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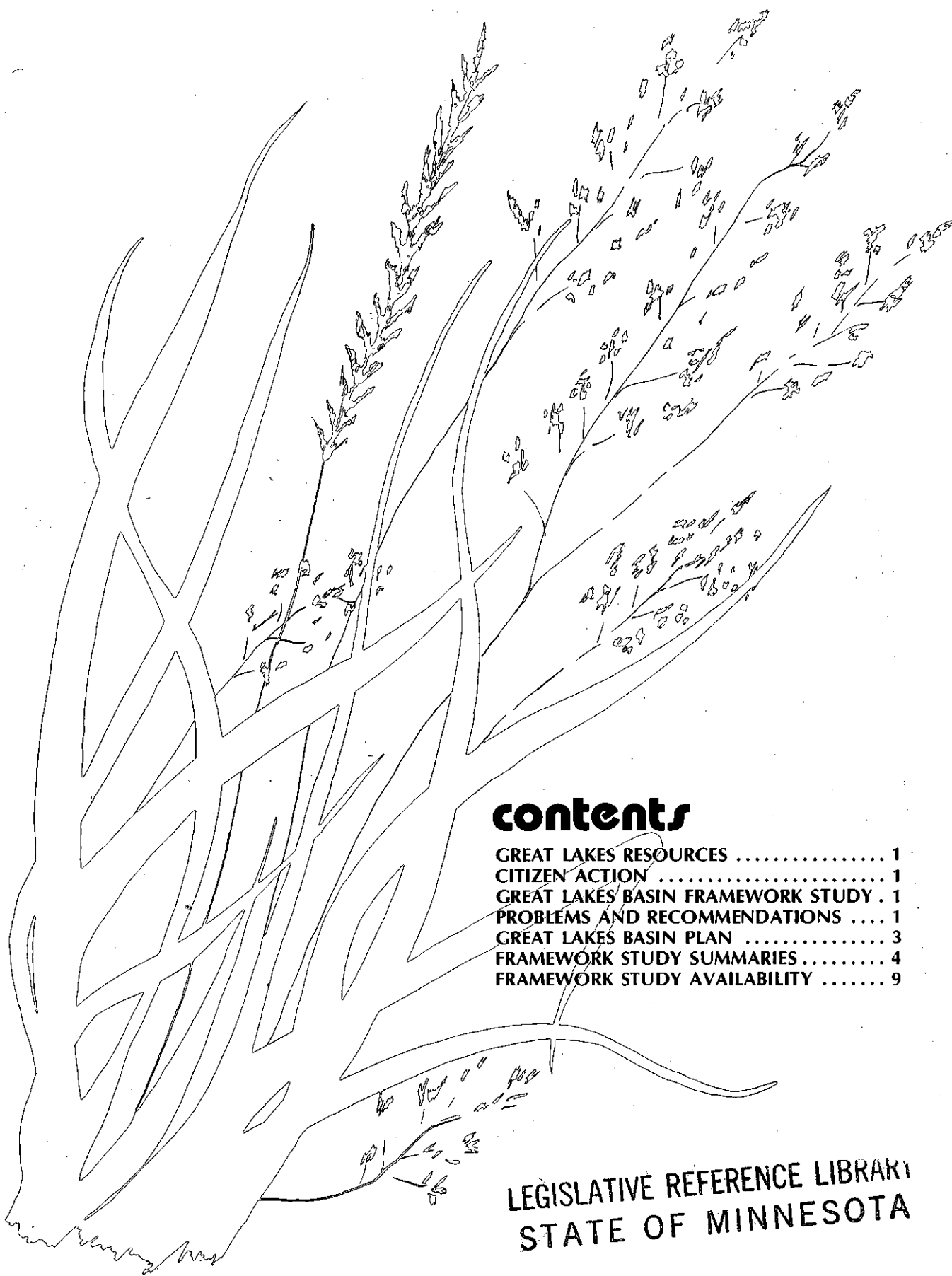
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GREAT LAKES BASIN
**FRAMEWORK
STUDY**



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great lakes resources

The massive glaciers that invaded much of North America during the Pleistocene epoch carved out old river valleys to form five large lakes. These Great Lakes comprise an extensive freshwater system that, together with other abundant natural resources, can attract and support such a diversity of human activities that today many areas of the Great Lakes Basin are heavily populated and industrialized.

The demands for living space, water, food, fuel and electrical energy, recreation, a healthy economy, and disposal of municipal and industrial effluents have burdened the Great Lakes waters. As human activities have increased, the availability of natural resources has decreased, and conflicting demands for the resources remaining have become major problems. The use of the Basin's water and related land resources to maintain a high economic standard has often been incompatible with physical well-being, health, conservation of the resources for future use, and both present and future enjoyment.

citizen action

Decisions affecting Great Lakes resources continue to be made by political leaders, legislators, governmental officials, and private interests. What can you, citizen, tax-payer, Great Lakes Basin resident, do to promote a viable economy, maintain healthy conditions, and preserve the natural beauty of the Great Lakes area? You can take part in the decision-making process.

By providing an active, informed and continuous input of ideas, opinions and values, you can help shape the policy decisions that will determine the future of the Great Lakes Basin. You can help make sure that the water and related land resources in the Region are used and conserved wisely. You can take the first step now by learning about the Great Lakes Basin and its resources, its most severe problems, their causes, and the best possible solutions.

