	-----	9,600	8,500	8,100	8,100	7,700		
Chemicals, Allied Products	28,615	40,142	53,082	-----	73,500	82,600	98,800	114,400	129,900		
Paper, Allied Products	-----	28,059	30,292	-----	41,300	47,000	53,600	60,900	67,700		
Petroleum Refining	-----	23,766	23,524	-----	16,100	13,100	11,400	9,500	7,700		
Primary Metals	-----	148,756	150,915	-----	152,900	152,200	152,700	151,300	150,600		
Federal Military	5,718	17,714	29,659	-----	31,500	31,500	31,500	31,500	31,500		
Other	1,418,103	1,753,699	2,024,629	2,524,783	3,046,700	3,547,900	4,104,600	4,685,700	5,318,500		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population	69	72	83	100	103	131	149	165	184	207	
Total Personal Income	52	50	73	100	108	229	329	475	686	990	
Per Capita Income (\$58)	76	69	88	100	105	175	221	288	372	478	
Total Earnings	47	49	73	100	106	214	300	432	618	889	
Per Worker Earnings (\$58)	---	72	84	100	---	157	196	251	322	416	
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)											
	1940	1950	1960	1970	1980	1990	2000	2010	2020		
Population	71	82	100	112	130	147	163	182	205		
Total Employment	68	88	100	113	136	153	172	192	214		
Agriculture, Forestry, Fisheries	161	141	100	80	77	66	59	52	45		
Mining	82	103	100	160	86	82	82	82	79		
Manufacturing	63	88	100	99	116	122	129	136	146		
Food, Kindred Products	81	98	100	---	81	73	69	64	62		
Textile Mill Products	170	143	100	---	92	80	81	77	74		
Chemicals, Allied Products	54	76	100	---	138	156	186	216	245		
Paper, Allied Products	---	93	100	---	136	155	177	201	223		
Petroleum Refining	---	101	100	---	68	56	48	40	33		
Primary Metals	---	99	100	---	101	101	101	100	100		
Federal Military	19	60	100	---	106	106	106	106	106		
Other	70	87	100	125	150	175	203	231	263		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-19 Economic Data by County for Planning Subarea 2.3**

County Name	Econ Area No.	Total Population				Number Urban	Percent Urban	Land Area
		1940	1950	1960	1970	1970	1970	Square Mi. 1970
TOTAL PLANNING SUBAREA 2.3		<u>1,498,842</u>	<u>1,807,268</u>	<u>2,211,001</u>	<u>2,522,579</u>	<u>1,493,546</u>	<u>59.0</u>	<u>14,063</u>
Indiana		<u>311,260</u>	<u>376,547</u>	<u>440,573</u>	<u>478,991</u>	<u>312,567</u>	<u>65.0</u>	<u>2,479</u>
Elkhart	72	72,634	84,512	106,790	126,529	79,223	62.6	468
Lagrange	72	14,352	15,347	17,380	20,890	-----	----	381
Marshall	72	25,935	29,468	32,443	34,986	11,148	31.9	443
Noble	71	22,776	25,075	28,162	31,382	9,872	31.5	412
St. Joseph	72	161,823	205,058	238,614	245,045	207,207	84.6	466
Steuben	71	13,740	17,087	17,184	20,159	5,117	25.4	309
Michigan		<u>1,187,582</u>	<u>1,430,721</u>	<u>1,770,428</u>	<u>2,043,588</u>	<u>1,180,979</u>	<u>58.0</u>	<u>11,584</u>
Allegan	69	41,839	47,493	57,729	66,575	15,014	22.6	826
Barry	70	22,613	26,183	31,738	38,166	6,501	17.0	554
Berrien	72	89,117	115,702	149,865	163,875	76,012	46.4	580
Branch	70	25,845	30,202	34,903	37,906	9,099	24.0	506
Calhoun	70	94,206	120,813	138,858	141,963	84,577	59.6	709
Cass	72	21,910	28,185	36,932	43,312	8,916	20.6	491
Clinton	70	26,671	31,195	37,969	48,492	10,338	21.3	572
Eaton	70	34,124	40,023	49,684	68,892	28,988	42.1	571
Hillsdale	70	29,092	31,916	34,742	37,171	7,728	20.8	600
Ingham	70	130,616	172,941	211,296	261,039	223,702	85.7	559
Ionia	69	35,710	38,158	43,132	45,848	15,299	33.4	575
Jackson	70	93,108	107,925	131,994	143,274	78,572	54.8	698
Kalamazoo	70	100,085	126,707	169,712	201,550	152,083	75.5	562
Kent	69	246,338	288,292	363,187	411,044	342,261	83.3	857
Montcalm	69	28,581	31,013	35,795	39,660	7,493	18.9	712
Ottawa	69	59,660	73,751	98,719	128,181	61,921	48.3	563
St. Joseph	72	31,749	35,071	42,332	47,392	16,650	35.1	506
Shiawassee	67	41,207	45,967	53,446	63,075	23,686	37.6	540
Van Buren	70	35,111	39,184	48,395	56,173	12,139	21.6	603

imately 0.8 percent of the total, were employed in mining. Services and related industries employed 590,000 workers, the largest share of area employment. Between 1950 and 1960 per capita income in the planning subarea was approximately equal to the United States average.

In 2020 population in Planning Subarea 2.3 will be 2.2 times its 1960 level, having increased at a rate almost equal to that of national population growth. The Basin growth rate will be 2.0 times its 1960 level. The labor force participation rate will rise to 40 percent, and total employment in the area will rise 2.4 times to 1,936,000 persons. Per capita income will remain at 97 percent of United States per capita income throughout the period of analysis. Employment in manufacturing will rise to 523,400 persons, but its share of total employment will decline from 35.7 percent to 27.0 percent. The number of employees in agriculture in 2020 will drop to 15,400, which will be less than one percent of total employment. Service related industries will experience the largest gain in employment, from 590,000 per-

sons in 1970 to 1,392,900 in 2020, almost 72 percent of projected total employment. At present 59 percent of the population lives in urban areas, and this proportion will increase with national and Basinwide density trends.

Further information is contained in Tables 19-19 and 19-20 and Figure 19-9.

### 1.6.7 Planning Subarea 2.4, Lake Michigan Northeast

Population in Planning Subarea 2.4 increased from approximately 368,700 persons in 1940 to approximately 496,500 in 1970. From 1940 to 1970 employment rose from 110,700 to 167,000 persons, approximately 1.5 percent of the Basin total, while the labor participation rate rose from 30 to 34 percent. Manufacturing related employment amounted to 54,700 persons in 1970, which was slightly less than 33 percent of total employment. This figure is approximately two percent lower than the Basin average and approximately eight percent higher than the national average. There were



**TABLE 19-20 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.3**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population (July 1)	1,408,599	1,512,621	1,818,315	2,193,606	2,239,615	2,914,000	3,325,300	3,771,900	4,281,800	4,876,400	
Total Personal Income	1,734,452	1,884,891	3,490,293	4,672,033	4,940,091	11,613,625	17,231,565	26,257,129	39,630,174	59,496,835	
Per Capita Income (\$58) <sup>1</sup>	1,231	1,246	1,920	2,130	2,206	3,985	5,182	6,961	9,255	12,201	
Per Capita Relative (US=1.00)	.97	.96	1.06	1.00	.98	.97	.97	.97	.98	.98	
Total Earnings <sup>2</sup>	1,332,077	1,573,336	2,933,586	3,892,624	4,043,958	9,138,755	13,278,431	20,110,686	30,155,687	45,053,865	
Per Worker Earnings (\$58) <sup>1</sup>	3,030	4,219	4,804	4,804	4,804	8,000	10,254	13,462	17,694	23,274	
Per Worker Relative (US=1.00)	.99	1.07	1.03	1.03	1.03	.99	.99	.99	.99	1.00	
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020											
	1940	1950	1960	1970	1980	1990	2000	2010	2020		
Population (April 1)	1,498,842	1,807,268	2,211,001	2,522,579	2,914,000	3,325,300	3,771,900	4,281,800	4,876,400		
Total Employment	519,210	695,320	810,231	966,990	1,142,400	1,294,900	1,493,900	1,704,300	1,935,800		
Participation Rate (EMPL/POP)	.35	.38	.37	.38	.39	.39	.40	.40	.40		
Agriculture, Forestry, Fisheries	96,367	74,217	48,241	29,518	31,100	25,400	21,900	18,500	15,400		
Mining	1,727	957	1,359	1,996	1,200	1,300	1,400	1,500	1,600		
Manufacturing	170,008	263,369	305,402	345,267	382,500	408,800	442,800	480,500	523,400		
Food, Kindred Products	14,424	19,620	25,030	23,800	23,800	23,600	23,400	23,200	23,000		
Textile Mill Products	3,220	2,137	1,198	800	800	800	700	700	700		
Chemicals, Allied Products	2,586	4,950	8,071	13,900	13,900	16,900	21,500	26,000	30,600		
Paper, Allied Products	-----	16,580	19,007	-----	25,800 <sup>3</sup>	29,000 <sup>3</sup>	32,700 <sup>3</sup>	36,700 <sup>3</sup>	40,400 <sup>3</sup>		
Petroleum Refining	-----	742	753	-----	-----	-----	-----	-----	-----		
Primary Metals	-----	11,441	16,942	-----	22,900	24,400	26,000	27,400	28,900		
Federal Military	191	4,745	1,529	-----	1,300	1,300	1,300	1,300	1,300		
Other	250,917	352,032	453,700	590,209	725,100	857,200	1,025,600	1,201,500	1,392,900		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population	64	69	83	100	102	133	152	172	195	222	
Total Personal Income	37	40	75	100	106	249	369	562	848	1,273	
Per Capita Income (\$58)	58	58	90	100	104	187	243	327	435	573	
Total Earnings	34	40	75	100	104	235	341	517	775	1,157	
Per Worker Earnings (\$58)	---	63	88	100	---	167	213	280	366	484	
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)											
	1940	1950	1960	1970	1980	1990	2000	2010	2020		
Population	68	82	100	114	132	150	171	194	221		
Total Employment	64	86	100	119	141	160	184	210	239		
Agriculture, Forestry, Fisheries	200	154	100	61	64	53	45	38	32		
Mining	127	70	100	147	88	96	103	110	118		
Manufacturing	56	86	100	113	125	134	145	157	171		
Food, Kindred Products	58	78	100	95	94	93	93	93	92		
Textile Mill Products	269	178	100	---	67	67	58	58	58		
Chemicals, Allied Products	32	61	100	---	172	209	266	322	379		
Paper, Allied Products	---	87	100	---	136	153	172 <sup>3</sup>	193 <sup>3</sup>	213 <sup>3</sup>		
Petroleum Refining	---	99	100	---	144	153 <sup>3</sup>	162 <sup>3</sup>	171 <sup>3</sup>	181 <sup>3</sup>		
Primary Metals	---	68	100	---	135	144	153	162	171		
Federal Military	12	310	100	---	85	85	85	85	85		
Other	55	78	100	130	160	189	226	265	307		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of Federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

TABLE 19-21 Economic Data by County for Planning Subarea 2.4

County Name	Econ Area No.	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Square Mi. 1970
		1940	1950	1960	1970			
<b>TOTAL PLANNING SUBAREA 2.4</b>		<b>368,684</b>	<b>410,465</b>	<b>452,884</b>	<b>496,540</b>	<b>209,626</b>	<b>42.0</b>	<b>12,696</b>
<b>Michigan</b>		<b>368,684</b>	<b>410,465</b>	<b>452,884</b>	<b>496,540</b>	<b>209,626</b>	<b>42.0</b>	<b>12,696</b>
Antrim	69	10,964	10,721	10,373	12,612	-----	----	476
Benzie	69	7,800	8,306	7,834	8,593	-----	----	316
Charlevoix	69	13,031	13,475	13,421	16,541	6,488	39.2	414
Delta	81	34,037	32,913	34,298	35,924	20,605	57.4	1,177
Emmet	69	15,791	16,534	15,904	18,331	6,342	34.6	461
Grand Traverse	69	23,390	28,598	33,490	39,175	18,048	46.1	462
Kalkaska	69	5,159	4,597	4,382	5,272	-----	----	566
Lake	69	4,798	5,257	5,338	5,661	-----	----	571
Leelanau	69	8,436	8,647	9,321	10,872	-----	----	345
Mackinac	68	9,438	9,287	10,853	9,660	2,892	29.9	1,014
Manistee	69	18,450	18,524	19,042	20,094	7,723	38.4	553
Mason	69	19,378	20,474	21,929	22,612	9,021	39.9	490
Mecosta	69	16,902	18,968	21,051	27,992	11,995	42.9	560
Missaukee	69	8,034	7,458	6,784	7,126	-----	----	565
Muskegon	69	94,501	121,545	149,943	157,426	108,733	69.1	501
Newaygo	69	19,286	21,567	24,160	27,992	3,465	12.4	849
Oceana	69	14,812	16,105	16,547	17,984	-----	----	536
Osceola	69	13,309	13,797	13,595	14,838	-----	----	581
Roscommon	68	3,668	5,916	7,200	9,892	-----	----	521
Schoolcraft	81	9,524	9,148	8,953	8,226	4,324	52.6	1,181
Wexford	69	17,976	18,628	18,466	19,717	9,990	50.7	559

6,400 persons employed in agriculture, forestry, and fisheries, areas which have declined steadily in the last 30 years. In 1970 agriculturally related employment was 3.8 percent of the total, over twice the Basin average but slightly below the national average.

The 1970 population, 496,500 persons, is projected to increase to 841,000 persons by 2020. This is a sizeable increase but the rate of growth is considerably lower than that of the Basin and the nation. Total employment is expected to increase from 147,500 persons in 1960 to 326,000 persons in 2020, and the labor force participation rate is expected to rise to 39 percent. Agricultural employment will decline to only 2,100 persons, and its proportion of total employment will decline to less than one percent. In 1962 the per capita income of the planning subarea was \$1,771 or 78 percent of the U.S. average. Although the 2020 projection of per capita income is almost six times its 1962 value, it will still be only 84 percent of the national per capita income. At present the planning subarea is only 42 percent urbanized. Eighty percent of the Great Lakes Basin is urbanized. In view of declining agricultural employment, a higher degree of urbanization is expected.

Further information is contained in Tables 19-21 and 19-22 and Figure 19-10.

#### 1.6.8 Planning Subarea 3.1, Lake Huron North

Planning Subarea 3.1, which is predominantly rural, contained 142,000 people in 1970, slightly less than 0.5 percent of total Great Lakes Basin population. Total employment was approximately 40,200 persons. Since 1940 both population and employment have increased less rapidly in PSA 3.1 than in the Great Lakes Basin. Agriculture in 1970 accounted for almost five percent of employment. The comparable figure for the Basin was less than two percent. The percentage of employment in manufacturing, 23 percent, was close to the national average of 25 percent, but well below the Great Lakes Basin figure of 35 percent. The major employers in the manufacturing sector are paper, food, and primary metals. Mining accounted for 2.6 percent of employment, with slightly more than 1,000 workers, and in absolute terms this figure has remained fairly constant over the last 20 years. Planning subarea agricultural employment decreased 84 per-

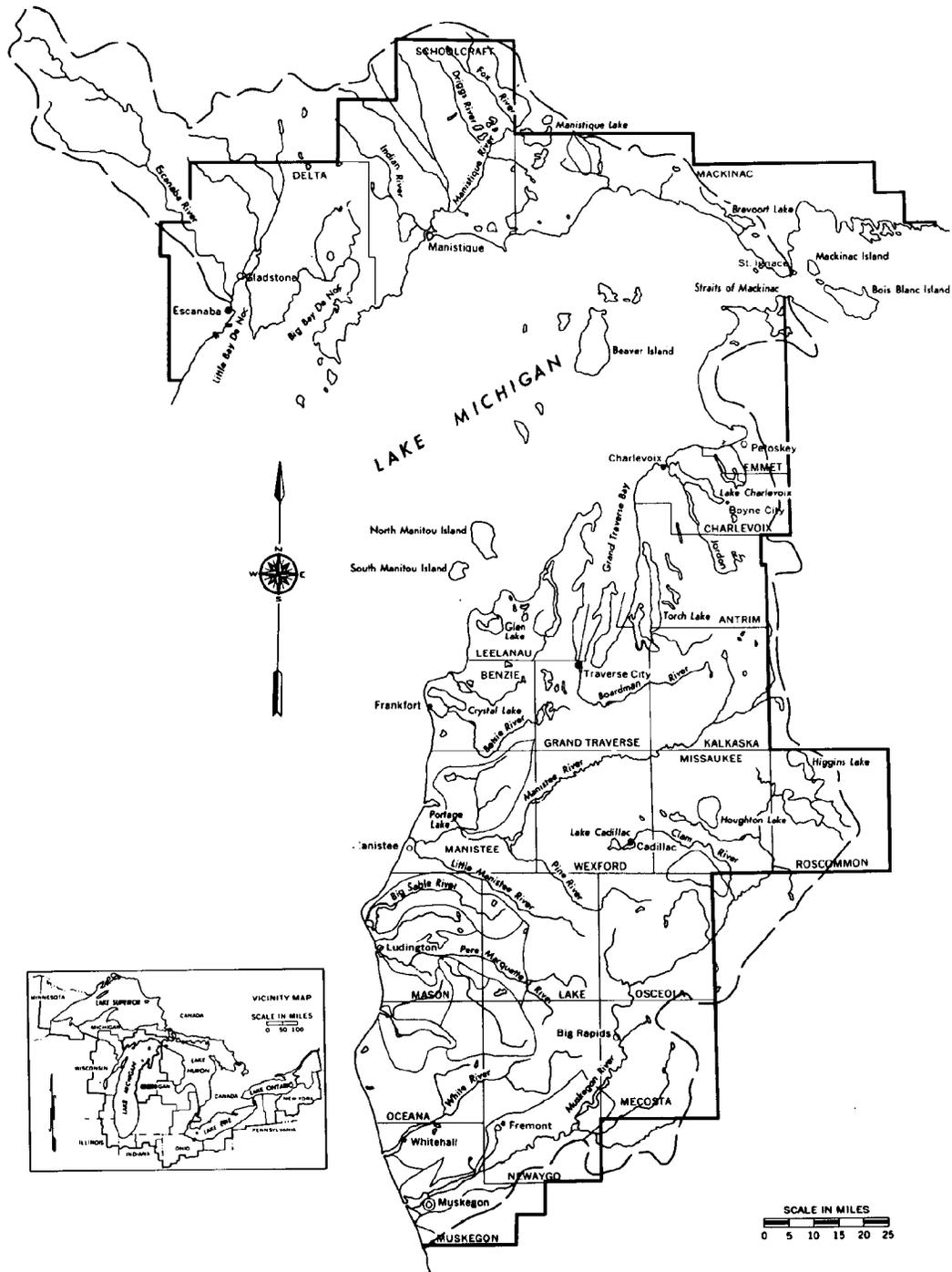


FIGURE 19-10 Planning Subarea 2.4

TABLE 19-22 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 2.4

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	332,023	372,815	412,733	449,630	463,464	547,200	607,700	671,400	748,400	841,400
Total Personal Income	291,199	324,305	600,843	755,704	820,756	1,790,037	2,621,499	3,934,350	5,881,312	8,763,587
Per Capita Income (\$58) <sup>1</sup>	.877	.870	1,456	1,681	1,771	3,271	4,314	5,860	7,859	10,415
Per Capita Relative (US=1.00)	.69	.67	.81	.79	.78	.80	.81	.82	.83	.84
Total Earnings <sup>2</sup>	233,705	268,353	488,855	611,166	650,924	1,371,090	1,979,571	2,970,365	4,431,064	6,589,398
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,423	3,640	4,145	-----	6,917	8,926	11,720	15,408	20,218
Per Worker Relative (US=1.00)	-----	.79	.93	.88	-----	.86	.86	.86	.86	.87
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	368,684	410,465	452,884	496,540	547,200	607,700	671,400	748,400	841,400	
Total Employment	110,743	134,291	147,452	166,993	198,200	221,800	253,400	287,600	325,900	
Participation Rate (EMPL/POP)	.30	.33	.33	.34	.36	.36	.38	.38	.39	
Agriculture, Forestry, Fisheries	31,234	23,249	11,014	6,399	5,800	4,300	3,400	2,600	2,100	
Mining	256	1,050	853	838	600	600	600	500	500	
Manufacturing	29,602	40,660	50,842	54,688	62,600	66,100	70,800	76,000	82,000	
Food, Kindred Products	1,992	2,842	4,224	-----	4,400	4,600	4,600	4,700	4,800	
Textile Mill Products	720	93	78	-----	-----	-----	-----	-----	-----	
Chemicals, Allied Products	771	946	1,626	-----	2,600	3,000	3,800	4,500	5,300	
Paper, Allied Products	-----	1,655	2,165	-----	3,200	3,800	4,400	5,000	5,600	
Petroleum Refining	-----	284	403	-----	-----	-----	-----	-----	-----	
Primary Metals	-----	4,523	6,186	-----	7,600	7,800	8,100	8,300	8,400	
Federal Military	134	282	620	-----	700	700	700	700	700	
Other	49,517	69,050	84,123	105,068	128,500	150,000	178,000	207,700	240,600	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	74	83	92	100	103	122	135	149	166	187
Total Personal Income	39	43	79	100	109	237	347	521	778	1,159
Per Capita Income (\$58)	52	52	87	100	105	195	257	349	467	619
Total Earnings	38	44	80	100	106	224	324	486	725	1,078
Per Worker Earnings (\$58)	---	58	88	100	---	167	215	283	372	488
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population	81	91	100	110	121	134	148	165	186	
Total Employment	75	91	100	113	134	150	172	195	221	
Agriculture, Forestry, Fisheries	284	211	100	58	53	39	31	24	19	
Mining	30	123	100	98	70	70	70	59	59	
Manufacturing	58	80	100	108	123	130	139	149	161	
Food, Kindred Products	47	67	100	100	104	109	109	111	114	
Textile Mill Products	923	119	100	---	---	---	---	---	---	
Chemicals, Allied Products	47	58	100	160	185	234	277	326	376	
Paper, Allied Products	---	76	100	---	---	---	---	---	---	
Petroleum Refining	---	70	100	---	---	---	---	---	---	
Primary Metals	---	73	100	---	---	---	---	---	---	
Federal Military	22	46	100	---	---	---	---	---	---	
Other	59	82	100	125	153	178	211	247	286	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Too small to be projected, but included in higher level totals.

TABLE 19-23 Economic Data by County for Planning Subarea 3.1

County Name	Econ Area No.	Total Population				Number Urban	Percent Urban	Land Area Square Mi.
		1940	1950	1960	1970	1970	1970	1970
<b>TOTAL PLANNING SUBAREA 3.1</b>		<b>94,611</b>	<b>101,512</b>	<b>119,007</b>	<b>142,064</b>	<b>37,052</b>	<b>26.0</b>	<b>6,300</b>
<b>Michigan</b>		<b>94,611</b>	<b>101,512</b>	<b>119,007</b>	<b>142,064</b>	<b>37,052</b>	<b>26.0</b>	<b>6,300</b>
Alcona	68	5,463	5,856	6,352	7,113	-----	----	678
Alpena	68	20,766	22,189	28,556	30,708	13,805	45.0	565
Arenac	68	9,233	9,644	9,860	11,149	-----	----	367
Cheboygan	68	13,644	13,731	14,550	16,573	5,553	33.5	721
Crawford	68	3,765	4,151	4,971	6,482	-----	----	561
Iosco	68	8,560	10,906	16,505	24,905	10,407	41.8	544
Montmorency	68	3,840	4,125	4,424	5,247	-----	----	555
Ogemaw	68	8,720	9,345	9,680	11,903	-----	----	571
Oscoda	68	2,543	3,134	3,447	4,726	-----	----	563
Otsego	68	5,827	6,435	7,545	10,422	3,012	28.9	527
Presque Isle	68	12,250	11,996	13,117	12,836	4,275	33.3	648

cent between 1940 and 1970 from 11,700 to only 1,900 persons.

Population growth in the planning subarea is expected to continue at an annual rate of increase of 1.3 percent. The labor force participation rate is expected to increase dramatically from a low of 28 percent in 1970 to 38 percent in 2020, which will be less than but close to national and Basin norms. While the population is expected to increase 1.3 percent annually, employment is expected to increase 1.75 percent annually. The rate of increase of total personal income is expected to be approximately 4.4 percent annually, which is higher than the expected Basin and national average of four percent. Per capita income in this planning subarea is expected to increase at approximately the same rate as the nation, but it will remain at only 70 percent of the national average. Total employment is projected to increase 2.7 times from 1960 to 2020, and employment in the manufacturing sector is expected to double. Employment in the service sector is projected to more than offset the declines in employment in the agricultural and mining sectors and the less than proportional growth in the manufacturing sector. Employment gains in the paper industry are projected to be particularly strong, with a growth of 3.3 times over the 1960 base. Employment in agriculture is expected to decline 90 percent from 1960 to 2020. Only 26 percent of the population of Planning Subarea 3.1 was classified as urban in 1970. The comparable percentage for the Great Lakes Basin as a whole was 80 percent. Seventy-four percent of the nation was

urbanized in 1970. With the expected 90 percent drop in agricultural employment, more urbanization can be expected.

Further information is contained in Tables 19-23 and 19-24 and Figure 19-11.

### 1.6.9 Planning Subarea 3.2, Lake Huron South

The population of this planning subarea was 1.1 million in 1970, and employment was 382,000 persons, slightly more than three percent of the Basin total. Population and employment trends have paralleled those in the Great Lakes Basin since 1940. Industry in 1970 was dominated by manufacturing, which employed 156,000 workers and accounted for almost 41 percent of total employment. The percentage of manufacturing employment in the nation was 25 percent. It was 35 percent in the Great Lakes Basin. The leading industrial employers were chemicals, primary metals, and food. Agriculture accounted for approximately 2.5 percent of employment, which was less than the national average of 4.4 percent but above the Basin average of 1.8 percent. Between 1940 and 1970, agricultural employment declined 78 percent, a greater decline than in the nation or Basin as a whole. Mining employment has been declining and losing significance.

Population growth in Planning Subarea 3.2 is expected to decline from an annual rate of almost 2.0 percent to 1.3 percent. The labor force participation rate is expected to increase from a below average figure of 35 percent in

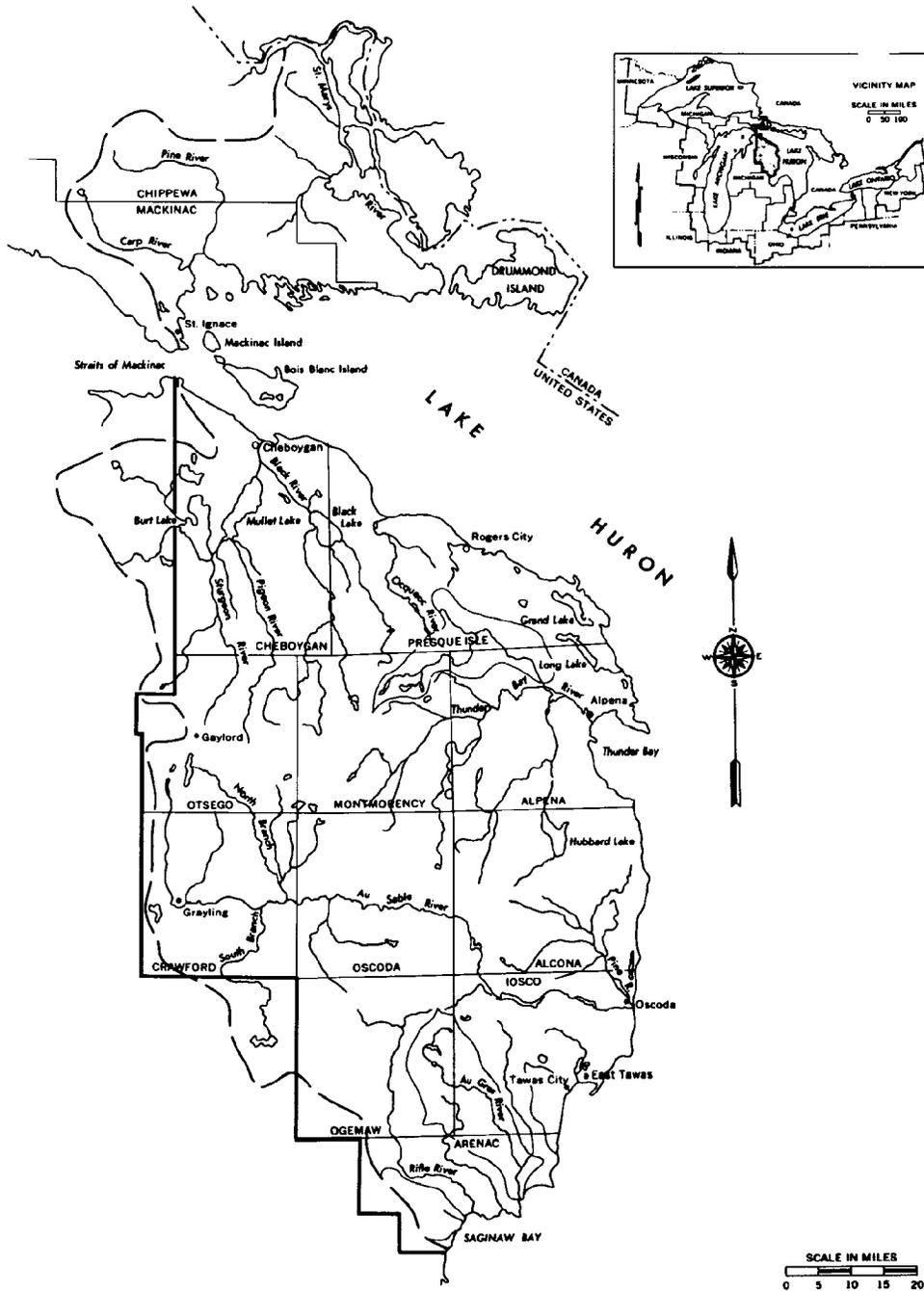


FIGURE 19-11 Planning Subarea 3.1

**TABLE 19-24 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 3.1**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	80,909	95,670	102,073	118,150	124,548	164,300	187,700	208,700	235,700	267,000
Total Personal Income	52,586	78,710	116,979	176,618	198,863	443,569	668,237	1,035,492	1,564,938	2,342,748
Per Capita Income (\$58) <sup>1</sup>	650	823	1,146	1,495	1,597	2,700	3,561	4,963	6,640	8,776
Per Capita Relative (US=1.00)	.51	.64	.63	.70	.71	.66	.67	.69	.70	.71
Total Earnings <sup>2</sup>	43,648	66,995	92,781	140,410	155,093	336,836	501,878	770,519	1,161,473	1,730,893
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,410	2,923	3,744	-----	5,620	7,327	9,787	12,938	16,983
Per Worker Relative (US=1.00)	-----	.79	.74	.80	-----	.70	.71	.72	.73	.73
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020
Population (April 1)	94,611	101,512	119,007	142,064	164,300	187,700	208,700	235,700	267,000	267,000
Total Employment	27,804	31,745	37,503	40,185	40,185	59,500	68,700	78,700	89,800	101,900
Participation Rate (EMPL/POP)	.29	.31	.32	.28	.28	.36	.38	.38	.38	.38
Agriculture, Forestry, Fisheries	11,636	8,965	3,692	1,900	1,900	1,700	1,100	800	600	400
Mining	737	1,151	1,099	1,045	1,045	1,000	900	900	900	800
Manufacturing	3,763	5,037	8,616	9,372	11,500	12,600	14,000	14,000	15,500	17,200
Food, Kindred Products	210	337	430	403	403	400	400	400	400	400
Textile Mill Products	9	12	41	41	41	43	43	43	43	43
Chemicals, Allied Products	50	84	40	40	40	43	43	43	43	43
Paper, Allied Products	-----	169	644	-----	-----	1,100	1,300	1,600	1,800	2,100
Petroleum Refining	-----	29	10	-----	-----	300	300	300	300	300
Primary Metals	-----	59	310	-----	-----	300	300	300	300	300
Federal Military	56	236	1,498	-----	-----	7,000	7,000	7,000	7,000	7,000
Other	11,612	16,356	22,598	27,868	38,800	46,700	56,000	65,800	76,400	76,400
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	68	81	86	100	105	139	159	177	199	226
Total Personal Income	30	45	66	100	113	251	378	586	886	1,326
Per Capita Income (\$58)	43	55	77	100	107	181	238	332	444	587
Total Earnings	31	48	66	100	110	240	357	549	827	1,233
Per Worker Earnings (\$58)	---	64	78	100	---	130	196	261	365	453
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020
Population	79	85	100	100	119	138	158	175	198	224
Total Employment	74	85	100	100	107	160	183	210	239	272
Agriculture, Forestry, Fisheries	315	243	100	100	51	46	30	22	16	11
Mining	67	105	100	100	95	91	82	82	82	73
Manufacturing	44	58	100	100	109	133	146	162	180	200
Food, Kindred Products	49	78	100	100	103	93	93	93	93	93
Textile Mill Products	22	29	100	100	---	---	---	---	---	---
Chemicals, Allied Products	102	171	100	100	---	---	---	---	---	---
Paper, Allied Products	---	23	100	100	---	---	---	---	---	---
Petroleum Refining	---	290	100	100	---	---	---	---	---	---
Primary Metals	---	19	100	100	---	---	---	---	---	---
Federal Military	4	16	100	100	---	---	---	---	---	---
Other	51	72	100	100	123	172	207	248	291	338

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

TABLE 19-25 Economic Data by County for Planning Subarea 3.2

County Name	Econ Area No.	Total Population				Number Urban	Percent Urban	Land Area
		1940	1950	1960	1970	1970	1970	Square Mi. 1970
TOTAL PLANNING SUBAREA 3.2		637,616	737,899	937,570	1,094,201	665,761	61.0	6,927
Michigan		637,616	737,899	937,570	1,094,201	665,761	61.0	6,927
Bay	68	74,981	88,461	107,042	117,339	78,352	66.8	447
Clare	68	9,163	10,253	11,647	16,695	2,639	15.8	571
Genesee	67	227,944	270,963	374,313	444,341	343,671	77.3	642
Gladwin	68	9,385	9,451	10,769	13,471	-----	-----	503
Gratiot	68	32,205	33,429	37,012	39,246	16,640	42.4	566
Huron	68	32,584	33,149	34,006	34,083	2,999	8.8	819
Isabella	68	25,982	28,964	35,348	44,594	20,504	46.0	572
Lapeer	67	32,116	35,794	41,926	52,317	6,270	12.0	658
Midland	68	27,094	35,662	51,450	63,769	34,921	54.8	520
Saginaw	68	130,468	153,515	190,752	219,743	153,262	69.7	814
Tuscola	68	35,694	38,258	43,305	48,603	6,503	13.4	815

1970 to 39 percent by 2020. This will equal the Basin's and nation's percentages. Jobs are expected to increase at an annual rate of 1.5 percent, which is 0.2 percent higher than the expected increase in population. Total personal income is projected to increase at a rate of 4.4 percent annually, which is higher than the Basin and national rates of 4 percent. Per capita income, which was slightly below the national average in 1962, is projected to increase rapidly and will eventually be approximately four percent above the national average and two percent above the Basin average. The increasing importance of the service industries is also evident in this planning subarea. Agriculture and mining employment will decline while total employment increases 2.5 times. The doubling of employment in manufacturing will be less than the proportional growth in total employment. Outstanding employment growth is projected for the paper industry (4.7 times) and chemical industry (3.6 times). Sixty-one percent of the population in this planning subarea is urbanized, compared to 80 percent in the Great Lakes Basin and 74 percent in the nation. Increased urbanization is expected to continue, partly due to the continuing reduction of agricultural employment.

Further information is contained in Tables 19-25 and 19-26 and Figure 19-12.

#### 1.6.10 Planning Subarea 4.1, Lake Erie Northwest

Planning Subarea 4.1, which includes the

Detroit SMSA, contained 4.8 million people in 1970, 16.5 percent of the total population of the Great Lakes Basin. The number of people employed was more than 1.8 million. Both population and employment have increased more rapidly there than in the Great Lakes Basin as a whole. Approximately 667,000 workers were employed in the manufacturing sector in 1970. Agriculture accounted for approximately one percent of employment and mining employment was insignificant. Manufacturing is becoming less significant. Between 1940 and 1970 employment in the manufacturing sector increased 46 percent, while total employment increased 82 percent and total population increased 80 percent.

Population is projected to increase at an annual rate of 1.3 percent, the same projected rate as that of the total Great Lakes Basin. The labor force participation rate is expected to increase from 37 percent in 1970, which is slightly less than Basin and national averages, to 40 percent by 2020. This will equal Basin and national averages. Employment is expected to increase annually at a rate of 1.5 percent, while the population increases at an annual rate of 1.3 percent. Total personal income is expected to increase at an annual rate of 4.1 percent, which is slightly higher than the projections for the Basin and the nation. Per capita income in this planning subarea is expected to remain at the Basin level while suffering a relative decline to only slightly above the national level in 2020. While total employment is projected to increase 2.5 times by 2020, employment in the manufacturing sector is projected to increase 1.6 times. Other

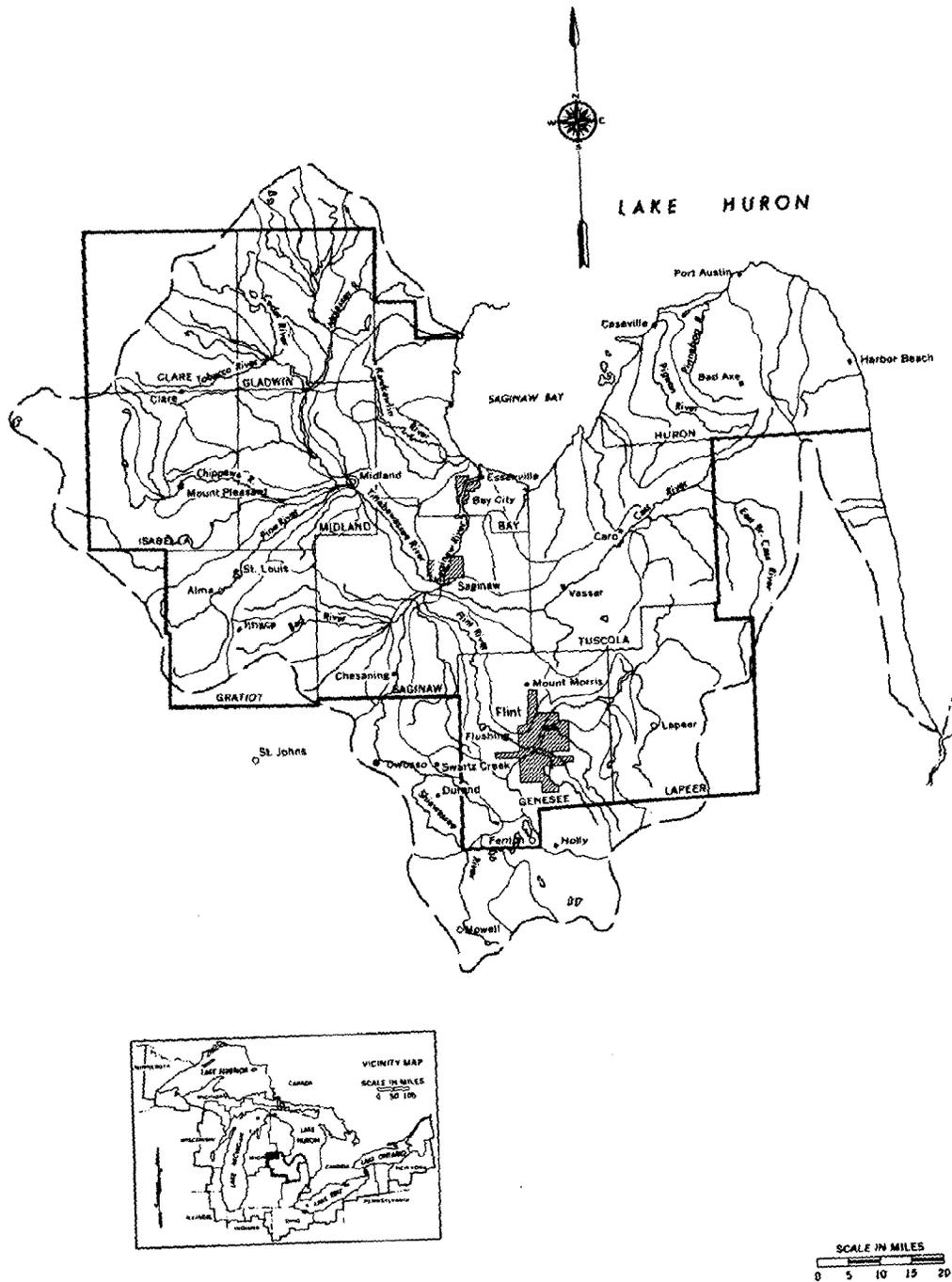


FIGURE 19-12 Planning Subarea 3.2

**TABLE 19-26 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 3.2**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population (July 1)	573,369	644,761	741,979	930,835	936,469	1,246,800	1,436,000	1,600,500	1,809,100	2,057,400	
Total Personal Income	654,901	764,078	1,356,695	1,946,895	2,131,850	5,243,288	7,874,349	11,917,005	17,865,627	26,649,587	
Per Capita Income (\$58) <sup>1</sup>	1,142	1,185	1,828	2,092	2,229	4,205	5,484	7,446	9,875	12,953	
Per Capita Relative (US=1.00)	.90	.91	1.01	.98	.99	1.02	1.03	1.04	1.04	1.04	
Total Earnings <sup>2</sup>	513,434	641,224	1,133,076	1,630,563	1,763,407	4,125,363	6,059,206	9,074,258	13,500,295	20,002,147	
Per Worker Earnings (\$58) <sup>1</sup>	-----	3,055	4,200	5,120	-----	8,772	11,204	14,652	19,111	28,444	
Per Worker Relative (US=1.00)	-----	1.00	1.07	1.10	-----	1.09	1.08	1.08	1.07	1.06	
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020											
	1940	1950	1960	1970	1980	1990	2000	2010	2020		
Population (April 1)	637,616	737,899	937,570	1,094,201	1,246,800	1,436,000	1,600,500	1,809,100	2,057,400		
Total Employment	209,880	269,798	318,478	381,874	470,300	540,800	619,300	706,400	805,100		
Participation Rate (EMPL/POP)	.33	.37	.34	.35	.38	.38	.39	.39	.39		
Agriculture, Forestry, Fisheries	44,562	31,590	17,636	9,506	10,700	8,200	6,500	5,200	4,100		
Mining	2,575	1,600	933	651	800	700	700	700	700		
Manufacturing	74,409	115,275	137,946	156,061	189,800	209,900	233,100	258,800	288,700		
Food, Kindred Products	4,384	4,800	6,164	-----	5,700	5,400	5,200	5,000	4,800		
Textile Mill Products	499	501	495	-----	600	600	600	600	600		
Chemicals, Allied Products	3,748	7,951	12,718	-----	21,100	25,500	32,300	39,000	45,800		
Paper, Allied Products	-----	153	485	-----	1,000	1,200	1,600	1,900	2,300		
Petroleum Refining	-----	555	774	-----	600	500	500	400	400		
Primary Metals	-----	9,512	10,816	-----	11,000	10,900	10,900	10,800	10,700		
Federal Military	12	190	299	-----	600	600	600	600	600		
Other	88,332	121,143	161,664	215,656	269,300	321,900	378,800	441,400	511,400		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population	62	69	80	100	103	134	154	172	194	221	
Total Personal Income	34	39	70	100	109	269	404	612	918	1,369	
Per Capita Income (\$58)	55	57	87	100	107	201	262	356	472	619	
Total Earnings	31	39	69	100	108	253	372	557	828	1,227	
Per Worker Earnings (\$58)	---	60	82	100	---	171	219	286	373	485	
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)											
	1940	1950	1960	1970	1980	1990	2000	2010	2020		
Population	68	79	100	117	133	153	171	193	219		
Total Employment	86	85	100	120	148	170	194	222	253		
Agriculture, Forestry, Fisheries	253	179	100	54	61	46	37	29	23		
Mining	276	171	100	70	86	75	75	75	75		
Manufacturing	54	84	100	113	138	152	169	188	209		
Food, Kindred Products	71	78	100	---	92	88	84	81	78		
Textile Mill Products	101	101	100	---	121	121	121	121	121		
Chemicals, Allied Products	29	63	100	---	166	201	254	307	360		
Paper, Allied Products	---	32	100	---	206	247	330	392	474		
Petroleum Refining	---	72	100	---	78	65	65	52	52		
Primary Metals	---	88	100	---	102	101	101	100	99		
Federal Military	4	64	100	---	201	201	201	201	201		
Other	55	75	100	133	167	199	234	273	316		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-27 Economic Data by County for Planning Subarea 4.1**

County Name	Econ Area No.	Total Population				Number Urban	Percent Urban	Land Area Square Mi.
		1940	1950	1960	1970	1970	1970	1970
<b>TOTAL PLANNING SUBAREA 4.1</b>		<b>2,697,068</b>	<b>3,440,259</b>	<b>4,291,457</b>	<b>4,848,153</b>	<b>4,332,063</b>	<b>89.0</b>	<b>6,240</b>
<b>Michigan</b>		<b>2,697,068</b>	<b>3,440,259</b>	<b>4,291,457</b>	<b>4,848,153</b>	<b>4,332,063</b>	<b>89.0</b>	<b>6,240</b>
Lenawee	66	53,110	64,629	77,789	81,609	32,873	40.3	753
Livingston	67	20,863	26,725	38,233	58,967	6,493	11.0	572
Macomb	67	107,638	184,961	405,804	625,309	576,672	92.2	480
Monroe	66	58,620	75,666	101,120	118,479	41,424	35.0	557
Oakland	67	254,068	396,001	690,259	907,871	816,874	90.0	867
St. Clair	67	76,222	91,599	107,201	120,175	55,320	46.0	734
Sanilac	67	30,114	30,837	32,314	34,889	-----	----	961
Washtenaw	67	80,810	134,606	172,440	234,103	182,994	78.2	711
Wayne	67	2,015,623	2,435,235	2,666,297	2,666,751	2,619,413	98.2	605

categories of employment, primarily in the service areas, are expected to balance this less than proportional growth. Eighty-nine percent of the population in this planning subarea was classified as urban in 1970. As density increases because of population growth, the degree of urbanization will also increase.

Further information is contained in Tables 19-27 and 19-28 and Figure 19-13.

**1.6.11 Planning Subarea 4.2, Lake Erie Southwest**

This planning subarea, which includes the Toledo SMSA, contained 1.7 million people in 1970. Employment included 667,000 persons, approximately six percent of all those employed in the Basin. The manufacturing sector employed 240,000 workers, or approximately 36 percent of all those employed in 1970. Food products and primary metals were other major employers. Between 1940 and 1970 employment in the manufacturing sector increased 2.1 times, while total employment increased approximately 1.7 times. The chemical industry had a greater than proportional increase of 2.4 times from 1940 through 1960. In 1970 agricultural employment of 20,800 persons accounted for approximately three percent of total planning subarea employment. Mining employment remained relatively insignificant.

Population in Planning Subarea 4.2 is expected to increase 1.2 percent annually from 1970 to 2020, which is a drop from the 1940 through 1960 rate of 1.4 percent. The labor force participation rate will increase to 40 percent by 2020, making it equal to the Basin and national rates. Employment is expected to increase slightly more rapidly than population.

Per capita income is slightly above the national average and is projected to continue to be. Although per capita income is less than the Basin average, it will increase at a more rapid rate and will begin to approach the Basin average. The rate of growth in total personal income is expected to be slightly above the Basin and national rates of four percent. Total employment is projected to double by 2020, and employment in the manufacturing sector is expected to increase 1.7 times over the 1960 level. The service-oriented industries are expected to offset the reduction in agricultural employment and the less than proportional growth in the manufacturing sector. Employment in the chemical and paper industries is projected to triple by 2020. The degree of urbanization, 67 percent, is slightly less in PSA 4.2 than in both the Basin and the nation. Urbanization is expected to increase with the increase in population.

Further information is contained in Tables 19-29 and 19-30 and Figure 19-14.

**1.6.12 Planning Subarea 4.3, Lake Erie Central**

This planning subarea, which contained 3.1 million people in 1970, includes the SMSAs of Cleveland, Akron, and Lorain, Ohio. Employment in 1970 was 1,220,000 persons, almost 11 percent of total Basin employment. The manufacturing sector employed 450,000 workers or 37 percent of all those employed, which was well above the national average of 25 percent and slightly above the Regional average of 35 percent. Primary metals alone accounted for more than five percent of all employment in the planning subarea. From 1940 to 1960 employment in the manufacturing sector in-

TABLE 19-28 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.1

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	2,435,755	2,727,289	3,459,284	4,260,634	4,326,463	5,801,700	6,673,000	7,425,200	8,382,400	9,567,600
Total Personal Income	4,316,276	5,065,696	8,074,219	10,332,589	10,926,905	26,727,416	38,959,599	56,526,727	82,843,541	121,937,364
Per Capita Income (\$58) <sup>1</sup>	1,772	1,857	2,334	2,425	2,526	4,607	5,838	7,613	9,883	12,745
Per Capita Relative (US=1.00)	1.39	1.43	1.29	1.14	1.12	1.12	1.09	1.06	1.04	1.03
Total Earnings <sup>2</sup>	3,348,376	4,415,261	6,972,171	8,715,391	9,121,265	21,205,895	30,220,350	43,636,960	63,518,469	92,996,484
Per Worker Earnings (\$58) <sup>1</sup>	-----	4,424	5,172	5,741	-----	9,253	11,514	14,696	18,853	24,274
Per Worker Relative (US=1.00)	-----	1.44	1.31	1.23	-----	1.15	1.11	1.08	1.06	1.04
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020
Population (April 1)	2,697,068	3,440,259	4,291,457	4,848,153	5,801,700	6,673,000	7,425,200	8,382,400	9,567,600	
Total Employment	997,976	1,347,949	1,518,046	1,815,105	2,291,800	2,624,600	2,969,300	3,369,100	3,831,100	
Participation Rate (EMPL/POP)	.37	.39	.35	.37	.40	.39	.40	.40	.40	
Agriculture, Forestry, Fisheries	42,111	31,291	21,448	15,265	14,400	11,900	9,900	8,200	6,800	
Mining	901	1,159	1,459	2,458	1,700	1,800	2,000	2,200	2,300	
Manufacturing	457,286	615,289	622,405	667,222	764,300	798,500	844,800	898,200	964,100	
Food, Kindred Products	19,585	22,332	31,131	28,200	28,200	27,200	26,900	26,400	26,100	
Textile Mill Products	2,154	2,332	1,918	1,800	1,800	1,700	1,700	1,600	1,600	
Chemicals, Allied Products	11,638	16,672	19,552	23,000	23,000	25,300	29,500	34,600	39,700	
Paper, Allied Products	-----	7,803	8,066	10,300	10,300	11,500	12,800	14,100	15,200	
Petroleum Refining	-----	-----	1,941	-----	1,200	1,000	900	700	600	
Primary Metals	-----	39,104	41,934	-----	43,200	43,300	43,500	43,200	43,000	
Federal Military	2,338	4,847	6,084	-----	5,400	5,400	5,400	5,400	5,400	
Other	495,340	695,363	866,650	1,130,160	1,505,800	1,807,900	2,106,900	2,455,100	2,852,200	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	57	64	81	100	102	136	157	174	197	225
Total Personal Income	42	49	78	100	106	259	377	547	802	1,180
Per Capita Income (\$58)	73	77	96	100	104	190	241	314	408	526
Total Earnings	38	51	80	100	105	243	348	501	729	1,067
Per Worker Earnings (\$58)	---	77	90	100	---	161	200	256	328	423
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1960	1970	1980	1990	2000	2010	2020
Population	63	80	100	100	113	135	155	173	195	223
Total Employment	66	89	100	100	120	151	173	196	222	252
Agriculture, Forestry, Fisheries	196	146	100	100	71	67	55	46	38	32
Mining	62	79	100	100	168	117	123	137	151	158
Manufacturing	73	99	100	100	107	123	128	136	144	155
Food, Kindred Products	63	72	100	100	---	91	87	86	85	84
Textile Mill Products	112	122	100	100	---	94	89	89	83	83
Chemicals, Allied Products	60	85	100	100	---	118	129	151	177	203
Paper, Allied Products	---	---	100	100	---	97	128	159	175	188
Petroleum Refining	---	134	100	100	---	62	52	46	36	31
Primary Metals	---	93	100	100	---	103	103	104	103	103
Federal Military	38	80	100	100	---	89	89	89	89	89
Other	57	80	100	100	130	174	209	243	283	329

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

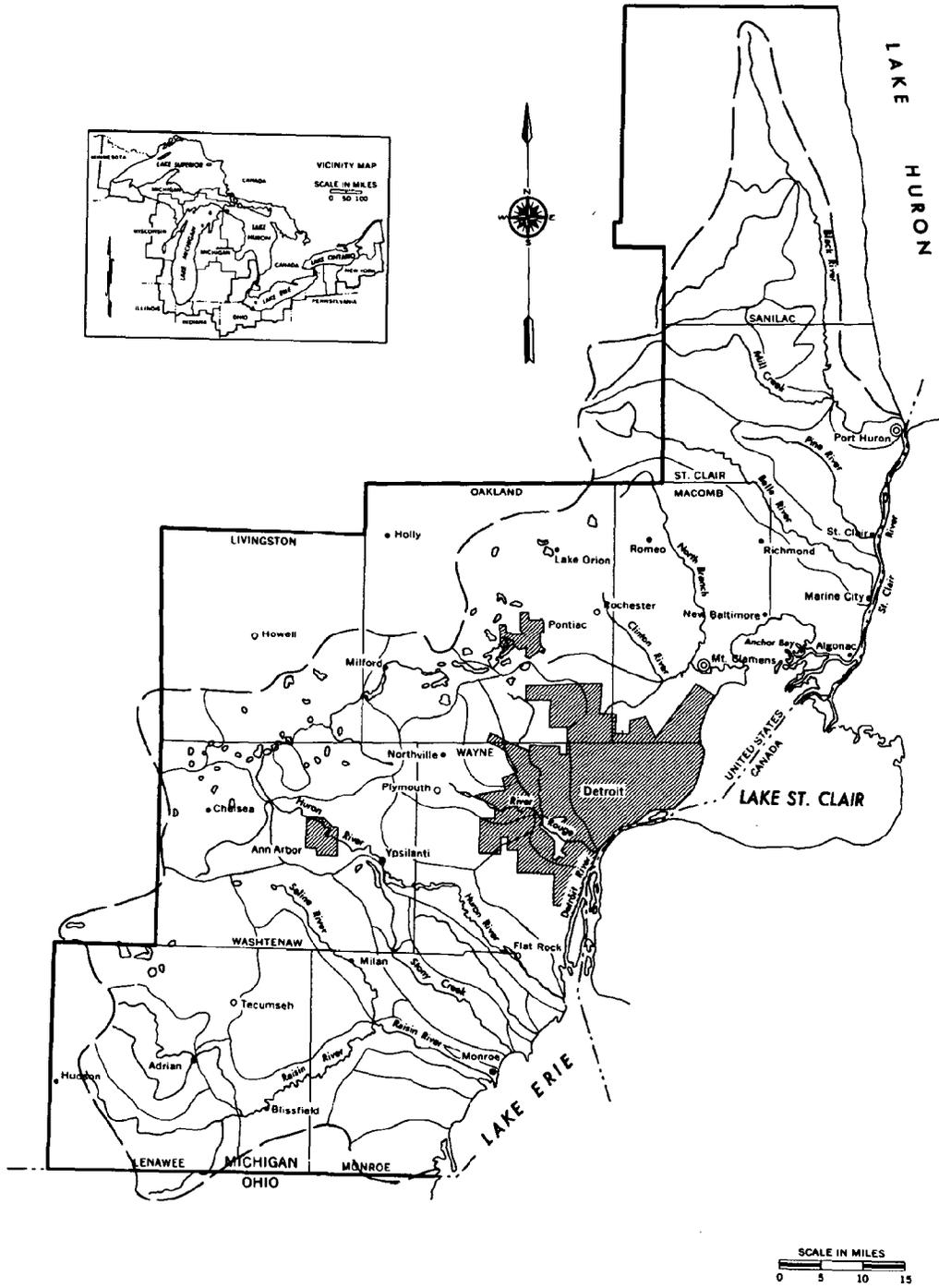


FIGURE 19-13 Planning Subarea 4.1

TABLE 19-29 Economic Data by County for Planning Subarea 4.2

County Name	Econ Area No.	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Square Mi. 1970
		1940	1950	1960	1970			
TOTAL PLANNING SUBAREA 4.2		<u>1,175,836</u>	<u>1,325,103</u>	<u>1,565,736</u>	<u>1,725,351</u>	<u>1,162,153</u>	<u>67.0</u>	<u>9,887</u>
Indiana		<u>201,094</u>	<u>232,138</u>	<u>285,110</u>	<u>338,163</u>	<u>248,669</u>	<u>74.0</u>	<u>1,382</u>
Adams	71	21,254	22,393	24,643	26,871	11,433	42.5	345
Allen	71	155,084	183,722	232,196	280,455	225,184	80.3	671
De Kalb	71	24,756	26,023	28,271	30,837	12,052	39.1	366
Ohio		<u>974,742</u>	<u>1,092,965</u>	<u>1,280,626</u>	<u>1,387,188</u>	<u>913,484</u>	<u>66.0</u>	<u>8,505</u>
Allen	65	73,303	88,183	103,691	111,144	76,428	68.8	410
Auglaize	65	28,037	30,637	36,147	38,602	16,126	41.8	400
Crawford	64	35,571	38,738	46,775	50,364	32,181	63.9	404
Defiance	71	24,367	25,925	31,508	36,949	19,742	53.4	412
Erie	64	43,201	52,565	68,000	75,909	53,571	70.6	264
Fulton	66	23,626	25,580	29,301	33,071	13,450	40.7	407
Hancock	66	40,793	44,280	53,686	61,217	38,897	63.5	532
Henry	66	22,756	22,423	25,392	27,058	7,791	28.8	416
Huron	64	34,800	39,353	47,326	49,587	23,288	47.0	497
Lucas	66	344,333	395,551	456,931	484,370	456,008	94.1	343
Mercer	65	26,256	28,311	32,559	35,265	11,312	32.1	444
Ottawa	66	24,360	29,469	35,323	37,099	10,009	27.0	261
Paulding	71	15,527	15,047	16,792	19,329	2,983	15.4	417
Putnam	65	25,016	25,248	28,331	31,134	3,622	11.6	486
Sandusky	66	41,014	46,114	56,486	60,983	30,790	50.5	409
Seneca	66	48,499	52,978	59,326	60,696	33,717	55.6	551
Van Wert	65	26,759	26,971	28,840	29,194	14,627	50.1	409
Williams	71	25,510	26,202	29,968	33,669	11,192	33.2	421
Wood	66	51,796	59,605	72,596	89,722	48,582	54.1	619
Wyandot	64	19,218	19,785	21,648	21,826	9,168	42.0	406

creased 1.7 times while population and employment increased approximately 1.5 times. Employment in the chemical industry doubled in this 20-year period. Between 1960 and 1970 there was little growth in manufacturing employment. Agriculture and mining employment were relatively insignificant. Growth in total personal income and per capita income was below national rates but paralleled Basin growth. The income differential over national levels, although reduced, is still substantial.

Population growth is projected to fall to an annual rate of 1.2 percent from the annual rate between 1940 and 1960 of over two percent. Employment is projected to increase slightly more rapidly than population, which will increase the labor force participation rate. Per capita income is projected to remain slightly above the Great Lakes Basin average. Total personal income is projected to increase at an annual rate just below the Basin and national rate of four percent. Total employment is projected to increase 209 percent. Strong growth is projected for both the chemical and paper industries. In 1970, 90 percent of

the population of this planning subarea was classified as urban. The projected demands on the land base will push this ratio even higher by 2020.

Further information is contained in Tables 19-31 and 19-32 and Figure 19-15.

#### 1.6.13 Planning Subarea 4.4, Lake Erie East

This planning subarea, which had a population in 1970 of 1.8 million and employment of 0.7 million, includes the SMSAs of Erie, Pennsylvania, and Buffalo, New York. Both population and employment have been increasing less rapidly in this planning subarea than in the Great Lakes Basin as a whole. Employment in manufacturing increased 50 percent between 1940 and 1960 to 257,000 persons, exceeding the nearly 40 percent increase in population and total employment. This trend has been reversed and in 1970, with 239,000 workers, manufacturing's share of total employment declined to less than 35 percent. Agriculture accounted for less than two percent of employment in 1970, and mining employment was insignificant.

**TABLE 19-30 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.2**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	1,150,530	1,179,157	1,331,628	1,558,038	1,598,699	1,963,500	2,217,300	2,473,800	2,770,900	3,116,200
Total Personal Income	1,489,536	1,586,683	2,642,904	3,381,017	3,677,965	8,204,192	12,019,932	17,977,468	26,652,385	39,303,762
Per Capita Income (\$58) <sup>1</sup>	1,295	1,346	1,985	2,170	2,301	4,178	5,420	7,267	9,618	12,612
Per Capita Relative (US=1.00)	1.02	1.04	1.10	1.02	1.02	1.02	1.01	1.01	1.02	1.02
Total Earnings <sup>2</sup>	1,238,119	1,327,920	2,228,212	2,842,133	3,042,495	6,465,825	9,257,310	13,756,166	20,240,925	29,707,307
Per Worker Earnings (\$58) <sup>1</sup>	3,337	4,340	4,999	4,999	4,999	8,437	10,743	14,020	18,299	23,930
Per Worker Relative (US=1.00)	1.09	1.10	1.07	1.07	1.07	1.04	1.03	1.03	1.03	1.02
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1962	1970	1980	1990	2000	2010	2020
Population (April 1)	1,175,836	1,325,103	1,565,736	1,725,351	1,963,500	2,217,300	2,473,800	2,770,900	3,116,200	
Total Employment	397,970	513,458	568,569	667,161	667,161	861,700	981,200	1,106,100	1,241,400	
Participation Rate (EMPL/POP)	.34	.39	.36	.39	.39	.39	.39	.40	.40	.40
Agriculture, Forestry, Fisheries	72,216	57,981	36,844	20,772	20,772	26,100	21,700	19,000	16,300	13,700
Mining	2,047	1,898	1,614	2,838	2,838	1,600	1,700	1,700	1,700	1,700
Manufacturing	113,038	177,779	205,322	240,605	240,605	255,500	274,000	295,100	317,300	341,700
Food, Kindred Products	11,266	13,799	19,201	---	---	17,700	17,300	16,800	16,400	16,100
Textile Mill Products	2,447	2,490	1,833	---	---	2,300	2,300	2,400	2,400	2,400
Chemicals, Allied Products	1,885	3,402	4,554	---	---	7,300	8,600	10,500	12,400	14,300
Paper, Allied Products	---	2,871	3,603	---	---	6,000	7,200	8,700	10,400	12,000
Petroleum Refining	---	4,302	4,148	---	---	2,900	2,400	2,100	1,700	1,400
Primary Metals	---	12,512	15,152	---	---	16,700	17,000	17,800	18,200	18,900
Federal Military	208	469	580	---	---	600	600	600	600	600
Other	210,461	275,331	324,189	402,946	402,946	483,000	564,000	665,300	770,800	884,400
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	74	76	85	100	103	126	142	159	178	200
Total Personal Income	44	47	78	100	109	243	356	532	788	1,162
Per Capita Income (\$58)	60	62	91	100	106	193	250	335	443	581
Total Earnings	44	47	78	100	107	227	326	484	712	1,045
Per Worker Earnings (\$58)	---	67	87	100	---	169	215	280	366	479
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1962	1970	1980	1990	2000	2010	2020
Population	75	85	100	110	117	125	142	158	177	199
Total Employment	70	90	100	117	117	135	152	173	195	218
Agriculture, Forestry, Fisheries	196	157	100	56	56	71	59	52	44	37
Mining	127	118	100	176	176	99	105	105	105	105
Manufacturing	55	87	100	117	117	124	133	144	155	166
Food, Kindred Products	59	72	100	---	---	92	90	87	85	84
Textile Mill Products	133	136	100	---	---	125	125	131	131	131
Chemicals, Allied Products	41	75	100	---	---	160	189	231	272	314
Paper, Allied Products	---	80	100	---	---	167	200	241	289	333
Petroleum Refining	---	104	100	---	---	70	51	51	41	34
Primary Metals	---	83	100	---	---	110	112	117	120	125
Federal Military	36	81	100	---	---	103	103	103	103	103
Other	65	85	100	124	124	149	174	205	238	273

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

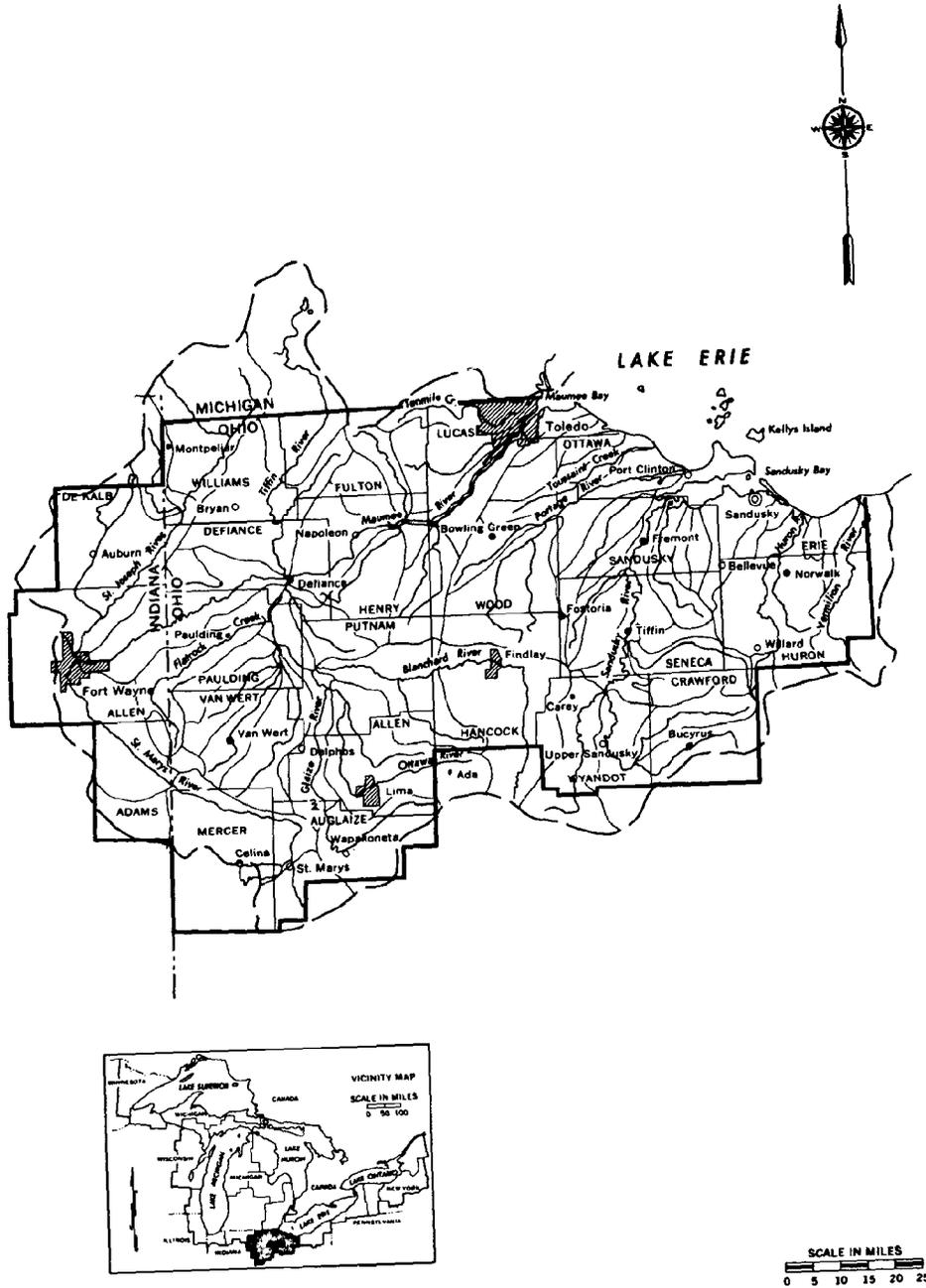


FIGURE 19-14 Planning Subarea 4.2

TABLE 19-31 Economic Data by County for Planning Subarea 4.3

County Name	Econ Area No.	Total Population				Number	Percent	Land Area
		1940	1950	1960	1970	Urban 1970	Urban 1970	Square Mi. 1970
TOTAL PLANNING								
SUBAREA 4.3		<u>1,886,863</u>	<u>2,233,417</u>	<u>2,825,417</u>	<u>3,098,513</u>	<u>2,777,530</u>	<u>90.0</u>	<u>3,617</u>
Ohio		<u>1,886,863</u>	<u>2,233,417</u>	<u>2,825,417</u>	<u>3,098,513</u>	<u>2,777,530</u>	<u>90.0</u>	<u>3,617</u>
Ashtabula	64	68,674	78,695	93,067	98,237	48,751	49.6	700
Cuyahoga	64	1,217,250	1,389,532	1,647,895	1,721,300	1,714,886	99.6	456
Geauga	64	19,430	26,646	47,573	62,977	9,181	14.6	407
Lake	64	50,020	75,979	148,700	197,200	175,846	89.2	231
Lorain	64	112,390	148,162	217,500	256,843	220,010	85.7	495
Medina	64	33,034	40,417	65,315	82,717	40,984	49.5	425
Portage	64	46,660	63,954	91,798	125,868	67,636	53.7	495
Summit	64	339,405	410,032	513,569	553,371	500,236	90.4	408

From the annual growth rate of 1.4 percent between 1940 and 1960, population growth is projected to fall to an annual rate of 0.9 percent. Employment is projected to increase slightly more rapidly than population, which will increase the labor force participation rate. Per capita income is projected to keep pace with the national average. Total personal income is projected to increase at an annual rate just below the Basin and national rates of four percent. The projected increase in manufacturing employment of 29 percent from 1960 to 2020 is well below the expected rate of increase of total employment, which is projected at 90 percent. However, employment in the chemicals and allied products industrial group is expected to more than double. The percent of population classified as urban in 1970 was approximately the same as that of the Great Lakes Basin, 79 percent. Population pressure will continue to increase urbanization.

Further information is contained in Tables 19-33 and 19-34 and Figure 19-16.

#### 1.6.14 Planning Subarea 5.1, Lake Ontario West

In 1970 close to one million people lived in and 0.4 million people worked in this planning subarea, which includes the Rochester SMSA. Between 1940 and 1970 manufacturing employment increased 73 percent from 84,000 persons to 144,000, while population increased 53 percent and total employment increased 66 percent. Manufacturing accounts for approximately 38 percent of total planning subarea employment. Agricultural sector employment decreased 64 percent during this period to only two percent of total employment. Mining employment has never been significant. The more recent employment increases have occurred in the services sector.

Population growth in the planning subarea is projected to fall from the annual rate between 1940 and 1960 of 1.3 percent to an annual rate of 1.1 percent. The labor force participation rate is expected to increase because employment will increase more rapidly than population. Per capita income, which is currently four percent above the Great Lakes Basin average, is projected to be approximately six percent above the Basin average in 2020. Total personal income is projected to increase at an annual rate equal to the Basin and national rate of four percent. Total employment is projected to double, and employment in the manufacturing sector is expected to increase 70 percent. By 2020 only one-third as many people will be employed in agriculture as were in 1960. Seventy-three percent of the population was classified as urban in 1970, which was approximately equal to the national ratio, but below the Basin percentage. The movement of workers out of agriculture and the overall increases in population should continue to push the percentage of urbanization higher in the future.

Further information is contained in Tables 19-35 and 19-36 and Figure 19-17.

#### 1.6.15 Planning Subarea 5.2, Lake Ontario Central

This planning subarea, containing 1.4 million residents (4.6 percent of the Great Lakes Basin), includes the SMSAs of Syracuse and Utica-Rome, New York. Population and employment have been increasing less rapidly in this planning subarea than in the Great Lakes Basin as a whole. Total employment in 1970 was 509,800 persons, of which 147,000 were in manufacturing. The 29 percent of the work force employed in manufacturing in PSA 5.2

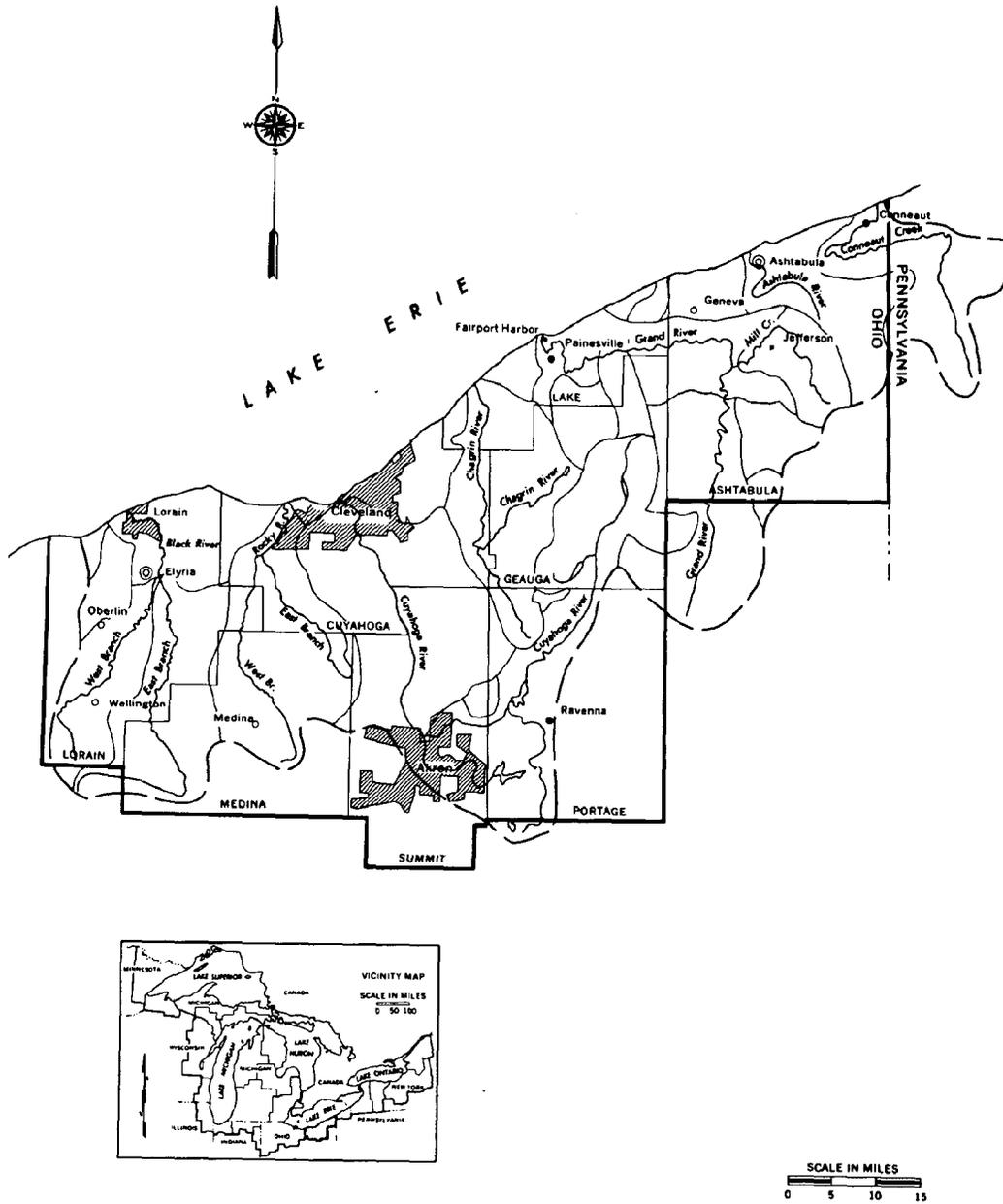


FIGURE 19-15 Planning Subarea 4.3

TABLE 19-32 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.3

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	1,846,832	1,892,706	2,242,798	2,815,114	2,914,553	3,476,400	3,927,700	4,389,200	4,913,500	5,526,500
Total Personal Income	3,179,412	3,372,357	5,075,376	7,092,456	7,435,577	15,671,515	22,452,419	32,928,999	48,411,697	70,997,275
Per Capita Income (\$58) <sup>1</sup>	1,722	1,782	2,263	2,519	2,551	4,508	5,716	7,502	9,853	12,847
Per Capita Relative (US=1.00)	1.35	1.38	1.25	1.18	1.13	1.10	1.07	1.05	1.04	1.04
Total Earnings <sup>2</sup>	2,543,654	2,843,627	4,282,563	5,950,654	6,139,792	12,339,621	17,302,545	25,243,526	36,877,909	53,820,348
Per Worker Earnings (\$58) <sup>1</sup>	-----	4,174	4,690	5,584	-----	8,774	11,020	14,192	18,518	24,202
Per Worker Relative (US=1.00)	-----	1.36	1.19	1.19	-----	1.09	1.06	1.04	1.04	1.04
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	1,886,863	2,233,417	2,825,417	3,098,513	3,476,400	3,927,700	4,389,200	4,913,500	5,526,500	
Total Employment	681,190	913,071	1,065,603	1,220,595	1,406,400	1,570,100	1,778,700	1,991,400	2,223,800	
Participation Rate (EMEL/POP)	.36	.41	.38	.39	.40	.40	.41	.41	.40	
Agriculture, Forestry, Fisheries	26,352	19,916	14,025	11,720	9,700	8,100	7,000	6,000	5,000	
Mining	1,279	1,677	1,942	2,472	1,500	1,500	1,400	1,400	1,300	
Manufacturing	268,966	384,901	447,624	450,314	516,200	542,300	573,100	609,200	650,200	
Food, Kindred Products	13,649	15,010	20,118	-----	17,100	16,000	15,100	14,200	13,500	
Textile Mill Products	5,153	7,170	5,118	-----	5,300	5,100	4,900	4,600	4,400	
Chemicals, Allied Products	13,114	19,130	25,104	-----	32,300	36,600	44,500	52,200	59,700	
Paper, Allied Products	-----	5,168	6,314	-----	9,400	11,000	12,800	14,700	16,600	
Petroleum Refining	-----	4,031	3,992	-----	2,700	2,200	1,900	1,600	1,300	
Primary Metals	-----	58,482	57,352	-----	58,300	58,100	58,300	57,700	57,400	
Federal Military	602	1,506	1,865	-----	1,300	1,300	1,300	1,300	1,300	
Other	383,991	505,071	600,147	756,089	877,600	1,016,900	1,195,800	1,373,500	1,565,900	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	66	67	80	100	104	123	140	156	175	196
Total Personal Income	45	48	72	100	105	221	316	464	682	1,000
Per Capita Income (\$58)	68	71	90	100	101	179	227	296	391	510
Total Earnings	43	48	72	100	103	207	291	424	620	904
Per Worker Earnings (\$58)	---	75	84	100	---	157	197	254	331	433
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population	67	79	100	110	123	139	155	174	196	
Total Employment	64	86	100	115	132	147	167	187	209	
Agriculture, Forestry, Fisheries	188	142	100	84	69	58	50	43	36	
Mining	66	86	100	127	77	77	72	72	67	
Manufacturing	60	86	100	101	115	121	128	136	145	
Food, Kindred Products	68	75	100	---	85	80	75	71	67	
Textile Mill Products	101	140	100	---	104	100	96	90	86	
Chemical, Allied Products	52	96	100	---	129	145	177	208	238	
Paper, Allied Products	---	82	100	---	149	174	203	233	263	
Petroleum Refining	---	101	100	---	68	55	40	33	33	
Primary Metals	---	102	100	---	102	101	102	101	100	
Federal Military	32	81	100	---	70	70	70	70	70	
Other	64	84	100	126	146	169	199	229	261	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

TABLE 19-33 Economic Data by County for Planning Subarea 4.4

County Name	Econ Area No.	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Square Mi. 1970
		1940	1950	1960	1970			
TOTAL PLANNING SUBAREA 4.4								
		<u>1,335,608</u>	<u>1,521,708</u>	<u>1,783,203</u>	<u>1,841,836</u>	<u>1,455,557</u>	<u>79.0</u>	<u>4,802</u>
Pennsylvania		<u>180,889</u>	<u>219,388</u>	<u>250,682</u>	<u>263,654</u>	<u>197,659</u>	<u>75.0</u>	<u>813</u>
Erie	11	180,889	219,388	250,682	263,654	197,659	75.0	813
New York		<u>1,154,719</u>	<u>1,302,320</u>	<u>1,532,521</u>	<u>1,578,182</u>	<u>1,257,898</u>	<u>80.0</u>	<u>3,989</u>
Cattaraugus	10	72,652	77,901	80,187	81,666	29,144	35.7	1,318
Chautauqua	10	123,580	135,189	145,377	147,305	80,656	54.8	1,081
Erie	10	798,377	899,238	1,064,688	1,113,491	978,200	87.8	1,058
Niagara	10	160,110	189,992	242,269	235,720	169,898	72.1	532

was above the national average of 25 percent, but below the Basin average of 35 percent. Three thousand more workers were employed in manufacturing in 1960 than in 1970, but employment increases in service type industries more than offset the decrease in manufacturing employment. Agriculture accounted for approximately three percent of total employment in 1970, while employment in mining was insignificant.

