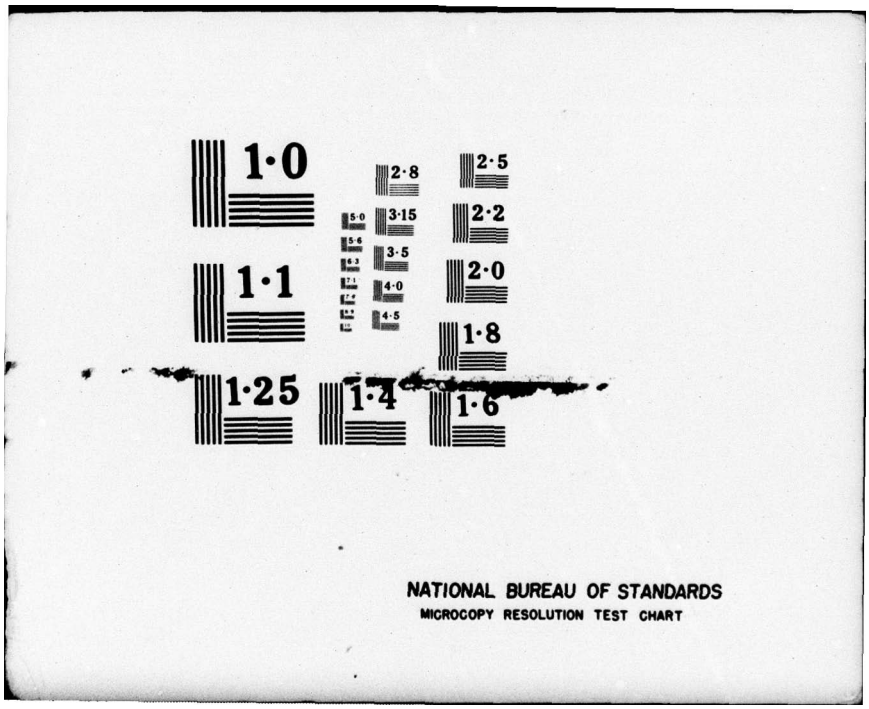
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GENESEE RIVER BASIN STUDY
VOLUME INDEX
AND
LIST OF APPENDICES

Volume	
I	SUMMARY REPORT
II	APPENDIX A - HISTORY APPENDIX B - PLAN FORMULATION APPENDIX C - PROJECT DESIGNS AND COST ESTIMATES
III	APPENDIX D - ECONOMIC BASE STUDY
IV	APPENDIX E - HYDROLOGY APPENDIX F - FLOOD CONTROL
V	APPENDIX G - STATE WATER LAWS APPENDIX H - WATER SUPPLY AND WATER QUALITY MANAGEMENT APPENDIX I - GROUNDWATER RESOURCES
VI	APPENDIX J - AGRICULTURAL STUDIES APPENDIX K - SEDIMENTATION
VII	APPENDIX L - HYDROELECTRIC POWER APPENDIX M - OUTDOOR RECREATION APPENDIX N - FISH AND WILDLIFE
VIII	NEW YORK STATE SUPPLEMENT

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GENESEE RIVER BASIN COMPREHENSIVE STUDY of Water and Related Land Resources.

Volume III.
Appendix D.
ECONOMIC BASE STUDY.

(9) Final rept.

(11) 1966

(12) 280p.

Contributing Agencies:

Part One

STATE OF NEW YORK
Conservation Department

Part Two

U. S. DEPARTMENT OF AGRICULTURE
Economic Research Service

Part Three

U. S. DEPARTMENT OF AGRICULTURE
Forest Service

Part Four

DEPARTMENT OF THE ARMY
Corps of Engineers

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IN REPLY REFER TO

PREFACE

This appendix, Economic Base Study, has been subdivided into four parts, all of which are intended to develop our knowledge of present economic activities and to establish projections of economic factors for specified time intervals for the Genesee River Basin Service Area. Data presented in this appendix will be used by Federal, State, and local Governments and private organizations as a basis for estimating the development of the water resources that will be needed in the region to sustain predicted growth patterns. Specific water-use and water flow requirements and control, both present and future, will be determined for the various study purposes and presented in other appendices to the comprehensive basin report.

Part one of this appendix was prepared by the State of New York under an agreement with the Corps of Engineers who established the guidelines for performance of this task. The State personnel are to be commended for their contribution, which was to develop the broad basic data including economic and demographic projections for the Genesee River Basin. The remaining parts, two through four, were special contributing studies prepared by the Economic Research Service, U. S. Forest Service, and Corps of Engineers. These studies dealt with the specific categories of Agriculture, Forestry, and Mining.

This appendix is the forerunner to the Main report including other technical appendices, which will present a comprehensive basin plan for the Genesee River Basin.

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R. WILSON NEFF
Colonel, Corps of Engineers
Chairman, Genesee River Basin
Coordinating Committee

BUY AND HOLD U. S. SAVINGS BONDS

GENESEE RIVER BASIN COMPREHENSIVE STUDY

APPENDIX D

ECONOMIC BASE STUDY

TABLE OF CONTENTS

Subject	Page
INTRODUCTION	
Preface	
Presentation	D - 1
Planning	D - 1
Limitations	D - 1
Study Area	D - 3
Changing Conditions	D - 3
PART ONE - ECONOMIC BASE STUDY	
Section I - Summary of Population and Employment Projections	D - I - 5
Section II - Employer Survey	D - I - 19
Section III - Subarea Profiles	D - I - 27
Section IV - Technical Notes	D - I - 43
Section V - Statistical Tables	D - I - 59
Section VI - Town Population	D - I - 87
Section VII - Partial Inventory of Regional Resources	D - I - 99
PART TWO - AGRICULTURAL ECONOMY	
Summary	D - II - iii
Nature of the Problem and Need for Study	D - II - 1
General Procedure	D - II - 2
Projected Needs for Agricultural Production	D - II - 4
Genesee River Basin Economic Subareas	D - II - 15

TABLE OF CONTENTS (Contd.)

Subject	Page
PART THREE - FOREST ECONOMY	
Introduction and Summary	D - III - 1
Primary Forest Products	D - III - 7
Projections of Production in SIC-24 and SIC-26	D - III - 9
Employment in the Forest Products Industries	D - III - 25
The Forest Resource	D - III - 31
PART FOUR - MINERAL ECONOMY	
Summary and Conclusions	D - IV - 1
Introduction	D - IV - 2
Methodology	D - IV - 2
Setting	D - IV - 4
Geology	D - IV - 4
Mineral Production	D - IV - 4
Projections of the Mineral Economy	D - IV - 9
Water Requirements	D - IV - 11

LIST OF FIGURES

Figure No.		Page
INTRODUCTION		
D1	Contributing Reports and Agencies	D-2
D2	Economic Area and Subareas	D-4

INTRODUCTION

PRESENTATION

Appendix D, entitled "Economic Base Study," has been presented in four different parts, which contain those studies covering the various economic aspects of the Genesee River Basin. The State of New York was instrumental in preparing the broad economic base study (Part One), upon which many of the cooperating agencies will rely for information to guide them in their determinations of projected water needs. The State also chaired Task Group No. 1, which played an important role in coordinating activities relevant to the economic base study. Presented in Parts Two through Four are special contributing studies prepared by the Economic Research Service, U. S. Forest Service and Corps of Engineers. These studies cover the specific categories of Agriculture, Forestry and Mining. In addition, Part Four has provided estimates of water requirements for the mineral industry of the Genesee River Basin. For appendix composition, refer to figure D1.

PLANNING

The intent of this appendix is to provide the planner with certain key projections, namely population, employment and production indices. From these projections and through application of judgement factors derived from any intimate knowledge available to the planner, he will determine projected needs and water requirements for the various water and related land resources. During project and plan formulation, projections will be used to determine future benefits and establish future site priority.

LIMITATIONS

It is realized that in some instances, the projections which have been provided present considerable difficulty to the engineer and planner in their attempts to translate such economic indicators as population and employment into specific water requirements. But one must be cognizant of the problems encountered by the economist. The major factors limiting selection of parameters are length of record, availability and accessibility of historical data. Another difficulty is that of concealing the identity of individual companies, especially when dealing with a relatively small economic area. Regardless, of these and other limitations, the economic base study is a valuable tool, since it presents a sound common base from which the engineer and planner may begin the technical follow-up studies.

GENESEE RIVER BASIN

CONTRIBUTING REPORTS AND AGENCIES

APPENDIX D

ECONOMIC BASE STUDY

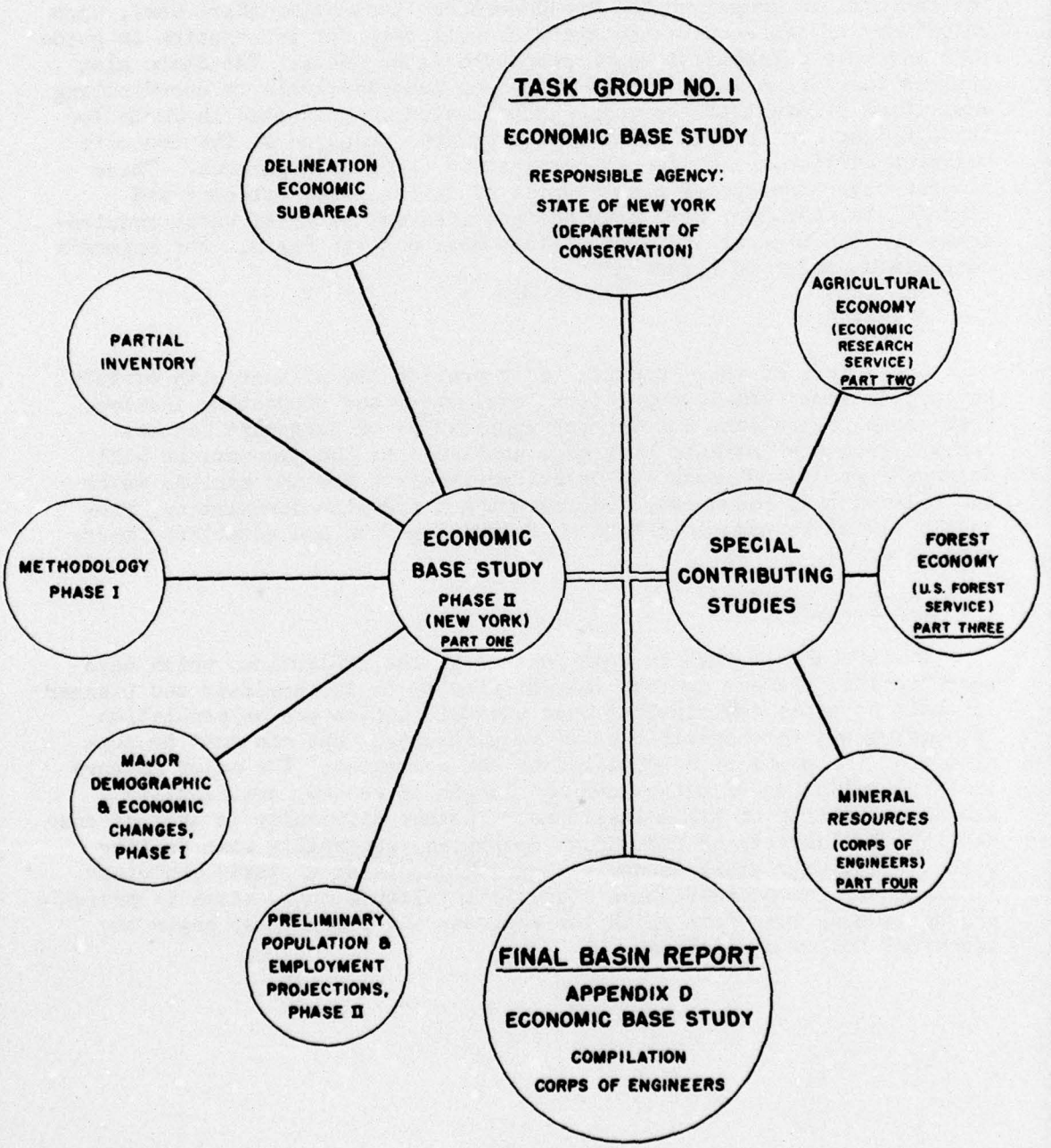


FIGURE D1

STUDY AREA

Two different areas have been used as a basis for the economic studies presented in this appendix. The principal area is comprised of those counties which are partially, or wholly, within the watershed of the Genesee River. Adjacent counties were added where there were close economic ties binding them to river basin counties. The collection of counties thus formed constitutes the over all economic area. This economic area was further divided into economic subareas, which were composed of a group of counties possessing similar economic and sociological characteristics. The subarea breakdown is as follows:

(1) Barge Canal - Monroe (Metropolitan Area), Orleans and Wayne Counties.

(2) Central Plain - Genesee, Livingston, Ontario and Wyoming Counties.

(3) Allegheny Plateau - Allegany, Cattaraugus, Steuben and Potter Counties.

Of the above counties, all lie within the State of New York, with the exception of Potter County, which is in the Commonwealth of Pennsylvania. The economic area covers approximately 8,943 square miles.

The hydrologic basin or Genesee River drainage area is the other basic area for which projections have been developed. This hydrologic area is composed of approximately 2,479 square miles of which 2,383 square miles are within the State of New York and about 96 square miles are in the Commonwealth of Pennsylvania.

Additional areas both to the East and West have been taken into consideration, since they constitute a service area for Recreation and Fish & Wildlife studies. New York State has economic studies in progress and have supplied preliminary projections for the service area. Reference is made to Figure D2 which illustrates the economic areas and shows the adjoining counties relevant to the Genesee River Basin Comprehensive Study.

CHANGING CONDITIONS

Projections were developed from a specific set of assumptions and since ample documentation has been provided concerning the methodology employed, these projections should be revised in the future as conditions change and new data becomes available.

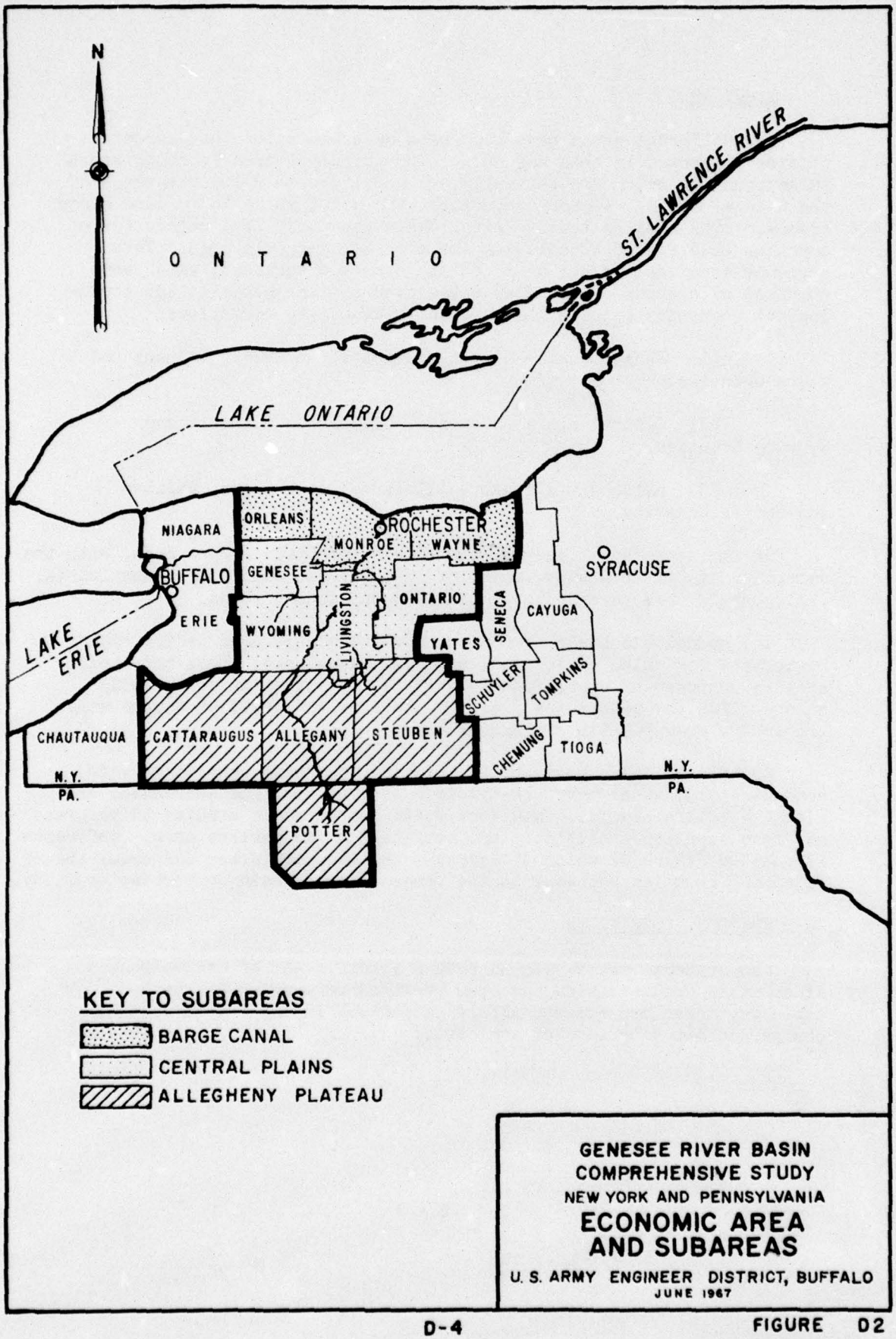

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ST. LAWRENCE RIVER
LAKE ONTARIO
NIAGARA
ORLEANS
ROCHESTER
MONROE
WAYNE
SYRACUSE
BUFFALO
GENESEE
ONTARIO
SENECA
CAYUGA
LAKE ERIE
ERIE
WYOMING
LIVINGSTON
YATES
SCHUYLER
TOMPKINS
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
CHEMUNG
TIOGA
N.Y.
PA.
N.Y.
PA.
POTTER
KEY TO SUBAREAS
BARGE CANAL
CENTRAL PLAINS
ALLEGHENY PLATEAU
GENESEE RIVER BASIN
COMPREHENSIVE STUDY
NEW YORK AND PENNSYLVANIA
ECONOMIC AREA
AND SUBAREAS
U. S. ARMY ENGINEER DISTRICT, BUFFALO
JUNE 1967

FIGURE D2

PART ONE

ECONOMIC BASE STUDY

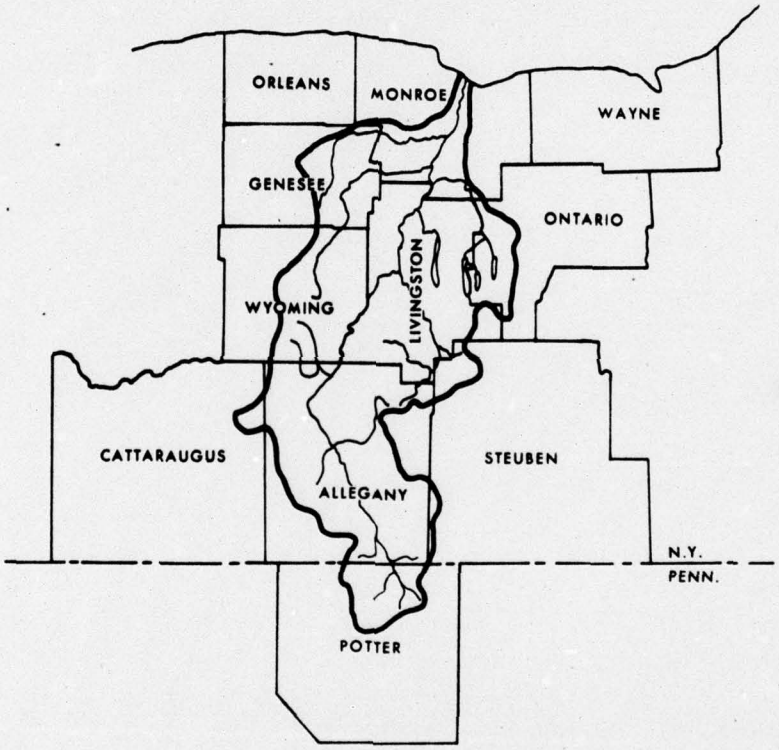
STATE OF NEW YORK

POPULATION AND EMPLOYMENT PROJECTIONS

1970-2020

GENESEE RIVER BASIN ECONOMIC BASE STUDY

PHASE II



COOPERATIVE STUDY
GENESEE RIVER BASIN COORDINATING COMMITTEE
NEW YORK STATE WATER RESOURCES COMMISSION
NEW YORK STATE DEPARTMENT OF COMMERCE

DIVISION OF WATER RESOURCES
CONSERVATION DEPARTMENT

JULY 1965

REVISED JANUARY 1966

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CONSERVATION DEPARTMENT, ALBANY, NEW YORK 12226

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February 2, 1966

Colonel R. Wilson Neff
District Engineer
Buffalo District Corps of Engineers
Foot of Bridge Street
Buffalo, New York 14207

Dear Colonel Neff:

On behalf of the Water Resources Commission, I am happy to send to you the enclosed official report on the Genesee River Basin Economic Base Study, Phase II (Population and Employment Projections 1970-2020). The report initially completed in July 1965, was revised after review, to include mutually agreed upon changes. It thus represents the final report on this aspect of the Genesee River Basin Study.

It has been a real pleasure to work with you and your staff on this unique planning project. The experience may well set a precedent for future cooperative arrangements between state and federal government agencies interested in comprehensive water resources planning.

We believe that the arrangement has proved viable.

Please feel free to call on us for any follow-up or clarifications that you may desire in connection with the economic base study.

Sincerely,

W. W. Sleight

Deputy Commissioner

ACKNOWLEDGMENTS

The report was prepared for the U. S. Army Engineer District, Buffalo Corps of Engineers by the Division of Water Resources, NYS Conservation Department. The research team responsible for producing this report included Paul W. Dickson, Irving E. Wolpert, Robert E. Barnes, Robert C. Kiddle, Key C. Kim, Alvin D. Gardinier, Thomas C. England, and Dale T. Kline. Technical direction was provided by the NYS Department of Commerce.

Economic and demographic data were made available by the NYS Devision of Employment, NYS Commerce Department, the U. S. Census Bureau, the U. S. Department of Agriculture, and National Planning Association.

GENESEE RIVER BASIN COMPREHENSIVE STUDY

APPENDIX D

PART ONE - ECONOMIC BASE STUDY

TABLE OF CONTENTS

Subject	Page
Letter of Transmittal	
Acknowledgement	
SECTION I - SUMMARY OF POPULATION AND EMPLOYMENT PROJECTIONS	
Scope of Report	D - I - 5
Ground Rules for the Economic Study	D - I - 5
General Conclusions	D - I - 6
Special Studies	D - I - 10
Projections of Population and Employment	D - I - 10
Population Estimates for the Hydrologic Basin	D - I - 14
Subarea Projections of Households	D - I - 16
Industrial Production	D - I - 16
SECTION II - EMPLOYER SURVEY	
General	D - I - 19
The Sample	D - I - 20
Raw Materials Sources	D - I - 22
Proximity to Markets	D - I - 23
Anticipated Growth	D - I - 23
Locational Factors	D - I - 24
SECTION III - SUBAREA PROFILES	
General	D - I - 27
Rochester Metropolitan Area	D - I - 27
Orleans & Wayne Counties	D - I - 31
Central Plains Subarea	D - I - 32
Allegheny Plateau Subarea	D - I - 34
Income Received by Residents	D - I - 36
Personal Income Changes by Subarea and County	D - I - 37
Sources of Personal Income	D - I - 39
Projections	D - I - 42

TABLE OF CONTENTS (Contd.)

Subject	Page
SECTION IV - TECHNICAL NOTES	
Employment	D - I - 43
Trend Analyses	D - I - 43
Share Analysis	D - I - 44
Differential "Shift" Analyses	D - I - 44
Population Cohort Survival Technique	D - I - 47
Projections of Numbers of Households and Industrial Production	D - I - 56
SECTION V - STATISTICAL TABLES	D - I - 59
SECTION VI - TOWN POPULATION	
General	D - I - 87
SECTION VII - PARTIAL INVENTORY OF REGIONAL RESOURCES	
Introduction	D - I - 99
The People (Bibliography)	D - I - 101
The Land (Bibliography)	D - I - 105
Water Resources (Bibliography)	D - I - 111
The Economic Base (Bibliography)	D - I - 114
Institutional Assets (Bibliography)	D - I - 120
Statistical Appendix	D - I - 122

LIST OF FIGURES

Figure No.		Page
D3	Delineation Map of Economic Areas and Subareas	D - I - 1
D4	Population and Employment, Economic Area, 1940 - 2020	D - I - 3
D5	Population, by Subareas, 1900-2020	D - I - 12
D6	Employment, by Subareas, 1940-2020	D - I - 13
D7	Cohort Population Technique, Flow Chart Detail	D - I - 50
D8	Relative Changes in Cohort - Rochester SMSA	D - I - 78
D9	Relative Changes in Cohort - Orleans & Wayne	D - I - 80

TABLE OF CONTENTS (Contd.)

LIST OF FIGURES (Contd.)

Figure No.		Page
D10	Relative Changes in Cohort - Central Plains Subarea	D - I - 82
D11	Relative Changes in Cohort - Allegheny Plateau Subarea	D - I - 84
D12	Map - County and Town	D - I - 89

LIST OF TABLES

Number	Title	Page
	SECTION I - SUMMARY OF POPULATION & EMPLOYMENT PROJECTIONS	
D1	Comparison of Population to the Year 2020	D - I - 7
D2	Projected Population Growth Rates 1960-2020	D - I - 8
D3	Population and Employment Growth Rates 1960-2020	D - I - 9
D4	Subarea Population Estimates, Economic Area, 1960-2020	D - I - 11
D5	Subarea Employment Estimates, Economic Area, 1960-2020	D - I - 11
D6	Population Projections, Hydrologic Basin, 1960-2020	D - I - 15
D7	Estimated Number of Households, 1960-2020	D - I - 17
D8	Industry Output Projections, 1980, 2000, 2020	D - I - 18
	SECTION II - EMPLOYER SURVEY	
D9	Standard Industrial Classification of 1957 Designations for Manufacturing Industries	D - I - 20
D10	Manufacturing Employer Survey	D - I - 21
D11	Analysis of Cooperating Companies	D - I - 22
D12	Anticipated Growth	D - I - 24
D13	Locational Factors	D - I - 24
D14	Locational Factors, SIC 38	D - I - 25

TABLE OF CONTENTS (Contd.)

LIST OF TABLES (Contd.)

Number	Title	Page
	SECTION III - SUBAREA PROFILES	
D15	Rochester SMSA, Employment in Nonagricultural Establishments, 1950 and 1963	D - I - 28
D16	Employment Shifts	D - I - 30
D17	Orleans and Wayne Counties, Employment in Nonagricultural Establishments, 1950 and 1963	D - I - 32
D18	Central Plains Subarea, Employment in Nonagricultural Establishments, 1950 and 1963	D - I - 33
D19	Allegheny Plateau Subarea, Employment in Nonagricultural Establishments, 1950 and 1963	D - I - 35
D20	Personal Income by Residence 1948-1963	D - I - 38
D21	Per Capita Personal Income by Residence 1948-1963	D - I - 39
D22	Personal Income by Residence, by Source, by County, 1948	D - I - 40
D23	Personal Income by Residence, by Source, by County, 1957	D - I - 41
D24	Personal Income by Residence, by Source, by County, 1963	D - I - 41
	SECTION V - STATISTICAL TABLES	
D25	Employment Projections, Economic Area	D - I - 59
D26	Employment Projections, Economic Area, Nonmanufacturing	D - I - 59
D27	Employment Projections, Economic Area, Manufacturing	D - I - 60
D28	Employment Projections, Barge Canal Subarea	D - I - 61
D29	Employment Projections, Barge Canal Subarea, Nonmanufacturing	D - I - 61
D30	Employment Projections, Barge Canal Subarea, Manufacturing	D - I - 62
D31	Employment Projections, Rochester SMSA	D - I - 63
D32	Employment Projections, Rochester SMSA, Nonmanufacturing	D - I - 63
D33	Employment Projections, Rochester SMSA, Manufacturing	D - I - 64
D34	Employment Projections, Orleans & Wayne	D - I - 65

TABLE OF CONTENTS (Contd.)

LIST OF TABLES (Contd.)

Number	Title	Page
D35	Employment Projections, Orleans & Wayne, Nonmanufacturing	D - I - 65
D36	Employment Projections, Orleans & Wayne, Manufacturing	D - I - 66
D37	Employment Projections, Central Plains Subarea	D - I - 67
D38	Employment Projections, Central Plains Subarea, Nonmanufacturing	D - I - 67
D39	Employment Projections, Central Plains Subarea, Manufacturing	D - I - 68
D40	Employment Projections, Allegheny Plateau Subarea	D - I - 69
D41	Employment Projections, Allegheny Plateau Subarea, Nonmanufacturing	D - I - 69
D42	Employment Projections, Allegheny Plateau Subarea, Manufacturing	D - I - 70
D43	Employment in Nonagricultural Establishments, Economic Area	D - I - 71
D44	Employment in Nonagricultural Establishments, Barge Canal Subarea	D - I - 72
D45	Employment in Nonagricultural Establishments, Rochester, SMSA	D - I - 73
D46	Employment in Nonagricultural Establishments, Wayne & Orleans	D - I - 74
D47	Employment in Nonagricultural Establishments, Central Plains Subarea	D - I - 75
D48	Employment in Nonagricultural Establishments, Allegheny Plateau Subarea	D - I - 76
D49	Historical Population Trends, 1900-1960	D - I - 77
D50	Population by Age Cohorts, Rochester SMSA	D - I - 79
D51	Population by Age Cohorts, Orleans & Wayne	D - I - 81
D52	Population by Age Cohorts, Central Plains Subarea	D - I - 83
D53	Population by Age Cohorts, Allegheny Plateau Subarea	D - I - 85

SECTION VI - TOWN POPULATION

D54	Genesee River Basin - Population, Towns, 1960	D - I - 91
D55	Genesee River Basin - Population Change by Towns, 1900-1960	D - I - 95

TABLE OF CONTENTS (Contd.)

LIST OF TABLES (Contd.)

Number	Title	Page
	SECTION VII - PARTIAL INVENTORY OF REGIONAL RESOURCES	
D56	Demographic Data	D - I - 122
D57	Urban-Rural Distribution - 1960	D - I - 123
D58	Sex Distribution - 1960	D - I - 124
D59	Civilian Labor Force - 1960	D - I - 125
D60	Educational Attainment	D - I - 126
D61	Land in Farm by County	D - I - 127
D62	Assessed Valuation by County - 1960	D - I - 128
D63	Value Added Per Employee - 1958	D - I - 130

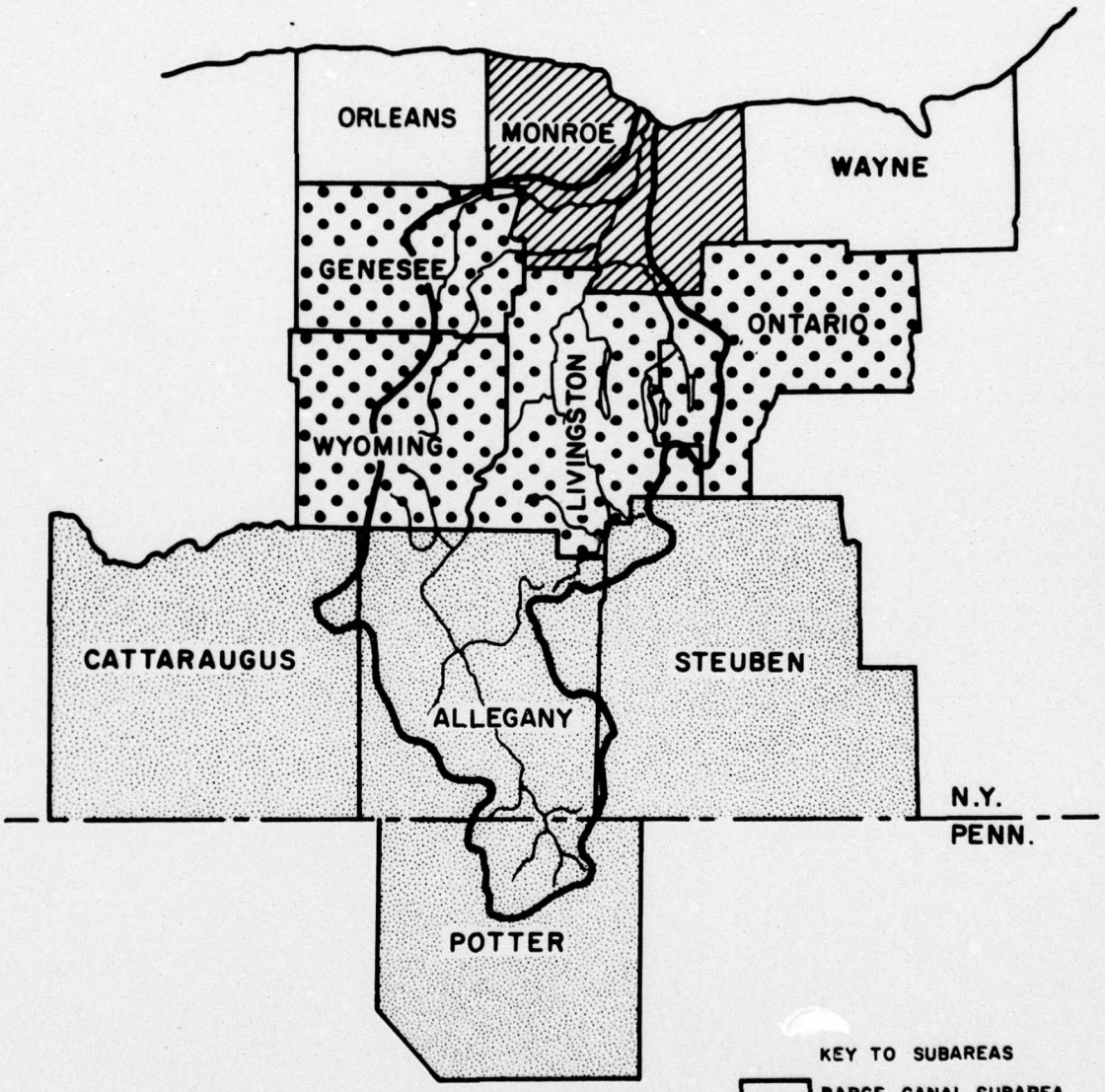
SECTION I

SUMMARY

OF

PROJECTIONS

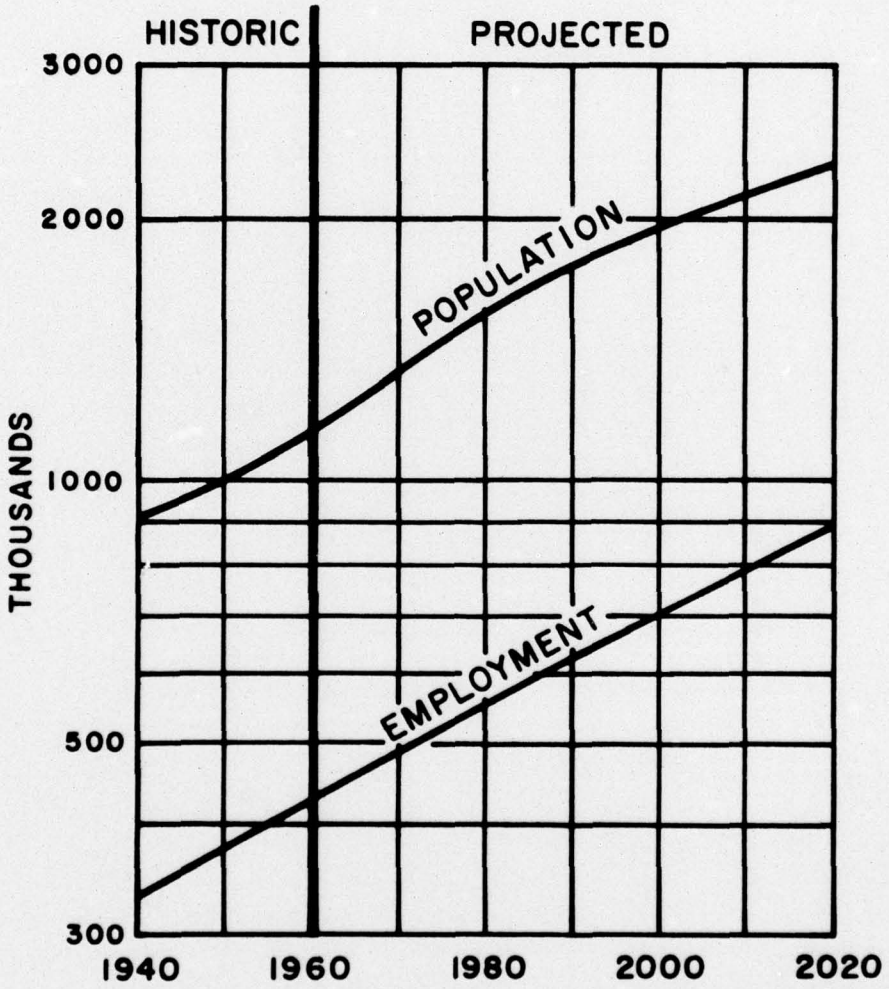
GENESEE RIVER BASIN
ECONOMIC AREA AND SUBAREAS



D-I-1(2)

FIGURE D3

GENESEE RIVER BASIN ECONOMIC AREA
POPULATION & EMPLOYMENT
1940—2020



SOURCE: N.Y.S. CONSERVATION DEPT., DIV. OF WATER RESOURCES

D-I-3(4)

FIGURE D4

GENESEE RIVER BASIN ECONOMIC STUDY

POPULATION AND EMPLOYMENT PROJECTIONS

PHASE II

SCOPE OF REPORT

This report presents population and employment projections for the Genesee River Basin economic area to 2020 as shown in figures D3 and D4. Estimates are also given for numbers of households and industrial output, based on the population and employment projections.

Accompanying tables and graphs give the actual data. Back-up information is contained in Section V along with notes on methods used to obtain the projections in Section IV.

For more detailed review of the preparatory work that went into the estimates of future employment and population trends earlier reports may be referred to. They include:

1. "Partial Inventory of Regional Resources," Phase I, Genesee River Basin Economic Study;

2. "Delineation of Genesee River Basin Economic Area and Subareas," Phase I;

3. "Methodology," Genesee River Basin Economic Base Study, Phase I;

4. "Major Demographic and Economic Changes," Genesee River Basin Economic Base Study, Phase I; and

5. "Preliminary Population and Employment Projections, 1970-2020," Genesee River Basin Economic Base Study, Phase II.

GROUND RULES FOR THE ECONOMIC STUDY

The principal underlying assumptions[1/] governing conduct of the study are stated here to properly qualify the estimates

1/ See Appendix A to Agreement for Economic Base Study, Genesee River Basin Service Area.

of future growth. These assumptions are:

1. Sufficient quantities of water of acceptable quality will be available to support the economy and facilitate economic growth.

2. Projections for individual watersheds will be made within the framework of national projections by the Economic Task Force of the Ad Hoc Water Resources Council Staff.

3. No major depressions will occur and a high level of national employment is anticipated. National projections also specify no major wars or other catastrophes.

4. Every region in the United States will have a future water supply "ample to meet its economic growth prospects."

GENERAL CONCLUSIONS

The general picture of the Genesee River Basin that emerges from the statistics is one of differential growth. Historic trends are expected to continue, by and large. The greater Rochester area should closely parallel the nation's growth while the Central Plains and Allegheny Plateau will, most likely, continue to lag. To qualify this general statement, a comparison was made between growth rates projected for the Genesee River Basin and the nation. The following tablesgives the rates. For total employment only Monroe County (Rochester Metropolitan Area) approaches the nation's projected rate of growth, while the upstream subareas are expected to expand jobs at rates of around half that of the U. S. A similar relationship obtains for population in the Basin's economic area versus the nation.

For comparative purposes, national projections are shown in the table D1.

TABLE D1 - COMPARISON OF POPULATION TO THE YEAR 2020

(MILLIONS OF PERSONS)

Year	1/ National Economic Growth Projection	2/ National Planning Association	3/ Raymond Vernon	4/ Resources for the Future	5/ Bureau of the Census
1940	132.1			132	
1955	165.3		165.3		
1960	180.7			180	180.7
1965	L 195.3	196	195.7		195.1 *
	M 196.9				194.7 **
					194.1 ***
1970	L 211.2	209.0			211.4 *
	M 214.4				209.0 **
					206.1 ***
					205.9 ****
1975	L 228.3	225.9	235.2		230.4 *
	M 233.4				225.9 **
					220.1 ***
					218.9 ****
1976	M 237.4	229.6			
1980	L 246.8			L 226	252.1 *
	M 254.1			M 245	245.3 **
	H 261.4			H 279	236.5 ***
					233.1 ****
1985	M 276.7		286.4		275.6 *
					266.3 **
					254.0 ***
					248.0 ****
2000	L 332.8			L 268	
	M 358.3			M 331	
	H 383.8			H 433	
2020	L 443.0				
	M 502.0				
	H 560.0				

* Series A; ** Series B; *** Series C; **** Series D.

1/ "National Economic Growth Projections 1980, 2000, 2020;" by the Economic Task Group of the Ad Hoc Water Resources Council Staff.

2/ "National Economic Projections 1962-1965, 1970;" by the National Planning Association, Washington, D. C. 1959, page 3. For the year 1976, "Looking Ahead, May 1963;" a monthly report by the National Planning Association.

3/ Vernon, Raymond - "Metropolis 1985;" Harvard University Press, 1960.

4/ Landsberg, Hans H., Fischman, Leonard L., and Fisher, Joseph L.; "Resources in America's Future;" Baltimore: The Johns Hopkins Press, 1963, page 71.

5/ "Current Population Reports," Series P-25, No. 286, July 1964.

Estimates of total national population furnished by the Economic Task Force of the Ad Hoc Water Resources Council Staff indicate a growth rate of 1.72 percent per year, while National Planning Association projections[1/] for the nation were 1.69 percent. Both were well above Genesee River Basin Estimates, though Monroe County (Rochester Metropolitan Area) is expected to come fairly close. The growth rates for this Genesee River Basin study are given in table D2.

TABLE D2 - PROJECTED POPULATION GROWTH RATES

ECONOMIC AREA AND SUBAREAS

Area & Subarea	1960	2020	Percent
Basin Economic Area	1,127,471	2,156,700	1.09
Barge Canal	688,535	1,559,600	1.37
Rochester SMSA	586,387	1,370,700	1.42
Central Plains	200,577	291,600	.63
Allegheny Plateau	238,359	304,200	.43

SOURCE: U. S. Census Bureau for historic data.
NYS Conservation Department, Division of Water Resources for projections.

These national rates appear too high, however, in the light of recent Census Bureau population projections. The arithmetic mean of the "B" and "C" projections (the two middle estimates by the Census Bureau out to 2010)[2/] is 1.47 percent in contrast to the earlier 1.72 percent projection supplied by the Economic Task Force of the Ad Hoc Water Resources Council Staff. It is clear that in line with the downward revision in population growth projections a modification in earlier employment projections may be anticipated. The Genesee River Basin employment projections, therefore, are expected to compare more favorably with the nation than suggested by reference to the earlier estimates cited above. These employment growth rates are shown in table D3.

1/ "Preliminary Report, Economic Base Study, Susquehanna River Basin;" Report to the Public Health Service and the U.S. Army Engineer District, Baltimore.
2/ "Current Population Reports," Series P-25, No. 286.

TABLE D3 - POPULATION AND EMPLOYMENT GROWTH RATES

ECONOMIC AREA

(Percent)

Area & Subarea	Projected Annual Growth Rate			
	Total Population	Total Employment	Manufacturing Employment	Nonmanufacturing Employment
Barge Canal	1.37	1.50	.79	1.94
Rochester SMSA	1.42	1.54	.75	1.99
Wayne & Orleans	1.04	1.25	1.12	1.62
Central Plains	.63	.84	.22	1.26
Allegheny Plateau	.43	.61	.27	.92
Basin Economic Area	1.09	1.25	.65	1.66

SOURCE: NYS Conservation Department, Division of Water Resources.

Among the forces that may strongly affect the Genesee River Basin are: 1) the nuclear research and nuclear fuels servicing capabilities in and near the basin; 2) the ultimate design and scheduling of state and federal expressway construction projects; 3) government plans for major capital construction outlays in the area; 4) the amounts and types of defense spending in the area; 5) the future course of international trade, particularly trade with Canada; and 6) national trends with respect to plant location.

Notwithstanding the usual caveats regarding an even distribution of water resources and other assets, some parts of the country will continue to enjoy locational advantages that cannot be offset. This area must be rated as one of the water-rich areas in the country but this report assumes no special advantage in the projection process for the Genesee River Basin.

As transportation improves in the Genesee River Basin economic area and industry becomes less and less dependent on proximity to natural resources or even to markets, there will be an ever widening range of choices for locating office or plant. Decision makers will more and more select those areas that have pleasant climates, good school systems, attractive recreational facilities, and a host of other advantages that may be loosely lumped together as the "amenities." This trend should help the Genesee River Basin with its proximity to Lake Ontario, good schools, cultural institutions and attractive country

side not to mention traditional economic resources such as a skilled labor supply, good transportation and the rest. On the other hand, winters can be severe, and cultural institutions are limited as compared with New York City and San Francisco, for example.

Traffic problems, polluted water and air plus urban social problems may strangle the big cities and the smaller cities such as Rochester with their more accessible hinterlands may prosper and grow as industry decentralizes.

SPECIAL STUDIES

Special studies were made by other state and federal agencies in the fields of agriculture, forestry, geology and mineral resources, power, and recreation. Although this report includes in its tabulations all of the employment in these activities, the special studies by U. S. Department of Agriculture and Corps of Engineers provide insights and details that could not be given in a general study of the area economy. Their reports are published in Parts Two, Three and Four of this appendix, and constitute an integral part of the economic base study for the Genesee River Basin. They include:

1. "The Agricultural Economy of the Genesee River Basin," U. S. Department of Agriculture, Economic Research Service;

2. "Projected Employment and Production in the Forest Industries in Economic Areas of the Genesee River Basin," U. S. Forest Service;

3. "Predominant Mineral Resources of the Genesee River Basin and Service Area," U. S. Army Corps of Engineers.

PROJECTIONS OF POPULATION AND EMPLOYMENT FOR ECONOMIC AREA AND SUBAREAS

Demographic projections for decade years 1970-2020 are presented in the accompanying tables D4 and D5 and figures D5 and D6. These data represent the end products of research into area and subarea historic growth trends. Observed trends were extrapolated out to 2020, but only after relating them to national and regional development historic and projected. Furthermore, the appraisal of anticipated population was tempered by a study of economic prospects for employers in the Genesee River Basin economic area by field and questionnaire survey, discussed in Section II, Employer Survey, of this appendix.

Technical Notes, Section IV of this appendix V explain procedures for deriving demographic and employment projections, but it may help

TABLE D4 - SUBAREA POPULATION ESTIMATES

ECONOMIC AREA [1/]

Area & Subarea	1960	1970	1980	1990	2000	2010	2020
Barge Canal	688,535	812,197	930,004	1,071,645	1,224,427	1,382,915	1,559,619
Rochester SMSA [2/]	586,387	693,208	799,733	927,451	1,065,310	1,208,818	1,369,321
Wayne & Orleans	102,148	118,989	130,271	144,194	159,117	174,097	190,298
Central Plains	200,910	220,131	235,603	252,565	268,029	279,797	291,591
Allegheny Plateau	238,339	258,047	271,148	284,872	295,464	298,672	305,581
Basin Total	1,127,784	1,290,375	1,436,755	1,609,082	1,787,920	1,961,384	2,156,791

1/ Economic Area as designated by County lines (See Figure D3).
2/ Old Census definition: Monroe County only.
SOURCE: NYS Conservation Department, Division of Water Resources.

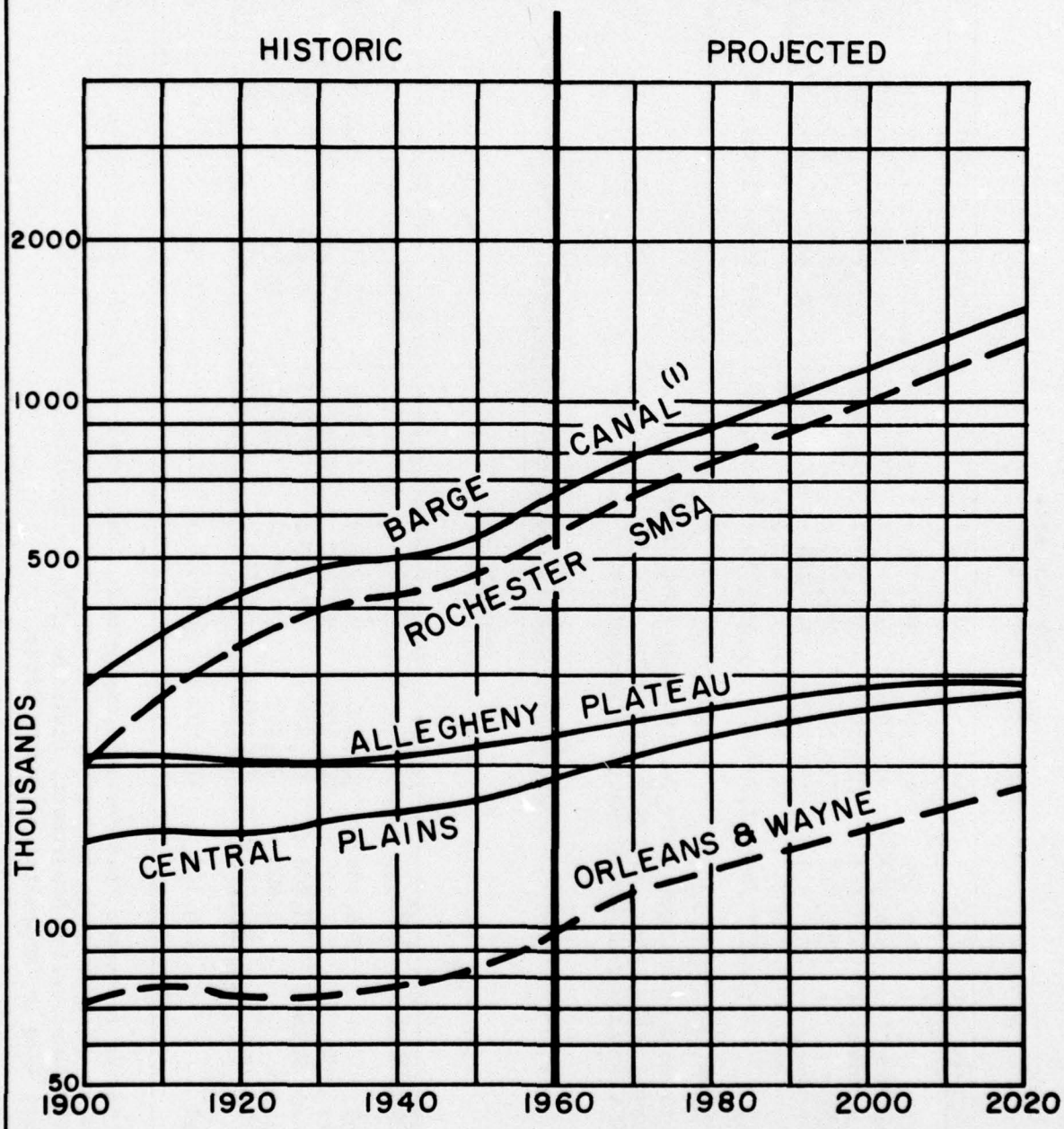
TABLE D5 - SUBAREA EMPLOYMENT ESTIMATES

ECONOMIC AREA [1/]

Area & Subarea	1960	1970	1980	1990	2000	2010	2020
Barge Canal	268,000	310,900	360,700	418,500	485,600	563,700	654,200
Rochester SMSA	231,200	269,300	313,600	365,200	425,300	495,400	576,900
Orleans and Wayne	36,800	41,600	47,100	53,300	60,300	68,300	77,300
Central Plains	71,900	78,200	85,000	92,400	100,500	109,300	118,800
Allegheny Plateau	84,200	89,500	95,200	101,200	107,600	114,400	121,600
Basin Total	424,100	478,600	540,900	612,100	693,700	787,400	894,600

Note: Estimates represent Most Probable employment. See Section V for detailed tables, with High, Low and Most Probable estimates.
SOURCE: NYS Conservation Department, Division of Water Resources.
1/ Economic Area as designated by County lines.

GENESEE RIVER BASIN - ECONOMIC SUBAREAS
POPULATION 1900 - 2020

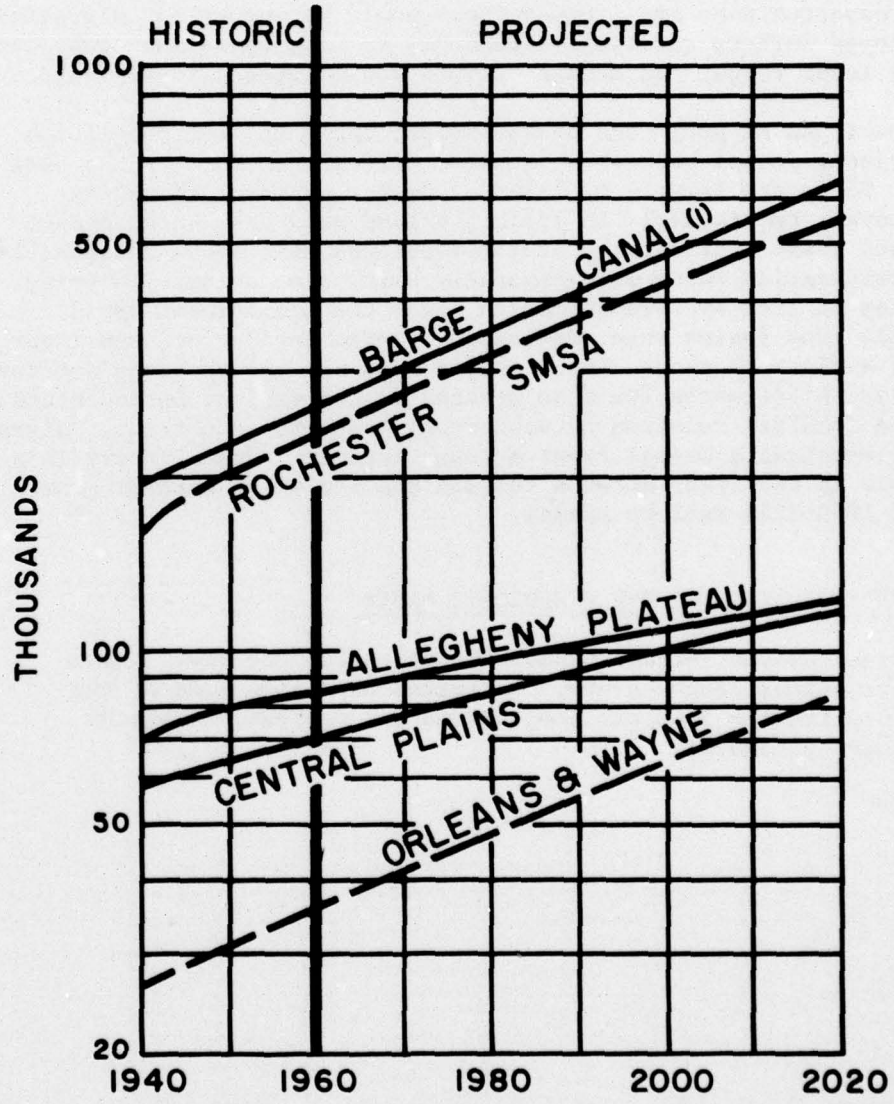


(1) BARGE CANAL INCLUDES ROCHESTER SMSA AND ORLEANS & WAYNE

SOURCE: N.Y.S. CONSERVATION DEPT., DIV. OF WATER RESOURCES

GENESEE RIVER BASIN - ECONOMIC SUBAREAS

EMPLOYMENT 1940 - 2020



(1) BARGE CANAL INCLUDES ROCHESTER SMSA AND ORLEANS & WAYNE

SOURCE: N.Y.S. CONSERVATION DEPT., DIV. OF WATER RESOURCES

FIGURE D6

to point out some pivotal premises in the methodology. First it was assumed that all areas are becoming more like the nation with respect to birth rates, fertility, family size and other demographic characteristics. A similar assumption was made in regard to participation rates and unemployment levels. Also, it was presumed that economically laggard areas would receive aid from state and federal government over the years and would catch up to the more prosperous areas in terms of employment, per capita personal income and other welfare measures. In theory, at least, under utilization of resources in the area would depress factor costs and private enterprise would be attracted to the area. Also, when job opportunities are limited there would be enough out migration of unemployed workers and their dependents to roughly balance jobs with available labor force. An excess of jobs would attract in-migrants.

Comparisons of projected growth rates, table D3, for population and employment reveal perhaps unexpected differences for the two sets of data. These are largely explained, however, by the assumptions stated above. Particularly in the hinterland subareas, unemployment in the 1960 (base year for the projections) was well above national levels while participation rates were generally below the nation. To bring these rates in line by 2020 has often meant that employment would necessarily grow faster than population. (A comparison between labor force and employment shows closer conformance but growth rates are not identical). Differences are also greater in the earlier period since there is a feedback relation between employment and population. Migration in or out eventually brings about a rough balance. Hence, there is a convergence in the later decades between the two which average growth rates for 1960-2020 fail to reveal.