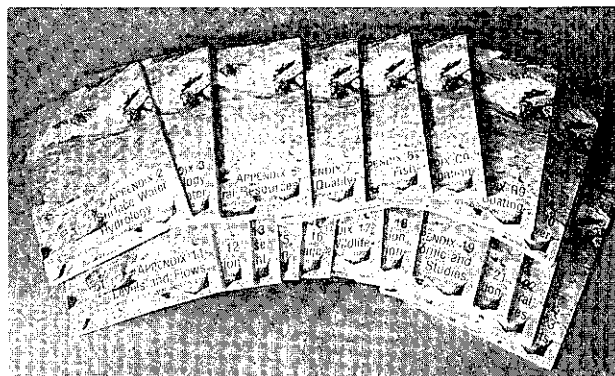
great lakes basin framework study

Use the Great Lakes Basin Framework Study to learn about Great Lakes resources problems and their causes. The Framework Study gathers into one set of volumes a wide range of data on Great Lakes Basin

resources. From these data, it determines existing problems and shortages as well as those which could occur by the year 2020 if resource management programs are not established to meet the challenges.

The Framework Study combines this knowledge with opinions expressed at two series of public meetings held throughout the study period or expressed directly to the Great Lakes Basin Commission planning staff and with the expertise of resource specialists to develop a guide—a framework—for wisely planning the use and conservation of the Basin's resources during the next 50 years. The Framework Study is an excellent example of resource planning that reflects citizen judgment.

This booklet contains a short summary of the problems identified in the Framework Study and Basin Commission recommendations for solving them. Brief descriptions of each Framework Study volume are provided to help you determine those that are of special value and interest to you.



problems & recommendations

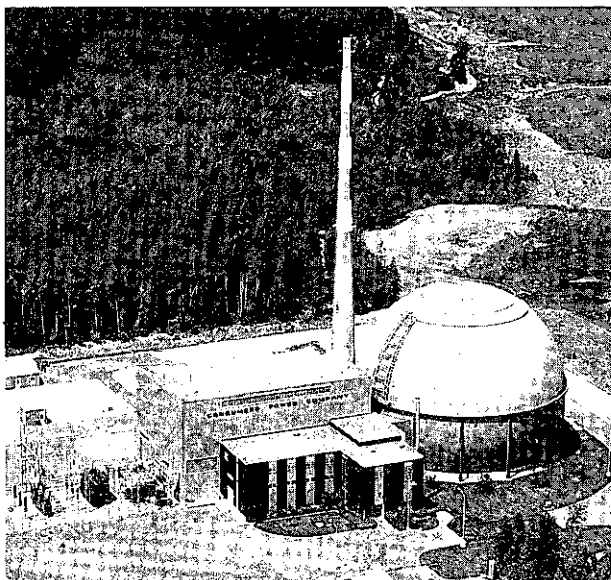
Energy

Energy production is an important use of Great Lakes water. Needs for energy are rising, but increased energy production risks impairment of environmental quality. Concern over the safety of nuclear power and waste disposal, air pollution, the effects of heated water discharge, and possible fish kills at water intakes are some of the major current problems.

To help solve these problems, the Commission

- will support studies of hydroelectric and alternative power sources.
- will support development of policies to reduce energy problems through proper management of water and land resources.

- will foster energy conservation to reduce energy problems.



Navigation

Navigation is a use of the Great Lakes waters that has contributed greatly to the economy of the Great Lakes Basin. Navigation problems such as icy winter conditions and inadequate channels and locks cannot be solved without environmental consequences.

The Commission

- recommends continued study of navigation season extension until its economic and environmental feasibility are determined.
- recommends that harbors be modified and deepened, consistent with the current 27-foot depth navigation system, taking economic and environmental criteria into consideration.

Lake Levels

Lake levels respond to precipitation, evaporation, and other natural phenomena and are affected by dams and diversions. Some natural resources and human activities benefit from high lake levels; others, from low levels. Decisions regarding them necessitate improved lake level forecasting techniques and more information on the environmental and economic effects of lake level regulation by human intervention.

The Commission

- will foster or undertake studies, to determine the economic and environmental effects of several regulation plans.

Recreation

Population concentrations in and around the Great Lakes Basin put heavy, growing demands on the Ba-

sin's many recreational resources. At the same time human activities often diminish the availability and attractiveness of these resources. Unequal distribution of population and resources, competing land uses, and crowding of recreational areas are some of the problems decisionmakers face.

The Commission

- encourages development of outdoor recreation facilities, particularly near urban areas.
- encourages additional controlled public access to private lands.
- recommends additional recreational boating harbors and harbors of refuge.

Water Quality

Water is abundant in the Great Lakes Basin, but water supply for human consumption, industry, agriculture, and recreation is sometimes limited by its poor quality. The same water often is the recipient of waste materials from cities, industry, and agriculture. In some localities water is sufficiently impaired that it lacks the ability to support healthy fish and wildlife populations.

To help improve and maintain water quality the Great Lakes Basin Commission

- encourages study of hazardous substances to determine how to eliminate their introduction and reduce their concentration in the lakes.
- supports legislation to ban polychlorinated biphenyls (PCBs).
- recommends accelerating state and federal water quality improvement programs.
- recommends maintenance of funding of construction grants for wastewater treatment facilities.
- recommends continued study of waste disposal methods.

Land Use and Management

Shoreland use is but one land use problem plaguing the Basin. Urban expansion and construction are converting valuable agricultural land and wetland into towns. Devegetation and soil erosion often accompany this activity. Topsoil and chemicals are washed off farm lands devoted to clean-tillage row crops and off clearcut forest tracts and eventually reach streams and lakes.

Strip mining causes devegetation and sedimentation in some areas. Competition for the available land often encourages fast development resulting in unplanned and unwise land use. An example is home building on a lake or river plain vulnerable to flooding.

The Commission

- recommends completion of soil surveys now underway.

• recommends accelerated soil treatment and water conservation programs, accelerated improvement of cropland drainage, and accelerated forest land treatment programs.

• recommends using both structural and nonstructural measures to reduce damages from flooding, with emphasis on nonstructural measures such as zoning.

• encourages accelerated flood plain delineation and flood elevation determination studies.

• supports reclamation of mined lands for recreation or open space.

• will develop a coordinated technical assistance program to stabilize eroding streambanks.

