US Army Corps
of Engineers
Chicago District

Water Resources Development in Illinois 1995

This publication is authorized by the Secretary of the Army as required by PL 99-662

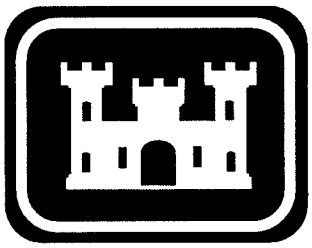
WATER RESOURCES DEVELOPMENT

by the

U.S. ARMY CORPS OF ENGINEERS

in

ILLINOIS



U.S. ARMY ENGINEER DISTRICT, CHICAGO

CHICAGO, ILLINOIS

1995

Letter from the Assistant Secretary of the Army for Civil Works

To Our Readers:

The U.S. Army Corps of Engineers has a long and proud history of applying its expertise in engineering and related disciplines to meet the nation's needs. Over the years, its activities have evolved; however, since 1824, the central focus of its civil mission has been the development of the nation's water resources. With an annual program of over $3 billion for civil projects, the Corps is the federal government's largest water resources development agency. The Corps develops projects that have proven to be wise investments. These projects have reduced flood damages; provided safe, low cost waterborne transportation; generated hydroelectric power; provided water for the public, industry and agriculture; offered opportunities for recreation; and helped the environment. They return to the public benefits that far outweigh their costs.

Corps civil works activities reflect partnership. All Corps projects begin when non-federal interests see a water-related problem and petition Congress for a solution. Under provisions of the Water Resources Development Act of 1986, once the Corps conducts a reconnaissance study to determine whether a feasible project is likely, these sponsors provide a share of the funding for the feasibility study upon which a project will be based. They also provide a share of the cost of the project's design and construction once Congress has authorized the project and provided construction funds. During the period 1986-1994, non-federal sponsors signed 286 cooperative agreements with the Department of the Army for cost sharing of project construction.

The Corps engineering expertise and responsiveness has stood the nation in good stead during times of natural disaster. During 1994, the Corps continued to rehabilitate levees damaged by the Midwest Flood of 1993 and responded to the Northridge, California, Earthquake and the floods that ravaged the Southeast.

Whatever challenges arise in the decades ahead, I have no doubt the Army Corps of Engineers will be equal to the task.

John H. Zirschky
Acting Assistant Secretary of the Army
(Civil Works)

Letter from the Chief of Engineers

To Our Readers:

The U.S. Army Corps of Engineers was founded some 220 years ago to be responsive to the needs of a young nation. While the nature of our work has changed with time, our basic purpose remains to be responsive to America's needs.

Clearly the nation's concern for the environment has permeated the Corps. Under the National Environmental Policy Act, environmental considerations are part of the planning of every Corps project; and under the Water Resources Development Act of 1990, environmental stewardship was made a primary Corps mission along with navigation and flood control.

Response to natural disasters offers opportunities for some of the most direct Corps assistance to local communities. From flood fighting, recovery and levee rehabilitation in response to the Midwest Flood of 1993, to emergency water, electrical power, construction and building inspections after the Northridge Earthquake, Corps people have shown courage, commitment and tenacity.

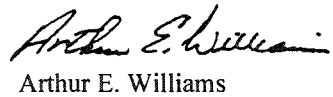
We have continued to enhance our responsiveness to customer needs. For example, the Corps achieved a major cultural shift by instituting a project management system, which assigns one manager to stay with a project from planning through design and construction and to serve as the single point of contact for that project. It has achieved greater accountability to our non-federal partners and, ultimately, projects which better reflect the needs of the community.

Partnering represents another positive shift in Corps business practices, particularly in civil works construction. A local sponsorship kit walks customers through the complexities of Corps projects. A technique related to partnering, alternative dispute resolution, creates an atmosphere in which the clash of differing viewpoints can transform into creative solutions and prevent costly legal disputes. Pioneered by the Corps, alternative dispute resolution is gaining acceptance throughout the federal government.

We are active participants in two major interagency efforts. The Interagency Flood Plain Management Review Committee is looking at ways the federal government can most effectively reduce the risk of flood damage and provide economic benefits and environmental enhancement in flood plains. The Interagency Working Group on the Dredging Process, meanwhile, is establishing better ways to handle the nearly 300 million cubic yards of soil the Corps moves each year from its navigation projects.

And, of course, we still respond to the needs of American families. As one of the nation's largest providers of outdoor recreation, the Corps welcomes citizens to its 461 lakes and other water resource projects. At 82 shore protection projects, the Corps has provided 226 miles of stable beaches. Recreation and natural resource management are responsibilities we take seriously, and we use the opportunity of a visit to a Corps project to help others appreciate our nation's valuable and delicate natural resources.

This booklet is one of a series detailing Corps of Engineers water resources programs and projects in the 50 States and in U.S. territories. I hope you will find it interesting and feel pride in ownership of the projects.



Arthur E. Williams
Lieutenant General, USA
Chief of Engineers

Foreword

This publication is a record of progress . . . a story of achievement by the U.S. Army Corps of Engineers in its work to improve the quality of our lives through water resources planning and development.

It explains the role of the Corps in the design, construction and operation of navigation projects, flood and erosion control, hydroelectric power development and other water-related works. And it details projects that are completed, underway or in the study stage.

Project and study classifications are:

Authorized Not Underway: (1) Projects or studies that have been authorized, but have not been funded; (2) projects or studies that have been funded at one time but not completed, and now are classified as inactive or deferred.

Underway: Projects or studies that have been funded and are not yet complete. Projects may be substantially complete and functioning and still be listed as underway if some portion is still not complete and that portion has not been classified inactive or deferred.

Completed: (1) Projects or studies that are completed; (2) Projects or studies that are completed except for some items that have been classified as inactive or deferred.

Activities of the Corps are organized by lake and river basins. A description of each basin precedes project and study descriptions.

Because nature does not respect state boundaries, the work of the Corps in a particular state may fall within the jurisdiction of more than one Corps division or district. The district or division responsible for each undertaking is listed following the project or study title.