POPULATION ESTIMATES FOR THE HYDROLOGIC BASIN

Subareas consist of one or more counties but the river basin itself cuts across county lines. Estimates have been made of the basin population for 1960 and projections out to 2020. Table D6 present these estimates.

TABLE D6 - POPULATION PROJECTIONS

HYDROLOGIC BASIN [1/]

Area & Subarea	1960	1970	1980	1990	2000	2010	2020
Barge Canal[2/]	304,558	360,040	415,350	481,670	523,250	627,770	711,110
Rochester SMSA[3/]	304,369	359,820	415,110	481,400	522,960	627,450	710,760
Orleans & Wayne	189	220	240	270	290	320	350
Central Plains	82,944	90,900	97,300	104,300	110,700	115,600	120,400
Allegheny Plateau	35,952	38,900	40,900	43,000	44,600	45,000	46,100
Basin Total	423,454	489,840	553,550	628,970	678,550	788,370	877,610

1/ See Delineation of Basin Figure D3. Tabulation excludes Potter County.
2/ Comprises Monroe, Orleans and Wayne counties.
3/ Old Census Definition. Monroe County only.
SOURCE: U. S. Census Bureau for historic data and
NYS Conservation Department, Division of Water Resources for projections.

SUBAREA PROJECTIONS OF HOUSEHOLDS

Table D7 gives estimates for the number of households in the economic subareas and the river basin economic area. Projections were derived from population estimates divided by estimated number of persons per household. Bureau of Census projections of average household size for the nation were used in conjunction with subarea historic data. Methods used are outlined in the Technical Notes. The projections will provide guidelines for calculating household water requirements in the decades ahead.

Implicit in this projection technique is the general premise that local areas will become more and more like the United States. In the light of demographic trends in the Genesee Basin area this is not an unreasonable assumption.

INDUSTRIAL PRODUCTION

The physical volume of industrial production has been estimated for the more important industry categories. Projected employment adjusted by estimated productivity gives production indices in table D8. A more detailed explanation may be found under Technical Notes, Section IV of this appendix.

TABLE D7 - ESTIMATED NUMBER OF HOUSEHOLDS

ECONOMIC AREA 1/

Area & Subarea	1960	1970	1980	1990	2000	2010	2020
Barge Canal	207,288	242,384	274,352	313,466	354,210	396,560	442,364
Rochester SMSA	177,743	208,176	237,238	272,631	309,417	347,982	389,576
Wayne & Orleans	29,545	34,208	37,114	40,835	44,793	48,578	52,788
Central Plains	56,763	62,856	67,073	71,475	75,627	78,483	81,313
Allegheny Plateau	69,504	74,794	78,357	81,836	84,394	85,043	86,493
Basin Total	333,555	380,034	419,782	466,777	514,231	560,086	610,170

Note: Based on Most Probable population projections.
SOURCE: NYS Conservation Department, Division of Water Resources.
1/ Economic area as designated by County lines.

TABLE D8 - INDUSTRY OUTPUT PROJECTIONS

ECONOMIC AREA
(1960 = 100)

Industry	Productivity Growth Factor 1/ (Percent)	Employment Indices 2/			Output Indices		
		1980	2000	2020	1980	2000	2020
Food & Kindred Products	2.2	111	124	139	172	296	513
Textile Mill Products	2.6	92	85	73	154	237	341
Apparel & Other Related Products	2.5	100	96	90	164	258	396
Furniture, Lumber & Wood Products	2.5	101	101	99	165	271	435
Printing, Publishing & Allied Products	1.9	117	136	159	170	289	492
Chemicals & Allied Products	4.7	107	117	128	268	735	2015
Primary & Fabricated Metal Industries	2.2	107	116	123	165	277	454
Nonelectrical & Electrical Machinery	2.4	120	143	171	193	369	710
Transportation Equipment	3.1	145	199	268	267	675	1674
All Other	2.6	112	125	139	187	349	649
Total Manufacturing	2.8	114	129	148	198	389	776

1/ National Planning Association 1963-85 adjusted rates carried forward.
2/ Based on "Most Probable" employment estimates.
SOURCES: National Planning Association Report No. 65-1 "Revised Statistics of Output, Employment, & Productivity: U. S. Economy & Selected Industries," 1947-1985 and National Planning Association Report No. 65-2 "National Economic Projections to 1975/76," and NYS Conservation Department, Division of Water Resources.

SECTION II

EMPLOYER

SURVEY

EMPLOYER SURVEY

GENERAL

Field surveys and questionnaires to key employers in the Genesee River Basin economic area elicited responses from 119 companies with aggregate employment of 98,986. This represents some 63 percent of the total for the Basin economic area.

The purpose of this study was to obtain first hand information about employment prospects in the area and to probe into some underlying reasons for future growth or decline in the Basin. Companies surveyed were all manufacturers and table D9 gives the standard classification for the industries. The rationale for looking only at manufacturing was the general thesis that this category constitutes the dynamic core or "base" of the area economy. By and large, the companies surveyed serve large regional or national markets and growth or decline depends to a great extent on exogenous factors. It is also assumed that a vigorous economic "base" will support a healthy service sector. In the sense that the term is used here the latter category includes all of the locally oriented economic activities such as retail trade, amusements, medical services, etc. Those industries linked closely to manufacturers serving large regional or national markets are viewed as part of the economic "base" or the so-called "export" group. There are some activities that do not fit neatly into the above categories, but for general purposes of appraising long term prospects the rough breakdown suggested should prove adequate.

TABLE D9 - STANDARD INDUSTRIAL CLASSIFICATION OF 1957 DESIGNATIONS FOR MANUFACTURING INDUSTRIES

The following listing provides a key to the Standard Industrial Classification, or SIC numbers used in the employment tables.

SIC 20 Food and kindred products
21 Tobacco manufacturers
22 Textile mill products
23 Apparel and other finished products
24 Lumber and wood products
25 Furniture and fixtures
26 Paper and allied products
27 Printing and publishing
28 Chemicals and allied products
29 Petroleum refining and related industries
30 Rubber and miscellaneous plastics products
31 Leather and leather products
32 Stone, clay, and glass products
33 Primary metal industries
34 Fabricated metal products
35 Machinery, except electrical
36 Electrical machinery
37 Transportation equipment
38 Instruments; photographic and optical goods
39 Miscellaneous manufacturing industries

THE SAMPLE

Tables D10 and D11 describe the survey sample. No extravagant claims can be made as to its representativeness but the companies studied included almost all the large employers. As is generally the case in voluntary survey work, the larger establishments are usually better staffed and better conditioned to take part in this type of research. There are, nonetheless, a number of small employers in the study group as shown by the accompanying tables.

TABLE D10 - MANUFACTURING EMPLOYER SURVEY

Standard Industrial Classification	Number of Cooperating Companies	1963 Employment (Sample)	Total Employment in Area	Sample as a percent of total
Durable	67	80,466	116,151	69
SIC 24	2	235	1,321	18
25	4	865	2,455	35
32	4	2,383	12,015	20
33	6	1,104)	10,572	60
34	9	5,284)		
35	15	9,624	17,755	54
36	12	9,594	16,479	58
37	2	3,364	7,431	45
38	13	48,013	48,123	100
Nondurable	52	18,520	42,109	44
SIC 20	29	8,770	17,401	50
22	3	624	2,005	31
23	4	2,907	8,875	33
26 1/	4	1,598	1,445	100
27	8	3,477	6,893	50
28	0	--	944	0
29	0	--	20	0
30	0	--	1,248	0
31	2	344	929	37
39	2	800	2,349	34
Durable and Nondurable	119	98,986	158,260	63

1/ Where survey sample exceeds total employment, difference reflects time lag between survey dates.

TABLE D11 - ANALYSIS OF COOPERATING COMPANIES
INDUSTRY AND EMPLOYMENT SIZE CLASS

Standard Industrial Classification 1/	Number of Companies	Employment			
		1-99	100-499	500-999	1000 or more
SIC 20	29	7	21		1
22	3	1	2		
23	4		3		1
24	2	1	1		
25	4	2	2		
26	4	2	1		1
27	8	2	3	2	1
31	2		2		
32	4		2	1	1
33	6	3	2	1	
34	9	2	2	3	2
35	15	6	3	3	3
36	12	4	3	1	4
37	2		1		1
38	13		3	6	4
39	2		2		
Totals	119	30	53	17	19

1/ See key to Standard Industrial Classification, table D9.

RAW MATERIALS SOURCES

Proximity to raw materials is generally a less important locational factor than it once was. For some lines, however, it is essential. Food processing plants, for example, are almost always situated in or near producing areas. Markets and labor supply often outweigh proximity to raw materials as attractive forces for industry location.

When queried about raw materials sources, about three-fourths of the 120 companies indicated that the bulk of their purchases were made in the northeast. Fewer than 5 percent named the Rochester Metropolitan Area as a major source, with the west ranking second only to the northeast. (It is likely that some respondents included

local purchases of raw materials in the "northeast"). Ranking behind the northeast and the west as sources were the northcentral and southern areas. Canada and foreign lands were last on the list.

Trucks were used four times as frequently as railroads to bring in raw materials suggesting that location on rail lines is no longer of crucial import. In fact, it is alleged by some that rail side locations are often used to keep trucking rates "in line."

No significant differences were noted among the subareas with respect to industry orientation to raw materials and size of industry appears to be no factor. Only the kind of industry affects raw materials sources to any appreciable degree, according to survey results (not to mention common sense).

Fewer than a tenth of those surveyed look for major changes in raw materials sources. Those who anticipate such changes are in food processing, lumber and wood products, furniture, and metal products. There is a hint in these returns that the area may lose some of these plants, particularly the ones with relatively low investments in plant and equipment here. The proportion to the total is, however, small.

PROXIMITY TO MARKETS

Location near principal markets is generally advantageous and for most manufacturers outweighs gains attributable to nearness to raw materials. Somewhat surprising then were the results of the study which show very substantial sales in the west and south as well as in the northeast and north central regions.

It may be generalized that a good part of Genesee River Basin industry serves national markets, supporting the analytical approach used in the study which ties the area economy to that of the nation.

In reply to a question on possible shifts in present markets, all but a handful of the 119 companies indicated that they anticipated no major shift.

ANTICIPATED GROWTH

Of the 101 companies who answered the question, 59 look for growth in line with the nation. Surprisingly for an area located in the northeast, 32 anticipate greater than national growth, while only 10 expect less than a national rate of increase. A further surprise is the fact that larger companies are more optimistic than the smaller ones, both upstream and downstream. Table D12 presents the results of the replies.

TABLE D12 - ANTICIPATED GROWTH

Subarea	Expected Growth Compared to Nation		
	In Line	Greater	Less
Rochester Metro	19	15	4
Upstream Subareas	40	17	6
Total	59	32	10

The magnitude of growth expected is indicated by a concentration of companies in the 1-49 percent classes. The median lies in the 10-19 percent growth group. As above, the larger companies are expecting the greater growth with most of this employment concentrated in the Rochester area.

LOCATIONAL FACTORS

Cooperating companies were asked to rate some of the more important locational factors in the area. Looking at all companies and subareas together, the principal shortcomings of the basin economic area appear to be a lack of land for plant expansion and available labor supply. On these two issues about one out of four companies registered definite dissatisfaction. As revealed by the table D13, none of the other factors drew more than about 10 percent negative responses.

TABLE D13 - LOCATIONAL FACTORS

Locational Factors	Number of Companies Rating Factors		
	Excellent	Satisfactory	Unsatisfactory
Transportation Facilities	32	80	7
Land for Plant Expansion	36	53	30
Available Labor Supply	11	76	32
Accessibility to Related Industries	14	89	13
Educational & Research Facilities	51	54	13
Availability of Utilities	51	57	10
Living Conditions	44	73	3
Proximity to Markets	18	87	10

Wide general approval was given to living conditions in the area, location with respect to markets, availability of utilities, and the educational and research facilities in the area. A surprise is the general satisfaction with transportation, despite some of the problems in the Allegheny Plateau Subarea.

Also it is of interest to note that accessibility to related industries was rated "excellent" or "satisfactory" by most companies surveyed though one might expect the opposite in a relatively small metropolitan area like Rochester and environs.

Notwithstanding general satisfaction with the area as a place to have a factory, several industries accounted for a disproportionate number of negative responses. Food processors were frequently concerned about land for plant expansion (over 25 percent expressed dissatisfaction) and labor supply was a problem for 20 percent of the food group. Availability of utilities was unsatisfactory for one out of every five food plants.

The single most important industry in the area, measured by employment, is SIC 38 or Instruments; Photographic and Optical Goods. A special tabulation for this group is presented in table D14.

TABLE D14 - LOCATIONAL FACTORS FOR SIC 38

Location Factors	SIC 38 - 13 Companies		
	Excellent	Satisfactory	Unsatisfactory
Transportation Facilities	3	8	2
Land for Plant Expansion	3	8	2
Available Labor Supply	2	4	7
Accessibility to Related Industries	4	8	1
Educational and Research Facilities	10	3	-
Availability of Utilities	7	5	1
Living Conditions in the Area	7	6	-
Proximity to Principal Markets	2	11	-

Labor supply is the major problem, according to the survey. Other items not listed might loom large such as local tax or zoning problems, but of the eight criteria given "available labor supply" was the only one drawing a generally negative response. With the pool of unemployed at record low levels (excepting war years), an immediate resolution of the problem is not in sight.

Printing and publishing, which is generally an urban centered industry, faces an expansion problem. For the most part they are unable to increase plant capacity at their present sites. The survey

results reflect this situation. Another local industry that accounts for a good share of manufacturing employment reports some dissatisfaction with labor supply and land for plant expansion. Almost half the cooperating companies cite these two factors as definite problem areas.

SECTION III

SUBAREA PROFILES

SUBAREA PROFILES

GENERAL

Physical characteristics of the river basin and its economic subareas are described by several reports of state and federal agencies. A listing of related studies was published in Section VII, Bibliography. Of particular interest are those studies carried out by federal agencies contributing to this economic base study and included as parts II, III and IV of this appendix.

Following is a brief review of the more important economic statistics which throw some light on subarea economies. These data reflect the impact of many of the attributes documented and described in the more specialized studies of resources of the Genesee River Basin area. It should be noted that resource oriented "industry," (i.e. farming, mining, and forestry) are of relatively minor and declining importance in the Genesee River Basin. Of far more economic significance are manufacturing, trade, and service lines. A later part of this report indicates the relative importance of the principal sources of personal income.

From the point of view of land use in the basin the picture is different. Agriculture and forestry, for example, account for very substantial percentages of total land used. The two points of view must be considered in any planning operation--but this study is concerned primarily with the economic activities which account for most of the jobs and income generated in the area.

ROCHESTER METROPOLITAN AREA

The Genesee River Basin Economic Area is dominated by Monroe County, or the Rochester SMSA[1/]. It contains over half of the population and even higher proportions of the jobs in the basin.

Rochester, on Lake Ontario lying astride the main east-west trade routes, is the nexus of the manufacturing complex in the area as well as the distribution, shopping, service, and cultural center of the basin.

The vigor of the Rochester area is attested to by its population growth which has matched or exceeded that of the nation since 1900, except for the 1930's. Migration into this area was substantial between 1950 and 1960.

1/ Old definition of Rochester SMSA (Monroe County only) is used throughout this report.

Employment expansion for Rochester residents, while modestly lagging in the 1940's, kept pace with the national growth pattern between 1950 and 1960. While the gain in manufacturing employment in Rochester was only about half of the national gain in the fifties, nonmanufacturing jobs rose at about the national rate. The smaller relative and absolute decline in farm jobs in the metropolitan area about balanced the slower growth in nonfarm employment in the past decade.

Establishment employment data, which measure nonfarm jobs at their site rather than by the residence of employees, indicate somewhat more favorable trends than Census statistics on residents. The area's lag versus the nation in manufacturing jobs between 1950 and 1963, according to establishment data, was not as marked as in the 1950-1960 decade and was wholly attributable to a decline in nondurable lines. Durable goods employment, in fact, grew faster in Monroe than in the nation during the 1950-1963 period. Nonmanufacturing employment growth in Rochester exceeded that for the country during this period. Except for the sharp drop in transportation jobs, most Rochester nonfactory lines exhibited greater gains than the nation as a whole. The above data are presented in table D15.

TABLE D15 - ROCHESTER SMSA EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS 1950 and 1963

Industry	1950	1963	Percent Change
Total Employment	198,200	239,100	+20.6
Manufacturing	100,200	109,100	+ 8.9
Durable Goods	67,200	81,500	+21.3
Nondurable Goods	33,000	27,600	-16.4
Nonmanufacturing	98,000	130,000	+32.7
Contract Construction	7,800	10,400	+33.3
Transportation, Communication, and Public Utilities	12,700	10,400	-18.1
Wholesale & Retail Trade	34,200	42,800	+25.1
Finance, Insurance, and Real Estate	5,200	8,700	+67.3
Services & Miscellaneous	22,000	32,600	+48.2
Government	16,100	25,100	+55.9

SOURCES: NYS Department of Labor, Division of Employment,
NYS Department of Conservation, Division of Water Resources.

The relative opulence of the Rochester job market and its importance to the basin is reflected in the fact that there were 5 percent more jobs in the county in 1960 than resident workers. Nearly 14,000 persons commuted to work in Monroe, predominantly from contiguous counties. Comparatively few Rochester residents had to travel to jobs in other counties. The unemployment rate has also reflected the high level of industrial and commercial activity and is currently far below the national average.

Despite substantial employment growth, there were structural changes in the economy of Monroe county in the past decade, reflected by application of the so-called shift technique[1/]. The results of this technique are shown in table D16. The net employment shift representing the actual gain or loss in area employment resulting from application of the difference between overall area and national percentage changes showed a very small lag for Rochester. On the other hand, the differential shift for the area was sizeable.

Rochester's significant negative differential shift representing the application of differences in area and national rates of change by industry reflected the fact that area industries were not expanding as fast as they were in the nation as a whole.

Proportional shift representing the algebraic difference between net and differential shifts practically balanced the negative differential shift for Rochester. This means that while Rochester's industries did not expand as much as these same industries in the nation, the overall gain was commensurate with that for the less favorable national industry mix.

1/ "Regions, Resources and Economic Growth;" Edgar Dunn and others; The Johns Hopkins Press, Baltimore; 1960.

TABLE D16 - GENESEE RIVER BASIN ECONOMIC AREA
EMPLOYMENT SHIFTS
1950-1960

	Total Employment			Employment Shifts		
	1950	1960	Percent Change	Total Net Shift	Differential Shift	Proportional Shift
Genesee River Basin Economic Area	382,024	424,060	+11.0	-13,357	-21,566	+ 8,209
Barge Canal Subarea	233,926	267,965	+14.6	+ 120	-11,424	+11,544
Rochester SMSA	202,197	231,201	+14.3	- 315	-13,580	+13,265
Orleans & Wayne Counties	31,729	36,764	+15.9	+ 435	+ 2,156	- 1,721
Central Plains	65,912	71,789	+ 8.9	- 3,590	- 2,103	- 1,487
Allegheny Plateau	82,186	84,216	+ 2.5	- 9,887	- 8,039	- 1,848

SOURCE: U. S. Census Bureau

On balance, it is fair to conclude that the Rochester Metropolitan Area is keeping pace with the nation in terms of employment growth. The favorable balance between people and jobs is reflected by low unemployment rates. On the other hand, the slow rate of growth in manufacturing, reflecting sluggish soft goods lines, is a weak spot in an otherwise bouyant economy. Continued expansion in nonmanufacturing, however, should more than offset any weakness in this strong metropolitan area.

ORLEANS & WAYNE COUNTIES

Wayne and Orleans counties flank Monroe on the east and west along Lake Ontario. The New York State Barge Canal runs through these counties and gives the subarea its name.

Orleans and Wayne have been predominantly farming areas with well developed truck and fruit farming. Their pattern of living has been changing in recent decades, however, in part because of proximity to the Rochester Metropolitan Area.

Population of these two counties has lagged and even declined in some decades between 1900 and 1940, then started to rise at an accelerating rate. Sizeable migration into these counties between 1950 and 1960 representated a real trend reversal.

Employment gains for residents of these two counties have been greater than for the nation. Expansion in non-agricultural activities has outstripped that for the nation in the last decade, because of substantial relative gains in manufacturing jobs. Nonmanufacturing job increases for residents have not quite matched gains for the nation. While agricultural employment dropped sharply in the area, the rate of decline was not as steep as for the nation and the belt of intensive truck and fruit farming along Lake Ontario did relatively well.

Establishment nonfarm employment data for 1950-1963 helps pinpoint job patterns. They confirm the greater rate of growth in the two counties in manufacturing, and particularly in durable goods. The statistics also emphasize the importance of area food processing plants which depend on area farms for their "raw materials." Nonmanufacturing provided an increase in jobs for area residents which matched national patterns between 1950 and 1963 with greatest gains in service fields. These changes are presented in table D17.

TABLE D17 - ORLEANS & WAYNE COUNTIES EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS 1950 and 1963

Industry	1950	1963	Percent Change
Total Employment	19,000	24,500	+ 28.9
Manufacturing	7,200	8,900	+ 23.6
Durable Goods	2,200	3,000	+ 36.4
Nondurable Goods	5,000	5,900	+ 18.0
Nonmanufacturing	11,800	15,600	+ 32.2
Contract Construction	300	600	+100.0
Transportation, Communication, and Public Utilities	1,900	1,400	- 26.3
Wholesale & Retail Trade	4,100	4,900	+ 19.5
Finance, Insurance, and Real Estate	200	500	+150.0
Services & Miscellaneous	1,400	2,500	+ 78.6
Government	3,800	5,700	+ 50.0

SOURCE: NYS Conservation Department, Division of Water Resources.

Commuting patterns for Orleans and Wayne indicate that a sizeable portion of the job gains in the past decade represent spillover from Monroe County.

Nearly one-sixth of the employed residents of the two counties commute to work in Monroe County[1/]. Without Rochester, the balance of jobs and people in the Barge Canal area would be seriously endangered.

Shift analysis, table D16, for the Barge Canal for 1950-1960 indicates a modest positive total net shift, based on residence data. A significant plus differential shift reflecting gains in newer growth industries, such as small metalworking plants was mostly offset by an appreciable negative proportional shift. The negative proportional shift resulted from a predominance of slow growth lines such as food processing.

CENTRAL PLAINS SUBAREA

The Central Plains Subarea consists of four counties--Genesee, Wyoming, Livingston, and Ontario--comprising the tier just below the Barge Canal subarea.

1/ Commuting to Monroe County was a prime reason for the redefinition by the Bureau of the Budget of the Rochester Standard Metropolitan Statistical Area to include Orleans, Wayne, and Livingston counties along with Monroe, constituting an economically integrated labor market area.

This area comprises some of the best farmland in the state and has been predominantly agricultural. In recent years this subarea has not matched growth patterns of the Barge Canal Subarea.

Population gains were well below national levels since 1900 with losses in some decades and only moderate pickup between 1950 and 1960.

Employment increases for area residents have lagged well behind the nation since 1940. In the past decade, total employment rose at only about two-thirds of the rate for the country. While farm jobs did not drop as sharply, nonfarm job gains were much smaller than for the nation. Factory jobs rose at nearly the national rate. On the other hand, nonmanufacturing employment gains were modest, particularly in services and public administration. The historical decline in agricultural job opportunities in this subarea has not been counterbalanced by commensurate expansion in nonfarm fields.

Establishment nonfarm employment data for 1950 through 1963 confirm the overall lag in job expansion and reveal a basic area weakness as shown in table D18. While nonmanufacturing jobs rose at about the national rate, factory jobs actually declined between 1950 and 1963. The substantial decrease in nondurable goods employment was only partially offset by limited durable goods gains during this period.

TABLE D18 - CENTRAL PLAINS SUBAREA EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS 1950 and 1963

Industry	1950	1963	Percent Change
Total Employment	44,500	51,700	+ 16.2
Manufacturing	18,100	17,100	- 5.5
Durable Goods	9,900	10,200	+ 3.0
Nondurable Goods	8,300	6,800	- 18.1
Nonmanufacturing	26,300	34,700	+ 31.9
Contract Construction	1,100	1,500	+ 36.4
Transportation, Communication and Public Utilities	3,600	3,100	- 13.9
Wholesale & Retail Trade	6,900	9,100	+ 31.9
Finance, Insurance and Real Estate	600	1,200	+100.0
Services & Miscellaneous	5,100	7,100	+ 39.2
Government	9,000	12,600	+ 40.0

Note: Due to rounding, parts may not add to total.
SOURCES: NYS Conservation Department, Division of Water Resources.

Substantial numbers of the working residents of all four counties of the Central Plains subarea commute to work to the more prolific job market in or near Rochester and the rest of the Barge Canal as well as to the Buffalo area. This heavy commuting accentuates the lag in area growth.

Analysis of industry structural changes in the Central Plains subareas by shift analysis of resident employment data indicate a pattern of relative job deficits in both growth and other industries compared with the nation. The significant negative net shift for total employment reflects both negative differential and proportional shifts.

ALLEGHENY PLATEAU SUBAREA

The Allegheny Plateau subarea consists of Potter County in Pennsylvania, at the headwaters of the Genesee and three southern tier counties of New York State--Cattaraugus, Allegany and Steuben.

The Allegheny Plateau Subarea comprises wooded hilly and mountainous areas. It is a declining farm area mostly devoted to dairying.

Virgin stands of hardwood, the basis of original woodworking industries, are in good part gone, but there is a good supply of marketable timber in the subarea[1/]. Oil and natural gas fields underlying this area are pretty well depleted and having substantial new discoveries will account for fewer and fewer jobs.

Population of this subarea has remained relatively static during much of this century with only modest gains since 1940. Potter County in Pennsylvania has only about half as many inhabitants as in 1900. Out migration from this four county subarea was sizeable between 1950 and 1960, reflecting a paucity of employment opportunities there.

Resident employment in the Allegheny Plateau Subarea increased at only a fraction of the national rate over the last twenty years. The marked drop in farm jobs between 1940 and 1960 paralleled that for the country. Nonfarm employment rose at only half the rate for the nation. Manufacturing jobs picked up significantly between 1940 and 1950, but the pace moderated in the fifties.

The lag in nonmanufacturing lines was notable between 1940 and 1960. A dramatic percentage decline in mining further aggravated the sluggish performance of nonmanufacturing lines.

1/ See Part III this appendix "Projected Employment and Production in the Forest Industries in Economic Areas of the Genesee River Basin," U. S. Forest Service.

Establishment employment data indicate that subarea jobs increased at only one-third of the national rate between 1950 and 1963, as shown in table D19. Manufacturing gains were only a fraction of national advances. Appreciable growth in durable goods industries, i.e. in metalworking plants, were largely offset by retrenchment in soft goods. The limited gains in nonmanufacturing were general except for finance and government employment.

TABLE D19. - ALLEGHENY PLATEAU SUBAREA EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS 1950 and 1963

Industry	1950	1963	Percent Change
Total Employment	60,200	65,400	+ 8.6
Manufacturing	25,500	26,200	+ 2.7
Durable Goods	18,800	21,400	+13.8
Nondurable Goods	6,700	4,800	-28.4
Nonmanufacturing	34,800	39,200	+12.6
Contract Construction	2,400	1,600	-33.3
Transportation, Communication, and Public Utilities	6,500	4,900	-24.6
Wholesale & Retail Trade	8,500	9,600	+12.9
Finance, Insurance, and Real Estate	1,000	1,500	+50.0
Services & Miscellaneous	7,500	8,300	+10.7
Government	8,800	13,300	+51.1

SOURCE: NYS Department of Conservation, Division of Water Resources.

Commuting patterns in 1960 of subarea residents exhibited different patterns than the remainder of the basin economic area. While jobs in the subarea balanced the number of employed residents, there were sizeable offsetting movements of commuters. Significant numbers of working residents of subarea counties commute to work in other counties both in and out of the subarea. Because of distance-time problems, very few travel as far as the Rochester job market. Comparable numbers of workers, many from nearby areas of Pennsylvania, commute to work in the Allegheny Plateau Subarea. Within the subarea only Steuben County reported a surplus of jobs over employed residents.

Weaknesses in the subarea are indicated by a shift analysis of resident employment data for 1950 and 1960, table D16. The net shift deficit for total employment in the decade was nearly 10,000 jobs. Over four-fifths of this loss was attributable to the sluggish performance of individual industries as contrasted with their national counterparts. The balance reflected a local industry mix which included several slow growth categories.

The Allegheny Plateau Subarea exhibited the lowest rate of growth among the subareas in the Genesee River Basin economic area. A rough balance between jobs and people at a low level is indicated by considerable outmigration and substantial cross commuting. There are a number of portents of strength, however, including the Steuben County industrial complex, projected development of the natural recreational possibilities of the area, and the burgeoning potential of the nuclear fuels reprocessing center in Cattaraugus.

INCOME RECEIVED BY RESIDENTS

Employment and population trends provide a good picture of an area's economy. Personal income levels add another dimension, providing comparative data for counties or groupings of counties. Further, statistics on actual income level may reveal that some of the older relatively slow-growing or stable areas often enjoy higher per capita income than the fast-growing places.

Personal income data are available by county in a handful of states, including New York and Pennsylvania[1/]. These states have worked out methods for distributing U. S. Department of Commerce state totals. The so-called "allocators" vary in dependability and these data should be viewed with some understanding of their shortcomings. Nonetheless, they provide helpful insights into variations in income from county to county and region to region.

The Genesee River Basin economic area chalked up a 101.5 percent rise in personal income from 1948-1963. This rise compared favorably with a 104.6 percent gain for the state and a 120.6 percent rise for the nation.

After adjustment for price changes (measured by the Bureau of Labor Statistics Consumer Price Index), the relative gains were 58.0 percent for the basin area, 60.8 percent for the state, and 73.2 percent for the nation.

1/ Data used in this report are from NYS Department of Commerce. In addition, the NYS Department of Taxation and Finance has recently completed a tabulation of personal income by counties for 1963 and plans to repeat this study biennially.

Considering the differences in population growth among the Genesee River Basin economic area, the state, and the nation, these comparative percentage changes are largely explained. The per capita personal income data, after adjustment for changes in the value of the dollar, clearly show this. The "real" per capita personal income of residents of the basin area was up 24.0 percent, against 30.0 percent for the state and 34.0 percent for the nation. Excluding the New York Metropolitan Area from the state data, the corresponding increase for the "upstate" area was 23.1 percent[1/].

PERSONAL INCOME CHANGES BY SUBAREA AND COUNTY

While the overall picture is of interest, more important for purposes of this study is the county by county analysis. Table D20 reveals that for the time period 1948-1961, all eleven counties registered increases in total personal "real" income.

The gains varied, however, from 29.7 percent for Cattaraugus to 71.3 percent in Wayne. Monroe residents account for about 60.0 percent of the total personal income for the basin economic area. The total in Monroe was up almost two thirds from 1948-1963.

1/ It should be noted that there has been a strong tendency in recent decades for the income levels to converge in the several geographic regions of the U. S. The reader is referred to a recent study of this trend and other aspects of regional income distribution in the April 1964 "Survey of Current Business;" U. S. Commerce Department.

TABLE D20 - PERSONAL INCOME BY RESIDENCE 1948-1963
(Million Dollars)

County	1948		1957		1963	1948-1963
	Current	Real	Current	Real[1/]	Current & Real[1/]	Percent Change--Real Income
Monroe	892.5	1136.9	1445.8	1574.9	1880.7	+65.4
Orleans	39.2	49.9	68.0	74.1	80.2	+60.7
Wayne	77.6	98.9	130.0	141.6	169.4	+71.3
Genesee	69.5	88.5	109.0	118.7	130.9	+47.9
Ontario	84.5	107.6	126.6	137.9	167.3	+55.5
Livingston	49.6	63.2	77.5	84.4	98.5	+55.9
Wyoming	37.0	47.1	58.9	64.2	71.1	+51.0
Cattaraugus	97.9	124.7	147.5	160.7	161.7	+29.7
Allegany	48.4	61.7	74.1	80.7	81.2	+31.6
Steuben	121.7	155.0	180.9	197.1	219.7	+41.7
Potter,Pa.[2/]	16.5	22.6	21.5	24.6	30.3	+34.1

1/ "Real" personal income -- actual dollar totals adjusted by Bureau of Labor Statistics' Consumer Price Index (1963=100) to remove the influence of price changes.
2/ Data for Potter, Pa. for 1947, 1955, and 1963.

Generally speaking, the pattern of percentage increases in personal income reflects gains in population. Those counties adjacent to and including Rochester experienced the greatest population growth and the largest gains in total personal income as shown in table D21.

Other more subtle influences have affected differential changes in per capita income. For example, highly industrialized counties like Monroe did not advance as much as might be expected. An apparent reason was that wages and salaries were already relatively high in 1948. This is suggested by the 22.5 percent advance in per capita real income from $2,415 in 1948 to $2,959 in 1963 (1963 dollars), a higher average than in any other county in upstate New York.

Counties whose residents have been leaving agriculture for industry, such as Wayne, Livingston, Wyoming, and Potter (Pa.) recorded the largest gains in per capita income. These trends are likely to continue with further declines in farm population and by 2020 much of the regional differences will have been eliminated.

A concurrent trend which will also shrink county variations is the increasing numbers of rural nonfarm residents who may drive long distances to enjoy country living on "city" wages and salaries.

TABLE D21 - PER CAPITA PERSONAL INCOME BY RESIDENCE
(1948-1963)

County	1948		1957		1963	1948-1963
	Current	Real[1/]	Current	Real[1/]	Current & Real	Percent Change In Real Per Capita Income
Monroe	$1896	$2415	$2619	$2853	$2959	+22.5
Orleans	1357	1729	2091	2278	2185	+26.4
Wayne	1454	1852	2113	2302	2406	+29.9
Genesee	1501	1912	2114	2303	2278	+19.1
Ontario	1479	1884	1975	2151	2354	+24.9
Livingston	1334	1699	1913	2084	2211	+30.1
Wyoming	1231	1568	1832	1996	2064	+31.6
Cattaraugus	1291	1645	1863	2029	1956	+18.9
Allegany	1135	1446	1690	1841	1802	+24.6
Steuben	1388	1768	1924	2096	2180	+23.3
Potter,Pa.[2/]	970	1331	1250	1430	1880	+42.0

1/ "Real" personal income--actual dollar totals adjusted by Bureau of Labor Statistics' Consumer Price Index (1963 = 100) to remove the influence of price changes.

2/ Data for Potter, Pa. are for 1947, 1955, and 1963.

SOURCES OF PERSONAL INCOME

The accompanying set of three tables, D22, D23, D24, provides information about sources of personal income received by basin area residents. Three key years, 1948, 1957, and 1963 have been selected in order to show changing origins of income payments.

The county by county picture is a varied mosaic, but there are some broad area-wide developments to be discerned. They are: 1) a decline in the relative importance of agriculture; 2) a general rise in the proportionate share of government as a generator of personal income; and 3) stable to slightly up or downward movements in private nonfarm income.

Among the eleven counties, Monroe is the predominant economic force. Private sources there generate close to 85 percent of the income received by residents of the county, a substantially higher proportion than is found elsewhere in the basin area. Cattaraugus, Potter and Steuben rank next in this respect.

In all counties named excepting Potter this percentage has declined slightly since 1948, while the shares accounted for by government have grown over this period. Farm income is off in all four.

Much more dramatic shifts have been taking place in the rural counties. Sharp decreases in the share of farming have been balanced by big gains in the proportion of income originating in government. Private income has, by and large, held up and still accounts for the bulk of the total. Its share of the total has been steady with more counties showing a gain than a loss.

TABLE D22 - PERSONAL INCOME BY RESIDENCE
1948
(Million Dollars)

County	Private Nonfarm		Government		Farm	
	Amount	Percent	Amount	Percent	Amount	Percent
Monroe	779.7	87.4	96.6	10.8	16.2	1.8
Orleans	21.8	55.6	5.8	14.8	11.6	29.6
Wayne	46.7	60.2	10.6	13.6	20.3	26.2
Genesee	50.4	72.5	9.1	13.1	10.0	14.4
Ontario	56.7	67.1	16.2	19.2	11.6	13.7
Livingston	29.7	59.9	8.9	17.9	11.0	22.2
Wyoming	21.6	58.4	6.4	17.3	9.0	24.3
Cattaraugus	76.0	77.6	13.2	13.5	8.7	8.9
Allegany	35.3	72.9	7.6	15.7	5.5	11.4
Steuben	92.8	76.2	16.9	13.9	12.0	9.9
Potter, Pa. 1/	11.5	70.0	2.1	13.0	2.8	17.0

1/ Potter, Pa. data are for 1947.

SOURCES: NYS Department of Commerce, Pennsylvania State Planning Board.

TABLE D23 - PERSONAL INCOME BY RESIDENCE
1957
(Million Dollars)

County	Private Nonfarm		Government		Farm	
	Amount	Percent	Amount	Percent	Amount	Percent
Monroe	1310.6	87.7	172.3	11.5	11.3	.8
Orleans	37.6	66.2	10.1	17.8	9.1	16.0
Wayne	84.3	71.0	21.5	18.1	13.0	10.9
Genesee	77.7	75.1	16.9	16.3	8.9	8.6
Ontario	86.6	73.9	22.8	19.5	7.7	6.6
Livingston	45.5	64.9	16.6	23.7	8.0	11.4
Wyoming	35.3	63.2	12.3	22.0	8.3	14.8
Cattaraugus	114.4	78.7	24.5	16.8	6.6	4.5
Allegany	54.4	76.5	12.9	18.0	3.9	5.5
Steuben	146.2	79.4	31.6	17.2	6.3	3.4
Potter, Pa. 1/	15.7	73.4	3.5	16.4	2.2	10.3

1/ Potter, Pa. data are for 1955.

SOURCES: NYS Department of Commerce, Pennsylvania State Planning Board.

TABLE D24 - PERSONAL INCOME BY RESIDENCE
1963
(Million Dollars)

County	Private Nonfarm		Government		Farm	
	Amount	Percent	Amount	Percent	Amount	Percent
Monroe	1594.1	84.8	275.4	14.6	11.2	.6
Orleans	55.1	68.7	15.1	18.8	10.0	12.5
Wayne	116.3	68.7	33.1	19.5	20.1	11.9
Genesee	95.5	73.0	26.7	20.4	8.6	6.6
Ontario	122.7	73.3	34.2	20.4	10.4	6.2
Livingston	63.9	64.9	25.3	25.7	9.3	9.4
Wyoming	43.4	61.0	18.0	25.3	9.7	13.6
Cattaraugus	118.8	73.5	35.7	22.1	7.2	4.5
Allegany	58.2	71.7	18.7	23.0	4.4	5.4
Steuben	162.6	74.0	46.8	21.3	10.3	4.7
Potter, Pa.	22.3	73.6	5.7	18.8	2.3	7.6

SOURCES: NYS Department of Commerce, Pennsylvania State Planning Board.

PROJECTIONS

In the light of broad economic and social trends working toward an elimination - or at least a marked reduction in geographic personal income differentials - it is a reasonable assumption for planning purposes that Genesee River Basin residents will come close to parity with the nation by 2020. Furthermore, data problems cast some doubt on reliability of available measures for individual counties. Rather than hazard a guess about future relationships and levels among counties in the basin economic area and the nation it is deemed advisable to use national projections for the local area. Latest revised estimates for the nation may be obtained from the Corps of Engineers. These data may be used for the Genesee River Basin for 2020; while for intermediate years estimates may be based on interpolation between latest county statistics and the 2020 projections.

Total personal income in the economic area may be estimated for future years by multiplying population estimates in this report by per capita personal income projections.

SECTION IV

TECHNICAL NOTES

TECHNICAL NOTES - EMPLOYMENT AND POPULATION PROJECTIONS

Following is a brief resume of the methodology used in preparing the demographic and economic projections.[1/]

Employment

Employment estimates have been presented as ranges with a most probable judgment value. High and low values have been selected from the families of projections by three basic techniques. The three methods included: 1) trend analysis; 2) share of the nation; and 3) shift analysis. The mechanical techniques were supplemented by a field and questionnaire survey of key employers in the area.

Trend analyses of historic employment data were based on curve fitting by standard least squares method. Generally, the exponential curve $y = ab^x$ was used, although in certain cases other curves gave better fits. The curve $y = ax^b$ was utilized in a few cases. Since comparable historic data were available for only 1940, 1950, and 1960, available information did not permit use of the more sophisticated types such as the Gompertz curve ($y = ab^{cx}$).

1/ "Methodology", Genesee River Basin Economic Base Study, NYS Conservation Department, Division of Water Resources.

The share analysis involved projection of the trended percentage share of the subarea to the nation. These projected shares were then applied to national projections. Water Resources Ad Hoc Committee projections for total U.S. employment and NPA estimates for sector and industry breakdowns were the principal benchmark data used.

Differential "shift" analyses were carried out, in addition to share and trend studies. This technique is attributed to Edgar Dunn and others[1/].

For projection purposes, an adaptation of the shift technique developed by the National Planning Association[2/] was used. This method establishes a quantitative relationship between a particular industry in the region with its national counterpart.

1/ " Regions, Resources and Economic Growth"; Perloff, Dunn, Lampard and Muth; The Johns Hopkins Press, Baltimore; 1960.

2/ A private economic research firm specializing in national and metropolitan area economic projections. NPA is located at 1606 New Hampshire Avenue NW, Washington, D.C.

This relationship, based on 1950-1960 or 1940-1960 comparisons with the nation, is assumed to obtain during the projection period. A local forecast is then made using available national projections for specific industries and the overall economy.

In symbols the differential projection technique can be expressed for a particular industry:

$$E^{r}_{t+10} = d^{r} \triangle E^{n} + B^{n}_{t} E^{r}_{t} \quad ,$$

Where

E^{r}_{t+10} = Employment projected for the local area in the year t+10.

d^{r} = Differential effect (see below).

$\triangle E^{n}$ = Change in national employment from the year t to t+10

$B^{n}_{t} = \frac{E^{n}_{t+10}}{E^{n}_{t}}$ or the national employment in the projection year t+10 divided by national employment in the year t.

E^{r}_{t} = Local area employment in the year t.

The "differential effect" is derived as follows:

$$d^r = \frac{E^r_t - B^n_{t-10}\, E^r_{t-10},}{\triangle E^n_{t-10}}$$

Where

$$B^n_{t-10} = \frac{E^n_t}{E^n_{t-10},}$$

$$\triangle E^n_{t-10} = E^n_t - E^n_{t-10}$$

The calculations were carried out for the 1950-1960 period with a few exceptions when 1940-1960 was used. With NPA national projections it was then possible to project out to 1970, 1985, and 2020.

Population Cohort Survival Technique

The following step-by-step procedure was used to develop age-sex cohort projections.

1. Five year age-sex cohort population for each county were taken from the two latest population censuses (1950, 1960).

2. Ten year survival rates were obtained for each cohort. National rates were used since historical differences between national, state and county rates are slight. Projected national rates are available while there are no comparable estimates for counties.

3. Net migration rates were computed by surviving the 1950 age-sex cohorts to 1960. Relating the "anticipated" population to the 1960 census data gives the assumed net migration from which rates can be calculated.

Preliminary projections assume this 1950-1960 rate as a constant over the forecast period, but the final adjusted estimates depend on migration to bring population into line with employment opportunities.

4. Fertility rates were calculated by computing and trending past county rates. County rates were projected by bringing the 1960 county figure up or down to an assumed rate of .450 in the year 2020.

5. A sex ratio (number of males to females born) is used to apportion births resulting from application of fertility rates to the appropriate age group. National male-female ratios were used.

5. For each projected decade year population is related to estimated employment. Population is adjusted by in or out migration.

   a. Participation rates for the subareas were projected then applied to male and female population cohorts to give anticipated labor force.

b. The relationship of projected labor force to projected employment results in an employment rate, the complement of which is an unemployment rate.

c. On the premise that unemployment beyond reasonable limits precipitates out-migration, or an excess of jobs over labor force induces in-migration, an adjustment for plus or minus migration is then made to bring projected population in labor force age brackets and employment into alignment. The tolerable unemployment rate was projected for each subarea based on historic data which was then trended out to approach the assumed national rate of 3.5 percent in 2020.

d. Distribution of this aggregate labor force adjustment plus dependents in other age groups constitutes the final adjustment.

COHORT SURVIVAL POPULATION PROJECTIONS AND ADJUSTMENTS TO EMPLOYMENT ESTIMATES

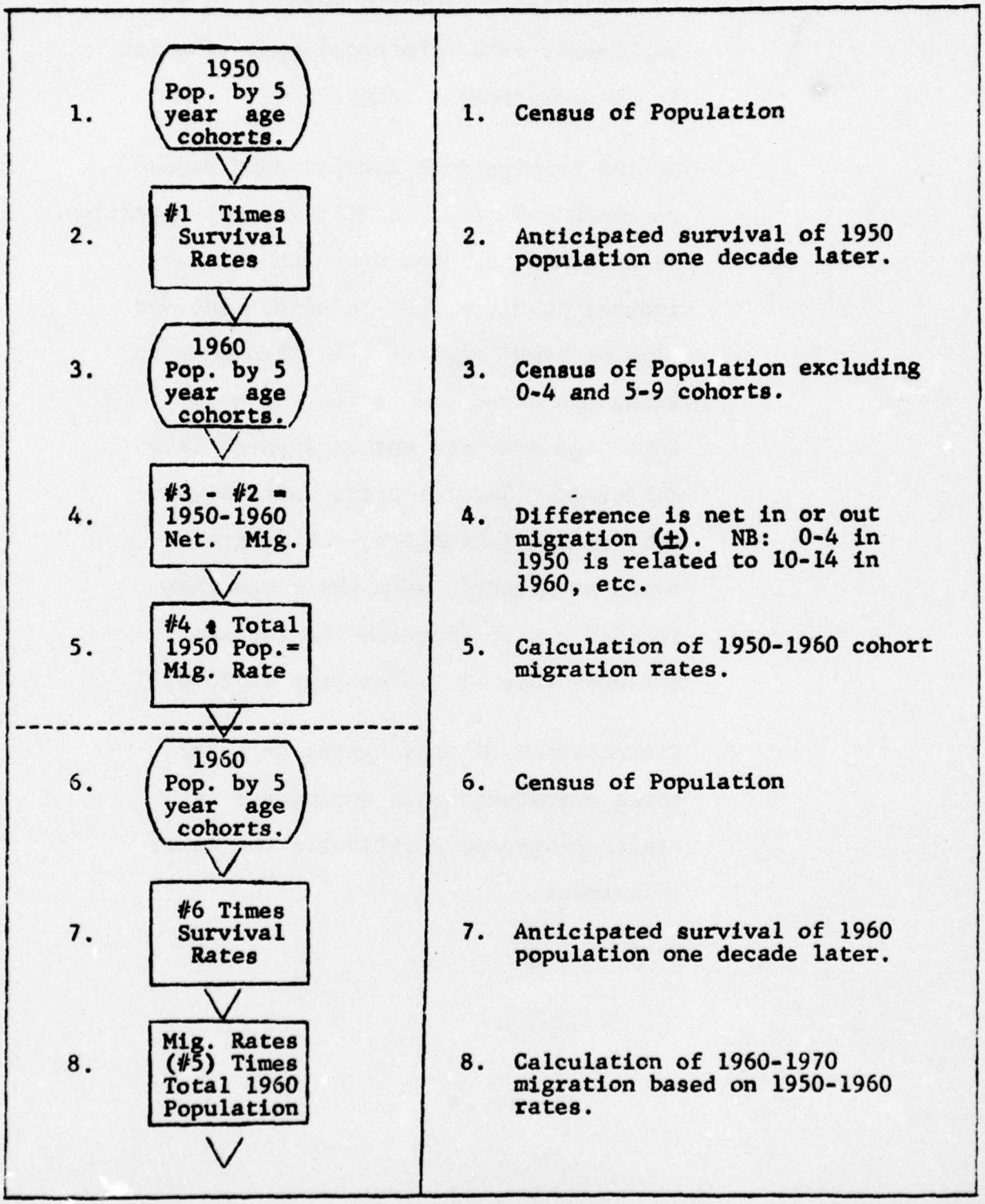
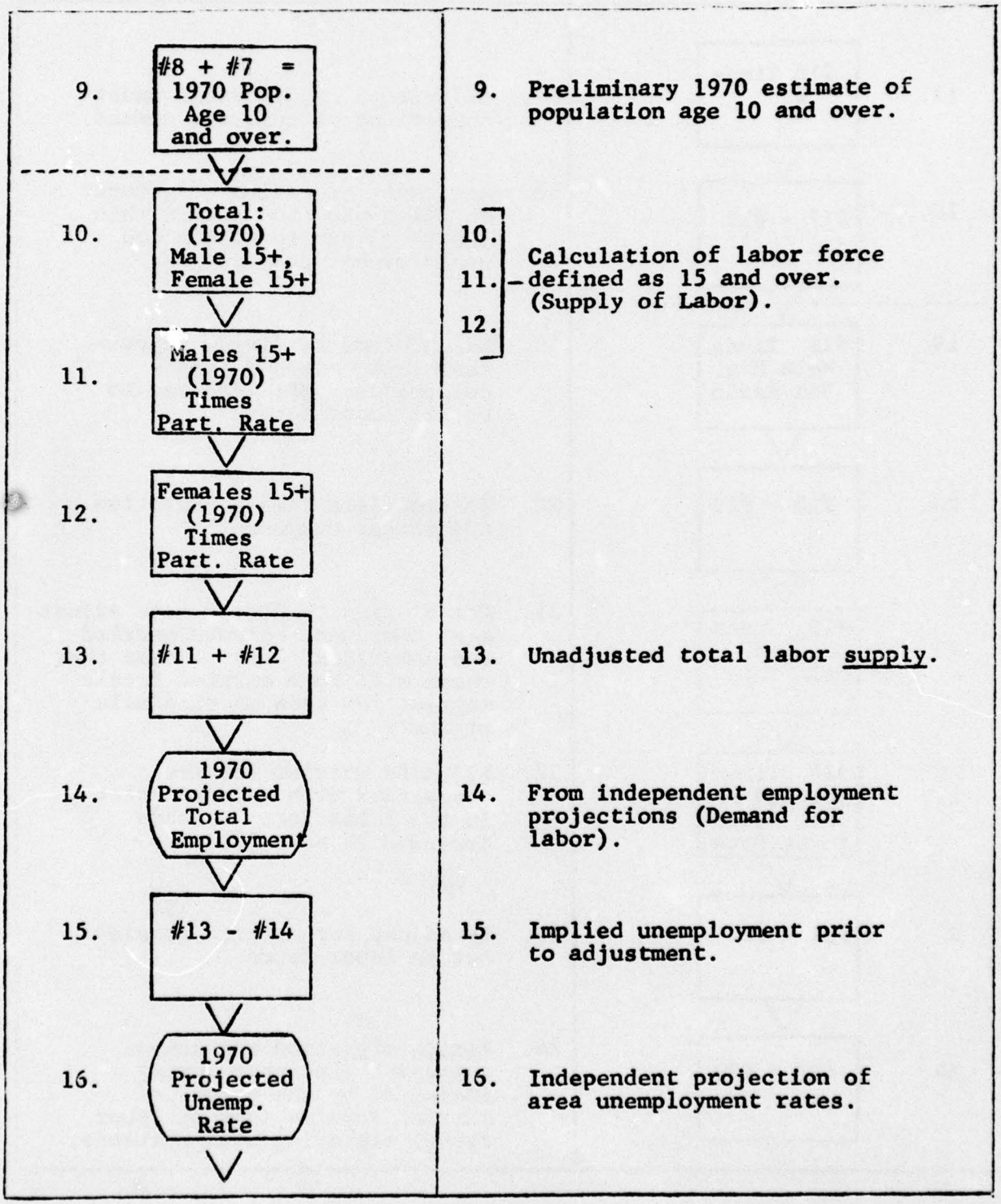
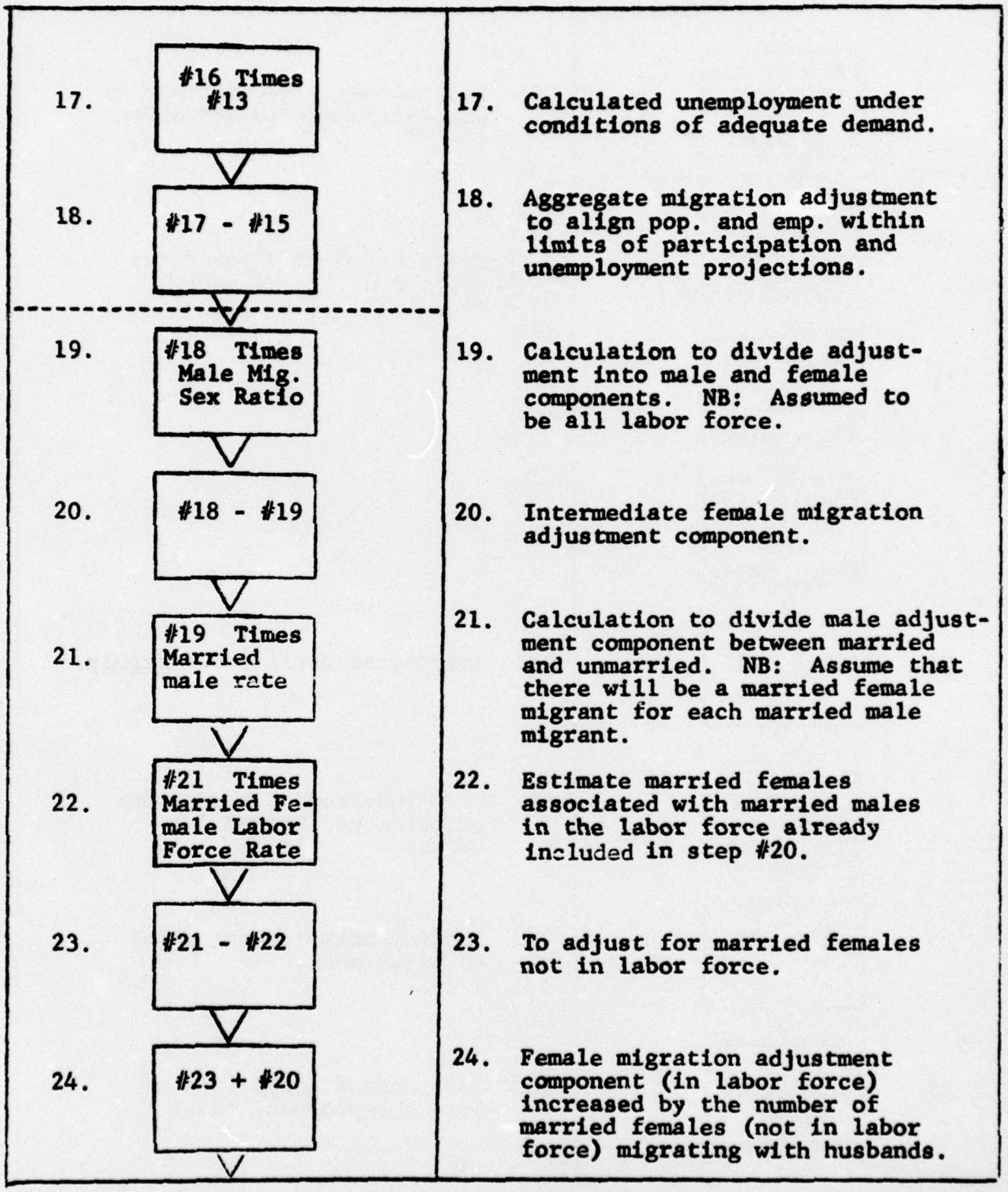