Fish and Wildlife

Fish and wildlife habitat are being degraded or destroyed by attrition of wetlands, urban and industrial expansion, stream modification practices, and activities that contribute hazardous materials to Great Lakes waters. Meanwhile the demands for fishing, hunting, and observing wildlife are growing.

The Commission

• recommends accelerated protection and management of wetlands and other valuable wildlife habitat.

• encourages expansion of programs to help the private landowner develop game habitat.

• encourages increased federal and state funding for fish population research.

• supports a Great Lakes fish restocking program and continued development of sea lamprey control programs.



Shorelands

In addition to power plant siting, the Great Lakes shorelands bear the brunt of pressure from industrial, commercial, and residential development. Shore erosion and resulting property loss and damage are major problems. Waterfront blight and encroachment on wetlands are others.

The Commission

• will support ongoing state and federal shore erosion studies and coastal zone management programs.

• will encourage nonstructural methods of reducing shore erosion damage in undeveloped areas, such as zoning and setback requirements.

• will support justifiable structural protection in developed areas.



great lakes basin plan

The Framework Study is the first part of the Great Lakes Basin Plan, a comprehensive regionwide plan. Further federal-state cooperative studies of the problems identified in the Framework Study, detailed plans for specific problems, and results of specific programs will add to the Great Lakes Basin Plan. The Great Lakes Basin Commission will encourage and coordinate further study and detailed plans and programs to aid development of this Basin Plan.

Your views and ideas are needed to guide the Basin Plan. Questions that the planning process will be continually reviewing are:

• What areas in the Basin and what resource problems should receive attention first?

• What should be done if there are not enough resources to meet requirements? Develop the resource further? Import the resource? Reduce the requirement by changing our lifestyle?

• What changes should there be in institutions and government agencies? How may they implement plans more efficiently? Should organization of and coordination among institutions be altered?

You are more likely to see Great Lakes Basin water and land resources used as you desire if you get involved—learn about and speak out about these and related issues. To aid your involvement, the Basin Commission invites you to peruse the Framework Study. Knowledge of the findings and conclusions of the Study will help you develop informed opinions about the Basin resources.

framework study summaries

The Framework Study Report is supported by a series of 25 appendices and an environmental impact statement. The appendices provide basic data on and analyses of water and related land resources, their management, use, and development. Programs and plans are presented for optimal management of the resources, based on the considered opinions of experts in various fields.



Report

The Report describes the methodology and scope of the Study and presents the recommendations of this exhaustive analysis of water and land resources in the Great Lakes Region. The recommendations represent the consensus views of the Commissioners of the Great Lakes Basin Commission, technical committees and work groups, and the responsive public in the Great Lakes Region.

The Report concisely describes the Proposed Framework, a guide to meet the needs for natural

resources based on technical expertise and citizen preferences. Tables show the types of needs, resource outputs, and costs of the Proposed Framework for the Basin and for each state. The tables on pages 12-14 summarize this information for the Basin.

The Report suggests ways to put the recommendations and proposed programs into effect. It concisely describes the natural, demographic, and economic characteristics of the Region, the availability and present use of resources, and the problems and opportunities associated with their uses.

(105 pages, 7 figures, 87 tables . . . \$3.00)

Appendix 1: Alternative Frameworks

Appendix 1 presents alternative ways to meet future needs in 22 resource categories and the expected results and costs of these alternatives. Two alternatives, the Normal and Proposed Frameworks, are described in detail. Others, less completely developed, are mentioned.

A description of the Basin's water and land resources and its economic-demographic characteristics permits an understanding of existing resource uses and anticipated problems.

(520 pages, 49 figures, 413 tables . . . \$8.75)

Appendix 2: Surface Water Hydrology

Appendix 2 provides a general evaluation of surface water runoff entering the five Great Lakes and the St. Lawrence River from the U.S. portion of the Basin.

More than 100 charts and tables record runoff fluctuations, flood characteristics, drought flows, stream characteristics, existing and potential reservoir sites, and river gaging and forecasting points. All existing and potential Basin reservoir sites are identified.

(152 pages, 94 figures, 9 tables . . . \$2.75)

Appendix 3: Geology and Ground Water

Geology and Ground Water provides the first systematic and uniform analysis of ground-water conditions throughout the entire Basin, outlines the gross aspects of Basin geology and ground water, describes unconsolidated and bedrock aquifers in detail, analyzes the chemical quality of available ground water, and discusses the potential yields if further development occurs. Each Lake basin's problems, needs, and management considerations are discussed.

Sixty colored maps, an extensive list of references, and an informative glossary make this volume valuable to both novices and experts in the field.

(172 pages, 60 figures, 15 tables . . . \$4.50)

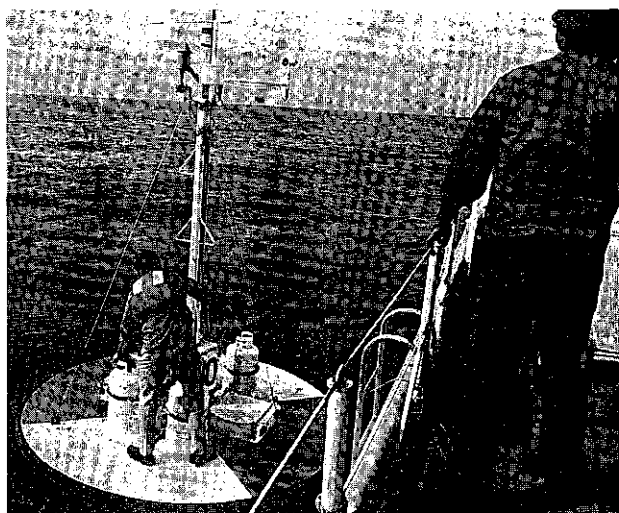
Appendix 4: Limnology of Lakes and Embayments

Appendix 4 discusses all aspects of Great Lakes

and upland lake limnology. This technical volume includes chapters on physical, chemical, and biological characteristics, wave motion, hydrometeorology, sedimentology, and ice cover.