The information in this publication is compiled and edited by the U.S. Army Corps of Engineers' Chicago District. For additional copies or more information, contact the Chicago District Public Affairs Office. Send any correspondence to 111 N. Canal Street, Suite 600, Chicago, IL, 60606-7206. The Water Resources Development in Illinois book is published every two years as required by PL 99-662.

Project locations and district boundaries are shown on maps at the end of this publication. Inquiries regarding specific projects should be addressed to the appropriate district or division engineer listed on the following page.

Division Engineer
U.S. Army Engineer Division
North Central
111 N. Canal Street, Suite 1200
Chicago, Illinois 60606-7205

District Engineer
U.S. Army Engineer District, Chicago
111 N. Canal Street, Suite 600
Chicago, Illinois 60606-7206

District Engineer
U.S. Army Engineer District, Detroit
P.O. Box 1027
Detroit, Michigan 48231-1027

District Engineer
U.S. Army Engineer District, Rock Island
P.O. Box 2004
Rock Island, Illinois 61204-2004

District Engineer
U.S. Army Engineer District, St. Paul
190 Fifth Street East
St. Paul, Minnesota 55101-1638

Division Engineer
U.S. Army Engineer Division
Lower Mississippi Valley
P.O. Box 80
Vicksburg, Mississippi 39180

District Engineer
U.S. Army Engineer District, Memphis
167 N. Main Street, Rm. B202
Memphis, Tennessee 38103-1894

District Engineer
U.S. Army Engineer District, St. Louis
1222 Spruce Street
St. Louis, Missouri 63103-2833

Division Engineer
U.S. Army Engineer Division
Ohio River
P.O. Box 1159
Cincinnati, Ohio 45201-1159

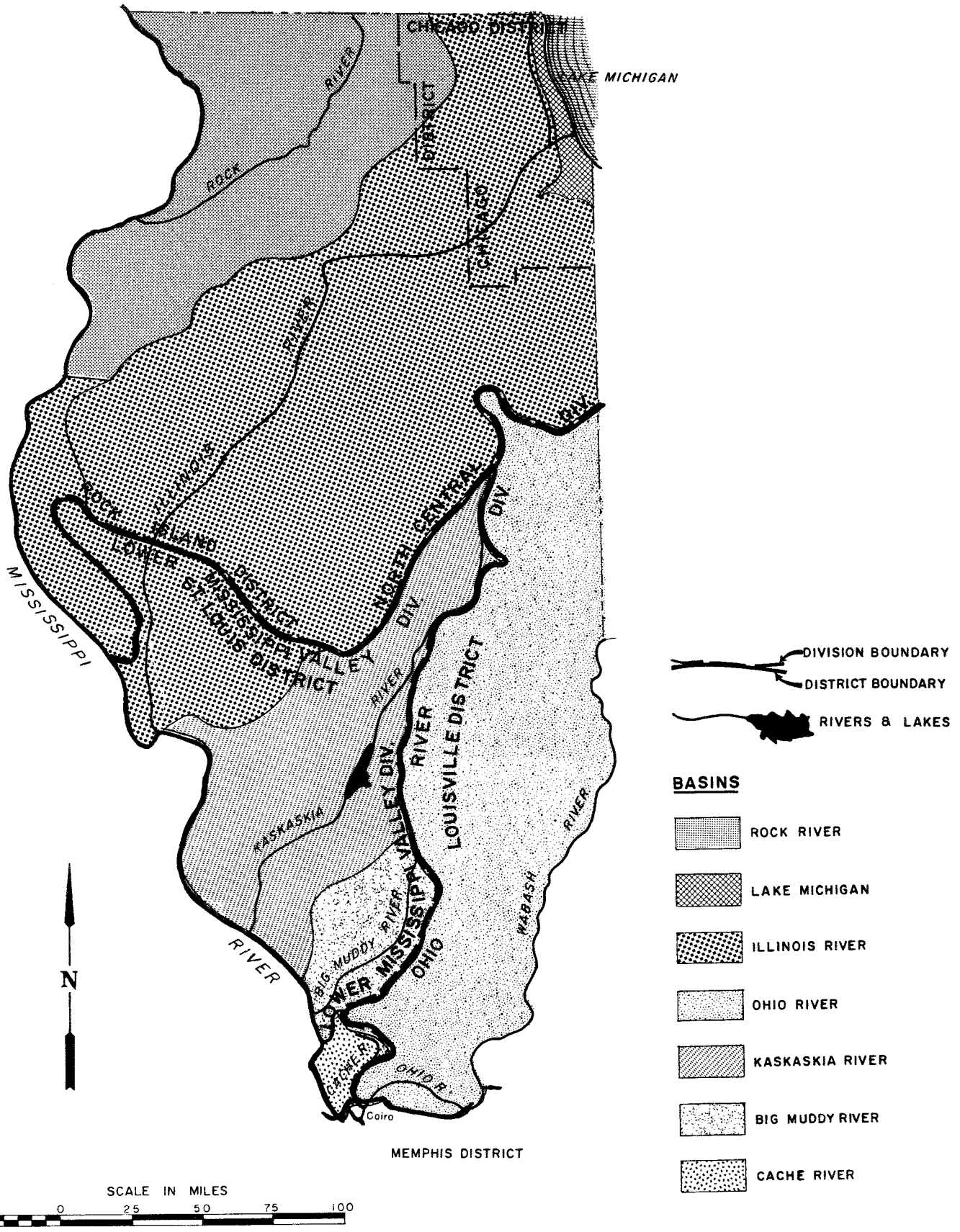
District Engineer
U.S. Army Engineer District, Louisville
P.O. Box 59
Louisville, Kentucky 40201-0059

About the North Central Division

The North Central Division is responsible for water resource activities, including planning and development in all or parts of 12 Midwestern states. The area included in the division encompasses the Great Lakes basin, the Upper Mississippi River valley and the watershed of the Souris-Red-Rainy rivers in northern Minnesota and North Dakota. Five districts carry out civil works activities in the division: St. Paul, Chicago, Rock Island, Detroit and Buffalo.