FIGURE D-7

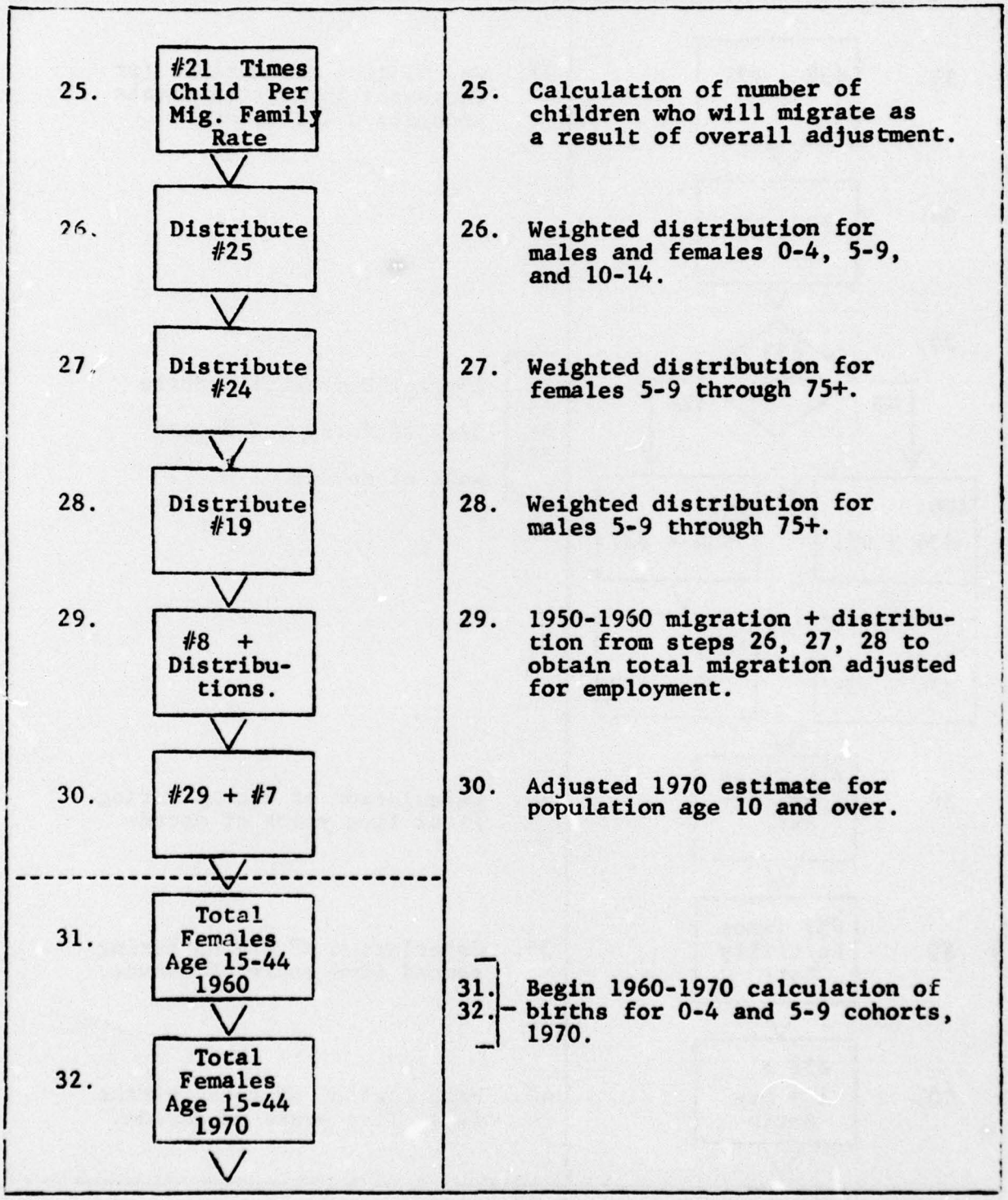
COHORT SURVIVAL POPULATION PROJECTIONS AND ADJUSTMENTS TO EMPLOYMENT ESTIMATES



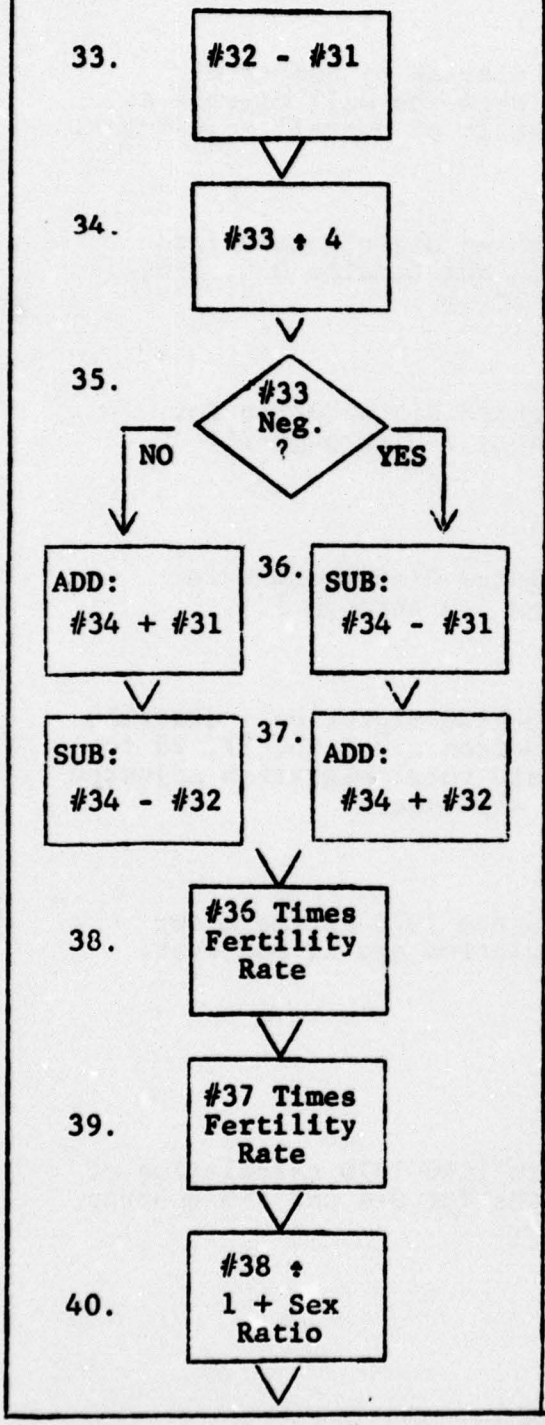
COHORT SURVIVAL POPULATION PROJECTIONS AND ADJUSTMENTS TO EMPLOYMENT ESTIMATES



COHORT SURVIVAL POPULATION PROJECTIONS AND ADJUSTMENTS TO EMPLOYMENT ESTIMATES



COHORT SURVIVAL POPULATION PROJECTIONS AND ADJUSTMENTS TO EMPLOYMENT ESTIMATES



33. Calculation of increase (or decrease) in fertile female population for decade.

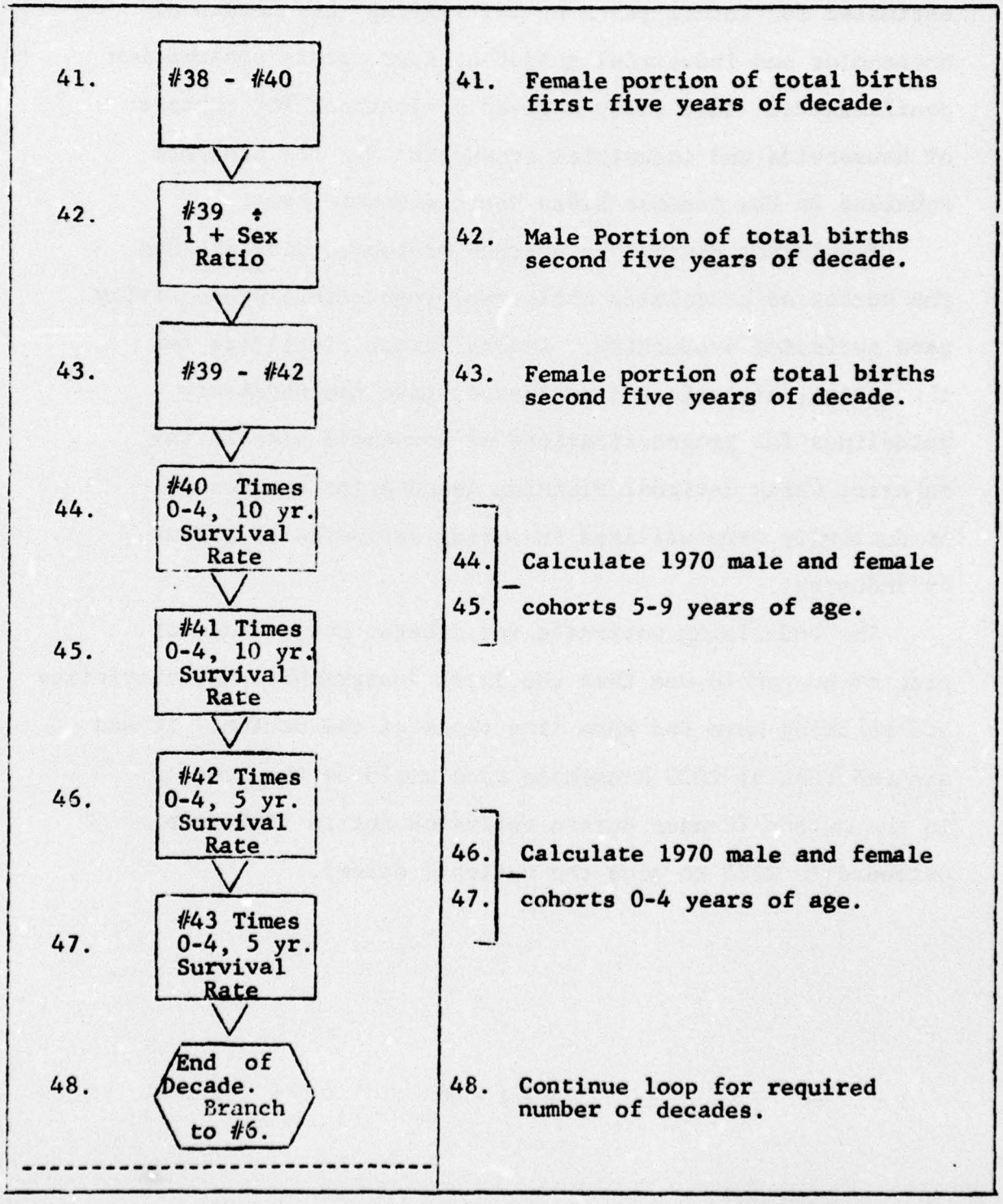
34. Average Number of Fertile
35. females first and second
36. half of decade.
37.

38. Calculation of births during first five years of decade.

39. Calculation of births during second five years of decade.

40. Male portion of total births first five years of decade.

COHORT SURVIVAL POPULATION PROJECTIONS AND ADJUSTMENTS TO EMPLOYMENT ESTIMATES



Projections of Numbers of Households and Industrial Production

Household and industrial water requirements can be estimated for future years by multiplying the numbers of households and industrial output by appropriate consumption coefficients. This study derived projections for numbers of households and industrial production for the economic subareas in the Genesee River Basin economic area.

Population divided by average household size yielded the number of households while employment times productivity gave estimated production. Census Bureau statistics for the nation, historic and projected, gave the necessary guidelines for prognostications of household size in the subarea, while National Planning Association studies of productivity were utilized in making estimates of output by industry.

The underlying rationale for subarea projections of size of household was that the local demographic characteristics are becoming more and more like those of the nation. It was assumed that by 2020 household size would be the same as in the nation (Census Bureau estimates out to 1985 were extended to 2020 to give the national datum).

Production indices for the period out to 2020 give rough approximations for key manufacturing lines. They depend heavily on forecasts of productivity trends. Obviously, such prognostications can only be based on extrapolations of historic trend tempered by an intuitive appraisal of what technological developments may occur. Some industries, of course, are willing and able to spend substantial sums for research and development and their advances can generally be predicted to be much more rapid than other lines where such efforts are more modest. Nonetheless, the extension of current rates of productivity growth fifty years out is an extremely hazardous step.

SECTION V

STATISTICAL

TABLES

TABLE D25 - EMPLOYMENT PROJECTIONS

GENESEE RIVER BASIN ECONOMIC AREA (1)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Employment	323,637	382,024	424,060						
High				489,100	564,900	653,400	756,700	877,500	1,018,800
Most Probable				478,600	540,900	612,100	693,700	787,300	894,600
Low				463,300	507,000	555,800	610,200	671,100	739,200
Agriculture	45,856	35,680	23,835						
High				22,000	20,100	18,600	17,600	16,600	15,900
Most Probable				21,400	19,100	17,200	15,800	14,500	13,600
Low				20,800	18,000	15,800	13,800	12,300	11,200
Manufacturing	103,677	140,804	160,696						
High				175,600	192,000	210,100	230,000	251,900	276,000
Most Probable				171,200	182,400	194,600	207,600	221,800	237,000
Low				167,300	174,400	181,900	189,900	198,400	207,500
Nonmanufacturing	174,104	205,540	236,529						
High				291,500	352,800	424,700	509,100	609,000	726,900
Most Probable				286,000	339,400	400,400	470,300	551,000	644,000
Low				275,100	314,600	358,100	406,600	460,400	520,500

TABLE D26 - EMPLOYMENT PROJECTIONS

GENESEE RIVER BASIN ECONOMIC AREA (Nonmanufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Nonmanufacturing	174,104	205,540	236,529						
High				291,500	352,800	424,700	509,100	609,000	726,900
Most Probable				286,000	339,400	400,400	470,300	551,000	644,000
Low				275,100	314,600	358,100	406,600	460,400	520,500
Mining	3,110	2,619	1,529						
High				1,600	1,600	1,700	1,600	1,600	1,400
Most Probable				1,600	1,600	1,600	1,500	1,400	1,300
Low				1,500	1,500	1,400	1,300	1,100	1,000
Construction	14,113	19,039	20,515						
High				24,200	28,300	32,700	37,500	42,700	48,300
Most Probable				23,700	27,600	30,800	34,600	38,600	42,700
Low				22,800	25,100	27,400	29,700	32,000	34,300
Transportation, Communications & Public Utilities	22,345	25,451	23,014						
High				25,900	28,800	31,400	33,700	35,600	36,800
Most Probable				25,400	27,600	29,500	31,000	32,100	32,700
Low				24,400	25,500	26,300	26,700	26,600	26,100
Wholesale & Retail Trade	49,752	65,755	67,737						
High				94,200	103,500	126,900	154,300	186,800	225,400
Most Probable				82,500	99,600	119,400	142,100	168,600	199,200
Low				79,200	92,100	106,300	122,300	140,100	160,100
Finance, Insurance & Real Estate	7,651	9,218	12,569						
High				15,200	18,200	21,600	25,300	29,400	34,000
Most Probable				14,900	17,500	20,300	23,300	26,500	30,000
Low				14,300	16,100	18,000	20,000	22,000	24,100
Services	60,093	65,616	84,655						
High				107,800	136,200	170,800	212,700	264,300	326,300
Most Probable				105,700	130,800	160,600	196,000	238,200	288,300
Low				101,400	120,800	142,900	168,500	197,800	231,700
Public Administration	9,932	12,523	14,104						
High				17,000	20,400	24,200	28,500	33,500	39,200
Most Probable				16,700	19,600	22,700	26,300	30,200	34,600
Low				16,000	18,100	20,200	22,600	25,100	27,800
Industry Not Reported	7,117	5,319	15,406						

1. Refer to Figure D1 for delination of area.

SOURCE: NYS Conservation Department, Division of Water Resources and the U. S. Census Bureau

NOTE: Industry Not Reported included in Total Nonmanufacturing.

NOTE: Due to rounding, parts may not add to zero.

TABLE D27 - EMPLOYMENT PROJECTIONS

GENESEE RIVER BASIN ECONOMIC AREA (1) (Manufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Manufacturing	103,677	140,804	160,696						
High				175,600	192,000	210,100	230,000	251,900	276,000
Most Probable				171,200	182,400	194,600	207,600	221,800	237,000
Low				167,300	174,400	181,900	189,600	198,400	207,500
SIC 20 Food & kindred products	10,348	13,592	16,022						
High				17,300	18,700	20,200	21,900	23,700	25,600
Most Probable				16,900	17,800	18,800	19,800	21,000	22,200
Low				16,500	16,900	17,400	17,900	18,500	19,100
SIC 22 Textile mill products	3,261	3,331	2,599						
High				2,600	2,600	2,500	2,500	2,400	2,300
Most Probable				2,500	2,400	2,300	2,200	2,100	1,900
Low				2,500	2,300	2,100	2,000	1,800	1,700
SIC 23 Apparel and other finished products	10,159	11,049	9,028						
High				9,300	9,500	9,600	9,700	9,600	9,500
Most Probable				9,000	9,000	8,900	8,700	8,400	8,100
Low				8,900	8,600	8,400	8,000	7,600	7,100
SIC 24 & 25 Lumber & wood products/Furniture & fixtures	4,025	5,749	5,351						
High				5,500	5,700	5,800	5,900	6,000	6,100
Most Probable				5,400	5,400	5,400	5,400	5,300	5,300
Low				5,200	5,100	5,000	4,800	4,600	4,500
SIC 27 Printing & publishing	4,831	5,927	8,830						
High				9,800	10,800	12,000	13,300	14,700	16,300
Most Probable				9,500	10,300	11,100	12,000	13,000	14,000
Low				9,300	9,900	10,400	11,000	11,700	12,400
SIC 28 Chemicals & allied products	2,180	2,637	2,812						
High				3,000	3,200	3,400	3,600	3,900	4,200
Most Probable				2,900	3,000	3,100	3,300	3,400	3,600
Low				2,800	2,900	2,900	2,900	3,000	3,000
SIC 33 & 34 Primary metal industries/Fabricated metal product	6,184	9,374	9,251						
High				9,900	10,500	11,200	11,900	12,700	13,500
Most Probable				9,600	9,900	10,300	10,700	11,000	11,400
Low				9,300	9,400	9,500	9,600	9,700	9,800
SIC 35 & 36 Machinery, except electrical/Electrial mach.	13,791	24,525	35,999						
High				40,400	45,300	50,900	57,000	64,000	71,700
Most Probable				39,400	43,100	47,100	51,400	56,200	61,500
Low				38,400	41,100	43,900	46,800	50,000	53,500
SIC 37 Transportation equipment	2,031	5,672	8,087						
High				10,000	12,300	14,900	17,800	21,300	25,300
Most Probable				9,800	11,700	13,800	16,100	18,700	21,700
Low				9,600	11,200	12,900	14,800	16,900	19,100
All Others	46,867	58,948	62,717						
High				67,900	73,500	79,700	86,300	93,600	101,600
Most Probable				66,200	69,900	73,900	78,100	82,600	87,400
Low				64,800	67,100	69,400	71,900	74,600	77,400

1. Refer to Figure D1 for delination of area.

SOURCE: NYS Conservation Department, Division of Water Resources and U. S. Census Bureau

NOTE: Due to rounding, parts may not add to total.

TABLE 28 - EMPLOYMENT PROJECTIONS

BARGE CANAL SUBAREA

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Employment	194,058	233,926	267,965						
High				317,400	376,100	445,600	528,000	625,800	741,700
Most Probable				310,900	360,700	418,500	485,700	563,700	654,200
Low				301,800	339,900	382,900	431,300	486,000	547,600
Agriculture	15,728	11,467	7,916						
High				7,100	6,300	5,700	5,400	5,000	4,800
Most Probable				6,900	6,000	5,300	4,900	4,500	4,200
Low				6,800	5,700	5,000	4,400	3,900	3,600
Manufacturing	73,834	98,457	111,726						
High				123,900	137,400	152,400	169,000	187,500	208,000
Most Probable				120,900	130,900	141,700	153,500	166,200	180,000
Low				118,600	125,900	133,700	141,900	150,700	160,000
Nonmanufacturing	104,523	124,002	148,323						
High				186,500	232,400	287,500	353,600	433,300	528,900
Most Probable				183,100	223,800	271,500	327,300	393,000	470,000
Low				176,400	208,300	244,200	285,000	331,400	384,000

TABLE 29 - EMPLOYMENT PROJECTIONS

BARGE CANAL SUBAREA (Nonmanufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Nonmanufacturing	104,523	124,002	148,323						
High				186,500	232,400	287,500	353,600	433,300	528,900
Most Probable				183,100	223,800	271,500	327,300	393,000	470,000
Low				176,400	208,300	244,200	285,000	331,400	384,000
Mining	191	167	149						
High				200	200	200	200	300	300
Most Probable				200	200	200	200	200	200
Low				200	200	200	200	200	200
Construction	8,412	11,245	12,274						
High				14,900	17,900	21,200	24,800	28,800	33,100
Most Probable				14,600	17,200	20,000	22,900	26,000	29,300
Low				14,100	16,000	17,900	19,900	21,900	23,900
Transportation, Communication and Public Utilities	11,944	13,599	12,741						
High				14,900	17,100	19,200	21,200	22,900	24,100
Most Probable				14,600	16,500	18,100	19,600	20,700	21,400
Low				14,100	15,300	16,200	17,000	17,400	17,400
Wholesale & Retail Trade	32,406	43,297	43,415						
High				55,600	70,500	88,300	109,800	135,900	167,300
Most Probable				54,600	67,700	83,200	101,400	122,900	148,300
Low				52,400	62,800	74,500	87,900	103,200	120,500
Finance, Insurance, and Real Estate	5,637	6,665	9,096						
High				11,000	13,200	15,700	18,500	21,600	24,900
Most Probable				10,800	12,700	14,800	17,100	19,500	22,100
Low				10,400	11,800	13,300	14,800	16,300	17,900
Services	35,250	38,091	51,310						
High				68,100	89,200	115,600	148,300	189,200	239,900
Most Probable									
Low									
Public Administration	6,276	7,825	8,016						
High				11,100	13,700	16,600	20,100	24,100	28,800
Most Probable				10,900	13,100	15,700	18,500	21,800	25,500
Low				10,500	12,200	14,000	16,100	18,300	20,800
Industry Not Reported	4,407	3,113	10,492						

1. Economic Area as designated by the county lines of Monroe, Orleans and Wayne.

2. Source: U. S. Census Bureau.

3. Source: NYS Conservation Department, Division of Water Resources.

4. The Industry Not Reported included in Total Nonmanufacturing. Due to rounding, parts may not add to total.

TABLE D30 - EMPLOYMENT PROJECTIONS

BARGE CANAL SUBAREA (Manufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Manufacturing	73,834	98,457	111,726						
High				123,900	137,400	152,400	169,000	187,500	208,000
Most Probable				120,900	130,900	141,700	153,500	166,200	180,000
Low				118,600	125,900	133,700	141,900	150,700	160,000
SIC 20 Food and kindred products	6,566	9,105	11,199						
High				12,300	13,600	14,900	16,500	18,100	19,900
Most Probable				12,100	13,000	13,900	15,000	16,200	17,400
Low				11,800	12,400	13,000	13,700	14,400	15,100
SIC 22 Textile mill products	894	833	859						
High				900	900	1,000	1,000	1,000	1,000
Most Probable				900	900	900	900	900	900
Low				900	800	800	800	800	800
SIC 23 Apparel and other finished products	9,645	10,319	7,881						
High				8,000	8,100	8,100	8,100	7,900	7,600
Most Probable				7,800	7,700	7,500	7,300	7,000	6,500
Low				7,700	7,500	7,200	6,800	6,400	5,800
SIC 24 & 25 Lumber & wood products/Furniture & fixtures	2,087	2,100	1,780						
High				1,800	1,800	1,900	1,900	1,800	1,800
Most Probable				1,800	1,800	1,700	1,700	1,600	1,500
Low				1,700	1,700	1,600	1,500	1,400	1,300
SIC 27 Printing and publishing	3,614	4,407	6,702						
High				7,500	8,400	9,400	10,600	11,900	13,300
Most Probable				7,300	8,000	8,800	9,600	10,500	11,500
Low				7,200	7,700	8,300	8,900	9,600	10,300
SIC 28 Chemicals and allied products	1,229	1,781	1,795						
High				2,000	2,100	2,300	2,600	2,800	3,100
Most Probable				1,900	2,000	2,200	2,300	2,500	2,700
Low				1,900	1,900	2,000	2,100	2,200	2,300
SIC 33 & 34 Primary metal industries/Fabricated metal prod.	3,241	4,244	4,128						
High				4,400	4,700	5,100	5,500	5,800	6,200
Most Probable				4,300	4,500	4,700	5,000	5,200	5,400
Low				4,200	4,300	4,500	4,600	4,700	4,800
SIC 35 & 36 Machinery, except electrical/Electrical mach.	8,770	14,526	20,755						
High				23,800	27,300	31,300	35,800	40,900	46,700
Most Probable				23,200	26,000	29,100	32,500	36,200	40,400
Low				22,800	25,000	27,400	30,000	32,900	35,900
SIC 37 Transportation equipment	1,825	5,071	6,989						
High				8,600	10,600	12,800	15,400	18,400	21,900
Most Probable				8,400	10,100	11,900	14,000	16,300	19,000
Low				8,300	9,700	11,200	12,900	14,800	16,900
All Others	35,963	46,071	49,638						
High				54,500	59,800	65,500	71,900	78,800	86,500
Most Probable				53,100	56,900	60,900	65,200	69,800	74,700
Low				52,200	54,800	57,600	60,500	63,600	66,800

1. Economic Area as designated by the county lines of Monroe, Orleans, and Wayne.

2. SOURCE: U. S. Census Bureau.

3. SOURCE: NYS Conservation Department, Division of Water Resources.

NOTE: Due to rounding, parts may not add to total.

TABLE D31 - EMPLOYMENT PROJECTIONS

ROCHESTER SMSA 1/

INDUSTRY				PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Employment	166,642	202,197	231,201						
High				275,000	327,200	389,200	463,000	550,800	655,200
Most Probable				269,300	313,600	365,200	425,300	495,400	576,900
Low				261,500	295,700	334,400	378,200	427,700	483,700
Agriculture	5,768	4,356	3,056						
High				2,800	2,500	2,300	2,300	2,200	2,200
Most Probable				2,700	2,400	2,200	2,100	2,000	1,900
Low				2,700	2,400	2,200	2,000	1,800	1,700
Manufacturing	68,766	90,079	98,897						
High				109,300	120,800	133,400	147,400	162,900	180,000
Most Probable				106,600	114,900	123,800	133,400	143,800	155,000
Low				104,800	111,000	117,700	124,700	132,100	140,000
Nonmanufacturing	92,108	107,762	129,248						
High				163,000	203,900	253,500	313,300	385,700	473,000
Most Probable				160,000	196,300	239,200	289,800	349,500	420,000
Low				154,000	182,300	214,600	251,500	293,800	342,000

TABLE D32 - EMPLOYMENT PROJECTIONS

ROCHESTER SMSA (Nonmanufacturing)

INDUSTRY				PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Nonmanufacturing	92,108	107,762	129,248						
High				163,000	203,900	253,500	313,300	385,700	473,000
Most Probable				160,000	196,300	239,200	289,800	349,500	420,000
Low				154,000	182,300	214,600	251,500	293,800	342,000
Mining	148	106	92						
High				100	100	100	100	100	100
Most Probable				100	100	100	100	100	100
Low				100	100	100	100	100	100
Construction	7,243	9,652	10,388						
High				12,700	15,200	18,100	21,300	24,800	28,600
Most Probable				12,400	14,600	17,000	19,600	22,400	25,300
Low				11,900	13,500	15,200	16,900	18,700	20,500
Transportation, Communications and Public Utilities	10,258	11,367	10,695						
High				12,500	14,400	16,200	17,800	19,100	20,100
Most Probable				12,300	13,800	15,200	16,400	17,300	17,800
Low				11,800	12,800	13,600	14,200	14,500	14,600
Wholesale and Retail Trade	28,896	37,809	37,403						
High				48,100	61,200	77,200	96,500	120,000	148,500
Most Probable				47,200	58,800	72,700	89,100	108,500	131,500
Low				45,300	54,400	64,900	76,900	90,700	106,500
Finance, Insurance and Real Estate	5,250	6,127	8,422						
High				10,200	12,300	14,500	17,000	19,800	22,800
Most Probable				10,000	11,800	13,700	15,700	17,900	20,200
Low				9,600	10,900	12,200	13,600	15,000	16,300
Services	30,633	33,189	45,030						
High				60,100	79,200	103,200	133,300	171,000	217,900
Most Probable				58,900	76,100	97,200	123,000	154,600	193,000
Low				56,600	70,400	86,700	106,200	129,200	156,300
Public Administration	5,649	6,876	7,776						
High				9,700	12,000	14,700	17,800	21,400	25,700
Most Probable				9,500	11,500	13,800	16,400	19,300	22,700
Low				9,100	10,700	12,300	14,200	16,200	18,400
Industry Not Reported	4,031	2,636	9,442						

1/ Comprises Monroe County

SOURCE: NYS Conservation Department, Division of Water Resources

NOTE: Due to rounding, parts may not add to total

TABLE D33 - EMPLOYMENT PROJECTIONS

ROCHESTER SMSA (Manufacturing)

	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Manufacturing	68,766	90,079	98,879						
High				109,300	120,800	133,400	147,400	162,900	180,000
Most Probable				106,600	114,900	123,800	133,400	143,800	155,000
Low				104,800	111,000	117,700	124,700	132,100	140,000
SIC 20 Food and kindred products	5,053	6,356	7,729						
High				8,500	9,200	10,100	11,000	12,100	13,200
Most Probable				8,300	8,800	9,400	10,000	10,600	11,300
Low				8,100	8,500	8,900	9,300	9,800	10,200
SIC 22 Textile mill products	878	798	828						
High				900	900	900	900	900	900
Most Probable				800	800	800	800	800	800
Low				800	800	800	800	800	700
SIC 23 Apparel and other finished products	9,492	10,025	7,641						
High				7,700	7,800	7,800	7,600	7,400	7,000
Most Probable				7,600	7,400	7,200	6,900	6,500	6,000
Low				7,400	7,200	6,800	6,400	6,000	5,400
SIC 24 & 25 Lumber and wood products/Furniture & fixtures	1,705	1,704	1,396						
High				1,400	1,400	1,300	1,300	1,200	1,100
Most Probable				1,400	1,300	1,300	1,200	1,100	1,000
Low				1,300	1,300	1,200	1,100	1,000	900
SIC 27 Printing & publishing	3,428	4,178	6,222						
High				7,000	7,800	8,600	9,700	10,800	12,000
Most Probable				6,800	7,400	8,000	8,700	9,500	10,400
Low				6,700	7,100	7,600	8,200	8,700	9,400
SIC 28 Chemicals & allied products	947	1,310	1,330						
High				1,400	1,500	1,500	1,600	1,700	1,800
Most Probable				1,400	1,400	1,400	1,500	1,500	1,500
Low				1,300	1,400	1,400	1,400	1,400	1,400
SIC 33 & 34 Primary metal industries/Fabricated metal prod.	2,822	3,761	3,445						
High				3,600	3,800	4,100	4,300	4,500	4,700
Most Probable				3,500	3,700	3,800	3,900	3,900	4,000
Low				3,500	3,500	3,600	3,600	3,600	3,600
SIC 35 & 36 Machinery, except electrical/electrical machinery	8,539	13,732	18,401						
High				21,100	24,100	27,500	31,300	35,700	40,700
Most Probable				20,500	22,900	25,500	28,400	31,500	35,000
Low				20,200	22,100	24,200	26,500	29,000	31,600
SIC 37 Transportation equipment	1,765	4,582	5,992						
High				7,400	9,100	11,000	13,200	15,800	18,700
Most Probable				7,200	8,600	10,200	12,000	13,900	16,100
Low				7,100	8,300	9,700	11,200	12,800	14,600
All Others	34,137	43,633	45,923						
High				50,400	55,300	60,600	66,500	72,900	80,000
Most Probable				49,100	52,600	56,200	60,200	64,400	68,900
Low				48,300	50,800	53,400	56,200	59,100	62,200

1. Comprises Monroe County

2. SOURCE: U. S. Census Bureau.

3. SOURCE: NYS Conservation Department, Division of Water Resources.

NOTE: Due to rounding, parts may not add up to total.

TABLE D34 - EMPLOYMENT PROJECTIONS

ORLEANS & WAYNE COUNTIES

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Employment	27,416	31,729	36,764						
High				42,400	48,900	56,400	65,000	75,000	86,500
Most Probable				41,600	47,100	53,300	60,400	68,300	77,300
Low				40,300	44,200	48,500	53,100	58,300	63,900
Agriculture	9,960	7,111	4,860						
High				4,300	3,800	3,400	3,100	2,800	2,600
Most Probable				4,200	3,600	3,200	2,800	2,500	2,300
Low				4,100	3,300	2,800	2,400	2,100	1,900
Manufacturing	5,068	8,378	12,829						
High				14,600	16,600	19,000	21,600	24,600	28,000
Most Probable				14,300	16,000	17,900	20,100	22,400	25,000
Low				13,800	14,900	16,000	17,200	18,600	20,000
Nonmanufacturing	12,415	16,240	19,075						
High				23,500	28,500	34,000	40,300	47,600	56,000
Most Probable				23,100	27,500	32,300	37,500	43,400	50,000
Low				22,400	26,000	29,700	33,500	37,600	42,000

TABLE D35 - EMPLOYMENT PROJECTIONS

ORLEANS & WAYNE COUNTIES (Nonmanufacturing)

INDUSTRY	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Nonmanufacturing	12,415	16,240	19,075						
High				23,500	28,500	34,000	40,400	47,600	56,000
Most Probable				23,100	27,500	32,300	37,500	43,400	50,000
Low				22,400	26,000	29,700	33,500	37,600	42,000
Mining	43	61	57						
High				100	100	100	100	100	100
Most Probable				100	100	100	100	100	100
Low				100	100	100	100	100	100
Construction	1,169	1,593	1,886						
High				2,300	2,700	3,100	3,500	4,000	4,500
Most Probable				2,200	2,600	2,900	3,300	3,700	4,100
Low				2,200	2,400	2,700	2,900	3,200	3,400
Transportation, Communications & Public Utilities	1,686	2,232	2,046						
High				2,400	2,700	3,100	3,400	3,700	4,100
Most Probable				2,300	2,600	2,900	3,200	3,400	3,600
Low				2,300	2,500	2,700	2,800	2,900	3,000
Wholesale & Retail Trade	3,510	5,488	6,012						
High				7,500	9,200	11,100	13,300	15,900	18,800
Most Probable				7,400	8,900	10,600	12,400	14,500	16,900
Low				7,100	8,400	9,700	11,000	12,500	14,000
Finance, Insurance & Real Estate	387	538	604						
High				800	1,000	1,200	1,500	1,800	2,100
Most Probable				800	900	1,000	1,400	1,600	1,900
Low				700	900	1,000	1,200	1,400	1,600
Services	4,617	4,902	6,280						
High				8,000	10,000	12,300	15,000	18,300	22,000
Most Probable				7,900	9,700	11,700	14,000	16,600	19,600
Low				7,600	9,100	10,700	12,400	14,300	16,400
Public Administration	627	949	1,140						
High				1,400	1,700	2,000	2,300	2,700	3,100
Most Probable				1,400	1,600	1,900	2,100	2,500	2,800
Low				1,300	1,500	1,700	1,900	2,100	2,300
Industry Not Reported	376	477	1,050						

1. Economic Area as designated by county lines of Orleans & Wayne Counties.

2. SOURCE: U. S. Census Bureau

3. SOURCE: NYS Conservation Department, Division of Water Resources.

NOTE: Industry Not Reported included in Total Nonmanufacturing. Due to rounding, parts may not add to total.

TABLE D36 - EMPLOYMENT PROJECTIONS

ORLEANS AND WAYNE COUNTIES (Manufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Manufacturing	5,068	8,378	12,829						
High				14,600	16,600	19,000	21,600	24,600	28,000
Most Probable				14,300	16,000	17,900	20,000	22,400	25,000
Low				13,800	14,900	16,000	17,200	18,600	20,000
SIC 20 Food and Kindred Products	1,513	2,749	3,470						
High				3,900	4,300	4,900	5,400	6,100	6,800
Most Probable				3,800	4,200	4,600	5,000	5,500	6,000
Low				3,700	3,900	4,100	4,300	4,600	4,800
SIC 22 Textile Mill Products	16	35	31						
High				--	--	--	100	100	100
Most Probable				--	--	--	--	100	100
Low				--	--	--	--	--	--
SIC 23 Apparel and other finish products	153	294	140						
High				300	300	400	400	500	600
Most Probable				300	300	400	400	500	500
Low				300	300	300	300	400	400
SIC 24 and 25 Lumber and wood products/Furniture and Fixtures	382	396	394						
High				400	500	500	600	600	700
Most Probable				400	500	500	500	500	600
Low				400	400	400	400	500	500
SIC 27 Printing and publishing	186	229	480						
High				600	700	800	900	1,100	1,300
Most Probable				600	600	800	900	1,100	1,200
Low				500	600	700	700	800	900
SIC 28 Chemicals and allied products	282	471	465						
High				600	700	800	900	1,100	1,300
Most Probable				500	600	700	900	1,100	1,200
Low				500	600	700	800	800	900
SIC 33 and 34 Primary metal industries/Fabricated metal products	419	483	683						
High				800	900	1,000	1,200	1,400	1,600
Most Probable				800	900	1,000	1,100	1,200	1,400
Low				700	800	900	1,000	1,000	1,100
SIC 35 and 36 Machinery, except electrical/Electrical mach.	231	794	2,354						
High				2,800	3,200	3,800	4,400	5,200	6,000
Most Probable				2,700	3,100	3,600	4,100	4,700	5,400
Low				2,600	2,900	3,200	3,500	3,900	4,300
SIC 37 Transportation equipment	60	489	997						
High				1,200	1,500	1,800	2,200	2,700	3,200
Most Probable				1,200	1,400	1,700	2,000	2,400	2,900
Low				1,200	1,300	1,500	1,800	2,000	2,300
All Others	1,826	2,438	3,715						
High				4,100	4,500	4,900	5,400	5,900	6,500
Most Probable				4,000	4,300	4,700	5,000	5,400	5,800
Low				3,900	4,000	4,200	4,300	4,500	4,600

NOTE: Due to rounding, parts may not add to total

SOURCE: NYS Conservation Department, Division of Water Resources

TABLE D37 - EMPLOYMENT PROJECTION

CENTRAL PLAINS SUBAREA 1/

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Employment	58,513	65,912	71,879						
High				80,300	89,700	100,200	111,900	125,000	139,600
Most Probable				78,200	85,000	92,400	100,500	109,300	118,800
Low				75,000	78,400	81,800	85,400	89,200	93,100
Agriculture	14,981	11,557	8,237						
High				7,600	6,900	6,400	6,100	5,900	5,700
Most Probable				7,400	6,500	5,900	5,400	5,000	4,800
Low				7,100	6,100	5,300	4,600	4,100	3,800
Manufacturing	13,921	17,764	20,984						
High				22,300	23,600	25,100	26,600	28,300	30,000
Most Probable				21,500	21,900	22,400	22,900	23,500	24,000
Low				20,800	20,700	20,500	20,300	20,200	20,000
Nonmanufacturing	29,611	36,591	42,658						
High				50,400	59,100	68,700	79,200	90,800	103,900
Most Probable				49,300	56,500	64,100	72,100	80,800	90,000
Low				47,100	51,600	56,000	60,500	64,900	69,300

TABLE D38 - EMPLOYMENT PROJECTIONS

CENTRAL PLAINS SUBAREA (Nonmanufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Nonmanufacturing	29,611	36,591	42,658						
High				50,400	59,100	68,700	79,200	90,800	103,900
Most Probable				49,300	56,500	64,100	72,100	80,800	90,000
Low				47,100	51,600	56,000	60,500	64,900	69,300
Mining	427	647	462						
High				500	500	600	600	600	600
Most Probable				500	500	500	500	500	500
Low				500	500	500	400	400	400
Construction	2,333	3,718	3,845						
High				4,400	5,000	5,700	6,300	6,900	7,600
Most Probable				4,300	4,800	5,300	5,700	6,200	6,600
Low				4,100	4,400	4,600	4,800	4,900	5,000
Transportation, Communication and Public Utilites	3,595	4,230	4,128						
High				4,600	5,000	5,400	5,700	5,900	6,100
Most Probable				4,500	4,800	5,000	5,200	5,300	5,300
Low				4,300	4,300	4,400	4,300	4,200	4,000
Wholesale and Retail Trade	7,829	10,413	11,801						
High				14,200	16,900	20,000	23,300	27,100	31,400
Most Probable				13,900	16,200	18,600	21,200	24,100	27,100
Low				13,200	14,700	16,200	17,700	19,200	20,700
Finance, Insurance and Real Estate	934	1,178	1,784						
High				2,200	2,600	3,100	3,700	4,400	5,100
Most Probable				2,100	2,500	2,900	3,400	3,900	4,400
Low				2,000	2,300	2,500	2,800	3,100	3,400
Services	11,752	13,067	15,670						
High				19,100	23,000	27,500	32,500	38,200	44,700
Most Probable				18,600	22,000	25,600	29,500	33,800	38,600
Low				17,800	20,000	22,200	24,600	27,000	29,500
Public Administration	1,765	2,396	2,786						
High				3,300	3,800	4,300	4,900	5,500	6,200
Most Probable				3,200	3,600	4,000	4,400	4,900	5,300
Low				3,000	3,300	3,500	3,700	3,900	4,100
Industry not reported	976	942	2,182						

1/ Comprises Genesee, Livingston, Ontario and Wyoming counties

SOURCE: U.S. Census Bureau

SOURCE: NYS Conservation Department, Division of Water Resources

TABLE D39 - EMPLOYMENT PROJECTIONS

CENTRAL PLAINS SUBAREA (Manufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Manufacturing	13,921	17,764	20,984						
High				22,300	23,600	25,100	26,600	28,300	30,000
Most Probable				21,500	21,900	22,400	22,900	23,500	24,000
Low				20,800	20,700	20,500	20,300	20,200	20,000
SIC 20 Food and kindred products	1,973	2,294	2,418						
High				2,500	2,500	2,500	2,600	2,600	2,600
Most Probable				2,400	2,300	2,300	2,200	2,100	2,100
Low				2,300	2,200	2,100	1,900	1,800	1,700
SIC 22 Textile mill products	1,588	1,428	1,002						
High				1,000	900	900	800	700	600
Most Probable				900	800	800	700	600	500
Low				900	800	700	600	500	400
SIC 23 Apparel and other finished products	350	434	802						
High				900	1,000	1,000	1,100	1,200	1,300
Most Probable				800	900	900	1,000	1,000	1,100
Low				800	800	800	900	900	900
SIC 24 and 25 Lumber and wood products/Furniture and fixtures	328	447	446						
High				500	500	500	500	600	600
Most Probable				500	500	500	500	500	500
Low				400	400	400	400	400	400
SIC 27 Printing and publishing	722	860	1,109						
High				1,200	1,200	1,300	1,300	1,400	1,400
Most Probable				1,100	1,100	1,100	1,100	1,100	1,100
Low				1,100	1,000	1,000	1,000	1,000	900
SIC 28 Chemicals and allied products	438	481	748						
High				800	800	900	900	900	1,000
Most Probable				800	800	800	800	800	800
Low				700	700	700	700	700	600
SIC 33 and 34 Primary metal industries/Fabricated metal prod.	2,008	3,182	2,836						
High				3,000	3,100	3,300	3,500	3,700	3,900
Most Probable				2,900	2,900	3,000	3,000	3,100	3,100
Low				2,800	2,700	2,700	2,700	2,600	2,600
SIC 35 and 36 Machinery, except electrical/Elect. mach.	2,635	4,059	5,474						
High				6,100	6,700	7,400	8,100	8,900	9,800
Most Probable				5,800	6,200	6,600	7,000	7,400	7,800
Low				5,700	5,800	6,000	6,200	6,400	6,500
SIC 37 Transportation equipment	112	394	805						
High				1,300	1,300	1,600	1,900	2,300	2,700
Most Probable				1,000	1,200	1,400	1,700	1,900	2,100
Low				1,000	1,100	1,300	1,500	1,600	1,800
All Others	3,767	4,179	5,344						
High				5,500	5,600	5,800	5,900	6,000	6,200
Most Probable				5,300	5,200	5,200	5,100	5,000	4,900
Low				5,100	4,900	4,700	4,500	4,300	4,100

1. Comprises Genesee, Livingston, Ontario, and Wyoming Counties

2. SOURCE: U.S. Census Bureau

3. SOURCE: NYS Conservation Department, Division of Water Resources

NOTE: Due to rounding, parts may not add to total

TABLE D40 - EMPLOYMENT PROJECTIONS

ALLEGHENY PLATEAU SUBAREA

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Employment	71,039	82,186	84,216						
High				91,400	99,200	107,600	116,800	126,700	137,500
Most Probable				89,500	95,200	101,200	107,600	114,400	121,600
Low				86,400	88,700	91,100	93,500	121,600	98,500
Agriculture	15,147	12,656	7,682						
High				7,300	6,900	6,500	6,100	5,700	5,400
Most Probable				7,100	6,600	6,000	5,500	5,000	4,600
Low				6,900	6,200	5,500	4,800	4,300	3,800
Manufacturing	15,922	24,583	27,986						
High				29,400	31,000	32,600	34,300	36.100	38,000
Most Probable				28,800	29,600	30,400	31,200	32,100	33,000
Low				27,900	27,800	27,700	27,700	27,600	27,500
Nonmanufacturing	39,970	44,947	48,548						
High				54,600	61,300	68,500	76,400	84,900	94,100
Most Probable				53,700	59,000	64,800	70,900	77,300	84,000
Low				51,600	54,700	57,800	61,000	64,100	67,200

TABLE D41 - EMPLOYMENT PROJECTIONS

ALLEGHENY PLATEAU SUBAREA (Nonmanufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Nonmanufacturing	39,970	44,947	48,548						
High				54,600	61,300	68,500	76,400	84,900	94,100
Most Probable				53,700	59,000	64,800	70,900	77,300	84,000
Low				51,600	54,700	57,800	61,000	64,100	67,200
Mining	2,492	1,805	918						
High				900	900	900	800	700	600
Most Probable				900	900	800	700	600	500
Low				900	800	700	600	500	400
Construction	3,368	4,076	4,396						
High				4,900	5,400	5,900	6,400	7,000	7,600
Most Probable				4,800	5,200	5,600	6,000	6,400	6,800
Low				4,600	4,800	4,900	5,100	5,200	5,400
Transportation, Communications and Public Utilities	6,806	7,622	6,145						
High				6,400	6,600	6,800	6,800	6,700	6,600
Most Probable				6,300	6,400	6,400	6,300	6,100	5,800
Low				6,100	5,900	5,700	5,400	5,000	4,600
Wholesale and Retail Trade	9,517	12,045	12,521						
High				14,400	16,400	18,600	21,100	23,800	26,700
Most Probable				14,100	15,800	17,600	19,500	21,600	23,800
Low				13,500	14,500	15,600	16,700	17,800	18,900
Finance, Insurance & Real Estate	1,080	1,375	1,759						
High				2,000	2,300	2,700	3,100	3,500	4,000
Most Probable				2,000	2,300	2,500	2,800	3,200	3,500
Low				1,900	2,100	2,300	2,400	2,600	2,800
Service	13,091	14,458	17,675						
High				20,700	24,000	27,700	31,900	36,600	41,800
Most Probable				20,300	23,100	26,200	29,500	33,200	37,100
Low				19,500	21,400	23,200	25,300	27,300	29,500
Public Administration	1,882	2,302	2,402						
High				2,700	3,000	3,200	3,600	3,900	4,200
Most Probable				2,600	2,800	3,100	3,300	3,500	3,800
Low				2,500	2,600	2,700	2,800	2,900	3,000
Industry Not Reported	1,734	1,264	2,732						

1/ Comprises Allegany, Cattaraugus, Steuben, and Potter counties

SOURCE: U. S. Census Bureau

SOURCE: NYS Conservation Department, Division of Water Resources

TABLE D-2 - EMPLOYMENT PROJECTIONS

ALLEGHENY PLATEAU SUBARRA (Manufacturing)

INDUSTRY	HISTORICAL			PROJECTED					
	1940	1950	1960	1970	1980	1990	2000	2010	2020
Total Manufacturing	15,922	24,583	27,986						
High				29,400	31,000	32,600	34,300	36,100	38,000
Most Probable				28,800	29,600	30,400	31,200	32,100	33,000
Low				27,900	27,800	27,700	27,700	27,600	27,500
SIC 20 Food and kindred products	1,809	2,193	2,405						
High				2,500	2,600	2,700	2,900	3,000	3,100
Most Probable				2,500	2,500	2,600	2,600	2,700	2,700
Low				2,400	2,400	2,300	2,300	2,300	2,300
SIC 22 Textile mill products	779	1,070	738						
High				800	700	700	700	700	600
Most Probable				700	700	700	600	600	600
Low				700	600	600	600	500	500
SIC 23 Apparel and other finished products	164	296	345						
High				400	400	400	500	500	500
Most Probable				400	400	400	400	400	500
Low				400	400	400	400	400	400
SIC 24 and 25 Lumber and wood products/Furniture and fixtures	1,610	3,202	3,125						
High				3,200	3,300	3,400	3,600	3,700	3,800
Most Probable				3,200	3,200	3,200	3,200	3,300	3,300
Low				3,100	3,000	2,900	2,900	2,800	2,700
SIC 27 Printing and publishing	495	660	1,019						
High				1,100	1,200	1,300	1,400	1,500	1,600
Most Probable				1,100	1,100	1,200	1,300	1,300	1,400
Low				1,000	1,100	1,100	1,100	1,100	1,200
SIC 28 Chemicals and allied products	513	375	269						
High				300	200	200	200	100	100
Most Probable				200	200	200	200	100	100
Low				200	200	200	100	100	100
SIC 33 and 34 Primary metal industries/Fabricated metal prod.	935	1,945	2,287						
High				2,400	2,600	2,800	2,900	3,100	3,300
Most Probable				2,400	2,500	2,600	2,700	2,800	2,900
Low				2,300	2,300	2,400	2,400	2,400	2,400
SIC 35 and 36 Machinery except electrical/Electrical mach.	2,386	5,940	9,770						
High				10,500	11,400	12,200	13,200	14,200	15,200
Most Probable				10,300	10,800	11,400	12,000	12,600	13,200
Low				10,000	10,200	10,400	10,600	10,800	11,000
SIC 37 Transportation equipment	94	207	293						
High				300	400	400	500	600	600
Most Probable				300	400	400	500	500	600
Low				300	400	400	400	400	500
All Others	7,137	8,695	7,735						
High				7,900	8,100	8,400	8,600	8,800	9,000
Most Probable				7,800	7,800	7,800	7,800	7,800	7,800
Low				7,500	7,300	7,100	6,900	6,700	6,500

1. Comprises Allegany, Cattaragus, Steuben and Potter counties

2. SOURCE: U.S. Census Bureau

3. SOURCE: NYS Conservation Department, Division of Water Resources

NOTE: Due to rounding, parts may not add to total

TABLE D43 - GENESEE RIVER BASIN ECONOMIC AREA

EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS

1950 - 1963

Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Nonagricultural Total	321,900	335,800	341,000	354,200	347,000	352,800	363,100	368,300	354,300	358,400	363,000	363,100	373,800	380,700
Manufacturing	151,000	162,300	164,300	174,000	164,900	166,800	169,100	169,900	156,400	157,900	159,600	156,500	159,600	161,300
Durable Goods	98,000	110,700	114,800	123,600	116,900	118,300	119,900	121,100	111,100	111,700	113,900	110,600	113,200	116,100
Primary & Fabricated Metals	10,100	10,900	11,200	11,500	10,500	10,700	10,900	11,300	10,700	10,400	10,800	10,600	10,500	10,600
Machinery, Except Electrical	13,500	16,300	17,300	17,400	15,600	16,200	17,500	18,400	16,100	15,800	17,300	16,900	17,300	17,800
Instruments; Photographic & Optical Goods	42,800	48,900	50,000	52,200	50,700	49,700	49,700	49,000	46,100	45,300	45,500	45,200	46,500	48,100
Other Durable Goods	31,700	34,500	36,400	42,500	40,100	41,700	41,800	42,400	38,200	40,300	40,400	37,900	38,900	39,600
Nondurable Goods	53,000	51,600	49,400	50,400	48,000	48,400	49,200	48,700	45,300	46,100	45,700	45,900	46,400	45,200
Food & Food Products	19,200	19,800	19,000	19,500	18,700	18,900	19,100	19,000	17,900	17,800	17,600	17,900	18,100	17,400
Men's Clothing & Apparel	12,300	11,000	10,600	11,000	10,600	10,500	10,600	10,200	8,900	9,000	8,900	8,600	8,900	8,900
Printing & Publishing	5,900	6,100	5,800	6,000	6,200	6,300	6,400	6,600	6,400	6,500	6,600	6,700	6,800	6,900
Other Nondurable Goods	15,600	14,700	14,000	13,900	12,600	12,700	13,100	12,900	12,100	12,800	12,500	12,600	12,600	12,000
Nonmanufacturing	170,900	173,400	176,700	180,200	182,000	186,000	194,000	198,400	197,900	200,500	203,500	206,600	214,300	219,400
Contract Construction	11,600	11,500	11,300	12,100	12,700	13,200	13,900	13,500	13,300	13,400	13,700	13,600	13,700	14,100
Transportation, Communication & Public Utilities	24,600	24,900	25,300	24,500	22,400	21,900	24,300	23,900	21,100	20,500	20,100	19,700	20,000	19,800
Wholesale & Retail Trade	53,800	54,500	55,100	56,400	57,500	58,600	60,000	61,100	61,000	61,500	62,100	62,800	65,200	66,400
Finance, Insurance, and Real Estate	7,100	7,400	7,800	8,000	8,200	8,600	9,100	9,700	9,700	10,200	10,500	11,000	11,600	11,900
Services & Miscellaneous	36,000	36,100	37,100	37,800	38,300	39,600	40,600	41,900	43,100	44,500	45,000	46,400	48,900	50,500
Government	37,700	38,900	40,200	41,400	42,800	44,000	46,300	48,300	49,800	50,400	51,900	53,100	54,900	56,700

NOTE: Due to rounding, details may not add to totals.

SOURCES: NYS Department of Labor, Division of Employment
NYS Department of Conservation, Division of Water Resources

TABLE D44 - GENESEE RIVER BASIN ECONOMIC AREA - BARGE CANAL SUBAREA

EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS

1950 - 1963

Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Nonagricultural Total	217,200	227,400	230,600	241,100	238,900	242,500	249,100	251,000	241,700	244,700	248,800	250,500	258,900	263,600
Manufacturing	107,400	115,300	116,800	125,100	120,900	121,400	122,700	122,400	112,900	113,900	115,500	114,700	117,000	118,000
Durable Goods	69,400	78,600	81,500	89,200	85,800	85,600	86,500	86,300	79,100	79,700	81,400	80,300	82,300	84,500
Primary & Fabricated Metals	4,700	5,100	4,900	5,300	5,100	5,200	5,400	5,400	5,000	5,100	5,600	5,700	5,700	5,700
Machinery, Except Electrical	6,200	7,600	8,100	8,800	8,300	8,400	9,100	9,200	7,900	7,900	8,600	8,500	8,800	9,100
Instruments, Photographic & Optical Goods	42,000	48,200	49,300	51,500	50,200	49,200	49,100	48,400	45,600	44,700	44,900	44,600	46,100	47,500
Other Durable Goods	16,500	17,700	19,200	23,600	22,200	22,800	22,900	23,300	20,700	21,900	22,200	21,500	21,700	22,100
Nondurable Goods	38,000	36,700	35,300	35,900	35,100	35,700	36,200	36,100	33,700	34,300	34,100	34,400	34,700	33,500
Food & Food Products	12,700	12,900	12,600	12,700	12,700	13,000	13,100	13,300	12,800	12,800	12,700	13,100	13,100	12,400
Men's Clothing & Apparel	11,500	10,300	9,800	10,100	9,800	9,800	9,700	9,300	8,100	8,200	8,100	7,700	8,000	7,900
Printing & Publishing	4,700	5,000	4,800	4,900	5,000	5,100	5,200	5,300	5,200	5,300	5,400	5,400	5,500	5,600
Other Nondurable Goods	9,100	8,500	8,100	8,200	7,600	7,800	8,200	8,200	7,700	8,000	7,900	8,100	8,100	7,800
Nonmanufacturing	109,800	112,100	113,800	116,000	118,000	121,100	126,400	128,600	128,900	130,700	133,300	135,800	141,900	145,600
Contract Construction	8,100	8,600	8,500	8,800	9,500	10,100	10,600	10,200	10,700	10,500	10,900	10,700	10,900	10,900
Transportation, Communication & Public Utilities	14,600	15,000	14,800	14,400	13,200	12,900	14,400	14,100	12,400	12,300	12,000	11,600	11,800	11,800
Wholesale & Retail Trade	38,300	38,700	39,000	39,900	40,800	41,600	42,400	43,000	43,000	43,200	43,900	44,500	46,800	47,800
Finance, Insurance, and Real Estate	5,400	5,700	6,000	6,100	6,300	6,600	7,000	7,500	7,400	7,800	8,100	8,400	8,900	9,100
Services & Miscellaneous	23,400	23,500	24,200	24,800	25,300	26,400	27,200	27,900	29,000	29,000	30,500	31,800	33,800	35,100
Government	19,900	20,600	21,300	22,000	22,800	23,500	24,800	25,900	26,800	27,000	28,000	28,800	29,700	30,800

NOTE: Due to rounding, details may not add to totals

1/ Comprises Orleans, Monroe and Wayne counties.

SOURCES: NYS Department of Labor, Division of Employment and
NYS Department of Conservation, Division of Water Resources.