The limnological processes are described in a fashion that allows them to be logically interrelated and applied to regional planning. Appendix 4 also identifies processes that require more research.

(480 pages, 301 figures, 95 tables . . . \$12.50)



Appendix 5: Mineral Resources

This book measures the effects mining will have on land and water resources in the next 50 years. It delineates current and projected development in the mineral industry, the extent and availability of minerals, and the problems involved in the use of land and water for the mineral industry. Projections of mineral production and associated needs for water and land are given for minerals that use large quantities of those resources in their production. Recommendations are presented for mineral development in the Basin.

(164 pages, 16 figures, 147 tables . . . \$3.75)

Appendix 6: Water Supply—Municipal, Industrial, and Rural

Appendix 6 gives the present and projected water withdrawal requirements of communities, industries, and rural users in each Lake basin, with a discussion of problems and their possible solutions.

Water supply methods are described, including ground-water management, storage of surface water, improved distribution systems, technological improvements, water use regulations, and other measures that can ensure that adequate water supplies will be available to meet the Basin's needs.

(294 pages, 62 figures, 128 tables . . . \$7.00)

Appendix 7: Water Quality

Appendix 7 summarizes the Basin's water quality conditions and trends and relates these to the established and potential uses of water supplies. It offers a base for measuring improvement or deterioration of water quality throughout the entire Great Lakes area.

The appendix appraises state and federal water quality programs and identifies the location, nature, and gravity of water quality problems as they existed in the Basin in 1970.

(256 pages, 40 figures, 78 tables . . . \$6.75)

Appendix 8: Fish

This appendix examines the fishery of each Great Lake and reviews long-range programs designed to encourage sport and commercial fishing. The tremendous changes the last twenty years in fish population, management practices and fish habitats are discussed.

The biology of individual species, the economic contribution of commercial and sport fishing, supply/demand relationships, and general management problems, needs, and solutions are discussed.

The effects on fish population of mercury and pesticide contamination, thermal pollution, oil spills, and lake level regulation are addressed.

(316 pages, 96 figures, 79 tables . . . \$7.00)

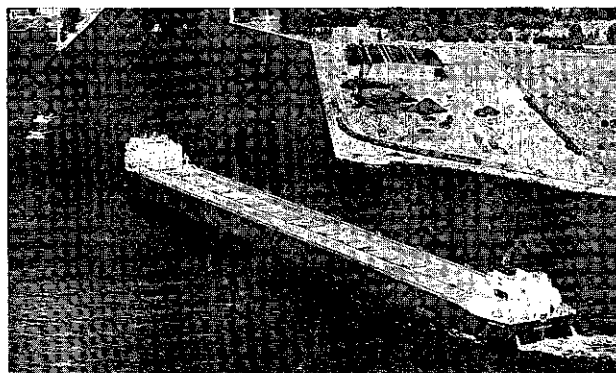
Appendix C9: Commercial Navigation

This appendix describes the Great Lakes-St. Lawrence Seaway system and the current and projected demands for the use of this system. The relationship between economic development and transportation is discussed, and commercial navigation is examined in relation to other modes of transport.

The volume describes the current shipping fleet and commodities shipped as well as possible changes in the shipping fleet and commodities.

A plan is suggested to improve the efficiency of the present system and to expand the lock and channel capacity by 1990.

(180 pages, 31 figures, 102 tables . . . \$5.75)



Appendix R9: Recreational Boating

Recent boating demands in each of the fifteen Basin subareas and the facilities that now exist to meet those demands are described. There are projections for areas where more facilities may be needed due to higher incomes, more leisure time, enhanced water quality, and an improved fishery.

Of special interest to boaters are descriptions of coastlines that lack harbors or offer a surplus of boatable waters.

(164 pages, 27 figures, 157 tables . . . \$3.00)

Appendix 10: Power

Appendix 10 describes present and projected electric power and corresponding water needs and looks into environmental problems associated with electrical power production.

This volume documents the amount of electric energy now produced by the various types of plants and provides general information about the electric power industry in the Basin.

The effects of power generation on water supplies are examined.

Reconciliation between ecological and environmental values and the growing demands for electric power is proposed.

(188 pages, 15 figures, 171 tables . . . \$3.50)

Appendix 11: Levels and Flows

Physiography and hydrology of the Great Lakes-St. Lawrence River system are discussed, as are the impacts that fluctuating lake levels have on land management, zoning, water use, and recreation.

Problems related to the various artificial factors affecting lake levels are considered, including diversions, changes in connecting channels, increased consumption of water, and extension of the navigation season.

(234 pages, 75 figures, 71 tables . . . \$5.25)



Appendix 12: Shore Use and Erosion

This volume assesses Great Lakes shoreland management problems, their causes, effects and possible solutions. Useful information includes a discussion of coastal processes, a description of various shore protection measures, and a strategy for reducing shoreland damage.

A series of color-coded, small-scale maps of Great Lakes shoreline segments presents an inventory of shoreland uses (commercial, industrial, permanent, or seasonal residential), shoreland types (bluffs, low plains, wetlands), ownership, and other pertinent features.

(200 pages, 22 figures, 46 tables . . . \$3.75)

Appendix 13: Land Use and Management

This volume contains an inventory of existing land use and management practices, projections of future land use requirements, and estimates of future needs for the target years 1980, 2000, and 2020. Agricultural and forest land resources are examined in terms of present uses and soil characteristics. A study of land treatment needs is included.

A section on land use policies reviews various kinds of zoning ordinances and regulations, methods to ensure proper use, and tax policies and permits that can encourage land owners to use land according to its natural capabilities.

Urban and regional information systems and accelerated agricultural and forest land treatment are suggested.