This "heartland of America" covers 428,000 square miles, or 11 percent of the total area of the United States. Twenty percent of the U.S. population—40 million people—live here, and the area includes five of the nation's 13 largest cities. The region's waterways are a major factor in its economic strength, environmental excellence and the social well-being of its residents. The division is seeking solutions to modern water resource problems, such as water pollution, environmental enhancement, flood damage, shore erosion, water supply, wastewater management, efficiency of water transportation and water-related recreation.

Because of the geographical location of the division, the Division Commander represents the United States on several U.S. - Canadian international boards concerned with boundary water matters of the two countries.



ILLINOIS WATER DRAINAGE BASINS

CONTENTS

Pull-out Maps *(Authorized federal projects completed, Authorized federal projects under construction, and Authorized federal projects not started)* are located in rear of book.

Civil Works Overview

Introduction

From 1775 to the present, the U.S. Army Corps of Engineers has served the Nation in peace and war. The Corps traces its history to June 1775, when the Continental Congress appointed Colonel Richard Gridley as Chief of Engineers of the Continental Army, under General George Washington. The original Corps was the Army's engineering and construction arm until it mustered out of service at the close of the Revolutionary War in 1783.

In 1802, Congress reestablished a separate Corps of Engineers within the Army, and at the same time established the U.S. Military Academy at West Point, the country's first—and for 20 years its only—engineering school. With the Army having the nation's most readily available engineering talent, successive congresses and administrations established a role for the Corps as an organization to carry out both military construction and works "of a civil nature."

Throughout the nineteenth century, the Corps supervised the construction of coastal fortifications, lighthouses, several early railroads and many of the public buildings in Washington, D.C., and elsewhere. Meanwhile, the Corps of Topographical Engineers, which enjoyed a separate existence for 25 years (1838-1863), mapped much of the American West. Army engineers served with distinction in war, with many engineer officers rising to prominence during the Civil War.

In its civil role, the Corps of Engineers became increasingly involved with river and harbor improvements, carrying out its first harbor and jetty work in the first quarter of the nineteenth century. The Corps' ongoing responsibility for federal river and harbor improvements dates from 1824, when Congress passed two acts authorizing the Corps to survey roads and canals and to remove obstacles on the Ohio and Mississippi rivers. Over the years since, the expertise gained by the Corps in navigation projects led succeeding administrations and Congress to assign new water-related missions to the Corps in such areas as flood control, shore and hurricane protection, hydropower, recreation, water supply and quality and wetland protection.

Today's Corps of Engineers carries out missions in three broad areas: military construction and engineering support to military installations; reimbursable support to other federal agencies (such as the Environmental Protection Agency's "Superfund" program to clean up hazardous and toxic waste sites); and the Civil Works mission, centered around navigation, flood control and—under the Water Resources Development Acts of 1986, 1988, 1990 and 1992—a growing role in environmental restoration.

Authorization and Planning of Water Resources Projects

Corps of Engineers water resources activities are normally initiated by non-federal interests, authorized by Congress, funded by a combination of federal and non-federal sources, constructed by the Corps under the Civil Works Program, and operated and maintained either by the Corps or by a non-federal sponsoring agency.

The Water Resources Development Act of 1986 made numerous changes in the way potential new water resources projects are studied, evaluated and funded. The major change is that the law now specifies greater non-federal cost sharing for most Corps water resources projects.

When local interests feel that a need exists for improved navigation, flood protection or other water resources development, they may petition their representatives in Congress. A congressional committee resolution or an act of Congress may then authorize the Corps of Engineers to investigate the problems and submit a report. Water resources studies, except studies of the inland waterway navigation system, are conducted in partnership with a non-federal sponsor, with the Corps and the sponsor jointly funding and managing the study.

For inland navigation and waterway projects, which are by their nature not "local," Congress, in the Water Resources Development Act of 1986, established an Inland Waterway Users Board, comprised of waterway transportation companies and shippers of major commodities. This board advises the Secretary of the Army and makes recommendations on priorities for new navigation projects such as locks and dams. Such projects are funded in part from the Inland Waterway Trust Fund, which in turn is funded by waterway fuel taxes.

Normally, the planning process for a water resource problem starts with a brief reconnaissance study to determine whether a project falls within the Corps' statutory authority and meets national priorities. Should that be the case, the Corps district where the project is located will carry out a full feasibility study to develop alternatives and select the best possible solution. This process normally includes public meetings to determine the views of local interests on the extent and type of improvements desired. The federal, state and other agencies with interests in a project are partners in the planning process.

Before making recommendations to Congress for project authorization, the Corps ensures that the proposed project's benefits will exceed costs, its engineering design is sound, the project best serves the needs of the people concerned, and that it makes the wisest possible use of the natural resources involved and adequately protects the environment.

Once the Corps of Engineers district completes its feasibility study, it submits a report, along with a final environmental impact statement, to higher authority for review and recommendations. After review and coordination with all interested federal agencies and the governors of affected states, the Chief of Engineers forwards the report and environmental statement to the Secretary of the Army, who obtains the views of the Office of Management and Budget before transmitting these documents to Congress.

If Congress includes the project in an authorization bill,

enactment of the bill constitutes authorization of the project. Before construction can get underway, however, both the federal government and the project sponsor must provide funds. A federal budget recommendation for a project is based on evidence of support by the state and the ability and willingness of a non-federal sponsor to provide its share of the project cost.

Appropriation of money to build a particular project is usually included in the annual Energy and Water Development Appropriation Act, which must be passed by both Houses of the Congress and signed by the President.

Navigation

Corps of Engineers involvement in navigation projects dates to the early days of the United States, when rivers and coastal harbors were the primary paths of commerce in the new country. Without its great rivers, the vast, thickly-forested region west of the Appalachians would have remained impenetrable to all but the most resourceful early pioneers. Consequently, western politicians such as Henry Clay agitated for federal assistance to improve rivers. At the same time, the War of 1812 showed the importance of a reliable inland navigation system to national defense.