TABLE D45 - GENESEE RIVER BASIN ECONOMIC AREA - ROCHESTER SMSA

EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS

1950 - 1963

Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Nonagricultural Total	198,200	207,200	210,000	219,900	217,900	200,200	225,300	226,600	218,000	220,300	224,300	225,900	234,200	239,100
Manufacturing	100,200	107,200	108,800	116,900	112,900	112,800	113,100	112,600	103,800	104,400	106,100	105,000	107,500	109,100
Durable Goods	67,200	75,700	78,500	85,900	82,800	82,400	83,000	82,700	76,000	76,300	78,100	77,400	79,400	81,500
Primary & Fabricated Metals	4,500	4,900	4,700	5,000	4,800	4,900	5,100	5,200	4,700	4,900	5,400	5,500	5,500	5,500
Machinery, Except Electrical	6,100	7,500	7,900	8,600	8,100	8,200	8,900	8,900	7,700	7,700	8,300	8,200	8,500	8,700
Instruments; Photographic & Optical Goods	42,000	48,200	49,300	51,500	50,200	49,200	49,000	48,100	45,600	44,700	44,900	44,600	46,100	47,500
Other Durable Goods	14,600	15,100	16,600	20,800	19,700	20,100	20,000	20,500	18,000	19,000	19,600	19,100	19,300	19,700
Nondurable Goods	33,000	31,500	30,300	31,000	30,100	30,400	30,100	29,900	27,800	28,100	28,000	27,600	28,100	27,600
Food & Food Products	8,800	8,800	8,800	9,000	8,900	8,900	8,700	8,900	8,700	8,600	8,700	8,800	8,800	8,600
Men's Clothing & Apparel	11,400	10,200	9,600	9,900	9,600	9,600	9,500	9,100	7,900	8,000	7,900	7,500	7,700	7,500
Printing & Publishing	4,600	4,900	4,700	4,700	4,800	4,900	5,000	5,100	5,000	5,100	5,200	5,200	5,300	5,400
Other Nondurable Goods	8,200	7,600	7,200	7,400	6,800	7,000	6,900	6,800	6,200	6,400	6,200	6,200	6,300	6,100
Nonmanufacturing	98,000	100,000	101,200	103,000	105,000	107,400	112,200	114,000	114,200	115,900	118,100	120,900	126,700	130,000
Contract Construction	7,800	8,200	8,000	8,300	9,000	9,400	9,900	9,600	9,700	9,900	10,000	10,000	10,400	10,400
Transportation, Communication & Public Utilities	12,700	12,900	12,700	12,300	11,400	10,900	12,100	11,900	10,400	10,500	10,300	10,200	10,300	10,400
Wholesale & Retail Trade	34,200	34,600	34,800	35,500	36,300	37,000	37,900	38,300	38,200	38,300	38,900	39,600	42,000	42,800
Finance, Insurance, and Real Estate	5,200	5,500	5,800	5,900	6,100	6,400	6,700	7,200	7,100	7,400	7,700	8,000	8,500	8,700
Services & Miscellaneous	22,000	22,100	22,700	23,200	23,700	24,600	25,500	26,000	27,000	27,700	28,400	29,700	31,300	32,600
Government	16,100	16,700	17,200	17,800	18,500	19,100	20,100	21,000	21,700	21,900	22,800	23,400	24,100	25,100

SOURCES: NYS Department of Labor, Division of Employment and
NYS Department of Conservation, Division of Water Resources

NOTE: Due to rounding, details may not add to totals.

TABLE D46 - GENESEE RIVER BASIN ECONOMIC AREA - WAYNE & ORLEANS COUNTIES

EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS

1950 - 1963

Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Nonagricultural Total	19,000	20,200	20,600	21,200	21,000	22,200	23,800	24,400	23,700	24,400	24,500	24,600	24,700	24,500
Manufacturing	7,200	8,100	8,000	8,200	8,000	8,600	9,600	9,800	9,000	9,500	9,300	9,700	9,500	8,900
Durable Goods	2,200	2,900	3,000	3,300	3,000	3,200	3,500	3,600	3,100	3,300	3,200	2,900	3,000	3,000
Nondurable Goods	5,000	5,200	5,000	4,900	5,000	5,300	6,100	6,200	5,900	6,200	6,100	6,700	6,500	5,900
Food & Food Products	3,900	4,100	3,800	3,700	3,800	4,100	4,400	4,400	4,100	4,100	4,000	4,300	4,200	3,700
Other Nondurable Goods	1,100	1,100	1,200	1,200	1,200	1,200	1,800	1,900	1,800	2,000	2,100	2,400	2,300	2,200
Nonmanufacturing	11,800	12,100	12,600	13,000	13,000	13,700	14,200	14,600	14,700	14,900	15,200	14,900	15,200	15,600
Contract Construction	300	400	500	500	500	700	700	600	600	600	700	600	500	600
Transportation, Communication & Public Utilities	1,900	2,100	2,100	2,100	1,800	2,000	2,300	2,200	1,900	1,700	1,700	1,500	1,500	1,400
Wholesale & Retail Trade	4,100	4,100	4,200	4,400	4,500	4,600	4,500	4,700	4,800	4,900	5,100	4,900	4,800	4,900
Finance, Insurance, and Real Estate	200	200	200	200	200	200	300	300	300	400	400	400	400	500
Services & Miscellaneous	1,400	1,400	1,500	1,600	1,600	1,800	1,700	1,900	2,000	2,200	2,100	2,100	2,400	2,500
Government	3,800	3,900	4,100	4,200	4,300	4,400	4,700	4,900	5,000	5,100	5,200	5,300	5,500	5,700

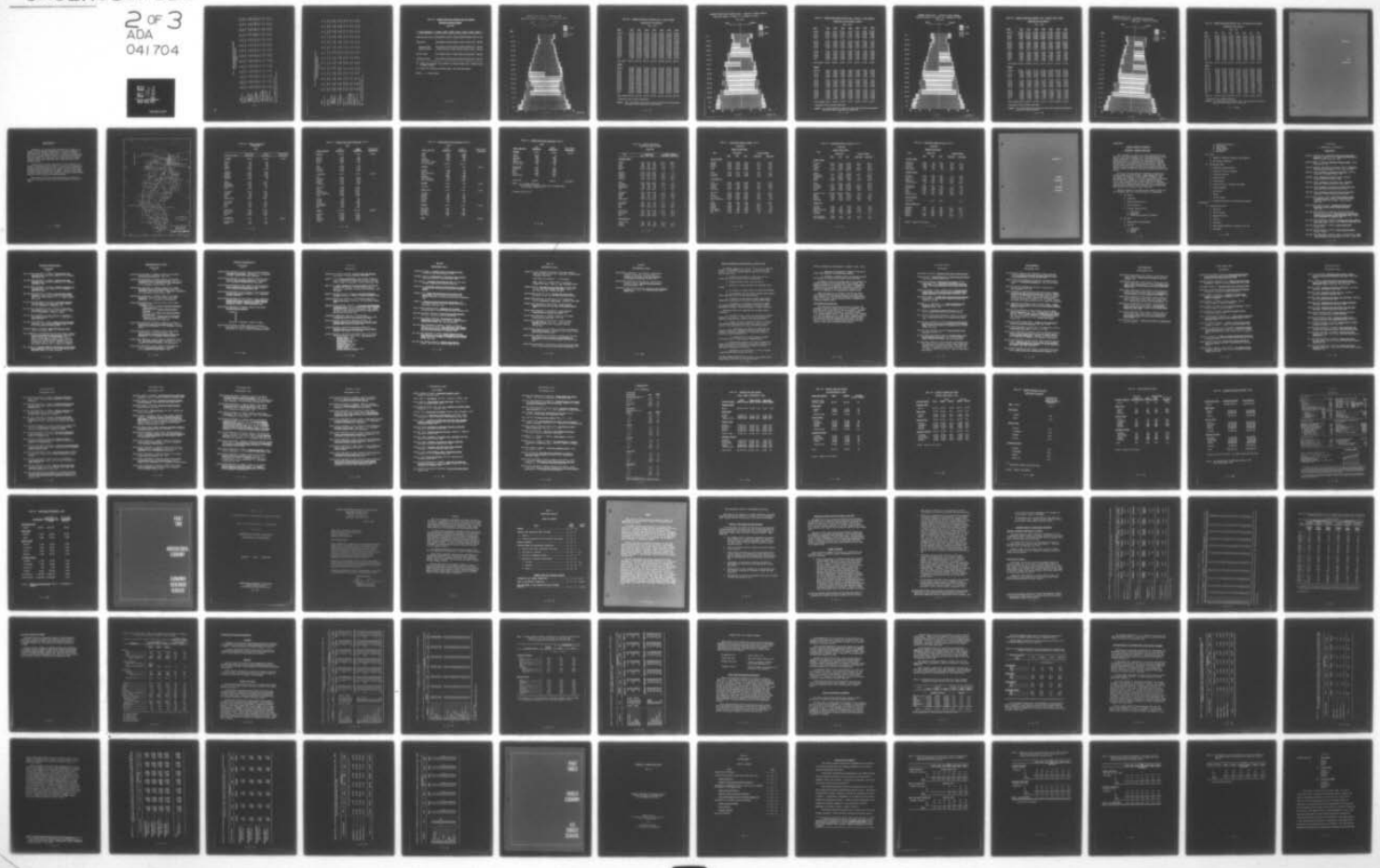
Note: Due to rounding, details may not add to totals.

SOURCE: NYS Conservation Department, Division of Water Resources.

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GENESEE RIVER BASIN COMPREHENSIVE STUDY OF WATER AND RELATED LA--ETC(U)
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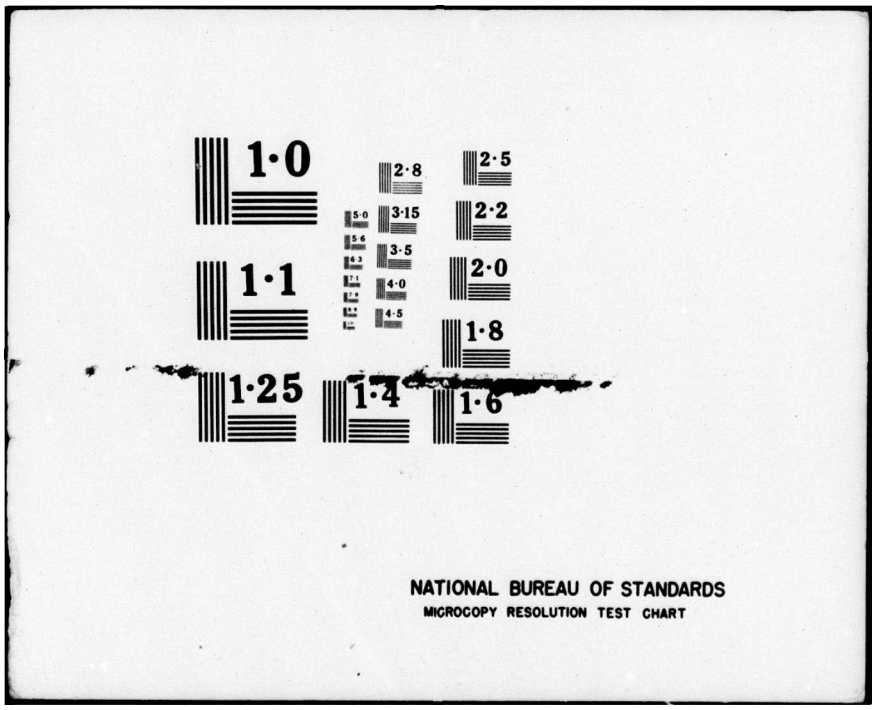

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TABLE D47 - GENESEE RIVER BASIN ECONOMIC AREA - CENTRAL PLAINS SUBAREA

EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS

1950-1963

Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Nonagricultural Total	44,500	46,100	46,400	47,800	46,800	48,200	49,000	50,100	48,600	49,300	49,400	48,600	50,000	51,700
Manufacturing	18,100	19,200	18,500	18,700	17,300	18,100	17,900	18,200	16,600	17,000	17,000	15,600	16,100	17,100
Durable Goods	9,900	10,900	10,700	10,600	10,400	11,200	10,800	11,300	10,300	10,400	10,500	9,100	9,400	10,200
Primary & Fabricated Metals	3,700	4,100	4,300	4,200	3,600	3,600	3,600	3,800	3,700	3,400	3,000	2,800	2,700	2,600
Machinery, Except Electrical	3,000	3,300	3,000	2,800	2,500	2,500	2,300	2,200	1,700	1,700	1,900	1,700	2,100	2,300
Other Durable Goods	3,200	3,600	3,400	3,600	4,400	5,100	4,800	5,300	4,900	5,300	5,600	4,500	4,700	5,400
Nondurable Goods	8,300	8,300	7,800	8,000	6,900	6,900	7,100	6,800	6,400	6,600	6,500	6,400	6,700	6,800
Food & Food Products	4,200	4,400	4,000	4,300	3,400	3,400	3,400	3,300	2,800	2,700	2,700	2,700	2,900	2,900
Other Nondurable Goods	4,100	3,900	3,800	3,700	3,500	3,500	3,700	3,600	3,600	3,900	3,800	3,800	3,900	3,900
Nonmanufacturing	26,300	26,900	27,900	29,100	29,500	30,100	31,200	32,000	31,900	32,300	32,400	33,100	33,900	34,700
Contract Construction	1,100	1,200	900	1,700	1,500	1,200	1,400	1,400	1,400	1,400	1,400	1,500	1,400	1,500
Transportation, Communication & Public Utilities	3,600	3,600	4,300	4,100	3,800	3,900	4,400	4,100	3,600	3,300	3,200	3,100	3,100	3,100
Wholesale & Retail Trade	6,900	7,200	7,300	7,400	7,700	7,900	7,900	8,300	8,400	8,700	8,700	8,900	9,000	9,100
Finance, Insurance, and Real Estate	600	700	700	700	800	900	900	900	1,000	1,100	1,100	1,200	1,200	1,200
Services & Miscellaneous	5,100	5,000	5,200	5,500	5,600	5,900	5,900	6,100	6,200	6,400	6,400	6,500	6,800	7,100
Government	9,000	9,200	9,500	9,700	10,000	10,200	10,600	11,000	11,300	11,500	11,800	12,000	12,300	12,600

NOTE: Due to rounding, details may not add to totals.

SOURCE: NYS Conservation Department, Division of Water Resources.

TABLE D48 - GENESEE RIVER BASIN ECONOMIC AREA - ALLEGHENY PLATEAU SUBAREA

EMPLOYMENT IN NONAGRICULTURAL ESTABLISHMENTS

1950 - 1963

Industry	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Nonagricultural Total	60,200	62,300	64,000	65,300	61,300	62,100	65,000	67,100	64,000	64,400	64,800	64,000	64,900	65,400
Manufacturing	25,500	27,800	29,000	30,200	26,700	27,300	28,500	29,300	26,900	26,900	27,100	26,300	26,400	26,200
Durable Goods	18,800	21,200	22,600	23,800	20,700	21,500	22,600	23,500	21,700	21,600	22,000	21,200	21,400	21,400
Primary & Fabricated Metals	1,700	1,800	1,900	2,000	1,800	1,900	1,900	2,000	2,100	1,900	2,200	2,100	2,100	2,300
Machinery, Except Electrical	4,300	5,500	6,200	5,800	4,800	5,300	6,100	7,000	6,500	6,200	6,800	6,700	6,400	6,400
Other Durable Goods	12,800	14,000	14,500	16,000	14,100	14,300	14,600	14,500	13,100	13,600	13,100	12,400	12,900	12,700
Nondurable Goods	6,700	6,600	6,400	6,500	6,000	5,800	5,900	5,800	5,200	5,300	5,100	5,100	5,000	4,800
Food & Food Products	2,300	2,400	2,400	2,500	2,500	2,600	2,600	2,500	2,300	2,300	2,200	2,200	2,200	2,100
Other Nondurable Goods	4,400	4,200	4,000	4,000	3,500	3,300	3,400	3,400	2,900	2,900	2,900	2,900	2,800	2,700
Nonmanufacturing	34,800	34,500	35,000	35,100	34,600	34,800	36,500	37,900	37,100	37,500	37,700	37,700	38,500	39,200
Mining	1,800	1,800	1,700	1,700	1,400	1,300	1,300	1,300	1,100	1,100	1,000	800	900	900
Contract Construction	2,400	1,800	1,900	1,600	1,700	1,800	1,900	1,900	1,500	1,500	1,500	1,500	1,400	1,500
Transportation, Communication & Public Utilities	6,500	6,300	6,200	6,000	5,400	5,100	5,500	5,700	5,100	5,000	5,000	5,000	5,100	4,900
Wholesale & Retail Trade	8,500	8,700	8,800	9,100	9,000	9,100	9,400	9,700	9,500	9,600	9,500	9,400	9,400	9,600
Finance, Insurance and Real Estate	1,000	1,000	1,100	1,100	1,100	1,100	1,200	1,200	1,300	1,400	1,400	1,400	1,500	1,500
Services & Miscellaneous	5,700	5,800	5,900	5,900	5,900	6,000	6,200	6,600	6,900	7,100	7,200	7,300	7,400	7,400
Government	8,800	9,100	9,400	9,700	10,000	01,300	01,800	11,300	11,700	11,800	12,200	12,400	12,900	13,300

NOTE: Due to rounding, details may not add to totals.

SOURCE: NYS Conservation Department, Division of Water Resources.

TABLE D49 - GENESEE RIVER BASIN ECONOMIC AREA AND SUBAREAS

HISTORICAL POPULATION TRENDS

1900-1960

Area & Subarea	1900	1910	1920	1930	1940	1950	1960
Basin Economic Area (1)	668,903	745,631	797,133	878,322	903,890	985,556	1,127,784
Barge Canal	296,678	365,391	429,480	501,671	518,737	574,787	688,535
Rochester SMSA	217,854	283,212	352,034	423,881	438,230	487,632	586,387
Wayne & Orleans	78,824	82,179	77,446	78,790	80,507	87,155	102,148
Central Plains	151,638	159,818	157,772	165,068	169,692	180,835	200,910
Allegheny Plateau	220,587	220,422	209,881	210,583	215,461	229,934	238,339

(1) Basin total consists of the addition of subareas Barge Canal, Central Plains & Allegheny Plateau

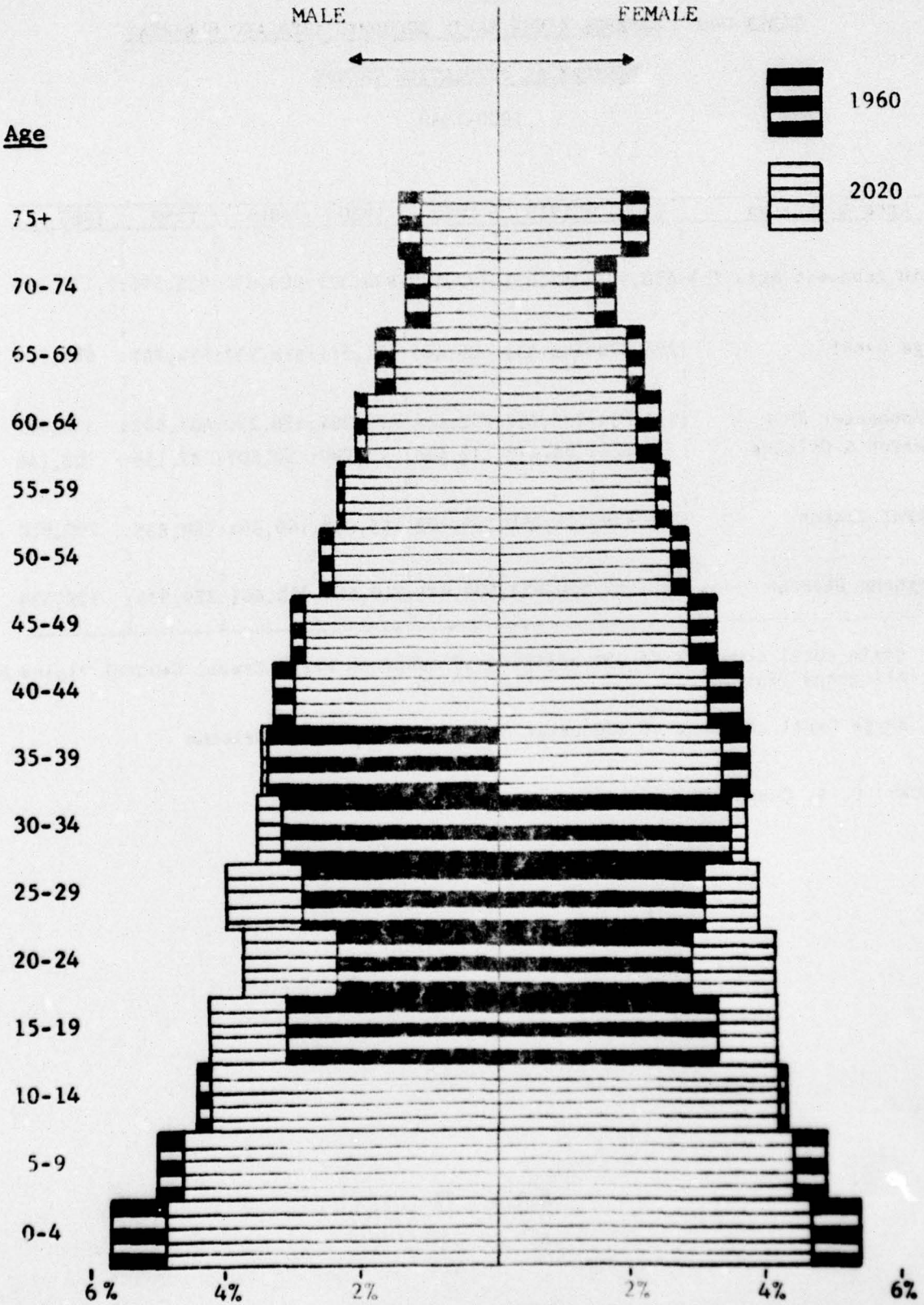
(2) Barge Canal consists of Rochester SMSA, plus Wayne and Orleans

SOURCE: U. S. Census Bureau

GENESEE RIVER BASIN - ROCHESTER SMSA

RELATIVE CHANGES IN COHORT AS A PERCENT OF TOTAL

1960-2020



D-I-78

FIGURE D8

TABLE D50 - GENESEE RIVER BASIN ECONOMIC AREA - ROCHESTER SMSA

POPULATION BY AGE COHORTS *

1960 - 2020

Male	1960	1970	1980	1990	2000	2010	2020
Under 5	33,296	36,969	43,712	51,301	56,817	61,578	66,886
5 - 9	29,308	34,612	40,206	47,319	54,097	58,689	63,530
10-14	25,943	34,372	35,739	41,823	48,126	52,631	57,859
15-19	18,252	29,121	34,372	39,927	46,987	53,712	58,279
20-24	13,836	25,556	33,820	35,144	41,112	47,296	51,735
25-29	16,814	21,806	30,776	35,816	40,653	47,262	54,989
30-34	18,925	17,909	27,493	35,478	36,073	41,564	48,887
35-39	20,121	18,524	22,513	31,258	35,886	40,466	47,547
40-44	19,454	19,707	18,158	27,469	35,066	35,554	41,293
45-49	17,937	20,265	18,310	22,141	30,402	34,772	39,480
50-54	15,557	18,598	18,621	17,232	25,893	32,966	33,601
55-59	14,042	16,482	18,346	16,673	20,099	27,500	31,614
60-64	12,365	12,516	14,916	14,909	13,682	20,893	26,804
65-69	10,544	10,702	12,583	14,099	12,893	15,599	21,370
70-74	8,023	8,157	8,368	10,091	10,195	9,410	14,374
75+	8,650	10,621	11,264	12,740	14,850	14,672	15,765
Total Male	283,067	335,917	389,197	453,420	522,829	594,564	674,013
Female							
Under 5	31,648	35,475	41,915	49,155	54,400	58,954	64,034
5 - 9	28,593	33,052	38,392	45,181	51,653	56,032	60,653
10-14	24,945	32,858	36,017	42,369	49,333	54,418	57,990
15-19	19,297	30,275	33,872	39,124	45,568	51,843	56,725
20-24	17,011	28,799	34,753	37,720	43,306	49,816	56,037
25-29	17,851	22,688	31,897	35,320	39,895	45,929	53,189
30-34	20,259	18,901	29,605	35,427	38,003	43,332	50,386
35-39	21,916	18,807	23,042	32,111	35,301	39,716	46,029
40-44	21,147	20,603	18,954	29,472	35,099	37,576	43,032
45-49	19,003	21,768	18,564	22,707	31,515	34,599	39,045
50-54	16,620	20,062	19,458	17,850	27,929	33,282	35,629
55-59	15,047	17,876	20,504	17,532	21,498	29,858	32,793
60-64	14,092	14,427	17,172	16,452	14,704	23,700	28,500
65-69	12,719	13,058	15,566	17,954	15,439	18,985	26,384
70-74	10,161	11,553	11,744	14,035	13,480	12,078	19,529
75+	13,011	17,089	19,081	21,622	25,358	24,136	25,353
Total Female	303,320	357,291	410,536	474,031	542,481	614,254	695,308

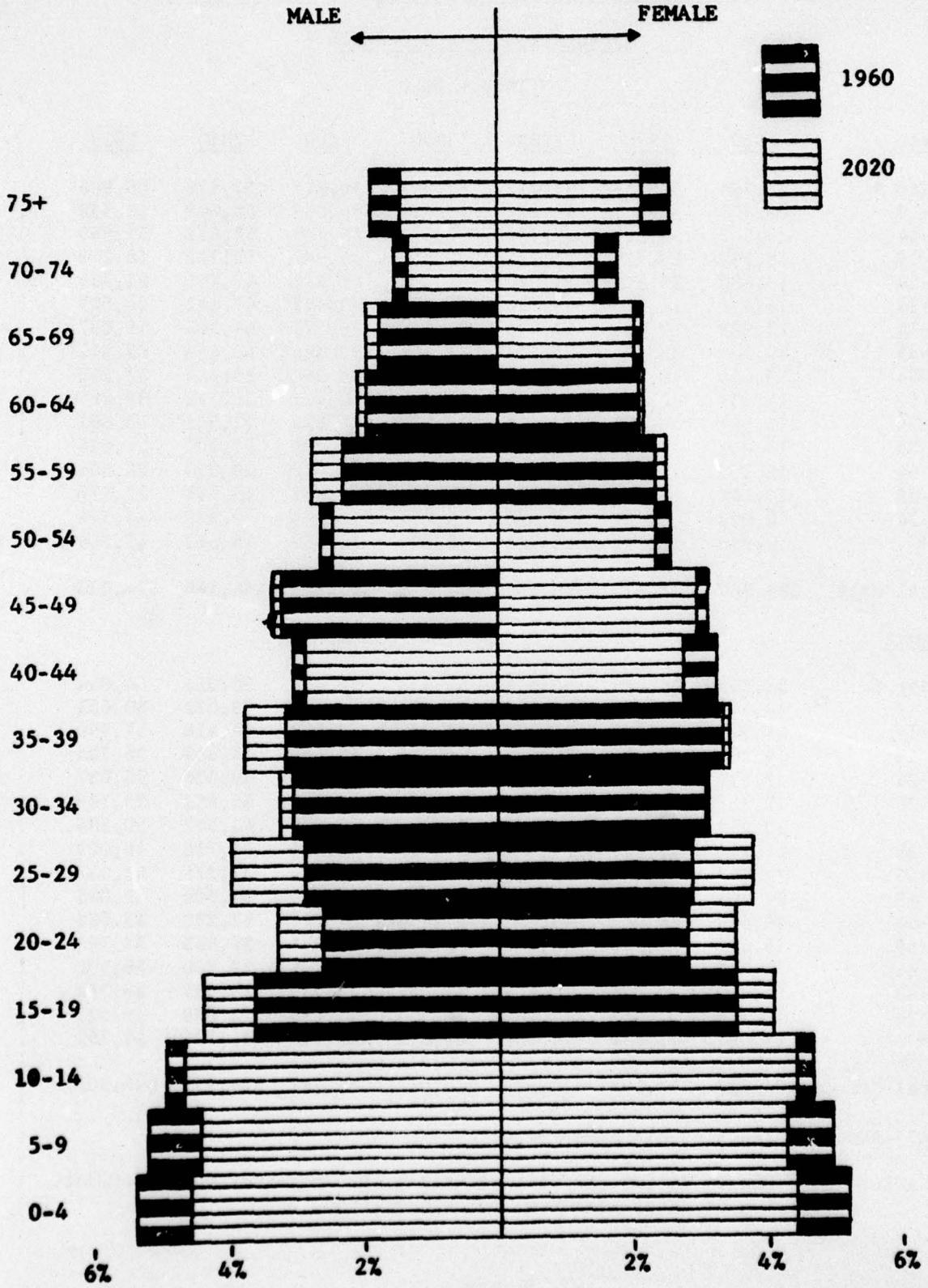
* Adjusted to Most Probable Employment.

SOURCES: U.S. Census Bureau for historic data; NYS Conservation Department, Division of Water Resources for projections.

GENESEE RIVER BASIN ECONOMIC AREA - ORLEANS & WAYNE COUNTIES

RELATIVE CHANGE IN COHORT AS A PERCENT OF TOTAL

1960-2020



D-I-80

FIGURE D9

TABLE D51 - GENESEE RIVER BASIN ECONOMIC AREA - ORLEANS & WAYNE COUNTIES

POPULATION BY AGE COHORTS - MALES *

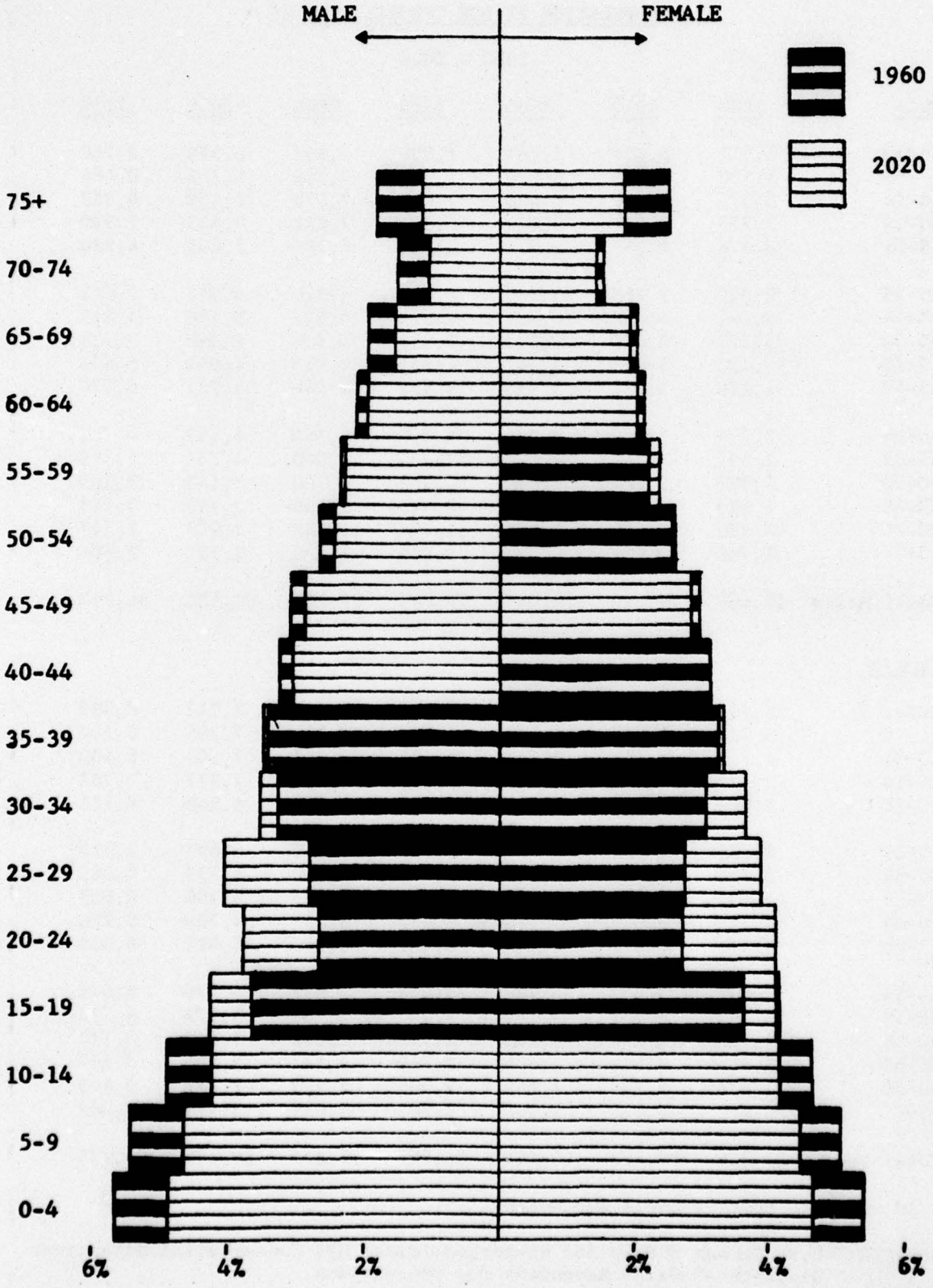
1960 - 2020

Male	1960	1970	1980	1990	2000	2010	2020
Under 5	5,511	6,157	6,767	7,509	7,997	8,368	8,760
5 - 9	5,358	5,771	6,418	7,132	7,764	8,132	8,484
10-14	5,074	6,330	6,476	7,097	7,870	8,439	8,958
15-19	3,735	5,236	5,673	6,311	7,014	7,635	7,999
20-24	2,678	4,266	4,771	4,776	5,189	5,803	6,280
25-29	2,949	3,785	5,180	5,612	6,240	6,941	7,573
30-34	3,141	3,478	4,451	4,972	4,977	5,458	6,215
35-39	3,273	3,419	3,872	5,257	5,684	6,348	7,133
40-44	3,139	3,273	3,447	4,405	4,916	4,944	5,453
45-49	3,298	3,416	3,358	3,809	5,144	5,583	6,274
50-54	2,716	3,044	3,076	3,252	4,159	4,652	4,705
55-59	2,392	3,162	3,108	3,080	3,500	4,728	5,168
60-64	2,007	2,304	2,550	2,593	2,760	3,542	3,969
65-69	1,829	1,930	2,441	2,423	2,419	2,769	3,743
70-74	1,608	1,496	1,594	1,784	1,832	1,973	2,543
75+	1,916	2,023	1,787	2,235	2,756	2,587	2,806
Total Males	50,624	59,090	64,969	72,247	80,221	87,902	96,063
Female							
Under 5	5,306	5,907	6,489	7,196	7,656	8,012	8,387
5 - 9	5,034	5,510	6,130	6,810	7,412	7,765	8,100
10-14	4,774	6,053	6,080	6,681	7,380	7,903	8,400
15-19	3,633	5,087	5,497	6,116	6,792	7,397	7,763
20-24	2,869	4,422	5,199	5,147	5,631	6,248	6,738
25-29	2,956	3,720	5,008	5,413	6,016	6,693	7,317
30-34	3,223	3,292	4,206	4,961	4,860	5,359	6,065
35-39	3,391	3,225	3,555	4,821	5,189	5,798	6,533
40-44	3,318	3,317	3,170	4,067	4,795	4,703	5,226
45-49	3,192	3,378	3,103	3,427	4,656	5,021	5,633
50-54	2,645	3,270	3,149	3,010	3,872	4,579	4,511
55-59	2,385	3,067	3,153	2,900	3,209	4,379	4,730
60-64	2,148	2,371	2,902	2,796	2,672	3,464	4,115
65-69	2,161	2,077	2,634	2,749	2,511	2,795	3,842
70-74	1,836	1,780	1,865	2,305	2,228	2,141	2,803
75+	2,652	3,423	3,162	3,548	4,017	3,938	4,062
Total Female	51,524	59,899	65,302	61,947	78,896	86,195	94,235

* Adjusted to Most Probable Employment

SOURCES: U.S. Census Bureau for historical data; NYS Conservation Department Division of Water Resources for projections.

GENESEE RIVER BASIN - CENTRAL PLAINS SUBAREA
RELATIVE CHANGES IN COHORT AS A PERCENT OF TOTAL
1960-2020



D-I-82

FIGURE DIO

TABLE D52 - GENESEE RIVER BASIN ECONOMIC AREA - CENTRAL PLAIN SUBAREA

POPULATION BY AGE COHORTS *

1960 - 2020

Male	1960	1970	1980	1990	2000	2010	2020
Under 5	11,346	11,929	12,905	13,909	14,088	13,859	13,554
5 - 9	10,858	11,571	12,328	13,295	13,946	13,768	13,464
10-14	9,768	11,465	11,894	12,825	13,778	13,916	13,761
15-19	7,257	10,097	10,338	10,905	11,662	12,121	12,043
20-24	5,339	7,923	8,360	8,297	8,679	9,129	9,672
25-29	5,619	6,693	9,153	9,259	9,675	10,288	10,813
30-34	6,525	6,485	8,856	9,287	9,224	9,600	10,215
35-39	6,816	5,557	6,546	8,943	9,031	9,422	10,053
40-44	6,472	6,374	6,294	8,596	9,009	8,937	9,325
45-49	6,225	6,417	5,163	6,096	8,379	8,443	8,833
50-54	5,276	5,770	5,534	5,418	7,519	7,848	7,816
55-59	4,693	5,545	5,689	4,583	5,428	7,472	7,554
60-64	4,254	4,250	4,608	4,406	4,306	6,066	6,363
65-69	3,908	3,625	4,200	4,314	3,461	4,104	5,731
70-74	3,018	3,067	2,801	2,990	2,787	2,648	3,987
75+	3,661	4,098	4,034	4,287	4,545	4,012	4,225
Total Males	101,035	110,866	118,703	127,410	135,517	141,633	147,409
Female							
Under 5	10,811	11,446	12,373	13,327	13,490	13,269	12,976
5 - 9	10,182	11,049	11,773	12,695	13,316	13,145	12,854
10-14	9,305	10,905	11,245	12,080	12,932	13,004	12,899
15-19	7,262	9,921	10,589	11,236	12,071	12,616	12,493
20-24	5,480	8,238	8,951	8,954	9,414	9,921	10,202
25-29	5,575	6,581	8,682	9,140	9,555	10,177	10,825
30-34	6,207	5,128	7,603	8,214	8,109	8,466	9,031
35-39	6,563	5,558	6,483	8,542	8,975	9,366	10,011
40-44	6,206	5,983	4,834	7,237	7,804	7,666	8,040
45-49	5,979	6,268	5,195	6,067	8,042	8,428	8,835
50-54	5,116	5,670	5,233	4,050	6,276	6,737	6,659
55-59	4,520	5,623	5,898	6,898	5,734	7,606	7,978
60-64	4,250	4,511	4,931	4,509	3,398	5,416	5,867
65-69	4,047	3,892	4,875	5,146	4,298	5,052	6,702
70-74	3,074	2,970	2,869	3,106	2,647	1,627	3,354
75+	4,965	5,522	5,366	5,954	6,451	5,668	5,456
Total Female	99,542	109,265	116,900	125,155	132,512	138,164	144,182

* Adjusted to Most Probable Employment

SOURCES: U.S. Census Bureau for historical data; NYS Conservation Department, Division of Water Resources.

GENESEE RIVER BASIN - ALLEGHENY PLATEAU SUBAREA
RELATIVE CHANGES IN COHORT AS A PERCENT OF TOTAL
1960-2020

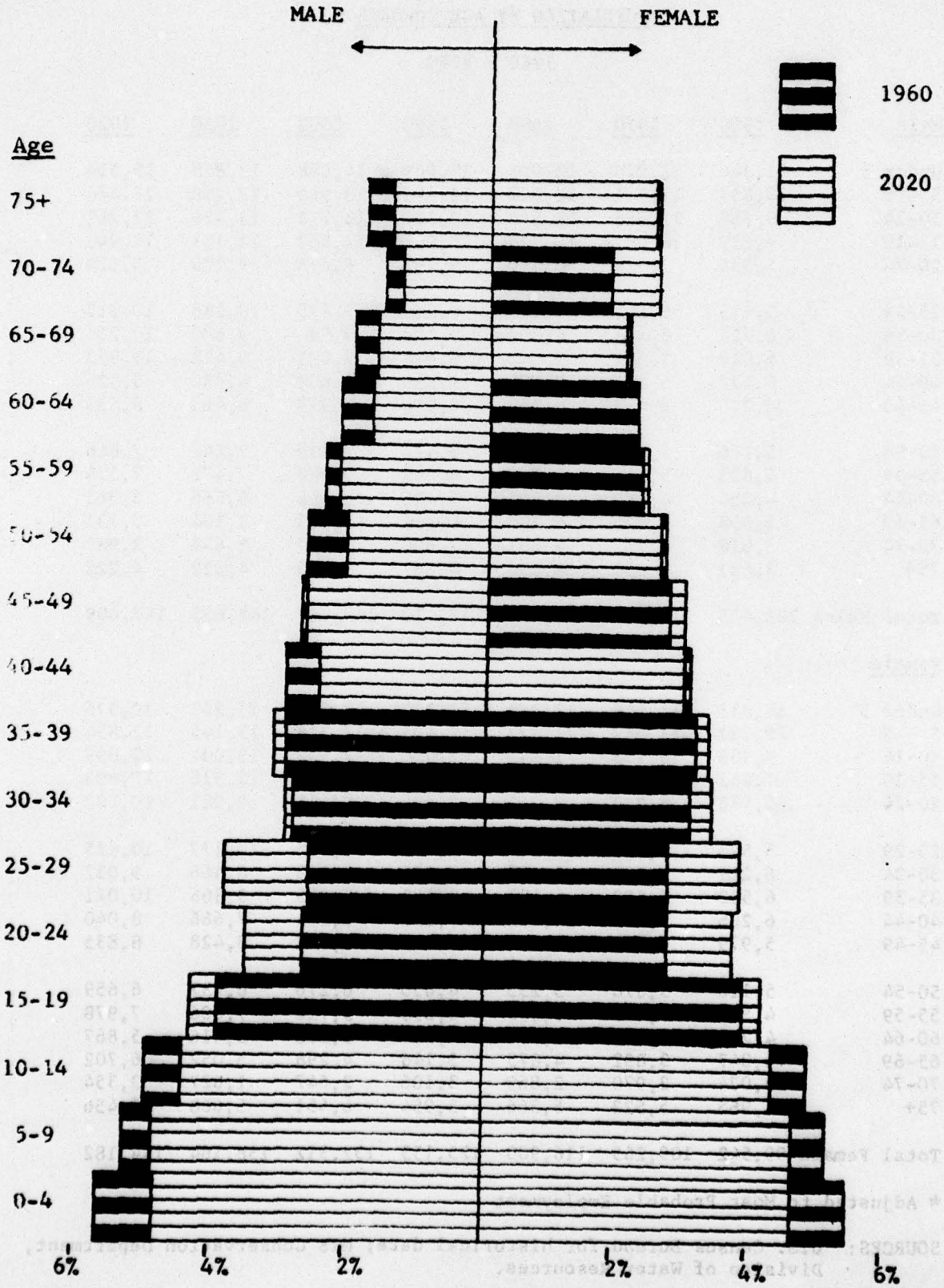


FIGURE DII

TABLE D53 - GENESEE RIVER BASIN ECONOMIC AREA - ALLEGHENY PLATEAU SUBAREA

POPULATION BY AGE COHORTS *

1960 - 2020

Male	1960	1970	1980	1990	2000	2010	2020
Under 5	13,581	14,621	15,560	16,489	15,972	14,907	14,691
5 - 9	12,619	13,897	15,100	15,889	16,245	14,652	14,826
10 - 14	11,879	12,778	13,477	14,261	15,046	14,374	13,516
15 - 19	9,378	11,840	12,760	13,798	14,436	14,624	13,254
20 - 24	6,387	9,912	9,826	10,084	10,437	10,765	10,697
25 - 29	6,202	7,875	9,544	10,116	10,804	11,093	11,744
30 - 34	6,863	5,472	8,480	8,194	8,247	8,390	8,996
35 - 39	7,068	5,439	6,731	8,215	8,627	9,147	9,648
40 - 44	7,154	6,346	4,824	7,680	7,331	7,307	7,558
45 - 49	6,616	6,455	4,752	5,930	7,294	7,622	8,219
50 - 54	6,461	6,433	5,612	4,176	6,818	6,456	6,490
55 - 59	5,745	5,835	5,722	4,231	5,312	6,545	6,842
60 - 64	5,298	5,319	5,325	4,664	3,486	5,726	5,426
65 - 69	4,832	4,441	4,531	4,270	3,356	4,203	5,179
70 - 74	3,813	3,682	3,717	3,448	3,335	2,533	4,110
75+	4,510	5,163	5,096	5,138	5,069	4,473	4,514
Total Male	118,406	125,508	131,057	136,583	141,815	142,817	145,710
Female							
Under 5	12,939	14,029	14,928	15,799	15,293	14,271	14,065
5 - 9	12,294	13,271	14,419	15,171	15,511	13,989	14,155
10 - 14	11,509	12,399	13,193	13,960	14,711	14,069	13,235
15 - 19	9,271	11,634	12,229	13,216	13,813	13,976	12,693
20 - 24	6,475	12,776	10,160	10,624	11,054	11,414	11,289
25 - 29	6,514	8,133	9,790	10,137	10,851	11,139	11,709
30 - 34	7,281	5,929	11,859	9,155	9,495	9,782	10,328
35 - 39	7,596	6,016	7,357	8,905	9,150	9,741	10,181
40 - 44	7,229	6,826	5,297	11,060	8,326	8,571	8,977
45 - 49	6,566	7,033	5,276	6,511	7,942	8,083	8,795
50 - 54	6,413	6,739	6,249	4,751	10,270	7,588	7,893
55 - 59	5,503	5,970	6,314	4,632	5,772	7,084	7,283
60 - 64	5,264	5,680	5,922	5,467	4,083	9,145	6,721
65 - 69	4,925	4,688	5,103	5,426	3,972	4,979	6,152
70 - 74	4,221	4,287	4,642	4,872	4,534	3,420	7,567
75+	5,953	7,129	7,353	7,989	8,628	7,574	7,418
Total Fe.	119,953	132,539	140,091	147,675	153,405	154,825	158,461

* Adjusted to Most Probable Employment

SOURCES: U. S. Census Bureau for historic data; NYS Conservation Department, Division of Water Resources for projections.

SECTION VI

TOWN

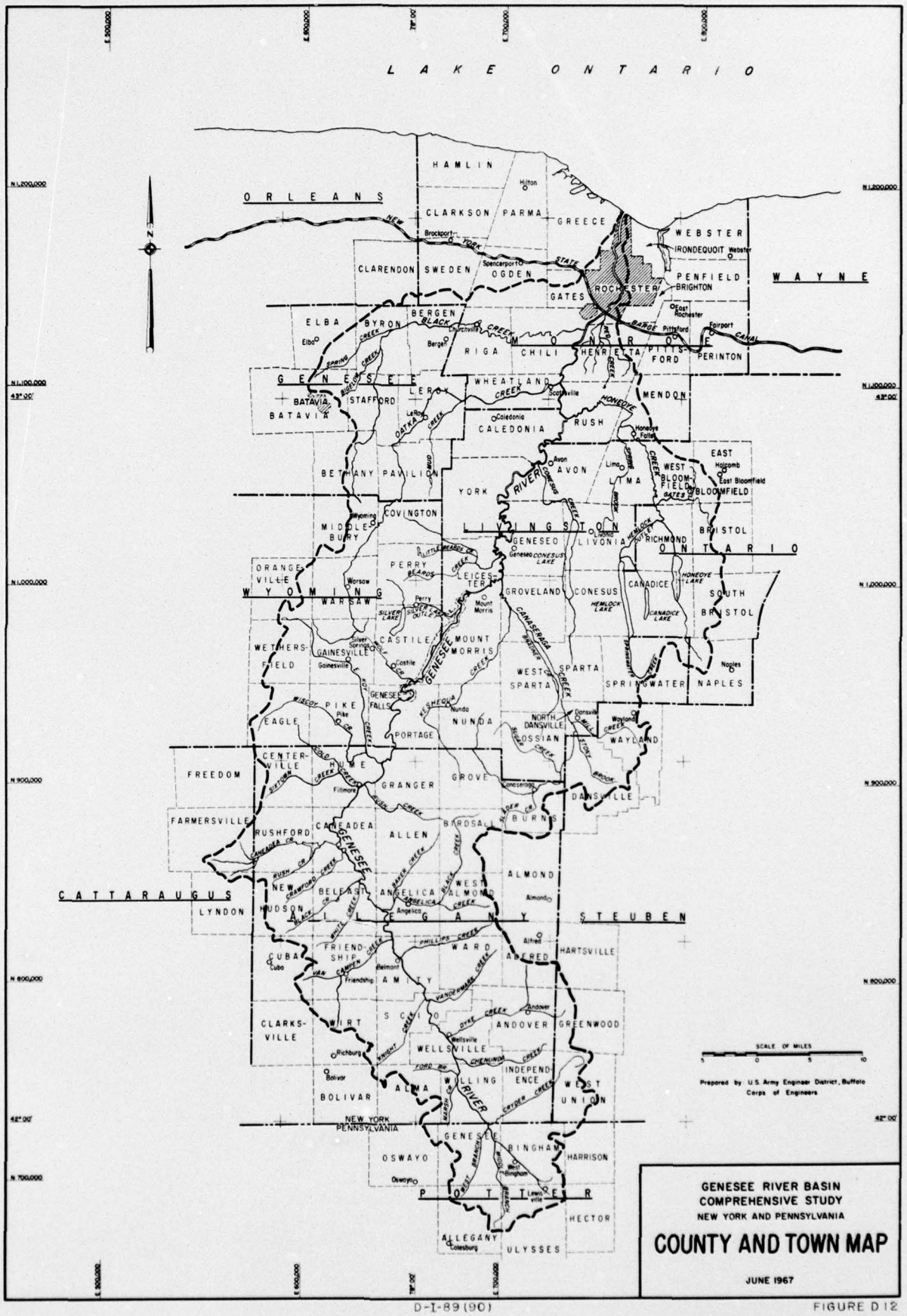
POPULATION

TOWN POPULATION

Preparation of town population estimates was a result of a request by those agencies responsible for determining adequacy of sanitary systems and water supply needs. Caution is advised, since there is a decreasing reliability of projections, the smaller the unit. Allowances should be made for any intimate knowledge the user may possess for a particular town. Minor social or economic changes in these small communities will drastically alter their growth patterns.

Source material used for preparation of these tables was the "Census of Population, 1960" by the U. S. Bureau of the Census, and "Genesee River Drainage Basin Survey, Series 1 and 2", dated 1961 by the New York State Department of Health. The data for the Upper Genesee was taken directly from the Health Department study, while the Lower Genesee estimates were updated by us using the methodology outlined in this study by the Health Department.

Where towns or cities were partially within the basin, the basis for the population split was the area within and without the basin.



D-I-89(90)

FIGURE D12

TABLE D54 - GENESEE RIVER BASIN
POPULATION

1960

County and Town	Total Town Population	Basin Population	Total County Population
ALLEGANY	42,785	30,330	43,978
Alfred	3,730	249	
Allen	306	306	
Alma	871	254	
Almond	1,373	53	
Amity	2,006	2,006	
Andover	1,801	1,801	
Angelica	1,335	1,335	
Belfast	1,265	1,265	
Birdsall	160	122	
Bolivar	2,441	36	
Burns	1,238	1,120	
Caneadea	1,911	1,911	
Centerville	491	425	
Clarksville	840	40	
Cuba	3,116	376	
Friendship	2,020	2,020	
Granger	429	429	
Grove	469	469	
Hume	1,729	1,727	
Independence	1,004	1,004	
New Hudson	612	495	
Rushford	995	975	
Scio	1,513	1,513	
Ward	234	234	
Wellsville	8,278	8,278	
West Almond	293	239	
Willing	1,208	1,208	
Wirt	1,117	440	
CATTARAUGUS	1,130	193	80,187
Farmersville	721	158	
Lyndon	409	35	

TABLE D54 - GENESEE RIVER BASIN POPULATION (Cont'd)

1960

County and Town	Town Population	Basin Population	Total County Population
GENESEE	22,244	15,784	53,994
Batavia	4,325	665	
Bergen	1,996	1,996	
Bethany	1,569	770	
Byron	1,589	1,510	
Elba	2,260	443	
LeRoy	6,779	6,779	
Pavilion	1,721	1,721	
Stafford	2,005	1,900	
LIVINGSTON	44,053	43,655	44,053
Avon	4,404	4,404	
Caledonia	3,067	3,067	
Conesus	1,221	1,221	
Geneseo	4,337	4,337	
Groveland	3,373	3,373	
Leicester	1,392	1,392	
Lima	2,716	2,716	
Livonia	3,526	3,526	
Mount Morris	4,567	4,567	
North Dansville	6,095	6,095	
Nunda	2,309	2,309	
Ossian	489	489	
Portage	733	733	
Sparta	1,019	1,019	
Springwater	1,293	895	
West Sparta	817	817	
York	2,695	2,695	
MONROE	514,513	304,369	586,387
Brighton	27,849	5,700	
Chili	11,239	11,237	
Gates	13,755	9,250	
Henrietta	11,598	5,000	
Mendon	3,902	2,763	

TABLE D54 - GENESEE RIVER BASIN POPULATION (CONT'D)

1960

County and Town	Town Population	Basin Population	Total County Population
Ogden	7,262	2,380	
Riga	2,800	2,800	
Rush	2,555	2,555	
Sweden	7,224	500	
Wheatland	3,711	3,711	
Rochester, Greece, and Irondequoit	422,618	258,473	
ONTARIO	9,257	4,072	68,070
Bristol	1,002	370	
Candice	558	558	
East Bloomfield	2,297	272	
Naples	1,955	105	
Richmond	1,384	1,384	
South Bristol	617	163	
West Bloomfield	1,444	1,220	
ORLEANS	1,659	189	34,159
Claredon	1,659	189	
POTTER (Pa.)	3,523	1,554	16,483
Allegany	304	91	
Bingham	504	454	
Genesee	838	670	
Harrison	1,110	100	
Oswego	226	23	
Ulysses	541	216	
STEUBEN	6,258	3,976	97,691
Dansville	1,125	692	
Greenwood	839	216	
Hartsville	479	10	
Wayland	3,385	2,833	
West Union	430	225	
WAYNE	0	0	67,989

TABLE D54 - GENESEE RIVER BASIN POPULATION (CONT'D)

1960

County and Town	Town Population	Basin Population	Total County Population
WYOMING	23,374	19,433	34,793
Arcade	2,861	30	
Castile	2,609	2,609	
Covington	827	827	
Eagle	896	790	
Gainesville	2,032	2,032	
Genesee Falls	397	397	
Middlebury	1,416	984	
Orangeville	633	269	
Perry	5,372	5,372	
Pike	878	878	
Warsaw	4,803	4,803	
Wethersfield	650	442	
Grand Total	668,796	423,555	1,127,784 *

SOURCE: U. S. Census Bureau and
NYS Department of Health, Genesee River Drainage Basin Survey Series, Report No. 2.