Population growth in this planning subarea, which was 1.3 percent from 1940 to 1960, is projected to fall slightly to 1.2 percent. The labor force participation rate is expected to increase as the number of new jobs exceeds population growth. In 1962 per capita income was four percent less than the national figure. By 2020 the difference will be two percent. Total personal income is projected to increase at an annual rate of 4.3 percent, which is above the Basin and national rates of four percent. Total employment is projected to increase 2.3 times, and employment in the manufacturing sector is projected to increase 1.7 times, while the chemicals and allied products industry employment is projected to increase nearly 2.5 times. In 1970 only 60 percent of the population was urbanized. The Basin was 80 percent urbanized and the nation was 74 percent urbanized. The PSA's percentage of urbanization is expected to increase because of declining numbers of agricultural workers and reduction in growth rates of population.

Further information is contained in Tables 19-37 and 19-38 and Figure 19-18.

#### 1.6.16 Planning Subarea 5.3, Lake Ontario East

This predominantly rural planning subarea had a 1970 population of 225,000 persons and

total employment of slightly more than 75,000 persons. Population and employment levels have been characterized by extremely slow but steady growth. Employment in manufacturing has remained constant at 17,000 persons since 1950. In 1970 this amounted to 22 percent of total employment. Agricultural employment of 6,100 in 1970 was little more than a third of its 1940 level. Increases in employment in service type industries, from 43,400 persons in 1960 to 51,100 in 1970, have been responsible for the rise in total employment in the planning subarea. The labor participation rate was only 34 percent in 1970, and per capita income was less than 90 percent of U.S. per capita income.

The low rate of population growth in the 1940 to 1970 period is projected to continue through 2020, while employment experiences a relatively faster rate of growth. As a result, the labor force participation rate is expected to attain the Basin and national norm of 39 percent by 2010. Per capita income, only 71 percent of the Basin average in 1962, is projected to reach 91 percent of the Basin average by 2020. Total personal income is projected to increase at an annual rate of 3.6 percent, which is below the Basin and national rate of four percent. Total employment is projected to increase 60 percent, and employment in the manufacturing sector is projected to increase 38 percent between 1960 and 2020. In 1970 only 39 percent of the population was classified as urban. Projections show that in 2020 agriculture will employ only three percent of the work force. In 1970 it employed eight percent. This factor along with some increase in the total population of the planning subarea should increase the degree of urbanization.

Further information is contained in Tables 19-39 and 19-40 and Figure 19-19.

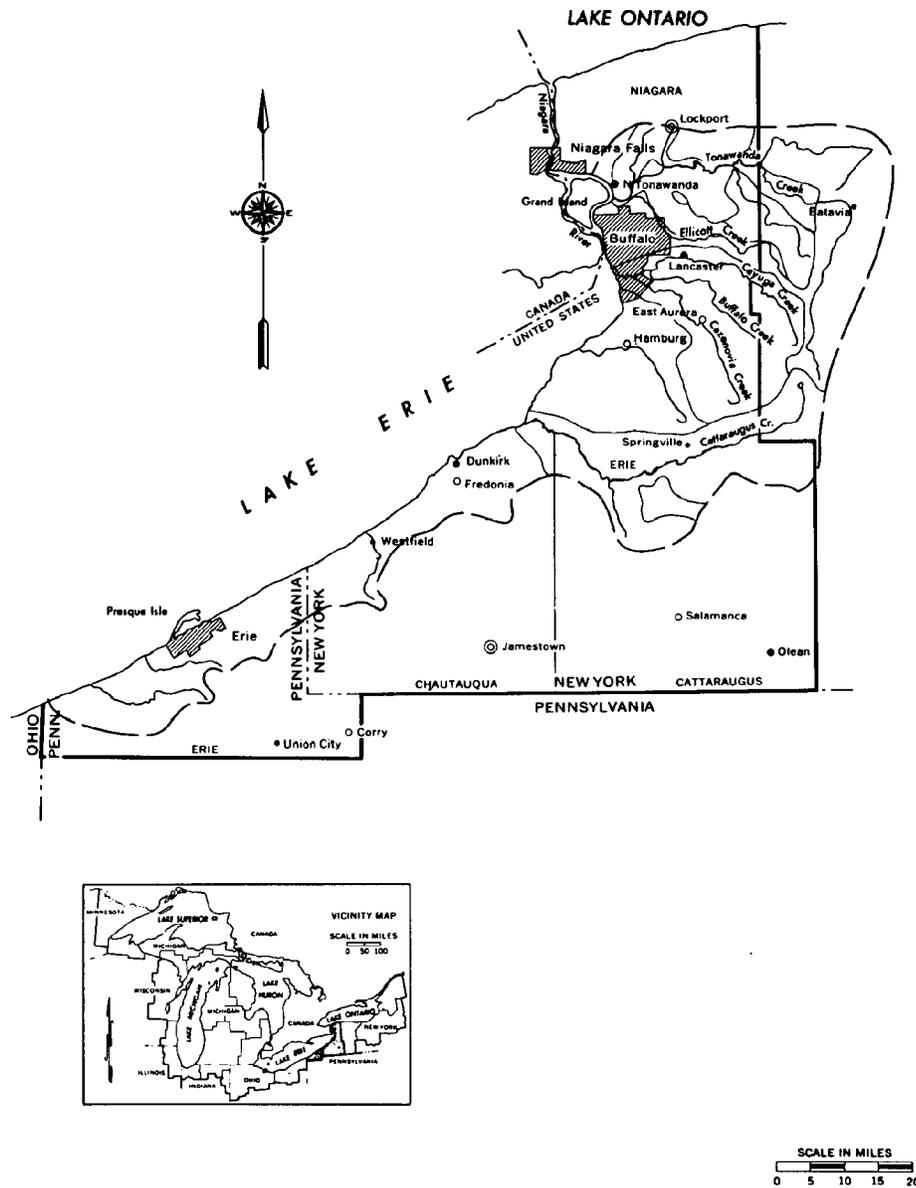


FIGURE 19-16 Planning Subarea 4.4

TABLE 19-34 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 4.4

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	1,250,740	1,333,549	1,524,953	1,772,426	1,862,220	2,058,000	2,288,200	2,506,000	2,765,000	3,070,200
Total Personal Income	2,050,421	2,241,765	3,150,481	4,081,500	4,193,300	8,753,281	12,591,141	18,346,283	25,517,923	38,326,504
Per Capita Income (\$58) <sup>1</sup>	1,639	1,681	2,066	2,303	2,252	4,253	5,503	7,321	9,590	12,483
Per Capita Relative (US=1.00)	1.29	1.30	1.14	1.08	1.00	1.03	1.03	1.02	1.01	1.01
Total Earnings <sup>2</sup>	1,602,796	1,851,112	2,633,412	3,371,326	3,405,752	6,821,947	9,610,679	13,950,308	20,058,690	28,885,808
Per Worker Earnings (\$58) <sup>1</sup>	-----	4,018	4,433	5,193	-----	8,335	10,645	13,854	17,985	23,412
Per Worker Relative (US=1.00)	-----	1.31	1.13	1.11	-----	1.03	1.02	1.02	1.01	1.00
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	2020
Population (April 1)	1,335,608	1,521,708	1,783,203	1,841,836	2,058,000	2,288,200	2,506,000	2,765,000	3,070,200	3,070,200
Total Employment	460,702	594,083	649,177	693,311	818,600	902,900	1,006,900	1,115,300	1,235,800	1,235,800
Participation Rate (EMPL/POP)	.34	.39	.36	.38	.40	.39	.40	.40	.40	.40
Agriculture, Forestry, Fisheries	28,296	22,639	14,914	10,991	9,800	8,200	7,100	6,000	5,000	5,000
Mining	1,308	1,039	690	894	500	400	400	400	400	400
Manufacturing	175,947	244,611	257,185	239,285	280,000	291,400	302,600	315,100	330,700	330,700
Food, Kindred Products	15,391	18,706	21,935	-----	18,100	17,500	16,800	16,100	15,500	15,500
Textile Mill Products	4,432	5,090	2,479	-----	1,800	1,500	1,300	1,100	900	900
Chemicals, Allied Products	13,239	17,298	19,074	-----	23,100	25,900	30,700	35,300	39,700	39,700
Paper, Allied Products	-----	10,051	9,413	-----	8,800	8,700	8,700	8,700	8,600	8,600
Petroleum Refining	-----	2,935	1,969	-----	600	600	500	400	300	300
Primary Metals	-----	42,013	46,024	-----	49,900	50,600	52,000	53,300	54,800	54,800
Federal Military	673	716	3,169	-----	2,300	2,300	2,300	2,300	2,300	2,300
Other	254,478	325,078	373,219	442,141	525,900	600,500	694,500	791,600	895,400	895,400
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	71	75	86	100	105	116	129	141	156	173
Total Personal Income	50	55	77	100	103	214	308	449	650	939
Per Capita Income (\$58)	71	73	90	100	98	185	239	317	416	542
Total Earnings	48	55	78	100	101	202	285	414	595	857
Per Worker Earnings (\$58)	---	77	85	100	---	160	203	267	346	451
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	2020
Population	75	85	100	103	115	128	141	155	172	190
Total Employment	71	91	100	107	126	139	155	172	190	190
Agriculture, Forestry, Fisheries	190	152	100	74	66	55	48	40	34	34
Mining	190	151	100	130	72	58	58	58	58	58
Manufacturing	68	95	100	93	109	113	118	123	129	129
Food, Kindred Products	70	85	100	---	82	80	77	73	71	71
Textile Mill Products	178	205	100	---	73	60	52	44	36	36
Chemicals, Allied Products	69	91	100	---	121	136	161	185	208	208
Paper, Allied Products	---	107	100	---	93	92	92	92	91	91
Petroleum Refining	---	46	100	---	46	30	25	20	15	15
Primary Metals	---	91	100	---	108	110	113	116	119	119
Federal Military	21	23	100	---	73	73	73	73	73	73
Other	68	87	100	118	141	161	186	212	240	240

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

TABLE 19-35 Economic Data by County for Planning Subarea 5.1

County Name	Econ Area No.	Total Population				Number	Percent	Land Area
		1940	1950	1960	1970	Urban 1970	Urban 1970	Square Mi. 1970
TOTAL PLANNING SUBAREA 5.1		<u>620,056</u>	<u>681,911</u>	<u>797,364</u>	<u>946,131</u>	<u>692,875</u>	<u>73.0</u>	<u>3,855</u>
New York		<u>620,056</u>	<u>681,911</u>	<u>797,364</u>	<u>946,131</u>	<u>692,875</u>	<u>73.0</u>	<u>3,855</u>
Allegany	10	39,681	43,784	43,978	46,568	9,619	20.7	1,047
Genesee	10	44,481	47,584	53,994	58,722	22,458	38.2	501
Livingston	09	38,510	40,257	44,053	54,041	17,827	33.0	638
Monroe	09	438,230	487,632	586,387	711,917	620,368	87.1	675
Orleans	09	27,760	29,832	34,159	37,305	11,537	30.9	396
Wyoming	10	31,394	32,822	34,793	37,688	11,066	29.4	598

### 1.7 Projected Population by State for Great Lakes Basin Planning Subareas

Past and projected population breakdowns are shown in Tables 19-41 and 19-42 for States within the Great Lakes Basin. Planning Subarea 2.2 in Illinois accounted for 62 percent of the State population in 1960. Population in this planning subarea and the non-Great Lakes portion of Illinois is expected to almost double by 2020. The State of Indiana contains parts of three Great Lakes Basin planning subareas. The area of Indiana within the Basin accounted for 30 percent of the State population in 1960. Total population in the State of Indiana is expected to increase 2.5 times, while the Great Lakes planning subarea portion will increase only 2.2 times from 1960 to 2020. Michigan is almost completely within the Great Lakes Basin, making up five complete planning subareas and part of two others. The 1960 State population of 7.8 million is projected to increase 2.2 times to 17.1 million by 2020. The portion of Planning Subarea 1.1

in Minnesota contains eight percent of the State population. New York includes three complete Great Lakes Basin planning subareas and part of one other, that together account for 23 percent of the State population. The portion of New York State in the Great Lakes Basin is expected to have a population increase of 1.9 times between 1960 and 2020, while the total State population increases 1.7 times. Ohio contains one entire Great Lakes Basin planning subarea and a major portion of another. They contain 42 percent of total State population. The entire State is projected to grow 2.2 times, while the Great Lakes Basin portion of Ohio is projected to increase 1.9 times. The State of Pennsylvania contributes one county, containing only 2 percent of the State population, to Planning Subarea 4.4. Portions of three Great Lakes Basin planning subareas in Wisconsin account for 63 percent of the population in the State. Population in the Wisconsin areas of the Great Lakes Basin is projected to grow at a slightly more rapid pace than in the remainder of the State during the 1960 to 2020 study period.

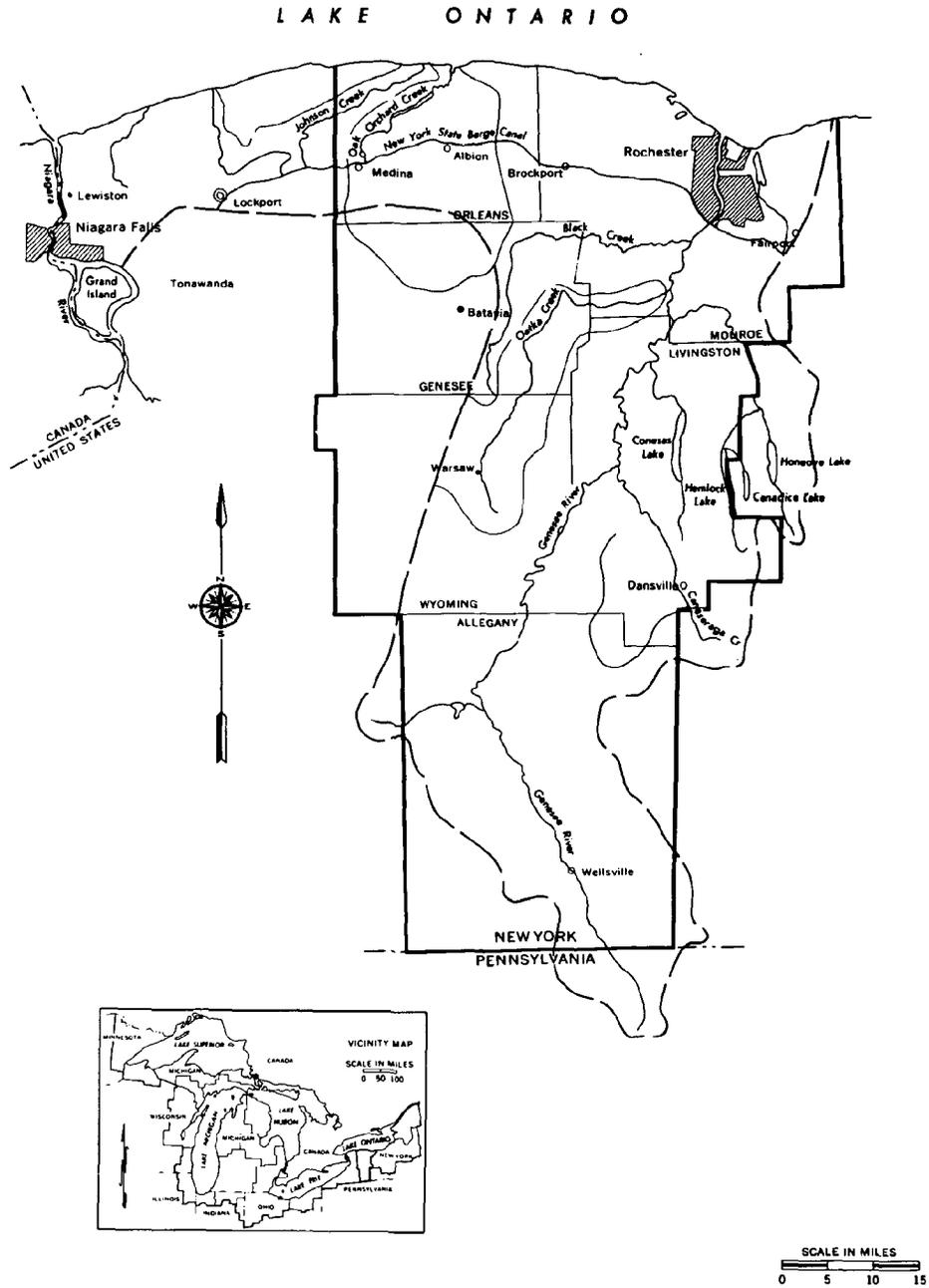


FIGURE 19-17 Planning Subarea 5.1

TABLE 19-36 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 5.1

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	581,565	618,992	683,512	792,741	835,688	978,200	1,098,500	1,221,800	1,367,300	1,538,000
Total Personal Income	961,381	1,072,784	1,399,392	2,013,781	2,185,300	4,609,781	6,675,323	9,830,146	14,368,568	20,936,065
Per Capita Income (\$58) <sup>1</sup>	1,653	1,733	2,047	2,540	2,615	4,713	6,077	8,046	10,509	13,613
Per Capita Relative (US=1.00)	1.30	1.33	1.13	1.19	1.16	1.15	1.14	1.12	1.11	1.10
Total Earnings <sup>2</sup>	713,199	853,458	1,136,761	1,651,508	1,760,530	3,560,513	5,049,228	7,416,249	10,790,543	15,687,410
Per Worker Earnings (\$58) <sup>1</sup>	-----	3,746	4,179	5,396	-----	8,879	11,339	14,750	19,163	24,944
Per Worker Relative (US=1.00)	-----	1.22	1.06	1.16	-----	1.10	1.09	1.08	1.07	1.07
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	620,056	681,911	797,364	946,131	978,200	1,098,500	1,221,800	1,367,300	1,538,000	
Total Employment	227,851	271,988	305,998	378,954	401,000	445,300	502,800	563,100	628,900	
Participation Rate (EMPL/POP)	.37	.40	.38	.40	.41	.41	.41	.41	.41	
Agriculture, Forestry, Fisheries	23,410	18,137	12,685	8,495	8,200	6,800	5,900	5,000	4,100	
Mining	1,987	1,863	1,031	898	600	600	500	400	400	
Manufacturing	83,929	111,068	127,085	144,434	154,000	165,500	179,600	194,900	212,400	
Food, Kindred Products	7,449	9,582	11,934	-----	11,100	10,900	10,600	10,400	10,100	
Textile Mill Products	2,514	2,383	1,947	-----	2,200	2,000	1,900	1,800	1,800	
Chemicals, Allied Products	1,652	2,224	2,485	-----	3,200	3,400	3,900	4,400	4,800	
Paper, Allied Products	-----	2,485	2,021	-----	1,800	1,700	1,600	1,500	1,200	
Petroleum Refining	-----	623	263	-----	-----	-----	-----	-----	-----	
Primary Metals	-----	2,273	1,889	-----	2,100	2,100	2,200	2,200	2,300	
Federal Military	32	242	187	-----	-----	-----	-----	-----	-----	
Other	118,493	140,678	165,046	225,127	238,000	272,400	316,600	362,600	411,800	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	73	78	86	100	105	123	139	154	172	194
Total Personal Income	48	53	69	100	109	229	331	488	714	1,040
Per Capita Income (\$58)	65	68	81	100	103	186	239	317	414	536
Total Earnings	43	52	69	100	107	216	306	449	653	950
Per Worker Earnings (\$58)	---	69	77	100	---	165	210	273	355	462
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population	78	86	100	119	123	138	153	171	193	
Total Employment	74	89	100	124	131	146	164	184	206	
Agriculture, Forestry, Fisheries	185	143	100	67	65	54	47	39	32	
Mining	193	181	100	87	58	58	48	39	39	
Manufacturing	66	87	100	114	121	130	141	153	167	
Food, Kindred Products	62	80	100	-----	93	91	89	87	85	
Textile Mill Products	129	122	100	-----	113	103	98	92	92	
Chemicals, Allied Products	66	89	100	-----	129	137	157	177	193	
Paper, Allied Products	---	123	100	-----	80	84	79	74	59	
Petroleum Refining	---	237	100	-----	---	---	---	---	---	
Primary Metals	---	120	100	-----	111	111	116	116	122	
Federal Military	17	129	100	-----	---	---	---	---	---	
Other	72	85	100	136	144	165	192	220	250	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of Federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

TABLE 19-37 Economic Data by County for Planning Subarea 5.2

County Name	Econ Area No.	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Square Mi. 1970
		1940	1950	1960	1970			
TOTAL PLANNING SUBAREA 5.2		<u>940,138</u>	<u>1,057,179</u>	<u>1,236,359</u>	<u>1,361,399</u>	<u>812,613</u>	<u>60.0</u>	<u>8,517</u>
New York		<u>940,138</u>	<u>1,057,179</u>	<u>1,236,359</u>	<u>1,361,399</u>	<u>812,613</u>	<u>60.0</u>	<u>8,517</u>
Cayuga	08	65,508	70,136	73,942	77,439	34,599	44.7	698
Herkimer	08	59,527	61,407	66,370	67,633	36,017	53.4	1,435
Madison	08	39,598	46,214	54,635	62,864	26,963	42.9	661
Oneida	08	203,636	222,855	264,401	273,037	185,960	68.1	1,223
Onondaga	08	295,108	341,719	423,028	472,746	385,522	81.6	794
Ontario	09	55,307	60,172	68,070	78,849	27,281	34.6	651
Oswego	08	71,275	77,181	86,118	100,897	40,464	40.1	964
Schuyler	13	12,979	14,182	15,044	16,737	2,716	16.2	330
Seneca	09	25,732	29,253	31,984	35,083	13,212	37.7	330
Tompkins	13	42,340	59,122	66,164	76,879	31,967	41.6	482
Wayne	09	52,747	57,323	67,989	79,404	22,744	28.6	606
Yates	09	16,381	17,615	18,614	19,831	5,168	26.1	343

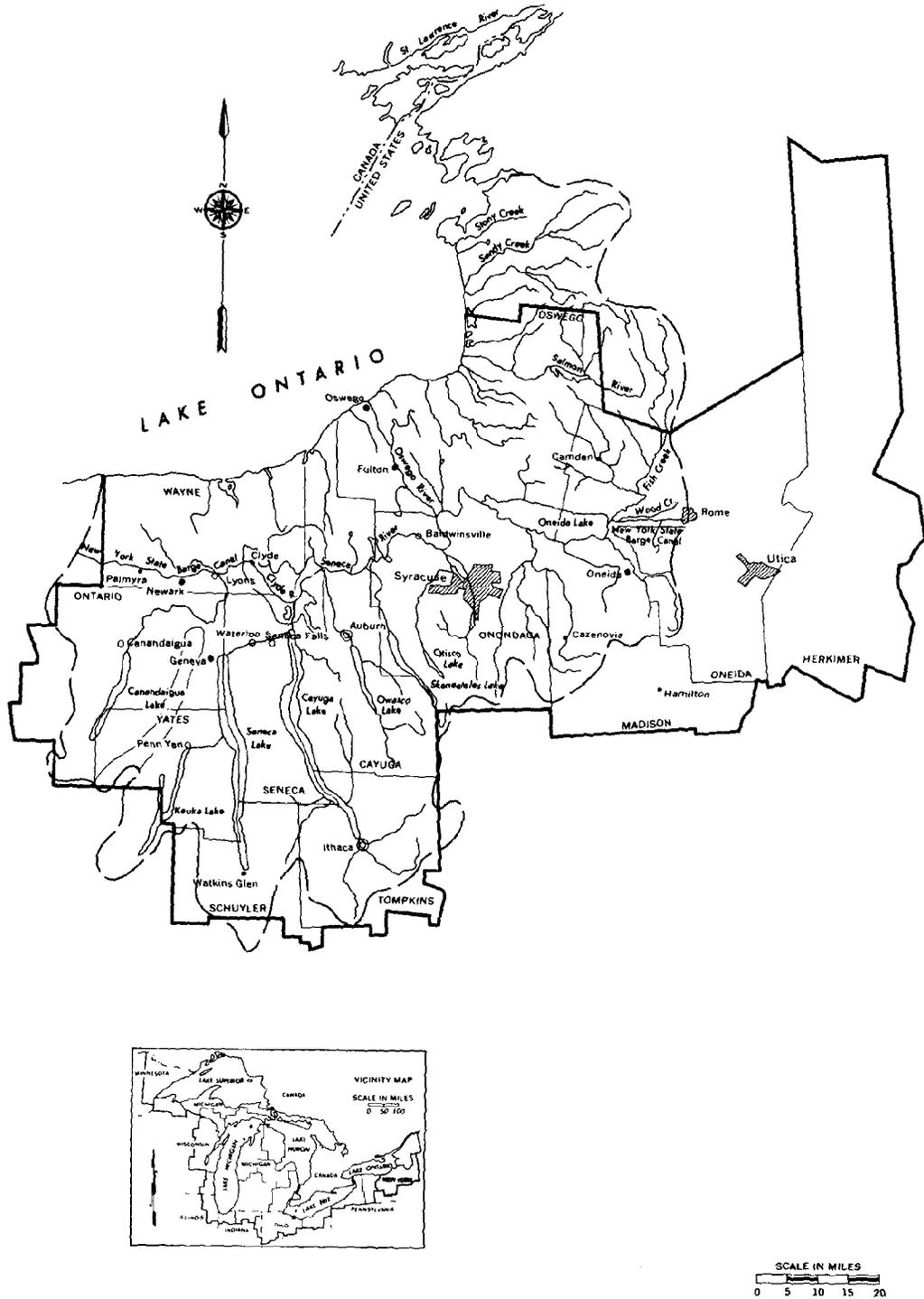


FIGURE 19-18 Planning Subarea 5.2

**TABLE 19-38 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 5.2**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	898,282	938,524	1,059,660	1,229,190	1,289,693	1,571,700	1,791,600	2,015,900	2,266,700	2,556,500
Total Personal Income	1,285,744	1,326,444	1,891,288	2,528,199	2,796,053	6,275,319	9,360,774	14,089,518	20,946,255	30,999,514
Per Capita Income (\$58) <sup>1</sup>	1,431	1,413	1,785	2,057	2,168	3,993	5,225	6,989	9,241	12,126
Per Capita Relative (US=1.00)	1.13	1.09	.99	.96	.96	.97	.98	.98	.98	.98
Total Earnings <sup>2</sup>	1,002,488	1,079,241	1,563,141	2,077,502	2,272,499	4,905,102	7,170,413	10,744,291	15,890,498	23,409,727
Per Worker Earnings (\$58) <sup>1</sup>	3,221	3,221	3,894	4,551	4,551	7,859	10,148	13,258	17,344	22,712
Per Worker Relative (US=1.00)	1.05	1.05	.99	.98	.98	.97	.98	.97	.97	.97
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	940,138	1,057,179	1,236,359	1,361,399	1,571,700	1,791,600	2,015,900	2,266,700	2,556,500	
Total Employment	335,094	401,439	456,508	509,812	624,100	706,600	810,400	916,200	1,030,700	
Participation Rate (EMPL/POP)	.36	.38	.37	.37	.40	.39	.40	.40	.40	
Agriculture, Forestry, Fisheries	47,645	36,474	25,166	17,043	16,600	13,600	11,600	9,800	8,300	
Mining	582	557	957	1,008	500	400	400	300	300	
Manufacturing	108,114	136,107	150,963	147,331	182,900	197,000	213,300	230,000	249,800	
Food, Kindred Products	9,154	11,280	13,289	-----	12,100	11,400	11,200	11,000	10,700	
Textile Mill Products	14,943	13,280	4,669	-----	2,500	2,000	2,000	1,800	1,700	
Chemicals, Allied Products	4,539	5,597	6,117	-----	8,200	9,400	11,200	13,000	14,900	
Paper, Allied Products	-----	5,725	7,045	-----	8,300 <sup>3</sup>	9,000 <sup>3</sup>	9,700	10,700 <sup>3</sup>	11,400 <sup>3</sup>	
Petroleum Refining	-----	427	613	-----	-----	-----	-----	-----	-----	
Primary Metals	-----	11,549	9,976	-----	7,800	7,100	6,800	6,600	6,600	
Federal Military	435	1,001	4,975	-----	4,400	4,400	4,400	4,400	4,400	
Other	178,318	227,300	274,411	344,430	419,600	490,900	580,600	671,400	767,700	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	72	76	86	100	105	128	146	164	184	208
Total Personal Income	51	52	75	100	111	248	370	557	829	1,226
Per Capita Income (\$58)	70	69	87	100	105	194	254	340	449	589
Total Earnings	48	52	75	100	109	236	345	517	765	1,127
Per Worker Earnings (\$58)	---	71	86	100	---	173	223	291	381	499
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population	76	86	100	110	127	145	163	183	207	
Total Employment	73	88	100	112	137	155	178	201	226	
Agriculture, Forestry, Fisheries	189	145	100	68	66	54	46	39	33	
Mining	61	58	100	105	52	42	42	31	31	
Manufacturing	72	90	100	98	121	130	141	152	165	
Food, Kindred Products	69	85	100	---	91	86	84	83	81	
Textile Mill Products	320	284	100	---	54	47	43	39	36	
Chemicals, Allied Products	74	91	100	---	134	154	183	213	244	
Paper, Allied Products	---	81	100	---	118	128	138	152	162	
Petroleum Refining	---	103	100	---	118	128	138	152	162	
Primary Metals	---	116	100	---	78	71	68	66	66	
Federal Military	9	20	100	---	88	88	88	88	88	
Other	65	83	100	126	153	179	212	245	280	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

TABLE 19-39 Economic Data by County for Planning Subarea 5.3

County Name	Econ Area No.	Total Population				Number Urban 1970	Percent Urban 1970	Land Area Square Mi. 1970
		1940	1950	1960	1970			
TOTAL PLANNING SUBAREA 5.3		<u>197,916</u>	<u>206,939</u>	<u>222,323</u>	<u>224,143</u>	<u>87,900</u>	<u>39.0</u>	<u>5,353</u>
New York		<u>197,916</u>	<u>206,939</u>	<u>222,323</u>	<u>224,143</u>	<u>87,900</u>	<u>39.0</u>	<u>5,353</u>
Jefferson	08	84,003	85,521	87,835	88,508	34,676	39.2	1,294
Lewis	08	22,815	22,521	23,249	23,644	3,671	15.5	1,291
St. Lawrence	07	91,098	98,897	111,239	111,991	49,553	44.2	2,768

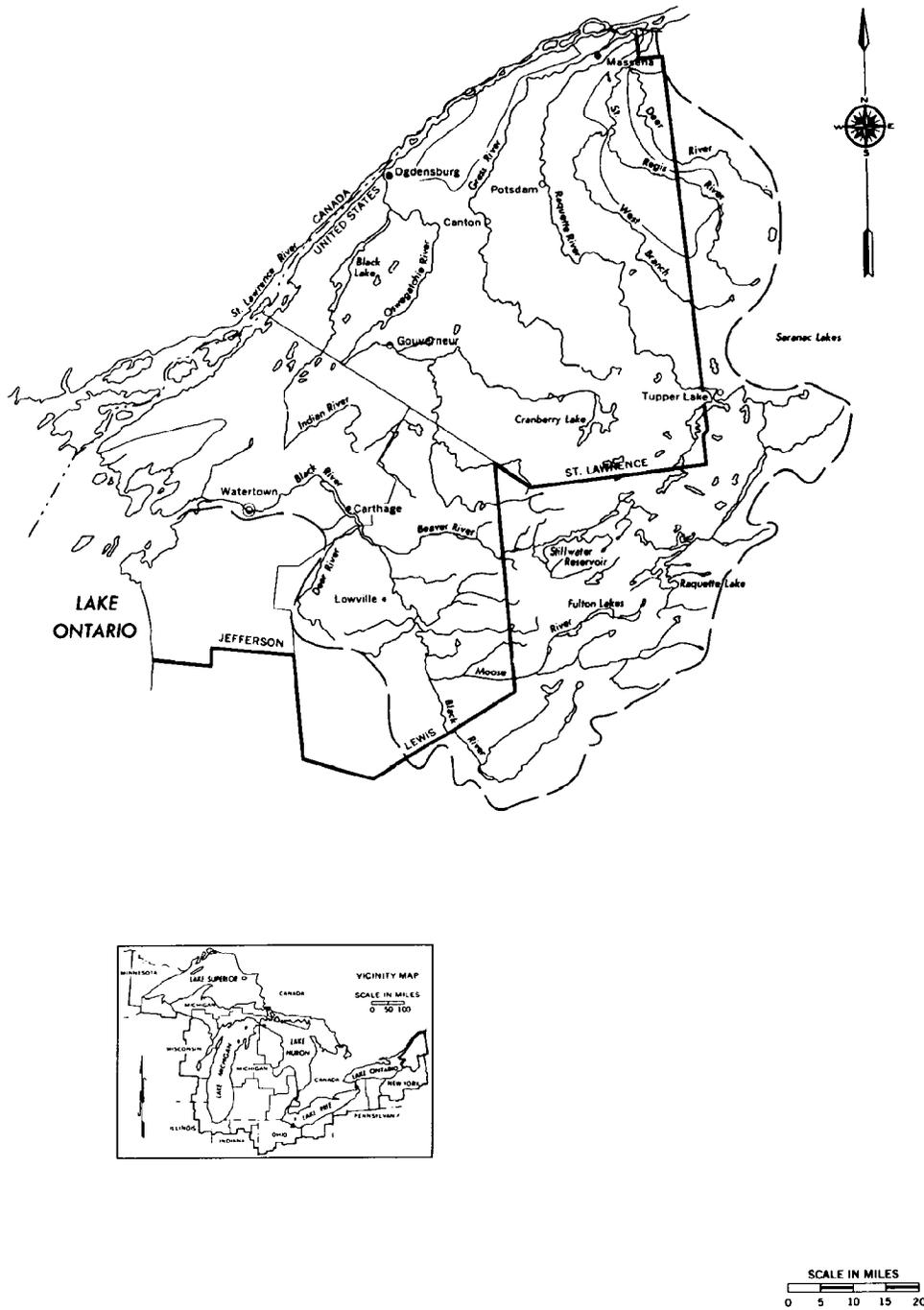


FIGURE 19-19 Planning Subarea 5.3

**TABLE 19-40 Population, Personal Income and Earnings (Thousands \$58), and Employment—Planning Subarea 5.3**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	191,421	197,577	207,425	221,034	229,224	225,700	241,500	257,200	276,000	298,600
Total Personal Income	224,315	230,588	313,974	407,010	412,189	802,596	1,146,217	1,565,607	2,407,148	3,475,580
Per Capita Income (\$58) <sup>1</sup>	1,172	1,167	1,514	1,841	1,798	3,557	4,746	6,477	8,722	11,640
Per Capita Relative (US=1.00)	.92	.90	.84	.86	.80	.87	.89	.90	.92	.94
Total Earnings <sup>2</sup>	178,443	188,946	258,111	337,023	321,152	619,266	870,153	1,263,312	1,820,298	2,621,745
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,861	3,650	4,676	-----	7,401	9,684	12,810	16,979	22,581
Per Worker Relative (US=1.00)	-----	.93	.93	1.00	-----	.92	.93	.94	.95	.97
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population (April 1)	197,914	206,939	222,323	224,143	225,700	241,500	257,200	276,000	298,600	
Total Employment	66,051	70,715	72,079	75,600	83,700	89,900	98,600	107,200	116,100	
Participation Rate (EMPL/POP)	.33	.34	.32	.34	.37	.37	.38	.39	.39	
Agriculture, Forestry, Fisheries	17,124	14,373	9,491	6,139	6,800	5,700	5,100	4,400	3,700	
Mining	537	1,355	1,578	1,300	1,300	1,200	1,200	1,200	1,200	
Manufacturing	14,477	17,018	17,109	17,022	18,900	19,600	21,000	22,300	23,600	
Food, Kindred Products	1,281	1,757	1,844	-----	1,700 <sub>3</sub>	1,600 <sub>3</sub>	1,600 <sub>3</sub>	1,600 <sub>3</sub>	1,600 <sub>3</sub>	
Textile Mill Products	668	270	89	-----	a <sub>3</sub>					
Chemicals, Allied Products	72	207	105	-----	a <sub>3</sub>					
Paper, Allied Products	-----	5,241	4,178	-----	3,200 <sub>3</sub>	3,000 <sub>3</sub>	2,800 <sub>3</sub>	2,600 <sub>3</sub>	2,500 <sub>3</sub>	
Petroleum Refining	-----	29	37	-----	a <sub>3</sub>					
Primary Metals	-----	3,973	3,526	-----	2,400	2,400	2,200	2,100	1,900	
Federal Military	1,139	271	473	-----	400	400	400	400	400	
Other	32,774	37,698	43,428	51,139	56,400	62,800	70,900	79,000	87,200	
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	87	89	94	100	104	102	109	116	125	135
Total Personal Income	55	57	77	100	101	197	282	409	591	854
Per Capita Income (\$58)	64	63	82	100	98	193	258	352	474	632
Total Earnings	53	56	77	100	95	184	258	375	540	778
Per Worker Earnings (\$58)	---	61	78	100	---	158	207	274	363	483
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
Population	89	93	100	101	101	109	116	124	134	
Total Employment	92	98	100	105	116	125	137	149	161	
Agriculture, Forestry, Fisheries	180	151	100	65	72	60	54	46	39	
Mining	34	86	100	82	82	76	76	76	76	
Manufacturing	85	99	100	99	110	115	123	130	138	
Food, Kindred Products	69	95	100	92	92	87	87	87	87	
Textile Mill Products	750	303	100	---	a <sub>3</sub>					
Chemicals, Allied Products	69	197	100	---	a <sub>3</sub>					
Paper, Allied Products	---	125	100	---	77 <sub>3</sub>	72 <sub>3</sub>	67 <sub>3</sub>	62 <sub>3</sub>	60 <sub>3</sub>	
Petroleum Refining	---	78	100	---	a <sub>3</sub>					
Primary Metals	---	113	100	---	74	68	62	60	54	
Federal Military	241	57	100	---	85	85	85	85	85	
Other	75	87	100	118	130	145	163	182	201	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

TABLE 19-41 Total Population for Great Lakes Area States and Population by State for Great Lakes Basin Planning Subareas

Great Lakes States and Great Lakes Basin PSAs	Actual					Projected				
	1940	1950	1960	1970	1980	1990	2000	2010	2020	
TOTAL U.S. GREAT LAKES AREA STATES	52,797,964	58,710,055	67,740,558	74,092,922	84,023,222	94,744,666	105,278,092	117,770,171	132,306,600	
Great Lakes Basin PSAs	18,791,175	21,772,152	26,364,598	29,332,295	33,566,246	38,074,558	42,338,176	47,436,364	53,496,561	
Other Great Lakes Area	34,006,789	36,937,903	41,375,960	44,760,627	50,456,976	56,670,108	62,939,916	70,333,807	78,810,039	
TOTAL ILLINOIS	7,897,241	8,712,176	10,081,158	11,113,976	12,603,722	14,138,078	15,573,564	17,290,841	19,324,040	
PSA 2.2	4,569,643	5,177,868	6,220,913	6,978,947	7,884,751	8,808,833	9,625,841	10,607,546	11,782,042	
Other Illinois	3,327,598	3,534,308	3,860,245	4,135,029	4,718,971	5,329,245	5,947,723	6,683,295	7,541,998	
TOTAL INDIANA	3,427,796	3,934,224	4,662,498	5,193,669	6,340,011	7,450,124	8,602,312	9,978,922	11,619,739	
PSA 2.2	396,949	500,318	686,570	757,989	914,612	1,074,553	1,221,634	1,399,768	1,611,178	
PSA 2.3	311,260	376,547	440,573	478,991	527,185	575,966	635,519	701,483	778,309	
PSA 4.2	201,094	232,138	285,110	338,163	403,574	480,531	561,272	658,795	775,863	
Total PSAs--Indiana	909,303	1,109,003	1,412,253	1,575,143	1,845,371	2,131,050	2,418,425	2,760,046	3,165,350	
Other Indiana	2,518,493	2,825,221	3,250,245	3,618,526	4,494,640	5,319,074	6,183,887	7,218,876	8,454,389	
TOTAL MICHIGAN	5,256,106	6,371,766	7,823,194	8,875,083	10,384,076	11,898,547	13,293,568	15,019,367	17,111,438	
PSA 1.2	196,688	183,075	186,062	188,384	171,294	174,878	177,377	183,898	193,767	
PSA 2.1	73,857	67,835	65,786	62,153	66,059	70,099	74,089	79,554	86,114	
PSA 2.3	1,187,582	1,430,721	1,770,428	2,043,588	2,386,807	2,749,315	3,136,340	3,580,341	4,098,081	
PSA 2.4	368,684	410,465	452,884	496,540	547,187	607,675	671,372	748,394	841,443	
PSA 3.1	94,611	101,512	119,007	142,064	164,285	187,669	208,655	235,688	266,959	
PSA 3.2	637,616	737,899	837,570	1,094,201	1,246,751	1,435,959	1,600,538	1,809,082	2,057,431	
PSA 4.1	2,697,068	3,440,259	4,291,457	4,848,153	5,801,693	6,872,952	7,425,197	8,382,410	9,567,643	
TOTAL MINNESOTA	2,792,300	2,982,483	3,413,864	3,805,069	4,316,374	4,908,014	5,528,899	6,227,435	7,025,626	
PSA 1.1	241,115	241,327	276,599	265,539	288,188	310,462	334,297	359,206	386,147	
Other Minnesota	2,551,185	2,741,156	3,137,265	3,539,530	4,028,186	4,597,552	5,194,602	5,868,229	6,639,479	
TOTAL NEW YORK	13,479,142	14,830,192	16,782,304	18,241,266	19,990,557	22,012,917	24,036,112	26,432,357	29,031,198	
PSA 4.4	1,154,719	1,302,320	1,532,521	1,578,182	1,764,995	1,960,156	2,143,968	2,360,997	2,617,288	
PSA 5.1	620,056	681,911	797,364	946,131	978,212	1,098,542	1,221,785	1,367,289	1,538,044	
PSA 5.2	940,138	1,057,179	1,236,359	1,361,399	1,571,672	1,791,645	2,015,912	2,266,669	2,556,549	
PSA 5.3	197,916	206,939	222,323	224,143	225,655	241,517	257,172	276,000	298,586	
Total PSAs--New York	2,912,829	3,248,349	3,788,567	4,109,855	4,540,534	5,091,860	5,638,837	6,270,955	7,010,467	
Other New York	10,566,313	11,581,843	12,993,737	14,131,411	15,450,023	16,921,057	18,397,275	20,161,402	22,020,731	
TOTAL OHIO	6,907,612	7,946,627	9,706,397	10,652,017	12,462,678	14,335,020	16,249,610	18,451,901	21,026,923	
PSA 4.2	974,742	1,092,965	1,280,626	1,387,188	1,559,893	1,736,817	1,912,551	2,112,122	2,340,323	
PSA 4.3	1,886,863	2,233,417	2,825,417	3,098,513	3,476,359	3,927,726	4,389,182	4,913,493	5,526,520	
Total PSAs--Ohio	2,861,605	3,326,382	4,106,043	4,485,701	5,036,252	5,664,543	6,301,733	7,025,615	7,866,843	
Other Ohio	4,046,007	4,620,245	5,600,354	6,166,316	7,426,426	8,670,477	9,947,877	11,426,286	13,160,080	
TOTAL PENNSYLVANIA	9,900,180	10,498,012	11,319,366	11,792,909	12,897,157	14,245,103	15,529,260	17,064,266	18,888,463	
PSA 4.4	180,889	219,388	250,682	263,654	293,010	328,012	362,015	404,038	452,944	
Other Pennsylvania	9,719,291	10,278,624	11,068,684	11,530,255	12,604,147	13,917,091	15,167,245	16,660,228	18,435,519	
TOTAL WISCONSIN	3,137,587	3,434,575	3,951,777	4,417,933	5,028,647	5,756,863	6,464,767	7,305,082	8,279,173	
PSA 1.1	94,796	88,650	82,123	79,616	78,375	80,443	82,950	85,712	88,890	
PSA 2.1	697,190	748,801	830,610	942,870	1,016,073	1,149,862	1,283,534	1,447,432	1,639,932	
PSA 2.2	1,067,699	1,240,618	1,573,614	1,755,887	2,199,616	2,610,946	2,996,976	3,456,447	3,992,508	
Total PSAs--Wisconsin	1,859,685	2,078,069	2,486,347	2,778,373	3,294,064	3,841,251	4,363,460	4,989,591	5,721,330	
Other Wisconsin	1,277,902	1,356,506	1,465,430	1,639,560	1,734,583	1,915,612	2,101,307	2,315,491	2,557,843	

TABLE 19-42 Population Index for Great Lakes Area States and Population by State for Great Lakes Basin Planning Subareas

Great Lakes States and Great Lakes Basin PSAs	(Index based on 1960 = 100)								
	1940	1950	1960	1970	1980	1990	2000	2010	2020
TOTAL U.S. GREAT LAKES AREA STATES	80	87	100	109	124	140	156	174	195
Great Lakes Basin PSAs	71	82	100	111	127	144	161	180	203
Other Great Lakes Area	82	89	100	108	122	137	152	170	190
TOTAL ILLINOIS	78	86	100	110	125	140	154	172	192
PSA 2.2	73	84	100	112	127	142	155	170	189
Other Illinois	86	92	100	107	122	138	154	173	195
TOTAL INDIANA	74	84	100	111	136	160	184	214	249
PSA 2.2	58	73	100	110	133	156	178	204	235
PSA 2.3	71	85	100	109	120	131	144	159	176
PSA 4.2	70	81	100	119	142	169	197	231	272
Total PSAs--Indiana	64	79	100	111	131	151	171	195	224
Other Indiana	77	87	100	111	138	164	190	222	260
TOTAL MICHIGAN	67	81	100	113	133	152	170	192	219
PSA 1.2	106	98	100	101	92	94	95	99	104
PSA 2.1	112	103	100	94	100	107	113	121	131
PSA 2.3	67	81	100	115	135	155	177	202	231
PSA 2.4	81	91	100	110	121	134	148	165	186
PSA 3.1	79	85	100	119	138	158	175	198	224
PSA 3.2	68	79	100	117	133	153	171	193	214
PSA 4.1	63	80	100	113	135	156	173	195	223
TOTAL MINNESOTA	82	87	100	111	126	144	162	182	206
PSA 1.1	87	87	100	96	104	112	121	130	139
Other Minnesota	81	87	100	113	128	147	166	187	212
TOTAL NEW YORK	80	88	100	109	119	131	143	158	173
PSA 4.4	75	85	100	103	115	128	140	154	171
PSA 5.1	78	86	100	119	123	138	153	171	193
PSA 5.2	76	86	100	110	127	145	163	183	207
PSA 5.3	89	93	100	101	102	109	116	124	134
Total PSAs--New York	77	86	100	108	120	134	149	166	185
Other New York	81	89	100	109	119	130	141	155	169
TOTAL OHIO	71	82	100	110	128	148	167	190	217
PSA 4.2	76	85	100	108	122	136	149	165	183
PSA 4.3	67	79	100	110	123	139	155	174	196
Total PSAs--Ohio	70	81	100	109	123	138	153	171	192
Other Ohio	72	83	100	110	133	155	178	204	235
TOTAL PENNSYLVANIA	87	93	100	104	114	126	137	151	167
PSA 4.4	72	88	100	105	117	131	144	161	181
Other Pennsylvania	88	93	100	104	114	126	137	151	167
TOTAL WISCONSIN	81	89	100	114	130	149	167	189	214
PSA 1.1	115	108	100	97	95	98	101	104	108
PSA 2.1	84	90	100	114	122	138	154	174	197
PSA 2.2	68	79	100	112	140	166	190	220	254
Total PSAs--Wisconsin	75	84	100	112	133	155	176	201	230
Other Wisconsin	87	93	100	112	118	131	143	158	175

## Section 2

# OVERALL ECONOMIC AND DEMOGRAPHIC TRENDS AND PROJECTIONS

### 2.1 Projection Methodology and Assumptions

#### 2.1.1 Introduction

Projections presented in this section were prepared during an analysis of the national economy conducted under the aegis of the U.S. Water Resources Council and performed by the Office of Business Economics (OBE) of the U.S. Department of Commerce (USDC) and the Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA). Initial results of the OBERS program and a discussion of the methodologies employed are presented in *Preliminary Report on Economic Projections for Selected Geographic Areas, 1920-2020*, March, 1968; and supplemented in January and June of 1969, and in *Preliminary Projections on Economic Activity in the Agricultural, Forestry and Related Economic Sectors of the U.S. and Its Water Resource Regions, 1980, 2000, and 2020*, August, 1967. The methodologies are summarized in this section.

Assumptions underlying the OBERS projection program were:

- (1) Use of the products of water resources development is related to economic activity generated in an area and this relationship can be measured and projected.
- (2) Details of economic activity can be projected more confidently than can the required amounts of water resources, goods, and services.
- (3) The product of the projected relationship and the economic activity yields satisfactory measures of requirements for water resource goods and services.
- (4) The impact of water and related land resources development on an area can be calculated and evaluated given projections of the economy of each region in appropriate industrial detail.

### 2.1.2 Nature of Projections

Projections are conditional because they are based on past relationships that are assumed to be relevant in the future. They are only as accurate as the assumptions on which they are based, unless errors in the overall aggregate offset one another. Well-founded projections can prove to be erroneous if, because of their publication, action is taken to forestall or eliminate the forecast outcome. Projection errors of this kind are proof of the usefulness of a projection program.

Use of the past to view the future requires the assumption that relationships relevant to the future can be identified and measured. As suggested in Simon Kuznets's "Concepts and Assumptions in Long-Term Projections of National Product,"<sup>1</sup> one assumes that a pattern among these relationships can be recognized and projected into the future, so one traces the economic path over as long a period of time as necessary to draw an empirical picture of the economy that is relevant to the future.

In developing a projection, measures must be assembled in sufficient detail to show relationships among components. Then, a time series for the measures must be constructed so that trends in the relationships can be determined. Trends may be modified substantially in the projection process. For example, a strong historical growth trend projected for mineral production in a particular area may end abruptly because of the expected depletion of the resource. The probability as well as the timing of this occurrence could be determined by dividing measured or estimated mineral supplies by the projected rate of production (or demand), with both numerator and denominator based on past observations. Another example of a reasoned and modified extension of past trends is afforded by the changing relationships of basic and residen-

tiary industries in an area. Basic industries are those that specialize in certain products in order to take advantage of lower production costs resulting from the availability of natural resources and from benefits from internal and external economies. These industries are also referred to as export industries because large amounts of their goods and services enter into inter-area trade. Residentiary industries are those that serve the households and other industries of the economic area. The goods and services produced by the residentiary industries usually enter only intra-area trade. An analysis of changes in the economy of an area may show an uptrend in the ratio of residentiary income to total income, which means the area is moving from a very unbalanced "colonial" economy to one that is approaching a position of equilibrium in respect to the residentiary total income relationship. All things being equal, a projection would terminate the uptrend in the relationship at the time when the area's residentiary-total ratio is expected to become stable.

### 2.1.3 Assumptions

Specific assumptions underlying the projections in this report are set forth in connection with the methodology to which they apply. The assumptions that follow apply to the projections generally.

The government will implement the policies needed to maintain full employment under a free enterprise economy.

Projections are free of the distorting effects of a major war at the several target dates. Although wars may occur within the time span of the projections, economic distortions caused by such wars are assumed to have worked themselves out so that each regional economy is on its normal trend line at the target dates. If a war is in progress at a target date, the projections will be in error because of the war's differential regional effects.

No explicit account has been taken of water resource endowments of the economic or water resource planning areas. Only a "base line" projection is used. The assumption is that water will play the same role in stimulating or depressing economic growth in the area that it has in the past. In cases where water resource limitations have not yet, but are about to be felt, the base line projection may be too high. The disparity between growth potential free of the water resource restriction (projected here) and actual growth if addi-

tional water resources are not found must be recognized. Such awareness stems from the translation of economic projections into water requirements.

Inherent in every assumption is the possibility that the assumed situation may not materialize.

### 2.1.4 Economic Measures Used in Projections

Nationally, the measure of the total economy used for both current economic analysis and as an indicator of the future is the gross national product, the market value of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institution consumption of durable capital goods. Other business products used up in the accounting period are excluded. The nation's economy in this context refers to the labor and property supplied by residents. Gross national product includes the goods and services purchased by consumers and government, gross private domestic investment (including change in business inventories), and net exports (exports less imports).

It is the climatic measure of the national income and product accounts which include data on total personal income and employment. Total personal income is available in its component parts of wages and salaries, proprietors' income, other labor income (these three items constitute earnings), property income, transfer payment, and contributions to social insurance. Earnings are available by industrial categories, as is employment. National income and product accounts are internally consistent as to industrial classification and measurement concepts. Data are compiled annually. This study includes the years 1948 through 1965, with reference for some series made to 1929.

National agricultural output is estimated by the U.S. Department of Agriculture on an annual basis in terms of crop units and livestock products produced.

National population data come from the Census Bureau on an annual basis. Employment data are available from the Census Bureau and the Bureau of Labor Statistics.

Because of conceptual difficulties, it is not possible to construct measures of gross product on a geographic basis. The most comprehensive measure of economic activity below the national level is total personal income. Local area income estimates (by SMSA

or county) for benchmark years 1929, 1940, 1950, 1959, and 1962 were prepared as part of the OBERS program. Since 1965 these estimates have been constructed on an annual basis.

Local area total personal income is available by source, i.e., wages and salaries, proprietors' income, and earnings are available by industry. Regional measures of earnings were prepared at the Standard Industrial Classification (SIC) division level.

County population and employment data for 35 industries are available from the *Censuses of Population* for 1940, 1950, and 1960. Estimates of local economic area employment for 1962 and 1965 were made by estimating the population according to the growth rate of corresponding employment classes in *County Business Patterns* data and data from other appropriate sources.

Agricultural economic activity is measured in units of crop and livestock products produced, as well as by income and employment. Additional discussion of some of the individual measures is included at appropriate places in the discussion of methods.

## 2.1.5 Terms

### 2.1.5.1 Export Base Theory

This theory hypothesizes that the factor initiating and determining growth in an economy is the "export base." Industrial growth in a given area, the theory proposes, is initiated by demand arising outside the area. Growth in external demand results in an expansion of economic activities, particularly local trade and service activities. As such an area matures, the base will become less distinguishable because the area's production will become more varied. The rate at which a region grows depends both on the rate at which the export base expands in response to the increased external demand for the region's exportable commodities and services, and on the rate at which the area assumes a level of self sufficiency in the residentiary industries as dictated by local income levels and consumption patterns.

The export base theory emphasizes that growth of any subnational unit is directly tied to developments within the national economy and, in some cases, to changes in international trade as well. Because attention is focused mainly on the relationship between a single

subnational unit and the "outside world" treated as a whole, the functional ties between regions are hidden from view, but the changing patterns of national demand and investment receive an appropriately central position in the analysis of regional growth. Aggregation of the industries and activities in a region in terms of export versus local use provides a classification that is meaningful for understanding and measuring certain aspects of growth.<sup>2</sup> The export base technique can use either employment or earnings as input data. It relates these two sets of data through the concept of earnings per worker relative to the nation in such a manner as to enable employment and earnings data both to reinforce each other and to measure the level of efficiency or well-being attained as a result of engaging in a specific endeavor.

### 2.1.5.2 Employment Shift Analysis

This is a method of separating factors that relate to the differences in regional rates of employment growth over a specified period of time. The principal standard of reference is the growth rate of the nation as a whole, both in total employment and in employment within various industries.

### 2.1.5.3 National Growth Component

The national growth component, a term used in employment shift analysis, is the number of the region's employees that would have obtained or lost jobs in a certain industry had the industry in that region changed at the same rate as total national employment during a specific time. The figure is computed as follows:

If  $E_{ij}$  = employment in industry  $i$  in region  $j$ ,  
 $E_{io}$  = employment in industry  $i$  in nation,  
 $E_{oo}$  = employment in all industries in nation  
 = national total employment,  
 $t-1$  = base year and  
 $t$  = current year,

Then the national growth component

$$= E_{ij}^{t-1} \left[ \frac{E_{oo}^t - E_{oo}^{t-1}}{E_{oo}^{t-1}} \right]$$

### 2.1.5.4 Industrial Mix Component

The industrial mix component used in employment shift analysis represents a compari-

son of the national growth rate of an individual industry with the all-industry growth rate. It is the number of the region's employees by which employment in an industry in that region would have changed during the specified time had employment in the region's industry changed at a certain rate. The rate is computed by taking the difference between the rate of change of national employment in the industry and the rate of change of national total employment over the same time period. The industrial mix component is said to be positive and favorable (or negative and unfavorable) when the rate of change of national employment in the industry under consideration exceeds (or falls short of) the rate of change of national total employment over the same time period. Likewise, the rate of change of national employment in the industry under consideration is said to be rapid (or slow) when it exceeds (or falls short of) the rate of change of national total employment over the same time period.

$$E_{ij}^{t-1} \left[ \frac{E_{io}^t - E_{io}^{t-1}}{E_{io}^{t-1}} \right] - \left[ \frac{E_{oo}^t - E_{oo}^{t-1}}{E_{oo}^{t-1}} \right]$$

#### 2.1.5.5 Regional Share Component

The regional share component used in employment shift analysis results from comparing the regional rate of growth of an industry with the national rate of growth of that industry. It is obtained by multiplying the base year employment by the difference in the regional and national rates of growth. The regional share component is said to be positive and favorable (or negative and unfavorable) when the rate of change of regional employment in the industry under consideration exceeds (or falls short of) the rate of change of national employment in the same industry during the same time.

$$E_{ij}^{t-1} \left[ \frac{E_{ij}^t - E_{ij}^{t-1}}{E_{ij}^{t-1}} \right] - \left[ \frac{E_{io}^t - E_{io}^{t-1}}{E_{io}^{t-1}} \right]$$

The sum of the national growth component, the industry mix component, and the regional share component equals the actual employment change in a region during the specified time. The net relative change is the difference between the actual employment change and the national growth component in a region (i.e., the sum of the industry mix and regional share components).

#### 2.1.5.6 Land Resource Area

This is an area that is homogeneous with respect to major soil characteristics, climate, and geologic, vegetative, and topographic features.

#### 2.1.5.7 Soil Resource Group

This is a group of soil types that are relatively homogeneous with respect to input-output coefficients within a land resource area.

#### 2.1.5.8 Personal Income

Personal income is the current income received by residents of an area from all sources. It is measured before deduction of income and other direct personal taxes, but after deduction of the individual's contributions to social security, government retirement, and other social insurance programs. While cash income makes up the overwhelming bulk of the total—more than 95 percent on a national basis—personal income also includes several types of nonmonetary income, or income in kind, in order to improve the scope of the estimates and thereby make the basis of comparisons by areas more meaningful.

Personal income is the most comprehensive measure available on an area basis. It covers the income received by residents of each area from business establishments, Federal, State, and local governments, households and institutions, and foreign countries. All forms of income flowing to persons from these sources are included, i.e., wages and salaries, supplementary earnings termed "other labor income," the net incomes of owners of unincorporated businesses (including farms), net rental income, dividends, interest, and government and business "transfer payments," consisting in general of disbursements to individuals for which no services are rendered currently, such as unemployment benefits, relief, and veterans' pensions.

Each of these types of income is measured on an area basis as the sum of separately estimated components. For example, wages, salaries, and proprietors' income are estimated by individual industries, while transfer payments are estimated by the numerous disbursements comprising this category. Total personal income for each area is thus built up from an extensive array of component detail.

Per capita income is derived by dividing this total by the area's midyear population.

The area estimates of personal income are constructed from a wide variety of statistical information, consisting largely of compilations by government agencies, but drawn from numerous private sources as well.

Area economic information is collected by government in the interest of business and other broad user groups. The periodic industrial and population censuses are predominant in this category. Also included is the Department of Agriculture's data collection and estimation of farm income by area.

Data that become available from governmental agencies as a byproduct of their administrative functions are of vital importance as a statistical source of local area income measures. An example is the tabulations of wages and salaries in "covered" industries prepared by the various State unemployment insurance commissions from employer reports. This information is transmitted to Washington for summary by the Labor Department's Bureau of Employment Security. Another example is the compilations by the Internal Revenue Service of the total amounts of various types of income reported by individuals in various areas on Federal income tax returns. The list of such byproduct data available from government could include the diverse records relevant to personal income measurement that are maintained by Federal, State, and local agencies for the administration of specific programs or the conduct of general functions.

Data on economic activities in local areas are not collected in a coordinated statistical program designed for income measurement. For the most part, reported statistics are not directly or wholly suitable for this purpose and must be adjusted for differences in definition and to fill gaps in coverage. Geographic income measurement, therefore, becomes a twofold task. Data from a multiplicity of sources must be assembled and adapted through estimation to build up aggregate income from component flows.

Income estimates used in this study were developed within the framework of the Commerce Department's official State estimates of personal income. That is, State totals for each of approximately 100 income components were allocated to the local areas of the States in accordance with each area's proportionate share of a related economic series available on a local area basis.

This approach to small-area income estima-

tion accomplishes three purposes. It permits the use of all available sources of information, which minimizes errors that stem from estimation of broad components using data differing in scope and internal composition. Secondly, it brings into play the factor of "offsetting errors." The tendency for errors in underlying components to compensate for one another in totals is a phenomenon observed repeatedly in the field of income estimation when a detailed, statistical procedure is followed. Finally, use of a detailed allocation method yields a large amount of useful information on industrial sources of income at the local level that can be analyzed.

Industrial detail is closely related to geographic detail. Estimates of the various income components were made when possible on a county basis and grouped into the economic areas used in the study. Although counties formed the basic "building blocks," estimates are not shown for these units.

There are two reasons for the absence of county figures. First, for a number of components, the most useful data for estimates were available only for metropolitan areas or for groups of counties. In such instances extension of geographic detail to the county level was sacrificed in favor of greater accuracy in the overall estimates. Whereas certain of the detailed income estimates must be classed as statistically unreliable on a county basis, they are satisfactory when grouped into area totals.

Secondly, income estimates for individual counties are not shown because of the lack of requisite data for making adjustments to take account of workers who commute across county lines. Certain income components (wages and salaries, in particular) are measured at the point of disbursement (place of work), while others (property income, for example) are estimated on a residential basis. Where workers reside in one county and work in another, personal income was estimated for those counties partly on a "where-received" basis and partly on a "where-earned" concept. Data suitable for completely converting personal income to either of the two definitions are lacking, but the commuter problem is "solved" by grouping counties into geographic areas so that commuting across area lines is at a minimum. This solution precludes the publishing of meaningful estimates for individual counties.

Use of the county as a building block served two purposes. It gave maximum flexibility in the delineation of economic areas to be used in

analysis and projection, and it provided the geographic detail necessary to convert the projections from economic areas to water resource planning subareas.

#### 2.1.5.9 Private Wages and Salaries and Other Labor Income

These two components of income are grouped together because they are closely related, and because the payroll estimates are used in measuring the distribution of "other labor income."

Payroll series for the most current year were prepared by allocating State totals to counties using a combination of payrolls obtained from individual State unemployment insurance (UI) agencies and special tabulations from the Bureau of Old-Age and Survivors' Insurance (OASI), which cover payrolls of firms excluded from UI coverage because of their size. These payroll estimates were carried back to earlier years by a combination of Census and OASI payroll and employment data.

Wages and salaries in industries not covered by the UI program—agriculture, forestry, fisheries, railroads, private education, hospitals, religious organizations, private households, and the "rest of the world"—were measured mainly on the basis of data collected in the various censuses of population and industry taken since 1929. Extension to years after 1960 was accomplished by extrapolating from the 1960 benchmark using a closely related "covered" industry.

State estimates of most components of other labor income were allocated to counties in accordance with the most relevant industry's wage and salary distribution. Other items such as military reserve pay, compensation for injuries and directors' fees were allocated by a related series.

#### 2.1.5.10 Government Payrolls

County estimates of Federal civilian pay were based on UI reports supplemented by special tabulations of W-2 income tax returns for selected areas, while military pay rests on special tabulations supplied by the U.S. Department of Defense. State and local government payrolls were assembled from data collected in the 1957 and 1962 Censuses of Governments, and from special information obtained directly from State and local govern-

ments. Each major component of government was carried back by Census payroll and employment data.

#### 2.1.5.11 Proprietors' Income

Self-employment income was measured separately for farm and nonfarm portions. Nonfarm income was derived by allocating State totals to counties or other local areas in accordance with three sets of collateral information. First, estimates of proprietors' income in the 100 largest SMSAs were prepared on the basis of data published by the Internal Revenue Service (IRS) in *Statistics of Income*. These figures were then deducted from the State totals leaving a much smaller residue among the remaining counties of each State. Estimates for the smaller SMSAs were then developed on the basis of information from the 1960 Census of Population. These, too, were deducted from the State totals. The remainder—representing less than one-fourth of total nonfarm self-employment income—was allocated among the remaining counties of each State in accord with the number of nonfarm self-employed persons in the county weighted by the average wages of workers in the same county. This process was carried out statistically to insure comparability among the various segments of proprietors' income that were based on different source material.

Farm proprietors' income was estimated by preparing county distribution of gross farm income and production expenses. Net farm income was the difference between the two. The county distributions of the two components were obtained by allocating State totals of income and expenses to counties on the basis of various allocators—some direct, others indirect. Many allocating series were obtained from the appropriate quinquennial census of agriculture or from other phases of the U.S. Department of Agriculture's agricultural reporting system. In other instances, indirect measures were necessarily used.

#### 2.1.5.12 Property Income

Rents, dividends, and interest were estimated currently by first preparing estimates of the 100 largest SMSAs from IRS data in *Statistics of Income*. These estimates were deducted from State totals and the remainder of property income distributed among the other

counties in accordance with relationships established for the 100 largest SMSAs. Imputed rents and interest were measured indirectly through data reflecting the value of rental property and the amount of non-interest-bearing cash deposits in financial institutions.

#### **2.1.5.13 Transfer Payments**

County data are generally available for measuring Social Security benefit payments, disbursements under the various veterans' programs, Federal Government retirement payments, and unemployment insurance benefits. Allocators for these transfers were derived from administrative data of the organizations responsible for the program. For numerous other components of transfer payments, individual State sources were used. For the remaining items, a general and indirect allocator such as population was used.

#### **2.1.6 An Overview of the Projection Procedure**

The projection procedure used here calls first for projections of summary national totals, which are then disaggregated into national industry components. The national industry components, in turn, are disaggregated to the economic areas and from there to water resource planning subareas. Conceivably, the economy of each economic area could have been projected independently, but the alternate course of first making national projections as a guide or control is followed in this report for several reasons. National trends can be made more accurately than regional ones because they are more stable and more easily measured.

The same reasoning applies within the set of national industry projections. Conceivably, each industry could have been projected separately and all summed to the national aggregates of employment, output, income, and earnings. Instead, a set of aggregate measures was first developed. These were then disaggregated into national totals for the individual industries.

The initial step in preparing economic projections for the water resource planning subareas was to project the GNP by decades to 2020, using the product of projected annual employment, man-hours worked per year, and product per man hour.

National employment totals were derived

by applying the Census Bureau's published projections of the population to estimated labor force participation ratios and unemployment rates based on past trends. Hours worked per year and product per man hour were also projected on the basis of trends in these two variables since 1948.

By extending trends in the industrial composition of the economy seen in the last two decades, total GNP was disaggregated into the gross product originating (GPO) in each of 43 industries on a national basis. National totals of aggregate personal income and earnings of persons engaged in each industry and employment by industry were derived from the GNP and GPO projections on the basis of past relationships and separate analyses of the industrial composition of earnings and employment.

Resident shares of earnings and employment in each basic industry that exports its production to other areas were calculated for five selected years from 1929 to 1962 for each economic area in the nation. Changes in the shares accruing to each region were analyzed industry-by-industry. Mathematical extensions of these trends were calculated and then modified in accordance with the findings of special industry analyses and in light of natural resource availability. Projected shares of earnings and employment in each decade in each region were applied to the national totals in the appropriate industry to obtain projected earnings and employment.

Earnings and employment in nonbasic or residuary industries that serve local businesses and population were then allocated to the economic areas in accordance with projections of the trend in past relationships of basic and residuary industries.

Other income shares were allocated to the regions in accordance with past trends. Population was projected on the basis of projected employment and income.

Finally, according to trends measured from 1929 to 1962, employment and income components for each water resource planning subarea were segregated from the projections by economic area.

Throughout the projection procedure special attention was paid to obtaining the proper interindustry relationship at the national, economic area, and water resource planning subarea levels, and to insuring that all geographic measures fit within the projected national economy.

TABLE 19-43 Selected National Aggregates

	Actual (BLS)				Projected (OBE)			Rate of Change	
	1950	1955	1960	1965	1980	2000	2020	1965	2020
Total Population (000s) (Census "C")	152,271	165,931	180,684	194,592	235,212	307,803	398,642	1.6	1.3
Population 14 and over (000s) (Census "C")	113,438	119,440	127,335	138,261	174,234	227,470	294,956	1.3	1.4
Labor force participation rate (computed)	.571	.577	.574	.567	.578	.583	.583		
Labor force (000s)	64,749	68,896	73,126	78,357	100,707	132,615	171,959	1.3	1.4
Civilian labor force (000s)	63,099	65,848	70,612	75,635	98,107	130,015	169,359	1.2	1.5
Unemployment rate (computed)	.053	.044	.056	.046	.040	.040	.040		
Civilian employment (000s)	59,957	63,193	66,681	72,179	94,183	124,814	162,585	1.3	1.5
Civilian government employment (000s)	5,817	6,838	7,943	9,623	14,365	22,232	33,122	3.4	2.3
Civilian private employment (000s)	54,140	56,355	58,738	62,556	79,818	102,582	129,463	1.0	1.3
Private economy hours per man year	2,125	2,091	2,026	2,020	1,949	1,850	1,749	-0.3	-0.26
Private economy product, <sup>1</sup> per man hour (computed)	2.79	3.34	3.68	4.42	6.89	12.44	22.47	3.1	3.0
Private economy gross pro- duct (000,000s) (computed)	319,410	392,007	438,523	558,671	1,071,474	2,361,517	5,087,660	3.8	4.1
Gross national product (000,000s) (computed)	355,288	437,963	487,682	616,659	1,151,794	2,479,538	5,257,745	3.7	4.0
Total manpower civilian plus military (000s)	61,607	66,241	69,195	74,901	96,783	127,414	165,185	1.3	1.4
Product per man (computed)	5,767	6,612	7,048	8,233	11,901	19,460	31,829	2.4	2.5
Product per capita (computed)	2,333	2,639	2,699	3,169	4,897	8,056	13,189	2.1	2.6
Total personal income (000,000s)	274,571	335,010	389,653	494,719	967,104	2,204,086	4,947,748	4.0	4.3
Personal income per capita	1,803	2,019	2,157	2,542	4,112	7,161	12,412	2.3	2.9
Domestic personal income (000,000s)	272,820	332,108	387,447	491,979	963,000	2,196,684	4,934,146	4.0	4.3
Domestic earnings (000,000s)	225,084	277,573	317,575	396,867	750,237	1,672,112	3,721,948	3.9	4.2

<sup>1</sup>All monetary amounts are in 1958 dollars.

## 2.1.7 National Projections

Table 19-43 contains summary national totals that formed the control total framework for both the national and regional industry projections. Following are explanations of some of the individual items in the table.

### 2.1.7.1 Total Population

This projection is the C series of the Census Bureau published in *Current Population Reports*, Series P-25, No. 381, December 18, 1967. The impact of using a lower level of total population shown in Series D is discussed in Subsection 2.1.8.

### 2.1.7.2 Population of Working Age

The population aged 14 years and over (the working population) is taken directly from the Census report already noted.

### 2.1.7.3 Total Labor Force Including Armed Forces

The total labor force is derived from the population aged 14 years and over. Its size depends on the propensity of this population of working age to seek employment. For present computations this is defined as the "total labor force participation rate."

#### 2.1.7.4 Civilian Labor Force

The difference between the labor force and the civilian labor force is the strength of the armed forces, which has shown the following pattern in recent years:

Year	Strength
1950	1,650,000
1955	3,049,000
1960	2,514,000
1965	2,723,000

The projected level of the armed forces calls for 3,300,000 in 1970 and 3,000,000 thereafter.

#### 2.1.7.5 Civilian Employment

Civilian employment, derived from the civilian labor force, depends on the success of civilian labor force participants in finding employment. The assumption is that fiscal, monetary, and labor market devices will maintain an average employment rate of 96 percent, or a four-percent rate of unemployment.

#### 2.1.7.6 Hours Worked per Year per Man

Hours worked per year per man were developed from historical estimates of total private employment and total private man hours, prepared by the Bureau of Labor Statistics, U.S. Department of Labor. The projected rate of decline in hours worked per year is significantly lower than that for the period 1950 to 1965, but the reduction is based on the premise that the "easy" reductions in hours per week have already been made. Also, it is assumed that future reduction in hours will involve a reduction in weeks worked as well as in hours per week.

#### 2.1.7.7 Gross Product per Man Hour

Estimates of real product per man hour in the private economy for recent years are implicit in the relationship between measured man hours and measured real product. The post war growth rate in product per man hour from 1945 to 1966 was 3.2 percent per year.

Professional opinion holds that the 3.2 percent rate is not sustainable because it was caused in part by the sizeable post-war shift of

workers from farm to nonfarm work. Because this shift cannot be repeated on the same scale, the long term prospect in this view is for a lower productivity growth rate in the private economy. Even though empirical evidence on the effect of the farm-nonfarm shift is fragmentary and inconclusive, the argument has been given some consideration. The middle assumption concerning the productivity growth rate calls for 3.0 percent instead of 3.2 percent.

#### 2.1.7.8 Aggregate Private Gross National Product

Total private man hours per year multiplied by gross product per man hour in the private sector yields the estimated private gross national product.

#### 2.1.7.9 Government Gross Product

Gross product projections for the government sector assume that product per worker remains constant over time, a convention used by the United States Department of Commerce in its income and product measurement. It is not feasible to measure government output, because not being sold to its users, it has no established market value. Therefore, government gross product is measured and projected as the product of the number of government employees and their average compensation in 1958. The computations are carried out separately for civilian government and military personnel.

#### 2.1.7.10 Gross National Product

The resulting government gross product when combined with private gross product yields a total GNP projection that excludes that received by Federal employees stationed temporarily abroad.

#### 2.1.7.11 Personal Income

When GNP is deflated, it measures constant-dollar production. Total gross product in constant dollars is an index of changes in total physical production. In contrast to GNP, personal income measures the current income received by persons and is not an indicator of the quantity of physical production.