There was, however, a question as to whether transportation was, under the Constitution, a legitimate federal activity. This question was resolved when the Supreme Court ruled that the Commerce Clause of the Constitution granted the federal government the authority, not only to regulate navigation and commerce, but also to make necessary navigation improvements.

The system of harbors and waterways maintained by the Corps of Engineers remains one of the most important parts of the nation's transportation system. The Corps maintains the nation's waterways as a safe, reliable and economically efficient navigation system. The 12,000 miles of inland waterways maintained by the Corps carry one sixth of the nation's inter-city cargo. The importance of the Corps mission in maintaining depths at more than 500 harbors, meanwhile, is underscored by an estimated one job in five in the United States being dependent, to some extent, on the commerce handled by these ports.

Flood Control and Flood Plain Management

Federal interest in flood control began in the alluvial valley of the Mississippi River in the mid-19th century. As the relationship of flood control and navigation became apparent, Congress called on the Corps of Engineers to use its navigational expertise to devise solutions to flooding problems along the river.

After a series of disastrous floods affecting wide areas in the 1920s and 30s, Congress determined, in the Flood Control Act of 1936, that the federal government would participate in the solution of flooding problems affecting the public interest that were too large or complex to be handled by states or localities. Corps authority for flood control work was thus extended to embrace the entire country. The Corps turns most of the flood control projects it builds over to non-federal authorities for operation and maintenance once construction is completed.

The purpose of flood control work is to prevent damage through regulation of the flow of water and other means. Prevention of flood-related damages can be accomplished with structural measures, such as reservoirs, levees, channels and floodwalls that modify the characteristics of floods; or non-structural measures, such as flood plain evacuation, floodproofing and floodway acquisition, that alter the way people use these areas and reduce the susceptibility of human activities to flood risk.

Corps flood control reservoirs are often designed and built for multiple-purpose uses, such as municipal and industrial water supply, navigation, irrigation, hydroelectric power, conservation of fish and wildlife, and recreation.

The Corps fights the nation's flood problems not only by constructing and maintaining structures, but also by providing detailed technical information on flood hazards. Under the Flood Plain Management Services Program, the Corps provides, on request, flood hazard information, technical assistance and planning guidance to other federal agencies, states, local governments and private citizens. Once community officials know the flood-prone areas in their communities and how often floods would be likely to occur, they can take necessary action to prevent or minimize damages to existing and to new buildings and facilities, such as adopting and enforcing zoning ordinances, building codes and subdivision regulations. The Flood Plain Management Services Program provides assistance to other federal and state agencies in the same manner.

Shore and Hurricane Protection

Corps work in shore protection began in 1930, when Congress directed the Corps to study ways to reduce erosion along U.S. seacoasts and the Great Lakes. Hurricane protection work was added to the erosion control mission in 1955, when Congress directed the Corps to conduct investigations along the Atlantic and Gulf Coasts to identify problem areas and determine the feasibility of protection.

While each situation the Corps studies involves different considerations, Corps engineers always consider engineering feasibility and economic efficiency along with the environmental and social impacts. Federal participation in a shore protection project varies, depending on shore ownership, use and type and frequency of benefits. (If there is no public use or benefit, the Corps will not recommend federal participation). Once a project is complete, non-federal interests assume responsibility for its operation and maintenance.

Eighty-two federal shore protection projects along the coasts of the Atlantic, Pacific, Gulf of Mexico and the Great Lakes protect a total of 226 miles of shoreline. Total investment in these projects since 1950 has been $674 million, of which $405 million was provided by the federal government, the rest by non-federal sponsors.

One shore protection method popular in seaside communities is beach nourishment—the periodic replenishment of sand along the shoreline to replace that lost to storms and erosion. Authorized nourishment projects usually have a nourishment period of 50 years. In addition, Section 145 of the Water Resources Development Act of 1976 authorizes placement of beach quality sand from Corps dredging projects on nearby beaches. Under Section 933 of the Water

Resources Development Act of 1986, local sponsors pay the federal government 50 percent of additional costs of this sand placement.

Hydropower

The Corps has played a significant role in meeting the nation's electric power generation needs by building and operating hydropower plants in connection with its large multiple-purpose dams. The Corps' involvement in hydropower generation began with the Rivers and Harbors Acts of 1890 and 1899, which required the Secretary of War and the Corps of Engineers to approve the sites and plans for all dams and to issue permits for their construction. The Rivers and Harbors Act of 1909 directed the Corps to consider various water uses, including water power, when submitting preliminary reports on potential projects.

The Corps continues to consider the potential for hydroelectric power development during the planning process for all water resources projects involving dams and reservoirs. In most instances today, it is non-federal interests who develop hydropower facilities at Corps projects without federal assistance. The Corps, however, can plan, build and operate hydropower projects when it is impractical for non-federal interests to do so. Today, the more than 20,000 megawatts of capacity at Corps-operated power plants provide approximately 24 percent of the nation's hydroelectric power, or three percent of its total electric energy supply.

Water Supply

Corps involvement in water supply dates back to 1853, when it began building the Washington Aqueduct, which provides water to the nation's capital city and some of its suburbs to this day.

Elsewhere in the nation, the Water Supply Act of 1958 authorized the Corps to provide additional storage in its reservoirs for municipal and industrial water supply at the request of local interests, who must agree to pay the cost. The Corps also supplies water for irrigation, under terms of the Flood Control Act of 1944. This act provided that the Secretary of War, upon the recommendation of the Secretary of the Interior, could allow use of Corps reservoirs for irrigation, provided that users agree to repay the government for the water.

Recreation

The Flood Control Act of 1944, the Federal Water Project Recreation Act of 1965, and language in specific project authorization acts authorize the Corps to construct, maintain and operate public park and recreational facilities at its projects and to permit others to build, maintain and operate such facilities. The water area of Corps projects are open to public use for boating, fishing, and other recreational purposes.