* Economic Service Area

TABLE D55 - GENESEE RIVER BASIN
POPULATION CHANGE BY TOWNS

1900-1960

Town	Population			Percent Change	
	1900	1930	1960	1900-1960	1930-1960
ALLEGANY COUNTY					
Alfred	1,615	1,404	3,730	131.0	165.7
Allen	655	419	306	-53.3	-26.9
Alma	1,182	884	871	-26.3	- 1.5
Almond	1,436	1,101	1,373	-4.4	24.7
Amity	2,216	1,867	2,006	-9.5	7.4
Andover	1,869	1,905	1,801	- 3.6	- 5.5
Angelica	1,639	1,338	1,335	-18.4	- .2
Belfast	1,574	1,113	1,265	-19.6	13.7
Birdsall	634	364	160	-74.8	-56.0
Bolivar	2,035	2,813	2,441	20.0	-13.2
Burns	1,424	1,152	1,238	-13.1	7.5
Caneadea	1,310	1,066	1,911	45.8	79.3
Centerville	833	553	491	-41.1	-11.2
Clarksville	836	768	840	.5	9.4
Cuba	2,360	2,256	3,116	31.5	38.1
Friendship	2,136	1,868	2,020	- 5.4	8.1
Granger	800	477	429	-46.2	-10.0
Grove	812	534	469	-42.2	-12.2
Hume	1,749	1,574	1,729	- 1.1	9.8
Independence	1,280	1,056	1,004	-21.6	- 4.9
New Hudson	926	565	612	-33.9	8.3
Rushford	1,300	936	995	-23.5	10.6
Scio	1,281	1,205	1,513	18.1	25.6
Ward	547	299	234	-57.2	-21.7
Wellsville	4,981	6,909	8,278	66.2	19.8
West Almond	601	391	293	-51.2	-25.1
Willing	1,246	820	1,208	- 3.0	47.3
Wirt	1,163	1,269	1,117	- 4.0	-12.0
CATTARAUGUS CO.					
Farmersville	1,043	719	721	-31.0	.3
Lyndon	690	463	409	-40.7	-11.7
Freedom	1,209	863	1,059	-12.4	22.7

TABLE D55 - POPULATION CHANGE BY TOWNS (Cont'd)

1900-1960

GENESEE RIVER BASIN

Town	Population			Percent Change	
	1900	1930	1960	1900-1960	1930-1960
GENESEE COUNTY					
Batavia	2,250	2,248	4,325	92.2	92.4
Bergen	1,699	1,512	1,996	17.5	32.0
Bethany	1,330	1,254	1,569	18.0	25.1
Byron	1,512	1,347	1,589	5.1	18.0
Elba	1,526	1,695	2,260	48.1	33.3
LeRoy	4,823	6,007	6,779	40.6	12.9
Pavilion	1,542	1,236	1,721	11.6	39.2
Stafford	1,338	1,231	2,005	49.9	62.9
LIVINGSTON CO.					
Avon	3,071	3,566	4,404	43.4	23.5
Caledonia	2,072	2,305	3,067	48.0	33.1
Conesus	1,149	832	1,221	6.3	46.8
Geneseo	3,613	3,135	4,337	20.0	38.3
Groveland	1,949	3,295	3,373	73.1	2.4
Leicester	1,415	1,565	1,392	- 1.6	-11.1
Lima	2,279	1,900	2,716	19.2	42.9
Livonia	2,788	2,644	3,526	26.5	33.4
Mt. Morris	3,715	4,234	4,567	22.9	7.9
North Dansville	3,961	5,310	6,095	53.9	14.8
Nunda	2,397	2,100	2,309	- 3.7	10.0
Ossian	780	510	489	-37.3	- 4.1
Portage	1,029	793	733	-28.3	- 7.6
Sparta	1,189	974	1,019	-14.3	4.6
Springwater	2,016	1,381	1,293	-35.9	- 6.4
West Sparta	906	667	817	- 9.8	22.5
York	2,730	2,349	2,695	- 1.3	14.7

TABLE D55 - POPULATION CHANGE BY TOWNS (Cont'd)

1900-1960

GENESEE RIVER BASIN

Town	Population			Percent Change	
	1900	1930	1960	1900-1960	1930-1960
MONROE COUNTY					
Brighton	3,815	9,065	27,849	630.0	207.2
Chili	2,099	2,493	11,239	435.3	350.7
Clarkson	--	1,456	2,339	--	60.6
Gates	3,468	3,634	13,755	296.6	278.5
Greece	5,579	12,113	48,670	772.4	301.8
Hamlin	--	2,079	2,755	--	32.5
Henrietta	2,062	2,142	11,598	462.4	441.5
Irondequoit	--	18,024	55,337	--	207.0
Mendon	2,760	2,636	3,902	41.4	14.8
Ogden	2,616	3,159	7,262	177.6	129.9
Parma	--	3,222	6,277	--	94.8
Penfield	2,857	3,306	12,601	341.1	281.2
Pittsford	2,373	7,192	15,156	538.7	110.7
Perinton	4,703	9,854	16,314	246.9	65.6
Riga	1,864	1,718	2,800	50.2	63.0
Rochester City	162,608	328,132	318,611	95.9	- 2.9
Rush	1,491	1,901	2,555	71.4	34.4
Sweden	4,743	4,613	7,224	52.3	56.6
Webster	3,299	4,778	16.434	398.2	244.0
Wheatland	2,071	2,364	3,711	79.2	57.0
ONTARIO CO.					
Bristol	1,310	743	1,002	-23.5	34.8
Canadice	674	317	558	-17.2	76.0
East Bloomfield	1,940	1,631	2,297	18.4	40.8
Naples	2,370	1,933	1,955	-17.6	1.1
Richmond	1,381	833	1,384	- .2	66.1
South Bristol	1,104	654	617	-44.1	- 5.7
West Bloomfield	1,306	1,040	1,444	10.6	38.8

TABLE D55 - POPULATION CHANGE BY TOWNS (Cont'd)

1900-1960

GENESEE RIVER BASIN

Town	Population			Percent Change	
	1900	1930	1960	1900-1960	1930-1960
STEUBEN COUNTY					
Dansville	1,417	995	1,125	-20.6	13.1
Greenwood	1,129	968	839	-25.7	-13.4
Wayland	2,984	3,071	3,385	13.4	10.2
West Union	1,025	715	430	-58.0	-39.9
Hartsville	787	470	479	-39.1	1.9
WYOMING COUNTY					
Castile	2,539	1,996	2,609	2.8	30.7
Covington	930	696	827	-11.1	18.8
Eagle	1,114	960	896	-19.6	- 6.7
Gainsville	2,325	2,074	2,032	-12.6	- 2.0
Genesee Falls	658	509	397	-39.7	-22.0
Middlebury	1,406	1,091	1,416	.7	13.0
Orangeville	1,005	679	633	-37.0	- 6.8
Perry	3,862	5,086	5,372	39.1	5.6
Pike	1,277	913	878	-31.2	- 3.8
Warsaw	4,341	4,361	4,803	10.6	10.1
Weathersfield	927	641	650	-29.9	1.4
ORLEANS COUNTY					
Clarendon	--	1,224	1,659	--	35.5
POTTER COUNTY, Pa.					
Allegany	928	407	304	-67.2	-25.3
Bingham	911	576	504	-44.7	-12.5
Genesee	1,179	773	838	-28.9	8.4
Harrison	--	1,016	1,110	--	9.3
Oswayo	1,584	225	226	-85.7	.4
Ulysses	891	487	541	-39.3	11.1

SOURCE: Bureau of the Census

SECTION VII

PARTIAL INVENTORY OF REGIONAL RESOURCES

INTRODUCTION

PARTIAL INVENTORY OF REGIONAL RESOURCES - GENESEE RIVER BASIN

The "resources of a region" are often considered to be the land with its subsoil deposits, water, and whatever other natural assets a region may be blessed with. This study embraces a broader definition. In addition, the human resources and man-made institutions and facilities that contribute to production and distribution of goods and services are included. What are loosely termed "amenities" are also included for the reason that they help to make a region attractive to the people who man the offices, plants, distribution, and service facilities, private and public.

Below are listed the principal categories of regional resources touched on by this report. These headings will serve to classify the references in this partial inventory. Some data particularly useful in the economic base study are presented. For the most part, references to source material are given. Later, what is needed for the economic study will be obtained from more recent surveys than are now available. In those fields where detailed studies are being conducted by other governmental agencies they will be merely noted at this time.

Regional resources of the Genesee River Basin economic area are catalogued under the following headings and subheadings.

I. The People

- A. Population
- B. General Characteristics
- C. Vital Statistics
- D. Economic Characteristics
  1. Labor Force
  2. Employment
  3. Skills and Educational Attainment

II. The Land

- A. Physiography and Climatology
- B. Land Use
  1. Agriculture
  2. Forestry
  3. Mining

4. Industry and Business
5. Residential
6. Institutional
7. Transportation
8. Recreation

III. Water

A. Supply for Industry, Business, and Household

B. Recreational Potential

IV. The Economic Base

A. Labor Force Characteristics

B. Industrial Plant and Equipment

C. Financial Resources

D. Energy Sources

E. Transportation

F. Trade Facilities - Wholesale and Retail

G. Private Research

H. Agriculture

I. Mining

J. Forest Products

K. Governmental Services to Agriculture, Business, and Industry

V. Institutional Assets

A. Education

B. Public Research

C. Medical Facilities

D. Culture

E. Recreation

F. Quasi-public Facilities - Housing, Port, etc.

G. Government

I. The People

I.A. Population Characteristics

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Notes on Research by Other Agencies - Subject - Land

An integral segment of the economic study is being conducted by the U. S. Department of Agriculture. As indicated by the "Plan of Work"(1) the Economic Research Service will undertake the following tasks:

1. Compilation and analysis of available past and present agricultural production and marketing data;

2. Cropping pattern tenure, and land values;

3. Appraisal of future marketing and production technology;

4. An Analysis of drought effects on agricultural yields:

5. In cooperation with SCS and FS, determine agricultural water requirements, both present and projected;

6. An analysis of agricultural product needs and the capability of land and water resources in meeting these needs:

7. An adaptation of available projections of demand for outdoor recreation and determination of the role of the agricultural economy in meeting shortages of outdoor recreation.

The Forest Service will undertake the following responsibilities:

1. Inventory, classification and correlation of forest resources of the basin in terms of present and potential use, physical characteristics, condition and management levels.

2. Analyses of forest resources as related to current and long-range water management needs with regard to erosion control, flood prevention, water supply and water quality.

a. Determination and analysis of hydrologic and related forested water management needs in subwatersheds as required, including a determination of hydrologic indices to be used in runoff determinations.

b. Determination of overall forestry programs and needs as part of land treatment recommendations.

3. Inventory and analysis of the use of natural resources by forest-based enterprises and related industries and their contribution to the present and prospective economic activity and employment in the basin.

4. Appraisal of the relationship of forest resources to agricultural water problems and needs.

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(1) Plan of Work, U.S.D.A.'s Participation in the Genesee River Basin Survey (10/21/63) (For Official Use Only)

(Notes on Research by Other Agencies - Subject - Land - cont.)

5. Appraisal and projection of demand for the use of forest land resources for recreational purposes.

6. Estimates of probable effects of proposed projects and programs on forest resource yields, values and uses.

The Bureau of Mines will develop data on the potential for mineral production in the Genesee River Basin economic area. Specific information is lacking at this time on the agency's study plan but it is assumed that an analysis of regional resources is being made so that the overall potential of the area can be assessed in the comprehensive economic study.

Urban land uses will be studied by the New York State Water Resources Board insofar as data may be available from other sources (i.e., the Rochester Metropolitan Transportation Study, and the Monroe County Planning Council, Background for Planning, December, 1962).

Physiography and Climatology

The significant environmental influence of weather and geography on the River Basin economy will be appraised. Available data should be adequate for any such analysis. Standard sources will be tapped, including U. S. Geodetic Surveys, U. S. Weather Bureau records for the twenty-three (23) stations in or near the basin, and U. S. Army Corps of Engineers reports. Also, the New England-New York Inter Agency Committee Report, The Resources of the New England-New York Region; (Part One, April 27, 1956) will be utilized along with other available reports listed in the accompanying bibliography.

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VI. STATISTICAL APPENDIX
(Sampling of Data)

TABLE D56 - DEMOGRAPHIC DATA

Population (1960)

Economic Subareas	Number	Percent of Total
Standard Metropolitan Statistical Area (Monroe County) (1)	586,387	52.0%
Barge Canal	102,148	9.1
Central Plain	200,910	17.8
Allegheny Plateau	238,339	21.1
Total	1,127,784	100.0

Age Distribution

Rochester SMSA (Monroe County)

Age Group	Number	Percent of Total
Under 15	173,733	29.6%
15 - 44	224,883	38.4
45 - 64	124,663	21.3
Over 65	63,108	10.8
Total	586,387	100.0

Barge Canal

Under 15	31,057	30.4
15 - 44	38,305	37.5
45 - 64	20,784	20.3
Over 65	12,002	11.7
Total	102,148	100.0

Central Plain

Under 15	62,270	31.0%
15 - 44	75,321	37.5
45 - 64	40,313	20.1
Over 65	23,006	11.5
Total	200,910	100.0

Allegheny Plateau

Under 15	74,821	31.4
15 - 44	87,398	36.7
45 - 64	47,866	20.1
Over 65	28,254	11.9
Total	238,339	100.0

Genesee River Basin Economic Area

Under 15	341,881	30.3
15 - 44	425,917	37.8
45 - 64	233,626	20.7
Over 65	126,360	11.2
Total	1,127,784	100.0

(1) Rochester SMSA enlarged 10/18/63 to include Monroe, Orleans, Wayne, and Livingston Counties. This study uses old delineation.

TABLE D57 - ECONOMIC AREA AND SUBAREAS

URBAN - RURAL DISTRIBUTION - 1960

Area and County	Urban		Rural Nonfarm		Rural Farm	
	Number	Percent	Number	Percent	Number	Percent
Rochester SMSA						
Monroe	508,121	86.7%	70,093	11.9%	8,173	1.4%
Barge Canal						
Orleans	11,863	34.7	17,134	50.2	5,162	15.1
Wayne	23,710	34.9	34,474	50.7	9,805	14.4
Subarea Total	35,573	34.8	51,608	50.5	14,967	14.7
Central Plain						
Genesee	22,872	42.4	25,040	46.4	6,082	11.3
Livingston	14,766	33.5	23,800	54.0	5,487	12.5
Ontario	25,656	37.7	33,597	49.4	8,817	13.0
Wyoming	11,040	31.7	17,053	49.0	6,700	19.3
Subarea Total	74,334	37.0	99,490	49.5	27,086	13.5
Allegheny Plateau						
Allegany	8,774	20.0	28,447	64.7	6,757	15.4
Cattaraugus	32,621	40.7	39,200	48.9	8,366	10.4
Potter (Pa.)	2,889	17.5	10,867	65.9	2,727	16.5
Steuben	42,459	43.5	45,641	46.7	9,591	9.8
Subarea Total	86,743	36.4	124,155	52.1	27,441	11.5
Area Totals	704,771	62.5	325,346	30.6	77,667	6.9

TABLE D58 - ECONOMIC AREA AND SUBAREAS

SEX DISTRIBUTION - 1960

Areas and Counties	Males	Females	Sex Ratio (Males ÷ Females)
Rochester SMSA (Monroe County)	283,067	303,320	93
Barge Canal			
Orleans	16,908	17,251	98
Wayne	33,716	34,273	98
Subarea Total	50,624	51,524	98
Central Plain			
Genesee	26,760	27,234	98
Livingston	21,561	22,492	96
Ontario	34,482	33,588	103
Wyoming	18,232	16,561	110
Subarea Total	101,035	99,875	101
Allegheny Plateau			
Allegany	21,707	22,271	97
Cattaraugus	39,857	40,330	99
Potter (Pa.)	8,184	8,299	99
Steuben	48,638	49,053	99
Subarea Total	118,386	119,953	99
Total	553,112	574,672	96

Source: Bureau of the Census

TABLE D59 - ECONOMIC SUBAREAS AND COUNTY

CIVILIAN LABOR FORCE - 1960

Area and County	Total	Males		Females	
		Number	Percent	Number	Percent
Rochester SMSA					
Monroe	242,322	155,556	64.2%	86,771	35.8%
Barge Canal	40,058	26,600	66.4	13,458	33.6
Orleans	13,789	9,315	67.6	4,474	32.4
Wayne	26,269	17,285	65.8	8,984	34.2
Central Plain	76,672	50,917	66.4	25,755	33.6
Genesee	21,155	14,157	66.9	6,998	33.1
Livingston	16,441	10,766	65.5	5,675	34.5
Ontario	26,082	17,318	66.4	8,764	33.6
Wyoming	12,994	8,676	66.8	4,318	33.2
Allegheny Plateau	89,403	60,283	67.4	29,124	32.6
Allegany	15,909	10,841	68.1	5,068	31.9
Cattaraugus	30,669	20,760	67.7	9,909	32.3
Potter (Pa.)	6,043	4,127	68.3	1,916	31.7
Steuben	36,782	24,555	66.8	12,231	33.2

Source: Bureau of the Census

TABLE D60 - ECONOMIC SUBAREAS AND COUNTY

EDUCATIONAL ATTAINMENT

	Percentage Who Completed High School or More (1) (Percent)
SMSA - Monroe	43.5
Barge Canal	
Orleans	34.1
Wayne	34.6
Central Plain	
Genesee	41.9
Livingston	40.3
Wyoming	36.8
Ontario	43.2
Allegheny Plateau	
Allegany	43.5
Cattaraugus	39.3
Steuben	40.3
Potter, Pa.	39.5

(1) Population 25 years of age and older.

Source: Bureau of the Census

TABLE D61 - LAND IN FARMS BY COUNTY

Economic Subareas	Total Land Area (Thousand Acres)	Land in Farms 1954 (Thousand Acres)	Land in Farms 1959 (Thousand Acres)	Percent of All Land 1959
Monroe	431	268	216	50.1%
Barge Canal				
Orleans	253	188	176	69.6
Wayne	388	282	275	70.9
Subtotal	641	470	451	70.4
Central Plain				
Genesee	321	253	239	74.5
Livingston	408	319	288	70.6
Ontario	415	310	284	68.4
Wyoming	383	320	287	74.9
Subtotal	1527	1202	1098	72.0
Allegheny Plateau				
Allegany	671	388	341	50.8
Cattaraugus	854	466	395	46.2
Potter, Pa.	698	192	168	24.1
Steuben	901	602	567	62.9
Subtotal	3124	1648	1471	47.1
Total	5723	3588	3236	56.5

Source: Bureau of the Census

TABLE D62 - ASSESSED VALUATION BY COUNTY - 1960

Metropolitan Area	Assessed Valuation	True Valuation
Monroe	$1,306,734,510	$3,187,157,341
Barge Canal		
Orleans	62,990,703	143,160,680
Wayne	115,094,512	319,706,978
Subtotal	178,085,215	462,867,658
Central Plain		
Genesee	109,232,805	260,078,107
Livingston	95,762,808	212,806,240
Ontario	164,645,595	357,925,207
Wyoming	73,348,941	159,454,220
Subtotal	442,990,149	990,263,774
Allegheny Plateau		
Allegany	91,122,272	211,912,260
Cattaraugus	143,791,029	334,397,742
Potter, Pa.	13,583,435*	32,036,403*
Steuben	206,502,865	430,214,302
Subtotal	454,999,601	1,008,560,707
TOTAL	2,382,809,475	5,648,849,480

* Figures represent 1962 data. All others taken from 1960 data.

Source: NYS Special Report on Municipal Affairs by the State Comptroller, 1961

BASIC STATISTICS

FOR

CATTARAUGUS COUNTY

GENERAL INFORMATION

County seat	Little Valley
Land area (sq. mi.)	1,335
Population	
County, 1960	80,187
Percent of State	0.5%
County, 1950	77,901
County, 1940	72,652
Percent change, 1950-1960	+2.9%
Proportion in communities over 50,000, 1960	0.0%

Largest communities - Cities (C), Villages (V) and Unincorporated Communities (U):	1960 Population	% Change Over 1950
1. Olean (C)	21,868	- 4.4
2. Salamanca (C)	8,480	- 4.3
3. Allegany (V)	2,064	+18.8
4. Gowanda (part) (V)	2,273	+ 2.3
5. Franklinville (V)	2,124	+ 1.5
Rest of county	43,378	+ 8.2

Characteristics of employed workers, 1960			
Total number			28,881
Percent female			32.1%
Percentage distribution by industry			
Manufacturing	33.5	Contract construction	4.8
Service industries	22.0	~~Government~~ Pub Adm	3.0
Retail trade	14.7	Finance, ins., rl. est.	2.5
Agriculture	8.6	Wholesale trade	2.0
Public utilities	7.9	Mining	1.0

Personal income, 1960	
Total	$153,200,000
Percent of State	0.3%
Per capita	$1,913
Upstate average	$2,237
Rank among NYS counties in per capita income excl. N.Y.C.	29

MANUFACTURING STATISTICS

Employment covered by Unemployment Insurance	
Manufacturing, total, March 1961	8,168
Manufacturing, total, March 1958	8,405
Percent change, March 1958-March 1961	-2.8%
Principal industrial groups, March 1961	
1. Machinery (except electrical)	2,402
2. Furniture and fixtures	1,138
3. Electrical machinery	939
4. Food products	784
5. Fabricated metal products	650
6. Lumber and wood products	603

TRADE AND SELECTED SERVICE STATISTICS, 1958
SALES OR RECEIPTS

Retail, total	$90,648,000
Food stores	22,354,000
Automotive dealers	13,159,000
General merchandise group stores	7,974,000
Eating, drinking places	7,404,000
Wholesale, total	40,687,000
Selected services, total	7,353,000
Personal	2,815,000
Auto repair, auto services, garages	1,310,000

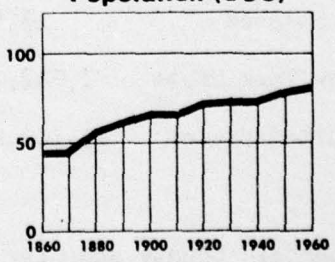
AGRICULTURAL STATISTICS

Percent of acreage in farms, 1959	46.2%
Number of farms, 1959	2,254
Number of farms, 1954	3,040
Average size of farm (acres), 1959	175.2
Value of land and buildings, average per farm, 1959	$16,144
Percent of farms tenant-operated, 1959	4.2%

Value of farm products sold, 1959	$16,407,469
Principal farm products sold, percent of total, 1959	
1. Dairy products	72.5%
2. Livestock and livestock products	14.2%
3. Poultry and poultry products	6.5%

PRINCIPAL INDUSTRIAL AND COMMERCIAL EMPLOYERS

Brown Shoe Co., Inc. (Moench Tanning Co., Inc., subsid.), Gowanda
Dresser Industries, Inc. (Clark Bros. Div.), Olean
Erie-Lackawanna Railroad Co.
Fancher Furniture Co., Salamanca
National Gypsum Co. (Olean Tile Co., Inc., subsid.), Olean
Pennsylvania Railroad Co.



Cattaraugus County produces a variety of manufactured goods, including compressors, diesel engines, furniture, glue and other animal by-products, electrical equipment, cutlery, yarn, food processing machinery, floor and wall tiles, electroplated goods, wood products and food products. The industrial city of Olean, the largest in the county, produces compressors, electronic and power line equipment and cutlery. Its importance as a trading center is increased by the location of St. Bonaventure University in the neighboring village of Allegany.

Dairy farming is the chief agricultural activity, and Cattaraugus ranks high among the milk producing counties of the State. The Allegany Indian Reservation, the largest in the State, and the Allegany State Park are located in the southern portion of the county.

TABLE D63 - VALUE ADDED PER EMPLOYEE - 1958

	All Employees	Value Added by Manufacture, Adj. ($1000)	Value added Per Employee (dollars)
Metropolitan Area			
Monroe	100,876	1,072,709	10,634
Barge Canal			
Orleans	2,004	20,882	10,420
Wayne	6,988	55,181	7,897
Central Plain			
Genesee	5,732	57,183	9,976
Livingston	3,444	25,842	7,503
Ontario	4,179	31,507	7,539
Wyoming	2,863	20,546	7,176
Allegheny Plateau			
Allegany	3,118	29,388	9,425
Cattaraugus	8,325	60,781	7,301
Potter, Pa.	894	3,316	3,709
Steuben	13,524	103,733	7,670
New York State	1,782,380	15,891,767	8,916
United States	15,402,884	141,380,886	9,179

Source: County and City Data Book, 1962, U. S. Department of Commerce

PART TWO

AGRICULTURAL ECONOMY

ECONOMIC RESEARCH SERVICE

PART II

APPENDIX D - ECONOMIC BASE STUDY

THE AGRICULTURAL ECONOMY

of the

GENESEE RIVER BASIN'S ECONOMIC SUBAREAS

Resources - Trends - Projections

UNITED STATES DEPARTMENT OF AGRICULTURE
Economic Research Service
Natural Resource Economics Division

May 1966

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Room 400 - Midtown Plaza
700 E. Water Street
Syracuse, New York 13210

June 8, 1966

Colonel R. Wilson Neff, Dist. Eng.
Buffalo District Corps of Engineers
Foot of Bridge Street
Buffalo, New York 14207

Dear Colonel Neff:

It is my pleasure as Chairman of the Genesee River Basin Field Advisory Committee, United States Department of Agriculture, to submit to you the final reports entitled "Projected Employment and Production in the Forest Industries in Economic Areas of the Genesee River Basin" as prepared by the U. S. Forest Service and "The Agricultural Economy of the Genesee River Basin" prepared by the Economic Research Service.

Members of the United States Department of Agriculture Field Advisory Committee wish to express their appreciation to you and your staff for the fine cooperation in connection with the preparation of these reports.

Please do not hesitate to call on us regarding any comments or clarifications you may have relative to these reports.

Sincerely yours,

Wallace L. Anderson
State Conservationist

FOREWARD

The Corps of Engineers, Department of Defense, has been authorized by a resolution of the Senate Committee on Public Works to prepare a comprehensive plan for the development of the water and related land resources of the Genesee River Basin in the combined interest of flood prevention, navigation, water supply, water quality control, recreation, and other beneficial uses.

To insure broad and adequate coverage of these subjects, the Corps of Engineers requested the participation of several State and Federal agencies including the Department of Agriculture. The Department of Agriculture is carrying out this assignment under authority contained in Section 6 of Public Law 566 and in accordance with a Memorandum of Understanding dated February 2, 1956, by Soil Conservation Service, Forest Service, and Agricultural Research Service. In 1961, the Economic Research Service succeeded to the responsibility formerly carried by the Agricultural Research Service.

The general Economic Base Study is being prepared by the New York Department of Conservation, Division of Water Resources.

United States Department of Agriculture participation is directed and coordinated by a USDA Field Advisory Committee composed of Wallace L. Anderson (Chairman), Soil Conservation Service; Frank J. Paradise, Forest Service; and Wayne F. Ehlers, Economic Research Service.

The attached report was prepared by Charles S. Hunt, Jr., Agricultural Economist, Natural Resource Economics Division, Economic Research Service, Cornell University, Ithaca, New York, under the supervision of Wayne F. Ehlers, Leader, Northeastern Resource Group, Natural Resource Economics Division, Economic Research Service, Upper Darby, Pennsylvania.

PART II

AGRICULTURAL ECONOMY

TABLE OF CONTENTS

Title	Page Number	Table Number
SUMMARY	D - II - iii	
NATURE OF THE PROBLEM AND NEED FOR STUDY	D - II - 1	
A. General	D - II - 1	
B. Problems associated with the Economic Base Study	D - II - 1	
GENERAL PROCEDURE	D - II - 2	
PROJECTED NEEDS FOR AGRICULTURAL PRODUCTION	D - II - 4	
A. National Population, Employment and Income	D - II - 4	1
B. Farm Output by Regions	D - II - 4	2,3
C. Per Capita Consumption Trends	D - II - 8	4
D. Agricultural Production Requirements	D - II - 10	
1. National	D - II - 10	5,6
2. Regional	D - II - 10	7,8
3. Basin	D - II - 10	
GENESEE RIVER BASIN ECONOMIC SUBAREAS		
INTRODUCTION AND GENERAL DESCRIPTION	D - II - 15	A1,A2
VALUE OF AGRICULTURAL PRODUCTION	D - II - 16	9,10,A3
FARM EMPLOYMENT IN THE GENESEE RIVER BASIN ECONOMIC SUBAREAS	D - II - 19	11,12,A4

SUMMARY

This report is concerned with the resources, trends, and projections of the agricultural economy of the Genesee River Basin's Economic Area.

The Basin's Economic Area pertains to the agricultural portion of the overall Economic Base Study being made by the State of New York, Department of Conservation, Division of Water Resources. The actual Drainage Area Study is needed to properly evaluate any proposed water development projects; and, the Service Area is being considered primarily for its potential requirements for Genesee River Basin water for irrigation. The Drainage Area and the Service Area Studies are being included in the United States Department of Agriculture Report.

Future production of agricultural products from the study areas has been derived from National and regional requirements based on National projections of population, per capita consumption rates, and imports and exports. These requirements indicate that by 2020 the output of livestock products will need to be more than three times the 1960 output, and crop production will have to more than double. Regional requirements consider interregional advantages or disadvantages in the production of various farm products.

The rural population, agricultural production and farm employment in the Genesee River Basin's Economic Area and Subareas are discussed. The rural farm population has been decreasing steadily since the early 1900s and is expected to continue this trend. However, total rural population has gained in some counties and declined in others. The value of agricultural production is expected to increase from 176 million dollars in 1960 to 258 million dollars in 1980 and to 584 million dollars in 2020, or a 47 percent and 232 percent increase, respectively. Milk, fruit, and vegetables are expected to increase their share of the Basin's production between 1960 and 2020; while beef, wheat, and potato production is expected to decline. Farm employment is expected to decline until about 1990 due to increased labor efficiency. Thereafter, employment is expected to increase because projected output is estimated to increase faster than labor efficiency in the study area.

THE AGRICULTURAL ECONOMY OF THE GENESEE RIVER BASIN

The intent of this report is to present information concerning projected agricultural output and to relate output to the agricultural resource base and its potential future use and development.

NATURE OF THE PROBLEM AND NEED FOR STUDY

A plan for water and related land resource use and development requires consideration of future needs and relative importance of various water uses. Future needs for water in agriculture and the associated economic value will depend on several factors. Among these are:

1. The combined effect on National requirements for agricultural products of (a) population growth, (b) improved dietary standards resulting from higher levels of income per capita, and (c) expected shifts in exports of agricultural products.

2. Shifts in economic advantage between agricultural regions of the country.

3. Effect on the availability of land for agricultural production because of (a) expanding non-agricultural use of land for highways, houses, factories, etc., and (b) retirement of less productive land from intensive agricultural use.

4. Advancements in agricultural technology resulting in improvements in the production and utilization of crops and pasture.

5. Opportunities for more intensive use of agricultural land and resources resulting in increases in output and associated cost.

6. Opportunities for resource development resulting in increases in output and changes in cost.

PROBLEMS ASSOCIATED WITH THE ECONOMIC BASE STUDY

The small size of the Genesee River Basin has made necessary the development of two separate subarea breakdowns for agriculture. Meeting the needs of the Economic Subarea Report required the inclusion of large areas of land that are outside of the drainage area. However, economic evaluation of the many proposed water control structures will require that the data be confined to the drainage area.

The part of this report concerning the Economic Subareas may be considered as an agricultural supplement to the New York State Water Resource Commission's "Economic Base Study". The second part is one of several Department of Agriculture special studies reports covering trends and projections for the Genesee Basin Drainage Area alone. In addition, a Service Area along the Barge Canal from Lockport to Rochester was considered, particularly as to its needs for irrigation water.

GENERAL PROCEDURE

Major procedural elements of the study are outlined here and discussed briefly to provide a general understanding of how the study was undertaken.

1. National projections of population growth were provided by the Economic Task Group of the ad hoc Water Resource Council. These National population projections along with improvements in dietary standards, and expected changes in exports and imports were utilized in estimating National requirements as shown in "Current and Projected Agricultural Product Requirements, United States", Water Resources Branch, Natural Resource Economics Division, Economic Research Service, USDA, July 1965 (unpublished). Middle Atlantic[1/] projections of future agricultural output were developed by examination of past agricultural production trends in the seven states involved relative to National production. These trends provide the basis for determining the Middle Atlantic's output in relation to National production requirements. These projections were developed Nationally so that interregional shifts and comparative advantage of different regions were considered. Similarly, future Basin agricultural output was also developed by examining

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1/ The seven Middle Atlantic states are: New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and West Virginia.

past trends in production and determining the Basin's relationship to the seven-state Middle Atlantic production.

2. Estimates of retirement from cultivation of less productive land were determined by several methods; (a) past trends of cropland harvested as reported in the Census of Agriculture and projected by the least squares method; (b) data from the United States Inventory of Conservation Needs provided acreage for major soil groups by major land use. Assuming that only the cropland in Land Capability Classes I and II would have the productivity potential required to remain in agriculture in the year 2020, present cropland was predicted to decline at a constant rate until 2020; (c) unpublished data furnished by the New York State College of Agriculture provided information on: (1) the level of intensity that farms in the Basin were used in 1958, (2) the cropland acreage on the average farm in each intensity class, and (3) an estimate of the number of farms in each intensity class. Using this data and assuming that only those farms currently being used at the most intensive level would remain in farming in 2020, cropland acreage available for agricultural production for the decades from 1960 to 2020 was established. Monroe was the only county for which additional adjustment was made for the loss of cropland to increased non-agricultural use.

3. Crop yields for the decades from 1960 to 2020 were estimated by assuming a two percent annual increase in yields. The reasonableness of the yields in 2020 was assumed if the yields were within 10 - 15 percent of maximum yields currently obtained. These yields are very close to the projected yields estimated by The Pennsylvania State University.1/ Irrigation was assumed only for those crops commonly irrigated -- these are confined to a few vegetable crops. In general, 2020 crop yields are estimated to be about three times the average yields obtained in 1960. The only major crop diverging from this pattern is apples since an entirely new set of cultural practices is expected to increase yields from five to six times present yields.

4. For the decades from 1960 to 2020, production was estimated by projecting acreage and yield of individual crops. Initial analysis assumed present percentage distribution of acreage in each crop will continue. If a shortage of production occurs in future decades, adjustment in the

1/"Projection of Crop Yields and Rates of Fertilizer Application for Major River Basins in Eastern and Northeastern United States", Agricultural Experiment Station, Pennsylvania State University, 1964.

crop mix will be made to determine if the shortage can be met without resource development.

5. No production levels are projected for milk yield per cow or eggs per hen. However, feeding efficiency levels, as projected, assume higher production levels.

PROJECTED NEEDS FOR AGRICULTURAL PRODUCTION

National Population, Employment, and Income

The projections are based on specified assumptions relating to population, economic growth, technology, and trends in per capita use of farm products. They assume no major changes in present farm policy or major disruptive world events.

The Economic Task Group of the Water Resources Council has provided projections through the year 2020 (Table 1). (From unpublished report of USDA-ERS, July 1965).

Domestic demand for farm products will continue to expand beyond the next half century in response to population growth and rising living standards.

Farm Output by Regions

Farm output for the United States has expanded nearly two percent per year since 1939. Table 2 presents index numbers of total farm output for the ten farm production regions of the forty-eight states. The Northeast Region includes eleven states.1/ These index numbers do not indicate the relative importance of each region to the other regions, but show the change in total farm output that has taken place within the region.

Acreages and index numbers of cropland used for crops, and index numbers of crop production per acre for the United States and the Northeast Region are shown in Table 3.

1/ The eleven Northeast States are: Maine, New Hampshire, Vermont Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware and Maryland.

Table 1.--Population, employment, Gross National Product, personal income and per capita income, United States, 1960, and projections by decades from 1970 to 2020.

	1960	Projections					
		1970	1980	1990	2000	2010	2020
	Millions	Millions	Millions	Millions	Millions	Millions	Millions
Population	180.0[1/]	207.0	245.3	288.0	338.2	398.0	469.1
Employment, total	66.4	78.5	94.8	110.1	130.6	153.0	181.2
	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
Employment, Agricultural	4,529	3,090	2,370	2,020	1,809	1,705	1,663
	Billion dollars	Billion dollars	Billion dollars	Billion dollars	Billion dollars	Billion dollars	Billion dollars
Gross National Product	440	620	1,001	1,460	2,144	3,120	4,686
Personal income	352	497	785	1,180	1,680	2,465	3,630
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Gross product per capita	2,444	2,995	4,081	5,069	6,339	7,839	9,989
Per capita income	1,955	2,396	3,200	3,925	4,967	6,250	7,738

1/ 1959-61 average = 180.8

Table 2.--Index numbers of farm output, by regions, 1939-64[1/]

(1957-59 = 100)

Year	Northeast	Lake States	Corn Belt	Northern Plains	Appalachian	Southeast	Delta States	Southern Plains	Mountain	Pacific	United States
1939	74	69	67	50	85	75	87	72	56	60	68
1940	77	74	66	58	83	78	80	82	61	62	70
1941	77	72	71	72	81	70	84	78	69	65	73
1942	84	81	79	90	90	82	96	88	72	66	82
1943	83	78	78	86	87	86	90	83	76	69	80
1944	86	77	76	89	96	88	94	93	75	71	83
1945	85	82	76	91	94	88	86	77	74	72	81
1946	91	81	82	87	102	86	79	78	74	78	84
1947	87	77	68	88	98	86	85	92	78	76	81
1948	90	83	88	92	103	91	110	84	81	77	88
1949	92	84	84	77	99	85	93	108	78	79	87
1950	96	83	83	88	98	85	88	84	80	81	86
1951	97	87	83	85	106	100	95	85	83	86	89
1952	96	90	89	93	103	93	100	87	89	90	92
1953	99	91	87	85	101	104	109	90	94	91	93
1954	99	93	90	88	103	92	102	90	88	93	93
1955	98	95	94	84	106	111	117	92	91	93	96
1956	101	98	96	81	111	107	108	87	91	97	97
1957	96	97	95	92	94	95	93	90	96	97	95
1958	104	100	100	112	102	99	93	105	103	98	102
1959	100	103	105	96	104	106	114	105	101	105	103
1960	103	102	106	113	107	108	110	112	102	102	106
1961	105	107	106	101	109	118	118	113	101	103	107
1962	100	103	107	112	113	110	118	106	104	108	108
1963	101	108	115	111	116	120	132	109	107	110	112
2/1964	100	105	109	111	117	123	137	110	106	112	111

1/ Changes in Farm Production and Efficiency, A Summary Report, 1965, USDA Statistical Bulletin No. 233, July 1965.

2/ Preliminary.

Table 3.--Acreage and index numbers of cropland used for crops, and index numbers of crop production per acre, Northeast and United States. 1939-64. 1/

(1957-59 = 100)

Year	Northeast region			United States		
	Cropland acreage	Cropland acreage	Production per acre	Cropland acreage	Cropland acreage	Production per acre
	Million acres	Index number	Index number	Million acres	Index number	Index number
1939	19.2	124	76	363	102	74
1940	19.7	127	77	368	103	76
1941	19.7	128	74	367	103	77
1942	20.1	130	79	370	104	86
1943	20.1	130	73	377	106	78
1944	20.7	134	75	379	106	83
1945	19.9	129	74	372	104	82
1946	19.3	125	88	369	103	86
1947	18.1	117	85	373	104	82
1948	17.9	116	91	378	106	92
1949	17.2	112	90	387	108	85
1950	17.1	110	96	377	106	84
1951	17.0	110	95	381	107	85
1952	16.9	109	92	380	106	90
1953	16.8	109	94	380	106	89
1954	16.6	108	94	380	106	88
1955	16.4	106	92	378	106	91
1956	15.9	103	99	369	103	92
1957	15.7	102	92	358	100	93
1958	15.5	100	106	355	99	105
1959	15.2	98	102	358	101	102
1960	14.9	97	108	355	99	109
1961	14.6	94	114	339	95	113
1962	14.4	93	105	330	92	116
1963	14.6	94	105	336	94	119
1964	2/ 14.5	94	104	334	94	116

1/ Cropland used for crops is the sum of the acreage of land from which one or more crops were harvested plus acreage of crop failure and summer fallow.

2/ Preliminary.

Per Capita Consumption Trends

Estimated per capita consumption rates for a selected group of agricultural products through the year 1980 are given in Table 4. It appears reasonable to assume that per capita rates will be at a desirable level at that time and will not change appreciably on to 2020.

Levels of income, changes in consumption habits and nutritional developments will play important roles in determining the quantities of individual foods consumed. Changes will be toward increased consumption of higher cost food, such as, meat and most other livestock products, many fruits and vegetables; and a decline in the per capita use of cereals, potatoes, and other heavy carbohydrate foods.

Table 4.--Per capita uses of major farm products and projections; and Indexes of per capita utilization, 1959-61, 1970, and 1980.

(1959-61 = 100)

Commodity	Per capita use			Index of per capita utilization	
	1959-61	1970	1980	1970	1980
	Pounds	Pounds	Pounds		
1/Meat:					
Beef	84.9	102.7	112.0	121	133
Veal	5.9	5.3	5.0	111	88
Lamb	4.9	4.3	3.5	88	71
Pork (excluding lard)	65.0	62.5	58.0	96	89
Total red meat	160.7	174.8	178.5	109	111
Dairy products:					
Fluid milk and cream	323.0				
Other	330.0				
Total milk equivalent	653.0	620.0	570.0	95	87
2/Poultry:					
Chickens	29.1	32.8	34.5	113	119
Turkeys	6.7	10.3	11.0	154	164
Total poultry	35.8	43.1	45.5	120	127
Eggs (number)	352.8	337.6	304.0	96	86
Soybeans	150.6	208.5	217.5	138	144
Flax	7.0	4.5	4.0	64	57
Wheat	165.0	149.0	143.0	90	87
3/Rice	6.6	6.9	7.0	104	106
Rye	1.4	1.1	1.0	79	71
4/Peanuts	6.8	6.9	7.0	101	103
Wool, apparel, scoured	1.4	1.4	1.4	100	100
5/Sugar crops	104.0	103.9	103.8	100	100
Fruits, noncitrus	114.2	119.0	122.0	104	107
Tree nuts (shelled)	1.6	1.6	1.6	100	100
Vegetables, all, including melons	228.5	232.0	233.0	102	102
Potatoes	108.0	109.0	110.0	101	102
Sweetpotatoes	7.6	6.1	5.5	80	72
Dry beans	7.7	7.3	7.1	95	92
Dry peas	0.4	0.4	0.4	100	100
Tobacco	7.6	7.6	7.6	100	100

1/ Carcass weight.
2/ Ready to eat.
3/ Milled basis.
4/ Farm stock basis.
5/ Raw equivalent.

Agricultural Production Requirements

National

Estimates of the demand for agricultural products as determined from population growth and per capita consumption trends are given in Table 5. These requirements are shown as indexes in Table 6.

Projected requirements indicate that by 2020 the output of livestock products will need to be more than three times the 1960 output and for crops more than double the 1960 level.

Regional

Regional output for the seven states comprising the Middle Atlantic Region were determined so that consideration was given to interregional advantages or disadvantages in the production of various farm products.

Middle Atlantic production as a percent of National production is given in Table 7, and projected production is given in Table 8. Percentages beyond 1980 are assumed to be unchanged.

Genesee River Basin

Future agricultural product output for the Genesee River Basin was based on past trends in Basin production relative to the Middle Atlantic Production.

Projections of agricultural product output for the Economic Subareas were made by extending past trends in the Basin's share of Middle Atlantic production as determined from an examination of county census data. Projections are given in the dollar value of production expressed in terms of 1960 price levels.

Projections of agricultural product output for the Basin's drainage area were derived in the same manner. These projections are shown in the United States Department of Agriculture Report. Because of the Basin's small size, it was necessary to use census data for towns. Township data were further broken down on a part-town basis, where necessary, in order to make the best estimates of production in the Basin's watersheds as delineated by the Soil Conservation Service. (These data will appear later in the watershed reports). In the United States Department of Agriculture Report, data were summarized for the Basin's two Land Resource Areas. Final projections are expressed in quantities of products required rather than in dollars.

Table 5.--Current and projected United States requirements for major farm products, 1959-61 average, and by decades from 1970 to 2020

Commodity	Unit	Average 1959-61	Projections					
			1970	1980	1990	2000	2010	2020
		Millions	Millions	Millions	Millions	Millions	Millions	Millions
Beef and veal	Lb.-Live wt.	28,204	36,742	47,520	56,313	66,649	78,964	93,605
Lamb and mutton	Lb.-Live wt.	1,657	1,737	1,701	2,011	2,377	2,812	3,330
Pork	Lb.-Live wt.	20,563	21,782	23,959	28,145	33,066	38,927	45,897
Milk	Pound	121,146	132,418	144,213	168,552	197,166	231,252	271,779
Broilers	Lb.-Live wt.	6,302	8,400	10,605	12,389	14,488	16,987	19,959
Chickens	Lb.-Live wt.	1,269	1,354	1,562	1,825	2,134	2,502	2,940
Turkeys	Lb.-Live wt.	1,540	2,816	3,559	4,170	4,888	5,743	6,760
Eggs	Number	65,008	70,809	75,648	88,733	104,173	122,602	144,363
		Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
Wheat	Bushel	1,185,533	1,406,883	1,586,383	1,711,733	1,858,833	2,029,400	2,227,700
Rye	Bushel	29,929	34,946	39,393	44,429	52,018	59,607	69,804
Rice	Cwt.	52,960	74,210	84,000	89,350	95,680	103,260	112,120
Flax	Bushel	28,411	24,250	22,518	25,446	29,161	33,393	38,500
Soybeans	Bushel	597,600	1,033,333	1,267,300	1,433,333	1,600,417	1,812,500	2,074,700
Peanuts	Pound	1,760,000	2,011,000	2,402,000	2,815,000	3,293,000	3,825,000	4,550,000
Sugar beets	Ton	14,813	25,860	37,733	48,905	62,053	77,702	96,320
Dry beans	Cwt.	18,570	18,490	20,410	23,700	27,640	32,340	37,850
Dry peas	Cwt.	4,010	3,380	3,540	4,000	4,610	5,290	6,130
Potatoes	Cwt.	258,230	297,080	352,620	412,600	485,330	571,000	672,320
Sweetpotatoes	Cwt.	17,110	16,530	18,060	21,140	24,870	29,310	34,460
Vegetables	Cwt.	416,640	485,040	576,830	676,320	793,290	932,620	1,098,290
Fruits, noncitrus	Ton	8,098	9,362	11,687	14,292	17,354	21,002	25,338
Tree nuts, in shell	Pound	473,004	591,255	763,000	957,270	1,182,510	1,452,798	1,773,765
Tobacco	Pound	1,862,000	1,998,000	2,264,000	2,589,000	2,970,000	3,425,000	3,965,000

Table 6.--Index of total food and fibre requirements, United States, 1959-61 average, and projections by decades from 1980 to 2020.

Commodity	Average 1959-61	Projections					
		1970	1980	1990	2000	2010	2020
Beef and veal	100	130	168	200	236	280	332
Lamb and mutton	100	105	103	121	143	170	201
Pork	100	106	117	137	161	189	223
Chickens	100	129	161	188	220	257	302
Turkeys	100	183	231	271	317	373	439
Milk	100	109	119	139	163	191	224
Eggs	100	109	116	136	160	189	222
Wheat	100	119	133	144	156	171	188
Rye	100	117	132	148	174	199	233
Rice (rough)	100	140	159	169	181	195	212
Flax	100	85	79	90	103	118	136
Soybeans	100	173	212	240	268	303	347
1/ Peanuts	100	114	136	160	187	217	259
Sugar, cane	100	181	264	342	433	543	673
Sugar, beet	100	175	255	330	419	525	650
Dry beans	100	100	110	128	149	174	204
Dry peas	100	84	88	100	115	132	153
Potatoes	100	115	137	160	188	221	260
Sweetpotatoes	100	97	106	124	145	171	201
Vegetables	100	116	138	162	190	224	263
Fruits, noncitrus	100	116	144	176	214	259	313
Tree nuts	100	125	161	202	249	307	375
2/ Tobacco	100	107	122	139	160	184	213

1/ Farm stock basis.
2/ Unstemmed - Processing weight equivalent.

Table 7.--Middle Atlantic Region's production as a percent of United States' production for livestock products and non-feed crops, 1959-61 average, and projections for 1970 and 1980. 1/

Commodity Group	Average 1959-61	Projections 1970	Projections 1980
	-Percent-		
Livestock products:			
Dairy	18.2	19.1	20.0
Beef and veal	5.1	4.6	4.0
Pork	2.7	2.4	2.0
Lamb and mutton	3.6	3.7	3.8
Eggs	15.1	13.5	12.0
Poultry			
Turkeys	8.1	6.6	5.0
Farm chickens	13.2	12.5	12.0
Broilers	18.7	16.3	14.0
Non-feed crops:			
Wheat	2.9	2.5	2.0
Vegetables	14.5	14.3	14.0
Potatoes	15.0	14.5	14.0
Rye	7.3	6.6	6.0
Fruits and nuts	17.6	18.3	19.0
Soybeans	3.1	3.1	3.0
Dry beans	5.9	6.5	7.0
Sweetpotatoes	23.6	23.8	24.0
Tobacco	12.2	11.8	11.5

1/ Percentages for years beyond 1980 to 2020 are assumed to show no change in percentages of United States for the Middle Atlantic Region.

Table 8.--Current and projected Middle Atlantic Region requirements for major farm products, 1959-61 average, and by decades from 1970 to 2020

Commodity	Unit	Average 1959-61	Projections					
			1970	1980	1990	2000	2010	2020
		Millions	Millions	Millions	Millions	Millions	Millions	Millions
Beef and veal	Lb.-Live wt.	1,438	1,690	1,901	2,253	2,666	3,159	3,744
Lamb and mutton	Lb.-Live wt.	60	64	65	76	90	107	127
Pork	Lb.-Live wt.	555	523	479	563	661	779	918
Milk	Pound	22,049	25,292	28,843	33,710	39,433	46,250	54,356
Broilers	Lb.-Live wt.	1,178	1,369	1,485	1,734	2,028	2,378	2,794
Chickens	Lb.-Live wt.	168	169	187	219	256	300	353
Turkeys	Lb.-Live wt.	125	186	178	208	244	287	338
Eggs	Number	9,816	9,559	9,078	10,648	12,501	14,712	17,324
		Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
Wheat	Bushel	34,380	35,172	31,728	34,235	37,177	40,588	44,544
Rye	Bushel	2,185	2,306	2,364	2,666	3,121	3,576	4,188
Soybeans	Bushel	18,526	32,033	38,019	43,000	48,013	54,375	62,241
Dry beans	Cwt.	1,096	1,202	1,429	1,659	1,935	2,264	2,650
Potatoes	Cwt.	38,734	43,077	49,367	57,764	67,946	79,940	94,125
Sweetpotatoes	Cwt.	4,038	3,934	4,334	5,074	5,969	7,034	8,270
Vegetables	Cwt.	60,413	69,361	80,756	94,685	111,061	130,567	153,761
Fruits, noncitrus	Ton	1,425	1,713	2,221	2,715	3,297	3,990	4,814
Tobacco	Pound	227,164	236,760	260,360	297,735	341,550	393,875	455,975

GENESEE RIVER BASIN ECONOMIC SUBAREAS

This section of the Economic Base Study deals with population, employment, and production in the agricultural sector of the Basin's economy and for the Economic Subareas as delineated in the October 1963 report by the New York State Department of Conservation, Division of Water Resources. The four Economic Subareas follow county lines and are as follows:

Metropolitan Area	-	Monroe County, N.Y.
Barge Canal Area	-	Wayne and Orleans Counties, N.Y.
Central Plain Area	-	Ontario, Livingston, Genesee, and Wyoming Counties, N.Y.
Allegheny Plateau	-	Steuben, Allegany, Cattaraugus, N.Y. and Potter, Pa., Counties.

TOTAL RURAL AND RURAL-FARM POPULATION

Total rural population includes those persons not living in urban areas. Urban areas are defined in the Census of Population, 1960, as: (a) those places of 2,500 inhabitants or more incorporated as cities, boroughs, villages, and towns (except towns in New England, New York, and Wisconsin); (b) the densely settled urban fringe, whether incorporated or unincorporated, of urbanized areas; (c) towns in New England and townships in New Jersey and Pennsylvania which contain no incorporated municipalities as subdivisions and which have either 25,000 inhabitants or more, or a population of 2,500 to 25,000, and a density of 1,500 persons or more per square mile; (d) counties in states other than the New England States, New Jersey, and Pennsylvania, that have no incorporated municipalities within their boundaries and have a density of 1,500 persons or more per square mile; and (e) unincorporated places of 2,500 inhabitants or more.

Rural farm population includes those persons living on farms. Farms are defined in the Census of Agriculture as those places of ten or more acres from which sales of farm products amounted to $50 or more in 1959, or on places of less than ten acres from which sales of farm products amounted to $250 or more in 1959.

Farm population in the United States has declined from 30.1 percent of total population in 1920 to 8.7 percent in 1960. Farm population in New York and Pennsylvania declined from 9.2 percent in 1920 to 2.9 percent in 1960.

Rural non-farm population in the United States has increased from 18.7 percent of the total population in 1920 to 21.4 percent in 1960. Rural non-farm population in New York and Pennsylvania increased from 8.7 percent in 1920 to 21.7 percent in 1960. Total rural population increased from 17.9 percent of total population in 1920 to 24.6 percent in 1960.

Between the years 1950 and 1960, rural farm population decreased from all counties in the Genesee River Basin Economic Subareas. A decrease in the number of farms, greater labor efficiency, greater mechanization and alternative employment opportunities in other occupations have been among the more important forces contributing to a decline in farm population.

No consistent trend in total rural population is evident for all counties in the Basin. An increase in rural population from 1950 to 1960 is found in Cattaraugus, Genesee, Ontario, Orleans, Steuben and Wyoming Counties, New York, and in Potter County, Pennsylvania. A decline in rural population occurred in Allegany, Livingston, Monroe and Wayne Counties, New York.

Projections were made of rural population, both farm and total rural population by Economic Subareas. These projections are shown in Appendix Table 1 and by percentages in Appendix Table 2 .

VALUE OF AGRICULTURAL PRODUCTION

The value of agricultural products sold includes income to agriculture from sales of crops and livestock products.

The cash value of on-farm domestic consumption of farm products is quite low and was not considered. For New York, it was estimated as 6.5 percent of cash receipts in 1949, 3.9 percent in 1959, and 2.4 percent in 1962. It can be assumed that the value of on-farm consumption is directly related to farm population. This form of consumption is expected to decline in relative importance because farm population is expected to decline while total farm production is expected to increase.

Projected values of agricultural products are based on 1959-60 price levels. These prices were applied to the projected quantity of major items produced in the Basin. The level of production was determined by deriving the Basin's share of projected Middle Atlantic production. The value of production for the Basin was distributed to Economic Subareas by projecting past trends for each Subarea relative to total Basin production.

It was estimated that two of the Economic Subareas would experience a decline in their percentage of Basin production, the Metropolitan Area and the Allegheny Plateau Area. Urban expansion in the Metropolitan area is expected to take much of the cropland out of agriculture. Shifts out of agriculture of less productive lands in the Allegheny Plateau Area will cause decline in the value of production in that area.

The remaining two Economic Subareas, Central Plain Area and Barge Canal Area, are expected to gain in percentage of total Basin production.

Major livestock, products and crops produced in the Basin are beef, milk, wheat, potatoes, fruit, and vegetables. Table 9 indicates the levels of production and percentage of total production of these livestock products and crops estimated for 1970, 1980 and 2020.

Table 9.--Estimated production and distribution of major products, Genesee River Basin Economic Area, 1970, 1980 and 2020.

Product	Value[1/]			Percent of total production		
	1970	1980	2020	1970	1980	2020
	Thousand dollars			Percent		
Beef and veal	21,160	24,840	41,584	10.5	9.6	7.1
Milk	108,626	144,578	358,621	53.7	56.2	61.4
Wheat	9,686	11,456	18,241	4.8	4.4	3.1
Potatoes	13,758	15,784	27,022	6.8	6.1	4.6
Fruit	25,984	36,686	83,781	12.8	14.3	14.3
Vegetables	11,658	15,196	39,034	5.8	5.9	6.7
Other	11,342	9,128	16,081	5.6	3.5	2.8
Total	202,214	257,668	584,364	100.0	100.0	100.0

1/ All values are in 1959-60 prices for New York State

The total estimated future value of agricultural production by decades and by Economic Subareas is given in Appendix Table 3.

The percentage distribution for major agricultural products for the Economic Subareas is given in Table 10.

Table 10.--Percentage distribution of major agricultural production by Economic Subareas, 1960, and projected for 1980 and 2020.

Economic Subareas and years	Milk	Cattle	Fruit	Vegetables
		Percent		
Metropolitan				
1960	7.4	7.6	12.7	16.1
1980	5.1	5.0	10.0	13.8
2020	1.0	1.0	5.0	9.0
Barge Canal				
1960	9.8	11.3	72.6	34.9
1980	12.8	12.2	78.7	36.4
2020	19.0	15.0	89.7	40.0
Central Plain				
1960	42.2	40.3	8.4	41.2
1980	50.1	47.6	6.1	39.8
2020	65.0	59.0	2.0	36.5
Allegheny Plateau				
1960	40.6	40.8	6.3	7.8
1980	32.0	35.2	5.2	10.0
2020	15.0	25.0	3.3	14.5

In the Allegheny Plateau Area, the predominance of less productive soils is expected to contribute to a major decline in milk production while the decline in beef production will not be so extreme. Most of the fruit produced is expected to be berries, while potatoes are expected to remain a major crop.

The expected expansion of fruit production in the Barge Canal Area will probably result in a decline of fruit production in the Central Plain and the Metropolitan Areas.

FARM EMPLOYMENT IN THE GENESEE RIVER BASIN ECONOMIC SUBAREAS

Projections of future labor requirements for the Genesee River Basin were derived by applying estimated per unit labor factors to the type and quantity of agricultural production for the years for which projections were being made. Allowances were made for minor products and labor needs for overhead, such as: fence or building repairs, etc.

It was assumed that improvements in technology, mechanization, and increased farm size would all continue at about the same rate of adoption and development. Coincidental with these developments would be improvements in labor efficiency. (For details, see Appendix Table 4). The ultimate results of these improvements will be a continuation of the trend which shows that farm output per man-hour has been steadily increasing.

The total labor requirement for agricultural production within the Basin depends, therefore, on labor efficiency and total agricultural production.

The trend in demand for agricultural production has not been as great as the increase in the efficiency of labor. As a result, the labor requirement has been declining. This trend was projected to continue into 1990 (Table 11). Percentage distribution of agricultural labor in the Genesee River Basin among the Economic Subareas is shown in Table 12. By 2020, the level of agricultural production was projected to be sufficiently high and the rate of labor efficiency increase slowed down so that the total labor requirement would increase even though labor efficiency would continue to improve. A major part of the projected labor requirements for 1980, more than 47 percent, would be used in the production of milk. Livestock products, 9 percent; vegetables, 7 percent; roughage feeds, 11 percent; grain 10 percent; and fruit, 12 percent; would account for most of the labor needs.

Given a constant number of hours worked per year for each worker, total employment in terms of the number of workers would drop in direct relation to the drop in number of hours required. Recent trends show that the labor requirement has dropped at a rate

Table 11.--Labor requirements in man-hours for agricultural production by Economic Subareas of the Genesee River Basin, 1960, and projections by decades from 1970 to 2020.

Economic Subareas	1960	Projections					
		1970	1980	1990	2000	2010	2020
	Thousand Man Hours						
Metropolitan	4,153	3,549	2,871	2,193	1,866	1,407	1,047
Barge Canal	8,401	9,919	10,069	9,477	9,855	9,848	10,123
Central Plain	18,854	18,700	18,339	17,858	19,751	21,063	24,871
Allegheny Plateau	16,323	13,331	11,569	9,635	9,084	7,878	7,593
Total	47,731	45,499	42,848	39,163	40,556	40,196	43,634

Table 12.--Labor requirements for agricultural production by Economic Subareas of the Genesee River Basin as a percentage of total Basin labor requirements, 1960, and projections by decade 1970-2020.