Because money paid to employees in one industry has the same purchasing power as money paid in another industry, all components of personal income are deflated by the same purchasing power index—that developed for personal consumption expenditures.

In some industries physical production and real purchasing power can diverge, as with government workers. In accounting for real output of government, no productivity rise is recognized in conventional income and product accounting practice, but government wages and salaries do rise, and they are deflated for real personal income purposes as are wages and salaries in any other industry.

In order to derive projected personal income from the projections of GNP already described, the ratio between historical constant-dollar personal income and constant-dollar GNP was projected. This projection was then applied to the projected constant-dollar GNP to obtain the projected constant-dollar personal income. In a similar fashion a projection of constant-dollar earnings was made by linking it to projected constant-dollar personal income.

### **2.1.8 Industrial Composition of National Projections**

To obtain national control totals for use in regional disaggregations it was necessary to prepare projected industry breakdowns of persons engaged in production, employment on a decennial census basis, and the earnings component of personal income. The initial step in the development of these national controls was that of projecting an industry breakdown of gross national product.

#### **2.1.8.1 Gross Product Originating (GPO) by Industry**

OBE's estimates of gross product originating by industry in constant (1958) dollars for the years 1948 through 1966 were divided into two groups—manufacturing and all other industries. The trend set by each group's percentage of total gross product from 1948 through 1966 was projected to 1980, 2000, and 2020. Application of the percentages to projected gross national product established major control totals for manufacturing and non-manufacturing.

The GPO in each of 43 industries in the years

1948 through 1966 was examined. First to be considered was the trend in the percent of total gross national product in each of these industries. Next, dollar amounts of GPO in each industry were charted. First approximations of GPO by industry were made by extending the trends revealed by the two approaches. In most instances the results of the two methods agreed. In cases of significant difference, investigation continued. For industries producing consumer goods, the implications of GPO as a function of population growth were explored and the initial projections adjusted where necessary. For industries whose product constituted mainly raw or semi-finished material for another industry, the implications of GPO as a function of growth in a related industry were explored and appropriate adjustments of the preliminary projections made.

Results of the explorations of consumer-oriented and industry-oriented industries were used to mediate the differences between projecting a share of the total gross product and the direct projection of GPO values. Following the choice of a first stage projection of gross product originating in each of 43 industries, the first stage values were adjusted to the appropriate manufacturing or non-manufacturing control totals noted above. As a result, the 43 industry projections of gross product originating added up to the projected gross national product.

#### **2.1.8.2 Persons Engaged in Production**

Persons engaged in production include wage and salary workers and proprietors. While in basic content it resembles the measurement of employment in the decennial censuses or in the monthly report of the labor force, it differs in three ways:

(1) It reflects an annual average rather than an April date.

(2) It includes all government employees in the government sector, while government employment reported in the 1960 Census is scattered very widely among other industries.

(3) It consolidates the count to a full time equivalent basis, whereas Census and the MLRF of the Bureau of Labor Statistics present a head count.

The first and third differences partially offset one another.

For initial projection work the persons-engaged series is less volatile than the full and part-time employee series. The latter brings

TABLE 19-44 Domestic Personal Income (Millions \$58) by Type of Payment, United States

Year	Domestic			Personal	
	Personal Income	Domestic Earnings	Property Income	Transfer Payments	Contributions to Social Insurance
<u>Actual</u>					
1950	272,820	225,084	33,046	18,181	-3491
1955	332,108	277,573	41,524	18,653	-5642
1960	387,447	317,575	51,218	27,684	-9030
1965	491,979	396,867	70,925	36,540	-12353
<u>Projected</u>					
1980	963,000	750,237	159,944	81,915	-29096
2000	2,196,684	1,672,112	387,481	203,210	-66119
2020	4,934,146	3,721,948	873,368	488,673	-149843

part-time workers into the count—whatever time of year they work. The census count only occurs in early April.

As with GPO, two preliminary projections of persons engaged in production were made. First, industry shares of total persons engaged in production were projected and applied to national projections of employment, i.e., projected national manpower minus projected national government (both military and civilian) employment. Second, the numbers of persons engaged in production were independently projected. The two projections of industry employment generally agreed.

All projections were subject to an additional test, because it was assumed that some regression toward the national average would occur in GPO per man. Where such regression was not in the projections, adjustments were made to projected civilian employment, to projected gross product originating, or to both series. The result of the entire procedure was a projection of persons engaged in both private and government production and within government in both a civilian and military capacity.

#### 2.1.8.3 Employment on a Decennial Census Basis

Projections of persons engaged in production were adjusted to an industrial grouping as close as possible to that used in the Decennial Census enumerations. This involved distribution of civilian government workers to several industries other than government in accordance with similarity of industrial pursuit as recognized in census classifications. This adjustment was necessary since the only comprehensive employment series covering

all local areas was that in the Censuses of Population. The resulting national totals of employment by industry were used to extend the industry figures in the 1960 Census of Population to 1980, 2000, and 2020. These provided the national totals of employment needed for the regional disaggregation.

#### 2.1.8.4 Domestic Personal Income by Type of Payment

For purpose of eventual regional distribution and projection, it was necessary to adjust total personal income downward to domestic personal income, from which the earning of Federal military and civilian employees stationed temporarily abroad were excluded.

The parts of domestic personal income were measured historically and projected in the detail suggested by Table 19-44.

#### 2.1.8.5 Earnings by Industry

In addition to the detail in the foregoing tabulation, domestic earnings were examined for each of 43 industries in the postwar period. The percentage that each industry constituted of total domestic earnings was projected and applied to total projected domestic earnings for a first approximation of domestic earnings in each industry. In addition, those industries with predominantly a product output (agriculture, mining, and manufacturing) were examined for the trend in the relationships between domestic earnings and gross product originating. When projected, the two types of trends generally implied very similar domestic earnings for the product industries. Differences were mediated by reference to in-

dependent projections originating in other governmental agencies.

In breaking down industry projections for the various aggregates the questions of new products, new industries, and an oversupply of certain commodities arise. Projections made in this section fit within a total industrial classification framework. This means that new products in the future will be made mainly by the industries of today. Changes in the industrial mix of this type have been going on for many years and a continuation of such developments is included implicitly and unidentifiably in the projections. It is because of this that it is difficult to foresee a satiation of demand for the products of a particular industry. What appears now to be an excess production of product A may be the correct amount of product A when it is placed in combination with product B, which may be a new product or service lending a new character to the contribution of industry A.

#### 2.1.8.6 Impact of Alternative Projections of Lower Total Population

The projected national population growth, with which the OBERS projections begin, is based on an assumed total fertility rate (the sum of age specific birth rates) of 2,777 births per 1,000 women. This fertility rate, a substantial decline from the 1962 to 1965 level, is incorporated in the Series C national population projection published by the Bureau of the Census in 1967.

Choosing the national population growth rate was one of the first decisions to be made in the projection process and the decision to use the C series was made in 1969 before the low birth rates of recent years were known. At that time most demographers were recommending the C series.

While many demographers now recommend the use of the D series, which is built on an assumed total fertility rate of 2,451 births per 1,000 women, there are still those who believe the C series to be valid.

Current water resources planning is for near term (15 to 20 years) requirements. During that time the change in birth rate will have little effect because the labor force for the next 20 years is already born. By 1990 the total population under the D series will be only approximately six percent less than under the C series. A six percent change in total population is well within the possible errors in the projections and the water use coefficients.

Table 19-45 shows the relationship between the C series used in the projections published in 1967 as compared with the D series published in 1970. The column under "population age 21+" shows the relationship between the C and D series in the age group from which most of the labor force is drawn.

### 2.1.9 Economic Area Projections

Regional projections have been prepared by disaggregating the national totals described in the preceding section to economic areas of the country. This was done with the area's historic contribution to the national economy. Because reliable regional projections can be made only on the basis of economic areas where past economic relationships can be identified and measured, the first step in the preparation of regional projections was to subdivide the country into economic areas.

**TABLE 19-45 Alternative Population and Labor Force Projections as a Percent of the OBERS Population**

Year	Total Population	Population Age 21+
1975	98.3	100.0
1980	96.7	100.0
1985	95.3	100.0
1990	94.1	100.0
1995	92.8	98.4
2000	91.2	96.5
2005	89.4	94.7
2010	87.6	93.2
2015	85.9	91.8
2020	84.3	N/A

#### 2.1.9.1 Regional Classification

The country was divided into economic areas where structural economic relationships could be best identified, measured, and projected. By applying the central place theory, city regions were drawn up, each with a hinterland where businesses and households are functionally related. These regions constitute modal-functional economic areas.

One of the main characteristics of these regions is that each combines the place of work and place of residence, so there is a minimum of commuting across the economic area boundaries.

Each economic area has a group of basic or export industries, which produce goods and services that are exported to other areas of the country, earning the exchange with which to purchase the specialized goods and services of other regions.

Economic areas for the most part remain open to the movement of transportable commodities and to the movement of people to non-transportable special services such as education at large universities and recreation at places like Miami and Las Vegas. The production location of these types of goods and services is determined not so much by transportation costs as it is by the costs associated with special resources. Regional specialization has implications for regional economies of scale in the production of commodities thus further reinforcing regional comparative advantage and specialization.

In addition to the basic or export industries, each area has another group of industries that produce most of the services and some of the goods required by the household sector and the intermediate products required by local business. Areas approach self-sufficiency in regard to these residentiary industries, including general and convenience retail and wholesale trade activities and other services which are difficult or impossible to transport. These products are most efficiently consumed in the vicinity of their production. Economic areas correspond to the closed trade areas of central place theory, in which the number and type of residentiary establishments and their size and trade areas are bounded by the relative transportation costs from hinterland to competing centers.

#### 2.1.9.2 Delineation Procedures

The first step in the economic area delineation was the identification of the economic centers. Standard Metropolitan Statistical Areas (SMSAs), which generally are trade and labor market centers, were chosen where possible. Some SMSAs were not considered to be the center of an economic area because they are integral parts of larger metropolitan complexes. For example, the Jersey City, Newark, Patterson-Clifton-Passaic, Stamford, Norwalk, and Bridgeport SMSAs are all part of the New York City complex. In rural parts of the country where there are no SMSAs, cities of 25,000 to 50,000 population are the economic centers.

After identifying the economic centers the

next task was to determine the economic center of each of the remaining counties by primarily using journey-to-work data from the 1960 Census of Population. Those data were summarized and posted on maps to show the gross commuting from each individual county to each adjacent county and to as many as 13 counties altogether, if such commuting occurred. Counties were then associated with the economic centers in accordance with the commuting pattern.

In places where the commuting pattern of adjacent economic centers overlapped, counties were included in the economic area containing the center drawing the most commuters. In the case of cities where the commuting pattern overlapped to a great degree, no attempt was made to separate the two cities; instead, both were included in the same economic area. Many counties were associated with an economic area not because of their commuting tie to the central city, but because of their association with other counties that were tied to the economic area.

In the more rural parts of the country, the journey-to-work information was insufficient to establish boundaries of the economic areas. For these areas the road network and geographic features that affect the time of travel to economic centers, and the connection of counties by socio-economic ties such as communications, cultural, recreational, and trade activities were the major determinants.

Compromises had to be made in assigning counties to areas when it was obvious that one portion of a county commuted in one direction while another portion commuted in a different direction. Such compromises do not damage delineation significantly, however, because separate areas were not delineated where the overlapping of commuting patterns was too great.

#### 2.1.9.3 Basic Industry Projections

Projections of basic or export-type industries were made by industry on the basis of the trend in the economic area's share of national totals. This technique constitutes a variant of shift-share analysis. The trend in the historic share was projected into the future, modified as called for by special industry-location analyses, which revealed forces or circumstances that would change the trend indicated by past growth. This technique is based on the fact that regional comparative advantage or disadvantage for an industry is re-

flected in the trend of the changing contribution of that region to the U.S. total of that industry, and that the comparative advantage or disadvantage that underlies the change in the region's contribution will continue throughout the projected period unless forces or circumstances change it. The projection analysis seeks to identify such forces, mainly those relating to industrial location, and to take them into account in making the projections. The projected regional shares were then applied to the appropriate national total to determine the absolute values in the areas.

It should be noted that certain factors that determine a region's comparative advantage in an industry are affected by changes in national and regional policies and programs, such as the national policy to support farm income. While it is not implied that the course of events portrayed in the projections cannot be changed, it is implied that some action is required to change that course.

Earnings and employment for each of the basic industries were projected independently. The calculated earnings per worker for each area expressed as a percent of the national industry earnings per worker served as a means of discovering discrepancies in the two series. Where discrepancies occurred, the data were reviewed in the light of information from other sources and the two series were reconciled. In some instances, this reconciliation pointed clearly to a change in either the earnings or the employment component. Occasionally compromise was necessary and both components were adjusted to achieve the proper economic relationship.

#### 2.1.9.4 Residentiary Industry Projections

Earnings and employment in residentiary industries were projected in accordance with basic-residentiary relationships derived from both cross-section (across economic areas) and time-trend analysis. The cross-section relationship between total earnings (or employment) and earnings (or employment) for each residentiary industry was adjusted to reflect the temporally changing national relationship and regional differences.

Earnings in each residentiary industry in an area were expressed as a function of:

(1) the national earnings in the industry expressed as a ratio of the total national earnings

(2) the regional location quotient, i.e., the ratio of the share of the industry in the region to the share of the industry at the national level

(3) the total earnings in the export industries

The function follows:

$$Y_{ir} = \left[ \frac{Y_{io}}{Y_{oo}} \cdot L_{ir} \right] Y_{or}$$

$Y_{ir}$  = earnings in a residentiary industry in an economic area

$Y_{or}$  = earnings for the sum of all industries in an economic area

$Y_{io}$  = National earnings in the same industry (projected as part of National projections)

$Y_{oo}$  = Total National earnings (projected as part of National projections)

$L_{ir}$  = Location quotient for the same industry in the economic area (projected as result of cross section and temporal analysis)

$$Y_{or} = \sum_{i=1}^c \left[ 1 - \frac{Y_{io}}{Y_{oo}} \cdot L_{ir} \right]^{-1} \cdot E_{or}$$

$i = 1, 2, \dots, c$  represent residentiary industries

$E_{or}$  = sum of regional basic earnings (projected by basic industry methodology)

Functional relationships were developed for each residentiary industry in the region and the equations were solved simultaneously to get the earnings for each industry and total area earnings for each projected time point.

Minor differences between the sum of the economic area earnings and employment for the residentiary industries projected by the above method and the previously derived national totals were allocated proportionally to the economic areas.

Certain industries are classed as residentiary in some areas and basic in others. In one area hotels may serve only the business community and local residents, while in an area such as Las Vegas, they may provide recreation to visitors and so form a basic industry in the area. Similarly, in one area printing and publishing may involve only local newspaper publishing and local business printing, while in another area it may serve a national market through book publishing. In each area such industries were identified and projected according to their local character.

#### 2.1.9.5 Population Projections

Projected regional population was derived from the projections of income and em-

ployment. It was assumed that the critical element in a population projection is regional migration and that the major motivating factor in migration is economic opportunity or its lack. This yields two corollary assumptions: per worker earnings and per capita income will converge toward the national average, and the population/employment ratio will converge toward the national ratio.

#### **2.1.10 Water Resource Planning Subarea Projections**

The foregoing discussion has described the method used in making projections for the functional economic areas. The final step involved conversion of the projections into those for water resource planning subareas.

Because planning subarea boundaries seldom coincide with those of functional economic areas, it was necessary to break the functional areas into parts that could be reassembled into planning subareas. This is a simple matter geographically, but for projection purposes, it was necessary to relate each planning subarea to the functional economic area containing it, in terms of its share of the variable in question over the historical period.

The present share trends were projected and were generally quite stable. The projected percent shares were then applied to the appropriate functional economic area projections to obtain corresponding segments of planning subarea projections. As a final step the projections for the planning subarea segments were assembled into projections for planning subareas.

## **2.2 Statistical Tables**

### **2.2.1 Trends and Projections for the Nation and Great Lakes Region Economic Areas**

The framework planning process requires data and projections for two types of areas: the nation and the OBE economic areas in the Great Lakes Region. Table 19-46 contains historical data (1929 to 1962) and projections (1980 to 2020) of total United States population, personal income, and earnings. Table 19-47 presents employment by selected industries for the United States during the historical periods of 1940, 1950, and 1960, and projection periods, by decade, from 1980 through 2020. Historical data and projections of populations, income, and employment are summarized for economic areas in Tables 19-48 through 19-65, using a table format similar to that used for the United States. The definitions of OBE economic areas for data and projection purposes are shown in Figure 19-1.

The tables are based on the projections developed by the Office of Business Economics (OBE) for the Water Resources Council. The amounts shown in all the tables are directly from the OBE data and projections and the indices were computed by the Economics Branch of the North Central Division of the Corps of Engineers.

### **2.2.2 Population by State for Economic Areas**

Tables 19-66 through 19-81 provide data, projections, and indices of population change by portions of economic areas within each of the eight States in the Great Lakes Region.

**TABLE 19-46 Population, Personal Income and Earnings, 1929-2020, United States, Excluding Overseas**

	Actual									
	1929	1940	1950	1959	1962					
Population, July 1	122,107,000	132,456,000	151,871,000	177,124,000	185,860,000					
Total Personal Income (1,000s) <sup>1</sup>	155,160,083	172,235,431	274,097,374	377,928,456	419,628,723					
Per Capita Income <sup>1</sup>	1,271	1,300	1,805	2,134	2,258					
Total Earnings (1,000s) <sup>1,2</sup>	118,663,000	139,103,000	226,612,000	309,601,000	340,680,000					
Per Worker Earnings <sup>1</sup>	3,223	3,066	3,943	4,665	5,045					
	Projected									
	1980	1990	2000	2010	2020					
Population	234,193,000	269,746,000	306,757,000	348,894,000	397,562,000					
Total Personal Income (1,000s) <sup>1</sup>	963,000,000	1,442,060,000	2,196,684,000	3,302,982,000	4,934,146,000					
Per Capita Income <sup>1</sup>	4,112	5,346	7,161	9,467	12,411					
Total Earnings (1,000s) <sup>1,2</sup>	749,158,000	1,100,496,000	1,670,268,000	2,498,805,000	3,718,754,000					
Per Worker Earnings <sup>1</sup>	8,080	10,390	13,615	17,830	23,360					
	Index Based on 1959 = 100									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	69	75	86	100	105	132	152	173	197	224
Total Personal Income	41	46	73	100	111	255	382	581	874	1,306
Per Capita Income	60	61	85	100	106	193	251	336	444	582
Total Earnings	38	45	73	100	110	242	355	539	807	1,201
Per Worker Earnings	69	66	84	100	108	173	223	292	382	501

<sup>1</sup>In 1958 Dollars<sup>2</sup>Including Armed Forces pay

TABLE 19-47 Employment by Selected Industries, 1940-2020, United States, Excluding Overseas<sup>1</sup>

Item	1940	1950	1960	1970	1980	1990	2000	2010	2020
Population	132,164,569	151,325,798	179,323,175	203,212,000	234,193,000	269,746,000	306,757,000	348,894,000	397,562,000
Total Employment	45,375,815	57,475,606	66,372,649	78,627,000	92,712,000	105,910,000	122,663,000	140,141,000	159,178,000
Partic. Rate (Emp./Pop.)	.3433	.3798	.3701	.3900	.3950	.3926	.3998	.4016	.4003
Agric., Forestry & Fisheries	8,657,454	7,174,661	4,469,625	3,463,000	3,271,000	2,809,000	2,505,000	2,201,000	1,897,000
Mining	931,713	945,179	674,662	622,000	607,000	595,000	589,000	583,000	577,000
Manufacturing	10,757,960	14,801,429	18,244,900	19,693,000	23,392,000	25,596,000	28,275,000	31,152,000	34,366,000
Food & Kindred Products	1,123,018	1,434,124	1,898,661	-----	1,871,000	1,865,000	1,859,000	1,848,000	1,848,000
Textile Mill Products	1,168,271	1,256,729	984,991	-----	981,000	958,000	941,000	924,000	908,000
Chemicals & Allied Prods.	447,257	668,643	902,114	-----	1,308,000	1,508,000	1,839,000	2,170,000	2,501,000
Paper & Allied Products	-----	475,465	602,535	-----	849,000	969,000	1,106,000	1,253,000	1,396,000
Petroleum Refining	-----	291,763	294,054	-----	208,000	173,000	151,000	129,000	107,000
Primary Metals	-----	1,183,767	1,272,286	-----	1,467,000	1,525,000	1,600,000	1,675,000	1,750,000
Armed Forces	309,562	1,037,713	1,790,617	-----	1,792,000	1,792,000	1,792,000	1,792,000	1,792,000
Other	24,719,126	33,516,624	41,192,845	-----	63,650,000	75,118,000	89,502,000	104,413,000	120,546,000

Item	Index Based on 1960 = 100									
Population	74	84	100	113	131	150	171	195	222	240
Total Employment	68	87	100	118	140	160	185	211	240	240
Agric., Forestry & Fisheries	194	160	100	77	73	63	56	49	42	42
Mining	138	140	100	92	90	88	87	86	86	86
Manufacturing	59	81	100	108	128	140	155	171	188	188
Food & Kindred Products	59	76	100	---	99	98	98	98	97	97
Textile Mill Products	119	128	100	---	100	97	96	94	92	92
Chemicals & Allied Prods.	50	74	100	---	145	167	204	240	277	277
Paper & Allied Products	---	79	100	---	141	161	183	208	232	232
Petroleum Refining	---	99	100	---	71	59	51	44	36	36
Primary Metals	---	93	100	---	115	120	126	132	138	138
Armed Forces	17	58	100	---	100	100	100	100	100	100
Other	60	81	100	---	154	182	217	253	293	293

<sup>1</sup>Data and projections from OBE-ERS program except 1970 preliminary data from Bureau of Labor Statistics, U.S. Department of Labor.

**TABLE 19-48 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 01007, Plattsburgh, New York**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	210,100	223,184	232,980	262,472	273,134	255,700	277,500	299,800	325,700	354,600
Total Personal Income (0-\$58)	222,650	323,055	323,435	464,568	496,684	872,800	1,252,200	1,836,200	2,674,100	3,878,600
Per Capita Income (\$58) <sup>1</sup>	1,060	1,387	1,387	1,770	1,818	3,413	4,512	6,125	8,209	10,939
Per Capita Relative (US=1.00)	.83	.80	.77	.83	.81	.83	.84	.86	.87	.88
Total Earnings (0-\$58) <sup>2</sup>	175,599	188,435	263,754	385,757	394,591	675,100	952,500	1,393,400	2,020,200	2,920,100
Per Worker Earnings (\$58) <sup>1</sup>	---	2,750	3,542	4,680	---	7,288	9,471	12,487	16,487	21,865
Per Worker Relative (US=1.00)	---	.90	---	---	---	.90	.91	.92	.92	.94

	Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020									
	1940	1950	1960	1962	1980	1990	2000	2010	2020	
Population (April 1)	233,568	232,435	264,003	264,003	255,700	277,500	299,800	325,700	354,600	
Total Employment	68,516	74,466	82,419	82,419	92,600	100,600	111,600	122,500	133,500	
Participation Rate (EMPL/POP)	.31	---	---	---	.36	.36	.37	.38	.38	
Agriculture, Forestry, Fisheries	17,156	14,030	8,255	8,255	5,500	4,500	3,900	3,300	2,700	
Mining	1,404	2,570	2,756	2,756	2,100	2,100	2,000	1,900	1,900	
Manufacturing	11,777	16,152	15,424	15,424	16,700	17,400	18,900	20,200	21,300	
Food, Kindred Products	1,049	1,556	1,541	1,541	1,400	1,300	1,300	1,300	1,300	
Textile Mill Products	262	52	24	24	---	---	---	---	---	
Chemical, Allied Products	213	437	270	270	700	800	1,100	1,300	1,500	
Paper, Allied Products	---	3,949	3,718	3,718	3,700	3,600	3,600	3,600	3,500	
Petroleum Refining	---	40	34	34	---	---	---	---	---	
Primary Metals	---	4,550	4,058	4,058	3,000	2,800	2,500	2,400	2,200	
Federal Military	2,013	84	5,268	5,268	3,200	3,200	3,200	3,200	3,200	
Other	36,166	41,630	50,716	50,716	65,100	73,400	83,600	93,900	104,400	

	Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	80	85	89	100	104	97	106	114	124	135
Total Personal Income (0-\$58)	48	50	70	100	107	188	269	395	575	835
Per Capita Income (\$58)	60	59	78	100	103	193	255	346	464	618
Total Earnings (0-\$58)	46	49	68	100	102	175	247	361	524	757
Per Worker Earnings (\$58)	---	59	76	100	---	156	202	267	352	467

	Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)									
	1940	1950	1960	1962	1980	1990	2000	2010	2020	
Population	85	88	100	100	97	105	114	123	134	
Total Employment	83	90	100	100	112	122	135	149	162	
Agriculture, Forestry, Fisheries	208	170	100	100	67	54	47	40	33	
Mining	51	93	100	100	76	76	73	69	69	
Manufacturing	76	105	100	100	108	113	123	131	138	
Food, Kindred Products	68	101	100	100	91	84	84	84	84	
Textile Mill Products	1,091	217	100	100	---	---	---	---	---	
Chemicals, Allied Products	49	62	100	100	160	183	252	297	343	
Paper, Allied Products	---	---	100	100	97	97	97	97	94	
Petroleum Refining	---	---	100	100	---	---	---	---	---	
Primary Metals	---	---	100	100	74	69	62	59	54	
Federal Military	38	2	100	100	61	61	61	61	61	
Other	71	82	100	100	128	145	165	185	206	

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-49 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 01008, Syracuse-Utica, New York**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	807,899	840,026	929,731	1,073,318	1,130,792	1,312,800	1,475,400	1,638,600	1,823,300	2,038,900
Total Personal Income	1,164,396	1,198,442	1,661,687	2,224,774	2,458,100	5,389,700	7,968,900	11,880,800	17,542,100	25,796,900
Per Capita Income (\$58) <sup>1</sup>	1,441	1,427	1,787	2,073	2,174	4,106	5,401	7,251	9,621	12,653
Per Capita Relative (US=1.00)	1.13	1.10	.99	.97	.96	1.00	1.01	1.01	1.02	1.02
Total Earnings <sup>2</sup>	909,393	978,414	1,372,777	1,834,695	2,013,219	4,233,700	6,122,400	9,079,200	13,321,200	19,495,400
Per Worker Earnings (\$58) <sup>1</sup>	-----	3,256	3,871	4,616	-----	8,110	10,513	13,781	18,097	23,779
Per Worker Relative (US=1.00)	-----	1.06	.98	-----	-----	1.00	1.01	1.01	1.01	1.02
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	841,470	927,554	1,079,578	1,312,800	1,475,400	1,638,600	1,823,300	2,038,900		
Total Employment	300,482	354,631	397,469	522,100	582,300	658,800	736,100	819,800		
Participation Rate (EMPL/POP)	.36	.38	.37	.40	.40	.40	.40	.40		
Agriculture, Forestry, Fisheries	37,810	29,598	20,390	13,800	11,500	10,000	8,500	7,200		
Mining	547	480	872	600	600	600	500	500		
Manufacturing	100,939	125,241	134,668	156,600	166,400	178,100	190,300	205,500		
Food, Kindred Products	7,818	9,163	11,047	10,200	9,700	9,500	9,400	9,200		
Textile Mill Products	14,877	13,035	4,219	2,500	2,000	1,700	1,400	1,200		
Chemicals, Allied Products	4,006	5,014	5,317	7,100	8,000	9,500	11,100	12,600		
Paper, Allied Products	-----	8,672	8,877	8,100 <sup>3</sup>	8,000 <sup>3</sup>	8,000 <sup>3</sup>	8,000 <sup>3</sup>	8,000 <sup>3</sup>		
Petroleum Refining	-----	397	365	-----	-----	-----	-----	-----		
Primary Metals	-----	11,243	9,669	7,600	6,900 <sup>a</sup>	6,500 <sup>a</sup>	6,300 <sup>a</sup>	6,300 <sup>a</sup>		
Federal Military	1,574	1,046	4,977	4,500	4,500	4,500	4,500	4,500		
Other	159,612	198,266	236,562	346,600	399,300	465,600	532,300	602,100		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	75	78	87	100	105	122	137	153	170	190
Total Personal Income	52	54	75	100	110	242	358	534	788	1,159
Per Capita Income (\$58)	69	69	86	100	105	198	280	350	464	610
Total Earnings	50	53	75	100	110	231	334	495	726	1,062
Per Worker Earnings (\$58)	-----	71	84	100	-----	176	228	298	392	515
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	78	86	100	122	137	152	169	189		
Total Employment	76	89	100	131	146	166	185	206		
Agriculture, Forestry, Fisheries	185	145	100	68	56	49	42	35		
Mining	63	55	100	69	69	69	57	57		
Manufacturing	75	93	100	116	124	132	141	153		
Food, Kindred Products	71	83	100	92	88	86	85	83		
Textile Mill Products	353	309	100	59	47	40	33	28		
Chemical, Allied Products	-----	94	100	133	150	179	209	237		
Paper, Allied Products	-----	98	100	91 <sup>3</sup>	90 <sup>3</sup>	90 <sup>3</sup>	90 <sup>3</sup>	90 <sup>3</sup>		
Petroleum Refining	-----	109	100	79	71	67	65	65		
Primary Metals	-----	116	100	79	71	67	65	65		
Federal Military	32	21	100	90	90	90	90	90		
Other	67	84	100	167	169	197	225	255		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-50 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 01009, Rochester, New York**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1990	2010	2020		
Population (July 1)	615,256	653,543	723,779	846,311	888,576	1,091,400	1,240,100	1,394,100	1,571,000	1,777,700
Total Personal Income	1,011,063	1,118,051	1,479,352	2,120,583	2,304,946	4,908,900	7,168,700	10,650,900	15,666,200	22,978,600
Per Capita Income (\$58) <sup>1</sup>	1,643	1,711	2,044	2,506	2,594	4,498	5,781	7,640	9,972	12,926
Per Capita Relative (US=1.00)	1.29	1.32	1.13	1.17	1.15	1.69	1.08	1.07	1.05	1.04
Total Earnings <sup>2</sup>	730,871	887,205	1,201,548	1,731,584	1,848,034	3,782,700	5,421,000	8,036,900	11,778,100	17,230,300
Per Worker Earnings (\$58) <sup>1</sup>	3,701	3,701	4,199	5,310	4,199	8,503	10,826	14,044	16,219	23,687
Per Worker Relative (US=1.00)	1.21	1.21	1.07	1.13	1.07	1.05	1.04	1.03	1.02	1.01
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1950	1950	1980	1990	2000	2010	2020	2020
Population (April 1)	659,667	722,084	851,256	1,091,400	1,240,100	1,394,100	1,571,000	1,777,700	1,777,700	1,777,700
Total Employment	239,650	286,119	326,117	444,900	500,700	572,500	646,500	727,400	727,400	727,400
Participation Rate (EMPL/POP)	.37	.40	.38	.41	.40	.41	.41	.41	.41	.41
Agriculture, Forestry, Fisheries	27,980	20,936	14,788	9,500	7,700	6,600	5,600	4,600	4,600	4,600
Mining	442	475	489	(Included in contract construction)						
Manufacturing	85,895	112,386	132,269	166,700	181,200	198,500	216,800	237,400	237,400	237,400
Food, Kindred Products	8,186	10,978	13,351	12,500	12,000	11,700	11,400	11,200	11,200	11,200
Textile Mill Products	1,567	1,515	1,517	2,100	2,000	2,000	2,000	2,000	2,000	2,000
Chemicals, Allied Products	1,380	2,239	2,460	3,500	3,000	4,700	5,400	6,200	6,200	6,200
Paper, Allied Products	-----	2,450	2,899	4,000 <sup>3</sup>	4,400 <sup>3</sup>	5,000 <sup>3</sup>	5,300 <sup>3</sup>	6,000 <sup>3</sup>	6,000 <sup>3</sup>	6,000 <sup>3</sup>
Petroleum Refining	-----	146	212	-----	-----	-----	-----	-----	-----	-----
Primary Metals	-----	1,694	1,460	1,600	1,600	1,700	1,700	1,800	1,800	1,800
Federal Military	32	298	465	300	300	300	300	300	300	300
Other	125,471	152,024	178,106	268,400	311,500	366,900	423,800	485,100	485,100	485,100
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	73	77	85	100	105	129	146	165	186	210
Total Personal Income	48	53	70	100	109	231	328	502	739	1,083
Per Capita Income (\$58)	66	68	82	100	104	179	231	305	398	516
Total Earnings	43	51	69	100	107	218	313	464	680	995
Per Worker Earnings (\$58)	---	70	79	100	---	160	204	282	343	446
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020	2020	2020
Population	77	85	100	128	146	164	184	209	209	209
Total Employment	73	88	100	136	154	175	198	223	223	223
Agriculture, Forestry, Fisheries	189	142	100	64	52	45	38	31	31	31
Mining	86	97	100	(Included in contract construction)						
Manufacturing	65	85	100	126	137	150	164	179	179	179
Food, Kindred Products	61	82	100	94	90	88	85	84	84	84
Textile Mill Products	103	100	100	138	132	132	132	132	132	132
Chemicals, Allied Products	56	91	100	142	159	191	220	252	252	252
Paper, Allied Products	---	85	100	138 <sup>3</sup>	152 <sup>3</sup>	172 <sup>3</sup>	190 <sup>3</sup>	207 <sup>3</sup>	207 <sup>3</sup>	207 <sup>3</sup>
Petroleum Refining	---	69	100	---	---	---	---	---	---	---
Primary Metals	---	121	---	114	114	121	121	129	129	129
Federal Military	7	64	100	65	65	65	65	65	65	65
Other	70	85	100	151	175	206	238	272	272	272

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-51 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 01010, Buffalo, New York**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	1,254,713	1,342,936	1,503,338	1,726,095	1,818,469	1,982,300	2,193,800	2,392,400	2,628,200	2,908,100
Total Personal Income	2,026,534	2,194,997	3,025,815	3,936,972	4,043,845	8,390,300	12,043,100	17,476,800	25,202,200	36,335,500
Per Capita Income (\$58) <sup>1</sup>	1,615	1,634	2,013	2,281	2,224	4,233	5,490	7,305	9,588	12,484
Per Capita Relative (US=1.00)	1.27	1.26	1.12	1.07	.98	1.03	1.03	1.02	1.01	1.01
Total Earnings <sup>2</sup>	1,571,564	1,800,191	2,521,408	3,246,715	3,272,134	6,540,500	9,196,200	13,299,700	19,080,600	27,404,500
Per Worker Earnings (\$58) <sup>1</sup>	3,888	4,353	5,109	5,109	-----	8,271	10,581	13,772	17,912	23,346
Per Worker Relative (US=1.00)	1.27	1.11	1.09	1.09	-----	1.02	1.02	1.01	1.00	1.00
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1960	1962	1980	1990	2000	2010	2020
Population (April 1)	1,345,149	1,499,827	1,736,286	1,736,286	1,736,286	1,982,300	2,193,800	2,392,400	2,628,200	2,908,100
Total Employment	462,975	579,222	634,257	634,257	634,257	790,700	869,100	965,700	1,065,200	1,173,900
Participation Rate (EMPL/POP)	.34	.39	.37	.37	.37	.40	.40	.40	.41	.40
Agriculture, Forestry, Fisheries	36,371	28,986	19,023	19,023	19,023	12,200	10,300	8,900	7,500	6,300
Mining	7,945	6,087	3,274	3,274	3,274	2,000	1,700	1,500	1,300	1,200
Manufacturing	164,805	225,032	244,442	244,442	244,442	266,700	278,100	289,400	300,800	315,300
Food, Kindred Products	15,605	18,639	21,671	21,671	21,671	17,700	17,100	16,300	15,600	14,900
Textile Mill Products	6,092	6,534	3,445	3,445	3,445	2,600	2,100	1,800	1,600	1,400
Chemicals, Allied Products	13,966	17,844	19,412	19,412	19,412	23,300	26,000	30,800	35,300	39,700
Paper, Allied Products	-----	8,637	8,035	8,035	8,035	7,600	7,500	7,500	7,600	7,600
Petroleum Refining	-----	4,175	2,292	2,292	2,292	1,000	700	500	400	300
Primary Metals	-----	38,917	42,582	42,582	42,582	46,600	47,500	48,900	50,400	51,900
Federal Military	586	667	3,078	3,078	3,078	2,200	2,200	2,200	2,200	2,200
Other	253,268	318,450	364,440	364,440	364,440	507,600	576,800	663,700	753,400	848,900
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	73	78	87	100	105	115	127	139	152	168
Total Personal Income	51	56	77	100	103	213	306	444	640	923
Per Capita Income (\$58)	71	72	88	100	98	186	241	320	420	548
Total Earnings	48	55	78	100	101	201	283	410	588	844
Per Worker Earnings (\$58)	---	76	85	100	---	162	207	270	351	457
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1960	1962	1980	1990	2000	2010	2020
Population	77	86	100	100	100	114	126	138	151	167
Total Employment	73	91	100	100	100	125	137	152	168	185
Agriculture, Forestry, Fisheries	191	152	100	100	100	64	54	47	39	33
Mining	243	186	100	100	100	61	52	46	40	37
Manufacturing	67	92	100	100	100	109	114	118	123	129
Food, Kindred Products	72	86	100	100	100	82	79	75	72	69
Textile Mill Products	177	190	100	100	100	61	52	46	46	41
Chemicals, Allied Products	72	92	100	100	100	120	134	159	182	204
Paper, Allied Products	---	107	100	100	100	95	93	93	95	95
Petroleum Refining	---	182	100	100	100	44	31	22	17	13
Primary Metals	---	91	100	100	100	109	112	115	118	122
Federal Military	19	22	100	100	100	71	71	71	71	71
Other	69	87	100	100	100	139	158	182	207	233

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-52 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 01011, Erie, Pennsylvania**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	351,428	364,918	411,659	440,651	444,390	496,300	545,900	593,700	654,800	727,500
Total Personal Income	459,012	478,728	732,041	831,816	883,820	1,867,400	2,670,800	3,927,900	5,685,000	8,258,400
Per Capita Income (\$58) <sup>1</sup>	1,306	1,312	1,778	1,888	1,989	3,763	4,893	6,616	8,682	11,332
Per Capita Relative (US=1.00)	1.03	1.01	.99	.88	.88	.92	.92	.92	.92	.91
Total Earnings <sup>2</sup>	327,205	379,286	600,184	669,053	704,747	1,437,100	2,020,500	2,964,800	4,276,700	6,197,600
Per Worker Earnings (\$58) <sup>1</sup>	3,221	3,981	4,384	4,284	4,284	7,383	9,127	12,636	16,662	21,754
Per Worker Relative (US=1.00)	1.05	1.01	.94	.94	.94	.94	.94	.94	.94	.93
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	365,071	411,206	444,000	496,300	545,900	593,700	654,800	727,500		
Total Employment	117,736	130,764	152,621	189,503	207,700	231,000	256,700	284,900		
Participation Rate (PEPI/POP)	.32	.37	.34	.38	.38	.39	.39	.39		
Agriculture, Forestry, Fisheries	14,450	11,209	6,576	4,300	3,500	2,900	2,500	2,000		
Mining	2,116	1,685	575	(Included in contract construction)						
Manufacturing	44,411	63,468	62,823	70,000	73,100	76,100	81,000	86,600		
Food, Kindred Products	2,072	2,788	3,480	3,000 <sup>3</sup>	2,900 <sup>3</sup>	2,900 <sup>3</sup>	2,800 <sup>3</sup>	2,800 <sup>3</sup>		
Textile Mill Products	186	278	94	2,100	2,100	2,200	2,400	2,600		
Chemicals, Allied Products	2,154	2,285	1,962	2,000	2,000	1,900	1,900	1,900		
Paper, Allied Products	-----	2,223	2,158	2,000	2,000	1,900	1,900	1,900		
Petroleum Refining	-----	1,973	1,749	960	700	500	400	300		
Primary Metals	-----	6,389	7,823	9,700	10,400	11,200	11,700	12,400		
Federal Military	87	141	179	315,200	315,200	315,200	315,200	315,200		
Other	56,674	74,261	82,468	111,100	131,100	152,000	173,200	196,300		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	80	83	93	100	101	113	124	135	149	165
Total Personal Income	55	58	88	100	106	224	321	472	683	993
Per Capita Income (\$58)	69	69	94	100	105	199	259	350	460	601
Total Earnings	49	57	90	100	---	215	302	443	639	976
Per Worker Earnings (\$58)	---	73	91	100	---	173	222	293	380	496
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	82	93	100	112	123	134	147	164		
Total Employment	77	59	100	124	136	151	168	187		
Agriculture, Forestry, Fisheries	220	170	100	65	53	44	38	30		
Mining	368	293	100	(Included in contract construction)						
Manufacturing	71	101	100	111	116	121	129	138		
Food, Kindred Products	60	80	100	86 <sup>3</sup>	83 <sup>3</sup>	83 <sup>3</sup>	80 <sup>3</sup>	80 <sup>3</sup>		
Textile Mill Products	198	296	100	107	107	112	122	122		
Chemicals, Allied Products	116	116	100	107	107	112	122	122		
Paper, Allied Products	---	103	100	93	93	88	88	88		
Petroleum Refining	---	113	100	51	40	29	17	17		
Primary Metals	---	82	100	124	133	143	150	158		
Federal Military	49	79	100	3 <sup>3</sup>	3 <sup>3</sup>	3 <sup>3</sup>	3 <sup>3</sup>	3 <sup>3</sup>		
Other	69	90	100	140	159	184	210	232		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-53 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05064, Cleveland, Ohio**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	2000	2010	2020	
Population (July 1)	3,153,006	3,240,075	3,789,492	4,629,822	4,761,535	5,614,300	6,296,600	6,992,800	7,788,900	8,727,100
Total Personal Income	4,742,487	5,091,881	7,859,438	10,817,335	11,315,890	23,879,900	34,225,100	50,210,300	73,837,900	108,308,200
Per Capita Income (\$58) <sup>1</sup>	1,504	1,562	2,074	2,336	2,377	4,253	5,436	7,180	9,480	12,411
Per Capita Relative (US=1.00)	1.18	1.21	1.15	1.09	1.05	1.03	1.02	1.00	1.00	1.00
Total Earnings <sup>2</sup>	3,887,629	4,307,927	6,621,159	9,091,902	9,342,088	18,821,800	26,392,300	38,507,000	56,256,400	82,104,300
Per Worker Earnings (\$58) <sup>1</sup>	-----	3,828	4,416	5,325	-----	8,432	10,615	13,691	17,880	23,381
Per Worker Relative (US=1.00)	-----	1.25	1.12	1.14	-----	1.04	1.02	1.01	1.00	1.00
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	3,125,706	3,774,366	4,647,708	5,614,300	6,296,600	6,992,800	7,788,900	8,727,100		
Total Employment	1,125,294	1,499,206	1,707,399	2,232,100	2,486,400	2,812,700	3,146,400	3,511,600		
Participation Rate (EMPL/POP)	.35	.40	.37	.40	.39	.40	.40	.40		
Agriculture, Forestry, Fisheries	83,129	65,951	44,536	31,000	25,900	22,500	19,300	16,200		
Mining	9,068	8,378	6,895	4,700	4,400	4,100	3,800	3,500		
Manufacturing	444,347	640,457	725,518	828,400	866,800	912,800	966,900	1,028,400		
Food, Kindred Products	20,785	23,433	32,927	29,500	28,200	27,100	26,000	24,900		
Textile Mill Products	5,411	7,717	6,028	6,700	6,600	6,500	6,400	6,300		
Chemical, Allied Products	14,637	21,730	28,171	36,400	41,400	50,300	59,200	67,800		
Paper, Allied Products	-----	10,228	11,802	16,200	18,500	21,000	23,800	26,500		
Petroleum Refining	-----	4,716	4,666	3,200	2,600	2,200	1,900	1,500		
Primary Metals	-----	149,447	145,673	146,800	146,000	145,900	144,200	143,300		
Federal Military	602	1,968	2,405	1,700	1,700	1,700	1,700	1,700		
Other	588,148	782,452	928,045	1,366,300	1,587,600	1,871,600	2,154,700	2,461,800		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1940	1950	1959	1980	1990	2000	2010	2020		
Population	68	70	82	103	103	136	151	168	188	
Total Personal Income	44	47	73	100	105	316	464	683	1,001	
Per Capita Income (\$58)	64	67	89	100	102	233	307	406	531	
Total Earnings	43	47	73	100	103	290	423	618	902	
Per Worker Earnings (\$58)	---	72	83	100	---	199	257	336	439	
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	70	81	100	121	135	150	168	188		
Total Employment	66	88	100	131	146	165	184	206		
Agriculture, Forestry, Fisheries	187	168	100	70	58	51	43	36		
Mining	131	121	100	68	64	59	55	51		
Manufacturing	61	88	100	114	119	126	133	142		
Food, Kindred Products	63	71	100	90	86	82	79	76		
Textile Mill Products	90	128	100	111	109	108	106	104		
Chemicals, Allied Products	52	77	100	129	147	179	210	241		
Paper, Allied Products	---	87	100	137	157	178	202	225		
Petroleum Refining	---	101	100	69	41	47	41	32		
Primary Metals	---	103	100	101	100	100	99	98		
Federal Military	25	82	100	71	71	71	71	71		
Other	63	84	100	147	171	202	232	265		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-54 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05065, Lima, Ohio**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	200,904	207,071	228,980	258,256	261,578	315,200	356,000	404,600	456,000	516,700
Total Personal Income	190,557	210,968	383,652	466,718	516,895	1,136,700	1,684,900	2,623,500	3,961,400	5,949,700
Per Capita Income (\$58) <sup>1</sup>	948	1,019	1,675	1,807	1,976	3,606	4,733	6,485	8,688	11,516
Per Capita Relative (US=L.00)	.74	.79	.93	.85	.88	.88	.88	.89	.91	.93
Total Earnings <sup>2</sup>	162,440	176,212	325,166	393,751	427,837	899,000	1,304,900	2,018,900	3,026,300	4,519,900
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,604	3,838	4,351	-----	7,521	9,686	12,875	16,969	22,354
Per Worker Relative (US=L.00)	-----	.85	.98	.93	-----	.93	.93	.95	.95	.96
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	206,432	228,023	259,201	315,200	356,000	404,600	456,000	516,700		
Total Employment	67,664	84,720	90,503	119,500	134,700	156,800	178,300	202,300		
Participation Rate (EMPL/POP)	.33	.37	.35	.38	.38	.38	.39	.39		
Agriculture, Forestry, Fisheries	19,980	16,641	9,933	6,700	5,500	4,800	4,100	3,400		
Mining	383	304	265	(Included in contract construction)						
Manufacturing	14,011	24,527	32,251	41,400	45,400	50,400	55,000	60,100		
Food, Kindred Products	1,752	2,411	2,934	2,700 <sup>3</sup>	2,600 <sup>3</sup>	2,500 <sup>3</sup>	2,400 <sup>3</sup>	2,400 <sup>3</sup>		
Textile Mill Products	178	511	80							
Chemicals, Allied Products	134	265	669	1,300	1,600	2,000	2,400	2,800		
Paper, Allied Products	-----	830	772	1,000	1,100	1,200	1,300	1,400		
Petroleum Refining	-----	702	806	600	600	500	400	300		
Primary Metals	-----	1,008	1,403	2,300	2,400	2,700	2,900	3,100		
Federal Military	-----	75	54							
Other	33,290	43,173	48,000	71,400	83,800	101,600	119,200	138,700		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	78	80	89	100	101	122	138	157	177	200
Total Personal Income	41	45	82	100	111	243	361	562	849	1,274
Per Capita Income (\$58)	52	56	93	100	109	200	262	359	481	637
Total Earnings	41	45	83	100	109	228	331	513	768	1,148
Per Worker Earnings (\$58)	---	60	88	100	---	173	223	296	390	514
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	80	88	100	122	137	156	176	199		
Total Employment	75	94	100	132	149	173	197	223		
Agriculture, Forestry, Fisheries	201	167	100	67	55	48	41	34		
Mining	145	115	100	(Included in contract construction)						
Manufacturing	43	74	100	128	141	156	171	186		
Food, Kindred Products	60	82	100	92	89	85	82	82		
Textile Mill Products	223	639	100	93	83	83	83	83		
Chemicals, Allied Products	20	40	100	194	239	299	359	418		
Paper, Allied Products	---	107	100	130	142	155	168	181		
Petroleum Refining	---	87	100	74	74	62	50	37		
Primary Metals	---	72	100	164	171	192	207	221		
Federal Military	---	139	100	3	3	3	3	3		
Other	69	90	100	149	175	212	248	289		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-55 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05066, Toledo, Ohio**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	695,692	712,006	819,908	963,787	978,642	1,186,900	1,331,000	1,473,900	1,646,900	1,846,900
Total Personal Income	963,826	1,006,007	1,663,329	2,064,359	2,179,982	4,890,400	7,093,800	10,455,200	15,374,300	22,507,100
Per Capita Income (\$58) <sup>1</sup>	1,385	1,413	2,029	2,142	2,228	4,120	5,330	7,094	9,335	12,186
Per Capita Relative (US=1.00)	1.09	1.09	1.12	1.00	.99	1.00	1.00	.99	.99	.98
Total Earnings <sup>2</sup>	778,052	829,677	1,387,911	1,716,019	1,774,615	3,813,800	5,419,800	7,957,300	11,642,200	16,979,700
Per Worker Earnings (\$58) <sup>1</sup>	-----	3,474	4,465	4,971	-----	8,278	10,543	13,702	17,829	23,236
Per Worker Relative (US=1.00)	-----	1.13	1.13	1.06	-----	1.02	1.01	1.01	1.00	.99
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	708,907	816,295	967,950	1,186,900	1,331,000	1,473,900	1,646,900	1,846,900		
Total Employment	238,834	310,817	345,211	460,700	514,100	580,700	653,000	730,800		
Participation Rate (EMPL/POP)	.34	.38	.36	.39	.39	.39	.40	.40		
Agriculture, Forestry, Fisheries	37,597	28,524	18,599	13,400	11,300	9,900	8,500	7,200		
Mining	1,414	1,227	958	700	700	700	700	700		
Manufacturing	73,132	114,634	127,954	154,300	163,100	173,800	186,500	200,300		
Food, Kindred Products	6,040	7,569	10,158	9,300	9,000	8,900	8,700	8,600		
Textile Mill Products	1,732	1,023	1,107	1,400	1,500	1,500	1,500	1,500		
Chemicals, Allied Products	1,287	2,251	3,350	5,500	6,500	8,000	9,600	10,900		
Paper, Allied Products	-----	4,822	4,437	5,600	6,300	7,000	7,900	8,600		
Petroleum Refining	-----	3,570	3,242	2,100	1,700	1,500	1,200	1,000		
Primary Metals	-----	7,920	9,210	9,300	9,200	9,300	9,200	9,100		
Federal Military	208	319	427	400	400	400	400	400		
Other	126,483	166,113	197,273	291,900	338,600	395,900	456,900	522,200		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	72	74	85	100	101	123	138	153	171	192
Total Personal Income	47	49	81	100	106	237	344	506	745	1,090
Per Capita Income (\$58)	65	66	95	100	104	192	249	331	436	569
Total Earnings	45	48	81	100	103	222	316	464	678	989
Per Worker Earnings (\$58)	---	70	90	100	---	166	212	276	359	467
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	73	84	100	123	137	152	170	191		
Total Employment	69	90	100	133	149	168	189	212		
Agriculture, Forestry, Fisheries	202	153	100	72	61	53	46	39		
Mining	147	128	100	73	73	73	73	73		
Manufacturing	57	90	100	121	127	136	146	157		
Food, Kindred Products	59	75	100	92	89	88	86	85		
Textile Mill Products	66	92	100	126	135	135	135	135		
Chemicals, Allied Products	38	67	100	164	239	239	281	325		
Paper, Allied Products	---	109	100	126	142	158	178	194		
Petroleum Refining	---	110	100	65	52	46	37	31		
Primary Metals	---	86	100	101	100	101	100	99		
Federal Military	49	75	100	94	94	94	94	94		
Other	64	84	100	148	172	201	232	265		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-56 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05067, Detroit, Michigan**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	2,611,196	2,918,950	3,672,688	4,549,321	4,632,146	6,240,900	7,180,900	7,979,500	8,991,100	10,241,500
Total Personal Income	4,564,158	5,336,605	8,548,601	11,097,004	11,804,384	28,907,000	42,182,000	61,162,300	89,529,200	131,502,400
Per Capita Income (\$58) <sup>1</sup>	1,748	1,828	2,327	2,439	2,548	4,632	5,874	7,665	9,958	12,840
Per Capita Relative (US=1.00)	1.37	1.41	1.29	1.14	1.13	1.13	1.10	1.07	1.05	1.03
Total Earnings <sup>2</sup>	3,555,047	4,650,193	7,372,171	9,362,557	9,861,617	22,921,900	32,695,200	47,177,600	68,580,800	100,229,600
Per Worker Earnings (\$58) <sup>1</sup>	-----	4,379	5,134	5,765	-----	9,303	11,583	14,789	18,976	24,425
Per Worker Relative (US=1.00)	-----	1.43	1.30	1.23	-----	1.15	1.11	1.09	1.06	1.05
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	2,886,605	3,652,688	4,582,233	6,240,900	7,180,900	7,979,500	8,991,100	10,241,500		
Total Employment	1,061,836	1,436,019	1,623,939	2,463,900	2,822,800	3,190,000	3,614,100	4,103,600		
Participation Rate (EMPL/POP)	.37	.39	.35	.39	.39	.40	.40	.40		
Agriculture, Forestry, Fisheries	44,332	32,794	22,279	14,600	11,800	9,800	8,000	6,600		
Mining	922	1,238	1,540	1,900	2,000	2,200	2,300	2,500		
Manufacturing	492,944	666,199	679,092	848,900	892,500	950,100	1,014,500	1,094,300		
Food, Kindred Products	20,152	22,701	32,254	29,200	28,000	27,700	27,200	26,900		
Textile Mill Products	2,170	2,404	2,162	2,200	2,100	2,100	2,100	2,100		
Chemicals, Allied Products	11,978	17,176	20,198	23,800	26,300	30,600	35,900	41,300		
Paper, Allied Products	-----	4,102	5,330	7,800	9,100	10,500	12,100	13,600		
Petroleum Refining	-----	2,576	1,929	1,300	1,000	900	700	600		
Primary Metals	-----	38,664	40,492	40,800	40,600	40,600	40,100	39,900		
Federal Military	2,338	4,898	6,070	5,500	5,500	5,500	5,500	5,500		
Other	521,300	730,890	914,958	1,593,000	1,911,000	2,222,400	2,583,800	2,994,700		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	57	64	81	100	102	137	158	175	198	225
Total Personal Income	41	48	77	100	106	260	380	551	807	1,185
Per Capita Income (\$58)	72	75	95	100	104	190	241	314	408	526
Total Earnings	38	50	79	100	105	245	349	504	732	1,070
Per Worker Earnings (\$58)	---	76	89	100	---	161	201	256	329	424
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	63	80	100	136	157	174	196	223		
Total Employment	65	88	100	152	174	196	223	253		
Agriculture, Forestry, Fisheries	199	147	100	66	53	44	36	30		
Mining	60	80	100	123	130	143	149	162		
Manufacturing	73	98	100	125	131	140	149	161		
Food, Kindred Products	62	70	100	91	87	86	84	83		
Textile Mill Products	100	111	100	102	102	97	97	97		
Chemicals, Allied Products	59	85	100	118	130	151	178	204		
Paper, Allied Products	---	77	100	146	171	197	227	255		
Petroleum Refining	---	134	100	67	52	47	36	31		
Primary Metals	---	95	100	101	100	100	99	99		
Federal Military	39	81	100	91	91	91	91	91		
Other	57	80	100	174	209	243	282	327		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-57 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05068, Bay City, Michigan**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, by Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	458,832	526,335	588,446	693,850	714,257	874,600	989,500	1,087,600	1,216,600	1,365,400
Total Personal Income (\$58) <sup>1</sup>	430,910	537,854	896,397	1,240,899	1,363,007	3,151,400	4,721,800	7,283,500	10,966,300	16,369,900
Per Capita Income (US=1.00)	939	1,022	1,523	1,788	1,908	3,603	4,772	6,697	9,014	11,989
Per Capita Relative (US=1.00)	.74	.79	.84	.84	.84	.88	.89	.94	.95	.97
Total Earnings <sup>2</sup>	333,451	447,263	731,578	1,017,987	1,101,474	2,456,500	3,608,400	5,474,600	8,173,700	12,094,600
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,735	3,700	4,469	-----	7,714	10,008	13,352	17,652	23,205
Per Worker Relative (US=1.00)	-----	.89	.94	.95	-----	.95	.96	.98	.99	.99
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	520,503	585,210	698,873	874,600	989,500	1,087,600	1,216,600	1,365,400		
Total Employment	163,505	197,747	227,810	318,400	360,600	410,000	463,100	521,200		
Participation Rate (EMPL/POP)	.31	.34	.33	.36	.36	.38	.38	.38		
Agriculture, Forestry, Fisheries	50,296	36,559	18,435	9,900	7,500	6,000	4,700	3,700		
Mining	3,266	2,829	2,329	1,700	1,700	1,600	1,500	1,500		
Manufacturing	37,434	58,710	74,609	96,400	105,300	115,600	127,000	140,200		
Food, Kindred Products	3,680	4,160	5,114	4,500	4,300	4,100	4,000	3,800		
Textile Mill Products	375	349	244	244	244	244	244	244		
Chemicals, Allied Products	3,932	8,061	12,431	20,900	25,300	32,100	38,700	45,500		
Paper, Allied Products	-----	229	828	1,400	1,700	2,000	2,300	2,700		
Petroleum Refining	-----	561	750	600	500	500	400	300		
Primary Metals	-----	8,936	10,470	10,600	10,500	10,500	10,400	10,300		
Federal Military	805	571	3,880	9,500	9,500	9,500	9,500	9,500		
Other	71,704	99,078	128,557	200,900	236,600	277,300	320,400	366,300		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	66	76	85	100	103	126	143	157	175	197
Total Personal Income (\$58)	35	43	72	100	110	254	380	587	884	1,319
Per Capita Income (\$58)	53	57	85	100	107	201	267	374	504	670
Total Earnings (\$58)	33	44	72	100	108	241	354	538	803	1,188
Per Worker Earnings (\$58)	---	61	83	100	---	173	224	299	395	519
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	74	84	100	125	141	156	174	195		
Total Employment	72	87	100	140	158	180	203	229		
Agriculture, Forestry, Fisheries	273	198	100	54	41	33	25	20		
Mining	140	121	100	73	73	69	64	64		
Manufacturing	50	79	100	129	141	155	170	188		
Food, Kindred Products	72	81	100	88	84	80	78	74		
Textile Mill Products	154	143	100	100	100	100	100	100		
Chemicals, Allied Products	32	65	100	168	203	258	311	366		
Paper, Allied Products	---	28	100	169	205	241	278	326		
Petroleum Refining	---	75	100	80	67	67	53	40		
Primary Metals	---	85	100	101	100	100	99	98		
Federal Military	21	15	100	245	245	245	245	245		
Other	56	77	100	156	184	216	249	285		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-58 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05069, Grand Rapids, Michigan**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	673,986	732,258	836,506	983,028	1,013,553	1,236,900	1,389,200	1,551,800	1,744,100	1,974,200
Total Personal Income (\$58) <sup>1</sup>	736,894	783,652	1,446,656	1,892,044	2,045,883	4,597,200	6,176,900	10,188,200	15,284,600	22,841,600
Per Capita Income (US=1.00)	1,093	1,070	1,729	1,925	2,019	3,717	4,871	6,565	8,763	11,570
Per Capita Relative (US=1.00)	.86	.83	.96	.90	.89	.90	.91	.92	.93	.93
Total Earnings <sup>2</sup>	565,311	645,819	1,187,772	1,539,544	1,646,746	3,562,600	5,148,400	7,727,700	11,541,400	17,191,500
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,718	3,967	4,497	-----	7,630	9,858	12,952	17,066	22,451
Per Worker Relative (US=1.00)	-----	.89	1.01	.96	-----	.94	.95	.95	.96	.96
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1960	1980	1990	2000	2010	2020	2020
Population (April 1)	724,145	831,908	990,142	990,142	1,236,900	1,389,200	1,551,800	1,744,100	1,974,200	1,974,200
Total Employment	237,626	299,433	342,319	342,319	466,900	522,300	596,600	676,300	765,700	765,700
Participation Rate (EMEL/POP)	.33	.36	.35	.35	.38	.38	.38	.39	.39	.39
Agriculture, Forestry, Fisheries	53,551	39,589	21,136	21,136	12,000	9,200	7,500	6,000	4,800	4,800
Mining	1,406	1,229	853	853	600	600	600	500	500	500
Manufacturing	72,398	106,852	129,418	129,418	162,100	172,300	185,400	199,900	216,500	216,500
Food, Kindred Products	5,479	7,324	10,470	10,470	10,300	10,300	10,200	10,200	10,200	10,200
Textile Mill Products	2,238	1,133	648	648	500	400	400	400	400	400
Chemicals, Allied Products	1,332	1,864	3,278	3,278	5,300	6,400	8,100	9,800	11,600	11,600
Paper, Allied Products	-----	3,920	4,432	4,432	5,600 <sup>3</sup>	6,200 <sup>3</sup>	6,800 <sup>3</sup>	7,500 <sup>3</sup>	8,200 <sup>3</sup>	8,200 <sup>3</sup>
Petroleum Refining	-----	588	589	589	-----	-----	-----	-----	-----	-----
Primary Metals	-----	6,755	9,626	9,626	12,600	13,300	14,200	14,800	15,500	15,500
Federal Military	193	458	653	653	600	600	600	600	600	600
Other	110,078	151,305	190,259	190,259	291,600	339,600	402,500	469,300	543,300	543,300
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	69	74	85	100	103	126	141	158	177	201
Total Personal Income	39	41	76	100	108	243	358	538	808	1,207
Per Capita Income (\$58)	57	56	90	100	105	193	253	341	455	601
Total Earnings	37	42	77	100	107	231	334	502	750	1,117
Per Worker Earnings (\$58)	---	60	88	100	---	170	219	288	379	499
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1960	1980	1990	2000	2010	2020	2020
Population	73	84	100	100	125	140	157	176	199	199
Total Employment	69	87	100	100	136	153	174	198	224	224
Agriculture, Forestry, Fisheries	253	187	100	100	57	44	35	28	23	23
Mining	165	144	100	100	70	70	70	59	59	59
Manufacturing	56	83	100	100	125	133	143	154	167	167
Food, Kindred Products	52	70	100	100	98	98	97	97	97	97
Textile Mill Products	345	175	100	100	77	62	62	62	62	62
Chemicals, Allied Products	41	57	100	100	162	195	247	299	354	354
Paper, Allied Products	---	88	100	100	126 <sup>3</sup>	140 <sup>3</sup>	153 <sup>3</sup>	169 <sup>3</sup>	185 <sup>3</sup>	185 <sup>3</sup>
Petroleum Refining	---	100	100	100	---	---	---	---	---	---
Primary Metals	---	70	100	100	131	138	147	154	161	161
Federal Military	30	70	100	100	92	92	92	92	92	92
Other	58	80	100	100	153	178	212	247	286	286

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-59 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05070, Lansing-Battle Creek-Kalamazoo, Michigan**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1960-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	542,779	598,098	731,109	882,902	897,290	1,262,000	1,476,800	1,710,600	1,973,300	2,277,900
Total Personal Income	692,275	732,402	1,352,848	1,874,272	1,993,572	5,103,000	7,764,600	12,086,500	18,447,900	27,989,500
Per Capita Income (\$58) <sup>1</sup>	1,275	1,225	1,850	2,123	2,222	4,044	5,258	7,066	9,349	12,287
Per Capita Relative (US=1.00)	1.00	.95	1.02	.99	.98	1.98	.98	.99	.99	.99
Total Earnings <sup>2</sup>	507,657	602,916	1,128,784	1,563,072	1,630,784	3,998,500	5,956,600	9,228,300	14,005,100	21,157,500
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,972	4,138	4,820	-----	8,042	10,290	13,490	17,644	23,154
Per Worker Relative (US=1.00)	-----	.97	1.05	1.03	-----	1.00	.99	.99	.99	.99
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
Population (April 1)	591,471	727,089	889,291	889,291	889,291	1,262,000	1,476,800	1,710,600	1,973,300	2,277,900
Total Employment	202,856	272,800	324,238	324,238	324,238	497,200	578,900	684,100	793,800	913,800
Participation Rate (EMPL/POP)	.34	.38	.36	.36	.36	.39	.39	.40	.40	.40
Agriculture, Forestry, Fisheries	38,392	28,455	18,894	18,894	18,894	12,000	9,600	7,900	6,500	5,300
Mining	296	236	658	658	658	1,000	1,100	1,300	1,500	1,600
Manufacturing	62,286	93,036	110,351	110,351	110,351	146,300	159,200	175,500	193,300	213,400
Food, Kindred Products	7,414	10,470	12,492	12,492	12,492	12,000	12,000	11,900	11,900	11,800
Textile Mill Products	445	479	176	176	176	300	300	300	300	300
Chemicals, Allied Products	1,365	2,791	4,381	4,381	4,381	7,300	8,900	11,200	13,500	15,800
Paper, Allied Products	-----	9,318	10,236	10,236	10,236	14,400	16,200	18,400	20,700	22,800
Petroleum Refining	-----	216	307	307	307	307	307	307	307	307
Primary Metals	-----	4,826	6,549	6,549	6,549	9,100	9,600	10,200	10,600	11,100
Federal Military	28	4,343	1,126	1,126	1,126	1,000	1,000	1,000	1,000	1,000
Other	101,854	146,730	193,269	193,269	193,269	336,900	408,000	498,400	591,500	692,500
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
Population	61	68	83	100	102	143	167	194	223	258
Total Personal Income	37	39	72	100	106	272	414	645	984	1,493
Per Capita Income (\$58)	60	58	87	100	105	190	333	333	440	579
Total Earnings	32	39	72	100	104	256	381	590	896	1,353
Per Worker Earnings (\$58)	---	62	86	100	---	157	213	280	366	480
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
Population	66	66	82	100	100	142	166	192	222	256
Total Employment	63	63	84	100	100	153	178	211	245	282
Agriculture, Forestry, Fisheries	203	203	151	100	100	64	51	42	34	28
Mining	45	45	36	100	100	152	167	197	228	243
Manufacturing	56	56	84	100	100	133	144	159	175	193
Food, Kindred Products	59	59	84	100	100	96	96	96	95	94
Textile Mill Products	253	253	272	100	100	100	100	100	100	100
Chemicals, Allied Products	31	31	64	100	100	167	203	256	308	361
Paper, Allied Products	---	---	91	100	100	141	180	202	202	223
Petroleum Refining	---	---	70	100	100	139	146	156	162	169
Primary Metals	---	---	74	100	100	139	146	156	162	169
Federal Military	2	2	386	100	100	89	89	89	89	89
Other	53	53	76	100	100	174	211	258	306	358

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-60 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05071, Fort Wayne, Indiana**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	376,903	396,349	443,705	512,372	553,766	716,600	846,900	982,900	1,147,100	1,344,200
Total Personal Income	408,249	467,491	801,861	1,044,412	1,193,972	2,878,400	4,420,900	6,902,500	10,651,800	16,395,500
Per Capita Income (\$58) <sup>1</sup>	1,083	1,179	1,807	2,038	2,237	4,017	5,220	7,023	9,286	12,197
Per Capita Relative (US=1.00)	.85	.91	1.00	.96	.99	1.00	.98	.98	.98	.98
Total Earnings <sup>2</sup>	352,888	402,383	691,889	884,789	1,007,620	2,305,900	3,455,200	5,349,500	8,185,400	12,515,600
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,977	3,991	4,536	-----	8,055	10,288	13,481	17,592	23,039
Per Worker Relative (US=1.00)	-----	.97	1.01	.97	-----	1.00	.99	.99	.99	.99
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	395,646	440,313	517,317	716,600	846,900	982,900	1,147,100	1,344,200		
Total Employment	135,167	173,561	195,063	286,300	335,900	396,800	465,300	543,200		
Participation Rate (EMPL/POP)	.34	.39	.38	.40	.40	.40	.41	.40		
Agriculture, Forestry, Fisheries	32,559	27,887	16,639	11,700	9,800	8,500	7,300	6,100		
Mining	250	218	365	400	500	500	600	600		
Manufacturing	36,118	58,219	70,011	97,300	109,900	123,500	138,800	156,000		
Food, Kindred Products	4,080	4,728	7,030	6,700	6,700	6,600	6,400	6,300		
Textile Mill Products	1,918	1,203	419	600	700	800	900	1,000		
Chemicals, Allied Products	432	696	548	1,400	1,600	1,900	2,200	2,500		
Paper, Allied Products	-----	565	887	-----	-----	-----	-----	-----		
Petroleum Refining	-----	54	198	-----	-----	-----	-----	-----		
Primary Metals	-----	4,004	6,215	7,500	7,800	8,200	8,600	9,000		
Federal Military	-----	123	173	-----	-----	-----	-----	-----		
Other	66,240	86,934	107,875	176,900	215,700	264,300	318,600	380,500		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	74	77	87	100	108	140	165	192	224	262
Total Personal Income	39	45	77	100	114	276	423	661	1,020	1,570
Per Capita Income (\$58)	53	58	89	100	110	197	256	345	456	598
Total Earnings	40	45	78	100	114	261	390	604	925	1,414
Per Worker Earnings (\$58)	---	66	88	100	---	178	227	297	388	508
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	76	85	100	139	164	190	222	260		
Total Employment	69	89	100	147	172	203	239	278		
Agriculture, Forestry, Fisheries	196	168	100	70	59	51	44	37		
Mining	68	60	100	109	137	137	164	164		
Manufacturing	52	83	100	139	157	176	198	223		
Food, Kindred Products	58	67	100	109	95	94	91	90		
Textile Mill Products	458	287	100	109	128	146	164	182		
Chemicals, Allied Products	79	127	100	158	180	214	249	282		
Paper, Allied Products	---	---	100	---	---	---	---	---		
Petroleum Refining	---	64	100	121	126	132	138	145		
Primary Metals	---	64	100	121	126	132	138	145		
Federal Military	---	71	100	---	---	---	---	---		
Other	61	81	100	164	200	245	295	353		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-61 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05072, South Bend, Indiana**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population (July 1)	462,102	489,095	593,104	705,658	718,433	862,100	949,600	1,040,400	1,148,900	1,275,500	
Total Personal Income	528,120	625,599	1,199,836	1,548,472	1,599,441	3,404,700	4,817,300	7,064,300	10,388,500	15,224,600	
Per Capita Income (\$58) <sup>1</sup>	1,143	1,279	2,016	2,194	2,226	3,949	5,073	6,790	9,043	11,936	
Per Capita Relative (US=1.00)	.90	.99	1.12	1.03	.99	.96	.95	.95	.96	.96	
Total Earnings <sup>2</sup>	443,083	538,310	1,035,793	1,314,753	1,326,553	2,696,600	3,731,100	5,437,700	7,938,000	11,567,700	
Per Worker Earnings (\$58) <sup>1</sup>	3,124	4,391	4,886	4,886	4,886	7,893	10,022	13,117	17,287	22,781	
Per Worker Relative (US=1.00)	1.02	1.12	1.04	1.04	1.04	.98	.96	.96	.97	.98	
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020											
	1940	1950	1960	1980	1990	2000	2010	2020			
Population (April 1)	486,972	590,685	712,434	862,100	949,600	1,040,400	1,148,900	1,275,500			
Total Employment	172,340	235,897	269,103	341,700	372,300	414,500	495,200	507,800			
Participation Rate (FREL/POP)	.35	.40	.38	.40	.39	.40	.40	.40			
Agriculture, Forestry, Fisheries	34,535	29,334	20,011	14,900	12,700	11,400	10,100	8,700			
Mining	122	184	219	(Included in contract construction)							
Manufacturing	59,814	97,610	110,225	126,300	130,900	137,300	144,800	153,200			
Food, Kindred Products	3,379	4,636	6,155	6,200	6,200	6,200	6,200	6,200			
Textile Mill Products	1,262	603	611	600	600	600	600	600			
Chemicals, Allied Products	806	1,628	2,764	5,100	6,200	7,900	9,500	11,200			
Paper, Allied Products	-----	4,375	5,885	8,500 <sup>3</sup>	9,800 <sup>3</sup>	11,400 <sup>3</sup>	13,100 <sup>3</sup>	14,700 <sup>3</sup>			
Petroleum Refining	-----	222	271	-----	-----	-----	-----	-----			
Primary Metals	-----	4,415	7,236	9,400	9,900	10,500	11,000	11,500			
Federal Military	83	183	261	-----	-----	-----	-----	-----			
Other	77,786	108,586	138,387	200,500	228,700	265,800	340,300	345,900			
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)											
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020	
Population	65	69	84	100	102	122	135	147	163	181	
Total Personal Income	34	40	77	100	103	220	311	456	671	983	
Per Capita Income (\$58)	52	58	92	100	101	180	231	309	412	544	
Total Earnings	34	41	79	100	101	205	284	414	604	880	
Per Worker Earnings (\$58)	---	64	90	100	---	161	205	268	354	466	
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)											
	1940	1950	1960	1980	1990	2000	2010	2020			
Population	68	83	100	121	133	146	161	179			
Total Employment	64	88	100	127	138	154	184	189			
Agriculture, Forestry, Fisheries	173	147	100	74	63	57	50	43			
Mining	56	84	100	(Included in contract construction)							
Manufacturing	54	89	100	115	119	125	131	139			
Food, Kindred Products	55	75	100	101	101	101	101	101			
Textile Mill Products	307	147	100	97	97	97	97	97			
Chemicals, Allied Products	29	59	100	184	224	286	344	405			
Paper, Allied Products	---	74	100	144	167	194	223	250			
Petroleum Refining	---	82	100	143	163	194	223	250			
Primary Metals	---	61	100	130	137	145	152	156			
Federal Military	32	70	100	145	165	192	246	250			
Other	56	78	100	145	165	192	246	250			

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

**TABLE 19-62 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05073 Chicago, Illinois**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	5,126,401	5,321,740	6,070,491	7,260,435	7,496,574	9,338,400	10,485,900	11,513,200	12,744,300	14,216,000
Total Personal Income	10,710,126	10,249,289	14,746,830	20,113,497	21,844,912	45,344,900	64,564,600	92,374,900	132,037,900	189,096,000
Per Capita Income (\$58) <sup>1</sup>	2,089	1,926	2,429	2,770	2,914	4,856	6,157	8,023	10,361	13,302
Per Capita Relative (US=1.00)	1.64	1.49	1.35	1.30	1.29	1.18	1.15	1.12	1.09	1.07
Total Earnings <sup>2</sup>	8,133,395	8,434,245	12,506,289	17,051,024	18,170,805	35,794,900	49,851,100	70,952,400	100,750,200	143,559,700
Per Worker Earnings (\$58) <sup>1</sup>	4,118	4,633	5,804	7,092	7,492	11,387	14,546	18,650	24,012	30,500
Per Worker Relative (US=1.00)	1.34	1.23	1.24	1.13	1.07	1.10	1.07	1.05	1.03	1.03
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	5,316,298	6,049,802	7,330,450	9,338,400	10,485,900	11,513,200	12,744,300	14,216,000		
Total Employment	2,047,933	2,587,549	2,937,930	3,936,800	4,377,800	4,877,800	5,402,200	5,978,700		
Participation Rate (EM/POP)	.39	.43	.40	.42	.42	.42	.42	.42		
Agriculture, Forestry, Fisheries	71,868	62,703	47,568	38,200	33,300	30,200	26,800	23,400		
Mining	3,538	3,253	2,966	2,000	1,800	1,600	1,500	1,400		
Manufacturing	701,147	956,034	1,087,127	1,248,700	1,297,000	1,359,500	1,433,800	1,522,300		
Food, Kindred Products	88,054	104,532	107,885	86,800	78,400	69,100	69,100	66,500		
Textile Mill Products	11,720	10,576	8,579	8,300	7,900	7,600	7,400	7,100		
Chemicals, Allied Products	25,846	37,426	49,990	70,600	80,000	96,700	113,100	129,700		
Paper, Allied Products	-----	25,565	27,077	36,400	41,200	47,000	53,200	59,000		
Petroleum Refining	-----	23,522	23,169	15,600	12,700	11,000	9,100	7,400		
Primary Metals	-----	133,893	134,078	135,100	134,400	134,400	133,200	132,500		
Federal Military	5,574	16,467	28,204	30,500	30,500	30,500	30,500	30,500		
Other	1,265,806	1,547,092	1,772,065	2,167,400	3,015,200	3,456,000	3,909,600	4,401,100		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	71	73	84	100	103	129	144	159	175	196
Total Personal Income	53	51	73	100	109	225	321	459	656	940
Per Capita Income (\$58)	75	70	88	100	105	175	222	290	374	480
Total Earnings	48	49	73	100	107	210	292	416	591	842
Per Worker Earnings (\$58)	---	71	83	100	---	157	196	250	321	413
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	73	63	100	127	143	157	174	194		
Total Employment	70	88	100	134	149	166	184	203		
Agriculture, Forestry, Fisheries	151	132	100	80	70	63	56	49		
Mining	119	110	100	67	61	54	51	47		
Manufacturing	64	88	100	115	119	125	132	140		
Food, Kindred Products	82	97	100	80	73	68	64	62		
Textile Mill Products	137	123	100	97	92	89	86	83		
Chemicals, Allied Products	52	75	100	141	160	193	226	259		
Paper, Allied Products	---	94	100	134	152	174	196	218		
Petroleum Refining	---	102	100	67	55	47	39	32		
Primary Metals	---	100	100	101	100	100	99	99		
Federal Military	20	58	100	108	108	108	108	108		
Other	71	87	100	122	170	195	221	248		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-63 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05080, Milwaukee, Wisconsin**

	Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020									
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	1,224,025	1,301,662	1,491,243	1,820,019	1,887,239	2,542,300	2,998,100	3,422,600	3,929,800	4,523,900
Total Personal Income	2,058,181	2,043,883	3,294,400	4,560,605	4,906,627	11,525,100	17,344,000	26,098,900	39,151,200	58,485,100
Per Capita Income (\$58) <sup>1</sup>	1,681	1,570	2,209	2,506	2,600	4,533	5,785	7,625	9,963	12,928
Per Capita Relative (US=1.00)	1.32	1.21	1.22	1.17	1.15	1.10	1.08	1.06	1.05	1.04
Total Earnings <sup>2</sup>	1,600,948	1,697,152	2,802,651	3,759,733	4,016,728	8,994,800	13,261,900	19,874,000	29,660,100	44,135,600
Per Worker Earnings (\$58) <sup>1</sup>	3,704	4,481	5,236	5,236	5,236	8,671	10,951	14,139	18,362	23,870
Per Worker Relative (US=1.00)	1.21	1.14	1.12	1.12	1.12	1.07	1.05	1.04	1.03	1.02
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1960	1960	1980	1990	2000	2010	2020
Population (April 1)	1,299,421	1,489,758	1,848,447	1,848,447	1,848,447	2,542,300	2,998,100	3,422,600	3,929,800	4,523,900
Total Employment	458,198	625,420	718,108	718,108	718,108	1,037,600	1,211,000	1,403,600	1,615,300	1,849,000
Participation Rate (EMPL/POP)	.35	.42	.39	.39	.39	.41	.40	.41	.41	.41
Agriculture, Forestry, Fisheries	48,319	43,926	28,916	28,916	28,916	21,600	18,500	16,300	14,100	12,000
Mining	673	870	926	926	926	1,100	1,100	1,200	1,300	1,300
Manufacturing	167,638	257,887	300,844	300,844	300,844	377,100	412,300	448,800	490,300	536,000
Food, Kindred Products	20,092	27,570	29,845	29,845	29,845	24,800	23,800	24,800	23,800	22,900
Textile Mill Products	8,794	6,715	3,796	3,796	3,796	2,900	2,500	2,200	2,000	1,900
Chemicals, Allied Products	3,105	4,083	5,705	5,705	5,705	8,000	9,200	11,200	13,200	15,200
Paper, Allied Products	-----	5,075	5,695	5,695	5,695	7,700	8,700	9,800	11,000	12,100
Petroleum Refining	-----	736	1,131	1,131	1,131	900	700	700	600	500
Primary Metals	-----	19,057	20,584	20,584	20,584	20,700	20,600	20,600	20,300	20,100
Federal Military	153	1,559	1,997	1,997	1,997	1,500	1,500	1,500	1,500	1,500
Other	241,415	321,178	385,425	385,425	385,425	636,100	777,600	935,800	1,108,100	1,298,200
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	67	72	82	100	104	140	165	188	216	249
Total Personal Income	45	45	72	100	108	253	380	572	858	1,282
Per Capita Income (\$58)	67	63	88	100	104	181	231	304	398	516
Total Earnings	43	45	75	100	107	239	353	528	789	1,174
Per Worker Earnings (\$58)	---	71	86	100	---	166	209	270	351	456
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1960	1960	1980	1990	2000	2010	2020
Population	70	81	100	100	100	138	162	185	213	245
Total Employment	64	87	100	100	100	144	169	195	225	257
Agriculture, Forestry, Fisheries	167	152	100	100	100	75	64	56	49	41
Mining	73	94	100	100	100	119	119	129	140	140
Manufacturing	56	86	100	100	100	125	137	149	163	178
Food, Kindred Products	67	92	100	100	100	90	86	83	80	77
Textile Mill Products	232	177	100	100	100	76	66	58	53	50
Chemicals, Allied Products	54	72	100	100	100	140	161	196	231	266
Paper, Allied Products	---	89	100	100	100	135	153	172	193	212
Petroleum Refining	---	65	100	100	100	80	71	62	44	44
Primary Metals	---	93	100	100	100	101	100	100	99	98
Federal Military	8	78	100	100	100	75	75	75	75	75
Other	63	83	100	100	100	165	202	243	287	337

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-64 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area 05081, Green Bay, Wisconsin**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	693,770	737,152	760,887	820,374	846,219	974,000	1,089,400	1,208,400	1,357,000	1,532,500
Total Personal Income	680,438	728,593	1,144,603	1,478,005	1,619,905	3,497,100	5,147,000	7,823,700	11,783,700	17,680,600
Per Capita Income (\$58) <sup>1</sup>	981	988	1,504	1,802	1,914	3,591	4,725	6,475	8,684	11,537
Per Capita Relative (US=1.00)	.77	.76	.83	.84	.85	.87	.88	.90	.92	.93
Total Earnings <sup>2</sup>	519,150	597,212	946,529	1,208,219	1,301,429	2,702,900	3,909,100	5,924,400	8,884,800	13,288,800
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,630	3,469	4,244	-----	7,474	9,676	12,899	17,047	22,538
Per Worker Relative (US=1.00)	-----	.86	.88	.91	-----	.93	.93	.95	.96	.96
Employment by Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	733,652	759,141	831,357	974,000	1,089,400	1,208,400	1,357,000	1,532,500		
Total Employment	227,071	272,837	284,719	361,600	404,000	459,300	521,200	589,600		
Participation Rate (EMPL/POP)	.31	.36	.34	.37	.37	.38	.38	.38		
Agriculture, Forestry, Fisheries	63,112	55,686	34,837	23,400	19,100	16,200	13,500	11,100		
Mining	7,939	7,791	7,416	5,100	4,800	4,500	4,200	3,900		
Manufacturing	55,419	79,310	90,687	115,400	126,500	138,800	152,800	168,000		
Food, Kindred Products	6,946	9,067	11,062	10,300	10,100	9,800	9,600	9,300		
Textile Mill Products	1,321	2,329	1,743	1,700	1,600	1,600	1,600	1,500		
Chemicals, Allied Products	864	1,225	1,645	2,300	2,700	3,300	3,900	4,500		
Paper, Allied Products	-----	17,552	21,112	29,500	33,600	38,200	43,200	48,100		
Petroleum Refining	-----	92	779	700	600	500	500	400		
Primary Metals	-----	2,757	2,569	2,600	2,600	2,600	2,500	2,500		
Federal Military	274	419	2,408	3,500	3,500	3,500	3,500	3,500		
Other	100,327	129,631	149,371	214,200	250,100	296,300	347,200	403,100		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	85	90	93	100	103	119	133	147	165	187
Total Personal Income	46	49	77	100	110	237	348	529	797	1,196
Per Capita Income (\$58)	54	55	83	100	106	199	262	359	482	640
Total Earnings	43	49	78	100	108	224	324	490	735	1,100
Per Worker Earnings (\$58)	---	62	82	100	---	176	228	304	402	531
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	88	91	100	117	131	145	163	184		
Total Employment	80	96	100	127	142	161	183	207		
Agriculture, Forestry, Fisheries	181	160	100	67	55	46	39	32		
Mining	107	105	100	69	65	61	57	53		
Manufacturing	61	87	100	127	139	153	168	185		
Food, Kindred Products	63	82	100	93	91	89	87	84		
Textile Mill Products	76	134	100	98	92	92	92	86		
Chemicals, Allied Products	53	74	100	140	164	201	237	274		
Paper, Allied Products	---	83	100	140	159	181	205	228		
Petroleum Refining	---	12	100	90	64	77	64	51		
Primary Metals	---	107	100	101	101	101	97	97		
Federal Military	11	17	100	145	145	145	145	145		
Other	67	87	100	143	167	198	232	270		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military.