(140 pages, 30 figures, 75 tables . . . \$2.75)

Appendix 14: Flood Plains

The flood plain inventory in this volume could serve as a basis for establishing flood plain development guidelines. Flood plain development, flood problems, and existing flood damage prevention measures in all areas of the Basin are described. Maps and tables record the kind and quantity of development on the Basin's flood plains as well as the nature and intensity of flood problems.

Structural and nonstructural methods of reducing flood damages are reviewed.

A series of tables presents recommended flood damage reduction measures for each river basin group in the Basin.

(360 pages, 65 figures, 118 tables . . . \$6.00)

Appendix 15: Irrigation

Current irrigation projects are identified and evaluated to determine potential development over the next 50 years. Also evaluated are the kind of crops that require irrigation, the amount of water used per season, sources of the water, present irrigation trends, soil types, and ground water to determine the poten-

tial for irrigation in each of 15 areas in the Basin. These data were used to estimate future irrigation needs.

The appendix furnishes estimates of the reduced acres needed for crop production if irrigation were to be increased. Data and projections from previous irrigation reports are included for comparison purposes.

(128 pages, 32 figures, 53 tables . . . \$2.75)

Appendix 16: Drainage

Assessment of agricultural and urban drainage problems caused by excess water are contained in this appendix.

After analyzing the scope and magnitude of drainage problems by county, watershed, and standard metropolitan statistical area, the appendix concludes that excess water reduces production on approximately 12 million of the 32 million acres of agricultural land in the Great Lakes Basin.

Not all lands in the Basin can be drained. Maps indicate the relative limitations for soil drainage under natural conditions in the 15 subdivisions of the Basin. Three programs to lessen drainage problems are presented.

(112 pages, 35 figures, 47 tables . . . \$3.00)

Appendix 17: Wildlife

This appendix has a grave message: the future of wildlife in the Basin is very limited. Unless measures are taken toward retarding habitat losses, millions of acres of wildlife habitat will be lost or degraded by 2020. The species and wildlife habitats found in the Basin are inventoried with outlines of trends and problems.

Using population and land use projections, the appendix describes the demands to be made on the Basin's wildlife in the next 50 years, alternative methods of meeting these demands, and specific measures for fostering wildlife in the Basin.

(160 pages, 48 figures, 76 tables . . . \$4.00)



Appendix 18: Erosion and Sedimentation

Damages resulting from erosion and sedimentation are described, and local rates of erosion from various sources (sheet, channel, and bank erosion, and urban construction) are quantified.

Erosion and sedimentation trends are estimated based on economic projections of land needs for crop production and urban expansion. The capability of existing programs to control future erosion problems is evaluated. Methods are suggested to improve control.

(144 pages, 50 figures, 47 tables . . . \$3.75)

Appendix 19: Economic and Demographic Studies

Appendix 19 is the foundation of the Framework Study in that its projections of population and employment were used by other work groups to estimate future demands on water and land.

Included are data and projections of population, employment, income, earnings, and selected industry output for the Basin and the nation. Data are summarized by decade from 1940 through 1970 with projections through 2020. Agriculture, forestry, and mining data are included.

(242 pages, 21 figures, 236 tables . . . \$6.25)

Appendix F20: Federal Laws, Policies, and Institutional Arrangements, and Appendix S20: State Laws, Policies, and Institutional Arrangements

One of the critical questions examined by the Great Lakes Basin Framework Study is whether existing legal institutions governing the availability, use, and management of Basin resources are adequate to cope with the demands of the next 50 years.

To help answer the question on the federal level, Appendix F20 includes laws concerning water resource development, management, and preservation in the Great Lakes Region, a brief explanation of the basic orientation of federal conservation, development, and use policies, and a description of existing institutional arrangements.

State legislation and common law relating to water resources are described in Appendix S20. This appendix provides a comparative analysis of powers, policies, and institutional arrangements within the eight Great Lakes states. Existing mechanisms for coordinating state efforts are also presented.

These volumes are on a 1970 base which is updated in the Report.

(F20: 144 pages . . . \$5.00)

(S20: 240 pages . . . \$7.25)

Appendix 21: Outdoor Recreation

Existing and potential recreational resources are listed, the use of existing facilities are quantified, and long-range needs and the requirements for immediate

additional development are determined.

This volume presents an outdoor recreation plan that promotes single- and multiple-purpose recreational developments. It attempts to integrate recreational needs with other needs for water and land resources.

(272 pages, 85 figures, 97 tables . . . \$5.75)

Appendix 22: Aesthetic and Cultural Resources

While other Framework Study appendices quantify the Basin's natural resources, Appendix 22 examines them from the standpoint of what they contribute to the quality of life.

Coded maps show the locations of thousands of features such as archeological and historical sites, parks, wildlife areas, wetlands, and impressive geological formations. Methods of establishing priorities for preserving these unique resources are examined and recommendations are made for institutional changes that would facilitate Basinwide planning.

(250 pages, 45 figures, 3 tables . . . \$2.25)

Appendix 23: Health Aspects

Appendix 23 discusses the precautions water resources planners must take to protect the public

against water-related health hazards. This volume examines waterborne diseases and other health hazards contained in drinking water. Air pollution, radiological health aspects of nuclear power projects, irrigation with effluent from sewage treatment plants, and solid waste management are also discussed. Health guidelines for water resource management are given to make planning authorities more aware of areas that require special attention.

(112 pages, 9 figures, 29 tables . . . \$3.00)

Environmental Impact Statement

The *EIS* is devoted to assessing the environmental impacts of the Proposed Framework. The unavoidable adverse impacts of the Proposed Framework are summarized in addition to factors and federal policy considerations that are believed to outweigh them. The balance between short-term and long-term effects of the various Proposed Framework resource use programs is examined. The *EIS* describes the impacts that would be produced by two alternatives to the Proposed Framework and briefly compares them.

The *EIS* includes comments on the Draft *EIS* made by federal, state, and local government agencies and the general public during an extensive review.