The Corps of Engineers today is one of the federal government's largest providers of outdoor recreational opportunities, operating more than 4,300 sites at its lakes and other water resource projects. More than 370 million visits per year are recorded at these sites. State and local park authorities and private interests operate nearly 2,000 of these areas at Corps projects.

Environmental Quality

The Corps carries out the Civil Works Programs in consistency with many environmental laws, executive orders and regulations. Perhaps primary among these is the National Environmental Policy Act (NEPA) of 1969. This law requires federal agencies to study and consider the environmental impacts of their proposed actions. Consideration of the environmental impact of a Corps project begins in the early stages, and continues through design, construction and operation of the project. The Corps must also comply with these environmental laws and regulations in conducting its regulatory programs.

NEPA procedures ensure that public officials and private citizens may obtain and provide environmental information before federal agencies make decisions concerning the environment. In selecting alternative project designs, the Corps strives to choose options with minimum environmental impact.

The Water Resources Development Act of 1986 authorizes the Corps to propose modifications of its existing projects—many of them built before current environmental requirements were in effect—for environmental improvement. Proposals the Corps has made under this authority range from use of dredged material to create nesting sites for waterfowl to modification of water control structures to improve downstream water quality for fish.

In recent years the Corps of Engineers has planned and recommended environmental restoration actions at federal projects to restore environmental conditions.

Regulatory Programs

The Corps of Engineers regulates construction and other work in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899, and has authority over the discharge of dredged or fill material into the "waters of the United States"—a term which includes wetlands and all other aquatic areas—under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500, the "Clean Water Act"). Under these laws, those who seek to carry out such work must first receive a permit from the Corps.

The "Section 404" program is the principal way by which the federal government protects wetlands and other aquatic environments. The program's goal is to ensure protection of the aquatic environment while allowing for necessary economic development.

The permit evaluation process includes a public notice and a public comment period. Applications for complex projects may also require a public hearing before the Corps makes a permit decision. In its evaluation of applications, the Corps is required by law to consider all the factors involving the public interest. These may include economics, environmental concerns, historical values, fish and wildlife, aesthetics, flood damage prevention, land use classifications, navigation, recreation, water supply, water quality, energy needs, food production and the general welfare of the public.

The Corps of Engineers has issued a number of nation-

wide general permits, mostly for minor activities which have little or no environmental impact. Individual Corps districts have also issued regional permits for certain types of minor work in specific areas. Individuals who propose work that falls under one of these general or regional permits need not go through the full standard individual permit process. However, many general permit authorizations do involve substantial effort by the Corps, and often require project-specific mitigation for the activities authorized by the permit. Corps districts have also issued State Program General Permits for work in states that have comprehensive wetland protection programs. These permits allow applicants to do work for which they have received a permit under the state program. These general permits reduce delays and paperwork for applicants and allow the Corps to devote most of its resources to the more significant cases while maintaining the environmental safeguards of the Clean Water Act.