**TABLE 19-65 Population, Personal Income and Earnings (Thousands \$58), and Employment—OBE Economic Area**

Population, Personal Income and Earnings, Actual Selected Years 1929-62, and Projected, By Decade, 1980-2020										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population (July 1)	513,903	551,596	532,618	547,960	550,923	556,200	588,300	623,600	661,200	703,000
Total Personal Income	446,812	518,131	770,440	935,223	991,477	1,966,300	2,755,800	3,996,800	5,669,700	8,004,900
Per Capita Income (\$58) <sup>1</sup>	869	939	1,447	1,707	1,800	3,535	4,685	6,409	8,574	11,387
Per Capita Relative (US=1.00)	.68	.72	.80	.80	.80	.86	.88	.89	.91	.92
Total Earnings <sup>2</sup>	377,389	424,502	629,652	752,295	775,842	1,482,000	2,060,300	2,986,900	4,228,000	5,960,900
Per Worker Earnings (\$58) <sup>1</sup>	-----	2,726	3,322	4,235	-----	7,420	9,706	12,942	17,129	22,724
Per Worker Relative (US=1.00)	-----	.89	.84	.90	-----	.92	.93	.95	.96	.97
Employment By Selected Industries, 1940-60 (April 1) and Projected 1980-2020										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population (April 1)	551,290	530,353	555,621	588,300	623,600	661,200	703,000	703,000		
Total Employment	155,732	189,522	177,642	201,100	212,300	230,800	246,800	262,300		
Participation Rate (EMPL/POP)	.28	.36	.32	.36	.36	.37	.37	.37		
Agriculture, Forestry, Fisheries	35,240	30,522	13,945	8,800	7,100	5,800	4,800	3,800		
Mining	10,104	17,954	20,560	16,900	16,800	16,900	17,000	17,000		
Manufacturing	20,024	30,567	29,073	32,500	34,100	36,200	38,500	41,000		
Food, Kindred Products	2,615	3,253	4,121	3,700	3,600	3,500	3,300	3,200		
Textile Mill Products	258	620	129	300	300	300	300	300		
Chemicals, Allied Products	613	493	474	500	500	600	600	700		
Paper, Allied Products	-----	4,167	6,695	8,800	9,900	11,200	12,500	13,700		
Petroleum Refining	-----	235	448	400	300	300	300	300		
Primary Metals	-----	4,266	3,434	3,400	3,400	3,500	3,500	3,500		
Federal Military	55	317	2,082	2,400	2,400	2,400	2,400	2,400		
Other	90,309	110,162	111,982	140,500	151,900	169,500	184,100	198,100		
Index, Actual 1929-62 (July 1) and Projected 1980-2020 (Based on 1959=100)										
	1929	1940	1950	1959	1962	1980	1990	2000	2010	2020
Population	94	101	97	100	100	101	107	114	121	128
Total Personal Income	48	55	82	100	106	210	295	427	606	856
Per Capita Income (\$58)	51	55	85	100	105	207	274	375	502	667
Total Earnings	50	56	84	100	103	198	274	397	562	792
Per Worker Earnings (\$58)	---	64	78	100	---	175	229	306	404	537
Index, Actual 1940-60 (April 1) and Projected 1980-2020 (Based on 1960=100)										
	1940	1950	1960	1980	1990	2000	2010	2020		
Population	99	95	100	100	106	112	119	126		
Total Employment	88	107	100	100	113	120	130	148		
Agriculture, Forestry, Fisheries	253	219	100	100	63	42	34	27		
Mining	49	87	100	100	82	82	83	83		
Manufacturing	69	105	100	100	117	124	132	141		
Food, Kindred Products	63	79	100	100	90 <sup>3</sup>	87 <sup>3</sup>	80 <sup>3</sup>	78 <sup>3</sup>		
Textile Mill Products	200	481	100	100	105	127	127	148		
Chemicals, Allied Products	129	104	100	100	105	148	167	205		
Paper, Allied Products	---	62	100	100	131	167	187	205		
Petroleum Refining	---	52	100	100	89	67	67	67		
Primary Metals	---	124	100	100	99	99	101	101		
Federal Military	3	15	100	100	115	115	115	115		
Other	81	98	100	100	125	151	164	177		

<sup>1</sup>Projections computed from unrounded data. <sup>2</sup>Includes pay of federal military. <sup>3</sup>Too small to be projected, but included in higher level totals.

TABLE 19-66 Economic Areas of the State of Illinois—Total Population

OBE Economic Area No.	Name	Actual Population							
		1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	7,606,000	7,905,000	8,738,000	9,986,000	10,260,000	10,654,000	10,787,000	10,887,000
54	Evansville, Ind. <sup>1</sup>	170,504	185,092	176,463	153,435	148,389	146,983	150,815	152,454
55	Springfield-Decatur, Ill.	385,822	400,653	423,122	452,376	459,166	464,903	477,035	480,279
56	Champaign-Terre Haute <sup>1</sup>	344,963	355,172	387,571	422,490	431,854	424,876	448,337	452,316
73	Chicago, Ill. <sup>1</sup>	4,759,971	4,911,255	5,553,143	6,568,852	6,787,888	7,118,339	7,152,022	7,214,955
74	Peoria, Ill.	479,065	507,295	552,135	596,984	607,257	612,708	631,247	637,996
75	Davenport, Iowa <sup>1</sup>	247,661	271,017	303,082	332,432	338,789	350,546	361,127	366,624
77	Dubuque, Iowa <sup>1</sup>	20,170	20,009	21,523	21,615	21,752	21,448	21,702	21,886
78	Rockford, Ill. <sup>1</sup>	199,985	207,098	245,204	311,436	325,776	339,328	351,226	357,343
108	Keokuk-Quincy- Hannibal <sup>1</sup>	121,944	125,939	121,410	120,680	121,173	119,357	122,010	123,101
109	St. Louis <sup>1</sup>	779,732	817,045	863,994	931,006	946,146	983,536	998,673	1,006,677
110	Paducah, Ky. <sup>1</sup>	96,183	104,425	90,353	74,694	71,810	71,976	72,806	73,369

OBE Economic Area No.	Name	Projected Population				
		1980	1990	2000	2010	2020
	STATE TOTAL	12,603,722	14,138,078	15,573,564	17,290,841	19,324,040
54	Evansville, Ind. <sup>1</sup>	168,433	183,511	197,757	218,530	244,096
55	Springfield-Decatur, Ill.	614,729	717,920	826,584	949,125	1,087,833
56	Champaign-Terre Haute <sup>1</sup>	563,405	659,070	762,719	883,378	1,022,841
73	Chicago, Ill. <sup>1</sup>	8,407,293	9,394,619	10,268,088	11,317,593	12,573,535
74	Peoria, Ill.	693,117	752,174	812,789	884,370	962,711
75	Davenport, Iowa <sup>1</sup>	384,613	421,474	446,500	482,823	526,154
77	Dubuque, Iowa <sup>1</sup>	25,524	27,877	30,647	34,110	37,984
78	Rockford, Ill. <sup>1</sup>	410,244	464,014	526,396	600,583	690,542
108	Keokuk-Quincy-Hannibal <sup>1</sup>	153,307	170,161	186,497	207,172	229,534
109	St. Louis <sup>1</sup>	1,113,242	1,277,390	1,444,856	1,640,520	1,873,083
110	Paducah, Ky. <sup>1</sup>	69,815	69,868	70,731	72,637	75,727

<sup>1</sup>Part of an economic area.

TABLE 19-67 Total United States and Economic Areas of the State of Illinois—Indexes of Change for Total Population

OBE Economic Area No.	Name	Index Based on 1959 = 100												
		Actual Change					Projected Change							
		1929	1940	1950	1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF ILLINOIS	76	79	88	100	103	103	108	109	126	142	156	173	194
54	Evansville, Ind. <sup>2</sup>	111	121	115	100	97	96	98	99	110	120	129	142	159
55	Springfield-Decatur, Ill.	85	89	94	100	102	103	105	106	136	159	183	210	240
56	Champaign-Terre Haute <sup>2</sup>	82	84	92	100	102	101	106	107	133	156	181	209	242
73	Chicago, Ill. <sup>2</sup>	72	75	85	100	103	108	109	110	128	143	156	172	191
74	Peoria, Ill.	80	85	92	100	102	103	106	107	116	126	136	148	161
75	Davenport, Iowa <sup>2</sup>	74	82	91	100	102	105	109	110	116	127	134	145	158
77	Dubuque, Iowa <sup>2</sup>	93	93	100	100	101	99	100	101	118	129	142	158	176
78	Rockford, Ill. <sup>2</sup>	64	66	79	100	105	109	113	115	132	149	169	193	222
108	Keokuk-Quincy-Hannibal <sup>2</sup>	101	104	101	100	100	99	101	102	127	141	155	172	190
109	St. Louis <sup>2</sup>	84	88	93	100	102	106	107	108	120	137	155	176	201
110	Paducah, Ky. <sup>2</sup>	129	140	121	100	96	96	97	98	93	94	95	97	101

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

TABLE 19-68 Economic Areas of the State of Indiana—Total Population

OBE Economic Area No.	Name	Actual Population							
		1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	3,226,000	3,433,000	3,967,000	4,613,000	4,725,000	4,901,000	4,973,000	5,012,000
53	Louisville, Ky. <sup>1</sup>	151,834	156,804	187,513	212,894	216,008	225,002	227,191	228,712
54	Evansville, Ind. <sup>1</sup>	327,337	354,691	388,876	386,754	390,742	395,990	396,327	397,554
56	Champaign-Terre Haute <sup>1</sup>	223,884	222,901	217,827	210,937	207,852	207,717	210,922	215,516
57	Lafayette, Ind.	171,085	177,849	206,923	225,363	229,930	234,515	241,152	245,234
58	Indianapolis, Ind.	900,016	958,408	1,116,364	1,369,648	1,412,696	1,495,587	1,521,139	1,539,622
59	Anderson-Muncie, Ind.	349,239	382,518	438,336	495,912	505,805	525,072	538,751	545,625
60	Cincinnati, O. <sup>1</sup>	90,583	93,882	102,408	107,346	109,494	108,856	108,273	108,762
71	Fort Wayne, Ind. <sup>1</sup>	314,767	330,743	376,249	434,389	454,192	475,840	484,414	484,782
72	South Bend, Ind. <sup>1</sup>	330,825	344,719	415,156	478,174	489,595	501,764	507,616	508,166
73	Chicago, Ill. <sup>1</sup>	366,430	410,485	517,348	691,583	708,686	730,657	737,215	738,027

OBE Economic Area No.	Name	Projected Population				
		1980	1990	2000	2010	2020
	STATE TOTAL	6,340,011	7,450,124	8,602,312	9,978,922	11,619,739
53	Louisville, Ky. <sup>1</sup>	263,065	297,471	334,583	377,487	429,358
54	Evansville, Ind. <sup>1</sup>	477,661	542,084	604,986	688,957	789,527
56	Champaign-Terre Haute <sup>1</sup>	248,836	278,327	309,495	344,717	384,321
57	Lafayette, Ind.	349,489	419,911	503,330	601,387	713,063
58	Indianapolis, Ind.	2,042,263	2,475,923	2,927,100	3,462,306	4,102,448
59	Anderson-Muncie, Ind.	711,238	846,920	990,108	1,162,264	1,371,883
60	Cincinnati, O. <sup>1</sup>	129,016	144,858	161,047	178,978	200,165
71	Fort Wayne, Ind. <sup>1</sup>	615,722	730,716	851,089	996,547	1,171,202
72	South Bend, Ind. <sup>1</sup>	571,597	622,600	675,444	739,572	815,347
73	Chicago, Ill. <sup>1</sup>	931,124	1,091,314	1,245,130	1,426,707	1,642,425

<sup>1</sup>Part of an economic area.

TABLE 19-69 Total United States and Economic Areas of the State of Indiana—Indexes of Change for Total Population

OBE Economic Area No.	Name	Index Based on 1959 = 100												
		Actual Change					Projected Change							
		1929	1940	1950	1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF INDIANA	70	74	86	100	102	106	108	109	137	162	186	216	252
53	Louisville, Ky. <sup>2</sup>	71	74	88	100	101	106	107	107	124	140	157	177	202
54	Evansville, Ind. <sup>2</sup>	85	92	101	100	101	102	102	103	124	140	156	178	204
56	Champaign-Terre Haute <sup>2</sup>	106	106	103	100	99	98	100	102	118	132	147	163	182
57	Lafayette, Ind.	76	79	92	100	102	104	107	109	155	186	223	267	316
58	Indianapolis, Ind.	66	70	82	100	103	109	111	112	149	181	214	253	300
59	Anderson-Muncie, Ind.	70	77	88	100	102	106	109	110	143	171	200	234	277
60	Cincinnati, O. <sup>2</sup>	84	87	95	100	102	101	101	101	120	135	150	167	186
71	Fort Wayne, Ind. <sup>2</sup>	72	76	87	100	105	110	112	112	142	168	196	229	270
72	South Bend, Ind. <sup>2</sup>	69	72	87	100	102	105	106	106	120	130	141	155	171
73	Chicago, Ill. <sup>2</sup>	53	59	75	100	102	106	107	107	135	158	180	206	237

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

**TABLE 19-70 Economic Areas of the State of Michigan—Total Population**

OBE Economic Area No.	Name	Actual Population							
		1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	4,795,000	5,315,000	6,407,000	7,767,000	7,923,000	8,334,000	8,496,000	8,608,000
66	Toledo, Ohio <sup>1</sup>	101,334	112,982	141,070	177,624	177,641	187,539	192,649	193,743
67	Detroit, Mich.	2,611,196	2,918,950	3,672,889	4,549,321	4,632,146	4,885,567	5,004,647	5,062,166
68	Bay City, Mich.	458,832	526,335	588,446	693,850	714,257	747,339	754,140	765,692
69	Grand Rapids, Mich.	673,986	732,258	836,506	983,028	1,013,553	1,051,698	1,056,155	1,078,701
70	Lansing-Battle Creek-Kalamazoo, Mich.	542,779	598,098	731,109	882,902	897,290	954,620	980,300	994,672
72	South Bend, Ind. <sup>1</sup>	131,277	144,376	179,948	227,484	228,838	249,798	251,447	255,654
81	Green Bay, Wis. <sup>1</sup>	233,323	238,362	219,490	218,088	224,944	225,988	225,257	225,955
83	Duluth-Superior, Minn. <sup>1</sup>	42,273	43,639	37,542	34,703	34,331	31,451	31,405	31,417

OBE Economic Area No.	Name	Projected Population				
		1980	1990	2000	2010	2020
	STATE TOTAL	10,384,110	11,898,541	13,293,531	15,019,362	17,111,449
66	Toledo, Ohio <sup>1</sup>	233,826	282,037	338,108	410,415	498,663
67	Detroit, Mich.	6,240,913	7,180,926	7,979,527	8,991,056	10,241,491
68	Bay City, Mich.	874,569	989,466	1,087,605	1,216,579	1,365,422
69	Grand Rapids, Mich.	1,236,901	1,389,232	1,551,780	1,744,148	1,974,218
70	Lansing-Battle Creek-Kalamazoo, Mich.	1,261,998	1,476,831	1,710,622	1,973,298	2,277,897
72	South Bend, Ind. <sup>1</sup>	290,517	327,026	364,956	409,284	460,185
81	Green Bay, Wis. <sup>1</sup>	219,928	230,197	240,410	256,001	276,420
83	Duluth-Superior, Minn. <sup>1</sup>	25,458	22,826	20,523	18,581	17,153

<sup>1</sup>Part of an economic area.**TABLE 19-71 Total United States and Economic Areas of the State of Michigan—Indexes of Change for Total Population**

OBE Economic Area No.	Name	Index Based on 1959 = 100												
		Actual Change					Projected Change							
		1929	1940	1950	1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF MICHIGAN	62	68	82	100	102	107	109	111	134	153	171	193	220
66	Toledo, O. <sup>2</sup>	57	64	79	100	100	106	108	109	132	159	190	231	281
67	Detroit, Mich.	57	64	81	100	102	107	110	111	137	158	175	198	225
68	Bay City, Mich.	66	76	85	100	103	108	109	110	126	143	157	175	197
69	Grand Rapids, Mich.	69	74	85	100	103	107	107	110	126	141	158	177	201
70	Lansing-Battle Creek-Kalamazoo, Mich.	61	68	83	100	102	108	111	113	143	167	194	223	258
72	South Bend, Ind. <sup>2</sup>	58	63	79	100	101	110	111	112	128	144	160	180	202
81	Green Bay, Wis. <sup>2</sup>	107	109	101	100	103	104	103	104	101	106	110	117	127
83	Duluth-Superior, Minn. <sup>2</sup>	122	126	108	100	99	91	90	91	73	66	59	54	49

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

TABLE 19-72 Economic Areas of the State of Minnesota—Total Population

OBE Economic Area		Actual Population							
No.	Name	1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	2,572,000	2,790,000	2,997,000	3,366,000	3,493,000	3,565,000	3,585,000	3,625,000
83	Duluth-Superior, Minn. <sup>1</sup>	379,212	412,998	406,337	432,396	436,336	433,091	435,493	440,320
84	Grand Forks, N.D. <sup>1</sup>	102,573	113,304	106,671	96,728	98,072	96,535	96,953	97,732
89	Fargo, N.D. <sup>1</sup>	176,143	192,260	192,724	189,887	197,517	196,281	195,212	195,565
92	Brookings-Aberdeen, S.D. <sup>1</sup>	17,832	18,714	17,746	16,226	16,335	16,443	15,958	15,882
93	Sioux Falls, S.D. <sup>1</sup>	102,532	110,083	111,766	109,822	110,551	105,024	104,681	105,594
94	Minneapolis-St. Paul <sup>1</sup>	1,578,853	1,703,594	1,906,098	2,236,477	2,342,539	2,424,715	2,440,821	2,469,725
96	Rochester-Austin, Minn.	165,713	186,560	201,118	227,746	233,858	233,863	235,462	238,263
97	Lacrosse, Wis. <sup>1</sup>	49,142	52,487	54,540	56,718	57,792	59,048	60,420	61,919

OBE Economic Area		Projected Population				
No.	Name	1980	1990	2000	2010	2020
	STATE TOTAL	4,316,374	4,908,014	5,528,899	6,227,435	7,025,626
83	Duluth-Superior, Minn. <sup>1</sup>	452,382	485,014	520,126	556,942	596,927
84	Grand Forks, N.D. <sup>1</sup>	99,455	102,780	105,466	108,312	110,559
89	Fargo, N.D. <sup>1</sup>	199,119	208,874	215,920	221,066	226,873
92	Brookings-Aberdeen, S.D. <sup>1</sup>	14,344	14,036	13,817	13,810	14,034
93	Sioux Falls, S.D. <sup>1</sup>	108,018	109,888	110,904	111,905	115,308
94	Minneapolis-St. Paul <sup>1</sup>	3,083,431	3,583,572	4,110,015	4,710,871	5,399,075
96	Rochester-Austin, Minn.	291,424	328,829	371,148	415,008	464,475
97	Lacrosse, Wis. <sup>1</sup>	68,201	75,021	81,503	89,521	98,375

<sup>1</sup>Part of an economic area.

TABLE 19-73 Total United States and Economic Areas of the State of Minnesota—Indexes of Change for Total Population

OBE Economic Area		Index Based on 1959 = 100												
No.	Name	1929	1940	1950	Actual Change				Projected Change					
					1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF MINNESOTA	76	83	89	100	104	106	107	108	128	146	164	185	209
83	Duluth-Superior, Minn. <sup>2</sup>	88	96	94	100	101	100	101	102	105	112	120	129	138
84	Grand Forks, N.D. <sup>2</sup>	106	117	110	100	101	100	100	101	103	106	109	112	114
89	Fargo, N.D. <sup>2</sup>	93	101	101	100	104	103	103	103	105	110	114	116	119
92	Brookings-Aberdeen, S.D. <sup>2</sup>	110	115	109	100	101	101	98	98	88	87	85	85	86
93	Sioux Falls, S.D. <sup>2</sup>	93	100	102	100	101	96	95	96	98	100	101	102	105
94	Minneapolis-St. Paul <sup>2</sup>	71	76	85	100	105	108	109	110	138	160	184	211	241
96	Rochester-Austin, Minn.	73	82	88	100	103	103	103	105	128	144	163	182	204
97	Lacrosse, Wis. <sup>2</sup>	87	93	96	100	102	104	107	109	120	132	144	158	173

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

**TABLE 19-74 Economic Areas of the State of New York—Total Population**

OBE Economic Area		Actual Population							
No.	Name	1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	12,171,000	13,456,000	14,865,000	16,685,000	17,464,000	17,848,000	17,968,000	18,023,000
6	Albany, N.Y. <sup>1</sup>	771,930	814,738	887,135	958,513	1,000,140	1,031,876	1,034,405	1,020,192
7	Plattsburgh, N.Y.	210,100	223,184	232,980	262,472	273,134	273,213	268,401	258,354
8	Syracuse-Utica, N.Y.	807,899	840,026	929,731	1,073,318	1,130,792	1,143,774	1,151,306	1,151,245
9	Rochester, N.Y.	615,256	653,543	723,779	846,321	888,576	934,242	947,905	964,824
10	Buffalo, N.Y. <sup>1</sup>	1,181,366	1,268,094	1,429,859	1,655,630	1,748,455	1,697,499	1,697,509	1,692,157
13	Binghamton, N.Y. <sup>1</sup>	520,656	563,009	639,411	703,803	733,471	761,394	760,103	745,698
14	New York, N.Y. <sup>1</sup>	8,063,793	9,093,406	10,022,105	11,184,943	11,689,432	12,006,002	12,108,371	12,190,530

OBE Economic Area		Projected Population				
No.	Name	1980	1990	2000	2010	2020
	STATE TOTAL	19,990,557	22,012,917	24,036,112	26,432,357	29,031,198
6	Albany, N.Y. <sup>1</sup>	1,086,865	1,202,857	1,315,395	1,445,355	1,597,112
7	Plattsburgh, N.Y.	255,692	277,535	299,798	325,742	354,567
8	Syracuse-Utica, N.Y.	1,312,783	1,475,390	1,638,616	1,823,338	2,038,878
9	Rochester, N.Y.	1,091,410	1,240,136	1,394,059	1,571,020	1,777,651
10	Buffalo, N.Y. <sup>1</sup>	1,909,052	2,116,201	2,311,031	2,541,715	2,814,866
13	Binghamton, N.Y. <sup>1</sup>	878,108	985,050	1,102,652	1,241,709	1,403,038
14	New York, N.Y. <sup>1</sup>	13,456,647	14,715,748	15,974,561	17,483,478	19,045,086

<sup>1</sup>Part of an economic area.**TABLE 19-75 Total United States and Economic Areas of the State of New York—Indexes of Change for Total Population**

OBE Economic Area		Index Based on 1959 = 100												
No.	Name	1929	1940	1950	Actual Change					Projected Change				
					1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF NEW YORK	73	81	89	100	105	107	108	108	120	132	144	158	174
6	Albany, N.Y. <sup>2</sup>	80	85	93	100	104	108	108	106	113	125	137	151	167
7	Plattsburgh, N.Y.	80	85	89	100	104	104	102	98	97	106	114	124	135
8	Syracuse-Utica, N.Y.	75	78	87	100	105	107	107	107	122	137	153	170	190
9	Rochester, N.Y.	73	77	85	100	105	110	112	114	129	146	165	186	210
10	Buffalo, N.Y. <sup>2</sup>	71	77	86	100	106	103	103	102	115	128	140	154	170
13	Binghamton, N.Y. <sup>2</sup>	74	80	91	100	104	108	108	106	125	140	157	176	199
14	New York, N.Y. <sup>2</sup>	72	81	90	100	105	107	108	109	120	132	143	156	170

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

**TABLE 19-76 Economic Areas of the State of Ohio—Total Population**

OBE Economic Area		Actual Population							
No.	Name	1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	6,626,000	5,929,000	7,980,000	9,671,000	9,952,000	10,262,000	10,397,000	10,488,000
51	Charleston, W. Va. <sup>1</sup>	211,029	226,120	223,471	235,822	235,366	233,459	234,342	237,314
60	Cincinnati, O. <sup>1</sup>	1,451,735	1,548,154	1,864,467	2,332,831	2,417,146	2,512,827	2,542,245	2,569,510
61	Columbus, Ohio <sup>1</sup>	931,595	987,364	1,124,987	1,373,255	1,419,189	1,504,082	1,525,127	1,540,234
63	Pittsburgh, Pa. <sup>1</sup>	219,610	233,418	219,569	215,538	211,464	219,326	215,783	218,637
64	Cleveland, O. <sup>1</sup>	2,954,633	3,062,243	3,572,232	4,391,152	4,526,682	4,625,844	4,696,961	4,727,195
65	Lima, O.	200,904	207,071	228,980	258,256	261,578	269,544	272,063	276,338
66	Toledo, O. <sup>1</sup>	594,358	599,024	678,838	786,163	801,001	814,331	826,111	832,866
71	Fort Wayne, Ind. <sup>1</sup>	62,136	65,606	67,456	77,983	79,574	82,587	84,368	85,906

OBE Economic Area		Projected Population				
No.	Name	1980	1990	2000	2010	2020
	STATE TOTAL	12,462,644	14,335,026	16,249,647	18,451,906	21,026,912
51	Charleston, W. Va. <sup>1</sup>	257,510	287,070	315,335	349,257	389,157
60	Cincinnati, O. <sup>1</sup>	3,273,155	3,891,050	4,555,456	5,303,723	6,185,390
61	Columbus, O. <sup>1</sup>	1,985,409	2,381,071	2,763,220	3,222,470	3,749,532
63	Pittsburgh, Pa. <sup>1</sup>	216,595	227,074	235,240	248,458	266,563
64	Cleveland, O. <sup>1</sup>	5,360,736	6,027,583	6,708,280	7,484,980	8,398,396
65	Lima, O.	315,207	356,004	404,566	455,951	516,652
66	Toledo, O. <sup>1</sup>	953,110	1,048,953	1,135,774	1,236,516	1,348,237
71	Fort Wayne, Ind. <sup>1</sup>	100,922	116,221	131,776	150,551	172,985

<sup>1</sup>Part of an economic area.**TABLE 19-77 Total United States and Economic Areas of the State of Ohio—Indexes of Change for Total Population**

OBE Economic Area		Index Based on 1959 = 100												
No.	Name	Actual Change					Projected Change							
		1929	1940	1950	1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF OHIO	69	72	83	100	103	106	108	108	129	148	168	191	217
51	Charleston, W. Va. <sup>2</sup>	89	96	95	100	100	99	99	101	109	122	134	148	165
60	Cincinnati, O. <sup>2</sup>	62	66	80	100	104	108	109	110	140	167	195	227	265
61	Columbus, O. <sup>2</sup>	68	72	82	100	103	110	111	112	145	173	201	235	273
63	Pittsburgh, Pa. <sup>2</sup>	102	108	102	100	98	102	100	101	100	105	109	115	124
64	Cleveland, O. <sup>2</sup>	67	70	81	100	103	105	107	108	122	137	153	170	191
65	Lima, O.	78	80	89	100	101	104	106	107	122	138	157	177	200
66	Toledo, O. <sup>2</sup>	76	76	86	100	102	104	105	106	121	133	144	157	171
71	Fort Wayne, Ind. <sup>2</sup>	80	84	87	100	102	106	108	110	129	149	169	193	222

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

TABLE 19-78 Economic Areas of the State of Pennsylvania—Total Population

OBE Economic Area No.	Name	Actual Population							
		1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	9,723,000	9,896,000	10,507,000	11,234,000	11,336,000	11,618,000	11,657,000	11,672,000
10	Buffalo, N.Y. <sup>1</sup>	73,347	74,842	73,479	70,465	70,014	70,909	69,838	69,709
11	Erie, Pa.	351,428	364,918	411,659	440,651	444,390	455,072	453,094	452,256
12	Williamsport, Pa.	360,511	375,621	387,410	402,001	407,000	422,894	416,513	415,747
13	Binghamton, N.Y. <sup>1</sup>	115,808	119,462	119,267	123,736	124,282	127,985	126,411	126,580
15	Scranton-Wilkes-Barre, Pa.	863,873	847,904	757,413	684,002	676,167	687,186	683,106	680,716
16	Philadelphia-Trenton-Wilmington <sup>1</sup>	3,655,931	3,681,370	4,077,256	4,526,967	4,636,623	4,796,208	4,845,142	4,868,274
17	Harrisburg-York-Lancaster, Pa.	1,259,728	1,321,698	1,427,165	1,569,787	1,608,487	1,654,941	1,658,023	1,659,077
63	Pittsburgh, Pa. <sup>1</sup>	2,844,001	2,912,353	3,036,091	3,177,721	3,134,184	3,162,433	3,168,127	3,163,333
64	Cleveland, O. <sup>1</sup>	198,373	197,832	217,260	238,670	234,853	240,372	236,746	236,308

OBE Economic Area No.	Name	Projected Population				
		1980	1990	2000	2010	2020
	STATE TOTAL	12,897,157	14,245,103	15,529,260	17,064,266	18,888,463
10	Buffalo, N.Y. <sup>1</sup>	73,287	77,595	81,390	86,522	93,264
11	Erie, Pa.	496,283	545,858	593,682	654,811	727,504
12	Williamsport, Pa.	453,920	504,780	554,404	615,135	686,577
13	Binghamton, N.Y. <sup>1</sup>	118,464	125,125	132,771	142,561	154,392
15	Scranton-Wilkes-Barre, Pa.	760,555	846,005	922,894	1,019,789	1,135,487
16	Philadelphia-Trenton-Wilmington <sup>1</sup>	5,279,998	5,814,472	6,347,573	6,934,083	7,619,721
17	Harrisburg-York-Lancaster, Pa.	1,987,185	2,260,724	2,524,162	2,852,137	3,239,336
63	Pittsburgh, Pa. <sup>1</sup>	3,473,926	3,801,575	4,087,846	4,455,319	4,903,484
64	Cleveland, O. <sup>1</sup>	253,539	268,969	284,538	303,909	328,698

<sup>1</sup>Part of an economic area.

TABLE 19-79 Total United States and Economic Areas of the State of Pennsylvania—Indexes of Change for Total Population

OBE Economic Area No.	Name	Index Based on 1959 = 100												
		Actual Change					Projected Change							
		1929	1940	1950	1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF PENNSYLVANIA	87	88	94	100	101	103	104	104	115	127	138	152	168
10	Buffalo, N.Y. <sup>2</sup>	104	106	104	100	99	101	99	99	104	110	116	123	132
11	Erie, Pa.	80	83	93	100	101	103	103	103	113	124	135	149	165
12	Williamsport, Pa.	90	93	96	100	101	105	104	103	113	126	138	153	171
13	Binghamton, N.Y. <sup>2</sup>	94	97	96	100	100	103	102	102	96	101	107	115	125
15	Scranton-Wilkes-Barre, Pa.	126	124	111	100	99	100	100	100	111	124	135	149	166
16	Philadelphia-Trenton-Wilmington <sup>2</sup>	81	81	90	100	102	106	107	108	117	128	140	153	168
17	Harrisburg-York-Lancaster, Pa.	80	84	91	100	102	105	106	106	127	144	161	182	206
63	Pittsburgh, Pa. <sup>2</sup>	89	92	96	100	99	100	100	100	109	120	129	140	154
64	Cleveland, O. <sup>2</sup>	83	83	91	100	98	101	99	99	106	113	119	127	138

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

**TABLE 19-80 Economic Areas of the State of Wisconsin—Total Population**

OBE Economic Area		Actual Population							
No.	Name	1929	1940	1950	1959	1962	1965	1966	1967
	STATE TOTAL	2,934,000	3,143,000	3,438,000	3,891,000	4,014,000	4,152,000	4,178,000	4,194,000
77	Dubuque, Iowa <sup>1</sup>	73,772	77,796	77,326	77,699	78,811	81,916	81,318	80,454
78	Rockford, Ill. <sup>1</sup>	95,913	103,497	117,067	137,614	143,226	147,130	150,403	151,428
79	Madison, Wis.	260,120	284,248	326,095	371,491	388,378	417,292	422,031	426,648
80	Milwaukee, Wis.	1,224,025	1,301,662	1,491,243	1,820,019	1,887,239	1,950,204	1,958,650	1,970,374
81	Green Bay, Wis. <sup>1</sup>	460,447	498,790	541,397	602,286	621,275	648,755	655,257	658,070
82	Wausau, Wis.	276,793	302,842	307,480	317,423	324,412	334,870	335,198	334,351
83	Duluth-Superior, Minn. <sup>1</sup>	92,418	94,959	88,739	80,861	80,256	77,554	77,308	77,492
94	Minneapolis-St. Paul <sup>1</sup>	83,157	84,037	82,615	84,528	86,732	93,825	94,554	94,304
95	Eau Claire, Wis.	182,967	199,380	205,515	202,559	204,949	202,070	202,142	200,960
97	Lacrosse, Wis. <sup>1</sup>	184,388	195,789	200,523	196,520	198,722	198,384	201,139	199,919

OBE Economic Area		Projected Population				
No.	Name	1980	1990	2000	2010	2020
	STATE TOTAL	5,028,647	5,756,863	6,464,767	7,305,082	8,279,173
77	Dubuque, Iowa <sup>1</sup>	87,773	95,188	104,038	115,233	127,814
78	Rockford, Ill. <sup>1</sup>	177,547	197,613	220,994	248,909	282,813
79	Madison, Wis.	471,218	524,312	571,942	622,017	668,890
80	Milwaukee, Wis.	2,542,292	2,998,124	3,422,612	3,929,835	4,523,884
81	Green Bay, Wis. <sup>1</sup>	754,042	859,193	967,958	1,100,959	1,256,079
82	Wausau, Wis.	367,069	403,290	447,585	499,994	565,383
83	Duluth-Superior, Minn. <sup>1</sup>	78,375	80,443	82,950	85,712	88,890
94	Minneapolis-St. Paul <sup>1</sup>	101,874	111,431	120,949	131,821	144,114
95	Eau Claire, Wis.	220,143	238,605	257,835	278,332	301,830
97	Lacrosse, Wis. <sup>1</sup>	228,314	248,664	267,904	292,270	319,476

<sup>1</sup>Part of an economic area.**TABLE 19-81 Total United States and Economic Areas of the State of Wisconsin—Indexes of Change for Total Population**

OBE Economic Area		Actual Change								Projected				
No.	Name	1929	1940	1950	1959	1962	1965	1966	1967	1980	1990	2000	2010	2020
	TOTAL UNITED STATES <sup>1</sup>	69	75	86	100	105	109	111	112	132	152	173	197	224
	TOTAL STATE OF WISCONSIN	75	81	88	100	103	107	107	108	129	148	166	188	213
77	Dubuque, Iowa <sup>2</sup>	95	100	100	100	101	105	105	104	113	123	134	148	164
78	Rockford, Ill. <sup>2</sup>	70	75	85	100	104	107	109	110	129	144	161	181	206
79	Madison, Wis.	70	77	88	100	105	112	114	115	127	141	154	167	180
80	Milwaukee, Wis.	67	72	82	100	104	107	108	108	140	165	188	216	249
81	Green Bay, Wis. <sup>2</sup>	76	83	90	100	103	108	109	109	125	143	161	183	209
82	Wausau, Wis.	87	95	97	100	102	105	106	105	116	127	141	158	178
83	Duluth-Superior, Minn. <sup>2</sup>	114	117	110	100	99	96	96	96	97	99	103	106	110
94	Minneapolis-St. Paul <sup>2</sup>	98	99	98	100	103	111	112	112	121	132	143	156	170
95	Eau Claire, Wis.	90	98	101	100	101	100	100	99	109	118	127	137	149
97	Lacrosse, Wis. <sup>2</sup>	94	100	102	100	101	101	102	102	116	127	136	149	163

<sup>1</sup>Excluding overseas.<sup>2</sup>Part of an economic area.

## Section 3

# THE AGRICULTURAL ECONOMY

### 3.1 Introduction

#### 3.1.1 Objective and Scope

This section projects agricultural activity within the Great Lakes Basin needed to meet estimated future food and fiber requirements. Projections of the agricultural economy provide benchmark estimates for land-use and crop-distribution patterns, rural farm population, employment, and agricultural income, and an evaluation of total agricultural production in the Basin. The immediate purpose of this analysis is to assist in evaluating the importance of alternative water resource investment programs.

National requirements for agricultural products were projected to assess the capability of the agricultural resource base of the Basin in its present state of development to meet these requirements. The results provided projections of agricultural production and land use that serve as benchmarks for evaluating alternative types of resource development. In addition, projections of farm employment, income, and farm population were made.

#### 3.1.2 Relationships to Other Work Groups

Information contained in this section describes the agricultural economy, gives details on assumptions and projection methodology, and presents the baseline projections of the agricultural economy. These are a basis for subsequent analysis of water resource development alternatives. Direct relationship exists between projections presented in this section and those in Appendix 13, *Land Use and Management*; Appendix 14, *Flood Plains*; Appendix 15, *Irrigation*; and Appendix 16, *Drainage*. Each of these is involved in projecting the resource base and identifying the physical potential for particular types of water resource developments.

### 3.2 Methods and Assumptions

#### 3.2.1 Basic Geographic Organization

The basic reporting unit is the planning subarea, an aggregation of counties. Although planning subarea boundaries generally approximate homogeneous agricultural areas, this was not a criteria for their establishment.

#### 3.2.2 Methodological Approach

The framework for analysis is subdivided into three major phases.

First, estimates were made of national benchmark requirements for food, feed, and fiber and regional shares of production for the years 1980, 2000, and 2020. The Great Lakes Basin's share of national requirements for various agricultural products is based on historical shares and projected trends of production. This estimate reflects the Basin's comparative advantage in terms of factors such as land productivity, production, and marketing costs.

These projections of national and regional agricultural production requirements are referred to as OBERS projections, which were made jointly at the Washington level by the Office of Business Economics (OBE), the U.S. Department of Commerce, and the Economic Research Service (ERS), U.S. Department of Agriculture, under an interdepartmental agreement dated March 6, 1964, through the Water Resources Council. They serve as benchmark projections on which economic analysis of alternatives was made. They reflect coordination and organization of regional as well as interregional information, while being consistent with a projected national framework. Any adjustment in one sector or region must be evaluated to determine whether or not it affects other sectors or regions. Compensating adjustments in other

parts of the nation, in exports or other elements of the production system, may result. The effects of change in one region that suggests opportunities gained or forgone in other regions should be a part of the evaluation. OBERS projections for the nation as a whole can be adjusted but the adjustment must be done systematically to determine implications in various parts of the country and in various sectors of the economy.

A consistent set of projections must reflect the interregional relationships that planners should take into consideration. A regional development plan that increases production over the base line projection without considering offsetting interregional effects would cloak regional development under the guise of national efficiency. Should individual regions be permitted to do this, the objectivity of nationwide framework studies and the fundamental assumption that framework studies are being developed on a common base would be weakened, if not completely destroyed.

Next, an analysis was made of the capacity of land resources to produce food and fiber. Estimates were made of crop yields expected in various soil groups and the costs of obtaining those yields under average weather and management conditions. Projections of livestock productivity and feed requirements were also made.

Then demand and supply possibilities were brought together in a computerized analytical system designed to simulate the decision process of the producers who control the resources and weigh the alternative costs and returns in making production decisions. The results of the computer program provided base line projections of major crop production in the planning subareas of the Great Lakes Basin. While interpreting projections, alternative ways of meeting future requirements should be kept in mind. These include private practices, such as adaption of yield-increasing technology, better management, and land-use changes, as well as public investments in water resource development.

Labor requirements were derived from the projected crop pattern and associated crop and livestock production. Population estimates were derived from the employment pattern. Determination of farm income was based on value of output, production expenses, and government payments.

Requirements for food grains, fruits, and vegetables are based on population growth and per capita consumption. Demand for feed grains and roughage is derived from feed

needs associated with the demand for livestock products. Livestock product requirements were allocated to planning subareas on the basis of historical shares and discernible trends. Based on projected feeding efficiencies and ration composition, requirements for feed grains and roughage were estimated. Increased efficiency in livestock feed conversion, improved livestock breeding, better feed management, and improvements in protein content of feed grains are expected to reduce the feed-grain requirements per unit of livestock product. Because portions of the Basin are historical exporters of feed grains, the total feed grain requirements are in excess of amounts required for livestock production.

Although results can be aggregated in such categories as feed grains, food grains, roughage, and specialty crops, the analysis itself—the demand side of the study—was performed on specific crops, e.g., corn, wheat, or alfalfa hay. Major crops in terms of acreage were handled within a computerized analytical system. These include oats, wheat, corn for grain, corn silage, alfalfa hay, clover-timothy-other hay, soybeans, cropland pasture, and permanent pastures.

Crops involving relatively minor acreages or those not widely distributed throughout the Basin were handled outside the model. Included were barley, rye, sugar beets, dry field beans, potatoes, fruits, sod, and vegetables. Projected acreage required for these crops was removed from the resource base available for major field crop and roughage production.

The future supply of agricultural products depends on the production potential of the agricultural resource base of the Great Lakes Basin. The inventory of existing crop and pasture land base was that identified by the 1966-67 Conservation Needs Inventory (CNI). This inventory identified the type and acreage of specific soils and their major land use on a county basis. It served as the reference point for collection of land use and crop yield data used in the study. This information was collected for soil resource groups.

Soil resource groups (SRGs) are homogeneous groupings of land capability units. Great Lakes Basin soils were grouped into 23 SRGs by soil scientists and economists according to similarities of texture and problems, such as wetness, flood hazard, and droughtiness. They generally have similar cropping patterns, yield characteristics, and response to management practices. Climatic differences are not explicitly reflected in the SRGs, but are reflected in the distribution of crops

TABLE 19-82 Total Land in Urban and Built-up Area, Great Lakes Basin Planning Subareas

Planning Subarea	Total Urban and Built-Up Area (1,000 Acres)			
	Actual 1966-67	1980	Projected	
			2000	2020
1.1	284.5	285.2	293.0	307.9
1.2	137.8	137.8	138.8	142.0
2.1	464.0	487.0	530.2	583.5
2.2	1,210.5	1,726.2	2,397.7	2,902.6
2.3	818.5	923.5	1,083.2	1,279.9
2.4	414.8	429.9	458.7	492.0
3.1	179.6	187.9	198.8	212.4
3.2	389.0	441.1	517.1	569.1
4.1	759.4	1,053.9	1,471.0	1,747.3
4.2	567.8	630.5	732.1	838.9
4.3	609.0	749.4	1,009.6	1,227.8
4.4	485.0	537.6	630.4	716.1
5.1	271.1	301.3	341.9	393.3
5.2	250.7	322.9	414.0	512.0
5.3	145.9	146.7	153.8	161.8
Total	6,987.6	8,360.9	10,370.3	12,086.6

and crop yield differences of the respective planning subareas.

Within certain soil groups, factors inhibiting agricultural production were identified. These include wetness requiring draining, flood plains that could benefit from flood protection, erosion problems associated with slope characteristics, soil texture, and other factors such as stoniness.

Land available for agricultural production in 1980, 2000, and 2020 will be less than in the base period by the amount required for urban and industrial expansion, transportation, and recreation needs. These requirements (Table 19-82) have been estimated, based on regression analysis using projections of population, population change, and employment. The cropland and pasture base remaining after removal of urban and built-up requirements is considered available for crop production under assumed conditions of management and technology.

For each soil resource group available for crop production, average yields were estimated for alternative crops, along with the fertilizer requirements associated with each crop. The projected yields were based on anticipated technological changes and represent average management levels assuming normal climatic, disease, and insect conditions and hazards. The costs of production for each crop for individual planning subarea groups were also estimated. These costs include preharvest and harvest costs, and, where appropriate, the specific cost that would be incurred in attempting to farm steep slopes. They also reflect costs associated with lack of drainage and flood protection.

A farmer must select the crops he will raise,

run he tends to choose the set of crops that will use available resources most efficiently. In contrast to farmers, who consider and test various alternatives over the long run, planners do not have the "long run" to make projections. Instead they use a generalized analytical model designed to simulate the process of choosing between the various alternatives. The mathematical process used is minimum cost linear programming, a more exact form of enterprise budgeting. The system brings together and compares resources and associated costs and yields. The least costly set in terms of resource uses is selected as representing the farmer's decision. All of this is accomplished within certain constraints designed to promote "realism" in the analysis. Such constraints consist of requiring crop rotations, especially on steeper soils, and ensuring that the large capital commitments already made to agriculture in a particular planning subarea would not be prematurely idled in the interest of pure efficiency.

The generalized analytical model analyzes and projects agriculture production patterns by soil resource groups within planning subareas of the Great Lakes Basin. Initially the production patterns are based on the comparative advantage of the Basin's soil and water resources without any additional development.

In operation of the minimum cost linear programming model, a cropping pattern is selected that will minimize the cost of meeting the assumed demand for food and fiber within the restraints likely to confront agriculture. All analysis is done on the basis of planning subareas and associated soil resource groups.

The principal purpose of this model is to estimate patterns of agricultural land use using projected levels of production. The basic assumption of the analysis is that all future production patterns will be related to and restricted to a degree by the current patterns of use, which were developed using a normalizing process. Current normal is a concept used to describe estimates that conform to or constitute an acceptable model or pattern. In this study, acreage, production, price and value of crops and production, price and value of livestock have been adjusted to conform to a consistent pattern. Current normal values of the above parameters are estimates that reflect current production technology and prices, from which the impacts of abnormalities caused by weather and other hazards in a single year were weighted by their historical occurrence. Normalization may also

given his resource base, his managerial ability, relative costs, and receipts. Basic assumptions of this analysis are that he seeks to maximize his returns and that over the long be described as a geometrically weighted moving average. The process, as used in this report, was based on historical data for the years 1939 to 1967. Changes in patterns of use will result in shifts toward more efficient use of the resources within recognizable limits imposed by crop rotations, diversification, institutional restrictions, interdependence of crop enterprises, and the relationship of roughage production, pasture land, and livestock enterprises.

### 3.2.3 General Assumptions and Limitations

Benchmark projections of agricultural activity in the Great Lakes Basin are based on the assumption of a growing and increasingly prosperous population, which will demand more and more goods and services. Projected demands for agricultural products reflect estimates of consumer preferences, the efficiency of labor and other resources, and rates of technological developments in both mechanical-physical and biochemical fields. Pressures on resources may well induce unexpected changes in technology and in plant and animal breeding. Projections assembled in this appendix represent an informed judgment of the future, based upon current information. The general assumptions made for this study follow.

#### 3.2.3.1 Assumptions Affecting Demand for Food and Fiber

(1) The national population will increase approximately 30 percent during each 20-year period from 1960 through 2020 as shown in Table 19-83. At this rate, population will more than double between 1960 and 2020.

(2) National personal income, as indicated in Table 19-83, will increase more than tenfold between 1960 and 2020.

(3) Increased per capita food consumption will result from rising personal incomes and improved income distribution through 1980. Further increases in personal incomes will have an insignificant influence on per capita consumption.

(4) A general shift in consumption patterns will occur. For example, people are expected to consume more beef and poultry than dairy products and eggs.

(5) Both import and export volume of ag-

**TABLE 19-83 Population and Personal Income, United States**

Item	1960	Projected		
		1980	2000	2020
Population (Millions) <sup>1</sup>	180.7	235.2	307.8	398.6
Personal Income <sup>2</sup>	389.6	967.1	2,204.1	4,947.7

<sup>1</sup>Based on Series C projections

<sup>2</sup>In billions of 1958 dollars

ricultural commodities is expected to increase over the 1959 to 1961 level. Increases are projected for imports of beef, pork, milk, vegetables, noncitrus fruits, and tree nuts. Exports of livestock and livestock products, corn, wheat, rice, soybeans, vegetables, and fruits are projected to increase. Greatest export increases are expected for milk products, corn, grain sorghum, wheat, and soybeans. On balance, the foreign market demand for United States' agricultural products is projected to increase considerably above the 1959 to 1961 average level. Trends were projected to 1980 and held constant for 2000 and 2020. Exports as a share of total production are projected to be less in 2000 and 2020 than in 1980.

#### 3.2.3.2 Assumptions Affecting Supply of Food and Fiber

(1) The basic inventory of agricultural land is that identified by the 1966-67 National Inventory of Soil and Water Conservation Needs with appropriate adjustments for projected land withdrawals for urban and other uses.

(2) Projected crop yields and costs reflect estimates of future technology based on increased adoption of presently known techniques as well as implementation of new developments.

(3) Fixed livestock feed efficiencies were assumed for each time period and each class of livestock uniformly throughout the Basin. The crop composition of feed ration categories of feed grains and roughages was allowed to vary within planning subareas to reflect comparative advantage.

(4) Farmers will continue to implement practices that prevent significant losses of production capability from erosion, depletion, infertile outwash, and other factors causing deterioration of soils and reduced yields over the projection period.

(5) It is assumed that farmers organize their resources over the long run to minimize production costs and thereby take advantage of the Basin's comparative advantage for ag-

gricultural production. Then changes are assumed to be gradual. Constraints were imposed to prevent abrupt and unrealistic shifts in production patterns between planning sub-areas.

(6) The institutional framework of the Basin and the nation are assumed to remain relatively constant.

### 3.2.3.3 General Assumptions

(1) It is assumed that general economic stability will prevail during the projection period, that no major war or economic recession will occur, and that a high level of economic activity and nearly full employment will be maintained. This does not rule out periodic cyclical adjustments in economic activity.

(2) Prices used for agricultural products are based on the adjusted normalized prices published by the Water Resources Council.<sup>3</sup> Cost data are based on 1968 relationships.

(3) Current normal relationships among inputs and between inputs and outputs are expected to continue through the projection period. Inputs of type and quantity needed will be available.

(4) Government agricultural programs will continue during the projection period, but the price system and profit incentives will be the dominant factor in allocation of resources. This implies a gradual decrease in production restraints and greater market influence during the projection period.

(5) Private and public programs in research and extension will continue at present levels.

(6) Marketing and transportation facilities will be adequate to handle the projected agricultural production.

(7) Credit availability, tenure arrangements, zoning, and taxation policies will not interfere with agricultural adjustments, including farm consolidation or purchases of new technologies.

### 3.2.3.4 Assumptions Embodied in Determination of National and Regional Requirements

Extension of historical trends and relationships, modified by factors known to be changing these relationships, appears to be the most logical process for determining long-term benchmark projections.

Increased domestic requirements for major farm commodities considered in this report are a function of population growth and projected per capita consumption. The estimates of domestic consumption requirements are derived from the population estimates and assumed per capita consumption rates for each time period. Consumption requirements for the years 2000 and 2020 have been held at the rate projected for 1980 and are a direct function of population.

Population projections for 1980 and 2000 were based on Series C estimates made by the Bureau of the Census. They assume a medium-low fertility rate and an annual growth in population of approximately 1.3 percent, which is considerably lower than the 1.7 percent rate prevailing in the 1945 to 1965 period. These population estimates are for the 50 States.

#### (1) Projected Per Capita Use

The per capita consumption of various agricultural products has been changing with rising incomes, shifting tastes, substitute products, and lower relative prices. As shown in Table 19-84, the projected 1980 per capita consumption of meat will have increased from 1959 to 1961 levels. Consumption of eggs and dairy products will decline as will cereal grain. Oil seeds are expected to increase by 1980. Cotton consumption is projected to decline while tobacco remains constant. Industrial uses of major farm commodities were maintained at a constant per capita level for all time periods.

#### (2) Imports and Exports

The expansion of world markets has resulted in a large increase in United States agricultural exports. Public Law 480 and other export assistance programs have been the primary forces behind the increase in United States foreign marketings. A large upsurge occurred during the early 1960s, but subsequently slackened. The production of export commodities required approximately 64 million acres of land in 1960, peaked at 77 million acres in 1963, and declined to 58 million acres in 1969. Important commodities include soybeans, soybean meal, feed grains, poultry, and poultry products.

Projections of United States trade in agricultural commodities up to 1980 are shown in Table 19-85. These levels are held constant for 2000 and 2020. Both import and export volume is expected to increase over the 1959 to 1961 level, although some particular commodities will decrease. Substantial increases are projected for imports of beef, vegetables, non-citrus fruits, and tree nuts. Relative decreases

**TABLE 19-84 Per Capita Use of Major Farm Products, United States**

Commodity	Per Capita Use (Pounds)	
	Actual 1959-61 <sup>a</sup>	Projected 1980 <sup>b</sup>
Beef (carcass weight)	84.7	112
Veal (carcass weight)	5.8	5
Pork (excluding lard) (carcass weight)	64.8	65.5 <sup>c</sup>
Lamb & Mutton (carcass weight)	4.9	3.5 <sup>d</sup>
Chickens (ready-to-eat)	29.1	34.5
Turkeys (ready-to-eat)	6.6	11
Eggs (number)	337	290
Milk (fat solids basis)	657	570
Corn	46	52
Oats	7.3	7.0
Barley	1.4	1.3
Wheat	165	143
Rye	1.4	1.3
Rice (rough)	8.1	10.0
Flax	7.0 <sup>e</sup>	4.0 <sup>e</sup>
Soybeans	149.2 <sup>f</sup>	217.4 <sup>e</sup>
Peanuts (farm stock)	7.2	9.1
Sugar (raw equivalent)	104	104
Dry Beans	7.7	7.4
Dry Peas	0.4	0.1
Potatoes	110	110
Sweet Potatoes	6.4	5.5 <sup>e</sup>
Vegetables (fresh basis)	205	216
Melons (fresh basis)	25	20
Citrus Fruits (fresh basis)	82	84
Noncitrus Fruit (fresh basis)	113	122
Tree Nuts (shelled)	1.6	1.6 <sup>e</sup>
Cotton	23.4 <sup>g</sup>	20.5 <sup>g</sup>
Tobacco	7.6 <sup>g</sup>	7.6 <sup>g</sup>

<sup>a</sup>U.S. Dept. of Agr., ERS, U.S. Food Consumption, Sources of Data and Trends, 1909-1963, Stat. Bul. No. 364, June 1965, except as noted.

<sup>b</sup>R. F. Daly and A. C. Egbert, "A Look Ahead for Food and Agriculture", Agricultural Economics Research, Vol. XVIII, Jan. 1966, and "Statistical Supplement", except as noted.

<sup>c</sup>The per capita consumption of pork has been very stable over the period 1909 to 1964 except for war years and recessions when pork was substituted for beef, and the mid-1930's when drought reduced the corn supply. Per capita pork consumption from 1909 to 1964 averaged 66.3 pounds and ranged from 48.4 pounds in 1935 to 79.5 pounds in 1944. In a 56-year data series, consumption has gone below 60 pounds in four years and above 70 pounds in 11 years. A straight-line fitted to this data trends slightly upward. Average consumption per person from 1947 to 1964 was 65.9 pounds, ranging from 60.2 to 72.5 pounds per person.

<sup>d</sup>The per capita consumption of lamb & mutton from 1909 to 1964 averaged 5.7 pounds and ranged from 3.4 pounds in 1951 to 7.7 pounds in 1912. A straight-line fitted to this data projects a trend value of 4.6 pounds for 1980. Average consumption per person from 1947 to 1964 was 4.6 pounds, ranging from 3.4 to 5.3 pounds.

<sup>e</sup>Unpublished data, USDA, ERS, Economic and Statistical Analysis Division, mimeographed, Dec. 2, 1964.

<sup>f</sup>U.S. Department of Agriculture, Agricultural Statistics: 1965.

<sup>g</sup>J. P. Biniek, U.S. Agricultural Production Now and in the Future (unpublished mimeographed), July 1965.

are projected for imports of lamb and mutton, barley, rye, oats, rice, and sugar. Exports of livestock and livestock products, corn, wheat, rice, soybeans, vegetables, fruit, cotton, and tobacco are projected to increase by 1980.

The national requirements for major food and fiber crops (Table 19-86) were estimated as the sum of domestic consumption, other domestic uses, and export requirements. Domestic consumption was calculated as the product of the population estimates times the estimated per capita consumption levels. The projected continued expansion of total population created a continued increase in domestic requirements for all commodities. This increase will be required even with important consumer taste-shifts among food groups. Nonfood uses of major crops were computed either on the population per capita consumption basis (flax, soybeans, cotton, and tobacco) or were taken from the data series of Daly and Egbert's work (see footnote "b" in Table 19-85). Detailed explanation of these levels of nonfood use may be found in the two publications referenced. Export requirements used are those shown in Table 19-85.

### (3) Livestock and Meat Product Requirements

The national requirements for major livestock and meat products (Table 19-87) were estimated as the sum of domestic food consumption and other domestic and export requirements. Domestic consumption was calculated by multiplying the population estimates by the per capita consumption estimates. Population increases will require ever higher levels of livestock production by 1980 except for a slight decrease in lamb. Export demand, likewise, will increase for all animal products except eggs. Other uses of livestock products (such as hatching eggs and milk for calves) will increase in proportion to the final products.

### (4) Great Lakes Basin Benchmark Requirements

National requirements based on the above assumption have been allocated to the major water resources regions. This provides a benchmark for each region that insures a degree of consistency between regional and national projections. Regional production requirements are based on an analysis of historical production patterns. These patterns were projected to 1980. Very little change in the production patterns between regions was projected beyond 1980 due to data limitations.

The projected national agricultural product requirements allocated to the Great Lakes

TABLE 19-85 Imports and Exports of Major Farm Products, United States

Commodity	Millions of Pounds			
	Actual: 1959-61 <sup>a</sup>		Projected: 1980 <sup>b</sup>	
	Imports	Exports	Imports	Exports
Beef and Veal (carcass weight)	959	56	1,850	150
Pork (excluding lard, carcass weight)	186	140	275	225
Lamb and Mutton (carcass weight)	97	2	43	2
Chickens (ready-to-eat)	0	190	0	290
Turkeys (ready-to-eat)	0	21	0	40
Eggs (million dozen)	24	564	12	360
Milk (fat solids basis)	647	1,153	871	4,539
Corn	56	14,728	56	40,880
Oats	48	947	0	800
Barley	835	4,618	70	4,410
Sorghum	0	5,005	0	11,061
Wheat	420	38,842	480	66,000
Rye	140	381	50	390
Rice (rough)	40	3,120	20	5,180
Flaxseed	0	313	0	280 <sup>c</sup>
Soybeans	0	8,492	0	25,000
Peanuts (farm stock)	1	70	1	50 <sup>c</sup>
Sugar (raw equivalent)	11,478	106	10,300 <sup>d</sup>	106 <sup>c</sup>
Dry Beans	9	237	18 <sup>d</sup>	378
Dry Peas	0	205	0	322
Potatoes	70	390	120	340
Sweet Potatoes	0	7 <sup>c</sup>	0	7 <sup>e</sup>
Vegetables and Melons (fresh basis)	890	1,280	1,200	2,500
Citrus Fruit (fresh basis) <sup>f</sup>	122	1,789	158	2,194
Noncitrus Fruit (fresh basis) <sup>f</sup>	4,778	1,651	6,142	2,026
Tree Nuts (shelled)	236	26	322 <sup>g</sup>	87 <sup>g</sup>
Cotton	75	3,122	100	3,500
Tobacco (farm weight basis)	162	493	211 <sup>h</sup>	572 <sup>h</sup>

<sup>a</sup>U.S. Department of Agriculture, Agricultural Statistics: 1965.

<sup>b</sup>R.F. Daly and A.C. Egbert, "A Look Ahead for Food and Agriculture." Agricultural Economics Research, Vol. XVIII, Jan. 1966; and Statistical Supplement; unless noted.

<sup>c</sup>Unpublished data, USDA, ERS, Econ. and Stat. Anal. Div., mimeo., 12/2/64.

<sup>d</sup>Used same percent change in imports from 1959-61 as Daly and Egbert.

<sup>e</sup>Inadequate data for projection, held at 1959-61 level.

<sup>f</sup>Distribution of total fruit to citrus and noncitrus based on 1959-61 ratios.

<sup>g</sup>Straight-line trend; imports,  $T = 372 + 5.4 (X)$  (origin 1957); exports,  $T = 32 + 2.4 (X)$  (origin 1957).

<sup>h</sup>Projected from the estimated rates of change in tobacco trade by W.M. West, Foreign Supply and Demand Projections; Outlook for U.S. Agricultural Exports; USDA, ERS, FRAD, (Paper presented at the Annual Meeting of the American Farm Economics Assn., College Park, Md., 8/23/66)

TABLE 19-86 Crop Requirements with Indexes of Production Requirements, United States and Great Lakes Basin

Commodity and Area	Unit	Estimated 1959-61 Average	Requirements (Thousand Units)			Index of Production (1959-61 = 100)			
			1980	2000	2020	1959-61	1980	2000	2020
<b>Corn:</b>									
United States	Bu.	3,786,070	5,053,570	6,371,426	7,942,856	100	133	168	210
Great Lakes Basin		298,857	383,357	506,679	675,071	100	128	170	225
<b>Oats:</b>									
United States	Bu.	1,072,937	1,112,500	987,500	687,500	100	104	92	64
Great Lakes Basin		142,000	154,375	143,500	105,813	100	109	101	75
<b>Barley:</b>									
United States	Bu.	416,458	512,500	508,333	458,333	100	123	122	110
Great Lakes Basin		5,917	5,917	6,042	5,625	100	100	102	95
<b>Wheat:</b>									
United States	Bu.	1,237,700	1,873,600	2,127,500	2,458,600	100	151	172	199
Great Lakes Basin		74,400	96,400	111,800	133,600	100	130	150	180
<b>Rye:</b>									
United States	Bu.	27,868	41,400	54,100	71,800	100	148	194	258
Great Lakes Basin		1,945	1,902	2,516	3,386	100	98	129	174
<b>Soybeans:</b>									
United States	Bu.	589,257	1,268,900	1,531,900	1,860,900	100	215	260	316
Great Lakes Basin		50,045	107,440	135,048	174,176	100	215	270	348
<b>Potatoes:</b>									
United States	Cwt.	265,609	319,100	420,600	551,200	100	120	158	208
Great Lakes Basin		20,225	21,180	28,988	40,404	100	105	143	200
<b>Sugar:<sup>1</sup></b>									
United States	Ton	3,290	7,300	11,400	16,500	100	222	346	500
Great Lakes Basin		1,598	3,218	5,279	8,177	100	201	330	512
<b>Dry Edible Beans:</b>									
United States	Cwt.	19,048	22,900	28,900	36,600	100	120	152	192
Great Lakes Basin		7,713	11,376	15,029	20,171	100	147	195	262
<b>Noncitrus Fruit:</b>									
United States	Tons	9,952	12,600	17,200	22,900	100	127	173	230
Great Lakes Basin		1,105	1,457	2,097	2,996	100	132	190	271
<b>Vegetables:</b>									
United States	Cwt.	403,902	615,900	801,800	1,034,600	100	152	198	256
Great Lakes Basin		46,093	72,380	99,295	137,171	100	157	215	298

<sup>1</sup>United States requirement is in tons of raw sugar. Great Lakes requirement is in tons of sugar beets.

Basin are shown in Tables 19-86 and 19-87. Production requirements increase absolutely for all crops in the Basin except for oats. The Basin's requirements increase faster than the national requirements for corn, oats, soybeans, sugar beets, dry edible beans, fruits, and vegetables. This reflects a historical share as well as the expectation of relatively larger future shares. Production of all livestock products except eggs increases relatively faster within the Basin than for the entire nation. As mentioned previously, national requirements are based on Series C population projections. Regional shares were allocated to hydrologic areas. The area encompassed by the planning subarea boundaries of the Great Lakes is considerably larger than the hydrologic area, particularly in Planning Subarea 2.2. Basin requirements were adjusted to reflect the productivity from this additional acreage. Those used are based on Series B population projections. This series assumes a higher fertility rate than Series C, and results in greater national and regional requirements.

### 3.3 Agricultural Characteristics of the Basin

#### 3.3.1 Climate and Topography

The Basin was formed by glaciation and weathering. It is characterized by low relief with the exception of the Adirondack range on its eastern boundary.

The climate of the Great Lakes Basin is moderated considerably by the presence of the Lakes. Average annual temperatures for 74 years of record range from 39°F on Lake Superior to 49°F on Lake Erie. Mean annual precipitation for the period of record is approximately 31 inches. There is little variation in the mean annual precipitation throughout the Basin, although some local variations do occur. The mean annual snowfall varies over the Basin from approximately 30 inches in the south central area to approximately 150 inches in the higher elevations of the north and east. Average annual runoff varies in the Basin from 8.5 inches in the eastern portions

**TABLE 19-87 Livestock and Livestock Product Requirements with Indexes of Production Requirements, United States and Great Lakes Basin**

Product and Area (Liveweight basis)	Estimated 1959-61 Average	Requirements (Million Pounds) <sup>1</sup>			Index of Production (1959-61 = 100)			
		1980	2000	2020	1959-61	1980	2000	2020
<b>Beef and Veal:</b>								
United States	28,899	47,506	60,588	79,506	100	164	210	275
Great Lakes Basin	1,393	2,169	2,974	4,135	100	156	213	297
<b>Lamb and Mutton:</b>								
United States	1,683	1,630	2,160	2,831	100	97	128	168
Great Lakes Basin	55	53	74	104	100	96	134	189
<b>Pork:</b>								
United States	20,220	25,947	33,990	44,056	100	128	168	218
Great Lakes Basin	932	1,277	1,763	2,446	100	137	189	262
<b>Farm Chickens:</b>								
United States	1,252	1,396	1,824	2,362	100	115	146	189
Great Lakes Basin	83	86	118	163	100	103	142	196
<b>Broilers:</b>								
United States	6,207	10,263	13,293	17,094	100	165	214	275
Great Lakes Basin	93	88	117	161	100	95	126	173
<b>Turkeys:</b>								
United States	1,601	3,419	4,448	5,746	100	214	278	359
Great Lakes Basin	77	155	213	294	100	201	277	382
<b>Milk:</b>								
United States	123,461	139,372	181,490	234,266	100	113	147	190
Great Lakes Basin	20,365	23,343	31,974	44,130	100	115	157	217
<b>Eggs:<sup>2</sup></b>								
United States	62,302	72,613	95,251	123,886	100	117	153	199
Great Lakes Basin	4,695	4,766	6,556	9,105	100	102	140	194

<sup>1</sup>Projected requirements are preliminary.

<sup>2</sup>Requirements expressed as millions of eggs.

of Michigan's Lower Peninsula to 19.2 inches in New York.

### 3.3.2 A General Description of Agriculture in the Great Lakes Basin

The agriculture sector of the Great Lakes Basin economy supplies food and food products as well as labor to major urban and industrial centers of the nation. It also is a market for the products of these centers.

The Basin contains approximately 15 percent of the nation's population and occupies only 4 percent of the land area. The resulting population density is four times the national average, reflecting population centers such as Detroit, Chicago, Milwaukee, and Cleveland. Associated with the population concentration is an industrial concentration employing 25 percent of the nation's manufacturing work force.

In 1960 the Basin farm labor force was 296,000. It supported a rural farm population of 1,144,000 and produced farm products that sold for \$2.7 billion. Some indicators of the relative importance of agriculture in the Basin as compared to the entire nation appear in Table 19-88.

**TABLE 19-88 Great Lakes Basin Share of United States Total (Selected Characteristics)**

Characteristic	Percent of Total U.S.
Number of farms	7.7
Number of dairy farms	19.0
Number of commercial vegetable farms	15.0
Number of fruit farms	13.0
Land in farms	3.3
Value of farm products sold	6.7
Rural farm population	8.0
Agricultural employment	7.0
Farmers working off-farm	8.5

Source: U.S. Department of Commerce, Agricultural Census 1964

A distinguishing characteristic of the Great Lakes Basin's agricultural economy is the industrial alternatives for off-farm employment. In 1964, 41 percent of the Basin's farmers reported some form of off-farm employ-

ment. Roughly 123,600 reported some off-farm work, while 95,000 reported off-farm employment of 100 days or more. With seven percent of the U.S. agricultural employment, the Basin has 8.5 percent of all farmers reporting some off-farm employment and 9.4 percent of those working 100 days or more off the farm.

The national trend from 1954 to 1964 was a decrease in farm numbers and an increase in farm acreage. The Basin is following this trend, although at a slower pace. The number of farms in the Basin declined approximately 32 percent, from 357,863 to 243,070. The decrease for the nation was 34 percent, from 4,782,400 to 3,157,900. Average farm size in the Basin increased 25.6 percent, from 121 to 152 acres. For the nation the increase was 45 percent, from 242 to 352 acres.

While farms in the Basin are smaller on the average than the U.S. average, they represent a greater per acre investment in land and buildings. The average value of investment per acre is approximately \$260, 80 percent higher than the U.S. average. It should be noted, however, that within the Basin this average ranges from approximately \$65 per acre in the northern areas to nearly \$500 in the areas near urban areas.

The decline in the Basin's farm population has been less than that found in the rest of the nation. In 1954, 7.1 percent of the U.S. rural farm population lived in the Basin. In 1964 this had increased to 8.5 percent, indicating that the rate of farm consolidation and off-farm migration was relatively greater in other regions. The industry of the Basin relative to other regions offers more off-farm employment to supplement farm incomes. This allows individuals to remain on the farm.

The Region is quite diverse agriculturally. Its types of agricultural products suggest proximity to large urban markets as well as comparative advantage for specific types of production. Major dairy areas are located in Wisconsin and New York. Feed grain and livestock production are important in southern Michigan, Ohio, Illinois, and Indiana. Fruit and commercial vegetables are important in areas of Wisconsin, Michigan, Ohio, and New York. Small grain and timber production contribute significantly to the economy of the northern portions of the Basin.

### 3.3.2.1 Major Land Use

The rate of loss of agricultural land compared to other uses has been greater within

the Basin than the entire country. This reflects the population pressures of the area. Between 1954 and 1964 land in farms within the Basin decreased 15 percent, which contrasted with a national decline of 5 percent. The Basin's total land in farms in 1964 was approximately 37 million acres, 3.3 percent of the U.S. total.

Comparative uses of farmland are reflected in Table 19-89. In general the Basin makes more intensive use of farmland than does the nation because of the Basin's favorable climatic and soil conditions.

### 3.3.2.2 Types of Farms

Farm type classifications are based on sales of a particular product or group of products amounting to 50 percent or more of the total value of all farm products sold by that farm during a year. The relative importance of the various types of farms in the Basin and the United States is shown in Table 19-90. Thirty percent of Basin farms are classified as dairy farms.