Economic Subarea	1960	Projections					
		1970	1980	1990	2000	2010	2020
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Metropolitan	8.7	7.8	6.7	5.6	4.6	3.5	2.4
Barge Canal	17.6	21.8	23.5	24.2	24.3	24.5	23.2
Central Plain	39.5	41.1	42.8	45.6	48.7	52.4	57.0
Allegheny Plateau	34.2	29.3	27.0	24.6	22.4	19.6	17.4
Total	100.	100.	100.	100.	100.	100.	100.

which is sufficiently rapid to have the effect of reducing the number of full time workers required. It is difficult to convert man-hours to employment in agriculture because of family and part-time workers.

Future estimates of farm employment equivalents in terms of man-years are somewhat arbitrary. Type of farming has an important effect on the number of hours worked during the year for each employee. Dairy farming has a relatively constant daily labor requirement throughout the year resulting in a high yearly total of hours worked, while field crop, fruit, and vegetable farming has peak seasonal demands resulting in lower yearly totals. With the large increase in dairy production in the Basin along with a decline in grain production, hours worked during the year could be expected to remain high despite National trends toward fewer hours worked per year per employee. Analysis of New York Cost Account Farms[1/] shows little change over time in the average man-hours per year per man. In 1914, the average hours worked per man were 2,975 and in 1953, 2,823 hours. Estimates of the number of persons employed in agriculture, based on the use of annual average of hours worked, are difficult to make for the Genesee River Basin because of the large number of migrant workers employed in the harvest of potatoes, fruit, and vegetables. However, the projections of labor efficiency are based on the almost complete change to mechanical harvesting of these crops.

1/ "Forty Years of Farm Cost Accounts", A.E. 984, Department of Agricultural Economics, Cornell University Agricultural Experiment Station, New York State College of Agriculture, Cornell University, Ithaca, New York. July 1955.

Appendix Table 1.--Estimated rural farm population and rural non-farm population of Economic Subareas, Genesee River Basin Economic Areas, 1959, and projections by decades from 1970 to 2020.

Economic Subareas	1959	Projections					
		1970	1980	1990	2000	2010	2020
Metropolitan Subarea							
Rural Farm	8,173	7,900	7,200	6,500	5,300	3,600	1,400
Rural Non-farm	70,093	75,700	81,600	86,200	89,500	90,700	90,300
	78,266	83,600	88,800	92,700	94,800	94,300	91,700
Barge Canal Subarea							
Rural Farm	14,967	12,600	11,500	10,800	10,300	9,600	9,500
Rural Non-farm	51,608	63,800	72,000	79,800	88,400	96,900	105,400
	66,575	76,400	83,500	90,600	98,700	106,500	114,900
Central Plain Subarea							
Rural Farm	26,086	20,900	18,800	17,700	16,800	15,000	13,100
Rural Non-farm	99,490	116,700	128,500	140,200	150,700	159,900	169,100
	125,576	137,600	147,300	157,900	167,500	174,900	182,200
Allegheny Plateau							
Rural Farm	27,603	21,900	20,300	18,500	16,200	14,200	12,200
Rural Non-farm	123,993	144,500	160,600	171,400	180,900	191,200	200,700
	151,596	166,400	180,900	189,900	197,100	205,400	212,900
Total							
Rural Farm	76,829	63,300	57,800	53,500	48,600	42,400	36,200
Rural Non-farm	354,184	400,700	442,700	477,600	509,500	538,700	565,500
	422,013	464,000	500,500	531,100	558,100	581,100	601,700

Appendix Table 2.--Percentage distribution of rural farm and rural non-farm population, by Economic Subareas, Genesee River Basin, projected by decades from 1970 to 2020.

Economic Subareas	Projections					
	1970	1980	1990	2000	2010	2020
	Percent	Percent	Percent	Percent	Percent	Percent
Metropolitan Subarea						
Rural Farm.....	1.1	0.9	0.7	0.5	0.3	0.1
Rural Non-farm....	11.0	10.2	9.3	8.4	7.1	6.2
	12.1	11.1	10.0	8.9	7.4	6.3
Barge Canal Subarea						
Rural Farm.....	10.6	8.4	7.6	6.5	5.5	5.0
Rural Non-farm....	53.8	55.2	55.2	55.5	55.5	55.0
	64.4	63.6	62.8	62.0	61.0	60.0
Central Plain Subarea						
Rural Farm.....	9.5	8.0	7.0	6.0	5.0	4.5
Rural Non-farm....	52.9	54.4	55.4	56.4	57.4	57.9
	62.4	62.4	62.4	62.4	62.4	62.4
Allegheny Plateau						
Rural Farm.....	8.5	7.5	6.5	5.5	4.5	4.0
Rural Non-farm....	56.0	58.1	60.3	62.5	64.5	66.0
	64.5	65.6	66.8	68.0	69.0	70.0

Appendix Table 3.--Value of Agricultural production by Economic Subareas of the Genesee River Basin, 1960, and projections by decades from 1970 to 2020

Economic Subarea	1960	Projections					
		1970	1980	1990	2000	2010	2020
	Thousands of dollars						
Metropolitan	18,324	17,864	20,370	22,442	23,532	23,064	20,325
Barge Canal	38,963	47,113	65,386	89,769	119,656	150,623	191,957
Central Plain	66,739	76,166	100,091	130,807	166,720	201,458	247,285
Allegheny Plateau	52,172	55,161	65,637	77,586	88,944	95,551	105,012
Total	176,198	196,304	251,484	320,604	398,852	470,696	564,579

Appendix Table 4.--Estimated hours of labor required per unit of production, Genesee River Basin, 1960 to 2020

Commodity	Unit	1960	Projections					
			1970	1980	1990	2000	2010	2020
		Hours	Hours	Hours	Hours	Hours	Hours	Hours
Milk	Cwt.	1.3	0.9	0.6	0.4	0.35	0.3	0.3
Beef and veal	Cwt.	2.9	2.6	2.2	1.9	1.6	1.5	1.4
Lamb and mutton	Cwt.	5.0	4.4	3.8	3.5	3.2	3.0	2.9
Hogs	Cwt.	2.2	1.9	1.6	1.3	1.2	1.0	0.9
Poultry	Cwt.	4.9	4.2	3.7	3.4	3.2	2.9	2.8
Eggs	100 eggs	0.38	0.34	0.28	0.23	0.18	0.13	0.10
Hay	Cwt.	0.25	0.15	0.13	0.11	0.09	0.07	0.06
Corn silage	Cwt.	0.065	0.045	0.035	0.030	0.025	0.020	0.020
Oats	Cwt.	0.47	0.37	0.31	0.25	0.22	0.16	0.16
Wheat	Cwt.	0.47	0.37	0.32	0.27	0.22	0.18	0.18
Dry beans	Cwt.	1.25	1.16	1.00	0.86	0.75	0.61	0.50
Potatoes	Cwt.	0.42	0.20	0.17	0.13	0.12	0.08	0.07
Fruit	Cwt.	0.66	0.60	0.42	0.26	0.18	0.12	0.06
Vegetables	Ton	8.51	7.06	5.80	4.66	3.95	3.53	3.13
Corn grain	Cwt.	0.34	0.27	0.21	0.18	0.14	0.13	0.09

PART THREE

FOREST ECONOMY

U.S. FOREST SERVICE

APPENDIX D - ECONOMIC BASE STUDY

PART III

PROJECTED EMPLOYMENT AND PRODUCTION IN THE FOREST INDUSTRIES IN ECONOMIC AREAS OF THE GENESEE RIVER BASIN

Prepared by the
Northeastern Forest Experiment Station
U. S. Forest Service

for

The Buffalo District
U. S. Army Corps of Engineers

PART III

FOREST ECONOMY

TABLE OF CONTENTS

Title	Page
INTRODUCTION AND SUMMARY	D - III - 1
PRIMARY FOREST PRODUCTS PRODUCTION IN NEW YORK STATE	D - III - 7
Lumber Production	D - III - 7
Woodpulp, Paper and Paperboard Production	D - III - 9
PROJECTIONS OF PRODUCTION IN SIC-24 AND SIC-26 IN ECONOMIC SUB-REGIONS OF THE GENESEE BASIN	D - III - 9
Lumber and Wood Products	D - III - 11
Woodpulp, Paper, and Board Production	D - III - 16
Water Requirements for Pulp and Paper Manufacture	D - III - 20
EMPLOYMENT IN THE FOREST PRODUCTS INDUSTRIES	D - III - 25
Lumber and Wood Products	D - III - 25
Paper Products	D - III - 28
Forestry (SIC-08)	D - III - 31
THE FOREST RESOURCE	D - III - 31

Introduction and Summary

This report provides projections of employment and production in certain wood-producing and consuming industries in the economic areas of the Genesee River Basin.

Projections of production and employment in the lumber and wood products industries, SIC-24, and in the paper and allied products industry, SIC-26, are provided. Projections of employment in Forestry Activities, SIC-08 are also provided.[1/]

Major industries SIC-24 and SIC-26 are broken down into three digit primary and secondary manufacturing industry groups. Projections of production of lumber, woodpulp, and paper and paperboard are shown in Table 1. Projections of employment in the lumber and wood products industry are presented in Table 2. Table 3 presents employment in the primary and secondary segments of the pulp and paper industry. Employment in Forestry, SIC-08, is shown in Table 4.

The Genesee River Basin Economic Area is broken down into three economic sub-areas. These sub-areas contain the following counties.

1/ Industry definitions used in this study correspond to those enumerated in the Bureau of the Budget's Standard Industrial Classification Manual, Washington: U. S. Government Printing Office, 1957. Three digit "primary" and "secondary" industry groupings are defined on page 5.

Table 1.--Production and projected production of lumber, woodpulp, and paper and paperboard in the economic area of the Genesee River Basin for selected years.

		Year						
		1950	1960	1970	1980	1990	2000	2020
LUMBER PRODUCTION		MILLION BOARD FEET						
Economic sub-area:	I	3.0	2.9	2.9	3.3	3.9	4.3	5.3
	II	7.0	7.9	7.9	9.1	10.8	12.1	14.5
	III	47.1	61.0	61.4	70.6	83.2	93.2	112.2
TOTAL		57.1	71.8	72.2	83.0	97.9	109.7	132.0
WOODPULP PRODUCTION		THOUSAND TONS						
Economic sub-area:	I	-	-	-	20	25	25	30
	II	-	-	-	-	-	20	25
	III	-	-	-	20	25	30	35
TOTAL		-	-	-	40	50	75	90
PAPER AND BOARD PRODUCTION		THOUSAND TONS						
Economic sub-area:	I	20	20	25	30	30	40	40
	II	20	20	25	30	30	40	40
	III	-	-	-	20	25	30	35
TOTAL		40	40	50	80	85	110	115

Table 2.--Employment and projected employment in the lumber and wood products industry (SIC-24) in the economic area of the Genesee River Basin for selected years.

		Year						
		1950	1960	1970	1980	1990	2000	2020
		THOUSANDS						
PRIMARY EMPLOYMENT (SIC-241 & 242)								
Sub-area:	I	1/	1/	1/	1/	1/	1/	1/
	II	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	III	0.7	0.8	0.7	0.7	0.7	0.6	0.5
	TOTAL	0.8	0.9	0.8	0.8	0.8	0.7	0.6
SECONDARY EMPLOYMENT (SIC-243, 244, 249)								
Sub-area:	I	0.5	0.4	0.3	0.3	0.3	0.3	0.2
	II	0.3	0.3	0.3	0.3	0.3	0.2	0.2
	III	0.5	0.5	0.5	0.4	0.4	0.4	0.3
	TOTAL	1.3	1.2	1.1	1.0	1.0	0.9	0.7
TOTAL: ALL EMPLOYMENT		2.1	2.1	1.9	1.8	1.8	1.6	1.3

1/ Less than 50 persons.

Table 3.--Employment and projected employment in the pulp and paper manufacturing industry (SIC-26) in the economic area of the Genesee River Basin for selected years.

		Year						
		1950	1960	1970	1980	1990	2000	2020
		THOUSANDS						
PRIMARY EMPLOYMENT (SIC-261,262,263 & 266)								
Sub-area:	I	0.2	0.2	0.2	0.2	0.1	0.2	0.1
	II	0.2	0.2	0.2	0.2	0.1	0.2	0.1
	III	-	-	-	0.1	0.1	0.1	0.1
	TOTAL	0.4	0.4	0.4	0.5	0.3	0.5	0.3
SECONDARY EMPLOYMENT (SIC-264 & 265)								
Sub-area:	I	2.3	2.3	2.4	2.6	2.7	2.9	3.2
	II	0.8	0.8	0.8	0.8	0.9	0.9	1.0
	III	0.5	0.4	0.4	0.4	0.4	0.5	0.5
	TOTAL	3.6	3.5	3.6	3.8	4.0	4.2	4.7
TOTAL: ALL EMPLOYMENT		4.0	3.9	4.0	4.3	4.3	4.7	5.0

Table 4.--Employment and projected employment in forestry (SIC-08) in the economic area of the Genesee River Basin for selected years.

Economic sub-area	Year					
	1960	1970	1980	1990	2000	2020
	THOUSANDS					
I	1/	1/	1/	1/	0.1	0.1
II	1/	1/	1/	1/	0.1	0.1
III	0.1	0.1	0.1	0.2	0.2	0.2
TOTAL	0.1	0.1	0.2	0.3	0.4	0.4

1/ Less than 50 persons.

(Table 5)

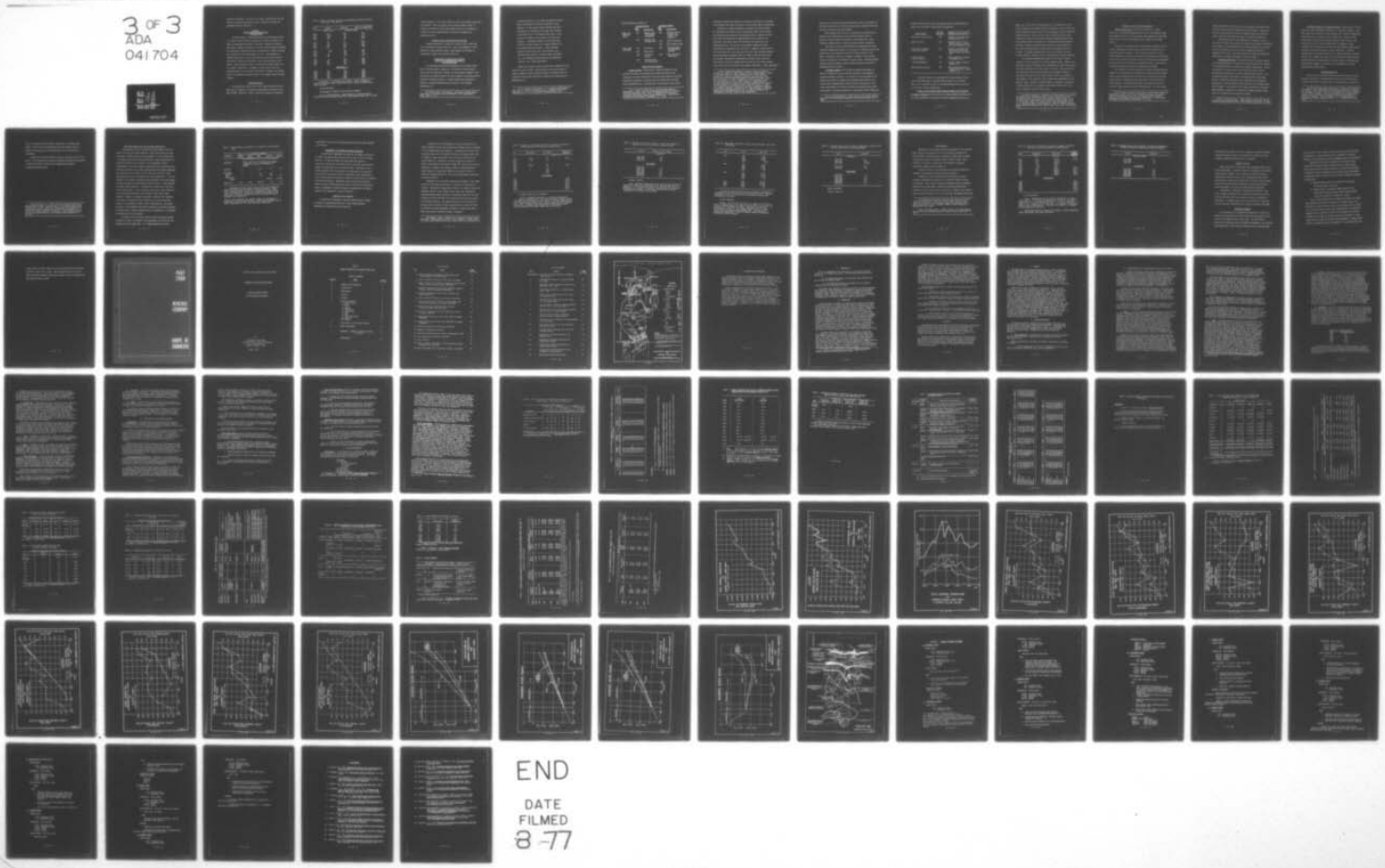
Economic sub-area:		
	I	Barge Canal
		Monroe
		Orleans
		Wayne
	II	Central Plain
		Genesee
		Livingston
		Ontario
		Wyoming
	III	Allegheny Plateau
		Allegany
		Cattarangus
		Potter, Pa.
		Steuben

This report is divided into four major parts. The first portion deals with a description of projected lumber, woodpulp, and paper and paperboard production in New York State. Since Potter County is the only Pennsylvania County in the Genesee Basin, a description of projected production in Pennsylvania is not presented. For the purposes of this report, Potter County is treated as being part of New York. This approach does not seem unreasonable in view of the fact that this county is a small rural area which is economically linked with New York as well as with Pennsylvania. The second section of the report details projections of production in industries SIC-24 and SIC-26 in the economic sub-areas of the Basin. The third section describes the method by which employment projections were derived from

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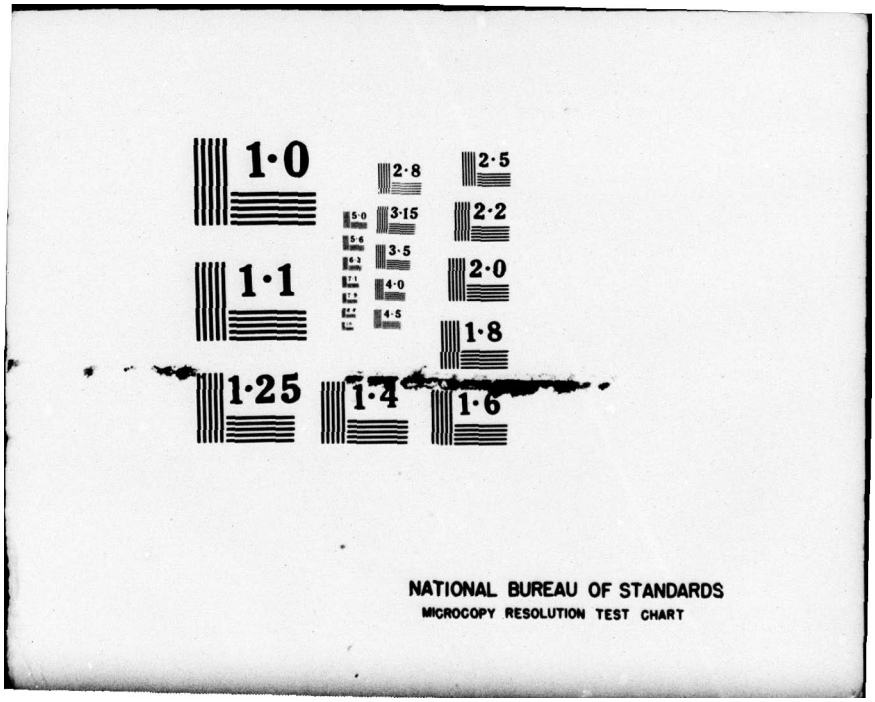
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NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

projected production. The fourth, and final, section deals with the ability of Genesee River Basin's forest resources to sustain the projected levels of production.

Primary Forest Products Production in New York State

The first phase of this study consisted of allocating current U. S. Forest Service National projections of lumber, woodpulp, and paper and paperboard production to New York. Historical trends in production, changes in patterns of location of forest based industries, and assumptions regarding the future availability of timber resources were considered in the apportionment process. The breakdown of regional projections to state projections involved ceteris paribus projections of historical production levels for each state in the region. These projections were in turn modified through analysis of the probable implications of changes in forest land use and its resulting impact on the economic availability of timber, and through study of the announced expansion plans of the region's pulp and paper industry.

Lumber Production

The projections indicate that total lumber production in New York State is expected to increase by approximately 84 percent from 1960 to 2020. (Table 6). Major increases are expected in hardwood

Table 6.--Lumber, woodpulp, and paper and paperboard production in New York State, 1947-2020. 1/

Year	Lumber	Woodpulp	Paper and paperboard
	(M bd. ft.)	(Thousand tons)	
1947	383	646	1859
1948	NA 2/	NA	NA
1949	NA	NA	1607
1950	NA	579	1878
1951	NA	711	1994
1952	NA	631	1736
1953	NA	585	1820
1954	362	541	NA
1955	S 3/	566	1912
1956	S	600	1939
1957	S	NA	NA
1958	368	517	1795
1959	S	521	1892
1960	299	513	1885
1961	271	500	1820
1962	290	521	1878
		PROJECTIONS 4/	
1970	301	600	2200
1980	346	700	2500
1990	408	800	2800
2000	457	1000	3200
2020	550	1600	4300

1/ Source: U. S. Bureau of the Census. Current Industrial Reports Series M24, Lumber production and mill stocks, and M26A, pulp, paper and board.

2/ Not available.

3/ Suppressed; standard error exceeds 15 percent.

4/ U. S. Forest Service. Timber Trends in the United States, Division of Forest Economics Research, Forest Resource Report No. 17, 1965.

lumber production. No relative shifts in intra-state lumber production are expected. Thus the Genesee area currently produces about 22 percent of New York's total lumber production and it is expected to continue to produce approximately this portion throughout the projection period.

Woodpulp, Paper and Paperboard Production

Woodpulp production is expected to nearly triple in New York over the projection period (Table 6). Paper and paperboard is also expected to show significant gains, approximately an increase of 128 percent, between 1960 and 2020 (Table 6).

Projections of Production in SIC-24 and SIC-26 in Economic Sub-areas of the Genesee Basin

In projecting production and employment in the Genesee River Basin's forest products industries, a distinction is made between three digit SIC industries composed of firms primarily engaged in the manufacture of primary products and those engaged in the production of fabricated secondary products. Industry groups are classified as primary or secondary manufacturing according to the following definitions: 2/

2/ Guthrie, John A. and George A. Armstrong. Western Forest Industries - an economic outlook (Baltimore: The Johns Hopkins Press, 1961), p. 51.

A primary industry is...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. A secondary industry, on the other hand, converts the final product of a primary industry to a more highly fabricated product. Thus, secondary products are sash and doors, wood furniture, etc.; secondary paper products are paper boxes, containers, etc., and secondary plywood products are containers, furniture, etc., made from plywood.

Primary and secondary industry groups were identified on the quantity of logs and bolts (raw materials) versus the quantity of lumber, woodpulp or paper (primary products) consumed by firms in alternative three digit industries as shown by the 1958 Census of Manufactures. 3/

3/ U. S. Bureau of the Census. U. S. Census of Manufactures: 1958, Vol. II, Industry Statistics, Part 1, Major Groups 202-28, Washington, D. C.: U. S. Government Printing Office, 1961.

The classification adopted is:

	Primary Segment SIC Code	Description	Secondary Segment SIC Code	Description
Lumber and wood products	241	Logging camps and logging contractors	243	Millwork veneer, plywood and prefab. wood products
	242	Sawmills and planing mills	244	Wooden containers
			249	Wood products, NEC
Pulp, paper and board	261	Pulp mills	264	Converted paper and paperboard products
	262	Paper mills		
	263	Paperboard mills	265	Paper and board containers
	266	Building paper and board mills		

Lumber and Wood Products

Primary Segment.--Projections of lumber production in the economic sub-areas of the Genesee River Basin are derived from projections of lumber production in New York State (Table 6) and from estimates of employment in SIC-241 and 242 obtained from the 1958 Census of Manufactures. 4/ Specifically, the percent of total state

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4/ U. S. Bureau of the Census. United States Census of Manufactures: 1958. Location of manufacturing plants by industry, county and employment size. Part 3.--Lumber and wood products; furniture and fixtures, Special Report MC58(S)-2.3. United States Government Printing Office, Washington, D. C. 1961.

employment in SIC-241 and SIC-242 occurring in the Basin was considered to be slightly less than the percent of total state lumber production.5/

Allocation of future production to economic sub-areas was made by considering the present size of the industry within each sub-area, its historical growth pattern (as determined from a comparison of the 1947, 1954 and 1958 Census of Manufactures) and its potential for expansion. The latter factor was based upon an evaluation of the following factors: (1) percent of the Basin's commercial forest land within the subregions; (2) the ratio of commercial forest land to all forest land and to all land; and (3) forest land ownership patterns within the economic subregion which are likely to have an effect upon the economic availability of physically available forest resources. These factors were then compared with the same data for those portions of New York which lie outside of the Genesee River Basin. Given these data a

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5/ This simplifying assumption contains a number of implicit assumptions, several of which deserve explicit acknowledgment. First, it is assumed that for a given employment size of mill employed technology is constant throughout the Basin, resulting in a near-perfect correlation between employment in SIC-242 and lumber output. This assumption, in turn, is predicated on the assumptions that (1) the proportion of state lumber production originating from secondary manufacturers which are vertically integrated with sawmills and sell lumber as a secondary product, and that portion of total state lumber production originating from firms classified in SIC-242 is constant throughout the Basin, and (2) that employment in SIC-241, Logging Camps and Logging Contractors, is highly correlated with employement in SIC-242, sawmills and planing mills.

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subjectively determined comparative-advantage index was developed for the Basin and each of its sub-areas and for areas situated within the state but located outside of the Basin.

These indexes were then used to determine the probability of growth in SIC industries 241 and 242 within the River Basin as opposed to growth outside of the Basin, in New York State, and to determine probable rates of expansion within economic subregions.

The percent of total state production originating from areas within the Genesee River Basin is not expected to increase relative to production in those sections of New York located outside of the Basin. Similarly, little or no change is expected in the relative levels of production in alternative economic areas. Resulting growth patterns within the Basin's three economic sub-areas are shown by projections given in Table 1.

Secondary segment.--The secondary manufacturing segment of SIC-24 is composed of a group of firms producing a heterogeneous group of wood based products. An indicator of likely growth of the Genesee River Basin's secondary wood manufacturing industries was constructed by summing Forest Service National projections of log volume requirements for various secondary wood product groups which have present or potential importance in the Middle Atlantic Region.6/

6/ U. S. Forest Service. Timber Trends in the United States, Division of Forest Economics Research, Forest Resource Report No. 17, 1965.

Projected National log volume requirements for the following product groups were utilized in constructing the indicator:

Product group	Relevant SIC class	Example of type of product included in this group
Residential construction	243	Millwork, including doors, window frames, etc.
Hardwood veneer	243	Hardwood veneer for plywood, furniture, baskets, and other containers, etc.
Lumber used in boxes, crates and pallets	244	Pallets, wirebound boxes and crates, nailed and tacked corner wood boxes, etc.
Consumer goods income sensitive	249	Sports equipment, musical instruments, etc.
income insensitive	249	Brooms, brushes, pencils, caskets, etc.
Miscellaneous products	249	Wood turning novelties, picture and mirror frames, ladders, etc.

Projected National log requirements for these groups for the period 1962-2000 shows an average annual increase of 1.6 percent. This rate is expected to apply to the Genesee River Basin as well as to the State, without modification.

Primary and Secondary manufacturing of lumber are classified as export industries.--Recent studies of lumber marketing indicate that the lumber produced in any given area moves considerable distance to

market. 7/ On the basis of these studies it is estimated that more than 50 percent of the lumber produced within most counties within the Genesee River Basin moves outside of the boundaries of their respective economic sub-area. There is also reason to believe that this percentage will increase as presently available technology becomes more widely employed and the average size of manufacturing establishment increases. Similar conditions have prevailed in other sections of the country characterized by a more mature and competitive forest economy. The primary manufacturing sector of the lumber and wood products industry, therefore, may be classified as an export industry.

The secondary manufacturing segment of the Basin's lumber industry is also classified as an export industry group. However, for individual economic subregions this classification is made with a great deal less certainty than for the Basin as a whole. Firms included in the three-digit industry groups composing this segment produce a diversity of products (27 five-digit product groups are included in this segment of the industry), some of which have predominately local markets, others regional or national markets. Moreover, the majority of firms included in this group can alter their product mix to suit local, regional or national market needs.

7/ Allison, Richard C. Marketing of lumber produced by sawmills in Pennsylvania. Unpublished Master's thesis, Pennsylvania State University, School of Forestry, 1960, and Christensen, Wallace W. et al, Marketing of lumber produced by sawmills in the Northeast--Phase 1, W. Va. Agric. Expt. Sta., Bulletin 478, 1962 and Whitmore, Roy A. et al, Marketing lumber in the Northeast: Phase II--Lumber purchases by wood products manufacturers, Vermont Agric. Expt. Sta., Bulletin 635, 1963.

Woodpulp, Paper and Board Production

Primary manufacturing.--The method employed to estimate production in the primary manufacturing sector of the woodpulp, paper and paperboard industry closely parallels that employed in projecting future output in the primary manufacturing segment of the lumber industry.

Projection of woodpulp, paper and paperboard production in the economic subregions of the Basin were derived from projections of state output given in Table 6. For New York the percent of total state production in SIC-261, 262, 263 and 266 occurring in that portion of the state included in the River Basin was determined from employment data presented in the 1958 Census of Manufactures.8/ A near-perfect correlation between production and employment was assumed.

The allocation of future production in paper and paperboard and woodpulp in the sub-areas was accomplished by considering the present extent of the industry within the sub-area, its historical trend and its potential for expansion in the same manner as was done for the lumber industry. The Genesee River Basin area presently has four relatively small paper mills and no woodpulp mills. For this reason

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8/ United States Bureau of the Census. United States Census of Manufactures: 1958. Location of Manufacturing plants by industry, county and employment size. Part 4.--Paper and allied products; printing and publishing, Special Report MC58(S)-2.4. United States Government Printing Office, Washington, D. C. 1961.

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future projections can be made with less confidence than might be the case for an area with more production in this industry. In general, however, these projections follow the expected trends for New York State, consistent with expected trends in resource availability.

Growth within each of the subregions was assumed to occur in the form of increases in present mill capacity and through establishment of new mills. It was assumed that the minimum capacity for new paper mills was 125,000 tons per year, and for integrated pulp mills, 100,000 tons per year. Resulting projections of paper and paperboard production, by economic subregion, are shown in Table 1.

Secondary manufacture.--The method utilized to project growth in secondary manufacture in the paper industry parallels that employed for estimating growth in secondary wood products manufacture. First, an indicator of likely growth was developed from Forest Service projections of production of various secondary paper products, such as container board, coarse papers, and bending board, which have present or potential importance in the Middle Atlantic Region.10/ Projections to the year 2000 were then expressed as an average annual rate of growth. On the basis of this index, production of secondary paper products is expected to increase at a weighted average annual rate of 3.2 percent over the projection period.

10/ U. S. Forest Service. Timber Trends in the United States, Division of Forest Economics Res., Forest Resource Report No. 17, 1965.

The paper industry is an export industry.--Modern paper and board plants are usually designed to operate at or near full capacity. Also, most paper mills specialize in the production of relatively homogeneous products and have a relatively narrow product mix. Because of the large volumes of particular products produced, market areas for the average pulp mill are usually region-wide or nationwide. Firms classified in SIC industries 262, 263, and 266 (primary manufacturers), therefore, should be classified as export industries. Secondary manufacturers in the paper industry (i.e., firms classified in SIC-264 and 265) also normally specialize in the production of relatively few products for which ultimate market areas are region or nationwide.11/ This industry segment is, therefore, also classified as an export manufacturing industry group.

Woodpulp Production

Based on past trends and announced expansion plans of the pulp and paper industry in the Northeastern Region, all of the projected growth in the Region's woodpulp capacity and production is expected to

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11/ Many secondary paper products move through a marketing chain consisting of three institutions--manufacturer, wholesaler or broker, and consumer. The primary market for the manufacture in the channel is the wholesaler or broker. In this case manufacturers' markets may be local, but the ultimate market (reached through the wholesaler), is regional or national. See: Blackman, F. H. The wholesaling and distributing of paper (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1963).

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occur in integrated pulp and paper, paperboard, or building board plants. There are no non-integrated pulp mills (firms classed as SIC-261) now operating in the Genesee Basin and no new growth is anticipated.

Because of the small capacity and age of the paper mills in the Basin, it is anticipated that some new woodpulp production will develop as these mills seek to improve their competitive position by integrating operations.12/

12/ Rich, Stuart U. - Product Policies of Non-integrated New England Paper Companies, Research Report to the Federal Reserve Bank of Boston No. 13, 1961. While the study stresses the product mix of non-integrated paper companies the possibility of integration as a solution to industry problems is discussed. The conclusions reached in this study apply equally to non-integrated paper operation in New York.

Water Requirements for Pulp and Paper Manufacture

The quantity of water required for pulp and paper production varies with the type of pulp consumed. Water requirements also vary according to whether market pulp is purchased, or if the paper plant is integrated with pulp producing facilities. Water requirements for paperboard mills are also variable. The variability of these requirements can be seen in Table 7 which gives water requirements for different operations in the paper making process by pulping techniques. With reference to this table it can be seen that even for a given pulping process, water requirements can vary significantly. It is not possible to be specific regarding pulping techniques since most grades of paper and board can be manufactured from a variety of pulp mixtures and other fibrous materials. Consequently, projections of potential use of various types of pulp necessarily have a much larger measure of uncertainty than projections of all grades of pulp and/or paper combined. However, it appears reasonable to conclude that expansion of pulping in the Middle Atlantic region will be concentrated most heavily in the hardboard, neutral sulfite semi-chemical, and sulfate processes. The groundwood and sulfite processes are generally employed in regions where a larger softwood resource is available as in Northern New England and in the Southeast.

It should also be cautioned that the water requirement figures presented in Table 7 are based on data published in 1957 and will not necessarily hold through time. It is highly probable that water

Table 7.--Water quantity requirements for elemental pulp processes, 1957.

Operation	Pulping techniques				
	Ground-wood	Hard-board	NSSC	Sulfate	Sulfite
	(Thousand gallons per ton of pulp produced)				
Debarking	Varies from 0-7.5 M depending on pulping techniques, process and equipment employed				
Pulp mill	1	-	3-20	20	30
Bleaching	1				
Partial		-	20	20	
Full	-	-	40	40	40
Dissolving pulp	-	-	-	50-100	50-100
Paper mill	7-10	5-20	10-25 1/	10	10

1/ Ranges in neutral sulfite semi-chemical for pulping and paper arise because of variations in washing techniques. Where three thousand gallons are used in the pulp mill 25 thousand are used in the paper mill. When pulp is washed before going to the paper mill, 20 thousand gallons are used in the pulp mill and 10 thousand in the paper mill.

Source: Water treatment and disposal aspects to development of California's pulp and paper resource. State Water Pollution Control Board, Publication No. 17, 1957, Sacramento, California.

requirements for each of the pulping processes will decrease somewhat in the future.

EMPLOYMENT IN THE FOREST PRODUCTS INDUSTRIES

Projections of employment are made for two segments of each of the major wood-using industry groups, SIC-24 and -26 and for SIC-08, Forestry. In both the lumber and paper industries separate projections are made for the primary and the secondary manufacturing segments as identified in the previous section. Employment in the primary segments of the two primary wood-using groups was projected on the basis of historical levels of employment in the appropriate 3 digit industry groups and projected changes in productivity as reflected by output per man-hour. Employment projections for the secondary segment of these industry groups were made on the basis of historical trends in employment, projected changes in productivity, and likely changes in the composition of these industries.

LUMBER AND WOOD PRODUCTS

Projections of employment in primary manufacturing of lumber were made by determining productivity trends from appropriate employment and production data for New York.

A comparison of 1958 employment in SIC-241 and SIC-242 and lumber production in New York indicates an average output per employee of 76.9 thousand board feet (Table 8). Comparing this with the 1954 output per worker of 70.9 thousand feet gives an average annual rate of change in output per employee over the period 1954-1958 of 2.0 percent (Table 9). Estimates of future productivity levels are based on past Regional and National trends.[13/] Projections of future employment in economic sub-areas were made by dividing projected lumber output for target years (Table 1) by projected levels of output per employee (Table 8). The resulting employment projections are shown in Table 2.

Employment in the secondary manufacturing segment of the lumber industry in the Genesee River Basin is expected to remain fairly constant. Projections of employment (Table 2) are based on historical employment trends in this industry group (Table 10), assumptions regarding average annual increases in employment (Table 11) and upon estimates of likely increase in the overall activity of this portion of the lumber industry. The combined effects of a net increase in activity and an increase in labor productivity are expected to lead to relatively constant employment throughout the Basin from 1960 to 2000, after which a moderate decrease is expected.

13/ Zaremba, Joseph. Economics of the American lumber industry (New York: Robert Speller and Sons, 1963), Chapter 6, "Productivity."

Table 8.--Production, employment and index of output per employee in SIC-241 and 242 in New York for selected years.

Year	Employment	Production	Output per employee
		-MM bd. ft.-	
1954	5104	362	70.9
1955	- 1/	-	
1956	-	-	
1957	-	-	
1958	4787	368	76.9
1959	-	-	
1960	-	299	
1961	-	271	
1962	-	290	
		Projections	
1962			76.9
1970			85.9
1980			101.7
1985			112.3
1990			124.0
2000			151.1
2020			224.5

1/ Dashes indicate not available.

Source: Employment data from U. S. Bureau of the Census, U. S. Census of Manufactures: 1954, Industry Bulletin MC24A, Lumber and Timber Basis Products, 1957 and from U. S. Census of Manufactures: 1958, Industry Report MC58(2) 24-A, Logging camps, sawmills, planing mills, 1961. Production data from Bureau of the Census, Current Industrial Report Series M24A, Lumber and wood products.

Table 9.--Average annual rate of change in output per employee in SIC-241 and 242 in New York for selected periods.

Period	Annual rate of change
	(percent)
1954-1958	2.0
1954-1962	NA
1958-1962	NA
Projections	
1958-1962	0
1962-1970	1.4
1970-1980	1.7
1980-1990	2.0
1990-2000	2.0
2000-2020	2.0

Source: Table 8.

Note: National average annual rate of increase in output per employee in lumber mills (SIC-242) between 1899 and 1954 was 1.1% (Kendrick, J. - Productivity Trends in the United States, Princeton University Press, 1961). In New York, productivity in SIC-242 increased by 1.1% between 1954 and 1958.

Table 10.--Employment in SIC 243, 244 and 249 in New York, 1947, 1954, and 1958 1/.

SIC	Year	New York
243	1947	4,144
	1954	5,480
	1958	4,672
	1962	NA 2/
244	1947	3,304
	1954	2,082
	1958	1,323
	1962	NA
249	1947	5,992
	1954	5,198
	1958	5,766
	1962	NA
243)	1947	13,440
244)	1954	12,760
249)	1958	11,761
	1962	NA

1/ Data for alternate years may not be strictly comparable due to changes in the Standard Industrial classification code. However, comparisons of data in terms of the old SIC codes indicate that discrepancies are minor.

2/ Not available.

Source: 1947 and 1954 data from U. S. Bureau of the Census, Census of Manufactures: 1954, State Bulletins MC119, 131 and 137, and Industry Bulletins MC24A, and MC24B. 1958 data from Census of Manufactures: 1958, Vol. II, Industry Statistics, Part 1, Major Groups 20-28 and Industry Report MC58(2)-24A. 1962 data from Pennsylvania Department of Internal Affairs, Bureau of Statistics, 1962 County Industry Reports.

Table 11.--Average annual rate of change in employment in SIC-243, 244 and 249 in New York for selected periods.

Period	New York
	(Percent)
1947-1954	-0.7
1947-1958	-1.2
1947-1962	NA 2/
1954-1958	-2.1
1958-1962	NA
	Projections
1958-1962	0
1962-1970	1.0
1970-1980	1.5
1980-1985	2.0
1990-2000	2.0
2000-2020	2.0

2/ Not available.

Source: Table 10.

PAPER PRODUCTS

Employment in the primary manufacturing segment of the pulp and paper industry was projected using the projections of production given in Table 1 and assuming the increases in productivity of paper and paperboard output per employee shown in Table 13. 14/ These estimates of increase in output were then applied to employee productivity figures given in Table 12.

Projected output was then divided by productivity figures to determine the employment projections shown in Table 3.

Employment in the secondary part of SIC-26 was projected assuming a productivity increase of 2.1 percent in terms of output per employee. Major types of paper and paperboard used in secondary production are coarse papers, container board and bending board. Production of these paper types is expected to increase on an average annual weighted average rate of 3.2 percent.15/ Employment projections

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14/ Estimated productivity increases were based on historical trends in productivity in New York shown in Table 12 and on data presented in "Impact of technological change and automation in the paper industry" U. S. Dept. of Labor, Bureau of Labor Statistics, Bulletin No. 1347, 1962.

15/ U. S. Forest Service. Timber Trends in the United States, Division of Forest Economics Research, Forest Resource Report No. 17, 1965.

Table 12.--Production employment and output per employee in SIC-261, 262, 263, and 266 in New York for selected years.

Year	Employment	Production	Output / employee
	(M)	(M ton)	(Tons)
1947	17.9	1850.0	103.4
1954	16.0	NA 1/	
1955	16.7	1911.7	
1956	NA	1938.8	
1957	NA	NA	
1958	15.8	1795.1	113.6
1959	15.9	1892.6	119.0
1960	16.5	1885.5	114.3
1961	15.1	1819.8	120.5
1962	15.6	1878.2	120.4
		Projections	
1970			139.0
1980			172.0
1985			190.0
1990			207.0
2000			242.0
2020			312.0

1/ Not available.

Source: Employment data for 1947 and 1954 from U. S. Bureau of the Census. *U. S. Census of Manufactures: 1958, Vol. II, Industry Statistics, Part 1, Major Groups 20 to 28.* U. S. Gov't. Printing Office, 1961. Data for 1958 to 1962 from: U. S. Bureau of the Census. Annual Survey of Manufacturers: Statistics for State, Pt. 1, Middle Atlantic (M60 and 61 (AS)-42).

Production data from: Bureau of the Census. Current Industrial Report Series M26A, Pulp, Paper and Board.

Table 13.--Average annual rate of increase in output per employee in SIC-262, 263 and 266 in New York for selected periods.

Period	New York
	(Tons per year)
1947-1962	1.1
1947-1958	.9
1958-1962	1.3
	Projections
1960-1970	2.3
1970-1980	3.3
1980-1990	3.5
1990-2000	3.5
2000-2020	3.5

in SIC-264 and 265 shown in Table 3, therefore, were made assuming a growth in product output of 3.2 percent per year and an annual increase in employee productivity of 2.1 percent.

FORESTRY (SIC-08)

Major group 08 is a relatively minor employment group in the Genesee River Basin. Included in SIC-08 is employment in establishments primarily engaged in such activities as forest nurseries, reforestation, forestry services and a gathering of gums, barks, balsam needles, maple syrup, spanish moss, and other forest products. It does not include forestry employment accounted for elsewhere, such as employment of foresters by manufacturing industries.

Projections of employment in SIC-08 given in Table 4 show nearly constant employment levels through the projection period to the year 1990 after which time moderate increases in employment seem likely. It appears likely that this increase will take place in forest nurseries (SIC-082) and in forestry activities (SIC-085).

THE FOREST RESOURCE

The feasibility of increasing the production of lumber and woodpulp in the Genesee River Basin depends in large measure on the status of the timber resource of the area. If the projected production of particular kinds of lumber and woodpulp or the projected total production of these products indicates that strong pressures

will be placed on the available forest resource, either projections of production in these industries must be modified or increased employment and expenditures in forest management must be anticipated.

Information collected and compiled by the Forest Service concerning the present forest resource and likely timber growth under various levels of timber inventory in the Basin was analyzed. A comparison of this information with projected timber drain based on projected levels of production on both major industries indicated the following:

1) Overall timber growth at the present time exceeds the current level of cutting.
2) Overall levels of projected timber growth for the major forest types for target years exceed projected levels of cutting for the Basin as a whole.

Thus, projected production of lumber and woodpulp for target years appears to be within the quantities of timber likely to be available for these industries under the assumptions that were made. It is possible, however, that future timber quality and unforeseen changes in forest ownership and land use may modify the projected availability of timber in specific sections of the Basin. A very large volume of timber could effect an improvement in timber quality which in turn might attract new industries. On the other hand, the

urban sprawl and public demand for recreation may exclude substantial volumes of timber from cutting. These possibilities are such that they are beyond reasonable prediction; however, they are possibilities that should be kept in mind.

PART FOUR

MINERAL ECONOMY

CORPS OF ENGINEERS

GENESEE RIVER COMPREHENSIVE BASIN STUDY

Appendix D - Economic Base Study

Part IV, Mineral Economy of the Genesee River Basin

By

DEPARTMENT OF THE ARMY
Buffalo District, Corps of Engineers
Foot of Bridge Street
Buffalo, New York 14207

August 1967

PART IV

MINERAL ECONOMY OF THE GENESEE RIVER BASIN

TABLE OF CONTENTS

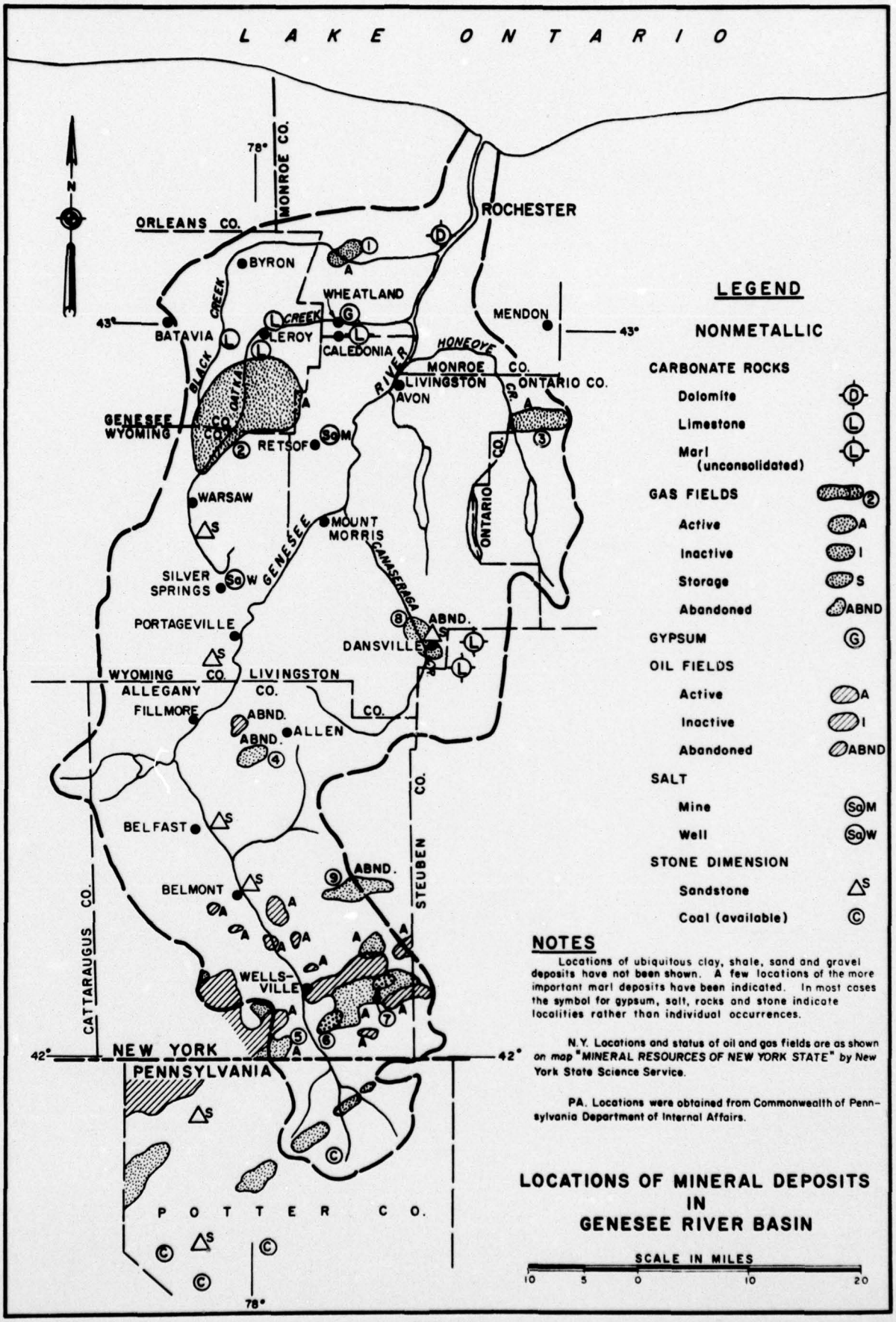
Section	Title	Page (D - IV)
A	Summary and Conclusions	1
B	Introduction	2
C	Methodology	2
D	Setting	3
E	Geology	4
F	Mineral Production	4
	1. Sand & Gravel	4
	2. Stone	5
	3. Salt	6
	4. Gypsum	7
	5. Petroleum	7
	6. Natural Gas	8
	7. Coal	8
	8. Peat	8
	9. Clays and Shales	8
	10. Iron Ore	9
	11. Cement	9
G	Projections of the Mineral Economy	9
H	Water Requirements	11
	Appendix 1. Summary of Mineral Industry by County	45
	Bibliography	53

LIST OF TABLES

No.	Title	Page (D - IV)
1.	Value of Apparent Consumption of Minerals in the United States, 1947, 1954, 1961.	13
2.	Value of Mineral Production in New York, 1952-1964.	14
3.	Index of Implicit Unit Value of Minerals Produced in the United States in 1960 dollars, 1952-1964.	15
4.	National Projections of Population and Gross National Product, 1959-61 Average and 1980-2020.	16
5.	Geologic Occurrence of Natural Gas in Central and Western New York.	17
6.	Value of Mineral Production by Counties, 1952-1964.	18
7.	Total Sand and Gravel Production and Government and Contractor Operations, by County, 1960-1964.	20
8.	Crushed and Broken Limestone Sold or Used by Producers in New York, 1961-1964.	21
9.	Salt Sold or Used by Producers in New York, 1953-57 Average, 1958-1964.	22
10.	Crude Gypsum Production in New York, 1953-57 Average, 1958-1964.	22
11.	Petroleum Production in New York, 1953-1957 (average), 1958-1964.	23
12.	Natural Gas Production in New York 1955-1964.	23
13.	Summary of Principal Gas Fields.	24
14.	Deep Gas Production in Potter County, Pensylvania, 1963.	25
15.	Peat Production in New York, 1955-1964.	26
16.	Shale Reserves	26
17.	Value of Mineral Production in the Genesee River Basin Economic Area, 1953-2020.	27
18.	Water Requirements for the Mineral Industry, 1962-2020.	28

LIST OF FIGURES

No.	Title	Page (D - IV)
Frontispiece	Locations of Mineral Deposits in Genesee River Basin.	
1.	Total Mineral Production in United States, 1936-1964.	29
2.	Approximate Value of Mineral Production in New York, 1937 - 1964.	30
3.	Total Mineral Production in Pennsylvania, 1940 - 1964.	31
4.	Sand and Gravel Production New York State vs Allegany County.	32
5.	Sand and Gravel Production New York State vs Cattaraugus County.	33
6.	Sand and Gravel, Stone and Gypsum Production New York State vs Genesee County	34
7.	Sand and Gravel, Stone and Gypsum Production New York State vs Monroe County.	35
8.	Sand and Gravel and Stone Production New York State vs Ontario County.	36
9.	Stone Production, Commonwealth of Pennsylvania vs Potter County.	37
10.	Sand and Gravel Production New York State vs Steuben County.	38
11.	Sand and Gravel Production New York State vs Wayne County.	39
12.	Projections of Mineral Production for Economic Area.	40
13.	Projections of Mineral Production for Barge Canal Subarea.	41
14.	Projections of Mineral Production for Central Plain Subarea.	42
15.	Projections of Mineral Production for Allegheny Plateau Subarea.	43
16.	Geologic Map Genesee River Basin.	44



LEGEND

NONMETALLIC

CARBONATE ROCKS

- Dolomite — D
- Limestone — L
- Marl (unconsolidated) — L

GAS FIELDS — 2

- Active — A
- Inactive — I
- Storage — S
- Abandoned — ABND

GYPSUM — G

OIL FIELDS

- Active — A
- Inactive — I
- Abandoned — ABND

SALT

- Mine — SaM
- Well — SaW

STONE DIMENSION

- Sandstone — S
- Coal (available) — C

NOTES

Locations of ubiquitous clay, shale, sand and gravel deposits have not been shown. A few locations of the more important marl deposits have been indicated. In most cases the symbol for gypsum, salt, rocks and stone indicate localities rather than individual occurrences.

N.Y. Locations and status of oil and gas fields are as shown on map "MINERAL RESOURCES OF NEW YORK STATE" by New York State Science Service.

PA. Locations were obtained from Commonwealth of Pennsylvania Department of Internal Affairs.

LOCATIONS OF MINERAL DEPOSITS IN GENESEE RIVER BASIN

SCALE IN MILES

10 5 0 10 20

Frontispiece

A. SUMMARY AND CONCLUSIONS

The mineral industry of the Genesee River Basin consists of the working of deposits of sand and gravel, crushed and broken stone, salt, gypsum and mineral fuels. The industry is projected to increase in dollar value from $34 million in 1960 to $73 million in 2020. Nonmetal production is estimated to increase substantially but petroleum resources are expected to be depleted within the projection period.

Water requirements for the mineral industry are minimal. Total water used is projected to about trebel from 47.6 c.f.s. in 1962 to 130.1 c.f.s. in 2020. Discharged water will increase from 28.0 c.f.s. in 1962 to 76.3 c.f.s. in 2020. Consumed water will increase from 3.8 c.f.s. in 1962 to 8.7 c.f.s. in 2020. For comparison, the average annual discharge of the Genesee River at Rochester is 2,785 c.f.s. Total water used would amount to about 2 percent of the discharge of the Genesee River if all the water in the river were available for the mineral industry. Therefore, it is concluded that the water resource is adequate for expansion of the mineral economy throughout the projection period.

B. INTRODUCTION

Part IV of Appendix D will concentrate on the mineral resource economy of the Genesee River Basin. The two major objectives of this report are:

a. To develop projections for the years 1980, 2000 and 2020 for the Basin's mineral economy.

b. To estimate future water requirements for the mineral industry within the Genesee River Basin.

This report was confined to published sources. No field interviews were conducted. Some information was supplied through questionnaires provided by other State and Federal agencies cooperating in the comprehensive study. Therefore the intent of this report is to establish a range of values which are converted to give an indication of the water requirements for the mineral industry through the year 2020.

C. METHODOLOGY

Historic data were compiled to indicate past trends in the mineral economy of the basin. In some cases data were not available for specific minerals due to disclosure problems. Rather than developing projections from short term historic data available by county, a comparison was made to establish general relationships between minerals at the National, Regional, and State levels and minerals of the basin (See Table 1 and Figure 1). An additional effort was made to fortify these estimates by translating to the basin level, national mineral consumption estimates of the Bureau of Mines for 1975. "These estimates reflected a growing demand based on such factors as population and labor force increases, changing technology and innovation, using gross national product, and projection of construction activity."(1) At the State level a percentage share of the basin and each subarea to New York was obtained (See Table 2 and Figures 2 and 3). Projected shares were derived by trend analyses of historic data based on a straight line approach with visual fitting to constant dollar values (See Figures 4-11).

A constant dollar series was used in an attempt to reduce the bias caused by price level variations, thus showing more nearly the real change in annual value of mineral production for the county and State. An index of implicit unit value of minerals (total nonmetals) was used for the conversion to constant 1960 dollars (See Table 3). The resulting value was tempered by applying appropriate judgment factors that were derived from economic indicators gathered for the Nation, Region, State, and the Basin. An alternate method was also used starting with the county and/or a specific mineral as a base. The above methods have been interwoven in arriving at final estimates.

(1) Source: U. S. Department of Interior, Minerals Yearbook, Volume I, Metals and Minerals (Except Fuels), 1963, p. 13.

Mineral consumption growth rate nationally has been relatively slower than that of the GNP (See Table 4). This may be partially attributable to the value of metals consumption remaining relatively static since 1956. Growth of mineral fuel consumption has also been slower than GNP. On the other hand, apparent consumption of nonmetals has grown consistently with population. Nonmetals account for the largest percentage of production in the basin. However, the growth of nonmetal consumption for the basin will not exceed the real GNP growth rate because the market area for nonmetal products is predominantly local and regional. Both local regional population projections for New England and the Middle Atlantic States indicate more modest growth rates when compared to various National projections.