(154 pages, 13 figures, 23 tables . . . \$1.75)



framework study availability

The Great Lakes Basin Framework Study is available at cost (\$130.75) from the Public Information Office of the Great Lakes Basin Commission, P.O. Box 999, Ann Arbor, Michigan 48106, (313/763-3590). You may purchase the entire set or individual volumes at the prices shown on the order form.

You will also find the Framework Study easily

available for reference at many locations throughout the Basin. Following is a partial listing of libraries and planning commissions where you can find complete sets. In addition, you will find sets available within the Basin at district offices of the U.S. Army Corps of Engineers, at many National Forest Offices of the U.S. Forest Service, and through your state Cooperative Extension Service.

Note: Librarian—these volumes are not federal depository items.

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Department of Interior, Office of Library & Information Services
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ILLINOIS

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Southern Illinois University Library

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Normal
Illinois State University, Milner Library

Springfield
Illinois Archives
Illinois State University

INDIANA

Bloomington
Indiana University Library

Indianapolis
Indiana State Library

Fort Wayne
Fort Wayne County Public Library
Three Rivers Coordinating Council

Hammond
Purdue University, Calumet Campus

Highland

Lake-Porter County Regional Planning Commission

Lafayette

Purdue University, Water Resources Research Center

Merrillville

Lake County Public Library

South Bend

Michiana Area Council of Governments

Terre Haute

Indiana State University Library

West Lafayette

Purdue University Libraries

MICHIGAN

Allendale

Grand Valley State College Library

Ann Arbor

Great Lakes Basin Commission, Library
University of Michigan Library

Dearborn

University of Michigan-Dearborn, Library

Detroit

Detroit Public Library
Great Lakes Technical Library
Southeast Michigan Council of Governments
Wayne State University, General Library

East Lansing

Michigan State University Library

Escanaba

Central Upper Peninsula Planning & Development Regional Commission

Essexville

East Central Michigan Planning and Development Regional Commission

Flint

Genesee-Lapeer-Shiawassee Region V Planning & Development Commission

Caylord

Northeast Michigan Regional Planning & Development Commission

Grand Rapids

West Michigan Regional Planning Commission

Houghton

Michigan Technological University Library
Western Upper Peninsula Planning & Development Regional Commission

Jackson

Region II Planning Commission

Kalamazoo

Western Michigan University Library

Lansing

Michigan Department of Education, Library
Michigan State Library
Tri-County Regional Planning Commission

Marquette

Northern Michigan University Library

Mount Pleasant

Central Michigan University Library

Muskegon

West Michigan Shoreline Regional Development Commission

Nazareth

Southcentral Michigan Planning & Development Council of Region III

Olivet

Olivet College Library

Port Huron

St. Clair County Community College,
Learning Resources Center

St. Clair

St. Clair County Regional Planning
Commission

St. Joseph

Southwestern Michigan Regional
Planning Commission

Sault Ste. Marie

Eastern Upper Peninsula Regional
Planning & Development
Commission
Lake Superior State College Library

Traverse City

Northwest Michigan Regional Planning
& Development Commission

University Center

Delta College, Learning Resources
Center
Saginaw Valley College

Wayne

Wayne County Public Library

Ypsilanti

Eastern Michigan University Library

MINNESOTA**Carlton**

Carlton County Board

Cloquet

Cloquet Public Library

Duluth

College of St. Scholastica Library
Duluth Public Library
Head of the Lakes Council of
Governments
University of Minnesota-Duluth, Library
Upper Great Lakes Regional
Commission

Minneapolis

Minneapolis Public Library
University of Minnesota Library

Grand Marais

Cook County Board

St. Paul

James J. Hill Reference Library
University of Minnesota, Wilson Library

Silver Bay

Silver Bay Public Library

Twin Cities

U.S. Fish & Wildlife Service, Regional
Library
Upper Mississippi River Basin
Commission

Two Harbors

Lake County Board

NEW YORK**Albany**

New York State Dept. of Environmental
Conservation
SUNY at Albany, New York Sea Grant
Institute

Alfred

Alfred University, Herrick Memorial
Library

Amherst

Erie-Niagara Regional Planning Board

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SUNY at Binghamton, Library

Bronx

Manhattan College, Cardinal Hayes
Library

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Library
SUNY at Buffalo, Lockwood Memorial
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Canton

Black River-St. Lawrence Planning
Board

Coming

Southern Tier Central Regional Planning
& Development Board

Cortland

SUNY, College at Cortland, Memorial
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Planning Board

Greenvale

Long Island University, C.W. Post
College, Library

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Cornell University, Albert R. Mann
Library

Lockport

Niagara County Economic
Development & Planning Department

New York City

Engineering Societies Library
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Region II, Library

Niagara University

Niagara University Library

Potsdam

SUNY, College at Potsdam, Library

Oswego

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St. Bonaventure University, Friedsam
Memorial Library

Salamanca

Southern Tier West Regional Planning
Board

Stonybrook

State University of New York, Sea Grant
Office

Syracuse

Central New York Regional Planning &
Development Board
St. Lawrence-Eastern Ontario
Commission
SUNY at Syracuse, F. Franklin Moon
Library
Syracuse Public Library
Syracuse University, Ernest S. Bird
Library

Utica

Herkimer-Oneida Counties
Comprehensive Planning Program

Watertown

Roswell P. Flower Memorial Library
St. Lawrence-Eastern Ontario
Commission

OHIO**Akron**

Akron-Summit County Public Library
University of Akron, Library

Bowling Green

Bowling Green State University

Cincinnati

Ohio River Basin Commission

Cleveland

Cleveland Public Library
Cleveland State University, Library
Three Rivers Watershed Council

Columbus

Ohio Environmental Protection Agency,
Library
Ohio State University Library

Dayton

Wright State University Library

Kent

Kent State University, Center for Urban
Regionalism & Environmental
Systems

Lima

Lima-Allen County Regional Planning
Commission

Oberlin

Oberlin College Library

Tiffin

Heidelberg College, Beeghly Library

Toledo

Ottawa Hills Jr. High School
Toledo-Lucas County Planning
Commission
Toledo Metropolitan Area Council of
Governments
University of Toledo