### 3.3.2.3 Distribution by Farm Size

As noted previously, average farm size in the Basin is smaller than that for the United States. Only a small percentage of farms in the Basin have 500 acres or more. Approximately 85 percent are less than 260 acres (Table 19-91).

### 3.3.2.4 Value of All Farm Products Sold

Although the number of farms and the land in farms is decreasing, the value of farm products sold is increasing. Between 1954 and 1959 the value of products sold increased 32 percent from \$1.8 to \$2.4 billion. The comparable increase for the U.S. was 43 percent, from \$24.6 to \$35.3 billion. These increases reflect increased production per acre, improved markets for agricultural products, and an increase in the general price level.

Great Lakes Basin livestock and livestock product sales are more important to the nation than crop sales. Livestock accounted for 59 percent of the value of farm products sold and crops accounted for 41 percent in both 1954 and 1964. Livestock has become increasingly important for the entire United States. It has increased from 50 percent in 1954 to 53 percent in 1964.

TABLE 19-89 Comparative Distribution of Land in Farms, Great Lakes Basin and United States

Land Use	Percent of Total Land in Farms	
	Basin	U.S.
Cropland harvested	53.0	25.8
Woodland not pastured	10.6	5.7
Idle cropland	8.9	8.1
Cropland pastured	7.5	5.2
Other land	7.5	3.6
Other pasture	6.4	44.2
Woodland pasture	<u>6.1</u>	<u>7.4</u>
	100.0	100.0

Source: U.S. Department of Commerce, Agricultural Census 1964

Dairy sales are the most important source of revenue for Basin farmers. They comprised 33 percent of the entire value of farm products sold in 1964, and represented 57 percent of the livestock and livestock products sales. In contrast, dairy sales make up less than 13 percent of all farm products sold in the nation and less than 25 percent of livestock and livestock products sales for the United States.

Planning Subarea 4.2 had the largest volume of sales in 1964 with 16.5 percent of the Basin total. The relative shares of all planning subareas are listed in Table 19-92. Differences reflect both the intensity of production and the physical size of the regions.

### 3.3.2.5 Average Size and Value of Farms

Farm size and value both increased from 1954 to 1964. Average farm size in the Basin was 152 acres in 1964, an increase of 26 percent over 1954. This compares with a national average of 352 acres, an increase of 45 percent. Between 1954 and 1964, the average value of land and buildings on each farm increased 100 percent in the Basin and 150 percent in the nation. The 1964 average value per farm for the Basin was \$39,581 compared to \$50,646 for the United States.

TABLE 19-90 Comparative Distribution of Total Number of Farms by Type of Farm, Great Lakes Basin and United States

Type of Farms	Percent Distribution	
	Basin	U.S.
Misc. & unclassified, & other <sup>1</sup>	32.1	19.1
Dairy	29.8	16.9
Cash grain	16.0	18.7
Other livestock	8.6	26.9
General	6.2	9.3
Fruits and nuts	3.0	2.6
Poultry	2.1	3.8
Vegetable	1.5	1.1
Other field crops	<u>0.7</u>	<u>1.6</u>
	100.0	100.0

<sup>1</sup>Miscellaneous and unclassified farms includes farms producing nursery and greenhouse products. It also includes farms specializing in forest products and horticultural specialty crops, as well as farms with no value of farm products sold. Other farms consist of tobacco and cotton farms, not found within the Basin with the exception of a few tobacco farms in Subarea 2.1.

Source: U.S. Department of Commerce, Agricultural Census, 1964

TABLE 19-91 Comparative Distribution of Number of Farms by Size of Farm, Great Lakes Basin and United States

Size	Percent of all Farms	
	Basin	U.S.
1- 99 acres	43.2	43.1
100-259 acres	41.9	31.3
260-499 acres	12.2	14.3
500+ acres	<u>2.7</u>	<u>11.3</u>
	100.0	100.0

Source: U.S. Department of Commerce, Agricultural Census, 1964

**TABLE 19-92 Planning Subarea Share of Value of Farm Products Sold, Great Lakes Basin**

Planning Subarea	Percentage Share
4.2	16.5
2.3	16.0
2.2	13.3
2.1	12.0
5.2	7.9
3.2	7.8
4.1	6.4
4.4	4.7
5.1	4.4
4.3	3.3
2.4	3.1
5.3	2.7
3.1	0.9
1.1	0.7
1.2	0.3

Source: U.S. Department of Commerce  
Agricultural Census, 1964

### 3.3.2.6 Commercial Farms by Economic Class

A major subcategory of the total number of farms is the number of commercial farms, those with sales of \$2,500 or more. These farms produce the bulk of food and fiber products. In 1964, 70 percent of all Basin farms were classified as commercial. The majority of commercial farms in the Basin (88 percent) fall in Classes II through V—\$2,500 to \$39,999 of sales. Only four percent have sales of \$40,000 or more.

### 3.3.2.7 Commercial Fertilizer Used

The trend in the Basin has been toward applying more fertilizer on fewer acres. Tonnage applied increased nine percent from 1954 to 1964, when 1,799,000 tons were applied. Total acres receiving fertilizer declined during the same period, but the share of harvested acres receiving fertilizer increased from 54 percent in 1954 to 59 percent in 1964. Average application rates increased from 280 pounds to 310 pounds per acre.

### 3.3.2.8 Irrigated Acreage

There are relatively few irrigated acres in the Basin because of general adequacy of an-

nual precipitation. Irrigation is concentrated primarily on intensively produced specialty crops, such as vegetables and fruits where high crop value justifies frost protection and controlled water applications. Only 30 acres per farm on an average required irrigation in the Basin as compared with 125 acres per farm for the United States. Irrigated acreage more than doubled from 1954 to 1964, yet it still amounted to only a fraction of cropland harvested—approximately 113,000 of 19.5 million acres, or less than a tenth of one percent.

### 3.3.2.9 Crop Production

Crops grown within the Basin reflect varying climate and soil types, as well as a varying degree of intensity. Hay crops cover the largest acreage, 5.5 million acres, followed closely by corn for grain with 4.3 million acres. Small grains account for another 4.4 million acres. The relative share of the Basin production of field crops is shown in Table 91-93. The shares reflect the Basin's support of livestock enterprises, particularly dairy production. Climatic conditions are largely responsible for the concentration of dry field beans, particularly in Planning Subarea 3.2.

#### (1) Corn for Grain

Production in 1964 from 4.3 million acres was 284 million bushels, 8.5 percent of U.S. production. Between 1954 and 1964, yield increases more than offset acreage declines so that total production increased. Corn acreage in the Basin decreased by only three percent compared to 20 percent for the United States. Production increased 15 percent for the Basin and 29 percent for the United States. In 1964 yields within the Basin were 65.5 bushels per acre and 62.5 for the United States. Planning Subareas 4.2 and 2.2 are the most important regions, with 29 percent and 25 percent of the Basin's production.

#### (2) Corn Silage

Important in both dairy and beef rations, 12.4 million tons of silage were produced from 1.1 million acres in 1964. Acreage in the Basin was relatively constant from 1954 to 1964, while it increased by 21 percent for the entire nation. Yields in the Great Lakes area equalled 11.4 tons per acre, while the national average was 9.5 tons per acre. Production is concentrated in Planning Subareas 2.1 (25 percent), 2.2 (13 percent), and 2.3 (13 percent).

#### (3) Wheat

Although there was a seven percent decline in the nation's wheat acreage from 1954 to 1964, Basin acreage remained constant at ap-

TABLE 19-93 Great Lakes Basin Share of United States Production of Selected Crops

Crop	Percent of Total U.S.
Dry field beans	49.6
Corn silage	15.7
Oats	14.7
Alfalfa	12.7
All hay	10.3
Potatoes	8.7
Corn, grain	8.5
Sugar beets	7.2
Soybeans	6.8
Wheat	6.8
Rye	5.8
Barley	0.1

Source: Department of Commerce  
Agricultural Census, 1964

proximately 2.1 million acres. Average yields in the Basin are 40 percent greater than for the entire nation. The Basin's average is 36 bushels compared to the nation's 25 bushels. The important wheat producing planning subareas are 4.2, 2.3, 3.2, and 4.1, with 29 percent, 22 percent, 15 percent, and 10 percent of 1964 production.

#### (4) Oats

Oats are important in both the Basin and the United States. Yields have been increasing, but acreage decreased 40 percent for the Region and 50 percent for the nation between 1954 and 1964. The Basin produced yields of 53 bushels per acre in 1964 compared to 43 bushels per acre for the entire country. Oat production is concentrated in the milk and livestock producing areas, Planning Subareas 2.1, 4.2, 2.2, and 2.3, which produced 27 percent, 13 percent, 11 percent, and 12 percent of the Basin's output in 1964.

#### (5) Barley

Barley, like oats, is declining in importance. Basin yields are higher than the United States, 45 bushels compared to 37 bushels. Acreage is decreasing for the United States as well as the Basin, but the rate of decrease from 1954 to 1964 was much faster for the Basin, 66 percent as compared with 22 percent for the

United States. Production has decreased 56 percent for the Basin, while the U.S. production has increased two percent. Production in 1964 was greatest in Planning Subareas 2.2, 2.3, 3.2, and 2.1, with 22 percent, 21 percent, 13 percent, and 11 percent of Basin output.

#### (6) Rye

Rye is another small grain declining in importance. In the Basin acreage has decreased by 33 percent and production has decreased by four percent from 1954 to 1964. The average yield in 1964 was 25 bushels for the Basin, compared with 19 bushels for the United States. Planning subareas with the greatest production were 2.3 and 4.2, with 25 percent and 15 percent of the total output.

#### (7) Soybeans

Soybeans have been increasing in importance in both the Basin and the United States. Acreage has increased 61 percent in the Basin and 81 percent in the United States. Production has increased 57 percent in the Basin and 107 percent in the United States. Average yields for the Basin and the United States were the same in 1964 (23 bushels per acre).

Basin production accounts for seven percent of the nation's total. Most of the production comes from Planning Subarea 4.2, with approximately 58 percent of both acreage and production. Planning Subarea 2.2 is second in importance with 22 percent of the acreage and production.

#### (8) Hay

Total acreage of hay crops decreased 16 percent in the Basin (to 5.5 million acres) and eight percent in the U.S. between 1959 and 1964. Production remained constant at 11.5 million tons in the Basin but increased 10 percent in the U.S. There has been a shift from lower to higher quality hay. Production of alfalfa and alfalfa mixtures increased 20 percent compared to a decrease of 43 percent in clover-timothy production. Alfalfa and alfalfa mixtures represent 75 percent of total hay production. This is up from 62 percent in 1954 and higher than the 61 percent share for the entire U.S. Alfalfa and alfalfa mixture yields have increased to approximately 2.4 tons per acre (1964) in both the U.S. and the Basin.

Clover and timothy and their mixtures are decreasing in the Basin and the U.S. in both acreage and production. In the Basin they are decreasing twice as fast as in the entire U.S. Some of the decrease in clover and timothy is being replaced by other hays. These are small grain hays, wild hay, lespedeza, and various other hays. While other hays are decreasing in

acreage for the U.S. and only slightly increasing in production, both acreage and production are increasing in the Basin.

#### (9) Dry Edible Beans

The Great Lakes Basin is rapidly becoming the most important bean producing area in the United States. In 1964 it produced 50 percent of the nation's output. Acreage increased 18 percent and production increased 28 percent between 1959 and 1964. The yields for the Basin and the U.S. are approximately the same, 13 hundredweight (cut) per acre. Planning Subarea 3.2, particularly the Saginaw Valley, produces two-thirds of the Basin's and one-third of the U.S. output of dry edible beans.

#### (10) Sugar Beets

Sugar beet acreage has increased 24 percent in the Basin and 59 percent in the U.S., while production has increased 61 percent in the Basin and 70 percent in the nation. Basin yields have been increasing at a more rapid rate than for the nation, but at 15 tons per acre they remain one ton less. Production is greatest in Planning Subarea 3.2, which produces 64 percent of the Basin total. Planning Subarea 4.2 is also important, with 23 percent of the Basin production.

#### (11) Fruit and Vegetable Production

The concentration of fruit and commercial vegetable production within the Basin is a result of the proximity of large urban markets and the availability of organic and lake plain soils and favorable climatic conditions. Fruit growing is concentrated in regions of western Michigan and New York where the westerly winds from Lakes Michigan, Erie, and Ontario temper the severity of winter temperatures.

#### (12) Fruit

Land in fruit-bearing and non-fruit-bearing orchards and vineyards in the Basin decreased eight percent to approximately 348,000 acres from 1954 to 1964. During the same period the U.S. area increased by five percent. In 1964, 90 percent of the nation's sour cherry production came from the Basin. Other important crops and their share of total national production were sweet cherries, 35 percent; apples, 23 percent; pears, 7 percent; grapes, 5 percent; and peaches, 4 percent. Important fruit producing planning subareas are PSA 2.3, with 32 percent of the acreage; PSA 2.4, with 21 percent; PSA 4.4, with 14 percent; and PSA 5.2, with 14 percent.

#### (13) Commercial Vegetables

The Basin, which is important in commercial vegetable production, encompasses approximately 13 percent of the total U.S. vege-

**TABLE 19-94 Great Lakes Basin Share of Total United States Production of Livestock and Livestock Products**

Item	Percent of Total U.S.
Value of livestock & livestock products	7.4
No. of milk cows	15.3
Pounds of milk sold	18.4
No. of cattle sold	4.2
No. of calves sold	5.0
No. of hogs & pigs sold	5.2
No. of sheep & lambs sold	2.7
Dozens of eggs sold	7.1
No. of broilers sold	0.6
No. of hens & roosters sold	7.0

Source: U.S. Department of Commerce, Agricultural Census, 1964

table acreage. Relatively large shares of the 1964 national acreage of the following vegetables were in the Basin: cucumbers and pickles, 33 percent; snapbeans, 30 percent; cabbage, 21 percent; dry onions, 18 percent; sweet corn, 17 percent; and green peas, 16 percent. Much of the commercial vegetable production is sold on the fresh market, but the processing industry provides the largest market for tomatoes, sweet corn, and green peas.

Acreage of commercial vegetables in the Basin has remained fairly constant at 435,000 acres. In the U.S. it decreased by 11 percent. In the Basin the major vegetable grown is sweet corn, which makes up 21 percent of the vegetable acreage. Following in importance are snapbeans (19 percent), green peas (15 percent), tomatoes (11 percent), cabbage, onions and asparagus (11 percent), and cucumbers and pickles (8 percent).

Important vegetable producing planning subareas include PSAs 2.1, 5.2, 2.2, and 2.3, with respective shares of Basin acreage in commercial vegetables of 26 percent, 11 percent, 10 percent, and 10 percent.

#### 3.3.2.10 Livestock Production

Although all types of livestock are produced in the Basin, the greatest relative share of U.S. production is milk production (Table 19-94).

(1) Cattle and Calves

The trend in the sale of cattle and calves from 1954 to 1964 reflects an increase in general beef production but a decline in the number of dairy cattle. The number of cattle sold increased 26 percent, but calf sales, coming largely from dairy herds, declined 4 percent. On the national level there was a 43 percent increase in the number of cattle sold, and a 41 percent increase in calves sold.

Number of cattle sales in 1964 originated primarily in the feed grain areas, Planning Subarea 4.2 (19 percent), Planning Subarea 2.2 (17 percent), Planning Subarea 2.3 (16 percent), and Planning Subarea 2.1 (11 percent). Calf sales were high in the dairy areas, Planning Subarea 2.1 (23 percent), Planning Subarea 5.2 (11 percent), Planning Subarea 2.2 (12 percent), and Planning Subarea 2.3 (11 percent).

(2) Milk

Milk production in the Basin is very important, both in terms of the nation's share and in Basin farm income. Nearly 20 percent of the nation's production originated in the Basin in 1964, providing 33 percent of the total dollar value of farm products sold.

In line with a national trend, the number of cows declined while production per cow rose to net an increase in total milk production. Average 1964 production per cow was greater in the Basin than for the United States (8,875 pounds compared to 7,350 pounds).

The bulk of 1964 Basin production came from four planning subareas: Planning Subareas 2.1, 2.3, 5.1, and 2.2. They supplied 25, 12, 11, and 10 percent of the Basin's production.

(3) Hogs and Pigs

The Basin produces approximately five percent of the nation's hogs and pigs. The location of production is tied closely to feed grain producing areas. Planning Subarea 4.2 markets the largest quantity of animals, approximately 31 percent of Basin sales. Other important planning subareas are Planning Subareas 2.3, 2.2, and 2.1, which produce 24, 17, and 15 percent of the Basin's production.

(4) Sheep and Lambs

Sheep and lambs sold in the Basin represent only three percent of the U.S. total. Sheep and lamb sales in the Basin declined 13 percent between 1954 and 1964 while national sales remained constant. Planning Subareas 4.2 and 2.3, with 31 percent and 25 percent of sales, are large producers.

(5) Poultry and Poultry Products

In contrast to increases in all types of poultry production in the nation, only turkey pro-

duction and egg sales have been increasing in the Basin. Planning Subareas 2.3 and 4.2 are the major poultry producers.

### 3.3.3 Agriculture in the Planning Subareas

The characteristics of agriculture in the 15 planning subareas differ for a variety of reasons. Some are related to climatic and topographical variance. Others are related to historical settlement patterns. Some differences are due to the variance among the planning subareas in area size. Tables 19-95 through 19-97 relate specific agriculture characteristics in the Great Lakes Basin to those of the total United States. The succeeding paragraphs and tables relate agricultural characteristics of the respective planning subareas to each other and to the Basin total.

#### 3.3.3.1 Planning Subarea 1.1

Planning Subarea 1.1 contains four Minnesota and four Wisconsin counties located around the west end of Lake Superior. This planning subarea ranks twelfth among Great Lakes planning subareas in population. The major cities are Duluth, Minnesota, and Superior, Wisconsin.

Soil and climatic conditions limit the PSA's agricultural productivity. The main agricultural emphasis is on livestock, especially dairy cattle. Farms in Planning Subarea 1.1 are large, but they have the lowest value in land and buildings of any Basin planning subarea. Although Planning Subarea 1.1 is twelfth in total land in farms, it is fourteenth in the value of farm products sold.

Tables 19-98, 19-99, and 19-100 provide selected planning subarea characteristics and their relation to the Basin total.

#### 3.3.3.2 Planning Subarea 1.2

This planning subarea consists of the northern part of Michigan's Upper Peninsula and borders Lake Superior. As in PSA 1.1, this area has severe soil and climatic limitations. Its sparse population is the second lowest in the Basin. It has the fewest number of farms and the least amount of land in farms of any Basin planning subarea, as well as the lowest value of farm output. Few crops are grown, with most farm sales coming from livestock.

Tables 19-101, 19-102, and 19-103 provide

selected planning subarea characteristics and their relation to the Basin total.

### 3.3.3.3 Planning Subarea 2.1

Planning Subarea 2.1 is the third largest and ninth most populous planning subarea. It borders Lake Michigan and includes most of eastern Wisconsin, where the PSA's major city, Green Bay, is located. Agriculture is important to the region's economy. The planning subarea is the largest producer of dairy products and related feed crops of silage, hay, and oats, while also leading in pasture acreage. PSA 2.1 farmers sold the most calves. Value of livestock and forest products sold ranked first in the Basin. In addition to dairy and related production, PSA 2.1 is important in vegetable production. Major vegetables are sweet corn, cabbage, and green peas.

Tables 19-104, 19-105, and 19-106 list selected planning subarea characteristics and their relation to the Basin total.

### 3.3.3.4 Planning Subarea 2.2

This PSA, the most populous and industrialized of the planning subareas, includes the megalopolis extending through Milwaukee, Chicago, and the steel centers of northern Indiana.

It is important agriculturally, ranking fourth in land in farms and third in value of farm products sold. Farms in the area are of average size for the Basin—161 acres. However, they are the highest in value of any in the Region. This reflects both the influence of urbanization on land values and the high agricultural quality of land in the area. Cash grain and dairy farms predominate. The dairy farms are located more in the northern portions while the cash grain farms are in the southern portions. Sizeable acreages in vegetables supply the needs of the metropolitan areas.

This planning subarea has the largest number of regular farm workers, reflecting the size and intensity of the operations.

Tables 19-107, 19-108, and 19-109 provide selected planning subarea characteristics and their relation to the Basin total.

### 3.3.3.5 Planning Subarea 2.3

This planning subarea, which extends over

much of southwest Michigan and northern Indiana, is the fourth most populous area. It includes such trade and manufacturing centers as Lansing, Grand Rapids, Kalamazoo, and South Bend. The fact that these centers provide employment for farmers is indicated by the fact that this area is first in the number of farmers working off the farm. It is also first in rural, nonfarm population.

Agriculturally this planning subarea is very important. It contains the largest share of land in farms in the Basin (15 percent) and has the largest number of farms. It also has the largest number of commercial farms, and in value of farm products sold it is second only to Planning Subarea 4.2. This planning subarea ranks first in acreage of fruits and commercial vegetables. It is also first in irrigated farms and acreage. Thirty-four percent of the farms having irrigation in 1964 were in PSA 2.3. This accounted for 30 percent of the irrigated acreage.

Livestock production is also important in Planning Subarea 2.3, which is second in dairy production and first in poultry production.

Tables 19-110, 19-111, and 19-112 provide selected planning subarea characteristics and their relation to the Basin total.

### 3.3.3.6 Planning Subarea 2.4

Planning Subarea 2.4 is in Michigan's northwest Lower Peninsula and southern Upper Peninsula. The planning subarea ranks eighth in size and eleventh in value of farm products sold.

Because of soil and climatic factors, production of field crops is limited. The PSA is important in fruit and forest products production, however. It produced 66 percent of the Basin's sweet cherry production in 1964, and 11 percent of the forest products sold.

Tables 19-113, 19-114, and 19-115 provide selected planning subarea characteristics and their relation to the Basin total.

### 3.3.3.7 Planning Subarea 3.1

Planning Subarea 3.1, which borders Lake Huron in the northeast Lower Peninsula of Michigan, has the lowest population of all the planning subareas. Farms are large and principally livestock enterprises. Major field crops are hay, small grains, and potatoes.

Tables 19-116, 19-117, and 19-118 provide

selected planning subarea characteristics and their relation to the Basin total.

#### **3.3.3.8 Planning Subarea 3.2**

Planning Subarea 3.2 is located in central-eastern Michigan. This PSA ranks eighth in the Basin in population and has Michigan's third and fifth largest cities, Flint and Saginaw. The planning subarea ranks fifth in land area and sixth in total value of farm products sold. Cash grain and other field crop farms predominate, although livestock sales account for 40 percent of farm products sold. Important crops are dry field beans, sugar beets, and potatoes. The planning subarea not only leads the Basin in dry field beans production but produces one-third of the field beans for the entire nation.

Tables 19-119, 19-120, and 19-121 provide selected planning subarea characteristics and their relation to the Basin total.

#### **3.3.3.9 Planning Subarea 4.1**

Planning Subarea 4.1 in southeastern Michigan contains the Basin's second largest city, Detroit. The PSA ranks seventh in area and value of farm output, but second in population. Agricultural production in this area is geared to providing dairy products, vegetables, and fruits to the urban market. In addition, sizeable amounts of field crops are produced.

Tables 19-122, 19-123, and 19-124 provide selected planning subarea characteristics and their relation to the Basin total.

#### **3.3.3.10 Planning Subarea 4.2**

Located mostly in northwestern Ohio and northeastern Indiana, Planning Subarea 4.2 ranks second in area and sixth in population. Agriculturally it is the most important of all planning subareas. It is first in terms of value of farm products sold and acres of cropland harvested.

Planning Subarea 4.2 leads the Basin in several areas of crop production. It has the most cash grain farms and produces the largest amounts of corn, wheat, and soybeans. The planning subarea ranks second in acreage and production of oats, rye, and sugar beets. Also, commercial vegetable production, especially tomato production, is important.

The planning subarea ranks second in the sale of livestock and livestock products. It is first in sales of cattle, hogs and pigs, and sheep and lambs.

Tables 19-122, 19-123, and 19-124 provide selected planning subarea characteristics and their relation to the Basin total.

#### **3.3.3.11 Planning Subarea 4.3**

This planning subarea, in northeast Ohio, includes the metropolitan Cleveland and Akron area and ranks third in population. Agriculture is overshadowed by industrial and urban growth. It ranks thirteenth in terms of land in farms and tenth in value of farm output sold. Average farm size is the smallest in the Basin, but the average value of farms is the fourth highest. This high valuation reflects the fact that this planning subarea is first in the value of nursery and greenhouse products sold.

Tables 19-128, 19-129, and 19-130 provide selected planning subarea characteristics and their relation to the Basin total.

#### **3.3.3.12 Planning Subarea 4.4**

Planning Subarea 4.4 is located in western New York and Erie County, Pennsylvania. It ranks seventh in farm population and includes Erie, Pennsylvania, and Buffalo, New York. It ranks eighth in value of farm output and ninth in land in farms. Farms are small with dairy products and fruits and vegetables as their most important enterprises. The most important vegetables are tomatoes and snap beans. The number of acres of orchards, groves, and vineyards is second highest in the Basin, with grapes, pears, and sweet cherries being the most significant crops.

Tables 19-131, 19-132, and 19-133 provide selected planning subarea characteristics and their relation to the Basin total.

#### **3.3.3.13 Planning Subarea 5.1**

Planning Subarea 5.1 is in northwest New York State, surrounding Rochester. The planning subarea ranks ninth in value of all farm products sold and tenth in size and population. Most farms are large and raise livestock. Dairy production is most important. As in PSA 4.4, vegetables are grown extensively. PSA 5.1 ranks second in production of cabbage

and onions and third in sweet corn. In the value of all commercial vegetables sold, Planning Subarea 5.1 is fifth.

Table 19-134, 19-135, and 19-136 provide selected planning subarea characteristics and their relation to the Basin total.

### 3.3.3.14 Planning Subarea 5.2

Planning Subarea 5.2 is found in the north central portion of New York, where the major city is Syracuse. The planning subarea has few cash grain farms but many dairy, poultry, and fruit farms. The most important agricultural activity is milk production. Planning Subarea 5.2 ranks second only to the milk production in Planning Subarea 2.1. The planning subarea also ranks second in calves produced, while rating high in various crops.

Other areas of agricultural importance are vegetable and fruit production. The planning subarea is first in snap beans grown and third in cabbage and onions. Apples and sweet cherries rate second in the Basin to Planning Subareas 2.3 and 2.4. Grapes and pears are also important.

Tables 19-137, 19-138, and 19-139 provide selected planning subarea characteristics and their relation to the Basin total.

### 3.3.3.15 Planning Subarea 5.3

Located in northern New York, Planning Subarea 5.3 is eleventh in land area and thirteenth in population. Population is sparse and there are no major cities. Most of the agriculture is extensive. Average farm size is the largest in the Basin, but average value per farm is thirteenth. PSA 5.3 ranks twelfth in value of farm products sold, 93 percent of which comes from livestock and livestock products, primarily dairy products, cattle, and calves.

Tables 19-140, 19-141, and 19-142 provide selected planning subarea characteristics and their relation to the Basin total.

## 3.4 Agricultural Production Potential

### 3.4.1 Agricultural Land Resource Base

The agricultural land resource is that acreage remaining in each projection period after removing estimated depletions for urban expansion and other nonagricultural uses. This

base defines the area physically available for meeting projected requirements for food and timber production.

The initial area in the agricultural resource base was that identified in the 1966-67 Conservation Needs Inventory. Adjustments to this base were made to account for projected requirements for urban, industrial, transportation, and land based recreational developments. These adjustments are based on a regression equation using variables projected by the U.S. Department of Commerce. Population, population change, and employment were among the more significant variables related to the expansion of urban and built-up areas. Intensive-use recreation land within urban areas is implicitly included in future projections of urban expansion. Additional recreation requirements in nonurban areas are assumed to be provided primarily from forested lands. Table 19-143 shows the urbanized area requirements and the remaining agricultural land resource base for each period. Estimates of actual land requirements are based on an analysis of the productive capacity of this base, in light of projected requirements for food and fiber. As Table 19-146 indicates, the resource base is more than adequate to meet food and feed requirements for all projection periods.

### 3.4.2 Production Technology

New technology during the past three decades has accounted for a major portion of increased agricultural output. Widespread use of mechanization, hybrid seed, pesticides, heavier applications of fertilizers, and improved strains of plants and livestock have enabled a steadily decreasing farm population to more than adequately feed an increasing U.S. population. Financial and technical assistance and educational programs to improve the managerial abilities of farm operators and to encourage them to use new technology have also been significant. For purposes of this study, production technology includes all output-increasing factors other than water resource development and major land use changes. It is both a substitute for and a complement to water resource development to meet food requirements.

#### 3.4.2.1 Future Technological Developments

Undoubtedly existing technology will be more widely employed to increase crop yields

*(continued on page 152)*

TABLE 19-95 Great Lakes Basin Total and Percent of United States Total—Acreage and Production of Principal Crops

	1954	1959	1964
Corn Grain--1000 Acres	4,454	4,852	4,334
Corn Grain Prod.--1000 Bushels	247,290	293,598	284,158
Percent of United States	9.46	7.94	8.45
Corn Silage--1000 Acres	1,118	987	1,093
Corn Silage Prod.--1000 Tons	9,999	10,546	12,442
Percent of United States	20.23	18.48	15.68
Wheat--1000 Acres	2,269	2,087	2,110
Wheat Prod.--1000 Acres	64,766	61,642	77,049
Percent of United States	7.13	5.84	6.33
Oats--1000 Acres	3,720	3,031	2,233
Oats Prod.--1000 Bushels	153,154	144,335	119,377
Percent of United States	11.65	14.42	14.77
Barley--Acres	179,774	158,158	60,489
Barley Prod.--1000 Bushels	6,231	5,296	2,767
Percent of United States	1.76	1.33	0.76
Rye--Acres	108,613	86,566	71,165
Rye Prod.--1000 Bushels	1,866	1,742	1,782
Percent of United States	8.54	7.99	5.76
Soybeans--1000 Acres	1,215	1,685	1,961
Soybeans Prod.--1000 Bushels	29,166	42,211	45,651
Percent of United States	9.00	8.19	6.82
Hay--1000 Acres	6,539	5,628	5,486
Hay Prod.--1000 Tons	11,749	11,460	11,555
Percent of United States	11.57	11.03	10.36
Alfalfa & Mix--1000 Acres	3,570	3,378	3,671
Alfalfa & Mix Prod.--1000 Tons	7,218	7,659	8,693
Percent of United States	13.14	12.79	12.71
Potatoes--Acres	119,638	107,407	99,826
Potatoes Prod.--1000 CWT	15,550	17,987	19,331
Percent of United States	7.62	8.02	8.71
Field Beans--1000 Acres	527	577	680
Field Beans Prod.--1000 CWT	4,400	6,863	8,755
Percent of United States	25.69	35.96	49.58
Sugar Beets--Acres	88,224	99,104	109,198
Sugar Beets Prod.--Tons	1,045,929	1,653,321	1,680,207
Percent of United States	7.67	9.83	7.24
Commercial Vegetables--Acres	433,188	436,187	435,224
Percent of United States	11.58	12.50	13.06
Orchards & Vineyards--Acres	380,062	365,648	347,850
Percent of United States	9.06	8.48	7.88

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964.

**TABLE 19-96 Great Lakes Basin Total and Percent of United States Total—Number, Size, Value and Types of Farms, and Major Land Use**

	1954	1959	1964
Average Size of Farms	121	138	152
Average Value of Farms	18,767	30,112	39,581
Number of Farms	357,863	286,589	243,070
Percent of United States	7.48	7.72	7.70
Cash Grain Farms--Number	55,162	36,006	38,865
Percent of United States	10.26	9.05	9.61
Other Field Crops--Number	3,193	1,948	1,678
Percent of United States	0.87	5.08	4.78
Dairy Farms--Number	119,920	88,144	72,374
Percent of United States	21.85	20.58	19.72
Poultry Farms--Number	12,409	6,089	4,998
Percent of United States	8.04	5.90	6.09
Other Livestock Farms--Number	26,059	25,877	21,036
Percent of United States	3.75	4.19	4.09
Fruit & Nut Farms--Number	8,846	7,167	7,318
Percent of United States	10.78	11.67	12.78
Vegetable Farms--Number	5,266	3,541	3,607
Percent of United States	16.17	16.16	15.54
General Farms--Number	32,598	16,222	15,102
Percent of United States	15.97	7.67	7.48
Misc. & Unclassified--Number	94,410	101,595	78,092
Percent of United States	6.33	8.27	7.29
Land in Farms--1000 Acres	43,358	39,508	36,947
Percent of United States	3.74	3.52	3.33
Cropland Harvest--1000 Acres	21,832	20,659	19,569
Percent of Land in Farms	50.35	52.29	52.96
Cropland Pasture--1000 Acres	4,391	3,445	2,780
Percent of Land in Farms	10.13	8.72	7.52
Other Cropland--1000 Acres	2,396	2,646	3,300
Percent of Land in Farms	5.53	6.70	8.93
Woods Pasture--1000 Acres	4,053	2,750	2,265
Percent of Land in Farms	9.35	6.96	6.13
Other Woods--1000 Acres	3,968	4,107	3,907
Percent of Land in Farms	9.15	10.40	10.57
Other Pasture--1000 Acres	3,562	2,742	2,376
Percent of Land in Farms	8.22	6.94	6.43
Other Land--1000 Acres	3,154	3,158	2,747
Percent of Land in Farms	7.27	7.99	7.43

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964.

TABLE 19-97 Great Lakes Basin Total and Percent of United States Total—Population, Employment, and Values of Farm Products Sold

	1940	1950	1960
Total Population	18,704	21,772	26,367
Percent of United States	14.21	14.45	14.70
Rural Farm Population	2,152	1,755	1,144
Percent of United States	7.12	7.61	8.51
Total Employment	6,758	8,715	9,864
Percent of United States	14.89	15.16	14.86
Agricultural Employment	586	467	296
Percent of United States	6.96	6.74	6.95
	1954	1959	1964
Farmers Work Off Farm <sup>1</sup>	180	144	124
Percent of United States	8.35	8.63	8.45
Value in \$1000			
All Farm Products Sold	1,806,549	2,012,329	2,378,962
Percent of United States	7.33	6.60	6.74
All Crops Sold	749,739	764,810	979,111
Percent of United States	6.07	5.69	5.97
Nursery and Greenhouse	79,157	98,503	102,707
Percent of United States	17.45	16.01	14.56
Forest Products	8,595	11,272	12,852
Percent of United States	6.59	6.02	7.37
Commercial Vegetables	66,170	69,965	93,068
Percent of United States	10.26	9.46	9.43
Livestock and Products Sold	1,066,881	1,247,663	1,396,558
Percent of United States	8.68	7.31	7.41
Dairy Products Sold	599,690	678,401	790,292
Percent of United States	17.99	16.87	17.04
Poultry and Products Sold	140,161	118,772	151,512
Percent of United States	7.30	5.26	4.95
Cattle and calves	195,570	312,325	296,360
Percent of United States	4.50	3.99	3.63
Hogs and pigs	116,223	121,073	113,509
Percent of United States	5.10	4.97	4.86
Sheep and lambs	10,684	11,463	10,113
Percent of United States	3.26	3.39	2.85

<sup>1</sup>Rounded to 1,000 people

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964, and Census of Population 1940, 1950, and 1960.

**TABLE 19-98 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 1.1**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	0	0	0
1000 Bu.	6	7	7
% of Basin	0.00	0.00	0.00
<b>Corn Silage</b>			
1000 Acres	3	3	3
1000 Tons	21	21	17
% of Basin	0.21	0.20	0.14
<b>Wheat</b>			
1000 Acres	1	1	1
1000 Bu.	12	18	19
% of Basin	0.02	0.03	0.02
<b>Oats</b>			
1000 Acres	33	30	26
1000 Bu.	816	1,048	877
% of Basin	0.53	0.73	0.73
<b>Barley</b>			
Acres	1,016	1,089	797
1000 Bu.	18	30	22
% of Basin	0.29	0.57	0.79
<b>Rye</b>			
Acres	200	126	75
1000 Bu.	3	5	1
% of Basin	0.14	0.27	0.06
<b>Soybeans</b>			
1000 Acres	0	0	0
1000 Bu.	0	0	0
% of Basin	0.00	0.00	0.00
<b>Hay</b>			
1000 Acres	263	207	208
1000 Tons	349	300	269
% of Basin	2.97	2.62	2.32
<b>Alf. &amp; Mix</b>			
1000 Acres	29	46	52
1000 Tons	48	83	84
% of Basin	0.66	1.09	0.97
<b>Potatoes</b>			
Acres	1,963	977	1,345
1000 Cwt.	181	95	171
% of Basin	1.17	0.53	0.89
<b>Field Beans</b>			
1000 Acres	0	0	0
1000 Cwt.	0	0	0
% of Basin	0.00	0.00	0.00
<b>Sugar Beets</b>			
Acres	0	0	0
Tons	0	0	0
% of Basin	0.00	0.00	0.00
<b>Commer. Veget.</b>			
Acres	998	383	330
% of Basin	0.23	0.09	0.08
<b>Orchards &amp; Vines</b>			
Acres	1,057	946	939
% of Basin	0.28	0.26	0.27

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959 and 1964. Same for Tables 19-99 and 19-100.

**TABLE 19-99 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 1.1**

	1954	1959	1964
<b>FARMS</b>			
Average Size	136	161	176
Average Value	6,590	9,482	11,708
Number	8,915	5,795	5,130
% of Basin	2.49	2.02	2.11
<b>Cash Grain Farms</b>			
Number	10	5	7
% of Basin	0.02	0.01	0.02
<b>Other Field Crops</b>			
Number	15	12	24
% of Basin	0.47	0.62	1.43
<b>Dairy Farms</b>			
Number	4,343	2,080	1,794
% of Basin	3.62	2.36	2.48
<b>Poultry Farms</b>			
Number	190	51	45
% of Basin	1.53	0.84	0.90
<b>Other Livestock</b>			
Number	188	207	264
% of Basin	0.72	0.80	1.25
<b>Fruit &amp; Nut Farms</b>			
Number	105	32	427
% of Basin	0.51	0.28	0.31
<b>Vegetable Farms</b>			
Number	15	11	6
% of Basin	0.28	0.31	0.17
<b>General</b>			
Number	175	119	199
% of Basin	0.54	0.73	1.32
<b>Misc. &amp; Unclass.</b>			
Number	3,874	3,278	2,364
% of Basin	4.10	3.23	3.03
<b>LAND IN FARMS</b>			
1000 Acres	1,211	936	901
% of Basin	2.79	2.37	2.44
<b>Cropland Harvest</b>			
1000 Acres	315	252	248
% of Land	26.00	26.93	27.50
<b>Cropland Pasture</b>			
1000 Acres	74	58	67
% of Land	6.10	6.25	7.43
<b>Other Cropland</b>			
1000 Acres	42	42	36
% of Land	3.50	4.44	4.00
<b>Woods Pasture</b>			
1000 Acres	328	224	221
% of Land	27.10	23.90	24.52
<b>Other Woods</b>			
1000 Acres	283	242	217
% of Land	23.37	25.84	24.09
<b>Other Pasture</b>			
1000 Acres	81	55	52
% of Land	6.72	5.92	5.78
<b>Other Land</b>			
1000 Acres	87	63	60
% of Land	7.20	6.73	6.66

**TABLE 19-100 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 1.1**

	1940	1950	1960
<b>Total</b>			
Population	336	330	359
% of Basin	1.80	1.52	1.36
<b>Rural Farm</b>			
Population	68	46	19
% of Basin	3.14	2.62	1.66
<b>Total</b>			
Employment	97	124	119
% of Basin	1.44	1.42	1.20
<b>Agricultural</b>			
Employment	14	11	4
% of Basin	2.35	2.46	1.51
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	6	4	3
% of Basin	3.11	2.55	2.63
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	15,914	15,683	17,352
% of Basin	0.88	0.78	0.73
<b>CROPS SOLD</b>			
Total	1,946	2,266	3,056
% of Basin	0.26	0.30	0.31
<b>Nursery &amp; Grnhse.</b>			
Number	235	379	349
% of Basin	0.30	0.38	0.34
<b>Forest Prods.</b>			
Number	615	804	643
% of Basin	7.16	7.13	5.00
<b>Commer. Veget.</b>			
Number	198	120	81
% of Basin	0.30	0.17	0.09
<b>LIVESTK. &amp; PROD.</b>			
Total	13,968	13,417	14,255
% of Basin	1.31	1.08	1.02
<b>Dairy Prods.</b>			
Number	10,790	9,612	9,551
% of Basin	1.80	1.42	1.21
<b>Poultry &amp; Prods.</b>			
Number	1,292	623	982
% of Basin	0.92	0.52	0.65
<b>Cattle &amp; calves</b>			
Number	1,658	2,651	2,532
% of Basin	0.85	0.85	0.85
<b>Hogs &amp; pigs</b>			
Number	107	230	104
% of Basin	0.09	0.19	0.09
<b>Sheep &amp; lambs</b>			
Number	77	209	84
% of Basin	0.72	1.82	0.83

<sup>1</sup>Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-101 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 1.2**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	0	0	0
1000 Bu.	1	1	0
% of Basin	0.00	0.00	0.00
<b>Corn Silage</b>			
1000 Acres	0	0	0
1000 Tons	1	2	4
% of Basin	0.01	0.02	0.03
<b>Wheat</b>			
1000 Acres	1	1	1
1000 Bu.	23	21	18
% of Basin	0.04	0.03	0.02
<b>Oats</b>			
1000 Acres	33	24	21
1000 Bu.	778	604	796
% of Basin	0.51	0.42	0.67
<b>Barley</b>			
Acres	1,238	489	281
1000 Bu.	28	12	8
% of Basin	0.45	0.22	0.30
<b>Rye</b>			
Acres	104	176	216
1000 Bu.	2	2	4
% of Basin	0.10	0.14	0.20
<b>Soybeans</b>			
1000 Acres	0	0	0
1000 Bu.	0	0	0
% of Basin	0.00	0.00	0.00
<b>Hay</b>			
1000 Acres	138	95	95
1000 Tons	182	127	112
% of Basin	1.55	1.10	0.97
<b>Alf. &amp; Mix</b>			
1000 Acres	12	14	14
1000 Tons	20	25	22
% of Basin	0.27	0.32	0.25
<b>Potatoes</b>			
Acres	3,833	2,638	1,970
1000 Cwt.	554	397	360
% of Basin	3.57	2.21	1.86
<b>Field Beans</b>			
1000 Acres	0	0	0
1000 Cwt.	0	0	0
% of Basin	0.00	0.00	0.00
<b>Sugar Beets</b>			
Acres	34	0	0
Tons	157	0	0
% of Basin	0.02	0.00	0.00
<b>Commer. Veget.</b>			
Acres	241	241	218
% of Basin	0.06	0.06	0.05
<b>Orchards &amp; Vines</b>			
Acres	778	492	217
% of Basin	0.20	0.13	0.06

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-102 and 19-103.

**TABLE 19-102 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 1.2**

	1954	1959	1964
<b>FARMS</b>			
Average Size	147	173	199
Average Value	6,901	9,535	13,417
Number	4,346	2,696	2,064
% of Basin	1.21	0.94	0.85
<b>Cash Grain Farms</b>			
Number	5	5	10
% of Basin	0.01	0.01	0.03
<b>Other Field Crops</b>			
Number	72	52	42
% of Basin	2.25	2.67	2.50
<b>Dairy Farms</b>			
Number	1,827	861	730
% of Basin	1.52	0.98	1.01
<b>Poultry Farms</b>			
Number	109	30	35
% of Basin	0.88	0.49	0.70
<b>Other Livestock</b>			
Number	99	110	154
% of Basin	0.38	0.43	0.73
<b>Fruit &amp; Nut Farms</b>			
Number	30	25	35
% of Basin	0.34	0.35	0.48
<b>Vegetable Farms</b>			
Number	0	0	3
% of Basin	0.00	0.00	0.08
<b>General</b>			
Number	302	66	96
% of Basin	0.93	0.41	0.64
<b>Misc. &amp; Unclass.</b>			
Number	1,902	1,547	959
% of Basin	2.01	1.52	1.23
<b>LAND IN FARMS</b>			
1000 Acres	641	466	411
% of Basin	1.48	1.18	1.11
<b>Cropland Harvest</b>			
1000 Acres	187	130	124
% of Land	29.21	27.87	30.29
<b>Cropland Pasture</b>			
1000 Acres	66	54	51
% of Land	10.23	11.62	12.48
<b>Other Cropland</b>			
1000 Acres	41	41	33
% of Land	6.34	8.84	7.92
<b>Woods Pasture</b>			
1000 Acres	133	71	58
% of Land	20.74	15.15	14.02
<b>Other Woods</b>			
1000 Acres	160	134	107
% of Land	25.06	28.81	26.08
<b>Other Pasture</b>			
1000 Acres	28	15	21
% of Land	4.34	3.26	5.08
<b>Other Land</b>			
1000 Acres	26	21	17
% of Land	4.09	4.45	4.14

**TABLE 19-103 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 1.2**

	1940	1950	1960
<b>Total</b>			
Population	197	183	186
% of Basin	1.05	0.84	0.71
<b>Rural Farm</b>			
Population	35	24	10
% of Basin	1.64	1.35	0.84
<b>Total</b>			
Employment	52	57	56
% of Basin	0.77	0.65	0.57
<b>Agricultural</b>			
Employment	6	5	2
% of Basin	1.03	1.16	0.69
<hr/>			
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	3	2	1
% of Basin	1.48	1.08	0.96
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	8,948	7,480	8,086
% of Basin	0.50	0.37	0.34
<b>CROPS SOLD</b>			
Total	2,485	1,838	2,267
% of Basin	0.33	0.24	0.23
<b>Nursery &amp; Grnhse.</b>			
Number	233	217	277
% of Basin	0.29	0.22	0.27
<b>Forest Prods.</b>			
Number	418	336	222
% of Basin	4.86	2.98	1.73
<b>Commer. Veget.</b>			
Number	32	31	44
% of Basin	0.05	0.04	0.05
<b>LIVESTK. &amp; PROD.</b>			
Total	6,463	5,643	5,799
% of Basin	0.61	0.45	0.42
<b>Dairy Prods.</b>			
Number	5,022	3,878	3,866
% of Basin	0.84	0.57	0.49
<b>Poultry &amp; Prods.</b>			
Number	497	254	468
% of Basin	0.35	0.21	0.31
<b>Cattle &amp; calves</b>			
Number	877	1,408	1,302
% of Basin	0.45	0.45	0.44
<b>Hogs &amp; pigs</b>			
Number	34	61	35
% of Basin	0.03	0.05	0.03
<b>Sheeps &amp; lambs</b>			
Number	19	24	28
% of Basin	0.17	0.21	0.28

<sup>1</sup>Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population  
1940, 1950, and 1960

**TABLE 19-104 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 2.1**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	194	264	249
1000 Bu.	10,926	18,404	16,706
% of Basin	4.42	6.27	5.88
<b>Corn Silage</b>			
1000 Acres	321	293	277
1000 Tons	3,006	3,202	3,124
% of Basin	30.07	30.37	25.11
<b>Wheat</b>			
1000 Acres	15	15	14
1000 Bu.	397	450	459
% of Basin	0.61	0.73	0.60
<b>Oats</b>			
1000 Acres	801	737	613
1000 Bu.	40,060	39,641	31,868
% of Basin	26.16	27.46	26.70
<b>Barley</b>			
Acres	38,259	14,143	6,743
1000 Bu.	1,521	585	282
% of Basin	24.42	11.04	10.18
<b>Rye</b>			
Acres	16,055	10,034	6,943
1000 Bu.	217	146	123
% of Basin	11.64	8.38	6.91
<b>Soybeans</b>			
1000 Acres	2	2	11
1000 Bu.	23	41	212
% of Basin	0.08	0.10	0.46
<b>Hay</b>			
1000 Acres	1,032	1,016	1,025
1000 Tons	2,141	2,355	2,350
% of Basin	18.23	20.55	20.34
<b>Alf. &amp; Mix</b>			
1000 Acres	812	810	836
1000 Tons	1,772	1,965	2,024
% of Basin	24.56	25.65	23.29
<b>Potatoes</b>			
Acres	19,103	21,279	20,972
1000 Cwt.	2,879	3,655	3,889
% of Basin	18.51	20.32	20.12
<b>Field Beans</b>			
1000 Acres	0	0	0
1000 Cwt.	0	0	0
% of Basin	0.01	0.00	0.00
<b>Sugar Beets</b>			
Acres	8,168	4,959	0
Tons	98,815	63,094	0
% of Basin	9.45	3.82	0.00
<b>Commer. Veget.</b>			
Acres	84,506	99,153	112,623
% of Basin	19.51	22.73	25.88
<b>Orchards &amp; Vines</b>			
Acres	16,654	16,271	12,923
% of Basin	4.38	4.45	3.72

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-105 and 19-106.

**TABLE 19-105 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.1**

	1954	1959	1964
<b>FARMS</b>			
Average Size	132	145	151
Average Value	15,055	20,262	25,119
Number	42,626	36,241	32,537
% of Basin	11.91	12.65	13.39
<b>Cash Grain Farms</b>			
Number	716	331	410
% of Basin	1.30	0.92	1.05
<b>Other Field Crops</b>			
Number	315	213	227
% of Basin	9.87	10.93	13.53
<b>Dairy Farms</b>			
Number	32,445	24,290	20,849
% of Basin	27.06	27.56	28.81
<b>Poultry Farms</b>			
Number	623	274	226
% of Basin	5.02	4.50	4.52
<b>Other Livestock</b>			
Number	1,473	2,152	1,543
% of Basin	5.65	8.32	7.34
<b>Fruit &amp; Nut Farms</b>			
Number	402	184	231
% of Basin	4.54	2.57	3.16
<b>Vegetable Farms</b>			
Number	377	354	479
% of Basin	7.16	10.00	13.28
<b>General</b>			
Number	1,941	979	1,496
% of Basin	5.95	6.04	9.91
<b>Misc. &amp; Unclass.</b>			
Number	4,334	7,464	7,076
% of Basin	4.59	7.35	9.06
<b>LAND IN FARMS</b>			
1000 Acres	5,646	5,243	4,921
% of Basin	13.02	13.27	13.32
<b>Cropland Harvest</b>			
1000 Acres	2,603	2,533	2,432
% of Land	46.10	48.30	49.43
<b>Cropland Pasture</b>			
1000 Acres	706	581	485
% of Land	12.51	11.07	9.86
<b>Other Cropland</b>			
1000 Acres	165	182	282
% of Land	2.91	3.47	5.73
<b>Woods Pasture</b>			
1000 Acres	753	523	426
% of Land	13.34	9.98	8.65
<b>Other Woods</b>			
1000 Acres	680	729	687
% of Land	12.05	13.91	13.96
<b>Other Pasture</b>			
1000 Acres	331	276	224
% of Land	5.87	5.27	4.54
<b>Other Land</b>			
1000 Acres	407	419	383
% of Land	7.22	8.00	7.79

**TABLE 19-106 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.1**

	1940	1950	1960
<b>Total</b>			
Population	709	816	896
% of Basin	3.79	3.75	3.40
<b>Rural Farm</b>			
Population	221	202	154
% of Basin	10.26	11.51	13.49
<b>Total</b>			
Employment	245	300	313
% of Basin	3.63	3.44	3.18
<b>Agricultural</b>			
Employment	77	68	43
% of Basin	13.07	14.48	14.69
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	17	16	14
% of Basin	9.70	11.02	11.50
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	200,803	243,090	285,446
% of Basin	11.12	12.08	12.00
<b>CROPS SOLD</b>			
Total	31,423	33,989	51,888
% of Basin	4.19	4.44	5.30
<b>Nursery &amp; Grnhse.</b>			
Number	1,785	2,144	3,214
% of Basin	2.26	2.18	3.13
<b>Forest Prods.</b>			
Number	1,648	1,670	1,993
% of Basin	19.18	14.82	15.50
<b>Commer. Veget.</b>			
Number	6,243	7,704	10,583
% of Basin	9.44	11.01	11.37
<b>LIVESTK. &amp; PROD.</b>			
Total	169,380	209,101	233,195
% of Basin	15.88	16.76	16.70
<b>Dairy Prods.</b>			
Number	123,474	142,796	169,552
% of Basin	20.59	21.05	21.45
<b>Poultry &amp; Prods.</b>			
Number	10,595	8,542	7,362
% of Basin	7.56	7.19	4.86
<b>Cattle &amp; calves</b>			
Number	21,579	36,987	32,812
% of Basin	11.03	11.84	11.07
<b>Hogs &amp; pigs</b>			
Number	13,158	20,113	11,438
% of Basin	11.32	16.61	10.08
<b>Sheep &amp; lambs</b>			
Number	324	357	256
% of Basin	3.03	3.11	2.53

<sup>1</sup> Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population  
1940, 1950, and 1960

**TABLE 19-107 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 2.2**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	841	939	797
1000 Bu.	51,822	65,188	62,846
% of Basin	20.96	22.19	22.11
<b>Corn Silage</b>			
1000 Acres	169	125	119
1000 Tons	1,776	1,519	1,558
% of Basin	17.76	14.40	12.53
<b>Wheat</b>			
1000 Acres	112	123	157
1000 Bu.	3,327	3,837	5,537
% of Basin	5.14	6.22	7.19
<b>Oats</b>			
1000 Acres	548	356	230
1000 Bu.	22,580	16,694	12,895
% of Basin	14.74	11.57	10.80
<b>Barley</b>			
Acres	20,095	14,715	13,203
1000 Bu.	655	563	644
% of Basin	10.51	10.63	23.28
<b>Rye</b>			
Acres	8,142	9,129	6,064
1000 Bu.	145	197	139
% of Basin	7.79	11.34	7.82
<b>Soybeans</b>			
1000 Acres	210	340	357
1000 Bu.	5,462	8,894	8,797
% of Basin	18.73	24.07	19.27
<b>Hay</b>			
1000 Acres	502	426	393
1000 Tons	1,184	1,138	1,066
% of Basin	10.07	9.93	9.22
<b>Alf. &amp; Mix</b>			
1000 Acres	397	358	340
1000 Tons	998	993	960
% of Basin	13.83	12.97	11.04
<b>Potatoes</b>			
Acres	7,612	6,988	7,179
1000 Cwt.	1,046	1,169	1,449
% of Basin	6.73	6.50	7.50
<b>Field Beans</b>			
1000 Acres	0	0	0
1000 Cwt.	0	0	0
% of Basin	0.00	0.00	0.00
<b>Sugar Beets</b>			
Acres	2,310	1,687	0
Tons	27,715	23,516	0
% of Basin	2.65	1.42	0.00
<b>Commer. Veget.</b>			
Acres	66,964	46,845	43,686
% of Basin	15.46	10.74	10.04
<b>Orchards &amp; Vines</b>			
Acres	8,420	6,396	4,824
% of Basin	2.22	1.75	1.39

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-108 and 19-109.

**TABLE 19-108 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.2**

	1954	1959	1964
<b>FARMS</b>			
Average Size	123	183	161
Average Value	33,006	63,827	82,680
Number	30,308	23,583	19,829
% of Basin	8.47	8.23	8.16
<b>Cash Grain Farms</b>			
Number	6,526	4,994	5,145
% of Basin	11.83	13.87	13.24
<b>Other Field Crops</b>			
Number	106	106	73
% of Basin	3.32	5.44	4.35
<b>Dairy Farms</b>			
Number	10,226	7,490	5,401
% of Basin	8.53	8.50	7.46
<b>Poultry Farms</b>			
Number	823	344	292
% of Basin	6.70	5.65	5.84
<b>Other Livestock</b>			
Number	2,836	2,953	1,909
% of Basin	10.88	11.41	9.48
<b>Fruit &amp; Nut Farms</b>			
Number	65	75	97
% of Basin	0.73	1.05	1.33
<b>Vegetable Farms</b>			
Number	802	449	368
% of Basin	15.23	12.68	10.20
<b>General</b>			
Number	1,596	878	1,178
% of Basin	4.90	5.41	7.80
<b>Misc. &amp; Unclass.</b>			
Number	7,328	6,294	5,366
% of Basin	7.76	6.20	6.87
<b>LAND IN FARMS</b>			
1000 Acres	3,714	3,416	3,190
% of Basin	8.57	8.65	8.63
<b>Cropland Harvest</b>			
1000 Acres	2,538	2,431	2,175
% of Land	68.33	71.17	68.18
<b>Cropland Pasture</b>			
1000 Acres	308	221	161
% of Land	8.30	6.46	5.06
<b>Other Cropland</b>			
1000 Acres	109	100	289
% of Land	2.95	2.91	9.06
<b>Woods Pasture</b>			
1000 Acres	213	143	117
% of Land	5.74	4.19	3.67
<b>Other Woods</b>			
1000 Acres	100	121	114
% of Land	2.70	3.53	3.58
<b>Other Pasture</b>			
1000 Acres	184	134	108
% of Land	4.94	3.93	3.38
<b>Other Land</b>			
1000 Acres	262	267	225
% of Land	7.05	7.81	7.05

**TABLE 19-109 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.2**

	1940	1950	1960
<b>Total</b>			
Population	6,034	6,919	8,481
% of Basin	32.26	31.77	32.16
<b>Rural Farm</b>			
Population	181	148	95
% of Basin	8.42	8.43	8.29
<b>Total</b>			
Employment	2,315	2,982	3,407
% of Basin	34.26	34.21	34.54
<b>Agricultural</b>			
Employment	59	52	39
% of Basin	10.10	11.05	13.28
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	13	10	8
% of Basin	7.07	6.91	6.87
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	250,826	259,072	284,902
% of Basin	13.88	12.87	11.98
<b>CROPS SOLD</b>			
Total	103,930	107,033	131,602
% of Basin	13.86	13.99	13.44
<b>Nursery &amp; Grnhse.</b>			
Number	21,280	23,763	23,217
% of Basin	26.88	24.12	22.61
<b>Forest Prods.</b>			
Number	102	156	230
% of Basin	1.18	1.38	1.79
<b>Commer. Veget.</b>			
Number	9,523	7,924	9,937
% of Basin	14.39	11.32	10.68
<b>LIVESTK. &amp; PROD.</b>			
Total	146,895	152,039	152,611
% of Basin	13.77	12.19	10.93
<b>Dairy Prods.</b>			
Number	70,343	70,477	73,320
% of Basin	11.73	10.39	9.28
<b>Poultry &amp; Prods.</b>			
Number	15,631	9,142	9,772
% of Basin	11.15	7.70	6.45
<b>Cattle &amp; calves</b>			
Number	41,320	52,035	44,583
% of Basin	21.12	16.66	15.04
<b>Hogs &amp; pigs</b>			
Number	18,561	18,488	16,205
% of Basin	15.97	15.27	14.28
<b>Sheep &amp; lambs</b>			
Number	698	796	465
% of Basin	6.54	6.95	4.60

<sup>1</sup> Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

TABLE 19-110 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 2.3

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	1,098	1,216	1,070
1000 Bu.	56,277	63,879	60,009
% of Basin	22.76	21.75	21.11
<b>Corn Silage</b>			
1000 Acres	108	110	150
1000 Tons	963	1,130	1,729
% of Basin	10.38	10.71	13.90
<b>Wheat</b>			
1000 Acres	534	573	508
1000 Bu.	14,421	17,405	18,659
% of Basin	22.27	28.24	24.22
<b>Oats</b>			
1000 Acres	626	401	285
1000 Bu.	22,499	15,709	14,398
% of Basin	14.69	10.88	12.06
<b>Barley</b>			
Acres	45,455	57,321	13,232
1000 Bu.	1,643	1,881	571
% of Basin	26.36	35.52	20.62
<b>Rye</b>			
Acres	26,701	21,844	18,554
1000 Bu.	461	444	476
% of Basin	24.69	25.48	26.68
<b>Soybeans</b>			
1000 Acres	69	145	223
1000 Bu.	1,442	3,054	4,782
% of Basin	4.95	7.23	10.47
<b>Hay</b>			
1000 Acres	911	734	704
1000 Tons	1,492	1,466	1,625
% of Basin	12.69	12.79	14.06
<b>Alf. &amp; Mix</b>			
1000 Acres	524	523	576
1000 Tons	944	1,126	1,423
% of Basin	13.08	14.70	16.37
<b>Potatoes</b>			
Acres	13,882	15,080	12,584
1000 Cwt.	2,272	2,786	2,849
% of Basin	14.61	15.50	14.74
<b>Field Beans</b>			
1000 Acres	52	66	97
1000 Cwt.	398	753	1,013
% of Basin	9.05	10.98	11.57
<b>Sugar Beets</b>			
Acres	5,865	2,235	412
Tons	66,587	32,148	6,203
% of Basin	6.37	1.94	0.37
<b>Commer. Veget.</b>			
Acres	45,836	48,272	43,137
% of Basin	10.58	11.07	9.91
<b>Orchards &amp; Vines</b>			
Acres	106,484	112,158	123,520
% of Basin	28.02	30.67	35.51

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-111 and 19-112.

TABLE 19-111 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.3

	1954	1959	1964
<b>FARMS</b>			
Average Size	109	124	135
Average Value	17,817	26,545	34,533
Number	65,365	54,484	46,619
% of Basin	18.27	19.01	19.18
<b>Cash Grain Farms</b>			
Number	10,348	5,958	6,848
% of Basin	18.76	16.55	17.62
<b>Other Field Crops</b>			
Number	382	307	208
% of Basin	11.96	15.76	12.40
<b>Dairy Farms</b>			
Number	14,365	10,601	9,133
% of Basin	11.98	12.03	12.62
<b>Poultry Farms</b>			
Number	2,923	1,629	1,452
% of Basin	23.56	26.75	29.05
<b>Other Livestock</b>			
Number	6,793	6,726	5,728
% of Basin	26.07	25.99	28.45
<b>Fruit &amp; Nut Farms</b>			
Number	3,056	2,642	2,605
% of Basin	34.55	36.86	35.60
<b>Vegetable Farms</b>			
Number	927	546	573
% of Basin	17.60	15.42	15.89
<b>General</b>			
Number	8,727	3,719	2,936
% of Basin	26.77	22.93	19.44
<b>Misc. &amp; Unclass.</b>			
Number	17,844	22,356	16,136
% of Basin	18.90	22.00	20.66
<b>LAND IN FARMS</b>			
1000 Acres	7,143	6,742	6,309
% of Basin	16.47	17.06	17.08
<b>Cropland Harvest</b>			
1000 Acres	3,809	3,629	3,356
% of Land	53.33	53.83	53.19
<b>Cropland Pasture</b>			
1000 Acres	786	611	475
% of Land	11.01	9.06	7.52
<b>Other Cropland</b>			
1000 Acres	517	672	870
% of Land	7.24	9.97	13.79
<b>Woods Pasture</b>			
1000 Acres	401	259	203
% of Land	5.61	3.84	3.22
<b>Other Woods</b>			
1000 Acres	456	533	529
% of Land	6.38	7.90	8.38
<b>Other Pasture</b>			
1000 Acres	477	343	288
% of Land	6.67	5.08	4.56
<b>Other Land</b>			
1000 Acres	696	696	589
% of Land	9.75	10.32	9.34

**TABLE 19-112 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.3**

	1940	1950	1960
<b>Total</b>			
Population	1,499	1,807	2,211
% of Basin	8.01	8.31	8.38
<b>Rural Farm</b>			
Population	374	309	224
% of Basin	17.23	17.62	19.54
<b>Total</b>			
Employment	519	695	810
% of Basin	7.68	7.97	8.21
<b>Agricultural</b>			
Employment	95	73	47
% of Basin	16.14	15.62	15.76
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	35	30	26
% of Basin	19.57	20.90	21.31
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
<b>TOTAL</b>	292,046	340,080	410,895
% of Basin	16.17	16.90	17.27
<b>CROPS SOLD</b>			
<b>Total</b>	134,213	142,548	175,855
% of Basin	17.90	18.64	17.96
<b>Nursery &amp; Grnhse.</b>			
Number	10,439	12,273	13,515
% of Basin	13.19	12.46	13.16
<b>Forest Prods.</b>			
Number	1,011	1,587	2,090
% of Basin	11.77	14.08	16.26
<b>Commer. Veget.</b>			
Number	9,390	9,569	13,219
% of Basin	14.19	13.68	14.20
<b>LIVESTK. &amp; PROD.</b>			
<b>Total</b>	167,905	197,604	234,527
% of Basin	15.74	15.84	16.79
<b>Dairy Prods.</b>			
Number	72,299	80,334	102,153
% of Basin	12.06	11.84	12.93
<b>Poultry &amp; Prods.</b>			
Number	31,683	29,485	42,522
% of Basin	22.61	24.82	28.06
<b>Cattle &amp; calves</b>			
Number	30,178	51,503	52,371
% of Basin	15.43	16.49	17.67
<b>Hogs &amp; pigs</b>			
Number	30,409	32,928	32,671
% of Basin	26.16	27.20	28.78
<b>Sheep &amp; lambs</b>			
Number	2,414	2,620	2,696
% of Basin	22.60	22.86	26.66

<sup>1</sup>Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-113 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 2.4**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	77	71	64
1000 Bu.	2,457	3,071	3,177
% of Basin	0.99	1.05	1.12
<b>Corn Silage</b>			
1000 Acres	41	34	42
1000 Tons	270	290	362
% of Basin	2.70	2.75	2.91
<b>Wheat</b>			
1000 Acres	43	45	32
1000 Bu.	1,099	1,160	1,043
% of Basin	1.70	1.88	1.35
<b>Oats</b>			
1000 Acres	118	79	54
1000 Bu.	3,250	1,903	1,793
% of Basin	2.12	1.32	1.50
<b>Barley</b>			
Acres	3,488	3,315	1,472
1000 Bu.	91	79	51
% of Basin	1.45	1.49	1.83
<b>Rye</b>			
Acres	12,507	8,994	6,481
1000 Bu.	177	137	125
% of Basin	9.50	7.88	7.00
<b>Soybeans</b>			
1000 Acres	0	0	0
1000 Bu.	6	2	3
% of Basin	0.02	0.00	0.01
<b>Hay</b>			
1000 Acres	376	303	278
1000 Ton	534	456	454
% of Basin	4.54	3.98	3.93
<b>Alf. &amp; Mix</b>			
1000 Acres	240	216	213
1000 Tons	362	350	370
% of Basin	5.01	4.57	4.25
<b>Potatoes</b>			
Acres	11,714	6,959	3,349
1000 Cwt.	1,360	1,042	644
% of Basin	8.75	5.79	3.33
<b>Field Beans</b>			
1000 Acres	11	3	3
1000 Cwt.	64	31	35
% of Basin	1.45	0.45	0.40
<b>Sugar Beets</b>			
Acres	356	0	89
Tons	3,015	0	800
% of Basin	0.29	0.00	0.05
<b>Commer. Veget.</b>			
Acres	17,267	14,398	15,956
% of Basin	3.99	3.30	3.67
<b>Orchards &amp; Vines</b>			
Acres	61,918	69,810	72,696
% of Basin	16.29	19.09	20.90

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-114 and 19-115.

**TABLE 19-114 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 2.4**

	1954	1959	1964
<b>FARMS</b>			
Average Size	139	154	167
Average Value	9,825	15,929	21,461
Number	18,974	13,848	11,230
% of Basin	5.30	4.83	4.62
<b>Cash Grain Farms</b>			
Number	401	70	204
% of Basin	0.73	0.19	0.52
<b>Other Field Crops</b>			
Number	232	136	69
% of Basin	7.27	6.98	4.11
<b>Dairy Farms</b>			
Number	6,597	3,509	2,756
% of Basin	5.50	3.98	3.81
<b>Poultry Farms</b>			
Number	469	219	183
% of Basin	3.78	3.60	3.66
<b>Other Livestock</b>			
Number	1,069	991	930
% of Basin	4.10	3.83	4.42
<b>Fruit &amp; Nut Farms</b>			
Number	939	1,240	1,300
% of Basin	10.61	17.30	17.76
<b>Vegetable Farms</b>			
Number	380	171	188
% of Basin	7.22	4.83	5.21
<b>General</b>			
Number	1,683	508	568
% of Basin	5.16	3.13	3.76
<b>Misc. &amp; Unclass.</b>			
Number	7,204	7,004	5,032
% of Basin	7.63	6.89	6.44
<b>LAND IN FARMS</b>			
1000 Acres	2,646	2,135	1,877
% of Basin	6.10	5.40	5.08
<b>Cropland Harvest</b>			
1000 Acres	800	654	591
% of Land	30.22	30.62	31.49
<b>Cropland Pasture</b>			
1000 Acres	370	255	223
% of Land	14.00	11.96	11.88
<b>Other Cropland</b>			
1000 Acres	248	263	235
% of Land	9.36	12.31	12.52
<b>Woods Pasture</b>			
1000 Acres	384	245	186
% of Land	14.53	11.45	9.88
<b>Other Woods</b>			
1000 Acres	476	427	386
% of Land	17.99	20.02	20.56
<b>Other Pasture</b>			
1000 Acres	207	143	126
% of Land	7.81	6.71	6.72
<b>Other Land</b>			
1000 Acres	161	148	131
% of Land	6.09	6.93	6.96

**TABLE 19-115 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 2.4**

	1940	1950	1960
<b>Total</b>			
Population	369	410	453
% of Basin	1.97	1.89	1.72
<b>Rural Farm</b>			
Population	125	94	50
% of Basin	5.81	5.37	4.41
<b>Total</b>			
Employment	111	134	147
% of Basin	1.64	1.54	1.49
<b>Agricultural</b>			
Employment	30	22	10
% of Basin	5.14	4.75	3.52
<hr/>			
<b>1954 1959 1964</b>			
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	11	8	7
% of Basin	6.22	5.64	5.28
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	53,183	59,215	73,301
% of Basin	2.94	2.94	3.08
<b>CROPS SOLD</b>			
Total	24,471	26,409	34,638
% of Basin	3.26	3.45	3.54
<b>Nursery &amp; Grnhse.</b>			
Number	1,359	1,368	1,526
% of Basin	1.72	1.39	1.49
<b>Forest Prods.</b>			
Number	896	905	1,518
% of Basin	10.42	8.03	11.81
<b>Commer. Veget.</b>			
Number	3,037	2,660	3,880
% of Basin	4.59	3.80	4.17
<b>LIVESTK. &amp; PROD.</b>			
Total	28,711	32,878	38,248
% of Basin	2.69	2.64	2.74
<b>Dairy Prods.</b>			
Number	16,498	18,547	21,193
% of Basin	2.75	2.73	2.68
<b>Poultry &amp; Prods.</b>			
Number	3,797	3,295	4,817
% of Basin	2.71	2.77	3.18
<b>Cattle &amp; calves</b>			
Number	6,257	9,127	9,020
% of Basin	3.20	2.92	3.04
<b>Hogs &amp; pigs</b>			
Number	1,753	1,559	1,228
% of Basin	1.51	1.29	1.08
<b>Sheep &amp; lambs</b>			
Number	251	247	192
% of Basin	2.35	2.15	1.90

<sup>1</sup>Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population  
1940, 1950, and 1960

**TABLE 19-116 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 3.1**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	13	13	14
1000 Bu.	406	580	759
% of Basin	0.16	0.20	0.27
<b>Corn Silage</b>			
1000 Acres	11	12	18
1000 Tons	73	107	165
% of Basin	0.73	1.01	1.32
<b>Wheat</b>			
1000 Acres	23	26	18
1000 Bu.	624	732	638
% of Basin	0.96	1.19	0.83
<b>Oats</b>			
1000 Acres	52	45	38
1000 Bu.	1,714	1,394	1,571
% of Basin	1.12	0.97	1.32
<b>Barley</b>			
Acres	4,974	2,339	901
1000 Bu.	132	53	33
% of Basin	2.12	1.00	1.20
<b>Rye</b>			
Acres	4,310	1,940	1,198
1000 Bu.	77	35	24
% of Basin	4.13	1.98	1.37
<b>Soybeans</b>			
1000 Acres	0	0	1
1000 Bu.	1	3	12
% of Basin	0.00	0.01	0.03
<b>Hay</b>			
1000 Acres	166	148	141
1000 Tons	263	222	240
% of Basin	2.24	1.94	2.08
<b>Alf. &amp; Mix</b>			
1000 Acres	131	115	114
1000 Tons	216	181	201
% of Basin	2.99	2.36	2.32
<b>Potatoes</b>			
Acres	7,482	6,066	3,878
1000 Cwt.	838	756	625
% of Basin	5.39	4.20	3.23
<b>Field Beans</b>			
1000 Acres	5	4	9
1000 Cwt.	25	45	123
% of Basin	0.56	0.66	1.41
<b>Sugar Beets</b>			
Acres	909	1,119	1,330
Tons	9,076	15,194	22,105
% of Basin	0.87	0.92	1.32
<b>Commer. Veget.</b>			
Acres	1,232	691	886
% of Basin	0.28	0.16	0.20
<b>Orchards &amp; Vines</b>			
Acres	2,354	2,413	1,235
% of Basin	0.62	0.66	0.36

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-117 and 19-118.

**TABLE 19-117 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 3.1**

	1954	1959	1964
<b>FARMS</b>			
Average Size	163	182	196
Average Value	10,490	15,224	23,459
Number	6,648	5,161	4,258
% of Basin	1.86	1.80	1.75
<b>Cash Grain Farms</b>			
Number	206	91	170
% of Basin	0.37	0.25	0.44
<b>Other Field Crops</b>			
Number	293	146	113
% of Basin	9.18	7.49	6.73
<b>Dairy Farms</b>			
Number	2,362	1,379	1,178
% of Basin	1.97	1.56	1.63
<b>Poultry Farms</b>			
Number	115	51	61
% of Basin	0.93	0.84	1.22
<b>Other Livestock</b>			
Number	565	604	593
% of Basin	2.17	2.33	2.82
<b>Fruit &amp; Nut Farms</b>			
Number	71	46	46
% of Basin	0.80	0.64	0.63
<b>Vegetable Farms</b>			
Number	21	5	7
% of Basin	0.40	0.14	0.19
<b>General Farms</b>			
Number	832	281	304
% of Basin	2.55	1.73	2.01
<b>Misc. &amp; Unclass.</b>			
Number	2,183	2,558	1,786
% of Basin	2.31	2.52	2.29
<b>LAND IN FARMS</b>			
1000 Acres	1,084	938	833
% of Basin	2.50	2.37	2.26
<b>Cropland Harvest</b>			
1000 Acres	308	272	256
% of Land	28.40	29.02	30.71
<b>Cropland Pasture</b>			
1000 Acres	141	117	121
% of Land	12.99	12.45	14.58
<b>Other Cropland</b>			
1000 Acres	59	63	55
% of Land	5.48	6.71	6.57
<b>Woods Pasture</b>			
1000 Acres	317	232	192
% of Land	29.24	24.73	23.01
<b>Other Woods</b>			
1000 Acres	175	170	140
% of Land	16.13	18.16	16.83
<b>Other Pasture</b>			
1000 Acres	41	39	35
% of Land	3.82	4.17	4.24
<b>Other Land</b>			
1000 Acres	43	45	34
% of Land	3.94	4.75	4.06

**TABLE 19-118 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 3.1**

	1940	1950	1960
Total			
Population	95	101	119
% of Basin	0.51	0.47	0.45
Rural Farm			
Population	42	34	19
% of Basin	1.97	1.92	1.69
Total			
Employment	28	32	38
% of Basin	0.41	0.36	0.38
Agricultural			
Employment	11	9	3
% of Basin	1.90	1.84	1.16
	1954	1959	1964
Farmers			
Work Off Farm <sup>1</sup>	4	3	2
% of Basin	2.09	2.04	1.97
PRODUCTS SOLD (Value in \$1000)			
FARM PRODUCTS			
TOTAL	15,129	17,769	22,216
% of Basin	0.84	0.88	0.93
CROPS SOLD			
Total	4,964	4,645	6,504
% of Basin	0.66	0.61	0.66
Nursery & Grnhse.			
Number	332	74	114
% of Basin	0.42	0.08	0.11
Forest Prods.			
Number	290	359	437
% of Basin	3.38	3.19	3.40
Commer. Veget.			
Number	224	78	191
% of Basin	0.34	0.11	0.21
LIVESTK. & PROD.			
Total	10,164	13,124	15,672
% of Basin	0.95	1.05	1.12
Dairy Prods.			
Number	5,295	6,449	8,624
% of Basin	0.88	0.95	1.09
Poultry & Prods.			
Number	1,050	839	1,291
% of Basin	0.75	0.71	0.85
Cattle & calves			
Number	3,118	5,082	5,182
% of Basin	1.59	1.63	1.75
Hogs & pigs			
Number	453	457	301
% of Basin	0.39	0.38	0.26
Sheep & lambs			
Number	169	232	171
% of Basin	1.58	2.03	1.69

<sup>1</sup>Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population  
1940, 1950, and 1960

**TABLE 19-119 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 3.2**

	1954	1959	1964
Corn Grain			
1000 Acres	280	306	308
1000 Bu.	11,640	16,664	20,640
% of Basin	4.71	5.68	7.26
Corn Silage			
1000 Acres	69	57	78
1000 Tons	535	621	880
% of Basin	5.35	5.89	7.08
Wheat			
1000 Acres	270	318	274
1000 Bu.	8,566	11,413	12,252
% of Basin	13.23	18.52	15.90
Oats			
1000 Acres	250	181	127
1000 Bu.	10,165	9,432	7,259
% of Basin	6.64	6.53	6.08
Barley			
Acres	11,069	14,805	7,842
1000 Bu.	350	590	404
% of Basin	5.62	11.13	14.60
Rye			
Acres	7,371	8,989	6,348
1000 Bu.	125	215	173
% of Basin	6.72	12.32	9.71
Soybeans			
1000 Acres	27	37	66
1000 Bu.	441	865	1,461
% of Basin	1.51	2.05	3.20
Hay			
1000 Acres	395	332	300
1000 Tons	642	688	650
% of Basin	5.46	6.00	5.63
Alf. & Mix			
1000 Acres	285	275	259
1000 Tons	492	599	586
% of Basin	6.81	7.82	6.75
Potatoes			
Acres	10,603	10,302	12,138
1000 Cwt.	1,059	1,291	1,921
% of Basin	6.81	7.18	9.94
Field Beans			
1000 Acres	299	360	430
1000 Cwt.	2,556	4,600	5,923
% of Basin	58.09	67.03	67.65
Sugar Beets			
Acres	49,283	59,088	64,556
1000 Tons <sup>1</sup>	568	1,014	1,074
% of Basin	54.32	61.34	63.90
Commer. Veget.			
Acres	16,127	18,137	15,222
% of Basin	3.72	4.16	3.50
Orchards & Vines			
Acres	6,454	5,134	3,813
% of Basin	1.70	1.40	1.10

<sup>1</sup>Rounded figures.