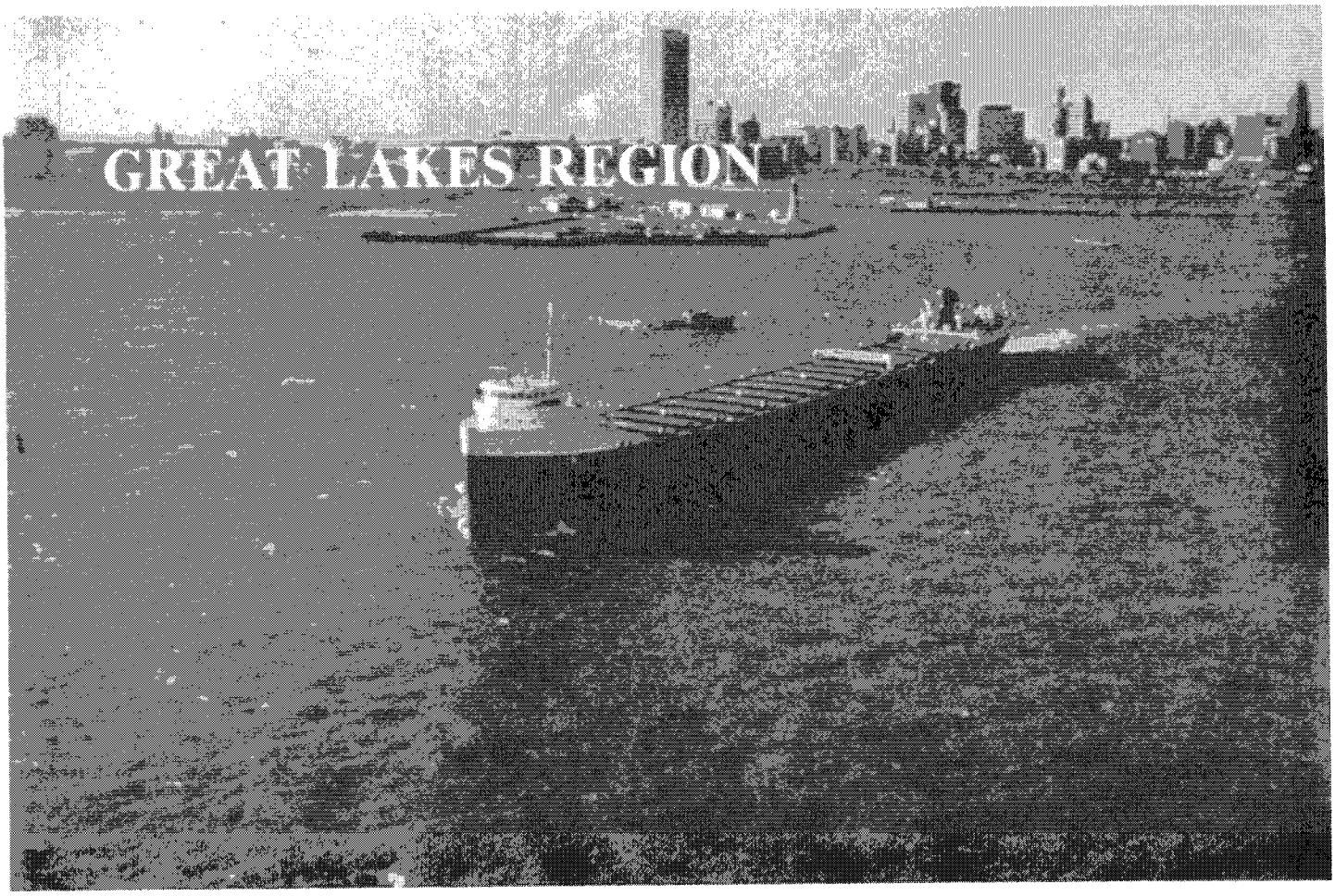
Emergency Response and Recovery

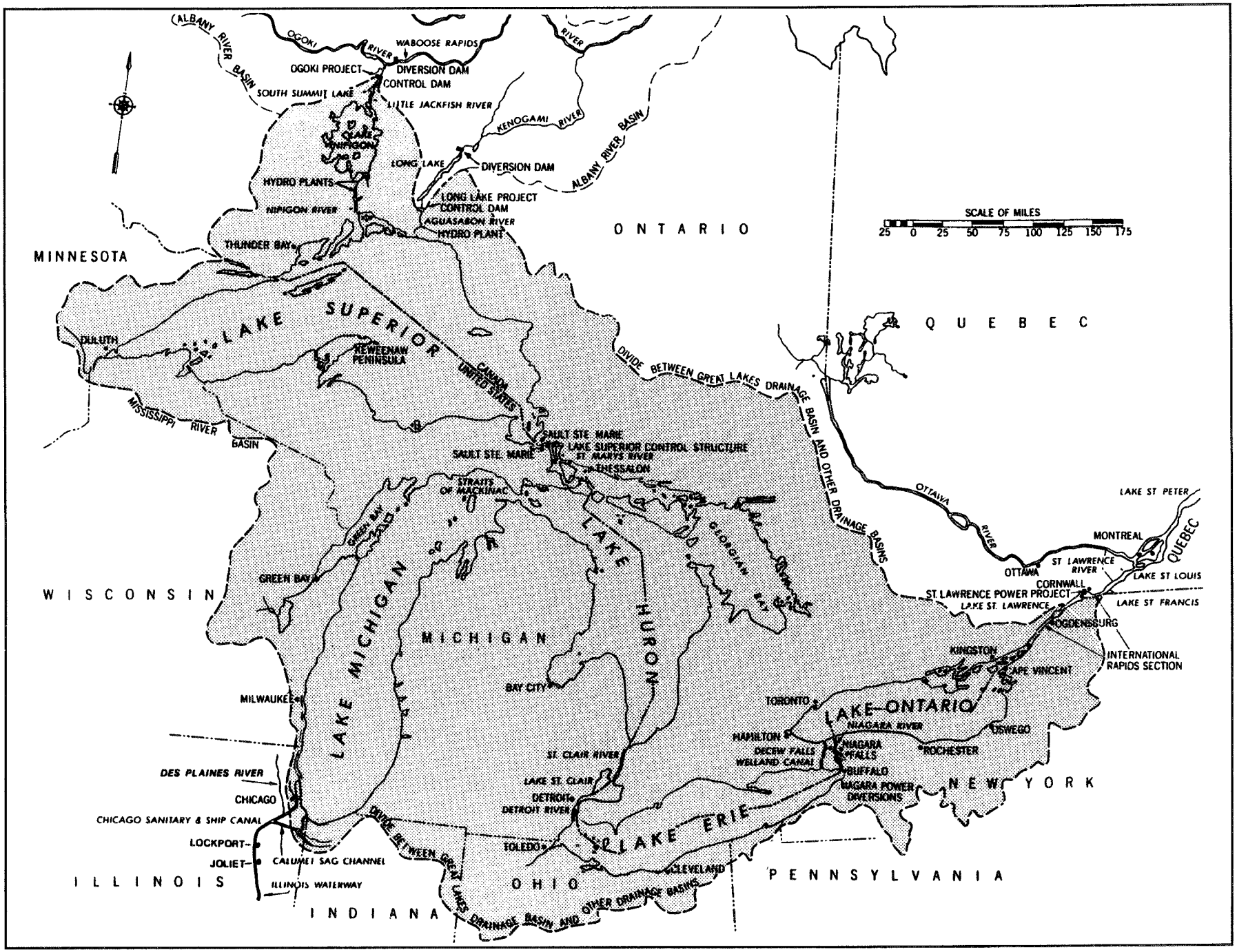
The Corps provides emergency response to natural disasters under Public Law 84-99, which covers flood control and coastal emergencies. It also provides emergency support to other agencies, particularly the Federal Emergency Management Agency (FEMA), under Public Law 93-288 (the Stafford Act), as amended.

Under Public Law 84-99 the Chief of Engineers, acting for the Secretary of the Army, is authorized to carry out disaster preparedness work; advance measures; emergency operations such as flood fighting, rescue and emergency relief activities; rehabilitation of flood control works threatened or destroyed by flood; and protection or repair of federally authorized shore protection works threatened or damaged by coastal storms. This act also authorizes the Corps to provide emergency supplies of clean water in cases of drought or contaminated water supply. After the immediate flooding has passed, the Corps provides temporary construction and repairs to essential public utilities and facilities and emergency access for a 10-day period, at the request of the governor and prior to a Presidential Disaster Declaration.

Under the Stafford Act and the Federal Response Plan, the Corps of Engineers, as designated by the Department of Defense, is responsible for providing public works and engineering support in response to a major disaster or catastrophic earthquake. Under this plan, the Corps, in coordination with FEMA, will work directly with state authorities in providing temporary repair and construction of roads, bridges, and utilities, temporary shelter, debris removal and demolition, water supply, etc.

The Corps is the lead federal agency tasked by FEMA to provide engineering, design, construction and contract management in support of recovery operations.