University Heights

John Carroll University, Grasselli Library

PENNSYLVANIA

Clarion

Clarion State College, Carlson Library

Erie

Erie County Metropolitan Planning
Department

Franklin

Northwest Pennsylvania Regional
Planning & Development
Commission

Harrisburg

Pennsylvania General State Library

WISCONSIN

Appleton

Fox Valley Council of Governments

Ashland

Northwestern Wisconsin Regional
Planning & Development
Commission
Upper Great Lakes Regional
Commission

Eau Claire

University of Wisconsin-Eau Claire,
William D. McIntyre Library

Fond du Lac

University of Wisconsin-Fond du Lac
Center, Library

Green Bay

Bay-Lake Regional Planning
Commission
Brown County Planning Commission
University of Wisconsin-Green Bay,
Technical Services Library

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Identified Proposed Framework Capital Costs, Great Lakes Basin, (\$1,000,000) (1970 Prices)¹

Resource Use Category	1971-1980	1981-2000	2001-2020	Total
Water Withdrawals				
Municipally Supplied	418.6	680.0	915.9	2,014.5
Self-Supplied Industrial	57.5	232.7	391.5	681.7
Rural Domestic & Livestock	2.6	4.6	3.8	11.0
Irrigation	20.1	17.0	21.4	58.5
Mining	6.2	11.6	20.7	38.5
Thermal Power Cooling ²	287.1	1,086.3	2,022.5	3,395.9
Nonwithdrawal Water Uses				
Municipal Wastewater Discharges	4,784.0	2,915.0	2,627.0	10,326.0
Sport Fishing	72.0	41.2	62.3	175.5
Recreational Boating	272.0	408.0	348.4	1,028.4
Commercial Navigation	295.6	1,386.6	0	1,682.2
Related Land Uses & Problems				
Agric. Land—Treatment	146.2	274.5	166.7	587.4
—Cropland Drainage	120.6	202.7	130.0	453.3
Forest Land Treatment	188.0	377.0	375.0	940.0
Shoreland Erosion	27.8	45.9	46.0	119.7
Streambank Erosion	19.2	57.7	96.3	173.2
Flood Plains—Urban	547.4	396.1	113.2	1,056.7
Wildlife Management	121.2	224.6	211.9	557.7
Outdoor Recreation—Intensive	722.4	848.5	725.4	2,296.3
Total	8,108.5	9,210.0	8,278.0	25,596.5

1. Some of these costs are presently being incurred through expenditures for programs now underway; notably the programs for water quality management accelerated under P.L. 92-500. The Federal obligations for this purpose in FY 1974 were estimated to be \$488 million.

2. Water withdrawal costs only. Does not include secondary cooling facilities, etc.

**Identified Proposed Framework Operation, Maintenance, and Replacement Costs,
Great Lakes Basin (\$1,000,000) (1970 Prices)¹**

Resource Use Category	1971-1980	1981-2000	2001-2020	Total
Water Withdrawals				
Municipally Supplied	192.0	1,224.3	2,713.9	4,130.2
Self-Supplied Industrial	53.5	704.7	2,015.3	2,773.5
Rural Domestic & Livestock	8.3	56.9	103.9	169.1
Irrigation	2.9	16.3	26.6	45.8
Mining	7.8	61.4	139.2	208.4
Thermal Power Cooling	73.8	842.7	2,431.4	3,347.9
Nonwithdrawal Water Uses				
Municipal Wastewater Discharges	4,108.7	9,955.0	16,223.9	30,287.6
Sport Fishing	22.0	54.2	71.4	147.6
Recreational Boating	62.9	432.0	772.5	1,267.4
Commercial Navigation	36.0	438.2	732.4	1,206.6
Related Land Uses & Problems				
Agric. Land—Treatment	3.4	31.9	50.7	86.0
—Cropland Drainage	3.1	25.2	38.7	67.0
Forest Land Treatment	4.8	43.0	70.4	118.2
Shoreland Erosion	2.7	20.3	38.8	61.8
Streambank Erosion	1.8	17.8	49.8	69.4
Flood Plains—Urban	1.2	9.4	12.2	22.8
Wildlife Management	6.0	11.2	11.2	28.4
Outdoor Recreation—Intensive	147.2	1,016.4	1,787.0	2,950.6
Total	4,738.1	14,960.9	27,289.3	46,988.3

1. These costs include the operation, maintenance, and replacement costs of plants constructed by the capital costs shown in the preceding table. They do not include OM&R costs of existing facilities, for example the present navigation facilities, or for facilities for which capital costs were not estimated.

Needs and Percent of Needs Met by the Proposed Framework in the Great Lakes Basin, 1980, 2000, 2020