The following assumptions are implicit in the projections for the Genesee River Basin:

a. Groupings of items (stone, sand & gravel, etc.) were consistent from year to year, unless otherwise noted.

b. Technological advances will approximately balance increasing costs (such as labor), causing a situation of relative economic stability.

c. Exhaustion of mineral reserves outside the basin will not occur causing a reverse in the economic feasibility for new development of available basin mineral resources.

d. No new mineral discoveries of any magnitude would occur in the basin, especially with reference to the petroleum and gas industries.

e. Other economic factors, such as improved transportation, climate, scenic value and proximity to educational and business facilities have been considered in projections of population and employment for the economic base study and will be reflected in the mineral estimates.

D. SETTING

The drainage area of the Genesee River Basin encompasses approximately 2,479 square miles which include all or portions of ten counties in New York and Potter County (96 square miles) in Pennsylvania. The southern portion of the river rises in Pennsylvania and flows in a northerly direction through New York to Lake Ontario. Rochester, the largest urban area, is located at the mouth of the river.

County boundaries have been used for the economic study and have been grouped into economic subareas in accordance with the delimiation done for Part One of Appendix D. Although the economic area is used primarily for determining economic trends, when preparing estimates of water use for the mineral industry, consideration was also given to the hydrologic area.

E. GEOLOGY

Throughout most of the Basin surface features reflect the glacial activity that took place during the Pleistocene Epoch. Till and other glacio-fluvial and glacio-lacustrine materials overlie most of the bedrock of the region. Glacio-fluvial deposits are generally stratified in layers of silts, sands and gravels and produce the best commercial sources of sand and gravel. Glacial clays and modified clays of glacial origin are found in the valley of the Genesee River. These clays are used for art pottery and in the manufacture of building brick. Peat, used essentially for agricultural purposes, occurs in all past and present swamplands throughout the Basin.

Bedrock of the area is composed of sedimentary rocks, primarily limestones, shales, and sandstones (see Figure 16). Sandstones outcrop in the west central area of the Basin and also in the northern tier of counties and are used for concrete aggregate, flagstone and curbing. Table 5 indicates a generalized geologic section of the Genesee River Basin. The Oriskany has been a major gas producer since the 1930's but recently pressures have been greatly reduced and the formation is currently being used for storage of pipeline gasses. The Chemung formation of dark-grained sandstone of the upper Devonian system contains the petroleum of the Basin. The producing depths are between 1,400 and 1,800 feet and are in the Allegheny Plateau subarea. The entire oil region is part of a dissected plateau with elevations ranging from 1,600 to 2,500 feet above sea level. The carbonate rocks outcrop throughout an area of about 75 square miles in the Barge Canal subarea and are the source of crushed stone, aggregate, road metal, etc. The Salina formation of Silurian age outcrops in the Central Plains subarea and dips south at 35 feet or more to the mile. It is from this formation that the extensive salt deposits are extracted.

F. MINERAL PRODUCTION

The important mineral commodities for the Genesee River Basin are sand and gravel, stone, salt, gypsum and mineral fuels. Mineral production by county for the Basin is indicated in Table 6. Some figures are withheld due to disclosure problems but for every county there are data for at least one year. Summary data by county are given in Appendix 1.

1. Sand and gravel. - Sand and gravel deposits are found throughout New York and are of great significance to the Genesee River Basin (see Figures 4-11).

Sands and gravels are classified according to their uses in industry as follows:

a. Building aggregates are first in importance in the State and normally represent one-half the total value of production.

b. Paving aggregates are approximately one-third in value.

c. Molding and special purpose sands represent about one-sixth in value. Changes in the methods of producing and handling sand and gravel have contributed to the recent growth of the construction business. Formerly this work was carried on by a number of small enterprises with a minimum of equipment and was more often seasonal than continuous. Mass production methods and enterprises that now supply large centers of population and industry represent a large outlay of capital for equipment to handle and transport sand, gravel, and aggregate products. This type of operation tends toward permanency of the industry.

In 1964, sand and gravel production increased for New York 5 percent over 1963, and 3.5 percent in value (see Table 7). Requirements for sand and gravel, other than the aggregate business also increased. There were 213 active commercial operations in 1958, which by 1964 had increased to 318. More than 1 million tons were reported by 3 plants, from 500,000 to 1 million tons at 7 plants and from 200,000 to 500,000 tons at 17 plants. Production was reported from 54 of the 62 counties in New York State.

Production of sand and gravel in Pennsylvania totaled 16.2 million short tons in 1964, the highest level since 1953. Production was reported from 47 of the 67 counties. Sand and gravel is available in Potter County for development.

2. Stone. - In the Genesee River Basin two types of rocks quarried are (a) the carbonate rocks, mainly the Lockport dolomite and the Onondaga limestone both used for aggregate purposes and (b) the various sandstones utilized for dimension stone (see Table 8). Crushed stone, aggregate stone, road metal, agricultural stone, furnace flux and refractory stone are manufactured from limestones and dolomites. Dimension stone is utilized for building stones, monumental stones, paving, curbing and flagging stones. Other formations within the Genesee River Basin containing lime rock which have been productive are the Clinton Irondequoit limestone and Reynales dolomite. The Hamilton limes and other limes of the Genesee Devonian group also have been productive. The resources of limestone and dolomites in the Basin are large and are sufficient to meet any foreseeable demand.

Sandstones of the Genesee Basin are used in the building grades for decorative stones and as architectural dimension stone. Two sandstones from which most dimension stone is quarried are Medina red sandstone and Devonian sandstone. The Medina red sandstone is obtained from Niagara and Orleans Counties just south of Lake Ontario. Quarries once extended in an almost continuous line along the Erie Canal east of Lockport, with Medina, Eagle Harbor, Albion, Hulberton and Holley shipping points. This sandstone had been used in the past for curbstone and paving blocks, but is now used in concret construction. The Devonian sandstone, called bluestone, is a member of the Portage Chemung formation.

Much of these Devonian sandstones cleave into slabs that are suitable for flagstones and curbings. The thicker beds that occur in Wyoming County near Warsaw and Portageville are in demand as decorative stone because of their fine grained texture and color. American Bluestone Co. of New York City has developed quarries in the Portageville area.

The total value of stone produced for New York in 1964 increased 5 percent over 1963. It was the second ranking commodity in value of all the State's mineral commodities. Total tonnage increased 9.5 percent indicating a general upward trend in production. Monroe County was the largest producer of stone in the Basin. Outside the Basin Erie County ranked fourth in production, with a value of over $3 million. Production of all types of crushed and broken stone increased 10 percent in tonnage and 5 percent in value in 1964. Crushed and broken limestone account for 89 percent of the quantity and 81 percent of the value of all the stone produced in the State. Table 8 indicates production of stone in New York.

Stone production in Pennsylvania, for 1964, amounted to 52,829,268 short tons, valued at $91,074,680. In 1963 Potter County produced 8,702 short tons valued at $254,751.(1) In Potter County nine quarries near Austin, Oswayo, Wharton and Roulette produce dimension sandstone for flagging and other purposes.

Marl occurs in surficial deposits at several places in marshes and swamps in the northern part of the Basin. Deposits occur in the Batavia-Leroy, Caledonia, and Dansville areas. The deposits near Caledonia are worked for agricultural lime. According to Peterson (1950, p. 101) (reference 17), "an expanded use of marl as a local source of agricultural lime would be economically advantageous to agriculture and might well prove the basis for small but thriving commercial developments."

3. Salt. - The salt resources of New York are enormous and the reserves have been estimated to be hundreds of billions of tons. It is estimated that 5,000 square miles of central and southwestern New York are underlain by salt reserves. The thicknesses of these beds range from 50 ft. to 75 ft. and several beds may exist in any one area. Salt was produced from wells in Onondaga, Schuyler and Wyoming Counties. Rock salt was mined in Livingston and Tompkins Counties. Most of the production was consumed in the Middle Atlantic States and New England (see Table 9). In Livingston County, the Retsof Company, a subsidiary of International Salt Company, has one of the largest salt mines in the world. In 1964, New York was third among the salt-producing states in tonnage and value. Evaporated salt, used for manufacturing of chemicals and a wide variety of industrial and food processes, as well as seasoning, had an average value of $23.28/ton. Rock salt had an average value of $5.57/ton, and was used primarily in manufacturing chemicals and highway ice control. In 1964, the total State value of salt producing was $34,216,000. Salt is available for developing in Potter County, Pennsylvania; however, major salt deposits are in the Saline formation which, in northern Potter County, is generally located in excess of 5,000 ft. with increasing depths in the southerly direction.

(1) 1964 data withheld to avoid disclosing individual company confidential data.

4. Gypsum. - Gypsum occurs as one or more interstratified beds in a series of shales and limestones in the western section of the Salina formation which extends between Victor, Ontario County and Clarence Center, Erie County. These beds strike in an east-west direction and dip southerly 40 to 50 feet per mile. The thickness of the individual beds are from 1 to 8 feet and range in depths to 250 ft. Gypsum deposits of the State are capable of supporting the industrial requirements throughout the projection period (see Table 10). The best quality gypsum, which averages as high as 90-95 percent pure gypsum, is found near the surface of the gypsum-bearing strata in the counties of Ontario, Monroe and Genesee. Genesee and Monroe Counties have actively produced the bulk of all the crude gypsum mined in the State and compete with mines in Erie County for total production. Three of the five underground mines from which gypsum was recovered were located in Erie County; 1 in Monroe County and 1 in Genesee County. In 1964, New York ranked 5th in the nation for crude gypsum production. It is also the only major producing State for gypsum in the northeastern part of the country. The largest share of tonnage mined is converted directly by the operating companies into calcined plasters of gypsum blocks, tiles and wallboards.

5. Petroleum. - The major producing area for crude oil in New York is contained almost entirely in the three southern counties of Cattaraugus, Steuben and Allegany within the Genesee Basin. The oil pools of New York are part of the main district of Appalachia in Pennsylvania, Virginia and Ohio. Early in 1965 geologists and representatives of the Nation's leading petroleum companies have renewed their search for gas and oil deposits in western New York, but no major finds have been reported. Reserves of petroleum in New York are being steadily depleted as shown by estimates of American Petroleum Institute. The estimated reserve for 1964 reflects a production of 1,874,000 barrels and a downward revision of the previous estimate.

Reserves of Crude Petroleum	
Year	(Million barrels)
1947	71
1956	40
1961	27.7
1962	23.1
1963	18.4
1964	13.6

New York's production of crude oil in 1964 increased 11.6 percent compared with 1963. Wells in Allegany and Steuben Counties yielded about one-half of the total; the remainder was from Cattaraugus County. In 1964 the average value dropped to $4.44 from $4.59 per barrel in 1963 (see Table 11).

Production of crude oil in Potter County, Pennsylvania is from the Oriskany and Bradford Sands. Wells, principally in the northwestern part of the county, yielded 211,488 barrels of crude oil during 1953. By 1962 there was about 418 producing oil wells which yielded only 50,731 barrels. The approximate price per barrel of crude oil in 1964 for the Northern or Bradford District was $4.48.

6. Natural Gas. - Natural gas has been produced in fifteen fields in southwestern and western New York (see Tables 5, 12 and 13). In the Genesee Basin gas is produced from Allegany, Steuben and Cattaraugus Counties. In 1955 the discovery of the Allegany State Park gas field added significantly to New York gas reserves which by 1956 were estimated to be 77 billion cubic feet. In 1964 the American Gas Association indicated proved recoverable reserves of 133.5 billion cubic feet; a net increase of 1.2 billion cubic feet over 1963. Reserves consisted of 38.3 billion cubic feet of natural gas and 95.2 billion cubic feet of underground storage. Additional requirements for New York are supplied by other states, especially Pennsylvania.

Production of natural gas in Pennsylvania decreased from 92.7 billion cubic feet, valued at $24.1 million in 1963 to 82.2 billion cubic feet valued at $22.3 million in 1964. Gas reserves at the end of 1964 were estimated at 1,243.6 billion cubic feet; of which 491.2 billion cubic feet were in storage. The total storage capacity for natural gas in Pennsylvania is 666.7 billion cubic feet. Location and production of gas wells in Potter County are shown in Table 14.

7. Coal. - Production of coal in the Genesee River Basin is minor; however, coal is available for development in Potter County, Pennsylvania. Coal in Potter County is an extension of the bituminous field which crosses the western end of Pennsylvania.

8. Peat. - Production of peat is primarily for agricultural purposes and includes the varieties of moss, reed, sedge and humus. Peat is evenly distributed throughout New York and occurs in all past and present swamplands. Peat production in New York increased in value from $178,000 in 1963 to $261,000 in 1964 (see Table 15). Production in the Genesee Basin is from extensive peat bogs in the Oak Orchard Swamp.

9. Clays and Shales. - Clays of New York are used in light-weight aggregate, for art pottery, in the production of cement and in the manufacture of building brick. Glacial clays are common in the Basin and along the Genesee River and its larger tributaries. The most important deposits are glacial lake clays which range in thickness from 3-50 ft. Clays of good quality are reported in the Genesee River Valley between Belfast and Portageville, near Wellsville, Rockville and Avon.

Shales have been quarried for making brick and tile, but most of the quarries were abandoned before 1930; however, there are ample reserves of shale available for use (see Table 16).

There has been a recent increase in the state-wide demand for clay and shale to supply new lightweight aggregate plans. Two of these plants were opened in 1962 in Ulster County.

10. Iron Ore. - Iron ore was formerly mined at Ontario Center, 15 miles northeast of Rochester. The beds containing these formations reach their maximum development between Oneida and Monroe Counties. The seams range from one to three feet in thickness. At Rochester, the Furnaceville iron ore member of the Reynales formation attains a thickness of 14 inches.

11. Cement. - Materials for cement production are available in the Genesee River Basin but at present are not being developed because of comparative locational advantage of other areas.

A $1 million storage and bagging plant was opened at Rochester by the Rochester Portland Cement Co. about 1958. The plant is on the Genesee River and has a 200-foot loading dock, four 100 by 40-foot silos and a cement-bagging building. It is supplied by an affiliate company in Canada.

G. PROJECTIONS OF THE MINERAL ECONOMY

Introduction. - Estimated Basin reserves for various minerals were considered to be adequate for the projection period. However, reserves of crude oil will be depleted and complete exhaustion will take place before the end of the projection period.

In Table 17 the medium value should be considered as the most probable figure, not the arithmetic average between the high and low value. Figures 12-15 represent values presented in Table 17. Emphasis was placed on dollar value as a measure of production. Mineral fuel production declined through the decade but appears to have leveled off. Nonmetal production has increased and will probably continue to increase.

Estimates are based on entire counties with no attempt being made to separate minerals which lie wholly within the Basin limits. It was felt that for the purpose intended, the additional work involved would not produce better results with regard to projected growth rates. However, when preparing estimates of water use for the mineral industry, a distinction was made as to those industries whose probable source would lie within the Basin.

Factors Affecting Projections. - Included in the following paragraphs are factors which should be considered in using these projections. These projections should not be considered as being precise but should be used only as a guide to the anticipated magnitude and direction of trends expected to prevail under the given set of assumptions.

Dollar values for county graphs (Figures 4 through 11) should not be considered as indicating the total mineral value for that county. Minerals excluded from county values were petroleum and natural gas and some sand and gravel; however, they were considered in economic subarea projections. In the case of Livingston, Orleans and Wyoming counties, there was insufficient data to establish any historical pattern.

Historic data were also inadequate for Ontario, Wayne and Potter counties. This deficiency is partially overcome by grouping the counties together into economic subareas similar to those for the economic base study. Another reason for the groupings is to place counties of similar growth characteristics together.

Historical data available by county covered only a 12-year period or less. Therefore, more emphasis was placed on the longer range state and national projections.

In many cases data for significant minerals could only be aggregated into two or more counties to avoid disclosing individual company data.

In a few isolated cases, the combination of minerals contributing to the early county value have been different. Differences were rather insignificant, but where such was the case it has been indicated by a footnote.

It should be noted in Table 6 that natural gas and petroleum, some gem stones and sand and gravel were included with "Undistributed" and could not be assigned to specific counties.

The projections for each economic subarea are discussed in the paragraphs that follow.

Barge Canal Subarea (Monroe, Orleans and Wayne Counties). The major minerals for the Barge Canal economic subarea are stone, sand and gravel, and gypsum. The following considerations were involved in preparation of estimates:

a. The subarea minerals fall into a nonmetal category. National historic data indicate similar growth patterns between nonmetals and population. These minerals are primarily used in the construction industry. Increased construction activity is indicated for residential, commercial and highway construction.

b. Mining employment projection for the subarea was examined.

c. National historic trends for mineral production were used for comparison.

d. Greater significance was given to subarea projections, since the minerals, except gypsum, are dependent primarily on a local market.

Central Plains Subarea (Genesee, Livingston, Ontario and Wyoming Counties). The major minerals for the Central Plains economic subarea are salt, stone, gypsum, and sand and gravel.

a. Minerals of this subarea also fall into the nonmetal category. National historic trends for mineral production were used for comparison.

b. All of the above minerals, except salt, are allied to the construction industry. Subarea projections for construction employment show only a slight increase over the next 50 years.

c. Salt has displaced crude oil as the major mineral not only for the economic subarea but for the Basin as a whole. The major market for salt has been the middle Atlantic States and New England. More weight was given to a regional projection for this mineral.

Allegheny Plateau Subarea (Allegany, Cattaraugus, Steuben and Potter Counties). The major minerals for the Allegheny Plateau economic subarea are crude oil, natural gas, stone and sand and gravel.

a. National historic trends for mineral production were used for comparison.

b. The mineral fuels are of major significance to the subarea, but are declining. Renewed interest has been shown in the area's mineral fuel potential. Considerable exploration is currently in progress. The discovery of new fields would cause a considerable divergence between estimated and actual value.

c. Stone, and sand and gravel are allied to construction industry. Subarea projections for construction employment show minor gains for the next 50 year period under consideration.

H. WATER REQUIREMENTS

Methodology. - In mid-1963 the U. S. Bureau of Mines conducted a survey of water use in the minerals industry for 1962. The results were summarized in the Minerals Yearbook for 1963.(1) The Bureau recognized five different types of operations:

(1) Metals
(2) Nonmetals
    (a) Sand and gravel
    (b) Quarries
    (c) Other
(3) Petroleum
(4) Natural gas
(5) Bituminous coal

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(1) Source: U. S. Bureau of Mines, Minerals Yearbook, Volume I, Metals and Minerals, (Except Fuels), 1963, pp. 1209-1220.

The Genesee River Basin's share of New York mineral water requirements was determined and a corrective factor added for Potter County, Pennsylvania. Estimates through 2020 of the Basin's water requirements for the mineral industry were established within the framework of the economic phase, Section D. Comparison was in constant dollar value of production. Reliability of using a dollar value verses a quantitative unit for production, demonstrated that a favorable comparison did exist. Additional methods were used to check these estimates.

The data in the Minerals Survey of 1962 was converted from million gallons per year to cubic feet per second by considering the work year, work week and work day of a specific type of operation. There is considerable variance in annual, monthly or daily water requirements depending upon the type of mineral industry, work week, number of shifts, etc. Other methods were used to support the approach used to determine the Basin's present share of state water requirements and to establish reasonable ranges for projected values.

Water Requirements. The projections of probable water requirements for the mineral industry of the Genesee River Basin are presented in Table 18. These data have been divided into new water, recirculated water, discharged water and consumed water. According to the Bureau of Mines "the mineral industry treated 33 percent of all new water before use. The principal treatment processes were filtration, pH control, chlorination, and bacteria control. Most recirculated water (93 percent) was settled, and 18 percent was filtered before being reused. Prior to discharge 28 percent of the water was settled or otherwise treated and the remainder was discharged without treatment. Disposal of water to streams and lakes was 81 percent; to surface seepage and well injection, 18 percent; and to sewers and other users, 1 percent."(1) The data in Table 18 indicate that water use will approximately triple during the projection period. In preparing these projections no allowances were made for improvement of water use systems to reduce quantities of water required by further recirculation or reuse. The percentage of recirculated water was held constant throughout the projection period at approximately 50 percent. Some industries obtain water from nearby municipalities, so that caution should be used to avoid double counting of requirements.

These estimates will act as a guide during the plan formulation stage, when reasoned choices may be necessary between competing purposes for water use. The basic objective in the formulation of plans for the Genesee River Basin is to provide the best use, or combination of uses, of related water and land resources to meet all foreseeable short and long-term needs. As specific projects emerge which appear to be justified, steps should be taken to have the appropriate agency examine proposed reservoirs and determine if any active mining properties will be jeopardized.

(1) U. S. Bureau of Mines, Minerals Yearbook, Volume III, Area Reports, 1963, p. 773.

TABLE 1 - VALUE OF APPARENT CONSUMPTION OF MINERALS IN THE UNITED STATES, 1947, 1954, and 1961 (1)

(Data are in 1954 Dollars)

Commodity	1947	1954		1961	
	Million Dollars	Million Dollars	Percent increase over 1947	Million Dollars	Percent increase over 1947
Dimension Stone	43	63	47	65	51
Crushed & Broken Stone	394	582	48	905	130
Sand & Gravel	267	503	88	680	155
Gypsum	26	37	42	43	65
Crude Petroleum	5,197	7,195	38	9,009	73
Natural Gas	488	952	95	1,458	199

(1) Source: U.S.Bureau of Mines, Minerals Yearbook, Volume 1, Metal and Minerals (Except Fuels), 1963, Table 11, p. 17.

TABLE 2 - VALUE OF MINERAL PRODUCTION IN NEW YORK BY MINERAL, 1952-1964 (1)(2)
(1960 Dollars)

Year	Column 1 Sand and Gravel (thousands)	Column 2 Stone (thousands)	Column 3 Gypsum (thousands)	Column 4 Sand & Gravel, Stone (thousands)	Column 5 Sand & Gravel, Stone & Gypsum (thousands)
1952	$ 21,167	$ 29,218	$ 4,417	$ 50,384	$ 54,801
1953	25,565	27,477	3,816	53,041	56,857
1954	31,655	33,432	4,261	65,087	69,348
1955	26,690	39,623	4,602	66,312	70,914
1956	28,837	36,280	4,836	65,117	69,954
1957	27,048	44,204	3,829	71,252	75,082
1958	27,876	38,683(3)	3,916	66,559	70,475
1959	31,042	46,004	4,608	77,046	81,654
1960	35,152	46,955	3,928	82,107	86,035
1961	30,563	43,866	3,451	74,428	77,880
1962	31,663	47,733	3,154	79,396	82,549
1963	37,957	45,366	3,400	83,323	86,723
1964	38,933	47,073	3,351	86,026	89,377

Footnotes:

(1) Source: U. S. Bureau of Mines Mineral Yearbook.

(2) Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

(3) Includes slate from 1958-1964 (relatively insignificant difference in value).

Column 1 - Figures used for comparison with Allegany, Cattaraugus and Steuben Counties.

Column 4 - Col. 1 + Col. 2, figures used for comparison with Ontario and Wayne Counties.

Column 5 - Col. 1 + Col. 2 + Col. 3, figures used for comparison with Genesee and Monroe Counties.

TABLE 3 - INDEX OF IMPLICIT UNIT VALUE OF MINERALS PRODUCED IN THE UNITED STATES IN 1960 DOLLARS, 1952-1964 (1)

Year	Index 1957-59=100		Index 1960=100	
1952	87.0		86.4	
1953	92.5		91.9	
1954	94.7		94.0	
1955	96.4		95.7	
1956	100.3		99.6	
1957	98.6		97.9	
1958	99.5		98.8	
1959	101.9		101.2	
1960	100.7		100.0	
1961	100.4		99.7	
1962	99.7(2)	100.0(3)	99.0(2)	99.3(3)
1963	98.9(2)	100.1(3)	98.2(2)	99.4(3)
1964	99.8		99.1	

(1) Data for 1952-1961 from U.S. Bureau of Mines Minerals Yearbook, Volume I, 1963, table 24, p. 29 and data for 1962-1964 from U. S. Bureau of Mines Minerals Yearbook, Volume I, 1964, table 19, p.23.

(2) Indices for 1962 and 1963 are a revision of the indices originally reported in the 1963 volume of the Minerals Yearbook.

(3) Indices originally reported in the 1963 volume of the Minerals Yearbook. These indices were used to compute values for year 1963 in section D of this report.

TABLE 4 - NATIONAL PROJECTIONS OF POPULATION AND GROSS NATIONAL PRODUCT, 1959-61 Average, and 1980-2020 (1)

Year	Population (Million)	Percent increase over 1959-61 av.	Gross National Product (2) (Bil. Dol.)	Percent increase over 1959-61 av.
1959-61 Average	180.8	-	502.1	-
1980	254.1	40.5	1,068.5	112.8
2000	358.3	98.2	2,174.7	333.1
2020	502.0	177.7	4,403.2	776.9

(1) Based on medium projections prepared by Ad Hoc Water Resources Economic Task Group, July, 1963.

(2) Gross National Product in 1960 dollars, (1960 price level adjustment ratio based on 1954 equals 1.00 was 1.144).

TABLE 5 - THE GEOLOGIC OCCURENCE OF NATURAL GAS IN CENTRAL AND WESTERN NEW YORK (*)

Rock System	Formation Name	Description of Rock Formation	Formation Thickness
Devonian	Chemung Shales	Gray, olive, blue shales and thin beds of argillaceous sandstones. The lower half of the Chemung contains the oil producing sands of the State.	1200 - 1500'
	Portage Sandstones	A well defined series of sandstones, flags, and black carbonaceous shales. Has gas bearing member. Cattaraugus, Allegany, Steuben (**)	1200 - 1400'
	Hamilton & Marcellus shales	Blue, gray and olive shales. Basal Marcellus member of black shale is gas bearing. Cattaraugus, Livingston, Ontario (**)	600 - 700'
	Onondaga	A heavy bedded limestone - gas bearing.	60 - 130'
	Oriskany Sandstone	Gas bearing sandstone of Steuben, Allegany, Cattaraugus, and also for Schuyler and Yates Counties. Cattaraugus, Allegany, Steuben (**)	0 - 20'
Silurian	Salina beds	Water limes, gypseous shales, and beds of gypsum and rock salt. Upper portion is gas bearing. Cattaraugus (**)	700 - 800'
	Niagara	At top is heavy bedded dolomites, the Lockport and Guelph. Rochester shale is at base. Some presence of gas	200'
	Clinton	Limestones, shales with thin beds of iron ore (hematite)	30 - 150'
	Medina Sandstone	The upper 150' of red and white sandstone is the most widespread gas horizon in the State below which is red shale and white Oswego sandstone. Cattaraugus, Genesee, Livingston, Monroe, Ontario, Wyoming (**)	1100 - 1200'
Ordovician	Hudson River or Utica	Alternating beds of sandstones and shales. The basal member is the Utica black shale.	500 - 600'
	Trenton	Alternating dark limestones and shales. Productive of gas in several northern counties east of the Genesee Basin.	700 - 900'
	Tribe Hills Little Falls	Heavy bedded limestones.	100 - 140'
Cambrian	Potsdam Formation	The sandstone produces gas in a few wells in central New York.	10 - 50'
Precambrian		No gas producing formations.	True thicknesses not known.

(*) Formation thicknesses applicable only to the Genesee River Basin and Service Area.

(**) Gas producing counties of the basin.

TABLE 6 - VALUE OF MINERAL PRODUCTION BY COUNTIES, 1952-1964 (1)(2)
(1960 Dollars)

County	1952	1953	1954	1955	1956	1957	1958
Allegany	$ 208,014	$ 331,806	$ 264,253	$ 272,730	$ 266,416	$ 377,159	$ 363,787
Cattaraugus(3)	441,779	446,146	590,582	483,974	780,344	720,582	839,385
Genesee	3,310,088	3,418,158	2,455,462	3,441,764	3,330,086	Withheld	Withheld
Livingston	7,730,591	6,807,805	8,104,113	Withheld	Withheld	Withheld	Withheld
Monroe(5)	2,495,286	1,706,332	1,460,009	2,874,412	2,935,832	1,090,340	2,665,111
Ontario	Withheld	Withheld	674,833	698,914	Withheld	Withheld	Withheld
Orleans	Withheld	Withheld	Withheld	Withheld	Withheld	Withheld	Withheld
Potter, Pa.	Withheld	Withheld	Withheld	179,479	Withheld	145,120	Withheld
Steuben	147,318	290,835	279,343	242,442	Withheld	346,204	Withheld
Wayne	88,411	17,277	28,751	Withheld	Withheld	Withheld	Withheld
Wyoming	1,739,220	2,123,665	Withheld	Withheld	Withheld	Withheld	Withheld

County	1959	1960	1961	1962	1963	1964
Allegany	$ 724,571(4)	$ 395,059	$ 312,126	$ 391,138	$ 403,681	$ 409,687
Cattaraugus (3)	754,665	827,940	836,231	1,066,509	1,167,203	1,050,454
Genesee	Withheld	2,981,712	2,755,215	2,726,352	2,860,270	2,888,494
Livingston	Withheld	Withheld	Withheld	Withheld	Withheld	Withheld
Monroe	2,960,408	3,184,620	3,096,899	3,645,472	3,522,823	4,217,785
Ontario	Withheld	Withheld	Withheld	1,424,705	1,503,087	1,230,071
Orleans	Withheld	Withheld	Withheld	106,645	160,662	Withheld
Potter, Pa.	Withheld	Withheld	Withheld	207,204	259,421	Withheld
Steuben	527,436	Withheld	Withheld	532,787	612,173	Withheld
Wayne	Withheld	Withheld	Withheld	Withheld	403,252	322,200
Wyoming	Withheld	Withheld	Withheld	Withheld	Withheld	Withheld

FOOTNOTES:

See following page

TABLE 6 - VALUE OF MINERAL PRODUCTION BY COUNTIES, 1952-1964(1)(2)
(Continued)

FOOTNOTES:

1. Source: U. S. Bureau of Mines, Minerals Yearbook.

2. Fuels, including natural gas and petroleum, are not indicated by county but are included with "undistributed" and therefore are incorporated in the total figure for the State.

3. Stone was also included in the 1955-56 figures, and peat was added in 1963.

4. Figure discarded.

5. Gem stones were included in the 1957-58 figures, but their value is insignificant to the total for this item.

TABLE 7 - TOTAL SAND AND GRAVEL PRODUCTION AND GOVERNMENT AND CONTRACTOR OPERATIONS, BY COUNTY, 1960-1964.

(Short tons)

County	1960	1961	1962	1963	1964
Allegany	-	-	-	-	-
Cattaraugus	22,890	11,940	7,000	-	14,000
Genesee	49,711	31,412	Withheld	58,000	31,000
Livingston	15,000	13,440	12,000	12,000	-
Monroe	-	-	-	-	-
Ontario	28,751	16,455	84,000	65,000	16,000
Orleans	12,852	16,167	13,000	8,000	10,000
Steuben	108,700	108,700	Withheld	116,000	116,000
Wayne	75,983	89,116	72,000	112,000	140,000
Wyoming	-	-	-	-	-
Basin Total	313,887	287,230	-	371,000	327,000
Undistributed*	283,466	1,387,037	453,000	7,796,000	10,766,000
State Total	5,870,612	2,714,312	1,908,646	9,530,000	12,671,000
Total sand & gravel (all operations)	30,687,000	28,043,000	29,447,000	37,381,000	39,282,000

*Includes data unspecified by county and data withheld to avoid disclosure of individual company confidential data.

Source: U.S.Bureau of Mines. Minerals Yearbook, Volume III, Area Reports, various years.

TABLE 8 - CRUSHED AND BROKEN LIMESTONE SOLD OR USED BY PRODUCERS IN NEW YORK, 1961-1964

(Thousand short tons and thousand dollars)

Use	1961		1962		1963		1964	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Riprap	85	$ 133	159	$ 272	209	$ 312	75	$ 129
Concrete aggregate & roadstone	16,148	25,669	14,739	26,270	14,261	25,578	15,344	26,622
Fluxing stone	63	102	51	82				
Agricultural	426	1,240	340	935	399	1,250	338	1,224
Railroad Ballast	327	532	588	952	497	848	477	815
Cement and lime *	5,034	5,188	5,930	5,782	5,869	4,506	7,290	6,021
Miscellaneous uses	1,952	3,449	2,021	3,619	1,880	2,908	2,302	3,054
Total	24,035	$36,313	23,827	$37,913	23,115	$35,402	25,826	$37,865

* Lime is included with miscellaneous in 1963 and 1964.

Source: U.S.Bureau of Mines, Minerals Yearbook, Volume III, Area Reports, various years.

TABLE 9 - SALT SOLD OR USED BY PRODUCERS IN NEW YORK, 1953-57 (average), 1958-1964.

(Thousand short tons and thousand dollars)

Year	Quantity	Value	Year	Quantity	Value
1953-57 (average)	3,616	$ 24,173	1961	4,149	$ 30,761
1958	3,896	30,609	1962	4,456	32,236
1959	4,011	30,958	1963	4,782	34,228
1960	4,008	30,763	1964	4,816	34,216

Source: U.S.Bureau of Mines, Minerals Yearbook, Volume III, Area Reports, various years.

TABLE 10 - CRUDE GYPSUM PRODUCTION IN NEW YORK, 1953-57 (average), 1958-1964.

(Thousand short tons and thousand dollars)

Year	Active Mines	Quantity	Value
1953-57 (average)	5	1,075	$ 4,097
1958	5	834	3,869
1959	5	919	4,663
1960	5	755	3,928
1961	5	663	3,441
1962	5	601	3,122
1963	5	647	3,339
1964	5	653	3,321

Source: U.S.Bureau of Mines, Minerals Yearbook, Volume III, Area Reports, various years.

TABLE 11 - PETROLEUM PRODUCTION IN NEW YORK, 1953-1957 (Average), 1958-1964

(Thousand barrels and thousand dollars)

Year	Quantity	Value	Average value per barrel	Year	Quantity	Value	Average value per barrel
1953-57 (average)	3,077	$12,493	$4.06	1961	1,658	$7,892	$4.76
1958	1,763	7,457	4.23	1962	1,589	7,309	4.60
1959	1,970	8,353	4.24	1963	1,679	7,707	4.59
1960	1,813	8,412	4.64	1964	1,874	8,321	4.44

Source: U.S.Bureau of Mines, Minerals Yearbook, Volume III, Area Reports, various years.

TABLE 12 - NATURAL GAS PRODUCTION IN NEW YORK, 1955-1964

Year	Quantity (Million ft^3)	Value (thousands)	Year	Quantity (Million ft^3)	Value (thousands)
1955	3,637	$1,073	1960	4,990	$1,542
1956	4,098	1,160	1961	5,742	1,694
1957	2,869	815	1962	4,262	1,198
1958	2,808	859	1963	3,962	1,169
1959	2,915	889	1964	3,125	963

Source: U.S.Bureau of Mines, Minerals Yearbook, Volume III, Area Reports, various years.

TABLE 13 - SUMMARY OF PRINCIPAL GAS FIELDS

Name of gas field	County	Number of field on frontispiece	Status	Producing horizons	Remarks
Churchville	Monroe	1	Active	Albion group ("Medina")	Depth of producing horizon is 475 feet.
Pavilion	Genesee, Livingston, Wyoming	2	Active		Production from 1906 with more than 100 wells; producing horizon ranges from 1,600 to 1,800 feet in depth.
Allens Hill	Ontario	3	Active		Production from 1895; producing horizon ranges from 1,800 to 2,000 feet in depth.
Allen	Allegany	4	Abandoned		Production begun in 1932; depth of producing horizon 3,000 feet.
State Line		5	Active	Oriskany sandstone	Production from 1933; depth of producing horizon 4,600 -4,900 feet.
Beach Hill		6	Active		Production from 1938; depth of producing horizon 4,900 feet.
Independence		7	Active		Production from 1940; depth of producing horizon 4,900 feet
Dansville	Livingston	8	Abandoned	Hamilton group	
Alfred	Allegany	9	Abandoned	Chemung group	

Source: W. L. Kreidler, History, Geology and Future Possibilities of Gas and Oil in New York State. New York State Museum Circular 33, 1953.

TABLE 14 - DEEP GAS PRODUCTION IN POTTER COUNTY, PENNSYLVANIA, 1963

Production in Mcf (Thousand cubic feet)

Field	Pool	Discovery Date	Cumulative Production at End of 1962	Production 1963	Cumulative Production at End of 1963	Status of Field or Pool at End of 1963
Ellisburg	TOTAL	9/ 1/33	79,500,000	100,000	79,600,000	Storage
	Bingham Center	1/ 2/39				Storage
	Ellisburg	9/ 1/33	79,500,000	100,000	79,600,000	Storage
	West Bingham	7/16/36				
Ulysses		10/ 2/39				
	Newfield	4/ 2/62	1,570,460	431,234	2,001,694	Producing
Leidy	TOTAL	1/ 9/50	158,352,832	462,000	158,814,832	Gas Storage & Producing
(Clinton & Potter County)	Ole Bull	1/ 9/59	3,552,800	462,000	4,014,800	

TABLE 15 - PEAT PRODUCTION IN NEW YORK, 1955-1964.

Year	Short Tons	Value (thousands)
1955	5,622	52
1956	2,900	23
1957	(1)	(1)
1958	13,606	117
1959	12,875	138
1960	10,042	146
1961	11,209	123
1962	16,200	113
1963	21,358	178
1964	32,574	261

(1) Figure withheld to avoid disclosing individual company confidential data.

Source: U.S.Bureau of Mines, Minerals Yearbook, Volume III, Area Reports, various years.

TABLE 16 - SHALE RESERVES

Formation	Thickness in feet	Localities where shales are accessible for mining	Possible uses of shale tested
Wellsville	200	Wellsville,Allegany County	Face brick and other redfired structural ceramics
Machias	(1)	Rushford-Belfast-Black Creek; Belfast-Delmont, Allegany County	Face brick, common brick, and structural tile
Hatch	150-200	Dansville, Scottsburg, Tuscarora, and Gibsonville, Livingston County	Drain tile and common brick of medium quality
Queenston	100-200, exposed	Rochester	Red-fired ceramic products

(1) No data available.

Source: W.E.Brownell, et al. The Clays and Shales of New York State, Albany: New York State Department of Commerce, 1951.

TABLE 17 - VALUE OF MINERAL PRODUCTION IN THE GENESEE RIVER BASIN ECONOMIC AREA, 1953, 2020 (1)

(Thousands of 1960 Dollars)

Year	Predicted Varience	Genesee River Basin Economic Area	Economic Subareas(2)			
			Barge Canal	Central Plain	Allegheny Plateau	Total(3)
1953	(Historic)	$ 34,400	$ 1,800	$ 13,180	$ 19,420	$ 34,400
1963	(Historic)(4)	34,100	4,040	17,910	12,150	34,100
1980	Low	43,000	7,180	24,952	10,868	43,000
	Medium(5)	44,800	7,400	25,900	11,500	44,800
	High	49,000	7,912	28,114	12,974	49,000
2000	Low	54,000	11,073	34,655	8,272	54,000
	Medium	57,500	11,500	36,500	9,500	57,500
	High	67,000	12,659	41,507	12,834	67,000
2020	Low	69,000	14,314	43,470	11,216	69,000
	Medium	73,800	14,900	46,000	12,900	73,800
	High	94,000	17,364	56,645	19,991	94,000

(1) Years were chosen for historic data which would give a reasonable range and for which the most reliable information could be obtained. Disclosure problems have necessitated estimation of data for the following counties in the economic subareas: Barge-Orleans Co., 1953; Central Plains-Wyoming Co., 1963; Livingston Co., 1963; Ontario Co., 1953; Allegany-Potter Co., Pa., 1953.

(2) Data include estimates for crude petroleum and natural gas production.

(3) Rounded.

(4) The 1963 values in this table and in this section were based on original index of implicit unit value of minerals (nonmetal) as reported in the U.S.Bureau of Mines, Minerals Yearbook, Volume I, 1963, Table 24, p.29.

(5) Most probable figure.

TABLE 18 - WATER REQUIREMENTS FOR MINERAL INDUSTRY, 1962, 2020
(1)

Genesee River Basin Hydrologic Area

Year	Predicted Variance	Water Use (cfs) (2) New Water	Recirculated Water	Total Water Used	Discharged Water	Consumed Water
1962		31.8	15.8	47.6	28.0	3.8
1980	Low (3)	40.2	20.7	60.9	35.8	4.4
	Medium	41.9	21.5	63.4	37.3	4.6
	High	45.7	23.5	69.2	40.8	4.9
2000	Low	49.5	25.9	75.4	44.3	5.2
	Medium	52.7	27.6	80.3	47.2	5.5
	High	61.1	32.2	93.3	54.9	6.2
2020	Low	62.3	33.2	95.5	56.0	6.3
	Medium	66.7	35.5	102.2	59.9	6.8
	High	85.0	45.1	130.1	76.3	8.7

(1) Data are representative for those mineral industries whose source lies within the basin's drainage area.

(2) Rounded

(3) Most probable figure.

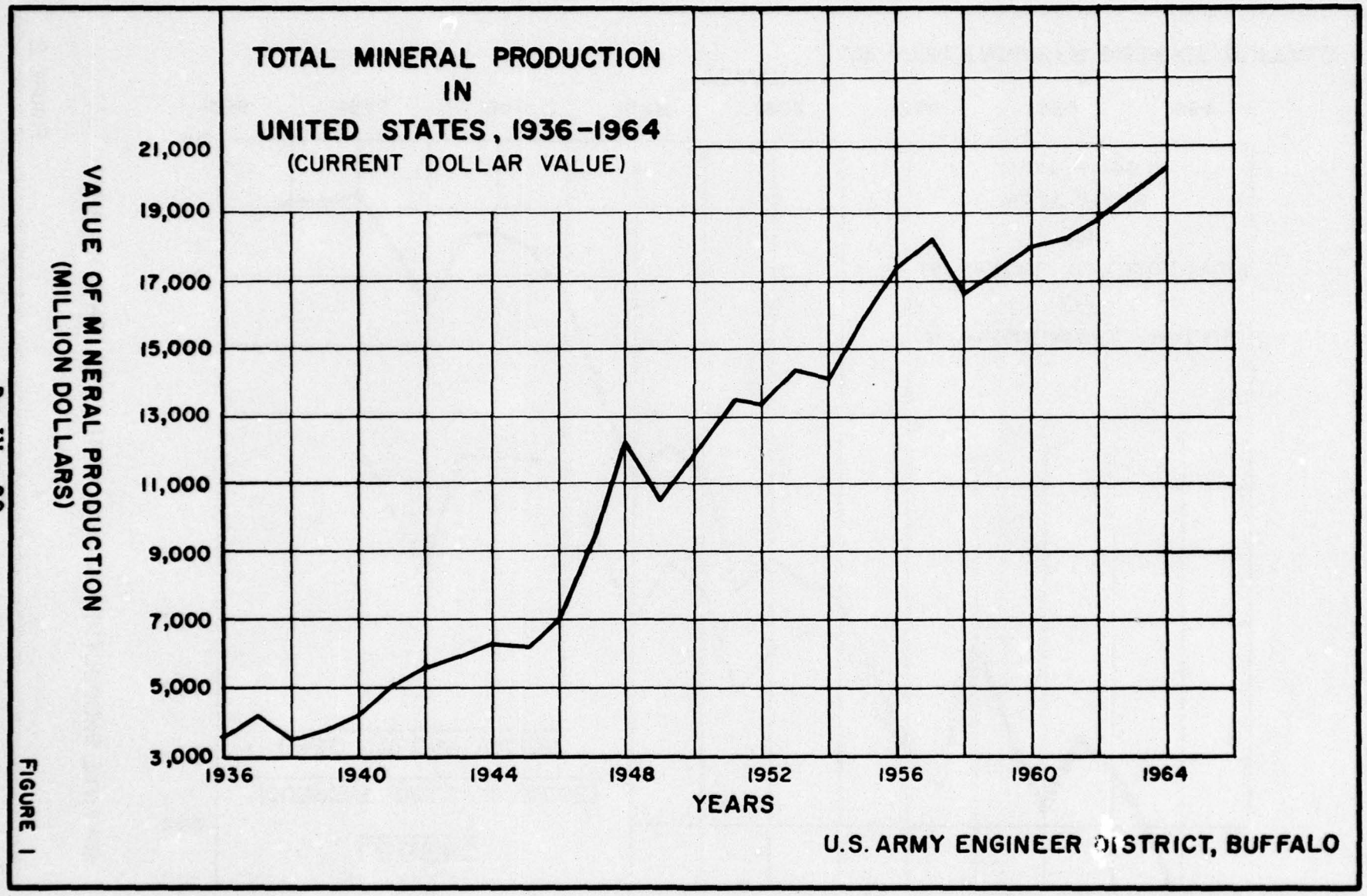

TOTAL MINERAL PRODUCTION
IN
UNITED STATES, 1936-1964
(CURRENT DOLLAR VALUE)
VALUE OF MINERAL PRODUCTION
(MILLION DOLLARS)
21,000
19,000
17,000
15,000
13,000
11,000
9,000
7,000
5,000
3,000
1936
1940
1944
1948
1952
1956
1960
1964
YEARS
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 1

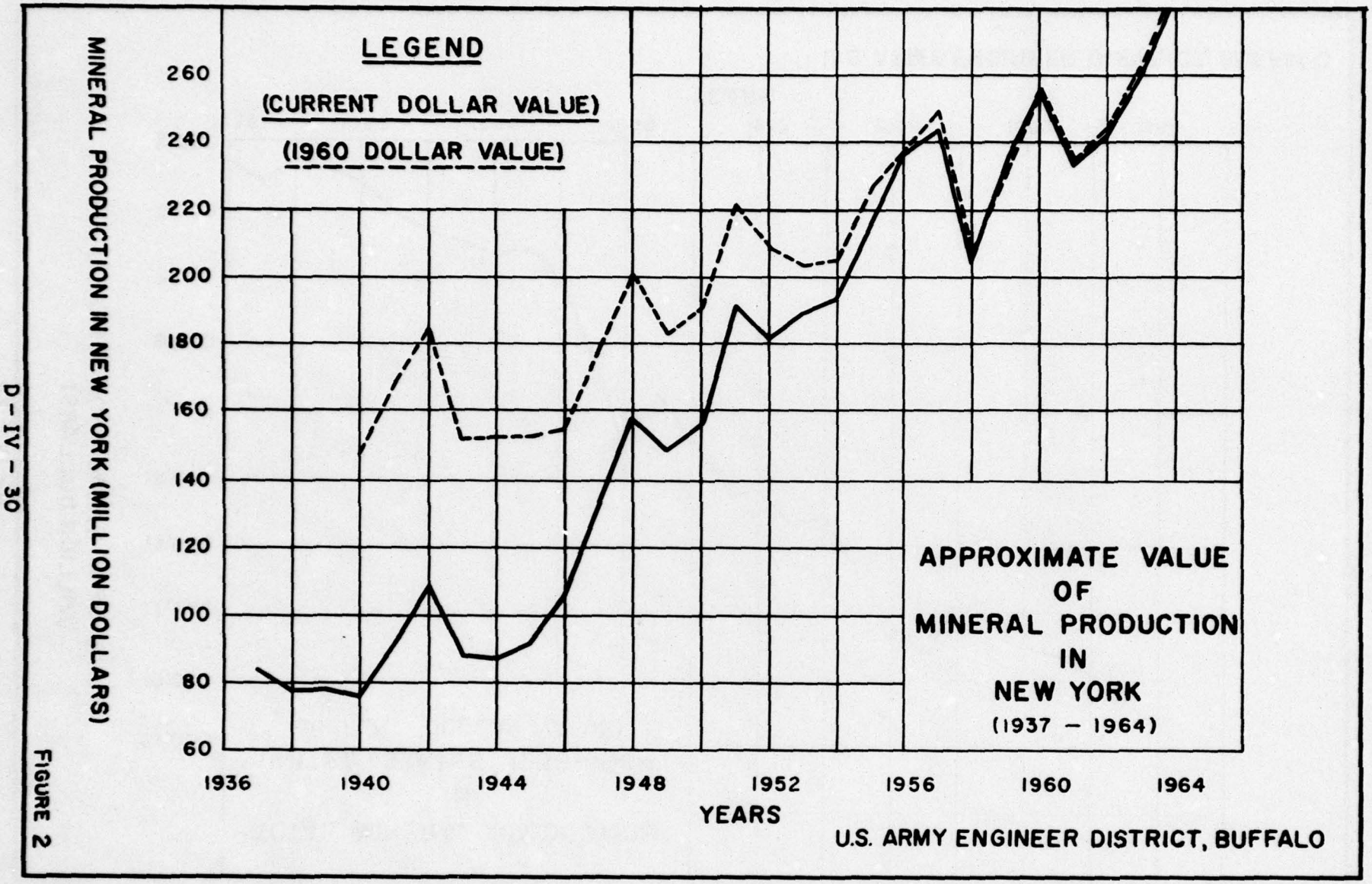
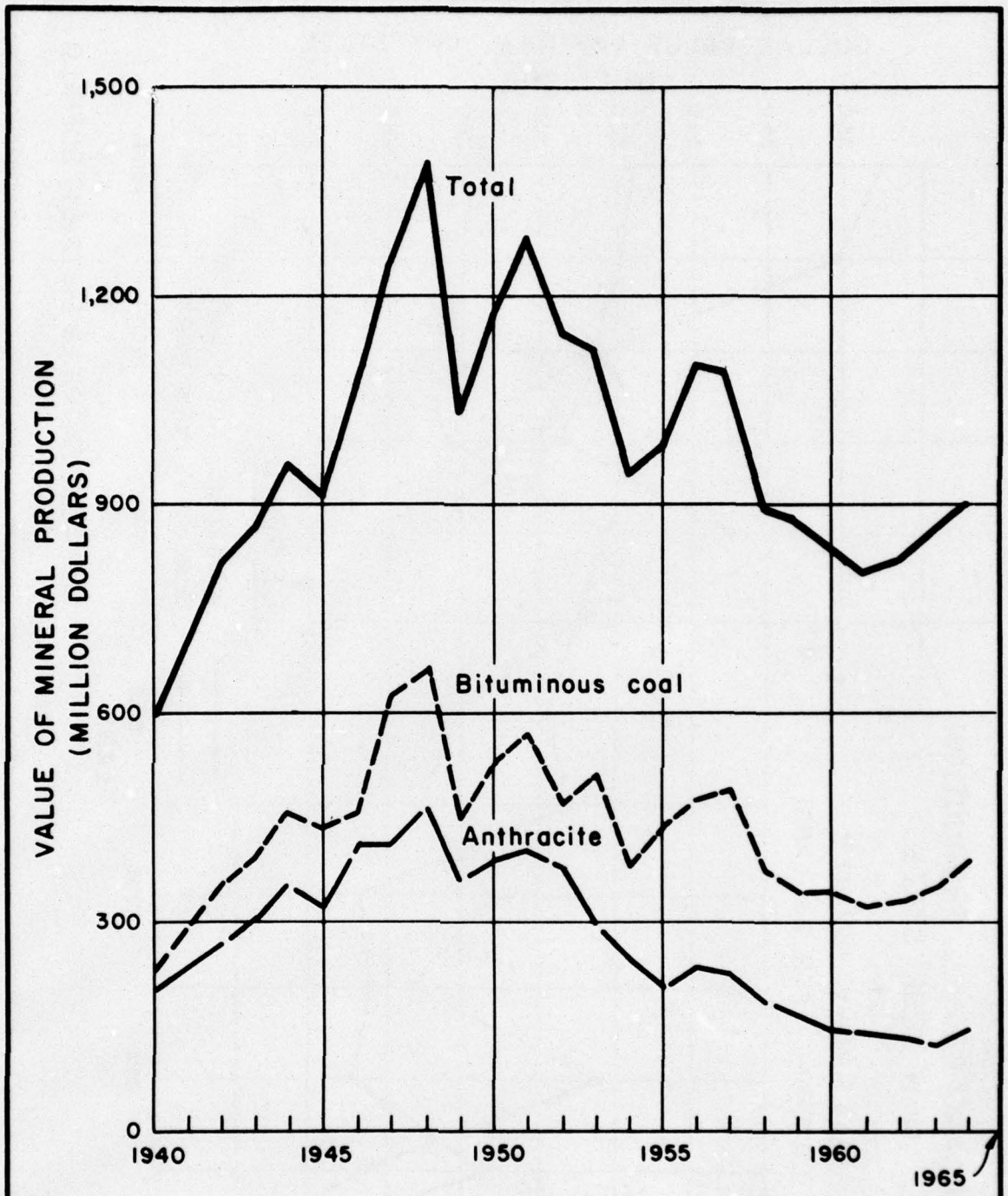

LEGEND
(CURRENT DOLLAR VALUE)
(1960 DOLLAR VALUE)
MINERAL PRODUCTION IN NEW YORK (MILLION DOLLARS)
260
240
220
200
180
160
140
120
100
80
60
1936
1940
1944
1948
1952
1956
1960
1964
YEARS
APPROXIMATE VALUE OF MINERAL PRODUCTION IN NEW YORK
(1937 – 1964)
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 2



TOTAL MINERAL PRODUCTION
IN
PENNSYLVANIA, 1940-1964
(CURRENT DOLLAR VALUE)

FIGURE 3

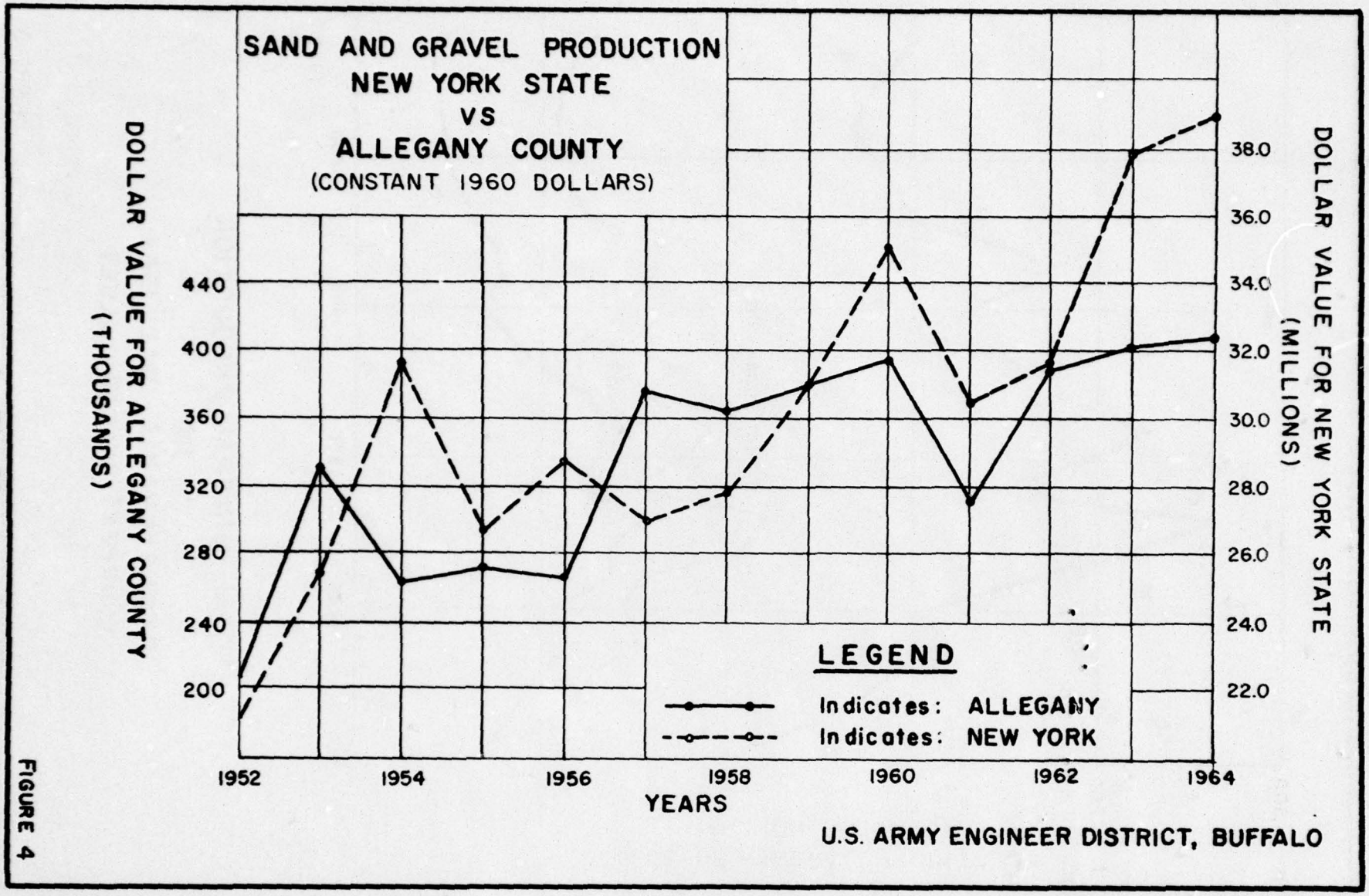

SAND AND GRAVEL PRODUCTION
NEW YORK STATE
VS
ALLEGANY COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR ALLEGANY COUNTY
(THOUSANDS)
DOLLAR VALUE FOR NEW YORK STATE
(MILLIONS)
440
400
360
320
280
240
200
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: ALLEGANY
Indicates: NEW YORK
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 4