GREAT LAKES REGION



GREAT LAKES — ST. LAWRENCE SEAWAY BASIN

Great Lakes Region Description

The Great Lakes region in the United States and Canada comprises 299,000 square miles, 95,000 miles are water surface areas and 204,000 miles is land. In the United States, it covers northeastern Minnesota, essentially all of Michigan and parts of six other states, with 4,000 miles of mainland shores and 1,500 miles of island shores.

The Great Lakes are connected by the following rivers and waterways; the St. Mary's River, Lake Superior to Lake Huron; the Straits of Mackinac, Lake Michigan to Lake Huron; the St. Clair River, Lake Huron to Lake St. Clair; the Detroit River, Lake St. Clair to Lake Erie; the Niagara River and the Welland Canal, Lake Erie to Lake Ontario; and the St. Lawrence River, Lake Ontario to the Atlantic Ocean. Four of the five Great Lakes are United States - Canadian boundary waters. The international boundary passes through these lakes and their connecting channels. Lake Michigan, however, lies wholly within the United States.

The region was created largely by glaciation, and its formation was, in terms of earth history, only recently completed. The region has been free from the direct influence of glacial ice for approximately 9,500 years. The five Great Lakes, with their outlets and approximate lake-levels as they are today, probably date back less than 3,000 years. The processes of stream and shoreline erosion have made only slight changes in the original topography.

The Great Lakes came into existence during the Pleistocene, or Ice Age, of earth history. At that time the area contained well-drained valleys and divides of several large rivers. The continental ice cap then developed to a thickness of several thousand feet over much of Canada, and spread southward covering what is now the Great Lakes region. However, this topography was entirely changed. Parts of the preglacial valleys were deepened by scouring, while other parts were filled by deposits, thus creating the basins of five lakes.

While the ice front was receding northward, gradual thawing left waters ponded between the ice and the exposed glacial deposits. This created a gradually enlarging body of lake waters at levels, in some cases hundreds of feet, above present lake levels and with overflow outlets across present watershed divides. As the ice border receded, the pattern and the levels of the lakes repeatedly were changed as new lower outlets were uncovered. The effect of these glacial lakes on present shorelines is illustrated by such features as the perched wave-cut cliffs of Mackinac Island, the lake-deposited clay flats of Chicago and Toledo, the variable stratified sands and silts constituting or overlying the bluffs along the shores of Lakes Erie, Huron and Michigan and the sand tracts of the dune areas.

Flow Rates, Climates

Enormous quantities of water are required to effect even small changes in the levels of the lakes. Therefore, comparatively large variations in supplies to the lakes still have little immediate effect on lake levels. Flow rates in the outlet rivers are remarkably steady in comparison with the range of flows observed in other large rivers of the world. Where suitable head exists, these large steady flows make generation of electric power economically feasible.

Average annual temperatures range from 39° F on Lake Superior to 48.7° F on Lake Erie. Minimum and maximum monthly temperatures occur in February and July, respectively, on all the lakes. Mean annual precipitation for the entire region is about 32 inches, with a minimum of 26 inches in 1930 and a high of 40 inches in 1985. Annual snowfall ranges from about 40 inches to 120 inches. Estimates of average monthly evaporation on the surface of the Great Lakes range from about 1.5 feet on Lake Superior to about 2.5 feet on Lake Erie. The lakes are as a rule ice-free from May to the early part of November. In general, an ice cover does not form on the lakes except in bays and in the northern areas between islands.

Resources Development

The region's predominant mineral resources are iron ore, limestone, salt, copper, sand and gravel and clay. Coal and petroleum are relatively limited in supply. Timber and wood products are important resources that depend upon water for transportation and processing. The glacial overburden has abundant mineral resources to support plant growth, and precipitation has been generally sufficient to develop agricultural potential. Surface and groundwater supplies have been adequate for industry.

In terms of economic development, the dominant characteristics of the Great Lakes are the large bodies of fresh water, the region's location within the highly industrialized north central United States, and natural resources for manufacturing and agriculture. The water surface makes the Great Lakes the world's largest body of fresh water and provides the means of transporting an average of 200 million tons of domestic and international freight per year over the Great Lakes-St. Lawrence navigation system.

Although the Great Lakes region contains only about four percent of the United States land area, it has 20 percent of the nation's population. The 1980 population of the basin was 45.8 million. The 1990 regional population is projected to be about 46.4 million people.

Commercial Navigation

The Great Lakes, connecting channels and St. Lawrence Seaway form a 2,343-mile waterway from the heart of the North American continent to the Atlantic Ocean.

The first recorded commercial navigation on the Great Lakes (a load of grain) occurred in 1678. For the years 1988-1993, an annual average of 161 million tons has been carried on the Great Lakes. Principal items of commerce and their 1993 tonnages are:

Item	1993 Traffic (million tons)
Iron Ore	66
Coal	29
Limestone	27
Other	38
Total	160

The opening of the St. Lawrence Seaway in 1958 generated substantial tonnage, especially in grain exports and iron ore imports. Original estimates of traffic predicted 50 million tons by 1968. This was reached in 1970.

It is anticipated, given recent developments in the Great Lakes regional economy, that iron ore traffic on the system will stabilize at a lower level than previously projected, but that western coal and grain traffic will show growth over the next decade.

The abundance of iron ore and limestone near the upper Great Lakes and good quality coal within 200 miles of southerly lake ports is responsible for 50 percent of the nation's steelmaking capacity being located along the southern Lake Michigan and western and southern Lake Erie shores. An additional 25 percent of the steelmaking capacity is not in the region (Pittsburgh, Pa. and Youngstown, Ohio) but is served by Lake Erie ports.

Costs of providing the present system, which allows a vessel draft of 25.5 feet, was about $2 billion. It has been estimated that the cargo carried on the Great Lakes generates more than $4 billion annually. This is equivalent to about $18 for every ton carried.

Electric Power

Total 1976 generating capacity in the region's U.S. portion was 45,406 megawatts, 5,852 hydroelectric and 40,554 thermal electric. Energy requirements are predicted to increase from 202 million megawatt hours in 1976 to 2,193 million megawatt hours by 2020. This would require an increase in installed capacity to 459,000 megawatts, comprising 10,000 megawatts hydro and 449,000 megawatts thermal capacity.