Resource Use Category	Unit	Needs and Percent Needs Met							
		1970	1980		2000		2020		
		Supply	Needs	%	Needs	%	Needs	%	
Water Withdrawals									
Municipally Supplied	mgd	4,300	870	over	2,810	over	5,400	over	
Self-Supplied Industrial	mgd	10,600	1,110	62	4,670	75	10,300	80	
Rural Domestic & Livestock	mgd	471	64.0	92	179	91	267	92	
Irrigation	mgd	661	824	83	1,570	84	2,460	85	
Mining	mgd	780	148	84	450	78	965	75	
Thermal Power Cooling	mgd	17,200	8,210	100	38,700	100	96,500	100	
Nonwithdrawal Water Uses									
Municipal Wastewater Discharges	mgd	3,060	3,680	100	4,940	100	6,720	100	
Industrial Wastewater Discharges	mgd	8,580	7,330	100	6,000	100	9,210	100	
Hydroelectric Power	mgd	NA	47,300	100	51,300	100	105,000	100	
Water Oriented Outdoor Rec.	1000 rec. days	100,000	105,000	55	201,000	66	324,000	58	
Sport Fishing	1000 angler days	80,700	24,800	82	52,300	89	79,200	92	
Recreational Boating	1000 boat days	29,000	6,820	36	12,500	51	19,500	55	
Commercial Navigation	million tons per year	343	432	100	583	100	754	100	
Related Land Uses and Problems									
Agric. Land—Treatment	1000 acres	20,450	20,450	20	20,450	56	20,450	76	
—Cropland Drainage	1000 acres	6,210	6,210	11	6,210	29	6,210	42	
Forest Land—Treatment	1000 acres	27,900	27,900	16	27,900	47	27,900	78	
Shoreland Erosion	miles	1,200	1,200	4	1,200	10	1,200	17	
Streambank Erosion	miles	10,900	10,900	5	10,900	16	10,900	27	
	\$1000 ave ann. damages	1,710	1,710	20	1,710	60	1,710	100	
Flood Plains—Urban	1000 acres	222	230	34	240	58	251	79	
—Urban	\$1000 ave ann. damages	46,300	67,100	78	118,000	87	90,000	93	
—Rural	1000 acres	2,570	2,560	21	2,560	36	2,550	48	
—Rural	\$1000 ave ann. damages	14,200	18,000	37	24,200	47	32,400	56	
Wildlife Management	1000 acres		2,920	40	7,990	38	14,100	35	
	1000 user days	49,600	15,000	15	23,900	30	33,300	38	
Outdoor Recreation—Intensive	1000 acres		30.0	74	62.0	84	109	69	
—Extensive	1000 acres	NA	170	89	348	92	600	76	

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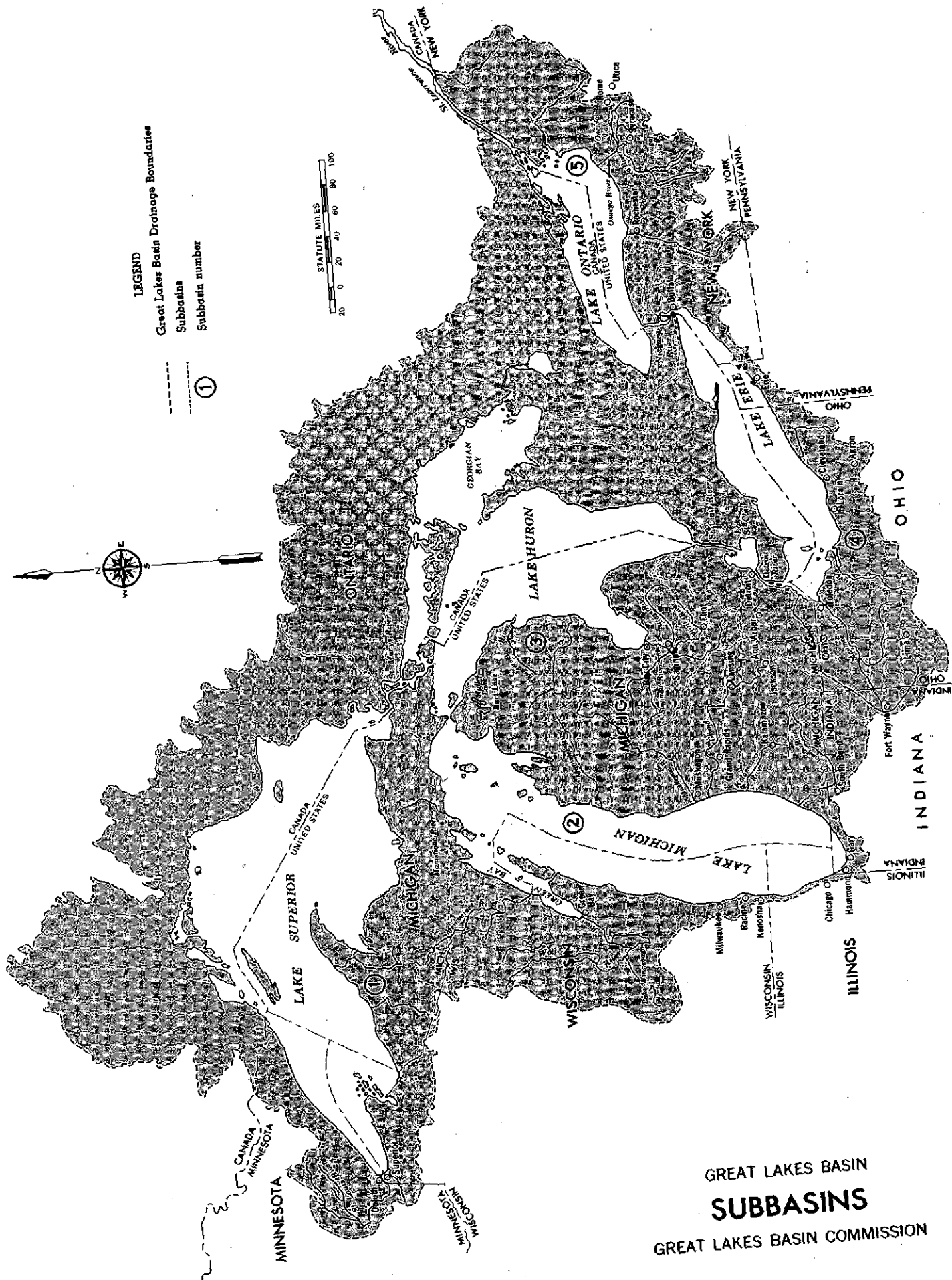
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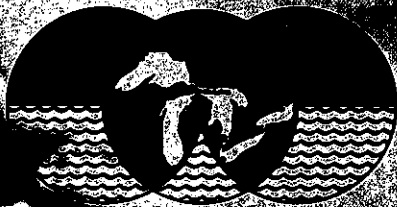
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