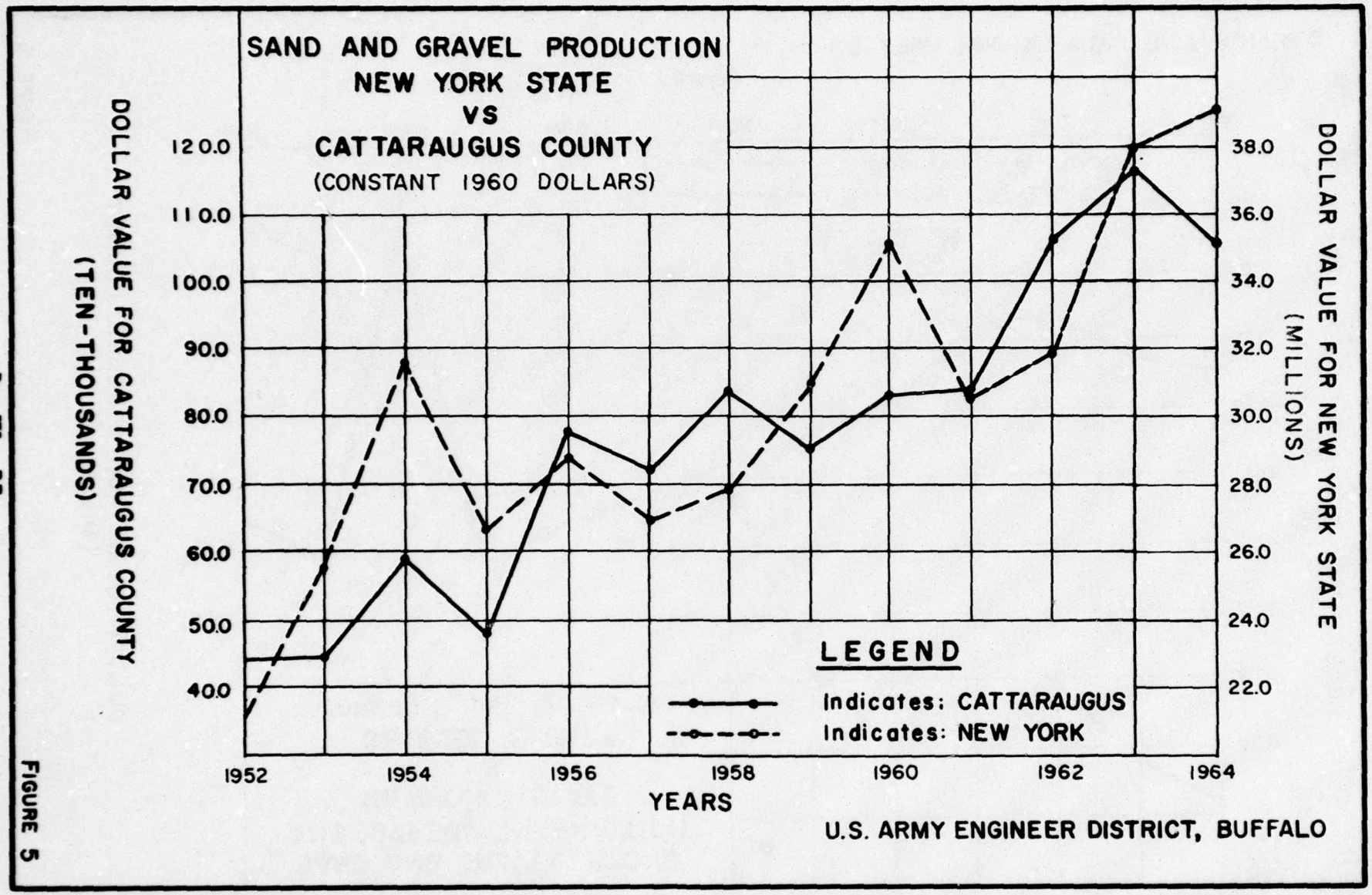

SAND AND GRAVEL PRODUCTION
NEW YORK STATE
VS
CATTARAUGUS COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR CATTARAUGUS COUNTY
(TEN-THOUSANDS)
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
DOLLAR VALUE FOR NEW YORK STATE
(MILLIONS)
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: CATTARAUGUS
Indicates: NEW YORK
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 5

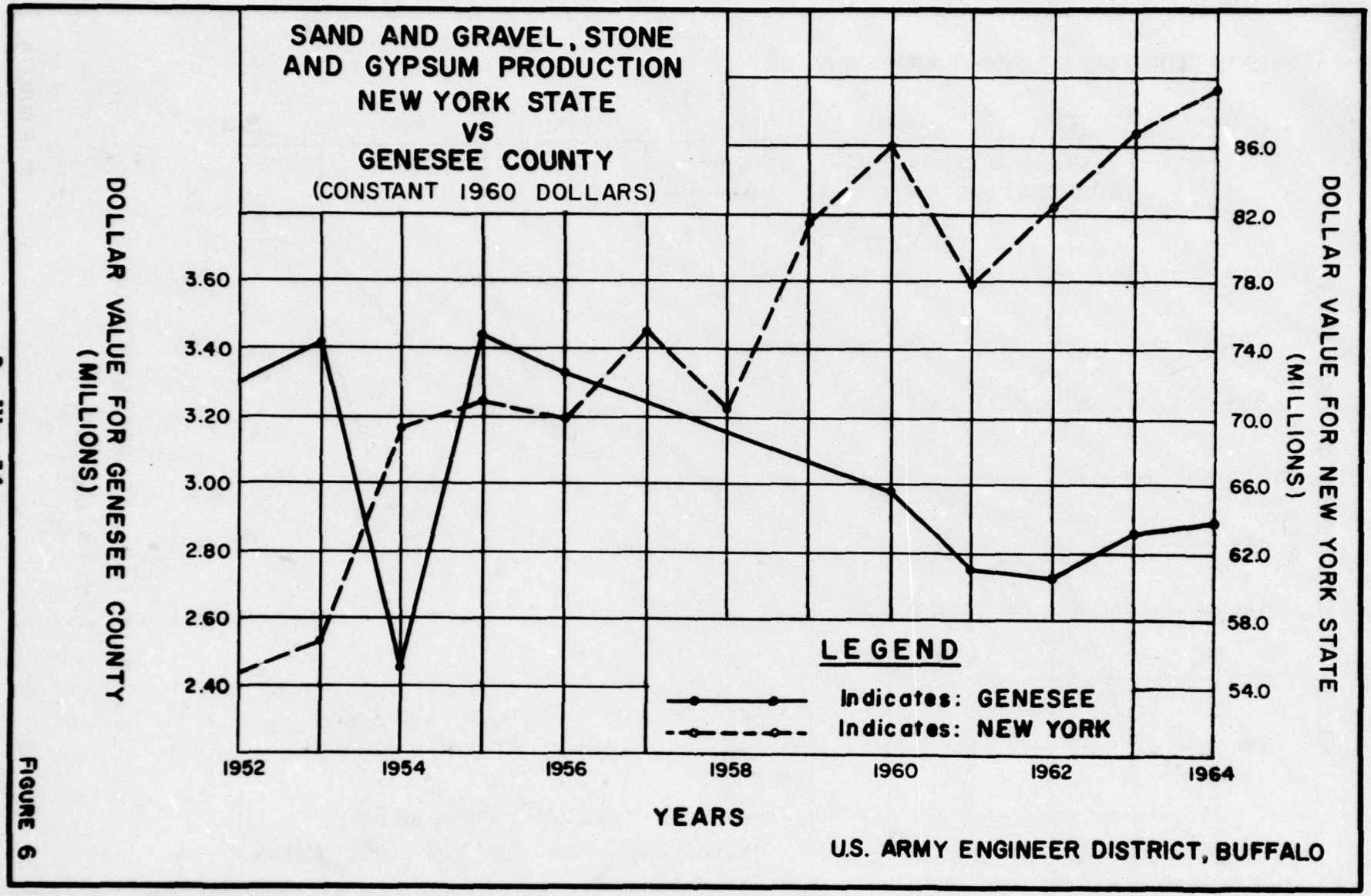

SAND AND GRAVEL, STONE AND GYPSUM PRODUCTION
NEW YORK STATE
VS
GENESEE COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR GENESEE COUNTY (MILLIONS)
DOLLAR VALUE FOR NEW YORK STATE (MILLIONS)
3.60
3.40
3.20
3.00
2.80
2.60
2.40
86.0
82.0
78.0
74.0
70.0
66.0
62.0
58.0
54.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: GENESEE
Indicates: NEW YORK
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 6

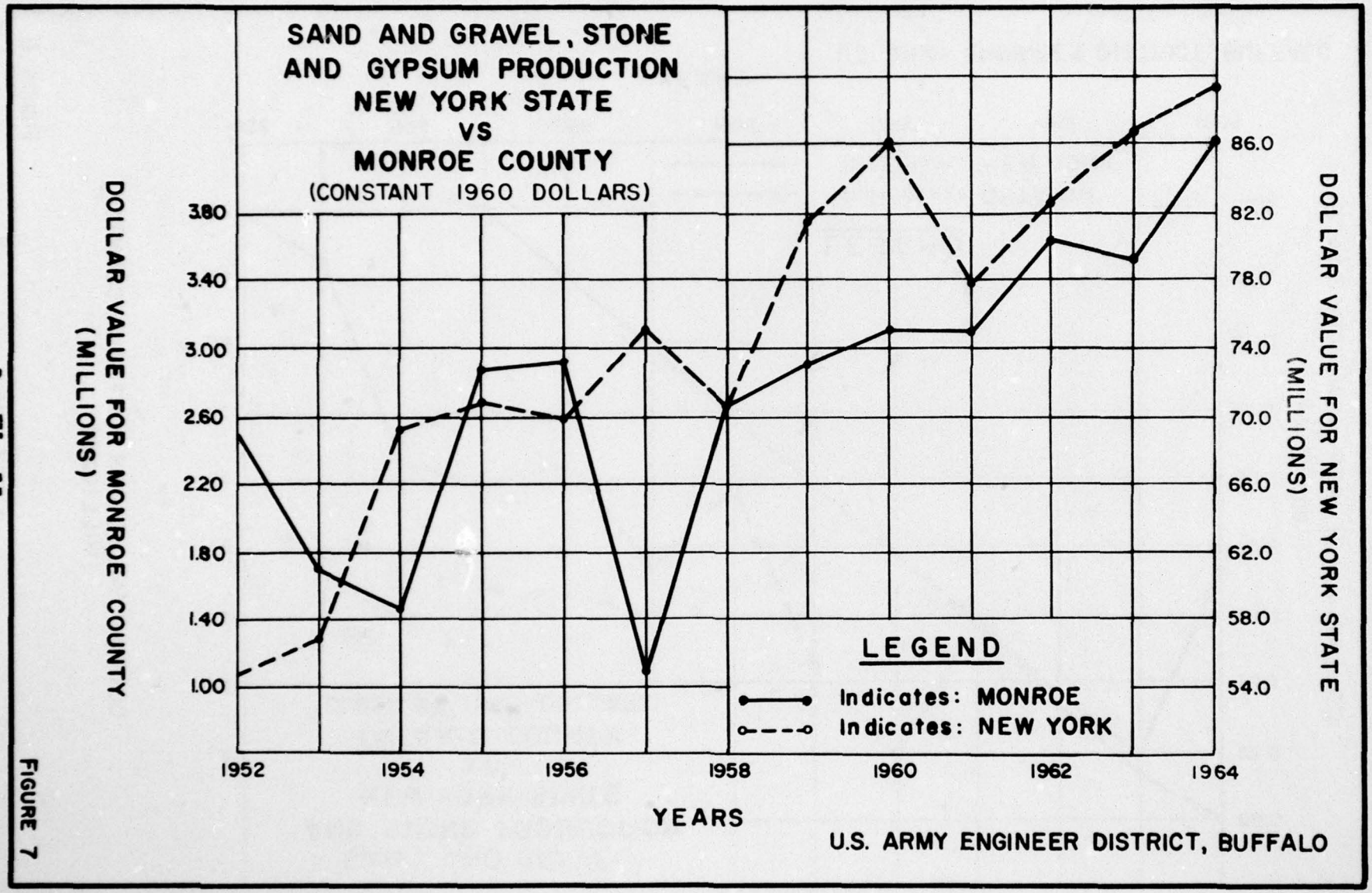

SAND AND GRAVEL, STONE AND GYPSUM PRODUCTION
NEW YORK STATE
VS
MONROE COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR MONROE COUNTY (MILLIONS)
DOLLAR VALUE FOR NEW YORK STATE (MILLIONS)
3.80
3.40
3.00
2.60
2.20
1.80
1.40
1.00
86.0
82.0
78.0
74.0
70.0
66.0
62.0
58.0
54.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: MONROE
Indicates: NEW YORK
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 7

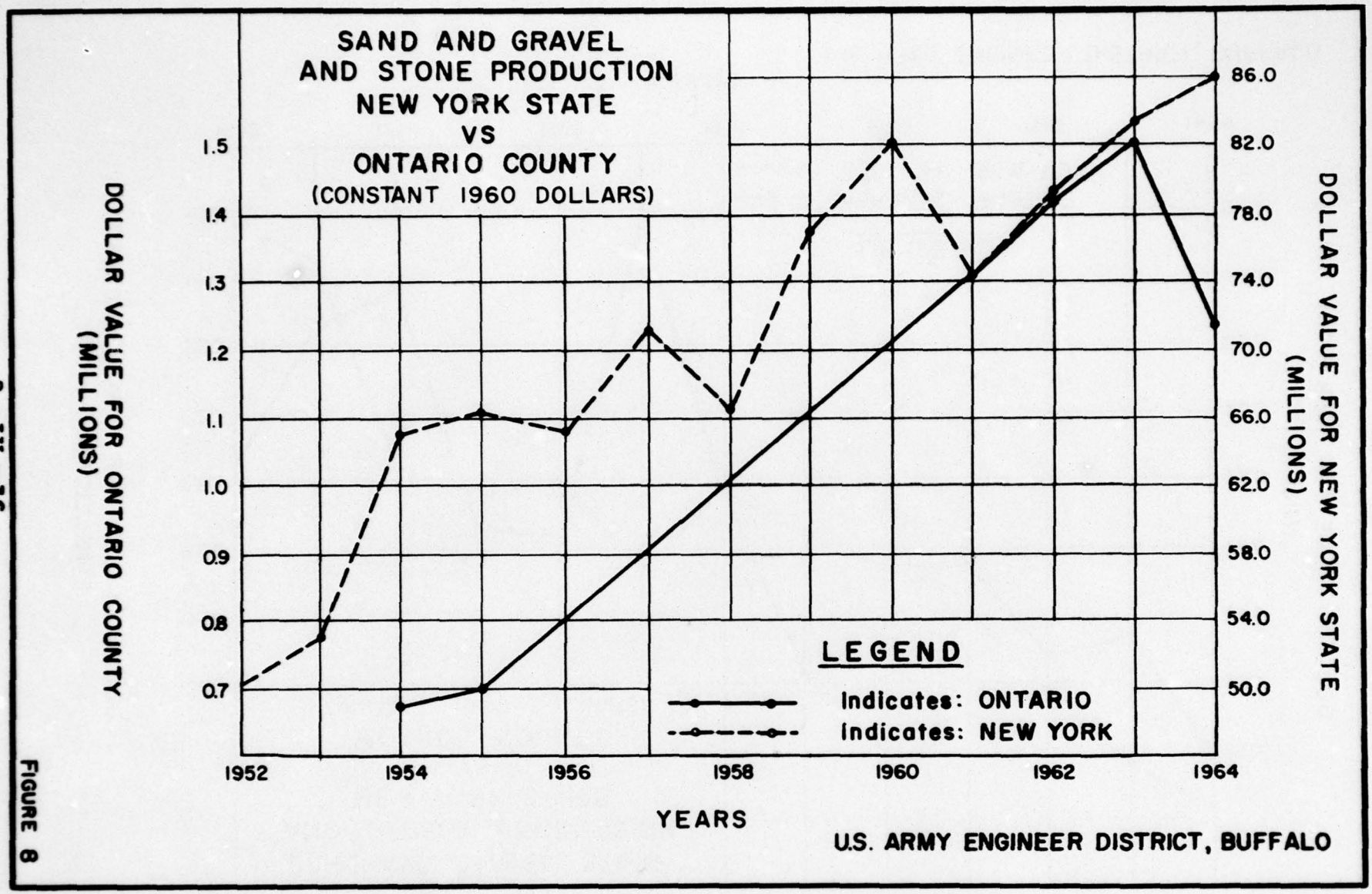

SAND AND GRAVEL
AND STONE PRODUCTION
NEW YORK STATE
VS
ONTARIO COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR ONTARIO COUNTY
(MILLIONS)
DOLLAR VALUE FOR NEW YORK STATE
(MILLIONS)
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
86.0
82.0
78.0
74.0
70.0
66.0
62.0
58.0
54.0
50.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: ONTARIO
Indicates: NEW YORK
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 8

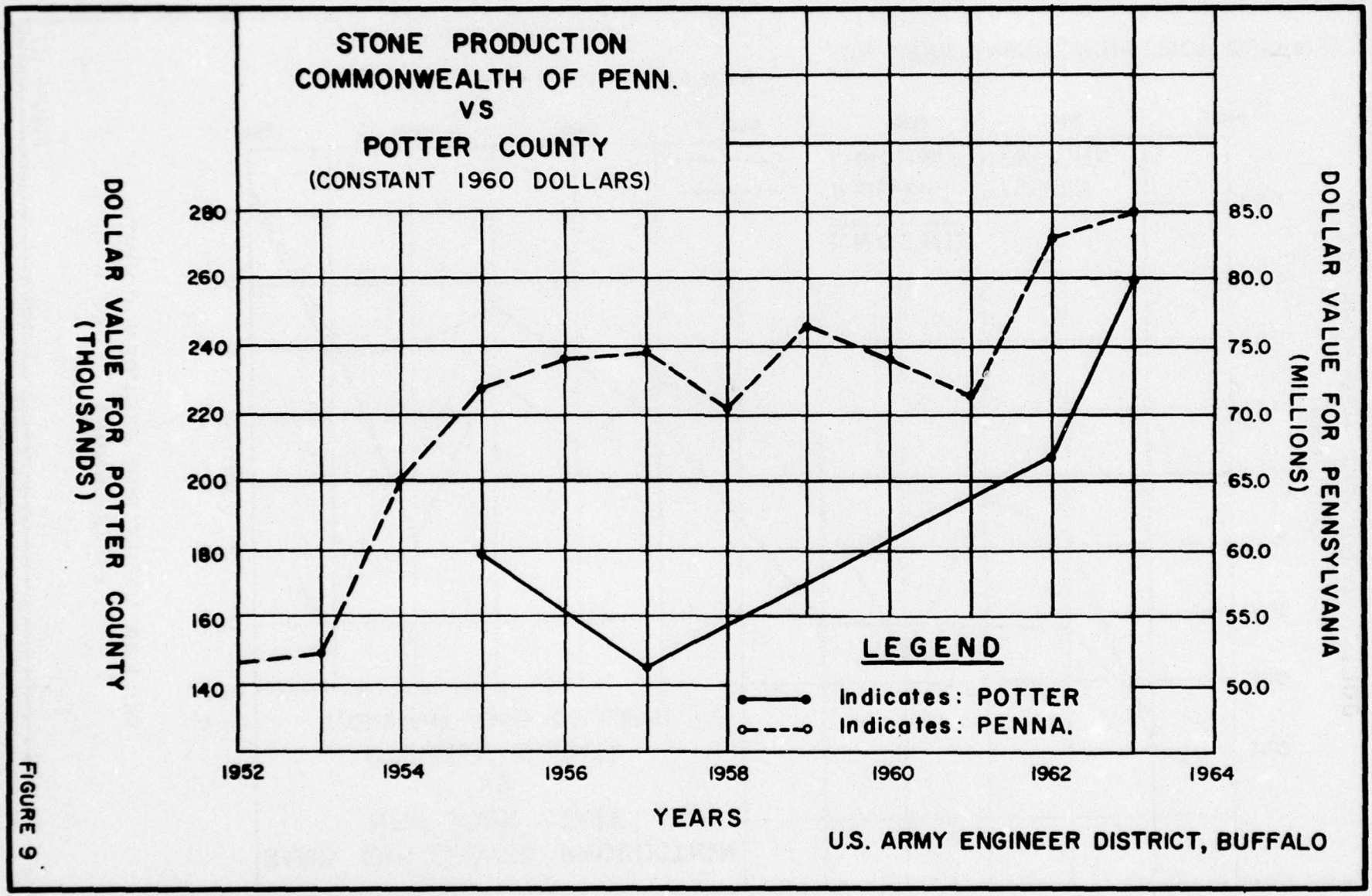

STONE PRODUCTION
COMMONWEALTH OF PENN.
VS
POTTER COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR POTTER COUNTY
(THOUSANDS)
280
260
240
220
200
180
160
140
DOLLAR VALUE FOR PENNSYLVANIA
(MILLIONS)
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: POTTER
Indicates: PENNA.
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 9

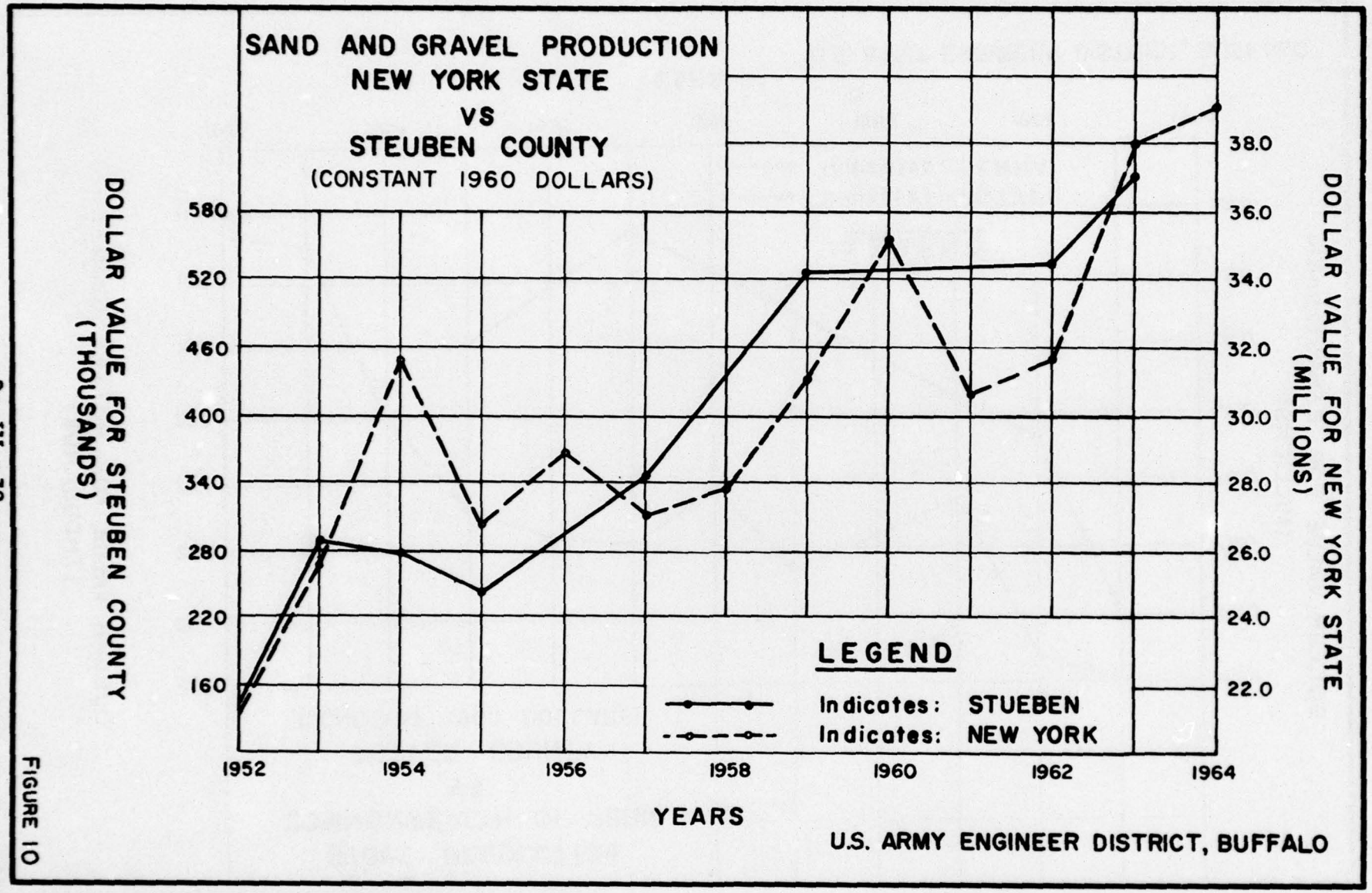

SAND AND GRAVEL PRODUCTION
NEW YORK STATE
VS
STEUBEN COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR STEUBEN COUNTY
(THOUSANDS)
DOLLAR VALUE FOR NEW YORK STATE
(MILLIONS)
580
520
460
400
340
280
220
160
38.0
36.0
34.0
32.0
30.0
28.0
26.0
24.0
22.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: STUEBEN
Indicates: NEW YORK
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 10

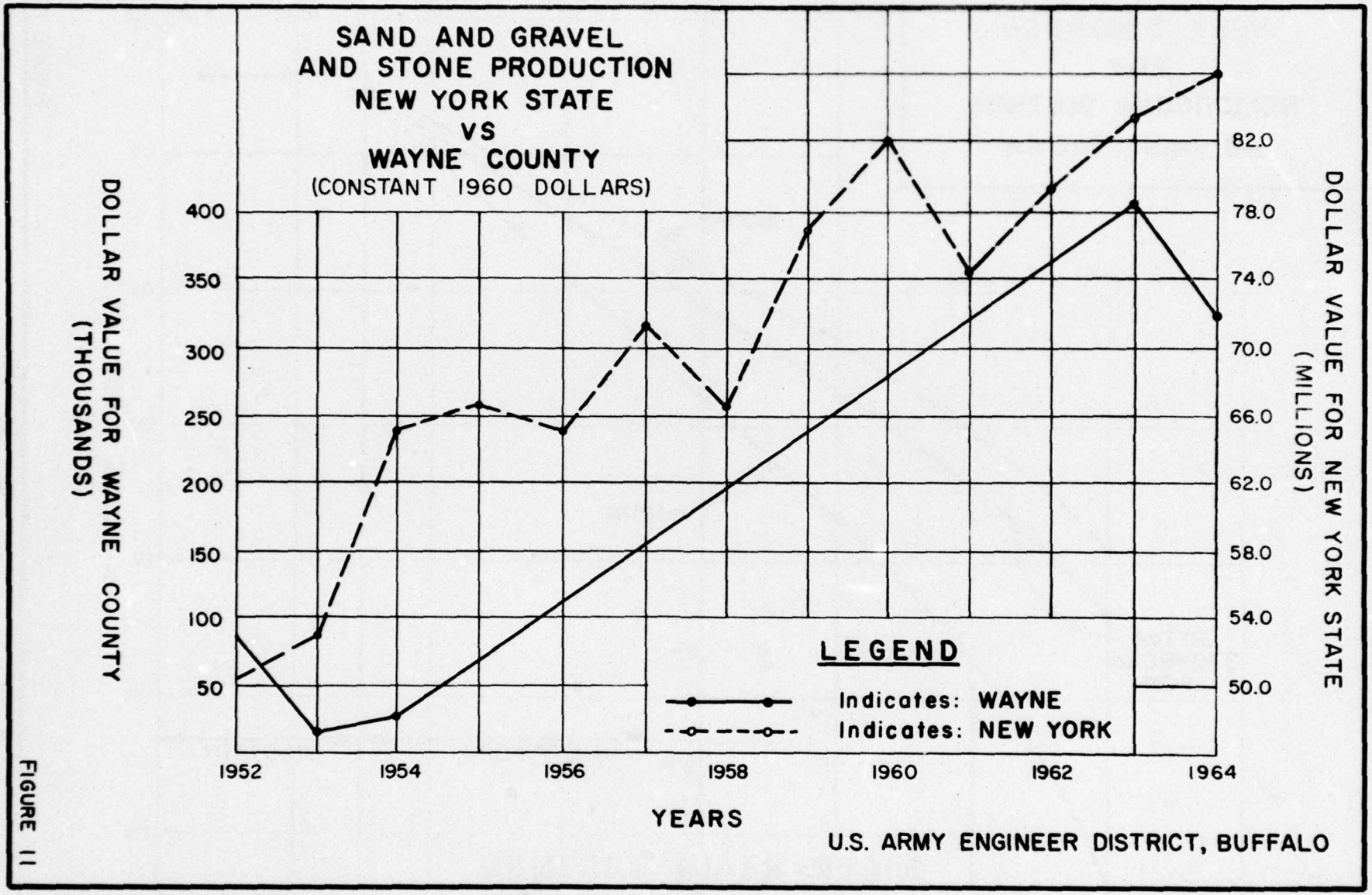

SAND AND GRAVEL
AND STONE PRODUCTION
NEW YORK STATE
VS
WAYNE COUNTY
(CONSTANT 1960 DOLLARS)
DOLLAR VALUE FOR WAYNE COUNTY
(THOUSANDS)
400
350
300
250
200
150
100
50
DOLLAR VALUE FOR NEW YORK STATE
(MILLIONS)
82.0
78.0
74.0
70.0
66.0
62.0
58.0
54.0
50.0
1952
1954
1956
1958
1960
1962
1964
YEARS
LEGEND
Indicates: WAYNE
Indicates: NEW YORK
U.S. ARMY ENGINEER DISTRICT, BUFFALO

FIGURE 11

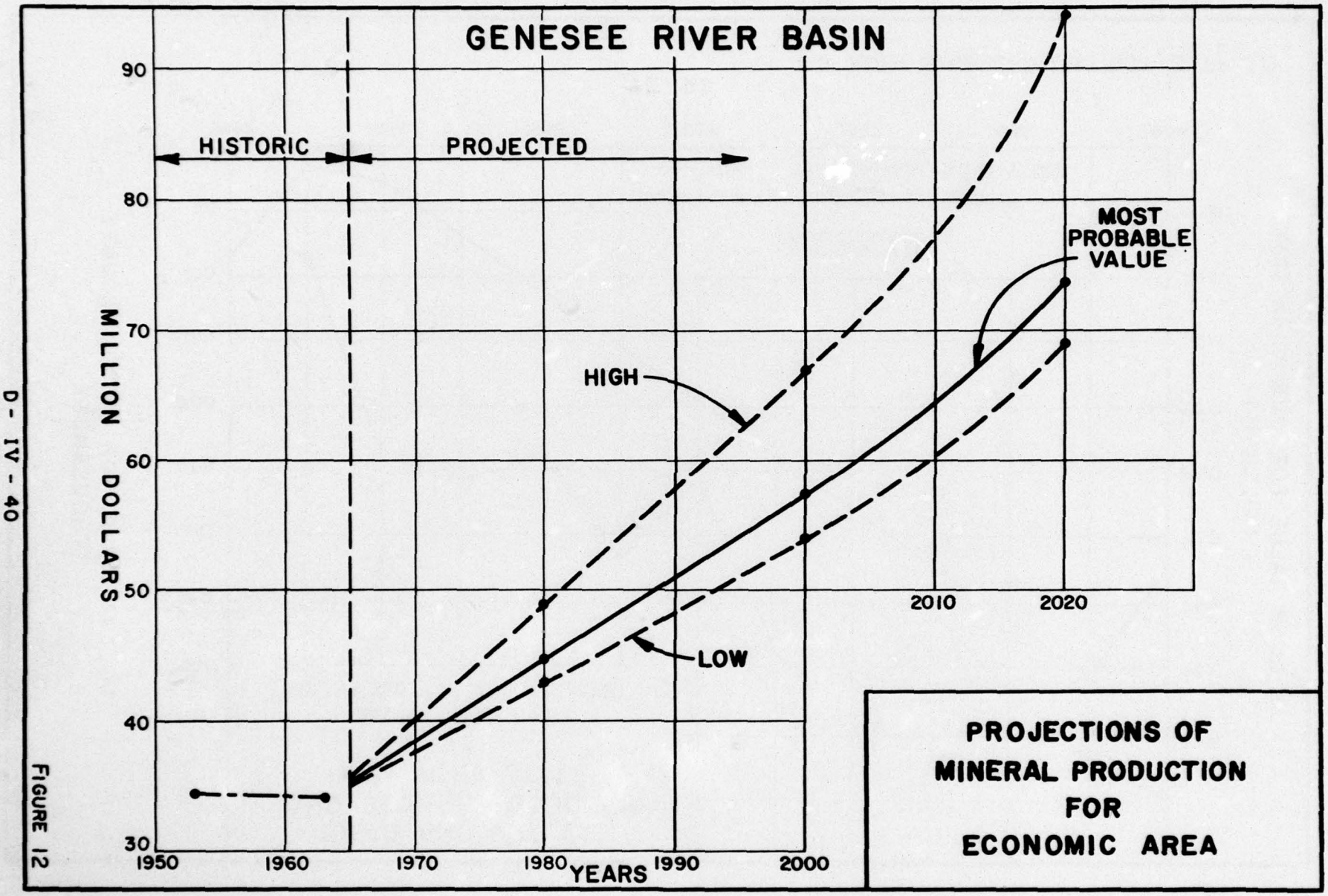
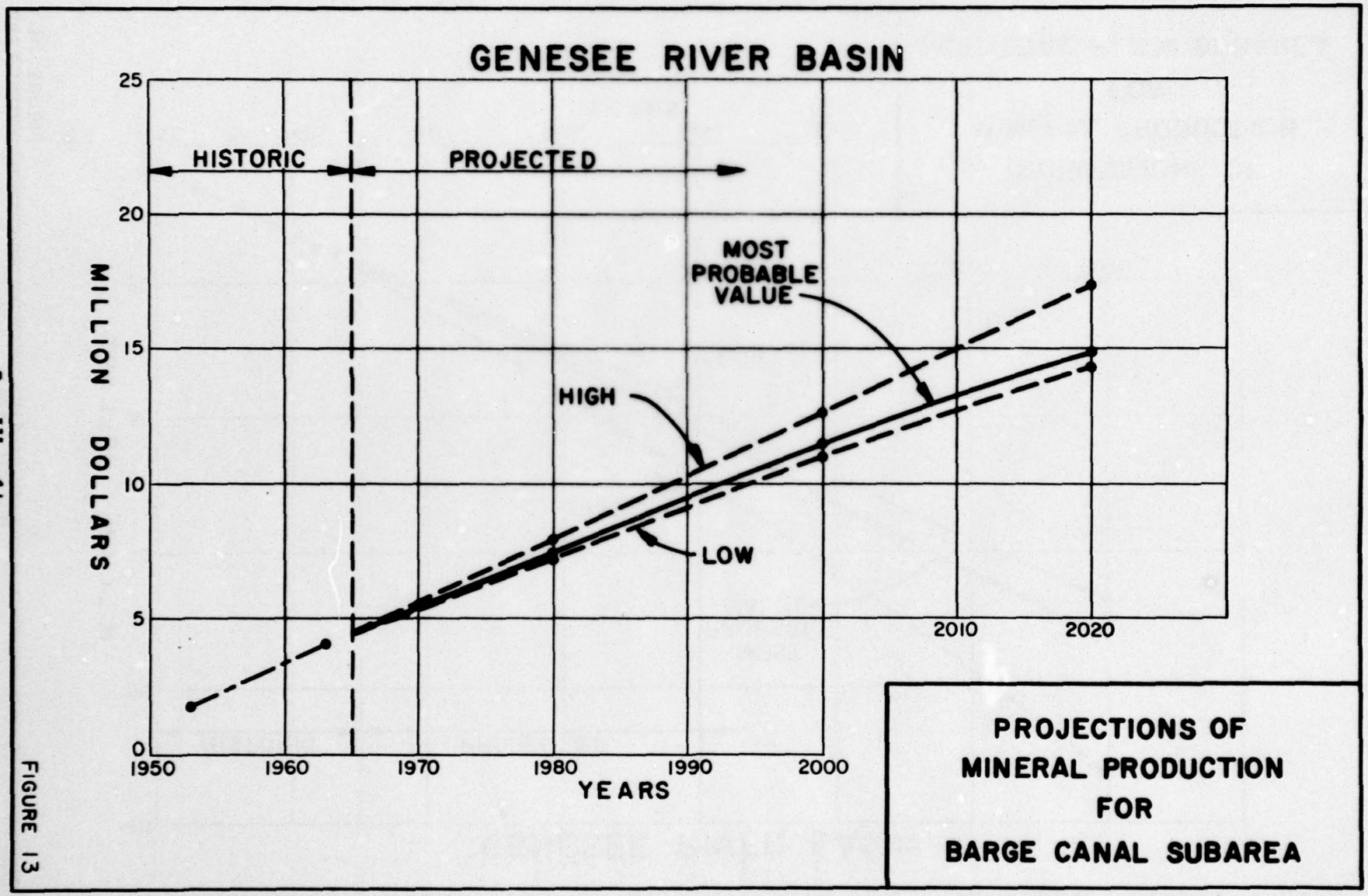

GENESEE RIVER BASIN
HISTORIC
PROJECTED
MOST PROBABLE VALUE
HIGH
LOW
MILLION DOLLARS
YEARS
90
80
70
60
50
40
30
1950
1960
1970
1980
1990
2000
2010
2020
PROJECTIONS OF MINERAL PRODUCTION FOR ECONOMIC AREA

FIGURE 12



PROJECTIONS OF MINERAL PRODUCTION FOR BARGE CANAL SUBAREA

FIGURE 13

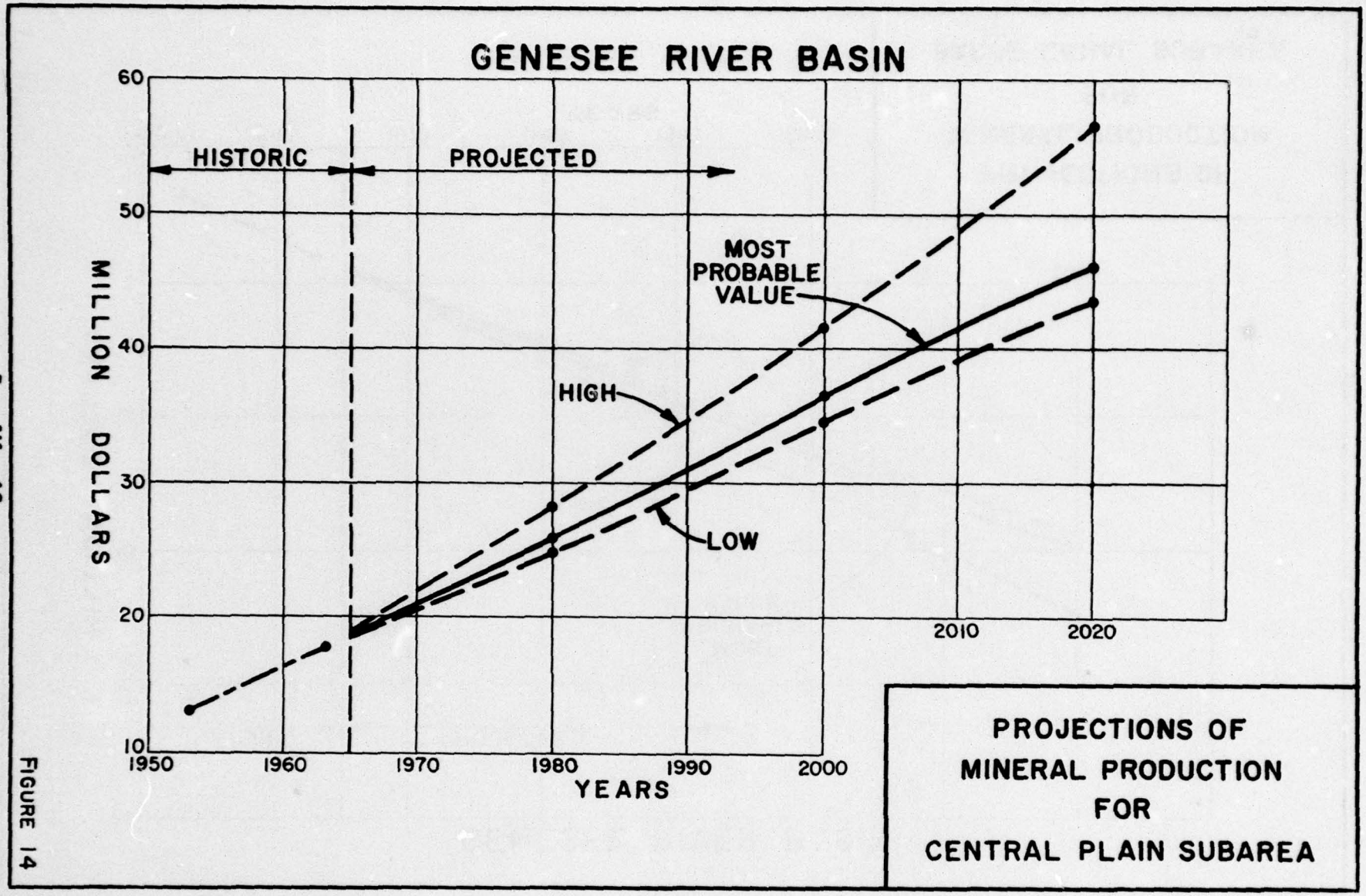
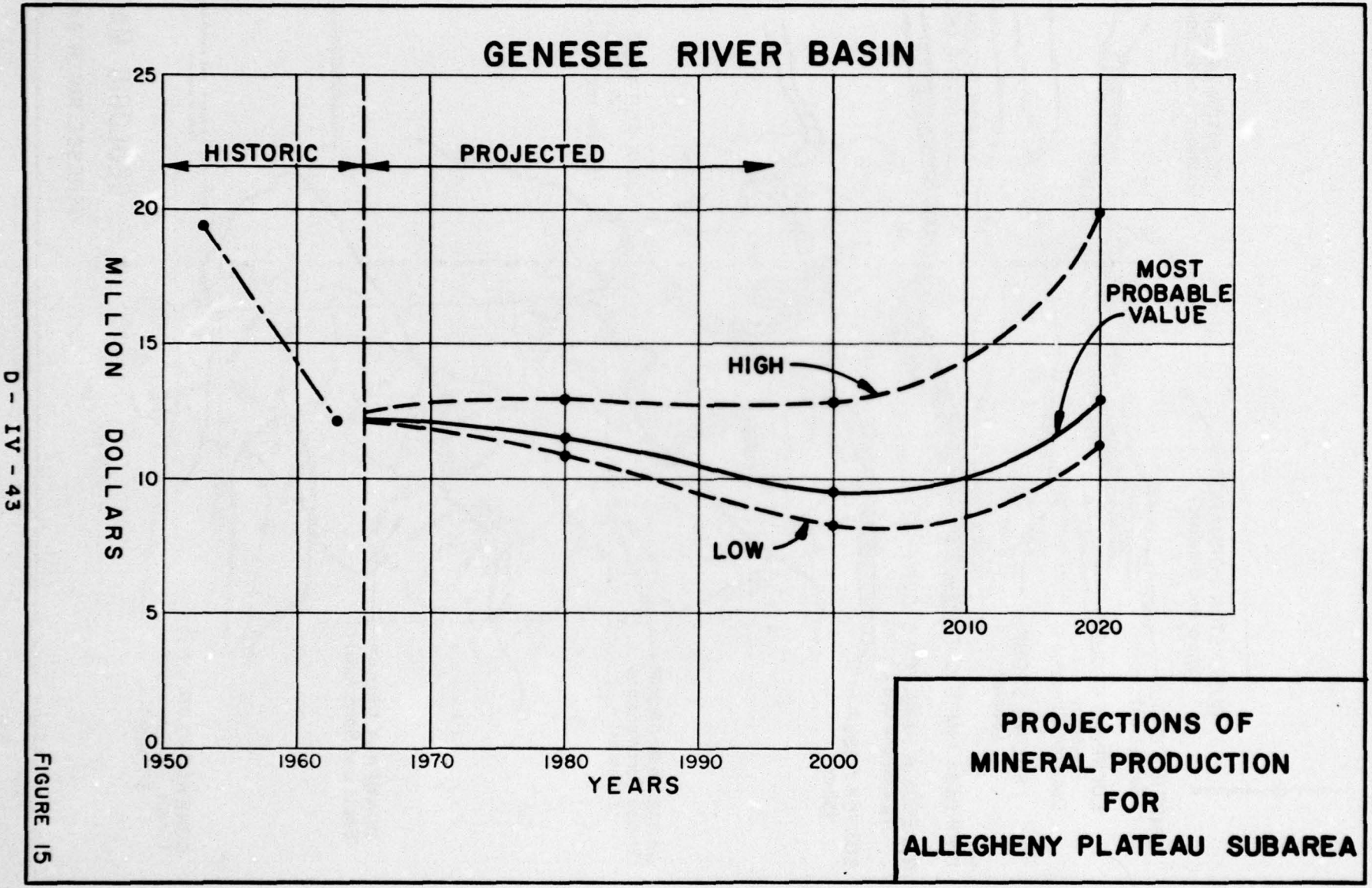
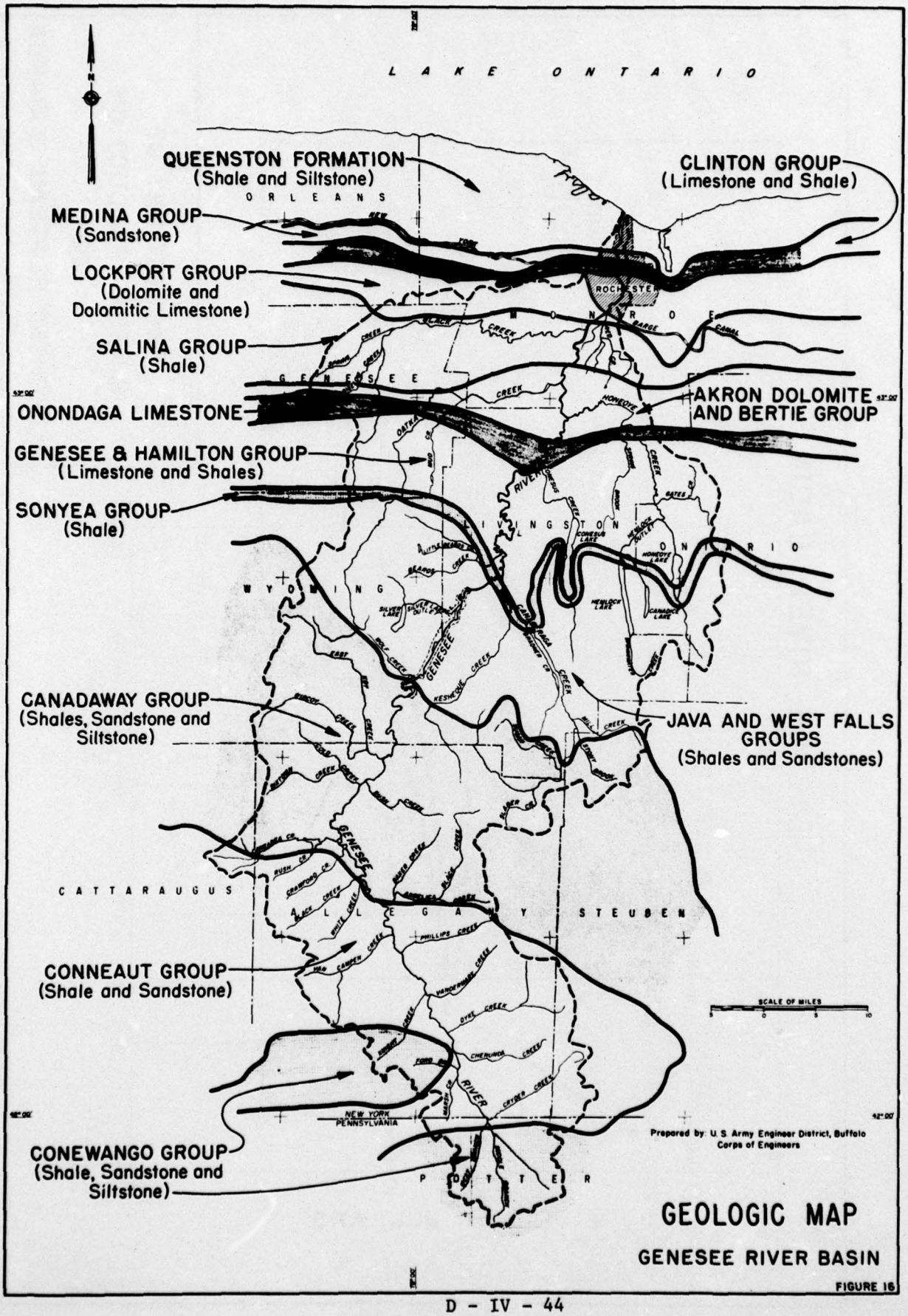

GENESEE RIVER BASIN
HISTORIC
PROJECTED
MOST PROBABLE VALUE
HIGH
LOW
MILLION DOLLARS
YEARS
60
50
40
30
20
10
1950
1960
1970
1980
1990
2000
2010
2020
PROJECTIONS OF MINERAL PRODUCTION FOR CENTRAL PLAIN SUBAREA

FIGURE 14



PROJECTIONS OF MINERAL PRODUCTION FOR ALLEGHENY PLATEAU SUBAREA

FIGURE 15



GEOLOGIC MAP

GENESEE RIVER BASIN

FIGURE 16

APPENDIX 1. MINERAL INDUSTRY BY COUNTY

1. ALLEGHENY COUNTY

SQUARE MILES:

1,048 (Economic Area) (1)
770 (Hydrologic Area) (2)

POPULATION: (1960 Census)

43,978 (Economic Area)
30,332 (Hydrologic Area) (3)
8,774 (Urban)
35,204 (Rural)

MAJOR PRODUCT:

Sand and Gravel (by 1964 value) (4)

USES:

a. Sand & Gravel produced primarily for building and paving purposes.

b. Petroleum and some natural gas were produced but the value by county was not disclosed.

PRODUCTION CENTERS:
(Sand and gravel)

Alfred, New York
Friendship, New York
Belmont, New York
Alfred Station, New York

2. CATTARAUGUS COUNTY

SQUARE MILES:

1,335 (Economic Area)
14 (Hydrologic Area)

(1) Economic Area - Total county area
(2) Hydrologic Area - Drainage area in basin
(3) Population estimates for portions of counties in the basin, from "Genesee River Drainage Basin Survey Series Report No. 2" by Dr. Herman E. Hilleboe, Commissioner, New York State Water Pollution Control Board.
(4) The value of fuels, including natural gas and petroleum, were not included in determining the major product for each county.

POPULATION: (1960 Census)

80,187 (Economic Area)
193 (Hydrologic Area)
32,621 (Urban)
47,566 (Rural)

MAJOR PRODUCT:

Sand and Gravel (by 1964 value)

USES:

a. Sand and gravel produced primarily for building, paving and ice control. Ten Commercial Sand and gravel operations were active with pits located near Allegheny, Franklinville, Gowanda, Olean, and Onoville.

b. Petroleum and natural gas are also produced, but the values by county were not disclosed.

c. Peat was added to the mineral value in 1963.

3. GENESEE COUNTY

SQUARE MILES:

501 (Economic Area)
203 (Hydrologic Area)

POPULATION: (1960 Census)

53,994 (Economic Area)
15,784 (Hydrologic Area)
22,872 (Urban)
31,122 (Rural)

MAJOR PRODUCTS: (In order of their 1964 value)

Gypsum, stone, sand and gravel

USES:

a. Gypsum used for manufacturing building material, such as plaster and gypsum lath.

b. Crushed stone for aggregate, railroad ballast, riprap and roadstone.

c. Sand and gravel primarily for building materials.

d. Some natural gas was produced.

PRODUCTION CENTERS:

Oakfield	(Crude and calcined gypsum)
LeRoy	(Limestone)
Stafford	(Limestone, sand and gravel)
Alexander	(Sand and gravel)
Batavia	(Gravel)

4. LIVINGSTON COUNTY

SQUARE MILES:

638	(Economic Area)
619	(Hydrologic Area)

POPULATION: (1960 Census)

44,053	(Economic Area)
43,655	(Hydrologic Area)
14,766	(Urban)
29,287	(Rural)

MAJOR PRODUCTS: (In order of their 1964 value)

Salt, sand and gravel, stone

USES:

a. Salt is county's leading product. Rock salt, used mainly in manufacturing chemicals (principally chlorine) and for highway ice removal was recovered from the Retsof underground mine.

b. Crushed limestone for agricultural uses and paving products.

c. Commercial sand and gravel for building purposes.

d. Marl deposits near Caledonia worked for agricultural lime.

e. Natural gas is also produced but the value by county was not disclosed.

PRODUCTION CENTERS:

Retsof	(Salt)
Honeoye Falls	(Limestone)
Avon	(Sand and gravel)
Dansville	(Sand and gravel)
Wadsworth	(Sand and gravel)

5. MONROE COUNTY

SQUARE MILES:

673 (Economic Area)
249 (Hydrologic Area)

POPULATION: (1960 Census)

586,387 (Economic Area)
304,369 (Hydrologic Area)
508,121 (Urban)
78,266 (Rural)

MAJOR PRODUCTS: (In order of their 1964 value)

Stone, sand and gravel, gypsum

USES:

a. Crushed dolomite, limestone for concrete aggregate and agricultural stone.

b. Some natural gas was produced.

c. Sand and gravel for building and paving purposes.

d. Gypsum for finished building products.

SOURCES OF MATERIALS:

Sand and gravel is recovered from pits near Mendon, Scottsville, Spencerport, Rochester, and Webster.

Limestone is quarried at Penfield and Gates.

Gypsum is mined at Wheatland and shipped to Caledonia (Livingston County) for processing into finished gypsum building products.

6. ONTARIO COUNTY

SQUARE MILES:

649 (Economic Area)
137 (Hydrologic Area)

POPULATION: (1960 Census)

68,070 (Economic Area)
4,072 (Hydrologic Area)
26,656 (Urban)
41,414 (Rural)

MAJOR PRODUCTS: (In order of their 1964 value)

Sand and gravel, stone

USES:

a. Crushed limestone for concrete aggregate and railroad ballast.

b. Sand and gravel was produced by 12 commerical operators for building, paving, filtration sand, ice control and fill from pits located near Victor, Oaks Corners, Geneva, Clifton Springs, and Phelps.

c. Some natural gas was produced.

7. ORLEANS COUNTY

SQUARE MILES:

396 (Economic Area)
4 (Hydrologic Area)

POPULATION: (1960 Census)

34,159 (Economic Area)
189 (Hydrologic Area)
11,863 (Urban)
22,296 (Rural)

MAJOR PRODUCT: (By 1964 value)

Sand and gravel

USES:

a. Limestone quarried and crushed for concrete aggregate, roadstone, and asphalt filler.

b. Sand and gravel was mostly processed material used mainly for building and as fill material.

SOURCES:

Production of sand and gravel comes from six commercial producers operating pits near Albion, Medina, Ridgeway, Bane and Shelby, New York.

8. POTTER COUNTY (PENNSYLVANIA)

SQUARE MILES:

1,090	(Economic Area)
96	(Hydrologic Area)

POPULATION: (1960 Census)

16,483	(Economic Area)
1,454	(Hydrologic Area)
2,889	(Urban)
13,594	(Rural)

MAJOR PRODUCT: (By 1964 value)

Stone

USES:

a. Dimension sandstone, for use as rough construction stone, rough architectural blocks, and flagging stone was produced from nine quarries near Austin, Oswayo, Wharton and Roulette.

b. Salt, coal, and sand and gravel are available for production.

(For oil and gas production, refer to Section F).

9. STEUBEN COUNTY

SQUARE MILES:

1,408	(Economic Area)
87	(Hydrologic Area)

POPULATION: (1960 Census)

97,691	(Economic Area)
3,976	(Hydrologic Area)
42,459	(Urban)
55,232	(Rural)

MAJOR PRODUCT: (By 1964 value)

Sand and gravel

USE:

a. Commercial sand and gravel used for building, paving and fill.

b. Petroleum and natural gas is produced, but the value by county was not disclosed.

PRODUCTION CENTERS:
(Sand and gravel)

Cohocton
Corning
Bath

10. WAYNE COUNTY

SQUARE MILES:

607 (Economic Area)
0 (Hydrologic Area)

POPULATION: (1960 Census)

67,989 (Economic Area)
0 (Hydrologic Area)
23,710 (Urban)
44,279 (Rural)

MAJOR PRODUCTS: (In order of their 1964 value)

Stone, sand and gravel

USES:

Building, agricultural limestone, concrete aggregate, and roadstone.

SOURCES:

Limestone is produced near Sodus.

Commercial sand and gravel is recovered from pits near Galen, Palmyra, and Red Creek.

11. WYOMING COUNTY

SQUARE MILES:

598 (Economic Area)
302 (Hydrologic Area)

POPULATION: (1960 Census)

34,793 (Economic Area)
19,433 (Hydrologic Area)
11,040 (Urban)
23,753 (Rural)

MAJOR PRODUCTS: (In order of their 1964 value)

Salt, stone

USES:

a. Evaporated Salt is produced for food processing, chemical and industrial purposes.

b. Quarry Stone used as rough construction and sawed and dressed architectural stone.

c. Natural gas is produced, but the value by county was not disclosed.

SOURCES:

At Silver Springs evaporated salt is produced by the vacuum-pan process.

A Bluestone quarry at Portageville, N. Y. produces decorative building stone.

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