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-120 and 19-121.

TABLE 19-120 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 3.2

	1954	1959	1964
<b>FARMS</b>			
Average Size	115	128	144
Average Value	17,328	28,954	39,744
Number	27,907	23,394	19,719
% of Basin	7.80	8.16	8.11
<b>Cash Grain Farms</b>			
Number	7,548	6,074	6,326
% of Basin	13.68	16.87	16.28
<b>Other Field Crops</b>			
Number	460	531	460
% of Basin	14.41	27.26	27.41
<b>Dairy Farms</b>			
Number	6,913	4,669	3,858
% of Basin	5.76	5.30	5.33
<b>Poultry Farms</b>			
Number	674	258	236
% of Basin	5.43	4.24	4.72
<b>Other Livestock</b>			
Number	1,591	1,455	1,318
% of Basin	6.11	5.62	6.27
<b>Fruit &amp; Nut Farms</b>			
Number	85	76	67
% of Basin	0.96	1.06	0.92
<b>Vegetable Farms</b>			
Number	195	161	146
% of Basin	3.70	4.55	4.05
<b>General</b>			
Number	3,072	1,653	1,224
% of Basin	9.42	10.19	8.10
<b>Misc. &amp; Unclass.</b>			
Number	7,369	8,517	6,084
% of Basin	7.81	8.38	7.79
<b>LAND IN FARMS</b>			
1000 Acres	3,198	2,996	2,831
% of Basin	7.38	7.58	7.66
<b>Cropland Harvest</b>			
1000 Acres	1,726	1,729	1,721
% of Land	53.96	57.73	60.80
<b>Cropland Pasture</b>			
1000 Acres	341	233	180
% of Land	10.66	7.79	6.35
<b>Other Cropland</b>			
1000 Acres	206	208	219
% of Land	6.44	6.95	7.73
<b>Woods Pasture</b>			
1000 Acres	361	239	193
% of Land	11.27	7.99	6.83
<b>Other Woods</b>			
1000 Acres	187	236	236
% of Land	5.86	7.86	8.33
<b>Other Pasture</b>			
1000 Acres	129	101	72
% of Land	4.04	3.36	2.54
<b>Other Land</b>			
1000 Acres	249	249	210
% of Land	7.77	8.32	7.41

TABLE 19-121 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 3.2

	1940	1950	1960
<b>Total</b>			
Population	638	738	938
% of Basin	3.41	3.39	3.56
<b>Rural Farm</b>			
Population	177	136	97
% of Basin	8.23	7.76	8.52
<b>Total</b>			
Employment	210	270	318
% of Basin	3.11	3.10	3.23
<b>Agricultural</b>			
Employment	43	31	17
% of Basin	7.42	6.60	5.79
<hr/>			
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	15	12	11
% of Basin	8.13	8.39	8.51
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	118,232	140,434	186,005
% of Basin	6.54	6.98	7.82
<b>CROPS SOLD</b>			
Total	62,213	75,342	104,115
% of Basin	8.30	9.85	10.63
<b>Nursery &amp; Grnhse.</b>			
Number	1,313	1,341	1,765
% of Basin	1.66	1.36	1.72
<b>Forest Prods.</b>			
Number	287	554	545
% of Basin	3.34	4.92	4.24
<b>Commer. Veget.</b>			
Number	2,122	2,504	2,882
% of Basin	3.21	3.58	3.10
<b>LIVESTK. &amp; PROD.</b>			
Total	56,019	65,092	81,689
% of Basin	5.25	5.22	5.85
<b>Dairy Prods.</b>			
Number	30,995	34,393	43,845
% of Basin	5.17	5.07	5.55
<b>Poultry &amp; Prods.</b>			
Number	7,325	5,694	8,432
% of Basin	5.23	4.79	5.57
<b>Cattle &amp; calves</b>			
Number	13,016	19,900	24,026
% of Basin	6.66	6.37	8.11
<b>Hogs &amp; pigs</b>			
Number	4,005	4,389	4,191
% of Basin	3.45	3.62	3.69
<b>Sheep &amp; lambs</b>			
Number	485	517	464
% of Basin	4.54	4.51	4.59

<sup>1</sup> Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-122 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.1**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	374	401	340
1000 Bu.	19,531	23,441	21,907
% of Basin	7.90	7.98	7.71
<b>Corn Silage</b>			
1000 Acres	70	64	79
1000 Tons	576	634	867
% of Basin	5.76	6.01	6.97
<b>Wheat</b>			
1000 Acres	236	222	206
1000 Bu.	6,772	6,756	8,001
% of Basin	10.46	10.96	10.38
<b>Oats</b>			
1000 Acres	236	182	148
1000 Bu.	9,708	9,123	8,994
% of Basin	6.34	6.32	7.53
<b>Barley</b>			
Acres	7,115	9,592	2,856
1000 Bu.	217	300	131
% of Basin	3.49	5.66	4.73
<b>Rye</b>			
Acres	7,335	6,451	4,731
1000 Bu.	139	153	130
% of Basin	7.43	8.76	7.27
<b>Soybeans</b>			
1000 Acres	86	128	138
1000 Bu.	1,830	3,303	3,358
% of Basin	6.27	7.83	7.36
<b>Hay</b>			
1000 Acres	385	303	297
1000 Tons	632	618	633
% of Basin	5.38	5.39	5.48
<b>Alf. &amp; Mix</b>			
1000 Acres	231	214	233
1000 Tons	412	472	534
% of Basin	5.71	6.16	6.15
<b>Potatoes</b>			
Acres	5,791	5,450	4,582
1000 Cwt.	807	811	857
% of Basin	5.19	4.51	4.43
<b>Field Beans</b>			
1000 Acres	40	62	52
1000 Cwt.	255	615	574
% of Basin	5.79	8.97	6.56
<b>Sugar Beets</b>			
Acres	8,530	9,545	13,979
Tons	81,456	140,303	194,030
% of Basin	7.79	8.49	11.55
<b>Commer. Veget.</b>			
Acres	27,136	29,759	28,642
% of Basin	6.26	6.82	6.58
<b>Orchards &amp; Vines</b>			
Acres	17,406	13,439	10,108
% of Basin	4.58	3.68	2.91

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-123 and 19-124.

**TABLE 19-123 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.1**

	1954	1959	1964
<b>FARMS</b>			
Average Size	107	120	133
Average Value	21,377	34,679	44,377
Number	25,423	20,908	17,472
% of Basin	7.10	7.30	7.19
<b>Cash Grain Farms</b>			
Number	5,366	3,431	3,589
% of Basin	9.73	9.53	9.23
<b>Other Field Crops</b>			
Number	130	122	115
% of Basin	4.07	6.26	6.85
<b>Dairy Farms</b>			
Number	6,086	4,704	3,790
% of Basin	5.08	5.34	5.24
<b>Poultry Farms</b>			
Number	820	317	247
% of Basin	6.61	5.21	4.94
<b>Other Livestock</b>			
Number	2,179	1,897	1,586
% of Basin	8.36	7.33	7.54
<b>Fruit &amp; Nut Farms</b>			
Number	191	151	162
% of Basin	2.16	2.11	2.21
<b>Vegetable Farms</b>			
Number	591	451	445
% of Basin	11.22	12.74	12.34
<b>General</b>			
Number	2,228	989	905
% of Basin	6.83	6.10	5.99
<b>Misc. &amp; Unclass.</b>			
Number	7,832	8,846	6,633
% of Basin	8.30	8.71	8.49
<b>LAND IN FARMS</b>			
1000 Acres	2,717	2,506	2,320
% of Basin	6.27	6.34	6.28
<b>Cropland Harvest</b>			
1000 Acres	1,554	1,468	1,360
% of Land	57.18	58.59	58.64
<b>Cropland Pasture</b>			
1000 Acres	321	234	183
% of Land	11.82	9.33	7.88
<b>Other Cropland</b>			
1000 Acres	185	218	276
% of Land	6.79	8.70	11.91
<b>Woods Pasture</b>			
1000 Acres	148	103	83
% of Land	5.44	4.09	3.58
<b>Other Woods</b>			
1000 Acres	147	162	150
% of Land	5.40	6.48	6.46
<b>Other Pasture</b>			
1000 Acres	116	91	76
% of Land	4.27	3.64	3.29
<b>Other Land</b>			
1000 Acres	247	230	191
% of Land	9.09	9.18	8.25

**TABLE 19-124 Population, Employment and Value of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.1**

	1940	1950	1960
<b>Total</b>			
Population	2,697	3,440	4,293
% of Basin	14.42	15.80	16.28
<b>Rural Farm</b>			
Population	158	131	78
% of Basin	7.33	7.46	6.85
<b>Total</b>			
Employment	998	1,348	1,518
% of Basin	14.77	15.47	15.39
<b>Agricultural</b>			
Employment	41	31	21
% of Basin	7.06	6.56	6.97
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	13	11	9
% of Basin	7.34	7.37	7.43
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	113,675	127,624	151,146
% of Basin	6.29	6.34	6.35
<b>CROPS SOLD</b>			
Total	53,810	59,080	68,496
% of Basin	7.18	7.72	7.00
<b>Nursery &amp; Grnhse.</b>			
Number	7,914	9,652	10,720
% of Basin	10.00	9.80	10.44
<b>Forest Prods.</b>			
Number	186	346	405
% of Basin	2.16	3.07	3.15
<b>Commer. Veget.</b>			
Number	4,389	5,590	6,303
% of Basin	6.63	7.99	6.77
<b>LIVESTK. &amp; PROD.</b>			
Total	59,865	68,544	82,471
% of Basin	5.61	5.49	5.91
<b>Dairy Prods.</b>			
Number	31,532	33,897	44,599
% of Basin	5.26	5.00	5.64
<b>Poultry &amp; Prods.</b>			
Number	7,022	4,417	5,772
% of Basin	5.01	3.72	3.81
<b>Cattle &amp; calves</b>			
Number	14,175	23,644	25,005
% of Basin	7.25	7.57	8.44
<b>Hogs &amp; pigs</b>			
Number	5,303	4,759	4,758
% of Basin	4.56	3.93	4.19
<b>Sheep &amp; lambs</b>			
Number	1,350	1,144	1,267
% of Basin	12.63	9.98	12.53

<sup>1</sup> Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-125 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.2**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	1,256	1,375	1,253
1000 Bu.	79,537	86,932	81,870
% of Basin	32.16	29.61	28.81
<b>Corn Silage</b>			
1000 Acres	27	43	66
1000 Tons	293	483	828
% of Basin	2.93	4.58	6.65
<b>Wheat</b>			
1000 Acres	656	494	677
1000 Bu.	17,982	12,033	22,353
% of Basin	27.76	19.52	29.01
<b>Oats</b>			
1000 Acres	483	488	275
1000 Bu.	21,400	21,588	16,110
% of Basin	13.97	14.96	13.49
<b>Barley</b>			
Acres	16,906	15,309	2,503
1000 Bu.	608	464	133
% of Basin	9.76	8.76	4.81
<b>Rye</b>			
Acres	14,679	10,680	9,741
1000 Bu.	292	211	260
% of Basin	15.63	12.10	14.60
<b>Soybeans</b>			
1000 Acres	780	1,003	1,132
1000 Bu.	19,303	25,415	26,355
% of Basin	66.18	60.21	57.73
<b>Hay</b>			
1000 Acres	629	460	411
1000 Tons	1,088	852	867
% of Basin	9.26	7.44	7.50
<b>Alf. &amp; Mix</b>			
1000 Acres	333	209	258
1000 Tons	720	460	637
% of Basin	9.98	6.01	7.32
<b>Potatoes</b>			
Acres	4,796	3,601	4,498
1000 Cwt.	807	535	901
% of Basin	5.19	2.97	4.66
<b>Field Beans</b>			
1000 Acres	0	0	0
1000 Cwt.	0	0	0
% of Basin	0.00	0.00	0.00
<b>Sugar Beets</b>			
Acres	12,768	20,471	28,832
Tons	190,970	364,968	383,341
% of Basin	18.26	22.07	22.82
<b>Commer. Veget.</b>			
Acres	29,863	37,391	36,549
% of Basin	6.89	8.57	8.40
<b>Orchards &amp; Vines</b>			
Acres	11,593	8,578	7,550
% of Basin	3.05	2.35	2.17

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-126 and 19-127.

TABLE 19-126 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.2

	1954	1959	1964
<b>FARMS</b>			
Average Size	121	138	156
Average Value	29,555	44,271	58,683
Number	46,111	40,154	35,201
% of Basin	12.89	14.01	14.48
<b>Cash Grain Farms</b>			
Number	18,895	13,189	14,139
% of Basin	34.25	36.63	36.38
<b>Other Field Crops</b>			
Number	796	56	100
% of Basin	24.93	2.87	5.96
<b>Dairy Farms</b>			
Number	3,297	4,035	3,426
% of Basin	2.75	4.58	4.73
<b>Poultry Farms</b>			
Number	1,566	1,048	1,119
% of Basin	12.62	17.21	22.39
<b>Other Livestock</b>			
Number	6,176	6,306	4,995
% of Basin	23.70	24.37	23.75
<b>Fruit &amp; Nut Farms</b>			
Number	225	160	119
% of Basin	2.54	2.23	1.63
<b>Vegetable Farms</b>			
Number	230	367	395
% of Basin	4.37	10.36	10.95
<b>General</b>			
Number	7,674	4,862	3,260
% of Basin	23.54	29.97	21.59
<b>Misc. &amp; Unclass.</b>			
Number	7,252	10,131	7,648
% of Basin	7.68	9.97	9.79
<b>LAND IN FARMS</b>			
1000 Acres	5,571	5,537	5,477
% of Basin	12.85	14.01	14.82
<b>Cropland Harvest</b>			
1000 Acres	3,993	4,079	3,984
% of Land	71.68	73.66	72.73
<b>Cropland Pasture</b>			
1000 Acres	361	273	196
% of Land	6.49	4.93	3.59
<b>Other Cropland</b>			
1000 Acres	116	175	374
% of Land	2.08	3.16	6.82
<b>Woods Pasture</b>			
1000 Acres	269	167	115
% of Land	4.82	3.01	2.10
<b>Other Woods</b>			
1000 Acres	264	315	324
% of Land	4.74	5.70	5.91
<b>Other Pasture</b>			
1000 Acres	202	153	131
% of Land	3.62	2.76	2.40
<b>Other Land</b>			
1000 Acres	365	375	353
% of Land	6.55	6.78	6.44

TABLE 19-127 Population, Employment, and Value of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.2

	1940	1950	1960
<b>Total</b>			
Population	1,176	1,325	1,566
% of Basin	6.29	6.09	5.94
<b>Rural Farm</b>			
Population	265	213	168
% of Basin	12.32	12.15	14.65
<b>Total</b>			
Employment	411	523	588
% of Basin	6.08	6.00	5.96
<b>Agricultural</b>			
Employment	70	56	35
% of Basin	11.96	12.10	11.87
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	21	19	18
% of Basin	11.59	13.41	14.52
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	307,520	315,383	392,363
% of Basin	17.02	15.67	16.49
<b>CROPS SOLD</b>			
Total	172,234	151,922	204,487
% of Basin	22.97	19.86	20.88
<b>Nursery &amp; Grnhse.</b>			
Number	6,123	6,533	7,110
% of Basin	7.74	6.63	6.92
<b>Forest Prods.</b>			
Number	235	464	540
% of Basin	2.73	4.12	4.21
<b>Commer. Veget.</b>			
Number	6,696	8,483	14,941
% of Basin	10.12	12.12	16.05
<b>LIVESTK. &amp; PROD.</b>			
Total	135,287	163,461	187,669
% of Basin	12.68	13.10	13.44
<b>Dairy Prods.</b>			
Number	35,383	37,020	46,342
% of Basin	5.90	5.46	5.86
<b>Poultry &amp; Prods.</b>			
Number	24,777	26,759	38,219
% of Basin	17.68	22.53	25.22
<b>Cattle &amp; calves</b>			
Number	33,633	61,986	58,570
% of Basin	17.20	19.85	19.76
<b>Hogs &amp; pigs</b>			
Number	37,015	33,151	38,877
% of Basin	31.85	27.38	34.25
<b>Sheep &amp; lambs</b>			
Number	3,286	3,543	3,191
% of Basin	30.75	30.91	31.55

<sup>1</sup> Rounded to 1,000 peopleADDITIONAL SOURCE: Census of Population  
1940, 1950, and 1960

**TABLE 19-128 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.3**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	116	81	73
1000 Bu.	5,004	5,063	4,982
% of Basin	2.02	1.72	1.75
<b>Corn Silage</b>			
1000 Acres	27	18	19
1000 Tons	212	184	218
% of Basin	2.12	1.74	1.76
<b>Wheat</b>			
1000 Acres	79	47	41
1000 Bu.	1,951	1,029	1,269
% of Basin	3.01	1.67	1.65
<b>Oats</b>			
1000 Acres	69	60	45
1000 Bu.	2,842	2,515	2,472
% of Basin	1.86	1.74	2.07
<b>Barley</b>			
Acres	3,427	2,133	1,234
1000 Bu.	114	61	53
% of Basin	1.84	1.15	1.93
<b>Rye</b>			
Acres	2,861	1,360	1,076
1000 Bu.	53	25	27
% of Basin	2.86	1.46	1.50
<b>Soybeans</b>			
1000 Acres	34	28	33
1000 Bu.	569	597	667
% of Basin	1.95	1.42	1.46
<b>Hay</b>			
1000 Acres	171	128	137
1000 Tons	289	252	290
% of Basin	2.46	2.20	2.51
<b>Alf. &amp; Mix.</b>			
1000 Acres	55	34	59
1000 Tons	107	79	155
% of Basin	1.48	1.03	1.78
<b>Potatoes</b>			
Acres	3,303	2,841	2,863
1000 Cwt.	484	540	615
% of Basin	3.11	3.00	3.18
<b>Field Beans</b>			
1000 Acres	0	0	0
1000 Cwt.	0	0	0
% of Basin	0.00	0.00	0.00
<b>Sugar Beets</b>			
Acres	1	0	0
Tons	5	0	0
% of Basin	0.00	0.00	0.00
<b>Commer. Veget.</b>			
Acres	8,787	6,973	6,887
% of Basin	2.03	1.60	1.58
<b>Orchards &amp; Vines</b>			
Acres	19,387	13,199	9,472
% of Basin	5.10	3.61	2.72

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-129 and 19-130.

**TABLE 19-129 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.3**

	1954	1959	1964
<b>FARMS</b>			
Average Size	75	93	104
Average Value	18,206	32,175	43,689
Number	17,211	10,748	8,563
% of Basin	4.81	3.75	3.52
<b>Cash Grain Farms</b>			
Number	1,518	297	510
% of Basin	2.75	0.82	1.31
<b>Other Field Crops</b>			
Number	75	29	28
% of Basin	2.35	1.49	1.67
<b>Dairy Farms</b>			
Number	3,905	2,566	1,808
% of Basin	3.26	2.91	2.50
<b>Poultry Farms</b>			
Number	870	391	243
% of Basin	7.01	6.42	4.86
<b>Other Livestock</b>			
Number	932	595	467
% of Basin	3.58	2.30	2.22
<b>Fruit &amp; Nut Farms</b>			
Number	460	255	294
% of Basin	5.20	3.56	4.02
<b>Vegetable Farms</b>			
Number	280	102	117
% of Basin	5.32	2.88	3.24
<b>General</b>			
Number	782	336	471
% of Basin	2.40	2.07	3.12
<b>Misc. &amp; Unclass</b>			
Number	8,389	6,177	4,625
% of Basin	8.89	6.08	5.92
<b>LAND IN FARMS</b>			
1000 Acres	1,299	1,004	892
% of Basin	3.00	2.54	2.41
<b>Cropland Harvest</b>			
1000 Acres	560	415	392
% of Land	43.09	41.33	43.96
<b>Cropland Pasture</b>			
1000 Acres	81	71	59
% of Land	6.26	7.10	6.64
<b>Other Cropland</b>			
1000 Acres	129	120	105
% of Land	9.90	11.94	11.76
<b>Woods Pasture</b>			
1000 Acres	104	65	51
% of Land	7.99	6.50	5.73
<b>Other Woods</b>			
1000 Acres	142	126	121
% of Land	10.91	12.51	13.53
<b>Other Pasture</b>			
1000 Acres	179	114	90
% of Land	13.81	11.32	10.04
<b>Other Land</b>			
1000 Acres	104	93	74
% of Land	8.04	9.31	8.33

**TABLE 19-130 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.3**

	1940	1950	1960
<b>Total</b>			
Population	1,887	2,233	2,825
% of Basin	10.09	10.26	10.72
<b>Rural Farm</b>			
Population	102	71	34
% of Basin	4.74	4.05	2.96
<b>Total</b>			
Employment	681	913	1,066
% of Basin	10.08	10.48	10.80
<b>Agricultural</b>			
Employment	26	19	13
% of Basin	4.39	4.16	4.55
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	11	6	5
% of Basin	6.12	4.10	3.77
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	64,204	71,601	78,301
% of Basin	3.55	3.56	3.29
<b>CROPS SOLD</b>			
Total	31,671	38,514	42,672
% of Basin	4.22	5.04	4.36
<b>Nursery &amp; Grnhse.</b>			
Number	17,155	26,051	25,467
% of Basin	21.67	26.45	24.80
<b>Forest Prods.</b>			
Number	199	588	653
% of Basin	2.31	5.21	5.08
<b>Commer. Veget.</b>			
Number	2,388	2,088	2,329
% of Basin	3.61	2.98	2.50
<b>LIVESTK. &amp; PROD.</b>			
Total	32,533	33,087	35,386
% of Basin	3.05	2.65	2.53
<b>Dairy Prods.</b>			
Number	18,600	20,143	21,266
% of Basin	3.10	2.97	2.69
<b>Poultry &amp; Prods.</b>			
Number	6,504	4,186	5,559
% of Basin	4.64	3.52	3.67
<b>Cattle &amp; calves</b>			
Number	5,120	6,672	5,459
% of Basin	2.62	2.14	1.84
<b>Hogs &amp; pigs</b>			
Number	1,870	1,488	1,178
% of Basin	1.61	1.23	1.04
<b>Sheep &amp; lambs</b>			
Number	237	224	192
% of Basin	2.22	1.95	1.90

<sup>1</sup>Rounded to 1,000 people.

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-131 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 4.4**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	43	34	30
1000 Bu.	2,027	1,693	2,197
% of Basin	0.82	0.58	0.77
<b>Corn Silage</b>			
1000 Acres	51	42	42
1000 Tons	423	427	546
% of Basin	4.23	4.05	4.39
<b>Wheat</b>			
1000 Acres	56	33	29
1000 Bu.	1,606	948	1,042
% of Basin	2.48	1.54	1.35
<b>Oats</b>			
1000 Acres	89	78	66
1000 Bu.	3,649	4,165	3,642
% of Basin	2.38	2.89	3.05
<b>Barley</b>			
Acres	3,303	2,973	1,020
1000 Bu.	105	82	46
% of Basin	1.68	1.55	1.66
<b>Rye</b>			
Acres	2,652	1,995	2,448
1000 Bu.	50	47	72
% of Basin	2.67	2.69	4.02
<b>Soybeans</b>			
1000 Acres	1	0	0
1000 Bu.	9	2	3
% of Basin	0.03	0.01	0.01
<b>Hay</b>			
1000 Acres	314	288	290
1000 Tons	598	572	635
% of Basin	5.09	4.99	5.50
<b>Alf. &amp; Mix</b>			
1000 Acres	59	66	100
1000 Tons	125	153	268
% of Basin	1.74	2.00	3.08
<b>Potatoes</b>			
Acres	7,926	5,535	5,157
1000 Cwt	867	1,024	1,096
% of Basin	5.58	5.69	5.67
<b>Field Beans</b>			
1000 Acres	2	1	1
1000 Cwt.	14	8	12
% of Basin	0.32	0.11	0.14
<b>Sugar Beets</b>			
Acres	0	0	0
Tons	0	0	0
% of Basin	0.00	0.00	0.00
<b>Commer. Veget.</b>			
Acres	30,299	28,714	37,053
% of Basin	6.99	6.58	8.51
<b>Orchards &amp; Vines</b>			
Acres	54,263	49,262	47,590
% of Basin	14.28	13.47	13.68

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-132 and 19-133.

**TABLE 19-132 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 4.4**

	1954	1959	1964
<b>FARMS</b>			
Average Size	102	116	129
Average Value	13,816	21,991	26,967
Number	18,165	13,730	11,297
% of Basin	5.08	4.79	4.65
<b>Cash Grain Farms</b>			
Number	511	171	174
% of Basin	0.93	0.47	0.45
<b>Other Field Crops</b>			
Number	94	83	61
% of Basin	2.94	4.26	3.64
<b>Dairy Farms</b>			
Number	6,486	4,691	3,860
% of Basin	5.41	5.32	5.33
<b>Poultry Farms</b>			
Number	955	381	237
% of Basin	7.70	6.26	4.74
<b>Other Livestock</b>			
Number	702	556	412
% of Basin	2.69	2.15	1.96
<b>Fruit &amp; Nut Farms</b>			
Number	1,752	1,226	1,368
% of Basin	19.81	17.11	18.69
<b>Vegetable Farms</b>			
Number	371	205	227
% of Basin	7.05	5.79	6.29
<b>General Farms</b>			
Number	898	377	589
% of Basin	2.75	2.32	3.90
<b>Misc. &amp; Unclass.</b>			
Number	6,396	6,040	4,369
% of Basin	6.77	5.95	5.59
<b>LAND IN FARMS</b>			
1000 Acres	1,848	1,593	1,453
% of Basin	4.26	4.03	3.93
<b>Cropland Harvest</b>			
1000 Acres	694	599	576
% of Land	37.58	37.58	39.65
<b>Cropland Pasture</b>			
1000 Acres	162	115	97
% of Land	8.74	7.22	6.65
<b>Other Cropland</b>			
1000 Acres	166	148	130
% of Land	8.96	9.26	8.97
<b>Woods Pasture</b>			
1000 Acres	186	128	106
% of Land	10.05	8.03	7.29
<b>Other Woods</b>			
1000 Acres	212	219	219
% of Land	11.47	13.73	15.09
<b>Other Pasture</b>			
1000 Acres	329	270	231
% of Land	17.81	16.97	15.86
<b>Other Land</b>			
1000 Acres	100	115	94
% of Land	5.40	7.21	6.47

**TABLE 19-133 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 4.4**

	1940	1950	1960
<b>Total</b>			
Population	1,336	1,522	1,783
% of Basin	7.14	6.99	6.76
<b>Rural Farm</b>			
Population	111	98	48
% of Basin	5.16	5.60	4.21
<b>Total</b>			
Employment	461	594	649
% of Basin	6.82	6.82	6.58
<b>Agricultural</b>			
Employment	28	22	14
% of Basin	4.70	4.72	4.81
<hr/>			
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	10	7	6
% of Basin	5.54	5.17	4.72
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	85,920	92,978	111,479
% of Basin	4.76	4.62	4.69
<b>CROPS SOLD</b>			
Total	35,335	33,831	47,049
% of Basin	4.71	4.42	4.81
<b>Nursery &amp; Grnhse.</b>			
Number	4,027	5,106	5,745
% of Basin	5.09	5.18	5.59
<b>Forest Prods.</b>			
Number	881	1,013	1,107
% of Basin	10.25	8.99	8.61
<b>Commer. Veget.</b>			
Number	5,574	5,387	8,118
% of Basin	8.42	7.70	8.72
<b>LIVESTK. &amp; PROD.</b>			
Total	50,585	59,147	64,295
% of Basin	4.74	4.74	4.60
<b>Dairy Prods.</b>			
Number	35,862	42,183	48,700
% of Basin	5.98	6.22	6.16
<b>Poultry &amp; Prods.</b>			
Number	7,610	6,057	6,102
% of Basin	5.43	5.10	4.03
<b>Cattle &amp; calves</b>			
Number	5,789	9,651	7,699
% of Basin	2.96	3.09	2.60
<b>Hogs &amp; pigs</b>			
Number	1,113	929	758
% of Basin	0.96	0.77	0.67
<b>Sheep &amp; lambs</b>			
Number	90	143	112
% of Basin	0.84	1.25	1.11

<sup>1</sup>Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-134 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 5.1**

	1954	1959	1964
Corn Grain			
1000 Acres	64	47	51
1000 Bu.	3,296	2,560	3,577
% of Basin	1.33	0.87	1.26
Corn Silage			
1000 Acres	57	54	52
1000 Tons	493	525	622
% of Basin	4.93	4.98	5.00
Wheat			
1000 Acres	109	87	71
1000 Bu.	3,467	2,628	2,843
% of Basin	5.35	4.26	3.69
Oats			
1000 Acres	114	103	89
1000 Bu.	4,390	5,825	5,246
% of Basin	2.87	4.04	4.39
Barley			
Acres	10,333	7,500	2,625
1000 Bu.	362	228	127
% of Basin	5.81	4.30	4.59
Rye			
Acres	2,572	1,597	2,498
1000 Bu.	59	41	79
% of Basin	3.18	2.36	4.46
Soybeans			
1000 Acres	0	0	0
1000 Bu.	7	2	0
% of Basin	0.02	0.00	0.00
Hay			
1000 Acres	271	260	271
1000 Tons	516	543	627
% of Basin	4.39	4.74	5.43
Alf. & Mix			
1000 Acres	117	142	173
1000 Tons	253	333	454
% of Basin	3.50	4.35	5.22
Potatoes			
Acres	11,662	9,628	9,472
1000 Cwt.	1,428	1,814	2,058
% of Basin	9.18	10.09	10.64
Field Beans			
1000 Acres	45	34	39
1000 Cwt.	444	315	528
% of Basin	10.09	4.58	6.03
Sugar Beets			
Acres	0	0	0
Tons	0	0	0
% of Basin	0.00	0.00	0.00
Commer. Veget.			
Acres	45,877	48,462	45,285
% of Basin	10.59	11.11	10.40
Orchards & Vines			
Acres	22,359	19,903	18,321
% of Basin	5.88	5.44	5.27

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-135 and 19-136.

**TABLE 19-135 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 5.1**

	1954	1959	1964
FARMS			
Average Size	144	165	190
Average Value	16,215	25,985	35,441
Number	12,056	9,363	7,556
% of Basin	3.37	3.27	3.11
Cash Grain Farms			
Number	1,085	329	464
% of Basin	1.97	0.91	1.19
Other Field Crops			
Number	112	67	71
% of Basin	3.51	3.44	4.23
Dairy Farms			
Number	4,628	3,881	2,873
% of Basin	3.86	4.40	3.97
Poultry Farms			
Number	500	253	139
% of Basin	4.03	4.16	2.78
Other Livestock			
Number	455	455	367
% of Basin	1.75	1.76	1.74
Fruit & Nut Farms			
Number	458	260	214
% of Basin	5.18	3.63	2.92
Vegetable Farms			
Number	397	340	280
% of Basin	7.54	9.60	7.76
General			
Number	988	501	655
% of Basin	3.03	3.09	4.34
Misc. & Unclass.			
Number	3,433	3,277	2,493
% of Basin	3.64	3.23	3.19
LAND IN FARMS			
1000 Acres	1,738	1,547	1,437
% of Basin	4.01	3.92	3.89
Cropland Harvest			
1000 Acres	789	695	673
% of Land	45.40	44.91	46.83
Cropland Pasture			
1000 Acres	182	165	126
% of Land	10.47	10.67	8.80
Other Cropland			
1000 Acres	128	142	139
% of Land	7.35	9.16	9.69
Woods Pasture			
1000 Acres	99	74	66
% of Land	5.68	4.78	4.56
Other Woods			
1000 Acres	180	176	176
% of Land	10.37	11.37	12.27
Other Pasture			
1000 Acres	247	178	157
% of Land	14.18	11.53	10.90
Other Land			
1000 Acres	114	117	100
% of Land	6.54	7.59	6.95

**TABLE 19-136 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 5.1**

	1940	1950	1960
<b>Total</b>			
Population	620	682	797
% of Basin	3.32	3.13	3.02
<b>Rural Farm</b>			
Population	78	67	38
% of Basin	3.64	3.82	3.35
<b>Total</b>			
Employment	228	272	306
% of Basin	3.37	3.12	3.10
<b>Agricultural</b>			
Employment	23	18	12
% of Basin	3.89	3.80	4.11
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	6	4	4
% of Basin	3.29	3.04	2.87
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	84,458	91,168	104,722
% of Basin	4.68	4.53	4.40
<b>CROPS SOLD</b>			
Total	38,824	33,060	43,163
% of Basin	5.18	4.32	4.41
<b>Nursery &amp; Grnhse.</b>			
Number	3,585	4,062	4,275
% of Basin	4.53	4.12	4.16
<b>Forest Prods.</b>			
Number	498	689	693
% of Basin	5.79	6.11	5.39
<b>Commer. Veget.</b>			
Number	7,472	8,138	10,564
% of Basin	11.29	11.63	11.35
<b>LIVESTK. &amp; PROD.</b>			
Total	45,634	58,108	61,464
% of Basin	4.28	4.66	4.40
<b>Dairy Prods.</b>			
Number	33,026	42,345	47,330
% of Basin	5.51	6.24	5.99
<b>Poultry &amp; Prods.</b>			
Number	5,089	4,409	4,186
% of Basin	3.63	3.71	2.76
<b>Cattle &amp; calves</b>			
Number	5,430	9,050	8,126
% of Basin	2.78	2.90	2.74
<b>Hogs &amp; pigs</b>			
Number	1,089	1,084	872
% of Basin	0.94	0.90	0.77
<b>Sheep &amp; lambs</b>			
Number	771	895	483
% of Basin	7.22	7.81	4.78

<sup>1</sup> Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-137 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 5.2**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	95	104	84
1000 Bu.	4,286	6,024	5,417
% of Basin	1.73	2.05	1.91
<b>Corn Silage</b>			
1000 Acres	127	101	112
1000 Tons	1,022	1,068	1,143
% of Basin	10.22	10.12	9.19
<b>Wheat</b>			
1000 Acres	128	101	80
1000 Bu.	4,013	3,181	2,874
% of Basin	6.20	5.16	3.73
<b>Oats</b>			
1000 Acres	188	194	157
1000 Bu.	6,649	11,061	8,650
% of Basin	4.34	7.66	7.25
<b>Barley</b>			
Acres	12,447	12,130	5,430
1000 Bu.	369	359	249
% of Basin	5.92	6.78	9.01
<b>Rye</b>			
Acres	3,035	3,165	4,760
1000 Bu.	65	83	149
% of Basin	3.47	4.75	8.36
<b>Soybeans</b>			
1000 Acres	7	2	0
1000 Bu.	70	33	0
% of Basin	0.24	0.08	0.00
<b>Hay</b>			
1000 Acres	563	536	548
1000 Tons	1,101	1,136	1,086
% of Basin	9.37	9.91	9.40
<b>Alf. &amp; Mix</b>			
1000 Acres	243	272	325
1000 Tons	541	649	724
% of Basin	7.50	8.47	8.33
<b>Potatoes</b>			
Acres	9,140	9,636	9,598
1000 Cwt.	908	2,007	1,856
% of Basin	5.84	11.16	9.60
<b>Field Beans</b>			
1000 Acres	71	48	49
1000 Cwt.	641	495	547
% of Basin	14.57	7.21	6.24
<b>Sugar Beets</b>			
Acres	0	0	0
Tons	0	0	0
% of Basin	0.00	0.00	0.00
<b>Commer. Veget.</b>			
Acres	57,681	56,479	48,528
% of Basin	13.32	12.95	11.15
<b>Orchards &amp; Vines</b>			
Acres	50,830	47,517	45,731
% of Basin	13.37	13.00	13.15

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-138 and 19-139.

**TABLE 19-138 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 5.2**

	1954	1959	1964
<b>FARMS</b>			
Average Size	128	151	173
Average Value	12,956	20,450	28,620
Number	24,909	19,377	15,561
% of Basin	6.96	6.76	6.40
<b>Cash Grain Farms</b>			
Number	2,012	1,061	860
% of Basin	3.65	2.95	2.21
<b>Other Field Crops</b>			
Number	81	88	82
% of Basin	2.54	4.52	4.89
<b>Dairy Farms</b>			
Number	9,864	8,382	6,593
% of Basin	8.23	9.51	9.11
<b>Poultry Farms</b>			
Number	1,550	778	426
% of Basin	12.49	12.78	8.52
<b>Other Livestock</b>			
Number	776	633	622
% of Basin	2.98	2.45	2.96
<b>Fruit &amp; Nut Farms</b>			
Number	1,067	807	756
% of Basin	12.06	11.26	10.33
<b>Vegetable Farms</b>			
Number	670	374	364
% of Basin	12.72	10.56	10.09
<b>General</b>			
Number	1,515	809	975
% of Basin	4.65	4.99	6.46
<b>Misc. &amp; Unclass.</b>			
Number	7,374	6,445	4,883
% of Basin	7.81	6.34	6.25
<b>LAND IN FARMS</b>			
1000 Acres	3,197	2,924	2,687
% of Basin	7.37	7.40	7.27
<b>Cropland Harvest</b>			
1000 Acres	1,381	1,258	1,180
% of Land	43.19	43.02	43.93
<b>Cropland Pasture</b>			
1000 Acres	319	286	222
% of Land	9.97	9.79	8.24
<b>Other Cropland</b>			
1000 Acres	209	210	214
% of Land	6.54	7.18	7.97
<b>Woods Pasture</b>			
1000 Acres	167	125	108
% of Land	5.24	4.29	4.02
<b>Other Woods</b>			
1000 Acres	341	343	344
% of Land	10.65	11.75	12.80
<b>Other Pasture</b>			
1000 Acres	555	459	416
% of Land	17.37	15.71	15.48
<b>Other Land</b>			
1000 Acres	225	242	203
% of Land	7.05	8.27	7.54

**TABLE 19-139 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 5.2**

	1940	1950	1960
<b>Total</b>			
Population	915	1,057	1,236
% of Basin	4.89	4.86	4.69
<b>Rural Farm</b>			
Population	163	135	79
% of Basin	7.55	7.70	6.89
<b>Total</b>			
Employment	336	401	457
% of Basin	4.97	4.61	4.63
<b>Agricultural</b>			
Employment	47	36	24
% of Basin	7.98	7.69	8.21
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	12	9	7
% of Basin	6.75	6.34	5.71
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	148,427	173,595	188,430
% of Basin	8.22	8.63	7.92
<b>CROPS SOLD</b>			
Total	50,276	51,493	59,460
% of Basin	6.71	6.73	6.07
<b>Nursery &amp; Grnhse.</b>			
Number	3,198	5,275	5,165
% of Basin	4.04	5.36	5.03
<b>Forest Prods.</b>			
Number	551	902	748
% of Basin	6.41	8.01	5.82
<b>Commer. Veget.</b>			
Number	8,825	9,637	9,952
% of Basin	13.34	13.77	10.69
<b>LIVESTK. &amp; PROD.</b>			
Total	98,151	122,101	128,889
% of Basin	9.20	9.79	9.23
<b>Dairy Prods.</b>			
Number	71,620	91,727	98,493
% of Basin	11.94	13.52	12.46
<b>Poultry &amp; Prods.</b>			
Number	15,191	12,820	13,276
% of Basin	10.84	10.79	8.76
<b>Cattle &amp; calves</b>			
Number	9,425	15,562	14,018
% of Basin	4.82	4.98	4.73
<b>Hogs &amp; pigs</b>			
Number	1,172	1,247	827
% of Basin	1.01	1.03	0.73
<b>Sheep &amp; lambs</b>			
Number	464	453	472
% of Basin	4.35	3.95	4.67

<sup>1</sup>Rounded to 1,000 people

ADDITIONAL SOURCE: Census of Population 1940, 1950, and 1960

**TABLE 19-140 Acreage and Production of Principal Crops and Percentage of Total Great Lakes Basin Production, Planning Subarea 5.3**

	1954	1959	1964
<b>Corn Grain</b>			
1000 Acres	2	2	1
1000 Bu.	75	91	64
% of Basin	0.03	0.03	0.02
<b>Corn Silage</b>			
1000 Acres	37	30	34
1000 Tons	336	333	376
% of Basin	3.36	3.16	3.03
<b>Wheat</b>			
1000 Acres	6	1	1
1000 Bu.	129	32	41
% of Basin	0.20	0.05	0.05
<b>Oats</b>			
1000 Acres	82	74	60
1000 Bu.	2,653	3,634	2,807
% of Basin	1.73	2.52	2.35
<b>Barley</b>			
Acres	649	305	350
1000 Bu.	16	10	13
% of Basin	0.26	0.20	0.46
<b>Rye</b>			
Acres	89	86	32
1000 Bu.	1	2	1
% of Basin	0.07	0.09	0.05
<b>Soybeans</b>			
1000 Acres	0	0	0
1000 Bu.	2	0	0
% of Basin	0.01	0.00	0.00
<b>Hay</b>			
1000 Acres	422	391	387
1000 Tons	739	734	651
% of Basin	6.29	6.40	5.63
<b>Alf. &amp; Mix</b>			
1000 Acres	100	83	118
1000 Tons	208	191	251
% of Basin	2.88	2.50	2.89
<b>Potatoes</b>			
Acres	828	427	241
1000 Cwt.	58	63	41
% of Basin	0.37	0.35	0.21
<b>Field Beans</b>			
1000 Acres	0	0	0
1000 Tons	3	1	0
% of Basin	0.07	0.01	0.01
<b>Sugar Beets</b>			
Acres	0	0	0
Tons	0	0	0
% of Basin	0.00	0.00	0.00
<b>Commer. Veget.</b>			
Acres	374	289	222
% of Basin	0.09	0.07	0.05
<b>Orchards &amp; Vines</b>			
Acres	105	130	79
% of Basin	0.03	0.04	0.02

Source: U.S. Department of Commerce, U.S. Census of Agriculture, 1954, 1959, and 1964. Same for Tables 19-141 and 19-142.

**TABLE 19-141 Number, Size, Value, and Types of Farms, and Major Land Use in the Great Lakes Basin, Planning Subarea 5.3**

	1954	1959	1964
<b>FARMS</b>			
Average Size	192	215	233
Average Value	10,341	13,595	18,074
Number	8,899	7,107	6,034
% of Basin	2.49	2.48	2.48
<b>Cash Grain Farms</b>			
Number	15	0	9
% of Basin	0.03	0.00	0.02
<b>Other Field Crops</b>			
Number	30	0	5
% of Basin	0.94	0.00	0.30
<b>Dairy Farms</b>			
Number	6,576	5,006	4,325
% of Basin	5.48	5.68	5.98
<b>Poultry Farms</b>			
Number	213	65	57
% of Basin	1.72	1.07	1.14
<b>Other Livestock</b>			
Number	225	237	148
% of Basin	0.86	0.92	0.70
<b>Fruit &amp; Nut Farms</b>			
Number	0	0	1
% of Basin	0.00	0.00	0.01
<b>Vegetable Farms</b>			
Number	10	5	9
% of Basin	0.19	0.14	0.25
<b>General</b>			
Number	185	145	246
% of Basin	0.57	0.89	1.63
<b>Misc. &amp; Unclass.</b>			
Number	1,645	1,649	1,234
% of Basin	1.74	1.62	1.58
<b>LAND IN FARMS</b>			
1000 Acres	1,705	1,525	1,407
% of Basin	3.93	3.86	3.81
<b>Cropland Harvest</b>			
1000 Acres	576	515	500
% of Land	33.79	33.78	35.50
<b>Cropland Pasture</b>			
1000 Acres	172	171	133
% of Land	10.12	11.20	9.43
<b>Other Cropland</b>			
1000 Acres	77	65	44
% of Land	4.53	4.24	3.13
<b>Woods Pasture</b>			
1000 Acres	191	153	141
% of Land	11.19	10.04	10.03
<b>Other Woods</b>			
1000 Acres	165	174	157
% of Land	9.67	11.41	11.15
<b>Other Pasture</b>			
1000 Acres	456	370	350
% of Land	26.74	24.23	24.88
<b>Other Land</b>			
1000 Acres	68	77	83
% of Land	3.96	5.08	5.88

**TABLE 19-142 Population, Employment, and Values of Farm Products Sold for the Great Lakes Basin, Planning Subarea 5.3**

	1940	1950	1960
<b>Total</b>			
Population	198	207	222
% of Basin	1.06	0.95	0.84
<b>Rural Farm</b>			
Population	55	46	30
% of Basin	2.55	2.64	2.64
<b>Total</b>			
Employment	66	71	72
% of Basin	0.98	0.81	0.73
<b>Agricultural</b>			
Employment	17	14	9
% of Basin	2.85	2.99	3.08
	1954	1959	1964
<b>Farmers</b>			
Work Off Farm <sup>1</sup>	4	3	2
% of Basin	2.02	2.04	1.96
<b>PRODUCTS SOLD</b> (Value in \$1000)			
<b>FARM PRODUCTS</b>			
TOTAL	47,264	57,156	64,318
% of Basin	2.62	2.84	2.70
<b>CROPS SOLD</b>			
Total	1,943	2,840	3,858
% of Basin	0.26	0.37	0.39
<b>Nursery &amp; grnhse.</b>			
Number	180	264	247
% of Basin	0.23	0.27	0.24
<b>Forest Prods.</b>			
Number	779	898	1,030
% of Basin	9.06	7.97	8.01
<b>Commer. Veget.</b>			
Number	56	52	43
% of Basin	0.09	0.07	0.05
<b>LIVESTK. &amp; PROD.</b>			
Total	45,321	54,316	60,389
% of Basin	4.25	4.35	4.32
<b>Dairy Prods.</b>			
Number	38,951	44,601	51,459
% of Basin	6.50	6.57	6.51
<b>Poultry &amp; Prods.</b>			
Number	2,098	2,251	2,751
% of Basin	1.50	1.90	1.82
<b>Cattle &amp; calves</b>			
Number	3,996	7,066	5,657
% of Basin	2.04	2.26	1.91
<b>Hogs &amp; pigs</b>			
Number	181	190	66
% of Basin	0.16	0.16	0.06
<b>Sheep &amp; lambs</b>			
Number	49	58	38
% of Basin	0.46	0.51	0.38

<sup>1</sup>Rounded to 1,000 peopleADDITIONAL SOURCE: Census of Population  
1940, 1950, and 1960

and feeding efficiencies. Only time will tell how rapidly new technologies now being developed will be available for general use. Possible effects of potential technology can only be estimated. Following are some of the more important general developments that are expected to be major contributors to increased production.

Plant varieties will be better adapted to variations in climate, more resistant to diseases and insects, more efficient in their use of water and nutrients, and more compact, with a higher proportion of fruit to foliage. Plants whose seed will germinate and grow under cold soil conditions are being developed. This should result in better use of early moisture and partial escape from hot, dry weather.

Development of additional hybrid varieties is a prospect. For example, the discovery of male sterility in certain small grains will make it possible to develop new hybrids under field conditions.

Spacing rows and plants closer together will result in greater ground use and yields. Heavier applications of high-analysis fertilizers is also expected to increase yields.

Widespread use of systemic insecticides, fungicides, and specific herbicides will increase yields by reducing pest control problems. However, usage will have to be judicious in keeping with realistic concern for environmental effects.

The use of mechanical harvesting of many fruits and vegetables, which will be widespread, will greatly reduce labor requirements. Varieties that are adapted to mechanical harvesting and designed to mature uniformly at a certain time rather than over an extended period will also be developed.

Much greater use of performance testing in beef cattle and selection for rapid rates of gain will result from the discovery that this characteristic is heritable. Artificial insemination will play an extended role in making superior sires available in dairy, beef, and swine production.

Trends toward specialization, increased farm size and scale of operations, and improvements in the organization and management of the farm business will continue and become increasingly important in meeting production objectives.

The projections of increased crop production and improved feeding efficiencies for 1980, 2000, and 2020 are based on approximations of the technology that farmers will use, given assumed conditions. They do represent the best available estimates and should be con-

**TABLE 19-143 Projections of Land Requirements for Urban and Associated Uses and the Land Resource Base, Great Lakes Basin Planning Subareas (1,000 acres)**

Planning Subarea	Actual 1966-67	Projected			Planning Subarea	Actual 1966-67	Projected		
		1980	2000	2020			1980	2000	2020
<u>1.1</u>					<u>4.1</u>				
Urbanized Area <sup>1</sup>	284.5	285.2	293.0	307.9	Urbanized Area <sup>1</sup>	759.4	1,053.9	1,471.0	1,747.3
Resource Base <sup>2</sup>	9,189.0	9,188.3	9,180.5	9,165.6	Resource Base <sup>2</sup>	3,221.0	2,926.5	2,509.4	2,233.1
Total Land	9,473.5	9,473.5	9,473.5	9,473.5	Total Land	3,980.4	3,980.4	3,980.4	3,980.4
<u>1.2</u>					<u>4.2</u>				
Urbanized Area <sup>1</sup>	137.8	137.8	138.8	142.0	Urbanized Area <sup>1</sup>	567.8	630.5	732.1	838.9
Resource Base <sup>2</sup>	6,304.0	6,304.0	6,303.0	6,299.8	Resource Base <sup>2</sup>	5,751.6	5,688.9	5,587.3	5,480.5
Total Land	6,441.8	6,441.8	6,441.8	6,441.8	Total Land	6,319.4	6,319.4	6,319.4	6,319.4
<u>2.1</u>					<u>4.3</u>				
Urbanized Area <sup>1</sup>	464.0	487.0	530.2	583.5	Urbanized Area <sup>1</sup>	609.0	749.4	1,009.6	1,227.8
Resource Base <sup>2</sup>	9,546.7	9,523.7	9,480.5	9,427.2	Resource Base <sup>2</sup>	1,699.6	1,559.2	1,299.0	1,080.8
Total Land	10,010.7	10,010.7	10,010.7	10,010.7	Total Land	2,308.6	2,308.6	2,308.6	2,308.6
<u>2.2</u>					<u>4.4</u>				
Urbanized Area <sup>1</sup>	1,210.5	1,726.2	2,397.7	2,902.6	Urbanized Area <sup>1</sup>	485.0	537.6	630.4	716.1
Resource Base <sup>2</sup>	4,001.6	3,485.9	2,814.4	2,309.5	Resource Base <sup>2</sup>	2,584.9	2,532.3	2,439.5	2,353.8
Total Land	5,212.1	5,212.1	5,212.1	5,212.1	Total Land	3,069.9	3,069.9	3,069.9	3,069.9
<u>2.3</u>					<u>5.1</u>				
Urbanized Area <sup>1</sup>	818.5	923.5	1,083.2	1,279.9	Urbanized Area <sup>1</sup>	271.1	301.3	341.9	393.3
Resource Base <sup>2</sup>	8,136.9	8,031.9	7,872.2	7,675.5	Resource Base <sup>2</sup>	2,187.6	2,157.4	2,116.8	2,065.4
Total Land	8,955.4	8,955.4	8,955.4	8,955.4	Total Land	2,458.7	2,458.7	2,458.7	2,458.7
<u>2.4</u>					<u>5.2</u>				
Urbanized Area <sup>1</sup>	414.8	429.9	458.7	492.0	Urbanized Area <sup>1</sup>	250.7	322.9	414.0	512.0
Resource Base <sup>2</sup>	7,679.4	7,664.3	7,635.5	7,602.2	Resource Base <sup>2</sup>	5,176.7	5,104.5	5,013.4	4,915.4
Total Land	8,094.2	8,094.2	8,094.2	8,094.2	Total Land	5,427.4	5,427.4	5,427.4	5,427.4
<u>3.1</u>					<u>5.3</u>				
Urbanized Area <sup>1</sup>	179.6	187.9	198.8	212.4	Urbanized Area <sup>1</sup>	145.9	146.7	153.8	161.8
Resource Base <sup>2</sup>	3,838.2	3,829.9	3,819.0	3,805.4	Resource Base <sup>2</sup>	3,239.7	3,238.9	3,231.8	3,223.8
Total Land	4,017.8	4,017.8	4,017.8	4,017.8	Total Land	3,385.6	3,385.6	3,385.6	3,385.6
<u>3.2</u>					<u>Basin Totals</u>				
Urbanized Area <sup>1</sup>	389.0	441.1	517.1	569.1	Urbanized Area <sup>1</sup>	6,987.6	8,360.9	10,370.3	12,086.6
Resource Base <sup>2</sup>	4,035.1	3,983.0	3,907.0	3,855.0	Resource Base <sup>2</sup>	76,592.0	75,218.7	73,209.3	71,493.0
Total Land	4,424.1	4,424.1	4,424.1	4,424.1	Total Land	83,579.6	83,579.6	83,579.6	83,579.6

<sup>1</sup>Includes projections for urban and urban build-up, transportation, industrial, and land-based recreational developments.

<sup>2</sup>Total land = total area minus water area. Total land is assumed constant for all periods.

considered as reasonably obtainable provided scientists continue to develop new technology and farmers continue to adopt it.

### 3.4.2.2 Technological Developments for Individual Crops

#### (1) Wheat

New developments in wheat production are expected to come from the plant breeding programs. Varieties resistant to the Hessian fly, which reduced yields three to four percent, are expected to reduce this loss materially. They will permit earlier planting and respond to larger fertilizer applications. Both will increase yields.

#### (2) Other Small Grains

Increased yields in all grains are expected to come from cross breeding. Beneficial characteristics, such as short straw varieties of wheat, are expected to be developed. The

hybridization of barley is expected to cause a breakthrough in yields, which will allow competition with corn in the production of feed grains on lighter soils.

#### (3) Soybeans

Yield improvements in soybeans are not expected to come from intensive plant breeding experiments but through improvements in management. Disease resistant varieties will increase yields. Closer row spacing and the use of herbicides have reduced labor needed per acre and increased yields by more than 25 percent in experimental work.

#### (4) Corn

Improved management techniques resulting from efficiencies of larger scale operations and more efficient harvesting equipment will account for much of the projected yield increases of corn. Higher plant populations per acre from closer row spacing, heavier fertilization on better soils, improved hybrids, varieties resistant to rootworm and corn dwarf

viruses, better weed control, and more timely planting and harvesting are expected to contribute to corn yield increases.

#### (5) Dry Beans

Development of new varieties suited to direct harvesting methods are expected to increase the quality of the bean and reduce the number of damaged beans thereby increasing the net yields. Labor requirements will also be reduced considerably. Adoption of improved production practices will increase yields by 20 percent through better weed control, heavier planting rates, and the use of superior seed that incorporates disease resistance and earlier maturity.

#### (6) Potatoes

Substantial yield increases are possible in the future for potatoes, but there is little emphasis on research on management practices and higher yielding varieties. Current research in potato breeding indicates that new varieties with desirable processing characteristics will soon be available for release to growers. The trend toward higher per capita consumption rates of processed potatoes will require more emphasis on quality and uniformity of product. Yield levels will increase considerably due to a shift to production to better quality soils.

#### (7) Hay and Pasture

Projected increases in the yields of forage crops are expected to come from the continued shift away from clover mixtures to alfalfa and alfalfa mixtures. Better management practices such as heavier fertilization, more frequent cutting, confinement feeding, and insect control will bring significant yield increases. Renovation and the use of quality seed and recommended applications of fertilizer will greatly increase pasture yields.

#### (8) Vegetables

Labor shortages have provided the impetus for research and development efforts in designing mechanical harvesting equipment for many of the vegetables grown in the Basin. Fresh vegetables probably will continue to be harvested by hand, but harvesting for processing is expected to become almost completely mechanized. There will be increased grower acceptance of better cultural practices and higher-yielding improved varieties that incorporate better quality characteristics for processing, uniform maturity, and resistance to blights, bolt and rusts. Earlier maturing varieties will be developed to avoid high temperatures during blossoming and resulting uneven maturity. Chemical soil organism control and rotations of crops will be used to reduce

root rot, which seriously impairs yield potential. New genetic discoveries in vegetables are expected to increase yields greatly, as will closer spacing and the use of chemical weed controls.

#### (9) Fruit

Recent heavy plantings that have been in the non-bearing category will soon be coming into production. This will result in yield increases from the newer varieties. Expansions of storage, marketing, and processing facilities will also encourage further planting of new orchards and vineyards. Yield increases will come primarily from improved varieties, closer planting on dwarfed root stock, chemical growth regulation and thinning, better training and pruning, improved fertilization with single elements depending on leaf testing for deficiencies, better control of diseases, insects, and rodents, and improved soil management and weed control.

Pest control problems are expected to be reduced through the use of systemic insecticides, fungicides, and specific herbicides. Mechanical harvesting will be widely used on some tree fruits that are to be processed. Improved management efficiency will be associated with specialization and increased size of operation. The use of mechanical pruning will reduce labor requirements.

### 3.4.3 Crop Yield Projections

Projected yields for the potential crops for each soil resource group are necessary for the projection model. These estimates were made in three steps. Future trends were estimated based on historical information. These trends were then reviewed by crop and soil specialists. Finally, planning subareas were aggregated into two or more groups based on similarities in average yield.

The yield projections are based on the combination of a long-term historical trend and a recent trend reflecting more current practices. Generally, the recent trend was used to project to 1980, and the long-term trend was used to project from 1980 to 2000 and 2020. The long-term historical trend is based on State yield data from 1934 to 1959. The short-term trend is based on weighted county yield figures from 1953 to 1967 for each planning subarea. Both trends were obtained by a least squares regression in which historical yields were regressed against several variations of time. Variations due to weather were assumed

to be offsetting in the long run and were excluded as variable.

The yields developed were reviewed jointly by soil and crop scientists from the respective State universities and SCS specialists. Their knowledge of specific area conditions and current and estimated future technological developments were used to adjust the initial estimates. Initial projections were made on a State basis because data were available in that form. Subsequently, these projections were converted to the various soil resource groups for production projections.

The planning subareas were grouped according to similarities in average yield by crop. The grouping was done to ensure consistency between planning subareas and to take advantage of similarities in yield between PSAs to reduce the number of yield estimates in the model.

Tables 19-144 and 19-145 show the planning subarea groupings by crop, projected yields, and projected yields indexed from 1966-67 current normalized yields for major field crops and for specialty crops.

#### 3.4.4 Production Costs

Production costs were developed for each planning subarea crop-soil combination considered for production. Costs reflect current input price levels and relationships. All items of on-farm costs were included with the exception of charges for storage and land. The per acre production costs for each crop and soil were aggregates of three major categories of costs. Fixed costs were developed to reflect costs that are attached to production on an acre basis regardless of yield. Labor and machinery costs for planting and cultivating were in this category.

The second category reflected differences due to yield variation, and included seed, fertilizer, lime, and harvest costs. Harvesting costs included the costs of equipment and labor needed to transport the crop to an on-farm storage facility. Off-farm transportation costs were not included. Fertilizer costs were established on a maintenance basis, i.e., application necessary to maintain the establishment yield and soil fertility level considering crop usage, runoff, and soil leaching.

The third cost category included differential costs associated with the peculiarities of certain soils, such as slope, stoniness, and wetness.

### 3.5 Projections of Crop and Livestock Production

#### 3.5.1 Crop Production

Benchmark projections of feed and food production indicate that the regional share of national requirements can be met with the existing land resource base in its current state of development (Table 19-146). Projected yield increases and improved technology, coupled with the use of cropland temporarily idled or in conservation use, contribute to meeting these requirements. However, the further one projects into the future, the greater the pressure on the land reserves. Shifts between planning subareas occur according to comparative advantage and result in substantial reductions in acreage in the idled land category in the more productive planning subareas. For example, the acreage in cropland not actively used in Planning Subarea 4.2 is estimated to decrease from 582,000 acres in the base period to 36,000 acres in 2020. Another trend at work in some planning subareas is for acreage in certain crop groups to decline between the base year and 1980 and 2000, and then to increase between subsequent projection periods. One of the factors behind this trend is that initially yields are projected to increase more rapidly than requirements. By 2020, however, rates of increase in requirements are expected to surpass yield increases, which implies an increase in the acreage in crops.

Several implications for land use can be drawn from these projections. Although land resources of the Basin are adequate to produce the benchmark food and feed requirements, more efficient uses of these resources may be possible through the implementation of some development activities. For example, drainage of wet but otherwise productive acreages can result in producing the benchmark requirements at a reduced cost, if the higher yields can be obtained at a relatively low drainage cost. In the resultant trade-off, less productive but adequately drained acreage would be released for other purposes. Both regional development and national efficiency objectives may be met, because economic activity will be stimulated in the region where development occurs. Efficiency gains may accrue to the consumer in terms of reduced food costs if the farm commodities market func-

TABLE 19-144 Group Yields for Major Field Crops

Crop	Group <sup>2</sup>	Unit	Current	Projected Yield Index <sup>1</sup>		
			Normal Yield 1966-1967	CN = 100		
				1980	2000	2020
Corn	1	Bu.	83	124	158	181
	2		73	125	148	168
	3		63	124	143	164
Corn Silage	1	Ton	14.0	141	168	189
	2		12.0	133	158	180
	3		9.0	139	176	198
Soybeans	1	Bu.	26	119	150	177
	2		21	119	152	176
Wheat	1	Bu.	39	128	154	179
	2		35	120	149	174
	3		31	116	145	174
Oats	1	Bu.	63	119	140	159
	2		52	127	150	167
	3		38	153	184	205
Alfalfa Hay	1	Ton	2.6	142	169	188
	2		2.4	125	154	175
	3		1.7	147	188	218
Clover-Timothy- Other Hay	1	Ton	1.9	147	179	205
	2		1.7	135	159	182
	3		1.3	138	154	169

<sup>1</sup>Indices of increase represent the general magnitude of yield increases. They are generalized for all soils within a planning subarea and hence are inappropriate for specific analysis.

<sup>2</sup>Groups are aggregates of the following planning subareas:

Crop	Group	Planning Subarea
Corn	1	2.2, 4.2
	2	2.1, 2.3, 3.2, 4.1, 4.3, 4.4, 5.1, 5.2
	3	1.1, 1.2, 2.4, 3.1, 5.3
Corn Silage	1	2.2, 4.2, 4.4, 5.1, 5.2, 5.3
	2	2.1, 2.3, 3.2, 4.1, 4.3
	3	1.1, 1.2, 2.4, 3.1
Soybeans	1	2.2, 4.1, 4.2
	2	2.1, 2.3, 3.2, 4.3
Wheat	1	2.1, 2.2, 3.2, 4.1, 4.2
	2	2.3, 2.4, 3.1, 4.3, 4.4, 5.1, 5.2
	3	1.1, 1.2, 5.3
Oats	1	2.1, 2.2, 3.2, 4.1, 4.2
	2	2.3, 4.3, 4.4, 5.1, 5.2, 5.3
	3	1.1, 1.2, 2.4, 3.1
Alfalfa Hay	1	2.1, 2.2, 4.4, 5.1, 5.2, 5.3
	2	2.3, 3.2, 4.1, 4.2, 4.3
	3	1.1, 1.2, 2.4, 3.1
Clover-Timothy- Other Hay	1	2.1, 2.2, 4.4, 5.1, 5.2, 5.3
	2	2.3, 3.2, 4.1, 4.2, 4.3
	3	1.1, 1.2, 2.4, 3.1

TABLE 19-145 Group Yields for Selected Specialty Crops

Crop	Group <sup>2</sup>	Unit	Current Normal Yield (1966-1967)	Projected Yield Index <sup>1</sup> CN = 100		
				1980	2000	2020
Potatoes	1	Cwt.	100	175	220	260
	2		125	200	252	304
	3		150	186	233	266
	4		170	170	212	250
	5		190	166	210	258
	6		180	183	233	277
Dry Field Beans	1	Cwt.	8.8	159	190	216
	2		9.2	154	185	209
	3		10.0	145	172	195
	4		11.4	132	158	175
	5		11.8	131	155	172
	6		13.0	123	144	158
Sugar Beets	1	Cwt.	12.0	166	216	254
	2		15.0	147	180	207
	3		15.5	146	179	206
Noncitrus Fruits	1	Tons	2.0	195	285	345
	2		2.9	145	207	259
	3		3.0	146	206	263
	4		3.2	137	184	203
	5		3.2	137	187	234
Commercial Vegetables	1	Cwt.	105	122	160	188
	2		106	127	165	193
	3		107	131	168	196

<sup>1</sup>Yield indices represent the general magnitude of yield increases. They are generalized for all soils within a planning subarea and hence are inappropriate for specific analysis.

<sup>2</sup>Groups are aggregates of the following planning subareas:

Crop	Group	Planning Subarea
Potatoes	1	1.1
	2	3.1, 3.2
	3	1.2, 2.4, 4.1, 4.2, 5.3
	4	2.1
	5	4.3, 4.4, 5.1, 5.2
	6	2.2, 2.3
Dry Beans	1	4.4, 5.3
	2	5.1
	3	2.4, 4.1
	4	2.3
	5	3.1
	6	3.2, 5.2
Sugar Beets	1	4.2
	2	3.1, 4.1
	3	3.2
Noncitrus Fruits	1	1.2
	2	2.2, 3.1, 4.3, 5.3
	3	2.1, 2.3, 2.4, 4.1, 4.2, 4.4, 5.1, 5.2
	4	1.1
	5	3.2
Vegetables	1	1.1, 1.2, 2.4, 3.1, 4.3, 5.3
	2	2.2, 3.2, 4.1, 4.4, 5.2
	3	2.1, 2.3, 4.2, 5.1

TABLE 19-146 Acreage of Major Crop<sup>2</sup> and Pasture Use (1,000 acres)

Planning Subarea	Current Normal <sup>1</sup>	Projections			Planning Subarea	Current Normal <sup>1</sup>	Projections		
		1980	2000	2020			1980	2000	2020
<b>PSA 1.1</b>				<b>PSA 4.1</b>					
Food crops	1.8	1.1	1.3	1.3	Food crops	508.1	647.6	581.5	693.4
Feed crops	30.4	40.1	21.1	21.0	Feed crops	435.7	340.9	318.5	335.9
Roughages	222.7	160.3	123.6	122.8	Roughages	386.9	301.6	215.3	217.8
Other	1.0	2.7	1.3	2.5	Other	99.7	80.8	80.5	85.6
Total Cropland Use	255.9	204.2	147.3	147.6	Total Cropland Use	1,430.4	1,370.9	1,195.8	1,332.7
Idled Cropland	174.2	225.9	282.4	281.4	Idled Cropland	785.1	642.1	530.2	203.2
Permanent Pasture	99.5	99.5	99.4	99.2	Permanent Pasture	117.8	107.0	91.8	81.7
Total	529.6	529.6	529.1	528.2	Total	2,333.3	2,120.0	1,817.8	1,617.6
<b>PSA 1.2</b>				<b>PSA 4.2</b>					
Food crops	5.7	1.4	1.2	1.4	Food crops	2,040.0	2,514.3	2,425.2	2,425.7
Feed crops	14.3	19.2	8.0	8.0	Feed crops	1,419.8	1,058.1	1,355.6	1,414.2
Roughages	114.5	64.0	48.3	46.9	Roughages	603.9	562.8	517.4	502.3
Other	2.2	0.6	0.4	1.6	Other	89.8	110.8	117.4	133.3
Total Cropland Use	136.7	85.2	57.9	57.9	Total Cropland Use	4,153.5	4,246.0	4,415.6	4,475.5
Idled Cropland	126.1	177.6	204.9	204.9	Idled Cropland	581.6	437.4	184.2	36.4
Permanent Pasture	65.8	65.8	65.8	65.8	Permanent Pasture	213.8	211.5	207.7	203.7
Total	328.6	328.6	328.6	328.6	Total	4,948.9	4,894.9	4,807.5	4,715.6
<b>PSA 2.1</b>				<b>PSA 4.3</b>					
Food crops	46.8	43.0	46.7	56.7	Food crops	103.7	97.2	111.4	110.5
Feed crops	759.6	832.2	817.3	848.1	Feed crops	116.1	111.4	84.4	100.7
Roughages	1,656.2	1,300.7	1,168.4	1,107.4	Roughages	290.5	123.8	94.3	85.8
Other	135.5	165.0	193.4	239.7	Other	31.2	19.9	18.1	19.3
Total Cropland Use	2,598.1	2,340.9	2,225.8	2,251.9	Total Cropland Use	541.5	352.3	308.2	316.3
Idled Cropland	718.3	967.5	1,067.6	1,023.0	Idled Cropland	199.8	327.7	258.3	155.0
Permanent Pasture	356.7	355.8	354.2	352.2	Permanent Pasture	131.3	120.5	100.4	83.6
Total	3,673.1	3,664.2	3,647.6	3,627.1	Total	872.6	800.5	666.9	554.9
<b>PSA 2.2</b>				<b>PSA 4.4</b>					
Food crops	536.3	743.1	600.5	578.4	Food crops	31.8	18.2	17.5	21.6
Feed crops	1,082.2	870.6	914.4	727.1	Feed crops	99.4	84.6	55.5	41.5
Roughages	670.8	477.1	264.3	231.8	Roughages	373.5	200.8	173.1	164.5
Other	76.9	64.8	56.3	50.4	Other	106.5	87.9	91.4	104.3
Total Cropland Use	2,366.2	2,155.6	1,835.5	1,587.7	Total Cropland Use	611.2	391.5	337.5	331.9
Idled Cropland	477.2	321.4	164.3	53.3	Idled Cropland	247.5	449.7	472.9	450.0
Permanent Pasture	237.4	206.8	167.0	137.1	Permanent Pasture	252.6	247.5	238.4	230.0
Total	3,080.8	2,683.8	2,166.8	1,778.1	Total	1,111.3	1,088.7	1,048.8	1,011.9
<b>PSA 2.3</b>				<b>PSA 5.1</b>					
Food crops	842.9	989.1	1,108.6	1,391.2	Food crops	102.0	76.6	73.9	102.9
Feed crops	1,308.1	1,357.8	1,413.4	1,812.6	Feed crops	133.6	102.6	86.6	57.4
Roughages	992.8	893.2	917.5	964.3	Roughages	345.0	240.0	196.6	209.9
Other	274.1	206.2	215.3	248.3	Other	77.0	71.9	75.7	88.6
Total Cropland Use	3,417.9	3,446.3	3,654.8	4,416.4	Total Cropland Use	657.6	491.1	432.8	458.8
Idled Cropland	1,956.9	1,859.1	1,545.1	653.6	Idled Cropland	397.5	549.4	588.1	537.3
Permanent Pasture	459.4	453.5	444.5	433.4	Permanent Pasture	162.9	160.7	157.7	153.9
Total	5,834.2	5,758.9	5,644.4	5,503.4	Total	1,218.0	1,201.2	1,178.6	1,150.0
<b>PSA 2.4</b>				<b>PSA 5.2</b>					
Food crops	50.6	37.5	44.4	51.8	Food crops	129.5	109.3	115.6	138.3
Feed crops	110.4	93.4	64.3	88.6	Feed crops	240.4	283.4	185.0	203.0
Roughages	382.3	264.6	312.1	395.9	Roughages	743.0	444.8	400.9	395.1
Other	172.0	119.8	122.4	139.9	Other	134.2	103.3	98.9	102.4
Total Cropland Use	715.3	515.3	543.2	676.2	Total Cropland Use	1,247.1	940.8	800.4	838.8
Idled Cropland	766.2	963.3	929.8	790.4	Idled Cropland	512.0	793.8	903.2	831.5
Permanent Pasture	351.8	351.1	349.8	348.3	Permanent Pasture	443.7	437.6	429.7	421.3
Total	1,833.3	1,829.7	1,822.8	1,814.9	Total	2,202.8	2,172.1	2,133.3	2,091.6
<b>PSA 3.1</b>				<b>PSA 5.3</b>					
Food crops	36.2	35.8	41.1	53.8	Food crops	2.0	0.6	0.7	1.2
Feed crops	37.1	40.9	23.1	25.6	Feed crops	54.9	51.4	31.7	22.0
Roughages	201.0	146.3	153.8	199.6	Roughages	434.0	224.8	197.3	207.0
Other	5.0	3.8	3.7	3.5	Other	0.1	0.3	0.5	0.9
Total Cropland Use	279.3	226.8	221.7	282.5	Total Cropland Use	491.0	277.1	230.2	231.1
Idled Cropland	251.9	303.3	306.9	244.2	Idled Cropland	142.9	356.6	402.1	399.6
Permanent Pasture	173.6	173.2	172.7	172.1	Permanent Pasture	254.4	254.3	253.7	253.1
Total	704.8	703.3	701.3	698.8	Total	888.3	888.0	886.0	883.8
<b>PSA 3.2</b>				<b>Great Lakes Basin Totals</b>					
Food crops	831.5	883.5	997.4	1,187.2	Food crops	5,268.0	6,198.9	6,167.2	6,815.8
Feed crops	370.7	364.7	348.1	354.2	Feed crops	6,212.2	5,652.4	5,727.8	6,060.2
Roughages	465.5	365.5	413.4	458.0	Roughages	7,882.8	5,770.0	5,196.8	5,309.3
Other	92.1	161.3	181.7	208.3	Other	1,298.7	1,197.7	1,255.5	1,427.6
Total Cropland Use	1,759.8	1,775.0	1,940.6	2,207.7	Total Cropland Use	20,661.7	18,819.0	18,347.3	19,612.9
Idled Cropland	610.2	564.4	354.2	56.6	Idled Cropland	7,947.3	8,939.2	8,194.2	5,920.4
Permanent Pasture	185.2	182.8	179.3	176.9	Permanent Pasture	3,505.8	3,427.5	3,312.1	3,212.3
Total	2,555.2	2,522.2	2,474.1	2,441.2	Total	32,114.8	31,185.7	29,853.6	28,745.6

<sup>1</sup>1966-67<sup>2</sup>Components of crop groups:

Food Crops: wheat, soybeans, dry edible beans, and potatoes Feed Crops: corn, oats, barley, miscellaneous small grains (rye)

Roughages: corn silages, all hays, cropland pasture Other Crops: fruits, vegetables, small fruits, sugar beets, commercial sod

tions freely. Alternatively, these gains will go to owners of resources affected by development if commodity prices remain constant.

Admittedly, not all of the acreage in the idled category should be considered available for alternative uses, such as recreation or wildlife. Conservation programs and less than 100 percent use of cropland will continue. However, the differing trends in idled land in the planning subareas provide indicators in evaluating alternatives. For example, those areas with increasing amounts of idled land may be evaluated for potential land use changes from agricultural to recreational use.

### 3.5.2 Livestock Production

The meat, milk, and poultry requirements allocated to the Basin were shown earlier in Table 19-87. Requirements for all products are projected to more than double between the base period and 2020.

National requirements were allocated to planning subareas on the basis of historical shares and discernible trends (Table 19-147). Shifts between planning subareas were tempered by such factors as the location rigidity of capital and management resources and climatic factors. Because of the relative immobility of roughages (hay, silage, pasture), there is a direct relationship between the production of roughages and the production of certain classes of livestock in a given planning subarea. While feed grains can be shipped from one area to another, roughages are generally used where they are produced.

Another factor considered in the estimation of livestock location were the forces of urbanization. For example, Planning Subarea 2.2 has traditionally been a heavy livestock producer. As Chicago encroaches on that area, production must shift elsewhere. One of the associated developments is the increased emphasis on beef production in the norther part of Michigan. Also influencing the location of beef production is the increasing trend toward large feedlot-packing operations, such as the Great Markwestern Enterprise near Quincy, Michigan. This may accelerate both the development of cow-calf and feeder operations in planning subareas such as 2.4 and 2.3.

The feed efficiencies and ratio assumptions used to convert livestock and poultry production into feed requirements appear in Table 19-148. In general, both the feed units required per unit of production and the pro-

portion of roughages in rations are projected to decrease. Factors contributing to this include better management, more confined feeding, and the development of improved supplements and high protein feed grains.

### 3.5.3 Fertilizer Use

Projections of fertilizer use were developed in conjunction with the yield projections and the cropping pattern. A maintenance level was assumed where nitrogen, phosphorus, or potassium, removed by the crop or by soil leaching, will have to be replaced by fertilizer application. Projections of use then were derived by including the fertilizer levels necessary to replace the three major nutrients taken out of the soil per unit of crop produced. After coordination with soil scientists, these data were used to project the amounts of fertilizer required by various soil and crop combinations. Through this process, fertilizer requirements per acre were tied directly to projected yields because crop yields generally vary directly with fertilizer applications. Fertilizer is considered an input in the agricultural production process. The amount applied depends on both the managerial ability of farm operators and the input/product price relationships. Because production can be increased through higher levels of use, fertilization provides an alternative to such water resource developments as drainage or flood protection.

There are limitations on fertilizer use. Beyond certain levels of application, the effect on physical production is negligible and perhaps negative. Economic factors suggest that additional fertilizer should be applied only to the level where the increase in revenues attributable to additional fertilizer equals the additional cost of the fertilizer. Increased applications can change water quality through percolation and sedimentation from cropland erosion. Data for use in defining and assessing this last limitation are still being gathered and evaluated. Two effects need consideration—the effect of fertilizer usage on water quality, and the effect of any use of limitations on the agricultural sector, and ultimately on the consumer.

### 3.5.4 Production Costs

Production costs, in general, are made up of the costs of growing and harvesting the crop

TABLE 19-147 Projected Shares of Basin Requirements for Livestock Products, 1980, 2000, and 2020

Product	Planning Subarea													Total		
	1.1	1.2	2.1	2.2	2.3	2.4	3.1	3.2	4.1	4.2	4.3	4.4	5.1		5.2	5.3
Percent of Total																
Beef & Veal																
1980	1.20	.54	16.95	10.71	15.74	3.81	2.09	7.42	6.00	14.26	2.21	3.72	4.00	7.65	3.70	100.00
2000	1.00	.45	16.50	8.50	17.00	5.00	2.30	9.50	5.00	16.80	2.00	2.75	4.00	7.20	2.00	100.00
2020	.80	.40	16.20	6.00	18.20	6.00	2.60	10.80	4.00	18.60	2.00	1.80	4.20	6.80	1.60	100.00
Pork																
1980	.05	.01	15.33	13.33	27.33	.70	.35	3.94	3.29	33.66	.83	.32	.43	.39	.04	100.00
2000	.06	.01	16.03	11.61	27.53	.71	.34	3.93	3.28	34.50	.82	.31	.44	.40	.03	100.00
2020	.06	.01	16.59	9.69	27.69	.71	.34	3.93	3.28	35.70	.82	.31	.44	.39	.04	100.00
Lamb & Mutton																
1980	1.12	.51	3.65	3.27	29.37	2.18	2.00	4.87	8.25	32.86	1.81	1.61	2.85	5.13	.52	100.00
2000	1.12	.51	3.65	3.27	29.50	2.18	2.00	4.87	7.20	33.78	1.81	1.61	2.85	5.13	.52	100.00
2020	1.12	.51	3.65	3.27	29.42	2.18	2.00	4.87	6.20	34.86	1.81	1.61	2.85	5.13	.52	100.00
Milk																
1980	1.33	.50	26.00	7.30	12.67	2.80	1.20	5.90	4.50	5.10	1.70	6.03	6.35	12.67	5.95	100.00
2000	1.00	.50	26.50	5.00	12.55	3.00	1.50	5.80	4.00	4.50	1.70	6.60	7.50	13.85	6.00	100.00
2020	.80	.50	27.00	3.50	12.40	3.50	1.50	5.10	4.00	3.60	1.70	7.30	8.50	13.80	6.80	100.00
Eggs																
1980	.37	.67	3.47	6.89	24.94	5.79	1.47	8.55	3.76	24.29	4.79	3.30	2.22	8.00	1.49	100.00
2000	.36	.68	3.47	7.00	25.00	6.21	1.47	8.60	3.76	24.52	4.36	3.30	2.20	7.57	1.50	100.00
2020	.36	.68	3.46	7.00	25.04	6.19	1.46	8.68	3.76	25.03	4.78	3.29	2.21	6.57	1.49	100.00
Broilers																
1980	3.65	.01	8.99	2.03	44.35	1.12	7.13	.95	.57	26.06	.98	1.56	1.10	1.44	.06	100.00
2000	3.65	.01	9.00	2.03	44.33	1.10	7.10	.95	.57	26.10	.98	1.56	1.10	1.45	.07	100.00
2020	3.65	.01	9.00	2.03	44.33	1.11	7.10	.95	.57	26.10	.98	1.56	1.10	1.45	.06	100.00
Turkeys																
1980	1.00	-----	4.49	1.50	47.20	2.00	.11	.70	.90	38.40	1.00	.70	.10	1.00	.90	100.00
2000	1.00	-----	4.49	1.50	47.20	2.00	.11	.70	.90	38.40	1.00	.70	.10	1.00	.90	100.00
2020	1.00	-----	4.49	1.50	47.20	2.00	.11	.70	.90	38.40	1.00	.70	.10	1.00	.90	100.00

TABLE 19-148 Feed Conversion Rates, Percent Roughage, by Class of Livestock

Feed Units Per Pound <sup>1</sup>	Beef & Veal	Sheep & Lambs	Pork	Milk Prod.	Eggs	Turkeys	Broilers
Current	10.7	13.5	4.3	.95	3.4	3.7	2.4
1980	9.7	11.4	4.0	.85	3.0	3.3	2.1
2000	8.0	9.3	3.5	.75	2.7	3.0	1.9
2020	6.8	8.1	3.0	.65	2.4	2.6	1.8
<b>Percent of Feed Units Supplied by Roughage</b>							
Current	70	78	7	70.1	---	5	---
1980	67	74	7	68.3	---	4	---
2000	65	70	6	66.6	---	3	---
2020	65	69	6	63.8	---	2	---

<sup>1</sup>Milk and eggs are in pounds; others are in pounds of live weight. Feed units are in corn equivalents.

Source for most figures: Great Plains Agricultural Council Publication No. 31.

and the cost of materials used in production. In terms of the 1968 constant-dollar prices used in the economic budgeting model, total cost of producing the 1980 Basin crop output will be 825.2 million dollars. By 2000, the costs will rise to 911.1 million, and in 2020 it will be 1.06 billion. Per acre cost of production also will increase over the same period from \$41.12 in 1980 to \$47.11 in 2000 and to \$52.70 by 2020. These per acre costs are merely averages of the cost of producing all crops. They do not necessarily represent the same mix of crops or relative quantities produced. They are presented here only to give an indication of relative magnitudes.

### 3.6 Rural Farm Population, Employment, and Income

Agricultural production, farm employment, income, and rural farm population are inter-related. Farm income is related to the gross value of farm products sold, which in turn is related to prices and output. Farm employment is a function of the level of agricultural output and the productivity of labor. Rural farm population is directly associated with the demographic characteristics of those individuals employed in farming, such as age, marital status, and family size.

Beginning with the agricultural output in each planning subarea, the gross value of farm production was estimated. The prices used were provided by the Water Resources

Council, as noted in Subsection 3.2.3.3. Farm employment and farm population estimates were then based on value of production.

#### 3.6.1 Farm Income

Farm income is defined by the Agricultural Census to include the sales of crops and livestock, value of government payments, and the value of prerequisites, such as the value of house rent and farm produce used in the home.

The value of farm products was used as a proxy for farm income. This represents the major portion of farm income and is more easily measured. It represents the relative magnitude of volume farm business in terms of gross receipts. It is not a measure of net income since there is double counting and expenses are not deducted.

The gross value of farm products is shown in Table 19-149. Increases occur in all planning subareas, with the Basin total increasing approximately 230 percent from 1960 to 2020, using 1966 dollars.

#### 3.6.2 Agricultural Employment

Different statistical data series on agricultural employment are available. Two commonly used are the Census of Population, published by the Office of Business Economics, U.S. Department of Commerce, and the USDA Farm Workers Series published by the Statis-

**TABLE 19-149 Value of Farm Products, Great Lakes Basin and Planning Subareas<sup>1</sup>**

Planning Subarea	1,000 Dollars			
	Actual 1960	1980	Projected	
			2000	2020
1.1	18,345	25,505	25,055	28,729
1.2	9,263	11,678	12,910	17,103
2.1	427,274	556,494	726,537	990,203
2.2	374,835	312,949	412,838	419,477
2.3	397,287	599,319	826,111	1,147,713
2.4	82,969	118,288	170,556	259,509
3.1	25,041	41,032	53,423	77,006
3.2	183,812	266,567	372,094	519,934
4.1	160,021	200,399	228,032	293,879
4.2	400,532	589,622	804,481	1,050,825
4.3	70,890	63,860	77,625	105,010
4.4	100,815	145,437	190,973	268,240
5.1	126,129	160,931	220,725	318,059
5.2	243,281	292,939	378,005	500,582
5.3	79,806	100,262	122,268	178,030
Total <sup>2</sup>	2,700,302	3,485,282	4,621,632	6,174,299

<sup>1</sup>Value of Farm Product = Output x 1966 Normalized Prices

<sup>2</sup>Totals may not add due to rounding

tical Reporting Service. Projections based on the two series (Table 19-150) provide a relative understanding of how the two series estimate the decline in farm employment.

Different concepts are used in each series. In the Census of Population, employment is determined at place of residence and persons are counted as working in the industry where they earn the greatest income. While this series has the advantage of being consistent with employment data from the non-agricultural sectors, it is based on a count made in March or April, when farm labor is near its seasonal low. As it includes primarily full-time farmers, it fails to reflect the contribution to agricultural production of part-time farmers, which is significant in the Great Lakes Basin.

The USDA series is a more appropriate measure of the number of people actually engaged in agricultural production. It recognizes the presence of people working at two or more jobs at the same time, as well as making an allowance for short-term or seasonally hired farm workers. These estimates are annual averages of family and hired farm workers. No attempt is made to determine if any of the workers hold additional jobs, so some double counting is involved. An individual doing part-time farm work may be counted as a farm worker even though he has a full-time non-farm job.

A dollar productivity concept was used to project agricultural employment for the Basin planning subareas. Based on the total value of production in major enterprises and the esti-

mated value of product per man hour, total man hours in agricultural employment were estimated. Total man hours were converted to man-year equivalents, i.e., agricultural employment.

The downward trend in agricultural employment is projected to continue (Table 19-151). This decline is both relative and absolute. The size of the total labor force is increasing while the absolute size of the farm labor force is decreasing. However, the rate of decrease is projected to lessen as surplus manpower leaves agriculture and a stable employment level is approached.

### 3.6.3 Rural Farm Population

Ideally, a definition of rural-farm population should account for all of those people who will be responsible for contributing to agricultural production in the Basin. The 1970 Census of Population closely approximates this ideal and that definition is used in this study. Rural-farm population is defined as all persons living on farms of 10 or more acres that sell at least \$50 of products, or on farms of less than 10 acres that sell \$250 or more. However, the definition does not include two groups of people who contribute to agricultural production. They are the people living on farms within the boundaries of towns and villages over 2,500 population, and those who don't live on farms but work on farms and actually derive their major source of support from farming. These two exceptions are minor and do not affect the estimate of rural-farm population significantly, except to exclude a small portion of the agricultural labor force.

There are people classified as farmers by the Census of Population who work part-time or full-time off the farm. Currently, the part-time farmer segment comprises a significant proportion of the rural farm population. Off-farm work is likely to decrease somewhat as larger, more specialized farms provide opportunity for full-time work. Part-time farming may continue to be prevalent in the future. In this case, the projected rural-farm population might be underestimated.

Rural-farm population was estimated from the projections of agricultural employment and average family size. The average family size differs between planning subareas, reflecting considerations such as the mix of married and single farmers and employees, their age, and the influence of ethnic and community pressures.

TABLE 19-150 Employment in Agriculture in the Great Lakes Basin and the United States

Employment	1,000 employees					
	Actual			Projected		
	1940	1950	1960	1980	2000	2020
United States <sup>1,2</sup>	8,657	7,175	4,470	3,271	2,505	1,897
Great Lakes Basin <sup>1,2</sup>	602	480	306	205	145	103
United States <sup>3,4</sup>	-----	-----	7,106	3,590	3,317	2,663
Great Lakes Basin <sup>3,4</sup>	-----	-----	535	287	265	213

<sup>1</sup> Agricultural employees as defined by Census of Population. Includes employment in forestry and fisheries.

<sup>2</sup> Source: GLBFS, Technical Report No. 19, May 1969.

<sup>3</sup> Agricultural workers based on SRS farm worker series. Excludes those employed in forestry and fisheries.

<sup>4</sup> Source: "Preliminary Projections of Economic Activity in Agricultural, Forestry and Related Economic Sectors of the United States and its Water Resource Regions 1980, 2000, and 2020." Economic Research Service and Forest Service, USDA, August 1967, p. 32.

TABLE 19-151 Agriculture Employment, Great Lakes Basin and Planning Subareas<sup>1</sup>

Planning Subarea	1,000 employees			
	Actual	Projected		
	1960	1980	2000	2020
1.1	4.5	1.7	0.9	0.7
1.2	2.0	0.7	0.4	0.4
2.1	43.5	36.0	25.7	23.0
2.2	42.4	14.2	11.4	8.9
2.3	43.7	38.2	31.6	32.4
2.4	10.4	8.3	11.1	12.1
3.1	3.4	2.4	1.9	1.9
3.2	17.6	16.6	15.2	17.3
4.1	20.7	11.5	8.1	8.0
4.2	35.1	29.1	24.6	25.2
4.3	13.5	4.1	2.9	2.8
4.4	14.2	12.7	9.8	9.6
5.1	12.3	11.9	9.1	8.8
5.2	24.4	22.4	16.5	15.0
5.3	9.1	6.8	4.2	3.8
Total <sup>2</sup>	296.9	216.6	173.5	170.1

<sup>1</sup> Based on productivity concept. Resolution with census concept pending.

<sup>2</sup> Totals may not add due to rounding.

TABLE 19-152 Rural Farm Population, Great Lakes Basin and Planning Subareas<sup>1</sup>

Planning Subarea	1,000 people			
	Actual	Projected		
	1960	1980	2000	2020
1.1	19.0	6.8	3.4	2.6
1.2	9.6	3.2	1.8	1.5
2.1	147.1	122.4	82.2	69.0
2.2	102.2	37.6	30.4	23.0
2.3	223.6	171.9	134.2	126.5
2.4	50.5	39.0	48.8	48.3
3.1	19.4	12.5	8.5	8.1
3.2	97.5	84.6	70.0	69.2
4.1	78.4	41.4	26.6	24.8
4.2	167.7	125.1	98.5	95.8
4.3	33.9	11.5	8.0	7.6
4.4	48.2	40.6	30.5	28.8
5.1	38.4	39.3	29.2	27.2
5.2	78.8	71.7	51.1	44.9
5.3	30.2	21.8	12.6	11.5
Total <sup>2</sup>	1,144.5	829.4	635.8	588.8

<sup>1</sup> Based on agricultural employment and assumptions of population per employee. Data from 1960 Census of Population.

<sup>2</sup> Totals may not add due to rounding.

In general, rural farm population is declining along with agricultural employment. The projected number of rural farm people in each planning subarea is shown in Table 19-152.

### **3.7 Implications for Water Resource Development**

Water resource development may be desirable from the standpoint of greater efficiency in agricultural production. An evaluation of the irrigation, drainage, and flood protection potential of the Basin will be necessary to identify what contribution water resource development could make to the objectives of national efficiency, regional development, environmental quality, and well-being of the people. Sufficient cropland is expected to be available even in later projection years, but farmers may be able to reduce costs through drainage or irrigation. For instance, drainage of certain soils that are currently undrained or partially drained may result in an increase

in productivity, which would more than pay for the annual cost of the drainage investment.

The requirements might be produced through improved farm management techniques at a lower cost. Greater applications of fertilizer than were assumed could increase the product from the Basin at lower costs of production.

Production might be expanded for the same cost or the same product could be produced for less money using any of the alternatives discussed. Throughout, the assumption has been that no cost is associated with idling farmland. Should resource development measures cause resources within the Basin or other regions not to be used, the cost of relocating these resources should be considered. The alternatives have costs associated with them and the results from each should be compared if the resources available to society are to be used in a manner complementary to economic development and growth in welfare.

## Section 4

# FOREST RESOURCES

### 4.1 Forest Resources

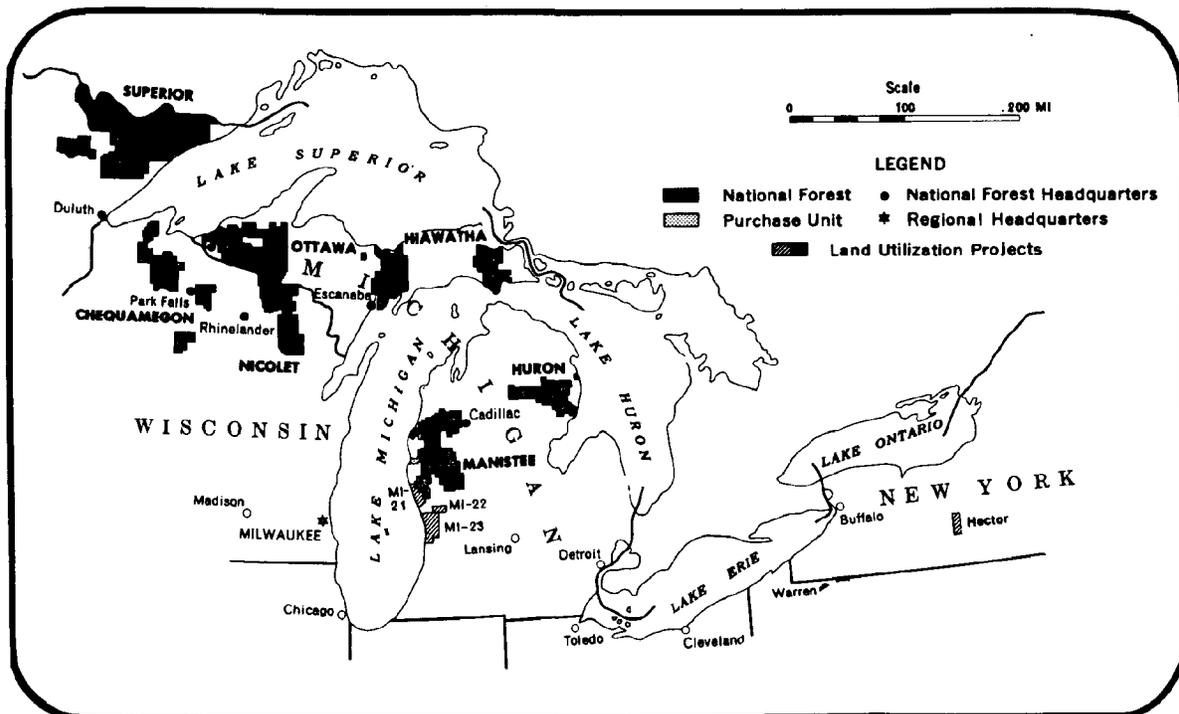
#### 4.1.1 Historical Development

Before settlement most of the land area of the Basin was occupied by virgin forest. Northern hardwood forests interspersed with spruce-fir and pine forests were found in New York, Pennsylvania, Minnesota, Wisconsin, and Michigan's Upper and northern Lower Peninsula. Eastern hardwood forests were dominant in Illinois, Indiana, Ohio, and Michigan's southern Lower Peninsula.

Forest cutting and clearing began in 1825 and increased during the early settlement period. The first farm homesteaders sought out the upland forested areas and considered forest cover a hinderance. The fallen trees were usually windrowed and burned.

The Basin's forests supplied much of the nation's lumber needs in the late 1800s, the era of most rapid expansion. Forests were logged mainly during the period of 1850 to 1930. Harvest of the original virgin stands attracted the growth of wood-using industries which used volumes of timber beyond the land's capacity to produce continually. High quality wood is not normally existent in such volumes as these industries consumed. Much of this cutover land was also subject to raging forest fires that occurred repeatedly during this period. As a result, the resource dwindled and the expansion of the lumber industry was relatively short-lived.

By the early 1900s most of the virgin forests had been cut and the lumber companies moved their operations to more profitable opportunities in other areas of the United States. A large part of the cutover area was in farms and



Source: U.S. Department of Agriculture, Forest Service, 1966

FIGURE 19-20 National Forests in the Great Lakes Basin

the rest was in volunteer trees, brush, and grass.

National forests came into being in 1891 when Congress adopted an act that empowered the President to set aside forest reserves for the purpose of "securing favorable conditions of water flows and to furnish a continuous supply of timber for the use and necessities of the citizens of the United States." The Weeks Law of 1911 and the Clarke-McNary Act of 1924 established forest reserve policies. Under authorization of these Acts, land was purchased to establish the Superior National Forest in Minnesota, the Chequamegon and Nicolet National Forests in Wisconsin, and the Ottawa, Hiawatha, Manistee, and Huron National Forests in Michigan. These areas came under the administration of the U.S. Forest Service. The Hector Land Use Area in New York was also established in the 1930s. It came under the administration of the U.S. Forest Service (Figure 19-20) in 1954. More than 4.7 million acres of commercial forest land within these national forests are Federally owned. Total Federal ownership of commercial forest land amounts to approximately 5.1 million acres, or 14 percent of all commercial forest land within the economic area of the Basin.

Other public forest areas, in addition to those Federally owned, were established throughout the Basin. More than 5.2 million acres of commercial forest lands are protected and managed for multiple-use by State agencies, mostly as designated State forests. Other land owned publicly by county and local governments equals more than 2.6 million acres.

The recognition of forests as an asset marked the beginning of a new era. Public forest land managers began protecting watersheds and forest land. Since the 1930s, both public and private landowners have improved and increased the value of their holdings through forest management. Lumber, pulp, paper, and other forest industries have grown and operate because of sustained-yield management programs.

#### 4.1.2 Present Description

Natural regeneration reforested much of the original forest land with timber stands and forest cover that are now from 30 to 60 years of age. These trees constitute one of the major land uses in the Basin.

Approximately 39.6 million acres or 50 percent of the Basin is classed as forest land (Ta-

ble 19-153). Almost all of this acreage is classed as commercial forest land capable of producing commercial crops of timber, the harvesting and use of which is an economic activity of the area. The remainder is classified as noncommercial forest land—forest land withdrawn from timber utilization through statute, ordinance, or administrative order, or incapable of yielding industrial wood products because of adverse site conditions.

The present natural and planted stands vary in type (Table 19-154), size classes (Table 19-155), stocking (Table 19-156), and volume (Table 19-157).

Sixty-six percent of the commercial forest area is owned by farmers, miscellaneous private owners, and the forest industry (Table 19-158). The remaining 34 percent is publicly owned with the eight Great Lake States owning 14 percent, most of which is in State forests. Twelve percent makes up seven national forests and a Land Utilization Project Area, 7 percent is in county-municipal ownership, and the remainder is in other Federal uses.

#### 4.1.3 Present and Projected Production

In spite of past use and abuse, the Basin's forests are growing. They contain an increasing volume of harvestable and usable timber products. Some of the newly maturing, or near-mature stands are good quality. They provide or will provide very attractive economic opportunities for business between landowners and loggers, as well as good timber products for industries. The most sought after high value products, such as veneer logs and high grade saw logs, are not common in concentrations, but are scattered in short supply throughout the forests, mixed with other lower value products. Table 19-159 shows round timber products harvested from the forests and used as raw material in lumber and wood product industries (major group 24, as defined in the Standard Industrial Classification Manual). Saw logs are used to manufacture lumber, and veneer logs are used for veneer, plywood, and miscellaneous industrial timber products such as cooperage, utility poles, and posts. By the year 2020, production will be increased almost 85 percent. Table 19-160 shows the wood raw material used in the pulp, paper, and allied products industries (major group 26, as defined in the Standard Industrial Classification Manual) for the manufacture of wood pulp. By the year 2020,

**TABLE 19-153 Forest Land Area in the Great Lakes Basin by Plan Area, Planning Subarea, and State, 1967**

	State	Forest Land (thousand acres)				State	Forest Land (thousand acres)							
		Total	Commercial	Noncommercial			Total	Commercial	Noncommercial					
<b>Plan Area 1.0</b>														
PSA 1.1	Minn.	5,981.5	5,347.6	633.9	PSA 3.0									
	Wis.	2,373.4	2,355.6	17.8	PSA 3.1	Mich.	2,914.3	2,889.6	24.7					
	Total	8,354.9	7,703.2	651.7	3.2	Mich.	1,194.7	1,182.0	12.7					
1.2	Mich.	5,909.6	5,605.7	303.9	Total		4,109.0	4,071.6	37.4					
Total		14,264.5	13,308.9	955.6	<b>Plan Area 4.0</b>									
<b>Plan Area 2.0</b>														
PSA 2.1	Mich.	1,664.5	1,657.1	7.4	PSA 4.1	Mich.	665.7	641.3	24.4					
	Wis.	3,452.0	3,420.0	32.0	4.2	Ind.	71.9	71.0	.9					
	Total	5,116.5	5,077.1	39.4		Ohio	381.5	379.9	1.6					
2.2	Ill.	93.0	64.1	28.9	Total		453.4	450.9	2.5					
	Ind.	90.6	87.5	3.1	4.3	Ohio	538.8	520.8	18.0					
	Wis.	157.1	157.1	-----	4.4	N.Y.	1,140.8	1,075.1	65.7					
	Total	340.7	308.7	32.0		Pa.	223.7	223.1	.6					
2.3	Ind.	140.1	136.9	3.2	Total		1,364.5	1,298.2	66.3					
	Mich.	1,564.6	1,554.7	9.9	<b>Plan Area 5.0</b>									
	Total	1,704.7	1,691.6	13.1	PSA 5.1	N.Y.	871.5	835.9	35.6					
2.4	Mich.	5,434.3	5,369.8	64.5	5.2	N.Y.	2,545.7	2,206.9	338.8					
Total		12,596.2	12,447.2	149.0	5.3	N.Y.	2,215.4	1,961.3	254.1					
							Total	5,632.6	5,004.1	628.5				
							Great Lakes Basin Total	39,624.7	37,743.0	1,881.7				

Source: Adjusted to the updated January 1, 1968, State Forest Survey figures, NCFES and NEFES, U.S. Forest Service. Keyed to Economic Planning Subarea, Great Lakes Basin Commission, 1968.

production of pulpwood will triple present production.

#### 4.1.4 Value of Forest Production

The value of timber cut (stumpage) from which the 1962 forest products were produced was more than \$19 million (Tables 19-161 and 19-162). This is expected to increase to more than \$43 million by the year 2020. The rough, round forest products harvested and delivered to the local points of delivery were valued at approximately \$85 million. By the year 2020 this is projected to rise to more than \$190 million. This represents income to forest and woodland owners and employment to those people engaged in harvesting and delivering these products. In addition, it provides the necessary raw material for those employed in forest-based industries.

## 4.2 Major Forest Industry

### 4.2.1 General

The employment and income created by forest-based industries are arranged in three categories:

(1) lumber and wood products industries, which include logging camps, contractors

engaged in cutting timber, sawmills, veneer mills, lath mills, shingle mills, cooperage-stock mills, planing mills, plywood mills engaged in producing lumber, veneer, plywood, and wood basic materials, and establishments engaged in manufacturing finished articles made entirely or mainly of wood (major group 24 as defined in Standard Industrial Classification Manual)

(2) pulp, paper, and allied products, which include establishments manufacturing pulp primarily from wood and converting this pulp into paper or board, and the manufacture of paper and paper bags, paperboard boxes, and envelopes (major group 26, as defined in the Standard Industrial Classification Manual)

(3) forest management, which is defined as the process of protecting and managing forest lands for the production of timber and related products. It includes such activities as the protection of forests from fire, insects, diseases, and other destructive agents; tree planting and timber stand improvement; timber sales; and related research activities. Each will be explained in greater detail in the following tables and narration.

### 4.2.2 Present and Projected Employment

Employment in lumber and wood products industries in the Basin for 1962 and projected years is presented in Table 19-163. The 1962

**TABLE 19-154 Area of Commercial Forest Land (1,000 acres) in the Great Lakes Basin by Forest Type, 1967**

Plan Area and Planning Subarea	State	Softwood				Hardwood				
		All Type	Total	Pine	Spruce-Fir	Total	Oak-Hickory	Elm-Ash Cottonwood	Maple-Beech Wh. Birch	Aspen-Birch
<b>Plan Area 1.0</b>										
PSA 1.1	Minn.	5,347.6	2,347.5	672.3	1,675.2	3,000.1	12.9	299.9	280.0	2,407.3
	Wis.	2,355.6	482.5	224.8	257.7	1,873.1	137.0	134.2	501.8	1,100.1
	Total	7,703.2	2,830.0	897.1	1,932.9	4,873.2	149.9	434.1	781.8	3,507.4
1.2	Mich.	5,605.7	1,674.6	440.2	1,234.4	3,931.1	66.8	335.7	2,430.6	1,098.0
Total		13,308.9	4,504.6	1,337.3	3,167.3	8,804.3	216.7	769.8	3,212.4	4,605.4
<b>Plan Area 2.0</b>										
PSA 2.1	Mich.	1,657.1	557.0	78.3	478.7	1,100.1	17.4	98.0	524.5	460.2
	Wis.	3,420.0	747.0	255.7	491.3	2,673.0	352.4	351.1	899.4	1,070.1
	Total	5,077.1	1,304.0	334.0	970.0	3,773.1	369.8	449.1	1,423.9	1,530.3
2.2	Ill.	64.1	-----	-----	-----	64.1	37.5	25.8	.4	.4
	Ind.	87.5	.5	.5	-----	87.0	45.9	20.1	19.8	1.2
	Wis.	157.1	19.3	5.8	13.5	137.8	48.0	33.0	41.3	15.5
	Total	308.7	19.8	6.3	13.5	288.9	131.4	78.9	61.5	17.1
2.3	Ind.	136.9	.5	.5	-----	136.4	61.7	33.8	40.2	.7
	Mich.	1,554.7	90.6	65.0	25.6	1,464.1	570.7	392.0	295.9	205.5
	Total	1,691.6	91.1	65.5	25.6	1,600.5	632.4	425.8	336.1	206.2
2.4	Mich.	5,369.8	1,394.3	651.5	742.8	3,975.5	829.0	442.0	1,262.8	1,441.7
	Total	12,447.2	2,809.2	1,057.3	1,751.9	9,638.0	1,962.6	1,395.8	3,084.8	3,195.3
<b>Plan Area 3.0</b>										
PSA 3.1	Mich.	2,889.6	793.8	470.8	323.0	2,095.8	485.3	263.2	426.0	921.3
3.2	Mich.	1,182.0	97.3	41.1	56.2	1,084.7	190.1	241.1	199.8	453.7
Total		4,071.6	891.1	511.9	379.2	3,180.5	675.4	504.3	625.8	1,375.0
<b>Plan Area 4.0</b>										
PSA 4.1	Mich.	641.3	31.6	18.8	12.8	609.7	245.7	164.0	104.9	95.1
4.2	Ind.	71.0	.2	.2	-----	70.8	27.8	25.3	17.4	.3
	Ohio	379.9	8.4	8.4	-----	371.5	182.7	109.8	79.0	-----
	Total	450.9	8.6	8.6	-----	442.3	210.5	135.1	96.4	0.3
4.3	Ohio	520.8	16.6	10.9	5.7	504.2	201.5	155.2	141.8	5.7
4.4	N.Y.	1,075.1	107.0	41.6	65.4	968.1	82.3	240.2	568.2	77.4
	Pa.	223.1	11.7	11.7	-----	211.4	65.6	50.5	42.5	52.8
	Total	1,298.2	118.7	53.3	65.4	1,179.5	147.9	290.7	610.7	130.2
Total		2,911.2	175.5	91.6	83.9	2,735.7	805.6	745.0	953.8	231.3
<b>Plan Area 5.0</b>										
PSA 5.1	N.Y.	835.9	72.8	25.4	47.4	763.1	58.1	242.6	409.9	52.5
5.2	N.Y.	2,206.9	249.3	101.7	147.6	1,957.6	98.9	648.2	1,042.8	167.7
5.3	N.Y.	1,961.3	404.7	129.0	275.7	1,556.6	28.4	421.7	826.2	280.3
Total		5,004.1	726.8	256.1	470.7	4,277.3	185.4	1,312.5	2,278.9	500.5
<b>Great Lakes Basin Total</b>		<b>37,743.0</b>	<b>9,107.2</b>	<b>3,254.2</b>	<b>5,853.0</b>	<b>28,635.8</b>	<b>3,845.7</b>	<b>4,727.4</b>	<b>10,155.2</b>	<b>9,907.5</b>

Source: Adjusted to the updated January 1, 1968, State Forest Survey figures, NCFES and NEFES, U.S. Forest Service. Keyed to Economic Planning Subarea, Great Lakes Basin Commission, 1968.

**TABLE 19-155 Area of Commercial Forest Land in the Great Lakes Basin by Stand-Size Class (1,000 Acres)**

Plan Area and Planning Subarea	State	Total	Saw Timber stands	Pole Timber stands	Saplings & seedlings stands	Non-stocked areas	Plan Area and Planning Subarea	State	Total	Saw Timber stands	Pole Timber stands	Saplings & seedlings stands	Non-stocked areas	
<b>Plan Area 1.0</b>							<b>Plan Area 3.0</b>							
PSA 1.1	Minn.	5,347.6	572.2	2,834.2	1,374.3	566.9	PSA 3.1	Mich.	2,889.6	466.8	1,529.0	831.1	62.7	
	Wis.	2,355.6	134.3	838.6	1,005.8	376.9	3.2	Mich.	1,182.0	249.4	468.8	405.9	57.9	
	Total	7,703.2	706.5	3,672.8	2,380.1	943.8	Total		4,071.6	716.2	1,997.8	1,237.0	120.6	
1.2	Mich.	5,605.7	1,737.4	2,394.5	1,404.5	69.3	<b>Plan Area 4.0</b>							
Total		13,308.9	2,443.9	6,067.3	3,784.6	1,013.1	PSA 4.1	Mich.	641.3	209.6	144.7	220.6	66.4	
<b>Plan Area 2.0</b>							4.2	Ind.	71.0	40.2	14.2	14.3	2.3	
PSA 2.1	Mich.	1,657.1	450.2	747.5	439.3	20.1	Ohio	379.9	143.2	13.3	219.2	4.2		
	Wis.	3,420.0	533.2	1,055.3	1,249.0	582.5	Total	450.9	183.4	27.5	233.5	6.5		
	Total	5,077.1	983.4	1,802.8	1,688.3	602.6	4.3	Ohio	520.8	173.4	50.5	273.5	23.4	
2.2	Ill.	64.1	40.1	15.4	8.2	.4	4.4	N.Y.	1,075.1	184.2	116.6	638.8	135.5	
	Ind.	87.5	49.6	17.5	17.7	2.7	Pa.	223.1	107.8	40.2	59.7	15.4		
	Wis.	157.1	52.8	41.2	23.1	40.0	Total	1,298.2	292.0	156.8	698.5	150.9		
	Total	308.7	142.5	74.1	49.0	43.1	Total	2,911.2	858.4	379.5	1,426.1	247.2		
2.3	Ind.	136.9	77.6	27.4	27.6	4.3	<b>Plan Area 5.0</b>							
	Mich.	1,554.7	507.6	360.3	539.5	147.3	PSA 5.1	N.Y.	835.9	161.5	88.7	487.7	98.0	
	Total	1,691.6	585.2	387.7	567.1	151.6	5.2	N.Y.	2,206.9	536.0	265.6	1,108.2	297.1	
2.4	Mich.	5,369.8	1,102.2	2,561.0	1,591.9	114.7	5.3	N.Y.	1,961.3	504.5	323.2	904.9	228.7	
Total		12,447.2	2,813.3	4,825.6	3,896.3	912.0	Total		5,004.1	1,202.0	677.5	2,500.8	623.8	
									Great Lakes Basin Total	37,743.0	8,033.8	13,947.7	12,844.8	2,916.7

Source: Adjusted to the updated January 1, 1968, State Forest Survey figures NCFES and NEFES, U.S. Forest Service. Keyed to Economic Subareas, Great Lakes Basin Commission, 1968.

**TABLE 19-156 Area of Commercial Forest Land in the Great Lakes Basin by Stocking Class (1,000 Acres)**

Plan Area and Planning Subarea	State	Total	Stocking Class				Plan Area and Planning Subarea	State	Total	Stocking Class				
			+70%	70-40%	40-10%	Less than 10%				+70%	70-40%	40-10%	Less than 10%	
<b>Plan Area 1.0</b>							<b>Plan Area 3.0</b>							
PSA 1.1	Minn.	5,347.6	2,032.1	1,802.1	930.5	582.9	PSA 3.1	Mich.	2,889.6	1,415.9	933.3	471.0	69.4	
	Wis.	2,355.6	565.3	765.6	633.7	391.0	3.2	Mich.	1,182.0	493.0	373.6	249.9	59.5	
	Total	7,703.2	2,597.4	2,567.7	1,564.2	973.9	Total		4,071.6	1,918.1	1,307.9	720.9	128.9	
1.2	Mich.	5,605.7	3,170.8	1,633.4	732.1	69.4	<b>Plan Area 4.0</b>							
Total		13,308.9	5,768.2	4,201.1	2,296.3	1,043.3	PSA 4.1	Mich.	641.3	192.5	190.9	191.5	66.4	
<b>Plan Area 2.0</b>							4.2	Ind.	71.0	30.4	24.6	13.8	2.2	
PSA 2.1	Mich.	1,657.1	934.7	483.1	218.7	20.6	Ohio	379.9	204.8	133.0	38.0	4.1		
	Wis.	3,420.0	820.8	1,111.5	920.0	567.7	Total	450.9	235.2	157.6	51.8	6.3		
	Total	5,077.1	1,755.5	1,594.6	1,138.7	588.3	4.3	Ohio	520.8	282.3	156.8	64.0	17.7	
2.2	Ill.	64.1	32.9	21.5	9.0	.7	4.4	N.Y.	1,075.1	545.1	242.2	152.3	135.5	
	Ind.	87.5	37.5	30.3	17.0	2.7	Pa.	223.1	116.5	80.5	21.9	4.2		
	Wis.	157.1	37.7	51.0	42.3	26.1	Total	1,298.2	661.6	322.7	174.2	139.7		
	Total	308.7	108.1	102.8	68.3	29.5	Total	2,911.2	1,371.6	828.0	481.5	230.1		
2.3	Ind.	136.9	58.7	47.4	26.5	4.3	<b>Plan Area 5.0</b>							
	Mich.	1,554.7	481.9	477.3	450.9	144.6	PSA 5.1	N.Y.	835.9	450.4	179.9	107.6	98.0	
	Total	1,691.6	540.6	524.7	477.4	148.9	5.2	N.Y.	2,206.9	1,147.5	469.7	292.6	297.1	
2.4	Mich.	5,369.8	2,888.9	1,666.9	712.6	101.4	5.3	N.Y.	1,961.3	942.7	525.6	264.3	228.7	
Total		12,447.2	5,293.1	3,889.0	2,397.0	868.1	Total		5,004.1	2,540.6	1,175.2	664.5	623.8	
									Great Lakes Basin Total	37,743.0	16,887.4	11,401.2	6,560.2	2,894.2

Note: Stocking is the degree of utilization of land by trees as measured in terms of basal area and/or the number of trees required to utilize fully the growth potential of the land.

Source: Adjusted to updated January 1, 1968, State Forest Survey figures, NCFES and NEFES, U.S. Forest Service. Keyed to Economic Subarea, Great Lakes Basin Commission, 1968.

**TABLE 19-157 Volume of Growing Stock, in Million Cubic Feet, and Saw Timber, in Million Board Feet, on Commercial Forest Land in the Great Lakes Basin, 1967**

Plan Area and Planning Subarea	State	Growing Stock			Sawtimber		
		Total	Softwood	Hardwood	Total	Softwood	Hardwood
Plan Area 1.0							
PSA 1.1	Minn.	3,771.6	1,714.4	2,057.2	4,659.9	2,843.7	1,816.2
	Wis.	<u>1,160.7</u>	<u>242.8</u>	<u>917.9</u>	<u>1,527.5</u>	<u>572.2</u>	<u>955.3</u>
	Total	4,932.3	1,957.2	2,975.1	6,187.4	3,415.9	2,771.5
1.2	Mich.	<u>4,820.9</u>	<u>1,591.6</u>	<u>3,229.3</u>	<u>11,896.9</u>	<u>4,664.1</u>	<u>7,232.8</u>
Total		9,753.2	3,548.8	6,204.4	18,084.3	8,080.0	10,004.3
Plan Area 2.0							
PSA 2.1	Mich.	1,372.4	491.7	880.7	3,133.2	1,390.2	1,743.0
	Wis.	<u>2,569.4</u>	<u>648.3</u>	<u>1,921.1</u>	<u>6,350.6</u>	<u>2,112.3</u>	<u>4,238.3</u>
	Total	3,941.8	1,140.0	2,801.8	9,483.8	3,502.5	5,981.3
2.2	Ill.	12.1	-----	12.1	74.9	-----	74.9
	Ind.	72.7	.3	72.4	229.6	.1	229.5
	Wis.	<u>95.2</u>	<u>2.3</u>	<u>92.9</u>	<u>399.2</u>	<u>2.1</u>	<u>397.1</u>
	Total	167.9	2.6	165.3	628.8	2.2	626.6
2.3	Ind.	107.5	1.2	106.3	347.8	1.3	346.5
	Mich.	<u>1,014.6</u>	<u>50.8</u>	<u>963.8</u>	<u>2,921.9</u>	<u>205.6</u>	<u>2,716.3</u>
	Total	1,122.1	52.0	1,070.1	3,269.7	206.9	3,062.8
2.4	Mich.	<u>4,258.5</u>	<u>1,024.9</u>	<u>3,233.6</u>	<u>8,816.8</u>	<u>2,222.6</u>	<u>6,594.2</u>
Total		9,490.3	2,219.5	7,270.8	22,199.1	5,934.2	16,264.9
Plan Area 3.0							
PSA 3.1	Mich.	2,265.7	563.5	1,702.2	3,887.1	882.1	3,005.0
3.2	Mich.	<u>875.1</u>	<u>98.5</u>	<u>776.6</u>	<u>1,880.0</u>	<u>223.2</u>	<u>1,656.8</u>
Total		3,140.8	662.0	2,478.8	5,767.1	1,105.3	4,661.8
Plan Area 4.0							
PSA 4.1	Mich.	417.8	17.4	400.4	1,197.8	71.9	1,125.9
4.2	Ind.	62.5	.3	62.2	203.2	.7	202.5
	Ohio	<u>280.0</u>	<u>.4</u>	<u>279.6</u>	<u>1,083.6</u>	<u>.7</u>	<u>1,082.9</u>
	Total	342.5	.7	341.8	1,286.8	1.4	1,285.4
4.3	Ohio	327.1	2.1	325.0	1,117.7	5.4	1,112.3
4.4	N.Y.	826.8	119.3	707.5	1,456.8	198.4	1,258.4
	Pa.	<u>187.6</u>	<u>14.5</u>	<u>173.1</u>	<u>289.4</u>	<u>17.3</u>	<u>272.1</u>
	Total	1,014.4	133.8	880.6	1,746.2	215.7	1,530.5
Total		2,101.8	154.0	1,947.8	5,348.5	294.4	5,054.1
Plan Area 5.0							
PSA 5.1	N.Y.	653.2	93.0	560.2	1,199.6	152.2	1,047.4
5.2	N.Y.	1,829.4	403.6	1,425.8	3,703.5	817.0	2,886.5
5.3	N.Y.	<u>1,378.4</u>	<u>452.0</u>	<u>926.4</u>	<u>2,937.0</u>	<u>924.7</u>	<u>2,012.3</u>
Total		3,861.0	948.6	2,912.4	7,840.1	1,893.9	5,946.2
Great Lakes Basin Total		<u>28,347.1</u>	<u>7,532.9</u>	<u>20,814.2</u>	<u>59,239.1</u>	<u>17,307.8</u>	<u>41,931.3</u>

<sup>1</sup>International 1/4-inch rule.

Source: Adjusted to updated January 1, 1968, State Forest Survey figures, NCFES and NEFES, U.S. Forest Service. Keyed to Economic Subareas, Great Lakes Basin Commission, 1968.

TABLE 19-158 Area of Commercial Forest Lane (1,000 Acres) in the Great Lakes Basin, 1967

Plan Area and Planning Subarea	State	Total	Public			Private		
			National Forest	Other Federal	State	Other Public	Forest Industry	Farmer-owned and Misc. private
Plan Area 1.0								
PSA 1.1	Minn.	5,347.6	1,561.5	69.5	759.4	1,213.9	342.2	1,401.1
	Wis.	<u>2,355.6</u>	<u>248.6</u>	<u>61.2</u>	<u>84.8</u>	<u>647.8</u>	<u>155.5</u>	<u>1,157.7</u>
	Total	7,703.2	1,810.1	130.7	844.2	1,861.7	497.7	2,558.8
1.2	Mich.	<u>5,605.7</u>	<u>975.3</u>	<u>20.3</u>	<u>881.2</u>	<u>79.8</u>	<u>1,451.6</u>	<u>2,197.5</u>
Total		13,308.9	2,785.4	151.0	1,725.4	1,941.5	1,949.3	4,756.3
Plan Area 2.0								
PSA 2.1	Mich.	1,657.1	157.2	2.8	380.1	4.6	418.1	694.3
	Wis.	<u>3,420.0</u>	<u>481.0</u>	<u>178.9</u>	<u>163.1</u>	<u>490.3</u>	<u>312.2</u>	<u>1,794.5</u>
	Total	5,077.1	638.2	181.7	543.2	494.9	730.3	2,488.8
2.2	Ind.	87.5	-----	1.9	1.1	.1	.3	84.1
	Ill.	64.1	-----	.8	.3	-----	.3	62.7
	Wis.	<u>157.1</u>	-----	<u>.8</u>	<u>5.8</u>	<u>3.0</u>	<u>2.3</u>	<u>145.2</u>
	Total	308.7	-----	3.5	7.2	3.1	2.9	292.0
2.3	Mich.	1,554.7	1.3	3.1	85.4	10.9	17.1	1,436.9
	Ind.	<u>136.9</u>	-----	<u>3.0</u>	<u>1.8</u>	<u>.1</u>	<u>.4</u>	<u>131.6</u>
	Total	1,691.6	1.3	6.1	87.2	11.0	17.5	1,568.5
2.4	Mich.	<u>5,369.8</u>	<u>888.6</u>	<u>41.5</u>	<u>1,322.9</u>	<u>48.9</u>	<u>316.6</u>	<u>2,751.3</u>
Total		12,447.2	1,528.1	232.8	1,960.5	557.9	1,067.3	7,100.6
Plan Area 3.0								
PSA 3.1	Mich.	2,889.6	401.7	-----	879.9	2.5	36.3	1,569.2
3.2	Mich.	<u>1,182.0</u>	-----	<u>1.4</u>	<u>196.1</u>	<u>7.6</u>	<u>7.2</u>	<u>969.7</u>
Total		4,071.6	401.7	1.4	1,076.0	10.1	43.5	2,538.9
Plan Area 4.0								
PSA 4.1	Mich.	641.3	-----	-----	35.3	4.5	-----	601.5
4.2	Ind.	71.0	-----	1.6	.9	.1	.2	68.2
	Ohio	<u>379.9</u>	-----	-----	<u>9.4</u>	-----	-----	<u>370.5</u>
	Total	450.9	-----	1.6	10.3	.1	.2	438.7
4.3	Ohio	520.8	-----	3.0	7.5	1.4	-----	508.9
4.4	N.Y.	1,075.1	-----	-----	51.4	10.2	12.6	1,000.9
	Pa.	<u>223.1</u>	-----	-----	-----	<u>6.3</u>	<u>1.0</u>	<u>215.8</u>
	Total	<u>1,298.2</u>	-----	-----	<u>51.4</u>	<u>16.5</u>	<u>13.6</u>	<u>1,216.7</u>
Total		2,911.2	-----	4.6	104.5	22.5	13.8	2,765.8
Plan Area 5.0								
PSA 5.1	N.Y.	835.9	-----	5.4	46.3	4.6	11.4	768.2
5.2	N.Y.	2,206.9	4.3	-----	150.6	36.0	187.8	1,828.2
5.3	N.Y.	<u>1,961.3</u>	-----	-----	<u>148.7</u>	<u>35.1</u>	<u>335.7</u>	<u>1,441.8</u>
Total		5,004.1	4.3	5.4	345.6	75.7	534.9	4,038.2
Great Lakes Basin Total		37,743.0	4,719.5	395.2	5,212.0	2,607.7	3,608.8	21,199.8

Source: Adjusted to updated January 1, 1968, State Forest Survey figures, NCFES and NEFES, U.S. Forest Service. Keyed to Economic Subareas, Great Lakes Basin Commission, 1968.

**TABLE 19-159 Production of Saw Logs, Veneer Logs, and Miscellaneous Industrial Timber Products in the Great Lakes Basin by Planning Subarea<sup>1</sup>**

	thousand cubic feet			
	Actual	Projected		
	1962	1980	2000	2020
Plan Area 1.0				
PSA 1.1	10,341	19,197	25,101	28,053
PSA 1.2	25,775	37,893	45,970	50,009
Total	36,116	57,090	71,071	78,062
Plan Area 2.0				
PSA 2.1 <sub>2</sub>	31,484	36,722	40,216	41,962
PSA 2.2 <sup>2</sup>	2,827	3,063	3,220	3,299
PSA 2.3 <sup>3</sup>	9,733	10,904	11,868	12,077
PSA 2.4	14,643	22,659	28,020	30,694
Total	58,687	73,358	83,142	88,032
Plan Area 3.0				
PSA 3.1	9,162	14,975	18,850	20,787
PSA 3.2	5,172	6,431	7,271	7,691
Total	14,334	21,406	26,121	28,478
Plan Area 4.0				
PSA 4.1	6,205	6,960	7,462	7,714
PSA 4.2	2,633	2,652	2,642	2,603
PSA 4.3	2,404	3,304	4,018	4,181
PSA 4.4	11,431	16,728	19,574	20,329
Total	22,773	29,644	33,696	34,827
Plan Area 5.0				
PSA 5.1 <sup>6</sup>	2,387	3,783	4,378	4,676
PSA 5.2 <sup>6</sup>	3,918	6,236	7,473	9,695
PSA 5.3	1,968	2,805	7,933	11,198
Total	8,273	12,825	19,786	25,569
Great Lakes Basin Total	140,083	194,323	233,814	254,968

<sup>1</sup>The end products of lumber and wood products industries have been converted to roundwood products harvested from the forests, so that they could be aggregated and used as a measure of timber input into the industry.

<sup>2</sup>Figures include St. Joseph and Marshall Counties in Indiana.

<sup>3</sup>Figures do not include St. Joseph and Marshall Counties in Indiana and Hillsdale County in Michigan.

<sup>4</sup>Figures include Hillsdale County in Michigan.

<sup>5</sup>Figures include Wayne County in New York.

<sup>6</sup>Figures do not include Wayne, Herkimer, and Oneida Counties in New York.

SOURCE: NCFES and NEFES U.S. Forest Service. Keyed to Economic Areas, Water Resources Council, 1967 National Assessment.

employment was almost 34,000. By the year 2020, employment will have decreased almost 42 percent. This is partly due to the increase in employee productivity because of machinery and better production techniques. Projections of employment were based on the timber input into industry and the assumption that productivity, i.e., the volume of wood processed by each employee, would continue to increase at historical rates. Implicit in this rate is an allowance for an increase in secondary manufacturing activities such as manufacture of lumber into millwork, flooring, and pre-fabricated buildings.

**TABLE 19-160 Production of Pulpwood in the Great Lakes Basin by Planning Subarea<sup>1</sup>**

	thousand cords			
	Actual	Projected		
	1962	1980	2000	2020
Plan Area 1.0				
PSA 1.1	630	877	1,200	1,333
PSA 1.2	395	655	995	1,136
Total	1,025	1,532	2,195	2,469
Plan Area 2.0				
PSA 2.1 <sub>2</sub>	479	673	927	1,031
PSA 2.2 <sup>2</sup>	13	16	24	28
PSA 2.3 <sup>3</sup>	15	66	132	158
PSA 2.4	326	563	872	998
Total	833	1,318	1,955	2,215
Plan Area 3.0				
PSA 3.1	239	405	622	711
PSA 3.2	50	99	163	190
Total	289	504	785	901
Plan Area 4.0				
PSA 4.1 <sup>4</sup>	1	4	8	10
PSA 4.2	7	10	13	13
PSA 4.3	3	6	9	11
PSA 4.4	32	63	68	73
Total	43	83	98	106
Plan Area 5.0				
PSA 5.1 <sup>5</sup>	5	13	17	19
PSA 5.2 <sup>6</sup>	41	86	129	192
PSA 5.3	201	276	440	514
Total	247	375	586	725
Great Lakes Basin Total	2,437	3,812	5,619	6,417

<sup>1</sup>The volume shown includes roundwood harvested directly from forests and plant by-products, obtained from other wood manufacturing plants such as sawmills and veneer and plywood plants, and used in manufacture of wood pulp. The end products of pulp and paper industries have been converted to pulpwood, the timber input into the industry.

<sup>2</sup>Figures include St. Joseph and Marshall Counties in Indiana.

<sup>3</sup>Figures do not include St. Joseph and Marshall Counties in Indiana and Hillsdale County in Michigan.

<sup>4</sup>Figures include Hillsdale County in Michigan.

<sup>5</sup>Figures include Wayne County in New York.

<sup>6</sup>Figures do not include Wayne, Herkimer, and Oneida Counties in New York.

SOURCE: NCFES and NEFES U.S. Forest Service. Keyed to Economic Areas, Water Resources Council, 1967 National Assessment.

Employment in the pulp, paper, and allied products industries for 1962 was 109,000. By the year 2020, employment will have decreased approximately 37 percent. The same reasoning and projection base that applied to the lumber and wood products industries apply here.

Table 19-163 shows the employment in forest management. In 1962 five thousand people were employed in forest management activities. A large majority of those were small private forest owners. The remainder was made up of professional foresters, engineers, clerks, firefighters, and other workers. By

TABLE 19-161 Stumpage and Harvested Value of Production of Saw Logs, Veneer Logs, and Miscellaneous Industrial Timber Products in the Great Lakes Basin (Thousands of Dollars)<sup>1</sup>

	Type of Actual Value			Projected		Type of Actual Value			Projected	
	1962	1980	2000	1980	2020	1962	1980	2000	2020	
Plan Area 1.0										
PSA 1.1	S <sup>2</sup> H <sup>3</sup>	537 2,767	1,000 5,152	1,309 6,742	1,464 7,537	S H	434 1,862	487 2,088	522 2,239	
PSA 1.2	S H	1,804 7,732	2,653 11,368	3,218 13,791	3,501 15,003	S H	265 772	264 779	262 776	
Plan Area 2.0										
PSA 2.1	S H	1,710 8,456	2,036 9,947	2,254 10,941	2,362 11,438	S H	264 697	363 958	442 1,165	
PSA 2.2 <sup>4</sup>	S	211	231	243	250	S	1,203	1,760	2,060	
PSA 2.3 <sup>5</sup>	H S	807 690	871 773	916 829	939 856	H S	4,953	7,249	8,481	
PSA 2.4	H S H	2,920 1,025 4,393	3,271 1,587 6,801	3,506 1,961 8,406	3,623 2,149 9,208	H S H	263 1,074 431	416 1,702 686	482 1,970 822	
Plan Area 3.0										
PSA 3.1	S H S H	641 2,749 362 1,552	1,048 4,492 450 1,929	1,320 5,655 509 2,181	1,455 6,236 538 2,307	S H S H	216 886	309 1,263	873 3,570	
PSA 3.2										
Great Lakes Basin TOTAL	S H	10,056 43,383	14,063 60,676	17,106 73,702	18,782 80,837	S H				

<sup>1</sup>Based on 1958 dollar value to local points of delivery and 1962 production figures.

<sup>2</sup>Stumpage value--volume of timber products cut from roundwood times average prices received from timber sales as found in U.S. Forest Service Miscellaneous Publication 941, "The Economic Importance of Timber in the U.S.", 1963.

<sup>3</sup>Harvested value--volume of products harvested times average prices received for each product at local points of delivery as found in U.S. Forest Service Miscellaneous Publication 941, "The Economic Importance of Timber in the U.S.", 1963.

<sup>4</sup>Figures include St. Joseph and Marshall Counties, Indiana.

<sup>5</sup>Figures do not include St. Joseph and Marshall Counties in Indiana and Hillsdale County in Michigan.

<sup>6</sup>Figures include Hillsdale County, Michigan.

<sup>7</sup>Figures include Wayne County, New York.

<sup>8</sup>Figures do not include Wayne, Herkimer, and Oneida Counties, New York.

SOURCE: Adapted from "The Economic Importance of Timber in the U.S.", Miscellaneous Publication 941, Forest Service, USDA, 1963; and NCFES and NEFES, Forest Service, USDA. Keyed to Economic Areas, Water Resource Council, 1967 National Assessment.



**TABLE 19-163 Employment of Forest-Based Industries in the Great Lakes Basin**

Industry	Actual				Projections <sup>1</sup>			
	1962	1980	2000	2020	1962	1980	2000	2020
<b>Plan Area 1.0</b>								
PSA 1.1	L <sup>2</sup>	1,911	1,851	1,402	1,049			
	P <sup>3</sup>	3,869	3,909	3,433	2,334			
	M <sup>4</sup>	886	1,265	1,877	2,341			
	Total	6,666	7,025	6,712	5,724			
PSA 1.2	L	2,443	2,367	1,792	1,341			
	P	1,088	1,099	966	657			
	M	635	906	1,344	1,676			
	Total	4,166	4,372	4,102	3,674			
<b>Plan Area 2.0</b>								
PSA 2.1	L	7,900	7,654	5,795	4,337			
	P	19,837	20,044	17,604	11,968			
	M	588	840	1,247	1,555			
	Total	28,325	28,538	24,646	17,860			
PSA 2.2 <sup>5</sup>	L	7,231	7,006	5,304	3,970			
	P	33,904	34,258	30,088	20,454			
	M	41	59	87	109			
	Total	41,176	41,323	35,479	24,533			
PSA 2.3 <sup>6</sup>	L	2,868	2,779	2,104	1,575			
	P	17,021	17,199	15,105	10,269			
	M	173	248	367	458			
	Total	20,062	20,226	17,576	12,302			
PSA 2.4	L	1,930	1,870	1,416	1,060			
	P	2,540	2,566	2,254	1,532			
	M	608	868	1,288	1,606			
	Total	5,078	5,304	4,958	4,198			
<b>Plan Area 3.0</b>								
PSA 3.1	L	819	793	601	450			
	P	913	923	810	551			
	M	327	467	693	864			
	Total	2,059	2,183	2,104	1,865			
PSA 3.2	L	575	557	422	316			
	P	211	213	187	127			
	M	139	198	294	366			
	Total	925	968	903	809			
<b>Plan Area 4.0</b>								
PSA 4.1 <sup>7</sup>	L	2,408	2,333	1,766	1,322			
	P	7,875	7,957	4,989	4,751			
	M	80	115	170	213			
	Total	10,363	10,405	6,925	6,286			
PSA 4.2	L	1,036	917	666	481			
	P	2,241	2,263	1,989	1,352			
	M	128	174	246	288			
	Total	3,405	3,354	2,901	2,121			
PSA 4.3	L	472	491	402	281			
	P	4,672	4,718	4,145	2,818			
	M	60	93	166	211			
	Total	5,204	5,302	4,713	3,310			
PSA 4.4	L	2,246	2,338	1,858	1,302			
	P	7,079	7,154	6,281	5,512			
	M	240	323	457	536			
	Total	9,565	9,815	8,596	7,350			
<b>Plan Area 5.0</b>								
PSA 5.1 <sup>8</sup>	L	469	488	388	281			
	P	1,545	1,559	1,370	931			
	M	60	93	166	211			
	Total	2,074	2,140	1,924	1,423			
PSA 5.2	L	770	852	697	528			
	P	3,114	3,146	2,764	2,412			
	M	715	970	1,308	1,606			
	Total	4,599	4,968	4,769	4,546			
PSA 5.3	L	387	714	993	979			
	P	2,734	3,101	2,755	2,412			
	M	180	323	588	803			
	Total	3,301	4,138	4,336	4,194			
<b>Great Lakes Basin Totals</b>								
	L	33,465	33,010	25,606	19,272			
	P	108,643	110,109	96,740	68,080			
	M	4,860	6,942	10,298	12,843			
	TOTAL	146,968	150,061	132,644	100,195			

<sup>1</sup>The base for employment projections is the projected timber production.

<sup>2</sup>Represents the lumber and wood products industries defined as Major Group 24 in the Standard Industrial Classification Manual.

<sup>3</sup>Represents the pulp, paper, and allied products industries defined as Major Group 26 in the Standard Industrial Classification Manual.

<sup>4</sup>Represents the forest management which includes such activities as protection of forests from fire, insects, diseases, and other destructive agents; tree planting, timber stand improvement, the making of timber sales; and related research activities.

<sup>5</sup>Figures include St. Joseph and Marshall Counties, Indiana.

<sup>6</sup>Figures do not include St. Joseph and Marshall Counties in Indiana and Hillsdale County in Michigan.

<sup>7</sup>Figures include Hillsdale County, Michigan.

<sup>8</sup>Figures include Wayne County, New York.

<sup>9</sup>Figures do not include Wayne, Herkimer, and Oneida Counties, New York.

Source: NCFES and NEFES--U.S. Forest Service. Keyed to Economic Areas, Water Resource Council, 1967 National Assessment.

TABLE 19-164 Income (Payrolls) of Forest-Based Industries in the Great Lakes Basin (Thousands of Dollars)

Industry	Actual 1962	Projections <sup>1</sup>		Industry	Actual 1962	Projections <sup>1</sup>		
		1980	2020			1980	2020	
Plan Area 1.0								
PSA 1.1				PSA 4.1 <sup>7</sup>				
L	6,464	8,942	10,080	L	11,425	15,805	17,815	
P	21,888	34,507	49,642	P	47,445	74,797	107,605	
M	4,429	9,846	23,979	M	400	898	2,174	
Total	32,781	53,295	83,701	Total	59,270	91,500	127,594	
PSA 1.2								
L	7,250	10,029	11,305	L	4,235	5,255	6,126	
P	6,828	10,765	15,486	P	11,395	19,536	28,073	
M	3,174	7,052	17,170	M	640	1,350	3,140	
Total	17,252	27,846	43,961	Total	16,270	26,141	36,907	
Plan Area 2.0								
PSA 2.1								
L	29,917	41,385	46,651	L	1,899	2,610	3,174	
P	125,444	197,764	284,507	P	27,349	41,175	59,147	
M	2,940	6,538	15,231	M	300	724	2,121	
Total	158,301	245,687	347,989	Total	29,548	44,509	64,442	
PSA 2.2 <sup>5</sup>								
L	37,343	51,658	58,231	L	9,029	12,424	14,670	
P	188,953	297,887	428,546	P	40,653	62,434	89,618	
M	205	459	1,111	M	1,200	2,514	5,838	
Total	226,501	350,004	487,888	Total	50,882	77,372	110,126	
PSA 2.3 <sup>6</sup>								
L	11,901	16,464	18,558	L	1,886	2,594	3,063	
P	104,003	163,962	235,879	P	9,288	13,605	19,544	
M	865	1,930	4,689	M	300	724	2,121	
Total	116,769	182,356	259,126	Total	11,474	16,923	24,728	
PSA 2.4								
L	5,492	7,597	8,564	L	3,095	4,531	5,508	
P	16,841	26,550	38,196	P	16,623	27,456	39,440	
M	3,040	6,756	16,455	M	3,575	7,550	16,710	
Total	25,373	40,903	63,215	Total	23,293	39,537	61,658	
Plan Area 3.0								
PSA 3.1								
L	2,428	3,359	3,786	L	1,554	3,796	7,845	
P	5,730	9,034	12,996	P	16,000	27,060	39,304	
M	1,635	3,635	8,853	M	900	2,514	7,511	
Total	9,793	16,028	25,635	Total	18,454	33,370	54,660	
PSA 3.2								
L	1,780	2,462	2,776	L	135,698	188,911	217,720	
P	1,348	2,125	3,057	P	639,788	1,008,657	1,451,040	
M	695	1,541	3,756	M	24,298	54,031	131,559	
Total	3,823	6,128	9,589	TOTAL	799,784	1,253,599	1,800,319	
Great Lakes Basin Totals								
L	11,199	15,119	17,199	L	135,698	188,911	217,720	
P	55,387	83,701	115,559	P	639,788	1,008,657	1,451,040	
M	4,469	11,559	25,061	M	24,298	54,031	131,559	
Total	76,057	115,559	157,819	TOTAL	799,784	1,253,599	1,800,319	

<sup>1</sup>Projections of payrolls were based on employment and the assumption that average wages and salaries per employee would increase at the same rate of productivity.

<sup>2</sup>Represents the lumber and wood products industries defined as Major Group 24 in the Standard Industrial Classification Manual.

<sup>3</sup>Represents the pulp, paper, and allied products industries defined as Major Group 26 in the Standard Industrial Classification Manual.

<sup>4</sup>Represents the forest management which includes such activities as protection of forests from fire, insects, diseases, and other destructive agents; tree planting, timber stand improvement, the making of timber sales; and related research activities.

<sup>5</sup>Figures include St. Joseph and Marshall Counties, Indiana.

<sup>6</sup>Figures do not include St. Joseph and Marshall Counties in Indiana and Hillsdale County in Michigan.

<sup>7</sup>Figures include Hillsdale County, Michigan.

<sup>8</sup>Figures include Wayne County, New York.

<sup>9</sup>Figures do not include Wayne, Herkimer, and Oneida Counties, New York.

Source: NCFES and NEFES—U.S. Forest Service. Keyed to Economic Areas, Water Resource Council, 1967 National Assessment.

2020, employment will almost triple. In the last few decades forest management programs of public agencies, forest industries, and many private landowners have expanded rapidly. Most of the timber production represents in some degree the results of management.

#### 4.2.3 Present and Projected Income

The 1962 income in the lumber and wood products industries was almost \$136 million (Table 19-164). This income will almost double by the year 2020 to more than \$243 million.

Income in the pulp, paper, and allied industries will increase from \$640 million in 1962 to more than 1.6 billion by the year 2020, an increase of two and a half times.

The income in forest management will increase more than 11 times, from \$24 million in 1962 to almost \$269 million in 2020. Increased production demands will necessitate higher income for foresters and skilled technicians in forest management activities.

#### 4.2.4 Present and Projected Value Added by Timber-Based Economic Activities

Timber-based economic activities are defined as forest management, harvesting, primary manufacturing, secondary manufacturing, construction, transportation, and marketing. Value added is considered as an economic measure used in estimating the portion of gross national product originating in each of these activities. As the difference between the cost of goods purchased by an enterprise and the value of the products it sells, it represents the amount available for payment of wages and salaries; interests; property, excise, profit, and sales taxes; and depreciation and depletion charges.

Table 19-165 shows the value added by each activity. The sum of the values added in all kinds of timber-based economic activities amount to almost \$2 billion in 1962. Of the total value added in 1962, approximately one percent was added in forest management. An additional 3 percent was added in harvesting, 13 percent in primary manufacturing, 26 percent in secondary manufacturing, 32 percent in construction, and 25 percent in transportation and marketing. The data show that in 1962 timber increased in value nearly 81 times between the stump and delivery of finished products to final consumers. By 2020, the sum of

the values added is estimated to be more than \$4 billion.

#### 4.2.5 Present and Projected Domestic Timber Demand

The total domestic demand (Table 19-166) for saw logs, veneer logs, pulpwood, and miscellaneous products in the Great Lakes Basin in 1962 was 1.3 billion cubic feet of growing stock trees. This demand is projected to almost triple by the year 2020. Saw and veneer log demand is expected to almost double between 1962 and 2020. Pulpwood and miscellaneous products demand is projected to be almost four times as great between 1962 and 2020. Up to the year 2000, saw and veneer log demands are expected to account for the major share of demand, but by 2020, pulpwood is expected to take the lead.

The Basin's share of U.S. demand in 1962 was approximately 15 percent. Between 1962 and 2020 the projections indicate there will be a steady decrease of this share.

Figure 19-21 graphically compares projected domestic timber demand and timber production in the Great Lakes Basin.

### 4.3 Summary of Forest Resources and Industrial Data for the United States and Great Lakes Basin

#### 4.3.1 Forest Resources

The Great Lakes Basin has 5.2 percent of the nation's forest land (Table 19-167), and more than 7 percent of the nation's commercial forest land. The Basin has 4.5 percent of the nation's volume of stock trees growing on this commercial land. Almost all of this volume is in hardwood species. The Basin grows 2.3 percent of the nation's sawtimber. Almost three-quarters of it is in hardwoods. Private ownership in both the United States and the Basin is quite high, but public ownership in the Basin is approximately six percent higher than in the United States.

#### 4.3.2 Forest Industry

The Great Lakes Basin has 2.1 percent of the nation's production of saw and veneer logs and miscellaneous products (Tables 19-168 and 19-169). This share of production will increase

**TABLE 19-165 Estimated Value Added in Timber-Based Economic Activities in the Great Lakes Basin**

Year	Thousand Dollars <sup>1</sup>						Total
	Forest Management <sup>2</sup>	Harvesting <sup>3</sup>	Primary Manufacturing <sup>4</sup>	Secondary Manufacturing <sup>5</sup>	Construction <sup>6</sup>	Transportation & Marketing <sup>7</sup>	
1962	19,220	55,881	250,146	494,188	628,975	481,111	1,929,521
1980	28,506	82,920	360,560	732,596	934,795	716,696	2,856,073
2000	38,582	112,246	478,823	998,088	1,273,413	979,543	3,880,695
2020	43,395	126,078	536,018	1,143,141	1,415,394	1,121,052	4,421,078

<sup>1</sup>Based on 1958 dollar value. Present and projected production figures and value of forest management were used as a base. Various State 1958 value added rates for each activity was used for each year.

<sup>2</sup>Assumed value of stumpage cut equalled value added in forest management.

<sup>3</sup>All activities involved in harvesting and transporting logs and related products from forests to local points of delivery.

<sup>4</sup>All activities involved in the manufacture of logs and related products into lumber, veneer, plywood, paper, turpentine, rosin, and other products.

<sup>5</sup>All activities involved in the remanufacture of lumber, plywood, paper, and other products into finished goods such as furniture, containers, toys, and wearing apparel.

<sup>6</sup>All activities involved in the fabrication of lumber, plywood, and other products into buildings and other fixed structures.

<sup>7</sup>All activities involved in the transportation of logs and related products from local points of delivery to manufacturing plants or consumers, transportation of primary and secondary products from point of manufacture to final consumers, and the marketing of these products through wholesale and retail channels.

Source: Adapted from "The Economic Importance of Timber in the U.S.", Miscellaneous Publication 941, Forest Service, USDA, 1963; and NCFES and NEFES, U.S. Forest Service. Keyed to Economic Areas, Water Resource Council, 1967 National Assessment.

**TABLE 19-166 Domestic Timber Demand—by Product Class, United States and Great Lakes Basin, 1962, with Projections for 1980, 2000, and 2020**

Product Class	Million Cubic Feet		Percent of U.S.
	United States <sup>2</sup>	Great Lakes Basin <sup>3</sup>	
<b>Saw &amp; veneer logs</b>			
1962	6,110.0	896.0	14.7
1980	6,780.0	974.4	14.4
2000	9,200.0	1,269.0	13.8
2020	11,430.0	1,535.4	13.4
<b>Pulpwood &amp; other misc. products</b>			
1962	3,060.0	449.4	14.7
1980	5,000.0	719.0	14.4
2000	8,840.0	1,218.2	13.8
2020	12,770.0	1,717.4	13.4
<b>Total</b>			
1962	9,170.0	1,345.4	14.7
1980	11,780.0	1,693.4	14.4
2000	18,040.0	2,487.2	13.8
2020	24,200.0	3,252.8	13.4

<sup>1</sup>Demand, as shown, is the total quantity of growing stock that timber processors would stand ready to purchase if the prices of timber and primary wood products (i.e., principally lumber, plywood, and paper) do not change significantly, relative to prices of all commodities.

<sup>2</sup>Adapted from "The Demand for Domestic Timber 1962-2060," Forest Service, USDA, January 1967, Table 1, page 2.

<sup>3</sup>GLB demand based on U.S. per capita consumption and OBE population projections for GLB and U.S.

in 1980 to 2.4 percent, and will remain constant at that level through 2020. The production of pulpwood will increase for the nation and the Basin, but the Basin's share will decrease 1.2 percent from 1962 to 2020. The Basin's share of forest-based industrial employment will steadily decrease from 12.0 percent in 1962 to 9.2 percent in 2020. Although forest-based industrial income will increase for both the Basin and the nation, the Basin's share of the United States total will steadily decrease from 12.9 percent in 1962 to 10.1 percent in 2020.

#### 4.4 General Methods and Assumptions for Forestry Projections

##### 4.4.1 Projection Techniques

As a result of its participation in the development of river basin plans, the Forest Service has been developing projections of cut, growth, timber inventories, and employment and production data for forestry related activities within Basin boundaries. Preliminary projections of production and related estimates of employment and payrolls for 1980, 2000, and 2020 on a national basis and by water resource regions are contained in the FS-ERS Blue Book of August 1967. Projections of total

TABLE 19-167 Growing Stock, Saw Timber, and Ownership on Commercial Forest Land and Total Forest Land, United States and Great Lakes Basin

	United States (1962)	Great Lakes Basin (1967)	Percent of U.S.
	<u>Thousands of Acres</u>		
Forest Land	758,865.0	39,624.7	5.2
Commercial	508,845.0	37,743.0	7.4
Hardwood	269,215.0	28,635.4	10.6
Softwood	239,630.0	9,107.2	3.8
Noncommercial	250,020.0	1,881.7	.7
	<u>Million Cubic Feet</u>		
Growing Stock on Commercial	627,882.0	28,347.1	4.5
Forest Land	193,800.0	20,814.2	10.7
Hardwood	434,082.0	7,532.9	1.7
Softwood			
	<u>Million Board Feet</u>		
Sawtimber on Commercial			
Forest Land	2,536,799.0	59,239.1	2.3
Hardwood	478,777.0	41,931.3	8.7
Softwood	2,058,022.0	17,307.8	.8
	<u>Thousands of Acres</u>		
Ownership of Commercial			
Forest Land			
Public	141,868.0	12,934.4	9.1
Private	366,977.0	24,808.6	6.8

Source: "Timber Trends in the United States," Forest Service, USDA Forest Resource Report 17, 1965.

domestic production for 1980 and 2000 are taken from Forest Service Report No. 17, *Timber Trends in the United States, 1965*. Projections of timber products output by major water resource regions and the related estimates of employment and payrolls are based to a large extent on prospective timber supplies. These are based on projections of timber growth in the eastern regions and projections of allowable cut in the western regions. All projections are subject to revision when more detailed studies are completed at regional forest experiment stations.

Projections in *Timber Trends* are made under the basic assumption that demand for timber products will balance with whatever supply is available under timber management levels expected in 2000. Since water resource planning under present standards is conducted using existing exchange values, this assumption simply states that given present price relationships, whatever supply of timber is available in 2000 will clear the market. In

view of present estimates of future supply and demand of timber products, this assumption appears conservative. (See Forest Service Report No. 18 and Forest Service Report "The Demand for Domestic Timber 1962-2060" PPB System January 1967.) These assumptions are made to simplify matters for planning purposes with a view toward avoiding introduction of demand elasticities and supply-price relationships.

Projections contained in the FS-ERS Blue Book for each water resource region were further disaggregated to the appropriate study area to be used in individual river basin studies.

#### 4.4.2 Projections for the Basin and Planning Subareas

There is no one best method for making projections in all regions. The type and quality of the data available are critical factors in de-

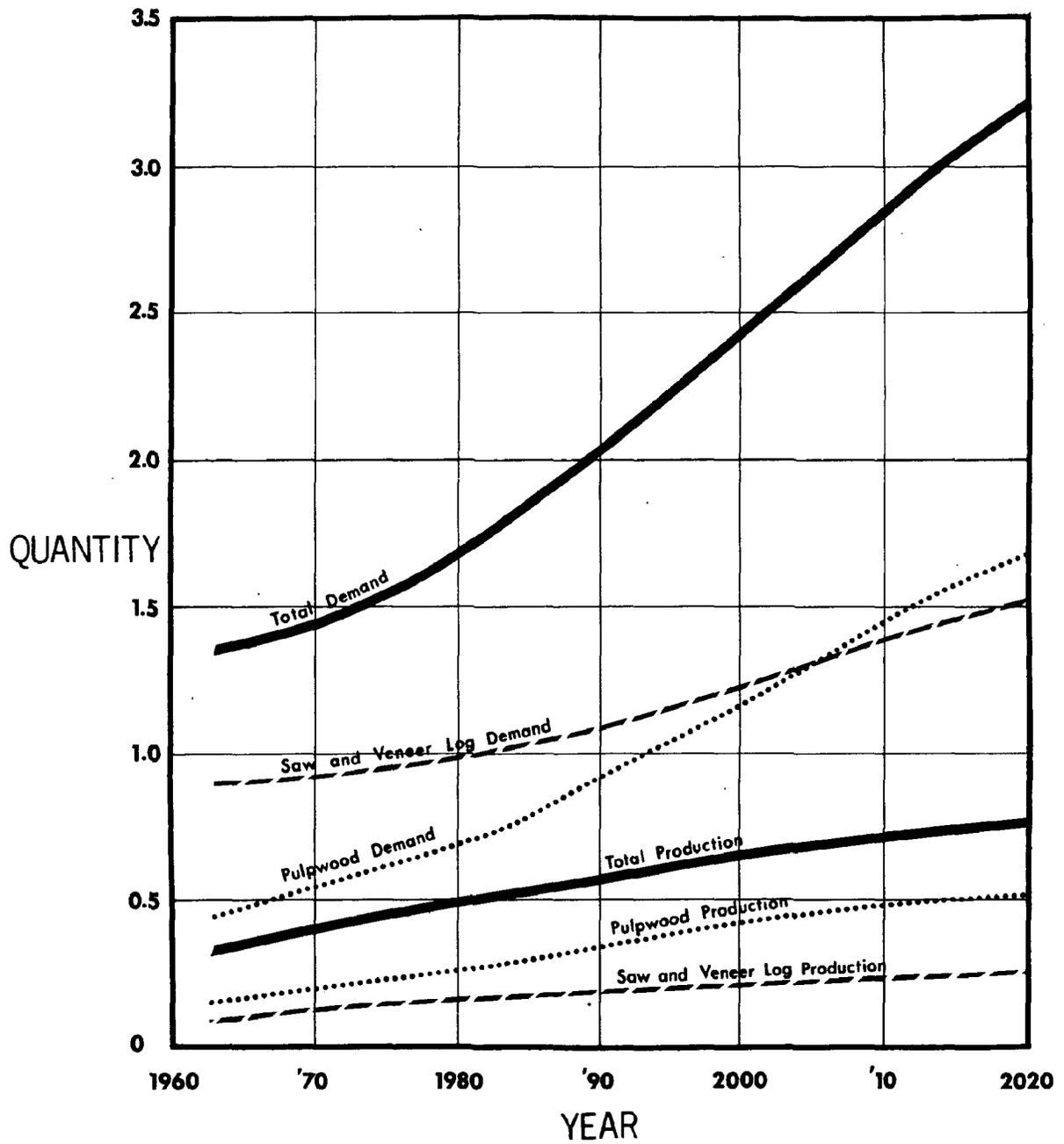


FIGURE 19-21 Comparison of Domestic Timber Demand and Production Projections in the Great Lakes Basin. The Great Lakes Basin demand is based on U.S. per capita consumption and OBE population projections for the Great Lakes Basin and the United States.

TABLE 19-168 Production, Employment, and Income of Forest-Based Industries, United States and Great Lakes Basin

	United States (1962)	Great Lakes Basin (1962)	Percent of U.S.
Million Cubic Feet			
Production of saw and vener logs and misc. products			
1962	6,515.0	140.1	2.1
1980	8,110.0	194.3	2.4
2000	9,790.0	233.8	2.4
2020	10,730.0	255.0	2.4
Million Cords			
Production of pulpwood			
1962	41.7	2.4	5.7
1980	78.4	3.8	4.8
2000	128.6	5.6	4.4
2020	142.2	6.4	4.5
Thousand People			
Employment (SIC 24 & 26 & forest management)			
1962	1,224.0	147.0	12.0
1980	1,326.0	150.1	11.3
2000	1,328.0	133.6	10.1
2020	1,093.5	100.2	9.2
Million Dollars			
Income (Payrolls) (SIC 24 & 26 & forest management)			
1962	6,190.3	799.8	12.9
1980	10,505.0	1,251.6	11.9
2000	16,432.5	1,800.3	10.9
2020	21,002.6	2,130.4	10.1

Source: "Preliminary Projections of Economic Activity in the Agricultural, Forestry, and Related Economic Sectors of the United States and Its Water Resource Regions 1980, 2000, and 2020," Economic Research Service and Forest Service, USDA 1967.

veloping a suitable methodology and these will vary from region to region. Basic data sources in addition to the FS-ERS regional projections include Forest Survey data, *Timber Trends*, County Census data of employment, production, and value by Standard Industry Codes, State breakdowns of commercial forest area where this is the best production indicator available, and various experiment station publications concerning State timber resources by county or survey areas,

timber production by individual States, and pulpwood production by individual States. Projections for individual basins or planning subareas are bounded by the water resource regional totals contained in the FS-ERS Blue Book and the basic assumption in *Timber Trends* that cut and growth by the year 2000 will be in balance. Within these parameters there is a wide latitude for projections of an individual basin or planning subarea. This is because the type of data available will vary

**TABLE 19-169 Production of Saw Logs, Veneer Logs, Miscellaneous Industrial Timber Products, and Pulpwood, United States and Great Lakes Basin**

Product Class	(million cubic feet)		Percent of U.S.
	United States	Great Lakes Basin	
<b>Saw &amp; veneer logs &amp; misc. products</b>			
1962	6,515.0	140.1	2.1
1980	8,110.0	194.3	2.4
2000	9,790.0	233.8	2.4
2020	10,730.0	255.0	2.4
<b>Pulpwood</b>			
1962	3,294.3	192.5 <sup>1</sup>	5.7
1980	6,193.6	301.1	4.8
2000	10,159.4	443.9	4.4
2020	11,233.8	506.9	4.5
<b>Total</b>			
1962	9,809.3	332.6	3.4
1980	14,303.6	495.4	3.5
2000	19,949.4	677.7	3.4
2020	21,963.8	761.9	3.5

<sup>1</sup>In converting cords to cubic feet, one cord equals 79 cubic feet.

Source: "Preliminary Projections of Economic Activity in the Agricultural, Forestry, and Related Economic Sectors of U.S. and Its Water Resource Regions, 1980, 2000, and 2020," Economic Research Service and Forest Service, August 1967.

from basin to basin. The area that the data cover may not be homogeneous with basin or study area boundaries. The timeliness of the data will vary, and production, growth, and cut data may not lend themselves to disaggregation to basin or county levels. Quality of the data may vary so that in the breakdown of data statistical or sampling errors may be magnified revealing obvious discrepancies. The type and nature of the data available may vary from basin to basin because of differences in physical and economic conditions.

For all these reasons, the procedure used should be developed after a careful review of all available data and it should make use of what is thought to be the best data available for that region. Even then adjustments will be required based on judgment, trends revealed by the most recent information, and the opinion of capable, experienced individuals familiar with conditions in the basin. (This may include FS personnel from regional, area, and experiment station staffs, personnel from State forester staffs, and industry leaders such as mill operators of forestry association officers.)

General steps in two basic techniques that have been used rely essentially on either pro-

duction data or employment data depending upon which are thought to be the best data available relative to the particular basin and planning subarea under study. Production data are preferable if available. The following general steps are used.

(1) Production estimates, which start with output from Forest Survey units for base years, are projected forward in accordance with trends in growth, cut, and inventory, but within the basic assumption that cut and growth will balance by the year 2000. Disaggregation of Forest Survey units to conform with basin or planning subarea boundaries is done where necessary on the basis of county breakdowns, land use estimates, or the judgment of knowledgeable individuals familiar with the area.

(2) Employment estimates are based on data from the Census of Manufacturers for primary employment. Employment projections for future years are based on the production projections in Step 1 and projected employee productivity trends.

(3) Value of production is based on available data concerning prices of timber delivered to the mill and estimates of value added from manufacturing.

(4) Production, cut, growth, and inventory projections are checked to make sure that Basin and planning subarea estimates when aggregated are within the national projection totals for the water resource region involved, as contained in the FS-ERS Blue Book.

(5) Allocations within a water resource region to individual basins rely on the best data available. Allocations sometimes are done on the basis of forest survey units. In some cases these data have to be broken down to a county basis.

(6) Once the projections for the desired future time frames are made, allocations to individual basins and planning subareas are made on the basis of forest survey units, county units, or State totals. Regional totals are checked against the FS-ERS regional projections or the "sideboard" figures provided as parameters by Forest Economics. Final adjustments may be necessary or desirable on the basis of expert judgment, obvious trends, recent program or policy changes, availability of other comparative data, or other constraints such as limitations imposed by the projected extent or capacity of the resource base.

When adequate production data were not available, projections were made on the basis of employment data, but in those cases another check was necessary to insure that

when the cut for pulpwood is subtracted from total cut, enough cut for sawtimber remains to supply the projected lumber and wood products production.

The following are methods used to make preliminary projections from the base year to 1980, 2000, and 2020 for specific items relying on either production or employment data.

(1) Projections of production of saw logs, veneer logs, and miscellaneous industrial timber products were based on past trends indicated in *Timber Trends*, past forest surveys, and special studies. The trend was further adjusted on the basis of estimated net annual growth (NAG), which indicates the number of trees available for cutting. It is assumed that no increase or decrease in NAG per acre of commercial forest land will be expected during the projection period.

(2) Projections of pulpwood production were constructed in essentially the same manner as the preceding projections. Past trend data were developed using *Timber Trends* and Pulpwood Production. It is assumed that the demand for pulpwood will be greater than the demand for other forms of timber. Therefore, wherever demand for the two product categories combined exceeds available net annual growth, pulpwood demand is satisfied first. What is left over goes to other products.

(3) Commercial forest area projections were developed using past trends and anticipated increases in urban areas. Preliminary estimates of forest area were compared with land use projections. These were merged and developed into a mutually agreed upon land use projection. Final commercial forest land area projections are based on the findings.

(4) In developing projections of employment in the lumber and wood products industries, estimates based on the 1963 and 1968 Census of Manufacturers were developed for each water resource region. Employment in primary industries was related to production projected in the Basin. Secondary production was based on the 1958 to 1963 trend adjusted subjectively to reflect anticipated future industrial shifts both regionally and toward more integration of primary and secondary industries.

(5) Projections of employment in pulp, paper and allied products were based on the trend as shown in Census of Manufacturers data from 1958 to 1962. Employment is projected to move to those areas where ample water and raw materials exist and away from highly urbanized areas. In general, secondary

employment was projected to follow a gradual trend toward integration with primary establishments.

(6) Average annual income for workers in primary and secondary SIC 24 industries were developed for the Northeast, Middle Atlantic States, and South Atlantic census regions. These were applied to the estimated number of primary and/or secondary workers that was developed for other tables dealing with employment projections.

(7) Income (wages and salaries) projections in the pulp, paper and allied products industries were compiled in the same manner as the table covering income in the lumber and wood products industries.

#### 4.4.3 Value of Production and Value Added in Timber-Based Activities

The economic importance of timber was appraised by estimating gross national product and employment originating in timber-based economic activities (Subsection 4.2.4). Value added is the difference between the cost of goods purchased by an enterprise and the value of the products it sells. It represents the amount available for payment of wages and salaries; interest profits; property, excise, profit, and sales taxes; and depreciation and depletion charges.

All of the values added and the employment in forest management and harvesting activities, as defined in this report, were considered to be timber-based and were attributed to timber. However, in enterprises engaged in manufacturing, fabrication, construction, transportation, and trade where both timber and nontimber materials were used or handled, only portions of the total value added and the employment were attributed to timber. For these enterprises estimates of both "total value added and total employment" and of "value added and employment attributed to timber" are presented. The sum of the values added and employment attributed to timber represents that part of the gross national product and national employment originating in timber-based economic activities.

Data on value added and employment in the manufacturing industries were derived from the Censuses of Manufacturers published by the Bureau of the Census. Value added in manufacturing, as defined by the Bureau of the Census, was obtained by subtracting the cost of materials, supplies and containers,

fuel, purchased electric energy, and contract work from the value of shipments for products manufactured plus receipts for services rendered.

In these manufacturing industries it was assumed that estimates of the value added and employment attributed to timber could be derived by using the ratios between the cost of timber products as a raw material and the total cost of all raw materials that were incorporated in some way in the final product. For example, in the wood household furniture industry—where lumber, plywood, veneer, and related wood products accounted for approximately 70 percent of the total cost of the materials used in the manufacture of the furniture—70 percent of the total value added and employment was attributed to timber. The remaining 30 percent of the total value added and employment was attributed to the metals, plastics, textiles, and similar nonwood materials used by the industry in making final products.

Costs of fuels, electric energy, containers, and related products used in manufacture but not incorporated into final products were not included in the calculations of these proportions because they were the final products of other industries. In many, although not in all instances, costs of these items were relatively small, and their inclusion would not have significantly changed the estimates of value added and employment attributed to timber.

In certain secondary industries an allowance was made for the non-timber raw materials that were used in earlier processing stages. For example, in the paper-converting industries only 85 percent of the cost of paper and paperboard consumed was used in the allocation of value added and employment. The other 15 percent of the cost of paper and paperboard consumed was considered to be allocable to straw, cotton, bagasse, clay, or other non-timber materials used in paper and paperboard in the earlier processing stages.

In some manufacturing industries detailed information on value of materials consumed was not available. In these cases the estimates of value added and employment attributed to timber were based on values or quantities of goods produced. In the garment industry, for example, approximately 25 percent of the garments are made from rayon and acetate, which are produced from cellulose. Therefore, 25 percent of the value added and employment in this industry were attributed to timber.

The estimates of value added and employment attributed to timber were computed

for all primary and secondary manufacturing industries where timber products represented more than 2.5 percent of the total cost of materials used or handled. In numerous other manufacturing industries, where the cost of timber products consumed was less than 2.5 percent, no separate industry estimates of value added or employment were computed nor was an attempt made to show value of products. However, estimates of the aggregate value added and employment attributed to timber in such industries were made. These were based upon the estimated volume of timber consumed in these industries and ratios of value added and employment attributed to timber, per unit of wood consumed, in the industries in which timber composed more than 2.5 percent of materials cost.

In the construction, transportation, and trade industries, there are no published data on value added. Estimates of total value added in these industries were therefore derived from the limited data available on costs of materials consumed and values of products or services produced, or computed by multiplying estimates of average value added per employee (based partly on fragmentary data and partly on judgment) by total reported or estimated employment. Estimates of the value added and employment attributed to timber in the construction industry were derived by multiplying estimates of total value added and employment by the ratio between the cost of timber products such as lumber, plywood, and building board and the total cost of all materials used in construction. In the transportation and trade industries the estimates of value added and employment attributed to timber were derived by multiplying estimates of total value added and employment by the ratios between freight revenue and between sales of timber products and total sales.

#### 4.4.4 Projections of Domestic Timber Demand

A study of timber demand in the U.S. that projects the nation's needs for timber is summarized in "The Demand for Domestic Timber 1962-2060," U.S. Forest Service, January 1967. It reveals that future timber demands are uncertain, because it is not known to what degree population, productivity, tastes, and technology will change. However, timber demand is likely to rise over the long run even when this uncertainty is taken into account.

The study showed three alternate projections of the demand for domestic timber

between 1962 and 2060, and also showed demand by product class for the mid-range projection. Demand, as shown, is the total quantity of growing stock that timber processors could purchase if the prices of timber and primary wood products (i.e., principally lumber, plywood, and paper) do not change significantly, relative to prices of all commodities.

Timber demand could be affected by many things, including larger population and an expanding gross national product that create greater raw material needs. Timber demand could be reduced by a shift in consumer desire away from physical goods and towards services. It could also be reduced by greater efficiency in the use of wood and the development and improvement of wood substitutes.

The study showed the range of demand estimates derived for each of the projection years. They broaden rapidly in the later years.

A sensitivity analysis was conducted for the year 2000 based on a range of determinant

values somewhat different from those used in the original analysis. The sensitivity analysis shows that these demand estimates are about equally sensitive to changes in any of the three underlying factors. A one-percent change in assumed population, GNP, or unit wood use, all cause about a one-percent change in estimated timber demand for the year 2000.

The Great Lakes Basin timber demands were derived from data found in the previously mentioned U.S. timber demand study and OBE population projections for the Basin. U.S. timber demand for domestic growing stock was determined by using OBE projected U.S. population figures. Demand for saw and veneer logs, and pulpwood and miscellaneous products was then determined by using a percent of U.S. share figures. This demand by product class was then converted into U.S. per capita consumption. Per capita figures were then multiplied by the OBE-Great Lakes Basin population figures and the result was the Basin demand for growing stock.

## Section 5

# MINERAL INDUSTRIES

### 5.1 Introduction

The 178,000 square miles comprising the United States portion of the Great Lakes Basin study area contain significant quantities of metallic minerals (copper, iron ore, lead and zinc, and silver), nonmetallic minerals (gypsum, sand and gravel, crushed and dimension stone, salt, and chemicals derived from well brines—bromine, calcium compounds, iodine, magnesium compounds, potash), and mineral fuels (natural gas, peat, and petroleum). In 1968 the mineral output of the Basin was valued at more than 1.5 billion dollars. The Basin supplied approximately 70 percent of the nation's production of iron ore, approximately 6 percent of the domestic copper output, approximately one-seventh of the sand, gravel, and stone, and nearly a quarter of the gypsum. More than one-third of the salt and one-half of the magnesium compounds, as well as a substantial portion of the nation's bromine production, was produced in the Basin.

Mineral production is defined as production measured by mine shipments, sales, or marketable production (including consumption by producers).

Employment is based primarily on production workers man-hours. Number of employees is calculated by specific mineral commodity industry by an equivalent man-year determined for that industry. For example, in the iron ore industry a man-year is 2,000 man-hours. For the sand and gravel industry a man-year is equivalent to only 1,800 man-hours, because of the seasonal aspects of the industry.

### 5.2 Existing and Projected Mineral Reserves in the Basin

Detailed information on mineral reserves by mineral commodity is presented in Appendix 5, *Mineral Resources*. With some exceptions mineral reserves in the Basin are adequate to meet projected demand through 2020. Where mineral shortages occur projected production

has been modified to reflect the limitations of reserves.

### 5.3 Projections of Selected Mineral Commodities, 1980-2020

Projections of mineral production and employment for selected mineral commodities were based on data compiled by the Bureau of Mines, which canvassed the mineral industry.

Commodity projections were based on analysis of historic area mineral industry growth, regional population growth trends, and the Bureau of Mines national projections of primary demand and production trends. Statistical parameters derived from these analyses as well as knowledge of foreseeable technological advances and engineering judgment were used to arrive at the projections.

Projections of employment in the mineral industry were based on productivity in the base year adjusted for productivity changes over the projection period. Changes in productivity were developed from material compiled by the Bureau of Mines, and other Federal and State agencies.

### 5.4 Productivity

Productivity is a measure of output per worker, generally computed by dividing production by the number of production workers, to arrive at an hourly, daily, or annual productivity rate. Changes in productivity generally indicate either an increase or decrease in the efficiency of an operation. Productivity can be useful only in comparing mining operations with similar characteristics.

In mining operations several factors not implicit in such data have an effect on productivity. Type of mining (underground or surface), depth of deposit, size of equipment used, size of operation and metal content of ores shipped each affect output per worker to some degree. Productivity rates vary from mine to mine,

and from one area to another, due to the variables cited above.

Basinwide productivity in nonmetallic mining operations, notably sand, gravel, and crushed stone, is expected to increase substantially over the projection period, as more efficient and larger equipment is employed.

In iron ore mining, where type of material produced has been changing and will continue to change over the projection period, the metal content has been increasing as lesser quantities of natural iron ores and larger amounts of pellets are being produced. Although productivity rates show little change over the period when based on gross weight, significant increases would be evident, if iron content were the criterion used.

### **5.5 Summary of Selected Mineral Industries, 1960 and 1968**

Table 19-170 shows mineral production in the Great Lakes Basin for 1960 and 1968. Ta-

bles 19-171 through 19-190 show mineral production for plan areas and planning subareas for 1960 and 1968. Included in the tables are several mineral commodities for which projections of production and employment have not been made. These include cement, lime, chemicals recovered from well brines, natural gas and petroleum. Data for these commodities are shown under manufacturing or are either confidential or not available.

Tables 19-191 through 19-194 show production for four major mineral commodities—clay, iron ore, sand and gravel, and crushed stone—for 1960 and 1968.

Tables 19-195 through 19-215 detail mineral production for selected commodities for the Great Lakes Basin and for plan areas and planning subareas for 1968 and projected 1980, 2000 and 2020.

Tables 19-216 through 19-236 detail employment for selected commodities for the Great Lakes Basin and for plan areas and planning subareas for 1968 and projected 1980, 2000, and 2020.

**TABLE 19-170 Great Lakes Basin Mineral Production**

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
<b>Cement:</b>				
Portland (376-pound barrels)	43,720,899	150,215,455	45,729,463	145,974,738
Masonry (280-pound barrels)	2,386,589	7,033,929	2,483,654	6,085,513
Clays and shale (short tons)	4,073,668	4,859,638	4,139,014	5,327,612
Coal, bituminous (short tons)	452,904	Withheld <sup>1</sup>	539,543	Withheld <sup>1</sup>
Copper (recoverable content of ores, etc.) (short tons)	56,385	36,199,170	74,805	62,607,296
Iron ore (usable) (long tons, gross weight)	54,584,173	486,480,576	56,635,595	597,232,792
Lead (recoverable content of ores, etc.) (short tons)	775	181,350	1,396	368,879
Lime (short tons)	5,752,584	78,750,017	7,744,542	98,553,213
Magnesium compounds (short tons, MgO equivalent)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	266,406	25,087,136
Manganiferous ore (5 to 35% Mn) (short tons, gross weight)	180,460	Withheld <sup>1</sup>	-----	-----
Natural gas <sup>2</sup> (million cubic feet)	20,790	4,449,000	40,480	10,160,000
Natural-gas liquids: <sup>2</sup>				
Natural gasoline (thousand 42-gallon barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	1,066	3,177,000
LP gases (thousand 42-gallon barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	1,384	3,432,000
Peat (short tons)	238,038	3,093,356	260,509	3,322,260
Petroleum <sup>2</sup> (42-gallon barrels)	15,899,000 <sup>3</sup>	46,266,000 <sup>3</sup>	12,974,404	38,286,742
Sand and gravel <sup>3</sup> (short tons)	101,060,482	89,494,826	129,121,000	124,424,000
Silver (recoverable content of ores, etc.) (troy ounces)	49,324	44,641	500,428	1,073,218
Stone (crushed and broken) (short tons)	91,859,610	119,884,341	110,557,798	154,170,674
Stone (dimension) (short tons)	193,742	4,283,746	142,007	4,323,495
Zinc (recoverable content of ores, etc.) (short tons)	66,364	17,121,912	66,194	17,872,380
Value of items that cannot be disclosed <sup>4</sup>	-----	141,923,440	-----	193,878,906
<b>Total Great Lakes Basin</b>	-----	<b>1,190,281,397<sup>5</sup></b>	-----	<b>1,496,257,854<sup>5</sup></b>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Excludes data for New York and Ohio, which are not available.

<sup>3</sup>Includes some data which could not be assigned to specific plan areas.

<sup>4</sup>These items include bromine, calcium compounds, gem stones, grindstones, gypsum, iodine (1968), iron oxide pigments (1960), potash, salt, talc, and items withheld to avoid disclosing individual company confidential data.

<sup>5</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes petroleum, natural gas, and natural-gas liquids data for New York and Ohio, which are not available.

TABLE 19-171 Mineral Production in Plan Area 1.0

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	20	80	50	100
Copper (recoverable content of ores, etc.) (short tons)	56,385	36,199,170	74,805	62,607,296
Iron ore (usable) (long tons, gross weight)	49,012,843	431,754,717	51,999,538	545,432,335
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	5,290,046	3,726,638	7,719,000	5,105,000
Silver (recoverable content of ores, etc.) (troy ounces)	-----	-----	472,813	1,013,995
Stone (crushed and broken) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	188	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	12,057,745	-----	10,572,848
Total Plan Area 1.0	-----	483,738,350	-----	624,731,574

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

TABLE 19-172 Mineral Production in Planning Subarea 1.1

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	20	80	50	100
Iron ore (usable) (long tons, gross weight)	42,239,727	369,530,900	42,749,198	Withheld <sup>1</sup>
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	3,271,472	2,159,172	5,754,000	3,687,000
Stone (crushed and broken) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	55,000	Withheld <sup>1</sup>
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	188	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	7,928,503	-----	438,760,229
Total Planning Subarea 1.1	-----	379,618,655	-----	442,447,329

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

TABLE 19-173 Mineral Production in Planning Subarea 1.2

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Copper (recoverable content of ores, etc.) (short tons)	56,385	36,199,170	74,805	62,607,296
Iron ore (usable) (long tons, gross weight)	6,773,116	62,223,817	9,250,340	Withheld <sup>1</sup>
Sand and gravel (short tons)	2,018,574 <sup>1</sup>	1,567,466 <sup>1</sup>	1,965,000	1,418,000
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	-----	-----
Silver (recoverable content of ores, etc.) (troy ounces)	-----	-----	472,813	1,013,995
Stone (crushed and broken) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Stone (dimension) (short tons)	145	3,050	-----	-----
Value of items that cannot be disclosed	-----	4,126,192	-----	117,244,954
Total Planning Subarea 1.2	-----	104,119,695	-----	182,284,245

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

TABLE 19-174 Mineral Production in Plan Area 2.0

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Bromine (pounds)	9,758,183 <sup>1</sup>	2,531,737 <sup>1</sup>	9,146,530 <sup>1</sup>	2,145,885 <sup>1</sup>
Calcium compounds (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Cement:				
Portland (376-pound barrels)	13,501,865 <sup>1</sup>	46,432,561 <sup>1</sup>	11,510,238	37,645,031
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	299,157	864,272
Clays and shale (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	833,957 <sup>1</sup>	1,175,873 <sup>1</sup>
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Coal, bituminous (short tons)	368,573	Withheld <sup>1</sup>	593,543	Withheld <sup>1</sup>
Iron ore (usable) (long tons, gross weight)	4,034,824	Withheld <sup>1</sup>	3,448,688	Withheld <sup>1</sup>
Lime (short tons)	916,464	14,228,604	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Magnesium compounds (short tons, MgO equivalent)	64,808	6,464,113	219,455	19,975,716
Manganiferous ore (5 to 35% Mn) (short tons, gross weight)	180,460	Withheld <sup>1</sup>	-----	-----
Peat (short tons)	23,083	237,498	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Petroleum (42-gallon barrels)	11,167,113 <sup>1</sup>	32,496,193 <sup>1</sup>	9,635,735 <sup>1</sup>	28,434,516 <sup>1</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	53,110,376	42,987,000	64,240,000	56,814,000
Stone (crushed and broken) (short tons)	30,845,249	41,409,993	39,810,806	56,521,824
Stone (dimension) (short tons)	118,972	1,665,394	85,771	1,753,504
Value of items that cannot be disclosed	-----	48,966,331	-----	80,659,920
Total Plan Area 2.0	-----	237,419,424 <sup>2</sup>	-----	285,990,541 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for natural gas and natural-gas liquids, which are not available.

TABLE 19-175 Mineral Production in Planning Subarea 2.1

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement, portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	132,508	137,218 <sup>1</sup>	6,130	11,034 <sup>1</sup>
Iron ore (usable) (long tons, gross weight)	4,034,824	Withheld <sup>1</sup>	3,448,688	Withheld <sup>1</sup>
Lime (short tons)	100,573	1,524,998 <sup>1</sup>	94,186	1,478,459
Manganiferous ore (5 to 35% Mn) (short tons, gross weight)	180,460	Withheld <sup>1</sup>	-----	-----
Sand and gravel (short tons)	7,320,368	5,455,467	8,423,000	6,210,000
Stone (crushed and broken) (short tons)	2,249,925	3,706,502	3,388,900	6,343,193
Stone (dimension) (short tons)	29,941	802,379	32,349	816,937
Total Planning Subarea 2.1	-----	11,626,564 <sup>2</sup>	-----	14,859,623 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data.

TABLE 19-176 Mineral Production in Planning Subarea 2.2

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	697,973	1,068,520	410,023	645,990
Coal, bituminous (short tons)	368,573	Withheld <sup>1</sup>	593,543	Withheld <sup>1</sup>
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	1,257,703	17,537,270
Peat (short tons)	14,679	168,795	8,664	193,860
Sand and gravel (short tons)	23,654,007	19,519,664	30,683,000	27,206,000
Stone (crushed and broken) (short tons)	20,389,480	27,506,830	26,766,352	37,525,732
Stone (dimension) (short tons)	76,311	767,395	51,413	921,058
Value of items that cannot be disclosed	-----	42,986,813	-----	26,006,204
Total Planning Subarea 2.2	-----	92,018,017 <sup>2</sup>	-----	110,036,114 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data.

TABLE 19-177 Mineral Production in Planning Subarea 2.3

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Clays and shale (short tons)	111,806 <sup>1</sup>	167,709 <sup>1</sup>	95,020 <sup>1</sup>	142,530 <sup>1</sup>
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Lime (short tons)	6,017	79,287	-----	-----
Peat (short tons)	8,404	68,703	26,304	226,173
Petroleum (42-gallon barrels)	8,932,738	25,994,182	7,759,723	22,898,509
Sand and Gravel (short tons)	17,133,624	13,759,118	19,692,000	18,442,000
Stone (crushed and broken) (short tons)	500,863	586,838	333,381	494,631
Stone (dimension) (short tons)	12,670	95,545	2,009	15,509
Total Planning Subarea 2.3	-----	40,751,382 <sup>2</sup>	-----	42,219,352 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for gypsum, which must be withheld to avoid disclosing individual company confidential data. Also excludes natural gas, and natural-gas liquids, which are not available.

TABLE 19-178 Mineral Production in Planning Subarea 2.4

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Bromine (pounds)	9,758,184 <sup>1</sup>	2,531,737 <sup>1</sup>	9,146,530 <sup>1</sup>	2,145,885 <sup>1</sup>
Calcium compounds (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	322,784 <sup>1</sup>	376,319 <sup>1</sup>
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Magnesium compounds (short tons, MgO equivalent)	64,808	6,464,113	219,455	19,975,716
Peat (short tons)	-----	-----	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Petroleum (42-gallon barrels)	2,234,375 <sup>1</sup>	6,502,011 <sup>1</sup>	1,876,012 <sup>1</sup>	5,536,007 <sup>1</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	5,002,377	4,252,751	5,442,000	4,956,000
Stone (crushed and broken) (short tons)	7,704,981	9,609,823	9,322,173	12,158,268
Stone (dimension) (short tons)	50	75	-----	-----
Value of items that cannot be disclosed	-----	22,196,093	-----	38,132,335
Total Planning Subarea 2.4	-----	51,556,603 <sup>2</sup>	-----	83,280,530 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for natural gas and natural-gas liquids, which are not available. Also excludes data for items which must be withheld to avoid disclosing individual company confidential data.

TABLE 19-179 Mineral Production in Plan Area 3.0

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Bromine (pounds)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Calcium compounds (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Iodine (pounds)	----- <sup>1</sup>	----- <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Magnesium compounds (short tons, MgO equivalent)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	46,951	5,111,420
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Petroleum (42-gallon barrels)	4,015,387 <sup>1</sup>	11,684,737 <sup>1</sup>	2,713,028 <sup>1</sup>	8,005,995 <sup>1</sup>
Potash (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	8,214,190 <sup>1</sup>	5,917,533 <sup>1</sup>	8,613,000	7,569,000
Stone (crushed and broken) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	22,003,197	20,852,687
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	100,448,858	-----	113,111,396
Total Plan Area 3.0	-----	118,051,128 <sup>2</sup>	-----	154,650,498 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for natural gas and natural-gas liquids, which are not available.

TABLE 19-180 Mineral Production in Planning Subarea 3.1

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Petroleum (42-gallon barrels)	1,112,129	3,236,285	880,994	2,599,764
Sand and gravel (short tons)	2,443,467	1,650,384	3,049,000	2,326,000
Stone (crushed and broken) (short tons)	19,090,014	16,445,472	21,566,352	20,219,460
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	38,599,954	-----	47,651,610
Total Planning Subarea 3.1	-----	59,932,095 <sup>2</sup>	-----	72,796,834 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for natural gas and natural-gas liquids, which are not available.

TABLE 19-181 Mineral Production in Planning Subarea 3.2

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Bromine (pounds)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Calcium compounds (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Iodine (pounds)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Magnesium compounds (short tons, MgO equivalent)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	46,951	5,111,420
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Petroleum (42-gallon barrels)	2,903,258 <sup>1</sup>	8,448,452 <sup>1</sup>	1,832,034 <sup>1</sup>	5,406,231 <sup>1</sup>
Potash (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	5,770,723 <sup>1</sup>	4,267,149 <sup>1</sup>	5,564,000	5,243,000
Stone (crushed and broken) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	436,845	633,227
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	1,371	18,512
Value of items that cannot be disclosed	-----	45,403,432	-----	65,441,274
Total Planning Subarea 3.2	-----	58,119,033 <sup>2</sup>	-----	81,853,664 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for natural gas and natural-gas liquids, which are not available.

TABLE 19-182 Mineral Production in Plan Area 4.0

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Calcium compounds (short tons)	-----	-----	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Cement:				
Portland (376-pound barrels)	16,456,800	56,550,363	17,567,820 <sup>1</sup>	55,227,575 <sup>1</sup>
Masonry (280-pound barrels)	882,387	2,541,640	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	2,057,041	2,381,775	2,185,126	2,959,363
Coal, bituminous (short tons)	84,331 <sup>1</sup>	318,328 <sup>1</sup>	-----	-----
Grindstones (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Gypsum (short tons)	758,381	3,858,144	666,561 <sup>1</sup>	3,215,345 <sup>1</sup>
Lime (short tons)	3,935,249	55,842,885	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Peat (short tons)	147,027 <sup>2</sup>	2,147,965 <sup>2</sup>	108,598 <sup>2</sup>	1,205,575 <sup>2</sup>
Petroleum (42-gallon barrels)	482,500 <sup>2</sup>	1,404,070 <sup>2</sup>	625,641 <sup>2</sup>	1,846,231 <sup>2</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	26,346,284	28,433,479	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Stone (crushed and broken) (short tons)	31,476,202	45,855,504	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	43,545,590	-----	233,148,336
Total Plan Area 4.0	-----	242,879,743 <sup>3</sup>	-----	297,602,425 <sup>3</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Excludes petroleum data for New York and Ohio, which are not available.

<sup>3</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes natural gas and natural-gas liquids data, which are not available.

TABLE 19-183 Mineral Production in Planning Subarea 4.1

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Calcium compounds (short tons)	-----	-----	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Cement:				
Portland (376-pound barrels)	6,730,657 <sup>1</sup>	23,394,636 <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	644,306 <sup>1</sup>	707,806 <sup>1</sup>	1,144,639	1,272,077
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	1,317,116 <sup>1</sup>	15,615,188 <sup>1</sup>
Peat (short tons)	140,510	2,052,592	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Petroleum (42-gallon barrels)	482,500	1,404,070	625,641	1,846,231
Salt (short tons)	3,102,514	25,150,398	3,367,324	25,349,600
Sand and gravel (short tons)	14,635,686	14,269,175	23,029,000 <sup>1</sup>	24,626,000 <sup>1</sup>
Stone (crushed and broken) (short tons)	1,387,830	1,728,491	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	12,736,353	-----	45,052,738
Total Planning Subarea 4.1	-----	81,443,521 <sup>2</sup>	-----	113,761,834 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for natural gas and natural-gas liquids, which are not available.

TABLE 19-184 Mineral Production in Planning Subarea 4.2

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	2,882,400 <sup>1</sup>	9,840,838 <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	383,470 <sup>1</sup>	495,555 <sup>1</sup>	356,155 <sup>1</sup>	433,117 <sup>1</sup>
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Lime (short tons)	1,794,098	29,118,374 <sup>1</sup>	2,072,291	31,193,313
Peat (short tons)	1,176	Withheld <sup>1</sup>	574	38,030
Sand and gravel (short tons)	2,539,845	2,396,960	3,838,000	4,074,000
Stone (crushed and broken) (short tons)	19,911,337	26,752,975	27,511,165	39,988,156
Stone (dimension) (short tons)	9,891	23,631	7,657	93,040
Value of items that cannot be disclosed	-----	2,123,615	-----	14,125,953
Total Planning Subarea 4.2	-----	70,751,948 <sup>2</sup>	-----	89,945,609 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for petroleum, natural gas, and natural-gas liquids, which are not available.

TABLE 19-185 Mineral Production in Planning Subarea 4.3

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	684,933	826,932	485,519	1,063,004
Coal, bituminous (short tons)	84,331 <sup>1</sup>	318,328	-----	-----
Grindstones (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Lime (short tons)	1,137,231 <sup>1</sup>	12,965,088 <sup>1</sup>	1,454,330	15,962,522 <sup>1</sup>
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	6,554,658	8,197,001	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Stone (crushed and broken) (short tons)	1,707,816	5,753,430	1,682,084	5,098,660
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	28,800,503	-----	48,136,448
Total Planning Subarea 4.3	-----	56,861,282 <sup>2</sup>	-----	70,260,634 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for petroleum, natural gas, and natural-gas liquids, which are not available.

TABLE 19-186 Mineral Production in Planning Subarea 4.4

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	-----	-----
Clays and shale (short tons)	344,332 <sup>1</sup>	351,482	198,813	191,165 <sup>1</sup>
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	2,616,095	3,570,343	5,791,000	7,611,000
Stone (crushed and broken) (short tons)	8,469,219	11,620,608	3,396,687	6,076,760
Stone (dimension) (short tons)	-----	-----	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	18,280,559	-----	9,755,423
Total Planning Subarea 4.4	-----	33,822,992 <sup>2</sup>	-----	23,634,348 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for petroleum, natural gas, and natural-gas liquids, which are not available.

TABLE 19-187 Mineral Production in Plan Area 5.0

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Iron ore (usable) (long tons, gross weight)	1,536,506	Withheld <sup>1</sup>	1,187,369	Withheld <sup>1</sup>
Iron oxide pigments (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	-----	-----
Lead (recoverable content of ores, etc.) (short tons)	775	181,350	1,396	368,879
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Salt (short tons)	4,007,960	30,763,284	5,217,566	42,487,852
Sand and gravel (short tons)	6,981,786	7,462,496	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Silver (recoverable content of ores, etc.) (troy ounces)	49,324	44,641	27,615	59,223
Stone (crushed and broken) (short tons)	7,861,735	12,496,464	10,452,335	18,093,085
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Talc (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Zinc (recoverable content of ores, etc.) (short tons)	66,364	17,121,912	66,194	17,872,380
Value of items that cannot be disclosed	-----	33,472,675	-----	37,516,397
Total Plan Area 5.0	-----	101,542,822 <sup>2</sup>	-----	116,397,816 <sup>2</sup>

<sup>1</sup> Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup> Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for petroleum, natural gas, and natural-gas liquids, which are not available.

TABLE 19-188 Mineral Production in Planning Subarea 5.1

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Gypsum (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	2,419,258	2,492,280	3,053,000	3,770,000
Stone (crushed and broken) (short tons)	1,913,739	3,200,491	2,769,945	5,288,922
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	17,012,189	-----	24,844,126
Total Planning Subarea 5.1	-----	22,704,960 <sup>2</sup>	-----	33,903,048 <sup>2</sup>

<sup>1</sup> Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup> Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Excludes data for petroleum, natural gas, and natural-gas liquids, which are not available.

TABLE 19-189 Mineral Production in Planning Subarea 5.2

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Cement:				
Portland (376-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Masonry (280-pound barrels)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Clays and shale (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Iron oxide pigments (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	----- <sup>1</sup>	----- <sup>1</sup>
Lime (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Peat (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Salt (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Sand and gravel (short tons)	3,079,510	3,352,208	4,333,000	4,490,000
Stone (crushed and broken) (short tons)	5,165,853	7,386,840	6,914,382	10,968,092
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Value of items that cannot be disclosed	-----	24,439,408	-----	27,218,527
Total Planning Subarea 5.2	-----	35,178,456 <sup>2</sup>	-----	42,676,619 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for petroleum, natural gas, and natural-gas liquids, which are not available.

TABLE 19-190 Mineral Production in Planning Subarea 5.3

Mineral	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Iron ore (usable) (long tons, gross weight)	1,536,506	Withheld <sup>1</sup>	1,187,369	Withheld <sup>1</sup>
Lead (recoverable contents of ores, etc.) (short tons)	775	181,350	1,396	368,879
Sand and gravel (short tons)	1,483,018	1,618,008	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Silver (recoverable content of ores, etc.) (troy ounces)	49,324	44,641	27,615	59,223
Stone (crushed and broken) (short tons)	782,143	1,909,133	768,008	1,836,071
Stone (dimension) (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	----- <sup>1</sup>	----- <sup>1</sup>
Talc (short tons)	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Zinc (recoverable content of ores, etc.) (short tons)	66,364	17,121,912	66,194	17,872,380
Value of items that cannot be disclosed	-----	22,784,362	-----	19,681,596
Total Planning Subarea 5.3	-----	43,659,406 <sup>2</sup>	-----	39,818,149 <sup>2</sup>

<sup>1</sup>Withheld to avoid disclosing individual company confidential data; included with "Value of items that cannot be disclosed."

<sup>2</sup>Incomplete total. Excludes data for items which must be withheld to avoid disclosing individual company confidential data. Also excludes data for petroleum, natural gas, and natural-gas liquids, which are not available.

TABLE 19-191 Clay Production in the Great Lakes Basin in Short Tons

	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Plan Area				
1.0	20	80	50	100
2.0	Withheld <sup>1</sup>	Withheld <sup>1</sup>	833,957	1,175,873
3.0	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
4.0	2,057,041	2,381,775	2,185,126	2,959,363
5.0	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Planning Subarea				
1.1	20	80	50	100
1.2	-----	-----	-----	-----
2.1	132,508	137,218	6,130	11,034
2.2	697,973	1,068,520	410,023	645,990
2.3	111,806	167,709	95,020	142,530
2.4	Withheld <sup>1</sup>	Withheld <sup>1</sup>	322,784	376,319
3.1	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
3.2	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
4.1	644,306	707,806	1,144,639	1,272,077
4.2	383,470	495,555	356,155	433,117
4.3	684,933	826,932	485,519	1,063,004
4.4	344,332	351,482	198,813	191,165
5.1	-----	-----	-----	-----
5.2	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
5.3	-----	-----	-----	-----
State				
Illinois	607,203	886,130	287,979	401,902
Indiana	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Michigan	1,737,588	1,904,389	2,599,351	2,905,880
Minnesota	20	80	50	100
New York	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Ohio	1,024,616	1,234,913	802,527	1,417,827
Pennsylvania	-----	-----	-----	-----
Wisconsin	133,358	139,768	8,930	16,634
Total Great Lakes	4,073,668	4,859,638	4,139,014	5,327,612

<sup>1</sup> Withheld to avoid disclosing individual company confidential data

TABLE 19-192 Iron Ore Production in the Great Lakes Basin in Long Tons

	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Plan Area				
1.0	49,012,843	431,754,717	51,999,538	545,432,335 <sup>1</sup>
2.0	4,034,824	Withheld <sup>1</sup>	3,448,688	Withheld <sup>1</sup>
5.0	1,536,506	Withheld <sup>1</sup>	1,187,369	Withheld <sup>1</sup>
Planning Subarea				
1.1	42,239,727	369,530,900	42,749,198	Withheld <sup>1</sup>
1.2	6,773,116	62,223,817 <sup>1</sup>	9,250,340	Withheld <sup>1</sup>
2.1	4,034,824	Withheld <sup>1</sup>	3,448,688	Withheld <sup>1</sup>
5.3	1,536,506	Withheld <sup>1</sup>	1,187,369	Withheld <sup>1</sup>
State				
Michigan	10,791,531	95,791,436 <sup>1</sup>	12,699,028	148,890,426 <sup>1</sup>
Minnesota	40,754,398	Withheld <sup>1</sup>	42,749,198	Withheld <sup>1</sup>
New York	1,536,506	Withheld <sup>1</sup>	1,187,369	Withheld <sup>1</sup>
Wisconsin	1,501,738	Withheld <sup>1</sup>	-----	-----
Total Great Lakes	54,584,173	486,480,576	56,635,595	597,232,792

<sup>1</sup>Withheld to avoid disclosing individual company confidential data

TABLE 19-193 Sand and Gravel Production in the Great Lakes Basin in Short Tons

	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Plan Area				
1.0	5,290,046	3,726,638	7,719,000	5,105,000
2.0	53,110,376	42,987,000	64,240,000	56,814,000
3.0	8,214,190	5,917,533	8,613,000 <sup>1</sup>	7,569,000 <sup>1</sup>
4.0	26,346,284	28,433,479	Withheld <sup>1</sup>	Withheld <sup>1</sup>
5.0	6,981,786	7,462,496	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Planning Subarea				
1.1	3,271,472	2,159,172	5,754,000	3,687,000
1.2	2,018,574	1,567,466	1,965,000	1,418,000
2.1	7,320,368	5,455,467	8,423,000	6,210,000
2.2	23,654,007	19,519,664	30,683,000	27,206,000
2.3	17,133,624	13,759,118	19,692,000	18,442,000
2.4	5,002,377	4,252,751	5,442,000	4,956,000
3.1	2,443,467	1,650,384	3,049,000	2,326,000
3.2	5,770,723	4,267,149	5,564,000	5,243,000
4.1	14,635,686	14,269,175	23,029,000	24,626,000
4.2	2,539,845	2,396,960	3,838,000 <sup>1</sup>	4,074,000 <sup>1</sup>
4.3	6,554,658	8,197,001	Withheld <sup>1</sup>	Withheld <sup>1</sup>
4.4	2,616,095	3,570,343	5,791,000	7,611,000
5.1	2,419,258	2,492,280	3,053,000	3,770,000
5.2	3,079,510	3,352,208	4,333,000 <sup>1</sup>	4,490,000 <sup>1</sup>
5.3	1,483,018	1,618,008	Withheld <sup>1</sup>	Withheld <sup>1</sup>
State				
Illinois	13,373,358	11,638,357	18,073,000	17,040,000
Indiana <sup>2</sup>	4,395,195	3,929,053	6,143,000	6,125,000
Michigan <sup>2</sup>	46,910,195	39,304,400	56,663,000	54,979,000
Minnesota	3,006,398 <sup>1</sup>	1,997,829 <sup>1</sup>	3,422,000 <sup>1</sup>	2,381,000 <sup>1</sup>
New York	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Ohio	7,821,730	9,638,495 <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Pennsylvania	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
Wisconsin	15,955,725	11,953,853	21,045,000	15,145,000
Total Great Lakes	101,060,482	89,494,826	129,121,000	124,424,000

<sup>1</sup>Withheld to avoid disclosing individual company confidential data.

<sup>2</sup>Includes some data that could not be assigned to specific plan areas.

TABLE 19-194 Crushed Stone Production in the Great Lakes Basin in Short Tons

	1960		1968	
	Quantity	Dollar Value	Quantity	Dollar Value
Plan Area				
1.0	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
2.0	30,845,249	41,409,993	39,810,806	56,521,824
3.0	Withheld <sup>1</sup>	Withheld <sup>1</sup>	22,003,197	20,852,687
4.0	31,476,202	45,855,504	Withheld <sup>1</sup>	Withheld <sup>1</sup>
5.0	7,861,735	12,496,464	10,452,335	18,093,085
Planning Subarea				
1.1	Withheld <sup>1</sup>	Withheld <sup>1</sup>	55,000	Withheld <sup>1</sup>
1.2	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>	Withheld <sup>1</sup>
2.1	2,249,925	3,706,502	3,388,900	6,343,193
2.2	20,389,480	27,506,830	26,766,352	37,525,732
2.3	500,863	586,838	333,381	494,631
2.4	7,704,981	9,609,823	9,322,173	12,158,268
3.1	19,090,014	16,445,472	21,566,352	20,219,460
3.2	Withheld <sup>1</sup>	Withheld <sup>1</sup>	436,845	633,227
4.1	1,387,830	1,728,491	Withheld <sup>1</sup>	Withheld <sup>1</sup>
4.2	19,911,337	26,752,975	27,511,165	39,988,156
4.3	1,707,816	5,753,430	1,682,084	5,098,660
4.4	8,469,219	11,620,608	3,396,687	6,076,760
5.1	1,913,739	3,200,491	2,769,945	5,288,922
5.2	5,165,853	7,386,840	6,914,382	10,968,092
5.3	782,143	1,909,133	768,008	1,836,071
State				
Illinois	17,397,410	23,911,040	23,899,368	33,492,582
Indiana	1,094,168	1,625,631	1,838,856	Withheld <sup>1</sup>
Michigan	31,237,769	32,117,581	37,274,803	41,026,207
Minnesota	10,009	12,652	55,000	Withheld <sup>1</sup>
New York	16,330,954	24,117,072	13,849,022	24,169,845
Ohio	20,556,370	30,902,368	27,389,321	42,391,702
Pennsylvania	-----	-----	-----	-----
Wisconsin	5,232,930	7,197,997	6,251,428	10,257,663
Total Great Lakes	91,859,610	119,884,341	110,557,798	154,170,674

<sup>1</sup>Withheld to avoid disclosing individual company confidential data.

**TABLE 19-195 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Great Lakes Basin**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	4,139	5,070	7,876	12,856	390,987
Coal	594	260	0	0	6,400
Copper	75	100	180	330	8,920
Gypsum <sup>1</sup>	----- <sup>6</sup>	2,210	2,990	4,070	147,140
Iron ore <sup>2</sup>	56,636	65,550	90,490	124,740	4,431,200
Lead	1	2	2	2	101
Peat	261	289	367	471	18,150
Salt	----- <sup>6</sup>	23,140	49,330	104,620	2,491,840
Sand and gravel	128,947	171,160	295,730	512,430	14,517,260
Silver <sup>3</sup>	500	682	1,202	2,132	59,140
Stone, crushed <sup>4</sup>	110,558	143,464	247,951	427,179	12,119,088
Stone, dimension <sup>5</sup>	142	195	310	595	15,126
Zinc	66	95	95	95	4,766

<sup>1</sup>Excludes data for Plan Areas 2.0 and 5.0.

<sup>2</sup>Thousands of long tons.

<sup>3</sup>Thousands of troy ounces.

<sup>4</sup>Includes limestone, basalt, marl, sandstone, and marble.

<sup>5</sup>Includes limestone, sandstone, and granite.

<sup>6</sup>Withheld to avoid disclosing individual company confidential data.

**TABLE 19-196 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Plan Area 1.0**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Copper <sup>1</sup>	75	100	180	330	8,920
Iron ore <sup>1</sup>	52,000 <sup>4</sup>	61,600	84,700	116,400	4,149,600
Peat	----- <sup>4</sup>	12	15	20	752
Sand and gravel	7,719	9,020	14,020	21,960	686,320
Silver <sup>2</sup>	473 <sup>4</sup>	640	1,160	2,090	57,040
Stone, crushed <sup>3</sup>	----- <sup>4</sup>	2,908	5,006	4,989	187,418

<sup>1</sup>Thousands of long tons.

<sup>2</sup>Thousands of troy ounces.

<sup>3</sup>Includes limestone and basalt.

<sup>4</sup>Withheld to avoid disclosing individual company confidential data.

**TABLE 19-197 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 1.1**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Iron ore <sup>1</sup>	42,749 <sup>3</sup>	49,600	68,100	93,600	3,337,600
Peat	----- <sup>3</sup>	12	15	20	752
Sand and gravel <sup>2</sup>	5,754	6,720	11,020	18,060	538,520
Stone, crushed <sup>2</sup>	55	108	176	289	8,618

<sup>1</sup>Thousands of long tons.<sup>2</sup>Basalt.<sup>3</sup>Withheld to avoid disclosing individual company confidential data.**TABLE 19-198 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 1.2**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Copper <sup>1</sup>	75	100	180	330	8,920
Iron ore <sup>1</sup>	9,250	12,000	16,600	22,800	812,000
Sand and gravel	1,965	2,300	3,000	3,900	147,800
Silver <sup>2</sup>	473 <sup>4</sup>	640	1,160	2,090	57,040
Stone, crushed <sup>3</sup>	----- <sup>4</sup>	2,800	3,630	4,700	178,800

<sup>1</sup>Thousands of long tons.<sup>2</sup>Thousands of troy ounces.<sup>3</sup>Includes limestone and basalt.<sup>4</sup>Withheld to avoid disclosing individual company confidential data.**TABLE 19-199 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Plan Area 2.0**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	834	840	966	1,606	53,707
Coal	594	260	0	0	6,400
Iron ore <sup>1</sup>	3,449 <sup>4</sup>	2,500	3,800	5,600	184,000
Peat	----- <sup>4</sup>	19	21	27	1,108
Salt	----- <sup>4</sup>	900	2,000	4,000	98,000
Sand and gravel <sup>2</sup>	64,240	89,600	157,700	278,100	7,750,800
Stone, crushed <sup>3</sup>	39,811	49,806	91,695	169,490	4,533,170
Stone, dimension <sup>3</sup>	86	122	197	422	9,646

<sup>1</sup>Thousands of long tons.<sup>2</sup>Includes limestone, basalt, and marl.<sup>3</sup>Includes limestone, sandstone, and granite.<sup>4</sup>Withheld to avoid disclosing individual company confidential data.

**TABLE 19-200 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 2.1**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale <sup>1</sup>	6	10	16	26	785
Iron ore <sup>1</sup>	3,449	2,500	3,800	5,600	184,000
Sand and gravel <sup>2</sup>	8,423	12,700	22,000	38,300	1,080,800
Stone, crushed <sup>3</sup>	3,389	4,520	7,810	13,570	383,600
Stone, dimension <sup>3</sup>	32	50	85	140	4,122

<sup>1</sup>Thousands of long tons.

<sup>2</sup>Includes limestone and basalt.

<sup>3</sup>Includes limestone and granite.

**TABLE 19-201 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 2.2**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	410	250	0	0	6,400
Coal	594	260	0	0	6,400
Peat	9	3	0	0	78
Sand and gravel <sup>1</sup>	30,683	43,300	79,700	146,700	3,933,800
Stone, crushed <sup>1</sup>	26,766	32,486	62,205	119,000	3,085,960
Stone, dimension <sup>2</sup>	51	70	110	180	5,420

<sup>1</sup>Includes limestone and marl.

<sup>2</sup>Limestone.

**TABLE 19-202 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 2.3**

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	95	180	310	550	15,222
Peat	26	16	21	27	1,030
Sand and gravel <sup>1</sup>	19,692	26,000	44,000	73,000	2,141,800
Stone, crushed <sup>2</sup>	333	400	580	920	29,210
Stone, dimension <sup>2</sup>	2	2	2	2	104

<sup>1</sup>Includes limestone and marl.

<sup>2</sup>Includes limestone and sandstone.

TABLE 19-203 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 2.4

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	323 <sup>2</sup>	400	640	1,030	31,300
Salt	----- <sup>2</sup>	900	2,000	4,000	98,000
Sand and gravel <sup>1</sup>	5,442	7,600	12,000	20,100	594,400
Stone, crushed <sup>1</sup>	9,322	12,400	21,100	36,000	1,034,400

<sup>1</sup>Limestone.<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

TABLE 19-204 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Plan Area 3.0

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Gypsum	----- <sup>2</sup>	1,400	1,900	2,600	93,600
Peat	----- <sup>2</sup>	120	150	200	7,520
Salt	----- <sup>2</sup>	1,250	2,640	5,560	133,200
Sand and gravel <sup>1</sup>	8,613	11,310	18,850	31,530	923,060
Stone, crushed <sup>1</sup>	22,003 <sup>1</sup>	29,210	48,720	81,710	2,387,560
Stone, dimension <sup>1</sup>	----- <sup>2</sup>	2	2	2	78

<sup>1</sup>Limestone.<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

TABLE 19-205 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 3.1

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Gypsum	----- <sup>2</sup>	1,400	1,900	2,600	93,600
Sand and gravel <sup>1</sup>	3,049	4,100	6,800	11,400	333,600
Stone, crushed <sup>1</sup>	21,566	28,600	47,700	80,000	2,337,600

<sup>1</sup>Limestone.<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

TABLE 19-206 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 3.2

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Peat	----- <sup>2</sup>	120	150	200	7,520
Salt	----- <sup>2</sup>	1,250	2,640	5,560	133,200
Sand and gravel <sup>1</sup>	5,564	7,210	12,050	20,130	589,460
Stone, crushed <sup>1</sup>	437	610	1,020	1,710	49,960

<sup>1</sup>Limestone.<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

TABLE 19-207 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Plan Area 4.0

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	2,185	2,730	4,390	7,020	213,980
Gypsum	667	810	1,090	1,470	53,540
Peat	109 <sup>2</sup>	138	181	224	8,770
Salt	----- <sup>2</sup>	12,700	27,200	58,200	1,357,800
Sand and gravel <sup>1</sup>	----- <sup>2</sup>	49,940	86,290	149,340	4,234,240
Stone, crushed <sup>1</sup>	----- <sup>2</sup>	47,590	79,220	132,030	3,870,440
Stone, dimension <sup>1</sup>	----- <sup>2</sup>	68	108	168	5,246

<sup>1</sup>Includes limestone and sandstone.<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

TABLE 19-208 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 4.1

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	1,145 <sup>2</sup>	1,330	2,140	3,430	104,380
Peat	----- <sup>2</sup>	130	170	210	8,240
Salt	3,367	4,800	10,200	21,600	515,400
Sand and gravel <sup>1</sup>	23,029 <sup>2</sup>	28,580	47,750	79,780	2,336,080
Stone, crushed <sup>1</sup>	----- <sup>2</sup>	4,250	6,840	10,980	333,800

<sup>1</sup>Limestone.<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

TABLE 19-209 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 4.2

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	356	470	750	1,200	36,620
Sand and gravel <sup>1</sup>	3,838	4,760	7,960	13,300	389,360
Stone, crushed <sup>1</sup>	27,511	36,740	61,390	102,600	2,997,640

<sup>1</sup>Includes limestone and sandstone.

TABLE 19-210 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 4.3

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	486 <sup>2</sup>	660	1,070	1,700	51,960
Salt	----- <sup>2</sup>	7,900	17,000	36,600	862,400
Sand and gravel <sup>1</sup>	----- <sup>2</sup>	9,400	17,300	31,800	853,400
Stone, crushed <sup>1</sup>	1,682	2,180	3,600	6,100	177,480

<sup>1</sup>Includes limestone and sandstone.

<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

TABLE 19-211 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 4.4

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	199	270	430	690	21,020
Sand and gravel <sup>1</sup>	5,791	7,200	13,280	24,460	655,400
Stone, crushed <sup>1</sup>	3,397	4,420	7,390	12,350	361,520

<sup>1</sup>Limestone.

TABLE 19-212 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Plan Area 5.0

Commodity	Actual	1980	2000	2020	Cumulative
	1968				1968 to 2020
Clay and shale	----- <sup>5</sup>	100	160	260	7,850
Iron ore <sup>1</sup>	1,187	1,450	1,990	2,740	97,600
Lead	1	2	2	2	101
Salt	5,218 <sup>5</sup>	8,290	17,490	36,860	882,840
Sand and gravel	----- <sup>5</sup>	11,290	18,870	31,500	922,840
Silver <sup>2</sup>	28	42	42	42	2,100
Stone, crushed <sup>3</sup>	10,452 <sup>5</sup>	13,950	23,310	38,960	1,140,500
Stone, dimension <sup>4</sup>	----- <sup>5</sup>	3	3	3	156
Zinc	66	95	95	95	4,766

<sup>1</sup>Thousands of long tons.

<sup>2</sup>Thousands of troy ounces.

<sup>3</sup>Includes limestone and marble.

<sup>4</sup>Includes limestone and sandstone.

<sup>5</sup>Withheld to avoid disclosing individual company confidential data.

**TABLE 19-213 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 5.1**

Commodity	Actual		1980	2000	2020	Cumulative
	1968					1968 to 2020
Sand and gravel <sup>1</sup>	3,053		4,080	6,820	11,400	333,680
Stone, crushed <sup>1</sup>	2,770		3,610	6,030	10,100	295,260

<sup>1</sup>Limestone.

**TABLE 19-214 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 5.2**

Commodity	Actual		1980	2000	2020	Cumulative
	1968					1968 to 2020
Clay and shale	----- <sup>2</sup>		100	160	260	7,850
Sand and gravel <sup>1</sup>	4,333		5,850	9,780	16,300	478,000
Stone, crushed <sup>1</sup>	6,914		9,390	15,690	26,200	767,440

<sup>1</sup>Limestone.

<sup>2</sup>Withheld to avoid disclosing individual company confidential data.

**TABLE 19-215 Projected Mineral Production by Selected Commodities (Thousands of Short Tons), Planning Subarea 5.3**

Commodity	Actual		1980	2000	2020	Cumulative
	1968					1968 to 2020
Iron ore <sup>1</sup>	1,187		1,450	1,990	2,740	97,600
Lead	----- <sup>4</sup>		2	2	2	101
Sand and gravel	----- <sup>4</sup>		1,360	2,270	3,800	111,160
Silver <sup>2</sup>	28		42	42	42	2,100
Stone, crushed <sup>3</sup>	768		950	1,590	2,660	77,800
Zinc	66		95	95	95	4,766

<sup>1</sup>Thousands of long tons.

<sup>2</sup>Thousands of troy ounces.

<sup>3</sup>Includes limestone and marble.

<sup>4</sup>Withheld to avoid disclosing individual company confidential data.

Projected Employment for Selected Commodities (Average Number of Men)

TABLE 19-216 Great Lakes Basin

Commodity	1968	1980	2000	2020
Coal	92	35	0	0
Copper <sup>1</sup>	1,606	2,000	3,600	6,000
Gypsum <sup>1</sup>	243	265	305	360
Iron ore	11,369	12,900	17,555	23,700
Lead-zinc-silver	326	635	700	790
Peat	213	280	345	440
Sand and gravel	5,585	6,130	7,690	10,445
Stone, crushed <sup>2,3</sup>	5,346	5,694	6,965	8,914
Stone, dimension	271	302	321	395

<sup>1</sup>Excludes data for Plan Areas 2.0 and 5.0.

<sup>2</sup>Includes limestone, marble, marl, sandstone, and traprock (basalt).

<sup>3</sup>Includes granite, limestone, and sandstone.

TABLE 19-217 Plan Area 1.0

Commodity	1968	1980	2000	2020
Copper	1,606	2,000	3,600	6,000
Iron ore	10,050	11,800	16,000	21,500
Peat	29	90	110	150
Sand and gravel <sup>1</sup>	345	335	380	470
Stone, crushed <sup>1</sup>	154	156	142	133

<sup>1</sup>Includes limestone and traprock (basalt).

TABLE 19-218 Planning Subarea 1.1

Commodity	1968	1980	2000	2020
Iron ore	7,600	8,700	11,750	15,800
Peat	29	90	110	150
Sand and gravel <sup>1</sup>	260	250	300	385
Stone, crushed <sup>1</sup>	4	6	7	8

<sup>1</sup>Traprock (basalt).

TABLE 19-219 Planning Subarea 1.2

Commodity	1968	1980	2000	2020
Copper	1,606	2,000	3,600	6,000
Iron ore	2,450	3,100	4,250	5,700
Sand and gravel <sup>1</sup>	85	85	80	85
Stone, crushed <sup>1</sup>	150	150	135	125

<sup>1</sup>Includes limestone and traprock (basalt).

TABLE 19-220 Plan Area 2.0

Commodity	1968	1980	2000	2020
Coal	92	35	0	0
Iron ore	1,000	715	1,035	1,500
Peat	50	30	33	40
Sand and gravel <sup>1</sup>	2,780	3,200	4,090	5,650
Stone, crushed <sup>2</sup>	2,070	2,141	2,777	3,789
Stone, dimension	157	167	162	200

<sup>1</sup>Includes limestone, marl, and traprock (basalt).

<sup>2</sup>Includes limestone, sandstone, and granite.

TABLE 19-221 Planning Subarea 2.1

Commodity	1968	1980	2000	2020
Iron ore	1,000	715	1,035	1,500
Sand and gravel <sup>1</sup>	380	470	590	800
Stone, crushed <sup>1,2</sup>	215	235	285	360
Stone, dimension <sup>2</sup>	50	75	90	140

<sup>1</sup>Includes limestone and traprock (basalt).

<sup>2</sup>Includes limestone and granite.

TABLE 19-222 Planning Subarea 2.2

Commodity	1968	1980	2000	2020
Coal	92	35	0	0
Peat	21	10	0	0
Sand and gravel <sup>1</sup>	1,275	1,500	2,000	2,875
Stone, crushed <sup>1,2</sup>	1,500	1,500	2,000	2,800
Stone, dimension <sup>2</sup>	105	90	70	58

<sup>1</sup>Includes limestone and marl.

<sup>2</sup>Limestone.

TABLE 19-223 Planning Subarea 2.3

Commodity	1968	1980	2000	2020
Peat	29	20	33	40
Sand and gravel <sup>1</sup>	875	950	1,175	1,550
Stone, crushed <sup>2</sup>	30	31	27	29
Stone, dimension <sup>2</sup>	2	2	2	2

<sup>1</sup>Includes limestone and marl.

<sup>2</sup>Includes limestone and sandstone.

TABLE 19-224 Planning Subarea 2.4

Commodity	1968	1980	2000	2020
Sand and gravel <sup>1</sup>	250	280	325	425
Stone, crushed <sup>1</sup>	325	375	465	600

<sup>1</sup>Limestone.

TABLE 19-225 Plan Area 3

Commodity	1968	1980	2000	2020
Gypsum	133	140	165	200
Peat	48	50	62	80
Sand and gravel <sup>1</sup>	390	420	510	670
Stone, crushed <sup>1,2</sup>	785	915	1,120	1,425
Stone, dimension <sup>1,2</sup>	16	22	22	22

<sup>1</sup>Limestone.

<sup>2</sup>Data calculated for Plan Area only.

TABLE 19-226 Planning Subarea 3.1

Commodity	1968	1980	2000	2020
Gypsum	133	140	165	200
Sand and gravel <sup>1</sup>	140	150	185	240
Stone, crushed <sup>1</sup>	744	865	1,065	1,360

<sup>1</sup>Limestone.

## Projected Employment for Selected Commodities (Average Number of Men)

TABLE 19-227 Planning Subarea 3.2

Commodity	1968	1980	2000	2020
Peat	48	50	62	80
Sand and gravel <sup>1</sup>	250	270	325	430
Stone, crushed <sup>1</sup>	41	50	55	65

<sup>1</sup>Limestone.

TABLE 19-228 Plan Area 4.0

Commodity	1968	1980	2000	2020
Gypsum <sup>1</sup>	110	125	140	160
Peat	86	110	140	170
Sand and gravel <sup>2</sup>	1,675	1,740	2,185	2,965
Stone, crushed <sup>2</sup>	1,767	1,877	2,221	2,707
Stone, dimension <sup>1,2</sup>	88	108	132	168

<sup>1</sup>Data calculated for Plan Area only.<sup>2</sup>Includes limestone and sandstone.

TABLE 19-229 Planning Subarea 4.1

Commodity	1968	1980	2000	2020
Peat	86	110	140	170
Sand and gravel <sup>1</sup>	960	985	1,195	1,565
Stone, crushed <sup>1</sup>	72	95	150	175

<sup>1</sup>Limestone.

TABLE 19-230 Planning Subarea 4.2

Commodity	1968	1980	2000	2020
Sand and gravel <sup>1</sup>	165	170	210	275
Stone, crushed <sup>1</sup>	1,475	1,550	1,800	2,200

<sup>1</sup>Includes limestone and sandstone.

TABLE 19-231 Planning Subarea 4.3

Commodity	1968	1980	2000	2020
Sand and gravel <sup>1</sup>	300	325	430	625
Stone, crushed <sup>1</sup>	20	22	26	32

<sup>1</sup>Includes limestone and sandstone.

TABLE 19-232 Planning Subarea 4.4

Commodity	1968	1980	2000	2020
Sand and gravel <sup>1</sup>	250	260	350	500
Stone, crushed <sup>1</sup>	200	210	245	300

<sup>1</sup>Limestone.

TABLE 19-233 Plan Area 5

Commodity	1968	1980	2000	2020
Iron ore	319	385	520	700
Lead-zinc-silver	326	635	700	790
Sand and gravel <sup>1</sup>	395	435	525	690
Stone, crushed <sup>1</sup>	570	605	705	860
Stone, dimension <sup>2,3</sup>	10	5	5	5

<sup>1</sup>Includes limestone and marble.<sup>2</sup>Includes limestone and sandstone.<sup>3</sup>Data calculated for Plan area only.

TABLE 19-234 Plan Area 5.0

Commodity	1968	1980	2000	2020
Sand and gravel <sup>1</sup>	130	145	175	235
Stone, crushed <sup>1</sup>	165	170	200	245

<sup>1</sup>Limestone.

TABLE 19-235 Planning Subarea 5.2

Commodity	1968	1980	2000	2020
Sand and gravel <sup>1</sup>	185	210	255	335
Stone, crushed <sup>1</sup>	340	370	430	530

<sup>1</sup>Limestone.

TABLE 19-236 Planning Subarea 5.3

Commodity	1968	1980	2000	2020
Iron ore	319	385	520	700
Lead-zinc-silver	326	635	700	790
Sand and gravel <sup>1</sup>	80	80	95	120
Stone, crushed <sup>1</sup>	65	65	75	85

<sup>1</sup>Includes limestone and marble.

## GLOSSARY

- baseline projection**—a projection based on trends in effect during the base year. It assumes that the resource will continue to play the same role in the economy as it did in the past.
- basic industry**—one that specializes in certain products, not because of local demand, but because of lower production costs resulting from the availability of natural resources; an export industry.
- board foot**—a unit of measure equal to one-twelfth of a cubic foot. It represents a board of rough lumber 1 ft. sq. × 1 in. thick.
- commercial forest land**—land not developed for other purposes that is producing or capable of producing crops of industrial wood. (Note: Areas qualifying as commercial forest land have the capability of producing more than 20 cubic feet of industrial wood per acre per year, under management. Areas currently inaccessible and inoperable are included unless they are small and unlikely to become suitable for production.)
- constant dollars**—the real value of the dollar from the base year over time. The effect of changing current dollars to constant dollars is to remove the change in value due to inflation or deflation.
- cord**—a unit of measure generally accepted as 4 × 4 × 8 feet. It commonly consists of sticks 4 feet long, in a pile 4 feet high and 8 feet long. It contains 128 cubic feet of wood, bark, and air space. The solid wood content of a standard cord is usually 79 cubic feet.
- cull trees**—species that will never mature into merchantable timber. They are often weeded out during woodland improvement cuttings.
- employment shift analysis**—a method of separating factors that relate to the differences in regional rates of employment growth over a specified period of time.
- export base theory**—the economic theory that hypothesizes that economic growth in an area is determined by the export base, i.e., the products manufactured in the area and demanded outside the area.
- forest industry lands**—lands owned by companies or individuals operating wood-using plants.
- forest land**—land at least 10 percent stocked by forest trees of any size, or land formerly having such tree cover and not currently developed for nonforest use. The minimum area for classification of forest land is one acre. Roadside, streamside, and shelter belt strips of timber must have a crown width of at least 120 feet to qualify. Unimproved roads and trails, streams and other bodies of water, or clearings in forest areas are classed as forest if they are less than 120 feet in width.
- forest trees**—woody plants having a well developed stem and standing more than 12 feet in height, including both growing stock and cull trees.
- forest types**—a classification of forest land based upon the tree species forming the majority of the stock.
- gross national product**—the market value of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable capital goods.
- gross product originating**—a measure of the productivity of individual industries computed by dividing the gross national product according to trends in the industrial composition of the economy.
- growing stock**—net volume in cubic feet of live sawtimber and poletimber trees from stump to a minimum 4-inch top (of central stem) outside the bark. Net volume equals gross volume less deduction for rot.

**growing-stock trees**—live sawtimber trees, poletimber trees, saplings, and seedlings meeting specified standards of quality or vigor; excludes cull trees.

**growing-stock volume**—net volume in cubic feet of growing-stock trees having a 5-inch diameter at breast height (d.b.h.) and over from a 1-foot stump to a minimum 4-inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs.

**hardwoods**—dicotyledonous trees, usually broad-leaved and deciduous.

**industrial wood**—all roundwood products, except fuelwood.

**land area**—(1) Bureau of the Census: the area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one eighth of a statute mile in width; and lakes, reservoirs, and ponds less than 40 acres in area; (2) Forest Survey: the same as the Bureau of the Census definition except minimum width of streams, etc. is 120 feet and minimum size of lakes is one acre.

**land resource area**—an area that is homogeneous with respect to major soil characteristics, climate, and geologic, vegetative, and topographic features.

**land use**—primary occupier of a tract of land, e.g., crops, pasture, forest, urban, and other.

**miscellaneous private lands**—privately owned lands other than forest-industry and farmer-owned lands.

**national forest land**—Federal lands that have been legally designated as national forests or purchase units, and other lands under the administration of the Forest Service, including experimental area and Bankhead-Jones Title III lands.

**national growth component**—the number of the region's employees that would have obtained or lost jobs in a certain industry had the industry in that region changed at the same rate as total national employment during a specific time.

**noncommercial forest land area**—forest land that is withdrawn from timber utilization through statute, ordinance, or administrative order, but that otherwise qualifies as commercial forest land; or land that is incapable of yielding industrial wood products (usually sawtimber) because of the adverse site conditions.

**noncommercial species**—tree species of typically small size, poor form or inferior quality that normally do not develop into trees suitable for industrial wood products.

**nonforest land**—land that has never supported forests or lands that were formerly forested that are now developed for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1-to-40 acre areas of water classified by the Bureau of the Census as land. If intermingled in forest area, unimproved roads and nonforest strips must be more than 120 feet wide, and clearings, etc. must be more than one acre in size to qualify as nonforest land.)

**nonstockable**—areas of forest land not capable of supporting seedlings of commercial species because of the presence of rock, water or other inhibiting factors.

**nonstocked areas**—commercial forest land less than 10 percent stocked with growing-stock trees.

**other Federal lands**—Federal lands other than national forests, including lands administered by the Bureau of Land Management, Bureau of Indian Affairs, and other Federal agencies.

**other public lands**—all public lands other than national forests.

**ownership**—property owned by one owner, regardless of the number of parcels in a specified area.

**personal income**—the current income received by residents of an area from all sources before deduction of income and other direct personal taxes.

**poletimber stands**—stands at least 10 percent stocked with growing-stock trees, of which

- half or more are poletimber and/or sawtimber trees with poletimber stocking exceeding that of sawtimber.
- poletimber trees**—trees of commercial species that meet regional specifications of soundness and form, and are of the following diameters at breast height: softwoods, 5 to 9 inches; hardwoods, 5 to 11 inches. Such trees will usually become sawtimber trees if left to grow.
- primary forest industry**—one which undertakes the first major processing of the basic raw material of the industry. In the forest products industry the basic raw material is considered to be logs, and the major processing consists of converting these logs to such products as lumber, pulp and paper, and veneer and pulpwood.
- pulp and paper producer**—a forest owner who manufactures wood pulp and who uses a greater cubic volume of timber from his land for this purpose than for any other primary wood product.
- regional share component**—a value used in employment shift analysis resulting from comparing the regional rate of growth of an industry with the national rate of growth of that industry. It is obtained by multiplying the base year employment by the difference in the regional and national rate of growth.
- residential industry**—one that serves the households and other industries of the economic area. Goods and services produced by the residential industry usually enter only intra-area trade.
- roundwood products**—logs, bolts, or other round sections cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts, cooperage logs and bolts, pulpwood, fuelwood, piling, poles, posts, hewn ties, mine timbers, and various other round, split, or hewn products.)
- saw log**—a log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight, with a minimum diameter inside bark for softwoods of 6 inches (8 inches for hardwoods) or other combinations of size and defect specified by regional standards.
- sawtimber stands**—stands at least 10 percent stocked with growing stock trees, with half or more of total stocking in sawtimber and poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.
- sawtimber trees**—live trees of commercial species containing at least a 12-foot saw log and meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches in diameter at breast height, except in California, Oregon, Washington, and coastal Alaska where the minimum diameter is 11 inches. Hardwoods must be at least 11 inches in diameter in all States.
- sawtimber volume**—net volume in board feet, international 1–4 inch rule of merchantable saw logs in live sawtimber trees. Net volume equals gross volume less deductions for rot, sweep, and other defects that affect use.
- secondary manufacturing**—an industry that converts the primary product of a primary industry to a more highly fabricated product.
- seedling and sapling trees**—trees of commercial species less than 5 inches in diameter at breast height and of good form and vigor.
- seedlings**—live trees less than one inch in diameter at breast height that are expected to survive according to regional standards.
- softwoods**—coniferous trees, usually evergreen, having needles or scalelike leaves.
- stand**—a growth of trees on a minimum of one acre of forest land that is at least 10 percent stocked by forest trees of any size.
- stand size class**—a classification of forest land based on the size class of growing stock trees on the area, i.e., sawtimber, poletimber, or seedlings and saplings.
- standard cord**—a unit of measure for stacked wood encompassing 128 cubic feet of wood, bark, and air space. Cord estimates can be derived from cubic-foot estimates by applying a factor of 80 cubic feet of wood (inside bark) per rough cord.
- State, county, and municipal lands**—lands owned by States, counties, and local public agencies or municipalities, or lands leased to these governmental units for 50 years or more.

**stocking**—a measure of the degree to which forest land is occupied by trees of specified classes in relation to a specified basal area standard for trees 5 inches d.b.h. and larger, or numbers of trees per acre for trees less than 5 inches. Tree classes include all live trees, growing-stock trees, and desirable trees. Classifications of forest land and forest types are based on stocking of all live trees. Classifications of condition classes are based on stocking of desirable trees.

**stocking percentage**—current area occupancy or stocking in relation to specified stocking standards.

**stocking standard**—the minimum number or basal area per acre of well spaced trees required to fully utilize a forest site.

**timber products**—roundwood products and

plant by-products, including roundwood products cut from growing stock on commercial forest land. Other sources are cull trees, salvable dead trees, limbs, saplings, trees on noncommercial and nonforest lands, and plant by-products.

**tree size classes**—a classification of growing-stock trees according to diameter at breast height (d.b.h.) outside bark, including saw-timber trees, poletimber trees, saplings, and seedlings.

**veneer**—a thin sheet of wood cut on a veneer machine. Logs used for this purpose are generally of better quality, larger in size, and have higher value than other forest products.

**veneer log**—tree segment suitable for veneer.

## LIST OF ABBREVIATIONS

<b>BOM</b> —Bureau of Mines, U.S. Department of the Interior	<b>NCFES</b> —North Central Forest Experiment Station
<b>BOR</b> —Bureau of Outdoor Recreation, U.S. Department of the Interior	<b>NEFES</b> —Northeast Forest Experiment Station
<b>BSF&amp;W</b> —Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior	<b>OASI</b> —Old Age and Survivors Insurance
<b>CNI</b> —Conservation Needs Inventory	<b>OBE</b> —Office of Business Economics, U.S. Department of Commerce
<b>cwt.</b> —hundredweight	<b>OBERS</b> —Office of Business Economics/Economic Research Service
<b>d.b.h.</b> —diameter at breast height	<b>PSA</b> —Planning Subarea
<b>EPA</b> —U.S. Environmental Protection Agency	<b>SCS</b> —Soil Conservation Service, U.S. Department of Agriculture
<b>ERS</b> —Economic Research Service, U.S. Department of Agriculture	<b>SIC</b> —Standard Industrial Classification
<b>FS</b> —Forest Service, U.S. Department of Agriculture	<b>SMSA</b> —Standard Metropolitan Statistical Area
<b>GNP</b> —Gross National Product	<b>SRG</b> —Soil Resource Group
<b>GPO</b> —Gross Product Originating	<b>UI</b> —Unemployment Insurance
<b>HUD</b> —U.S. Department of Housing and Urban Development	<b>USDA</b> —U.S. Department of Agriculture
<b>NCD, CE</b> —North Central Division, Corps of Engineers	<b>USDC</b> —U.S. Department of Commerce
	<b>USDI</b> —U.S. Department of the Interior

## LIST OF REFERENCES

1. Kuznets, Simon, "Concepts and Assumptions in Long-Term Projections of National Product," *Studies in Income and Wealth*, Volume 16, National Bureau of Economic Research, 1954.
2. Perloff, H.S. et al., *Regions, Resources and Economic Growth*, Lincoln, University of Nebraska, pp. 57-58.
3. Water Resources Council, Interdepartmental Staff Committee, *Interim Price Standards for Planning and Evaluating Water and Land Resources*, Washington, D.C., April 1966.