Recreation

The 5,500 miles of Great Lakes and island shoreline, inland lakes, park lands, beaches, forests, streams, trails, scenic highways, recreational harbors and access sites provided about 200 million recreation days in 1978. Supply and the need often are not located in the same area. For example, the Lake Superior area contains about one-half of the region's recreation land and water area but only about three percent of the region's needs. Conversely, the thickly populated Chicago, Detroit and Cleveland areas contain about one-half the region's needs, but only about four percent of the supply. Distribution of water surface area shows a similar disparity between location of supply (northern areas) and needs (southern urban areas). However, some potential does exist in the southern portion, mainly the Great Lakes shoreline and the flood plains of rivers. Annual recreational needs are predicted to increase to 455 million days by 2000 and 785 million by 2020.

Problems involved in developing a recreational program include competing land use, high land costs, complex ownership patterns, opposition to reservoir development and inadequate funds. Further, the quality of recreation is affected by natural and man-made contaminants from soil erosion and sedimentation, thermal pollution, shoreland development, solid waste disposal, shoreland erosion and air pollution.

It was estimated that some $2.5 billion would be needed to provide additional land and facilities during the 1970-2020 period, exclusive of an additional $1 billion for recreational boating facilities. Although the Corps of Engineers has constructed more than 200 harbors on the Great Lakes, providing facilities for recreational boating, and there are at least that many private marinas, a demand for many more facilities, especially near metropolitan areas, is indicated.

Wildlife

In the U.S. portion of the land area there are 75 million acres. Shoal waters total 550 thousand acres, of which 432 thousand are important to wildlife. All open waters are used by migrating waterfowl. The value of this habitat varies greatly, but the important consideration is that all land and waters have some value to wildlife.

Generally, the supply of wildlife habitat is good in the northern and northeastern areas and fair to the south. The country north of the Milwaukee-Buffalo line is forested and sparsely settled, while the region south of this line is heavily settled and primarily industrial and agricultural.

Wildlife includes big game, waterfowl, shorebirds, wading birds, song birds, small game and furbearers. Some species are classified as "endangered and threatened."

The most important factor affecting wildlife and wildlife habitat is human population density. The 1980 population was 30 million, and it is expected to increase to 46 million by 2030. Most of the increase will occur in the already heavily-populated areas. Wildlife managers are concerned that this population increase will cause both loss and degradation of wildlife habitat. It is estimated that demand for use of wildlife resources by both hunters and non-hunters will increase from 15 million man-days in 1980 to 30 million by 2010. The control of future development on wetlands and the creation of additional wetlands and refuges will benefit many species of animal, wildfowl, fish and plant life, as well as create additional recreational opportunities for man.

The region contains approximately 139,000 acres of National Wildlife Refuge lands. Recreational use of these refuges is both non-consumptive (nature study, photography, picnicking, etc.) and consumptive (fishing and hunting). Many refuges have visitor interpretive centers or self-guiding automobile tours and walking trails.

Fish

Until about 1950, 11 species contributed significantly to commercial Great Lakes fishing: lake sturgeon, lake trout, lake herring, pike chubs, lake whitefish, carp, suckers, catfish, yellow perch and walleye. Reduction of stocks due to inroads by the sea lamprey and invasion by smelt and alewives, accelerated in some cases by overfishing, nearly have eliminated the first four from the commercial fishery. However, continued success of the lamprey control program and the introduction of new species (e.g., coho and chinook salmon) have improved both sport and commercial fishing.

Many harbor breakwaters constructed by the Corps of Engineers are equipped with walkways, hand rails, parking areas and sanitary facilities to provide for sport fishing from the breakwater, in addition to fishing from boats that are berthed or launched at these harbors.

Conclusion

The Great Lakes area provides beautiful scenery, hunting, fishing, swimming, power boating and sailing; and agriculture, mining, manufacturing, power supply and transportation. These are all dependent upon water resources. Some uses are complementary, others are competitive. Prime consideration must be given to effects of any action on the environment and to restoring, preserving and improving the Great Lakes for the benefit of all users.

Corps of Engineers' Projects and Studies

Water Levels of the Great Lakes

Special Study Underway

(North Central Division)

In 1985 and 1986, after nearly two decades of above-average precipitation and below average evaporation in the Great Lakes-St. Lawrence River Basin, all of the Great Lakes--with the exception of Lake Ontario--reached their highest levels of this century. Storm activity combined with these high levels caused extensive flooding and erosion of lake shorelines and severe damage to lake shore properties. Millions of dollars in damage resulted. This marked the sixth occurrence this century of water level extremes. The first period of extremely high water levels was in 1929. This was followed by extreme lows in the dry years of the early 1930s. By 1952, lake levels had reached highs that matched those of 1929, but by the early 1960s they had dropped again to record lows. In 1973, lake levels had again reached highs equal to those of 1929 and 1952.

In response to widespread public concern over the record high levels, on August 1, 1986, the governments of Canada and the United States requested the International Joint Commission to study methods of alleviating the adverse consequences of fluctuating water levels in the Great Lakes-St. Lawrence River Basin. The North Central Division was the lead U.S. agency, supported by Detroit, Buffalo and Chicago districts. All elements were involved throughout the six-year study. The Director, Planning and Engineering Directorate, NCD, chaired the U.S. Section of the Study Board. Environment Canada served as lead Canadian agency.

The final report of the Levels Reference Study Board was submitted to the IJC on March 31, 1993. It responded to the issues raised by governments and the subsequent Directive from the Commission. The report recommended 42 practical actions that governments could take in six key areas: (1) guiding principles for future management of water level issues; (2) measures to alleviate the adverse consequences of fluctuating Great Lakes-St. Lawrence River water levels; (3) emergency preparedness planning for high or low water level crises; (4) institutional arrangements to assist in implementing changes; (5) improvements in communications with the general public on water level issues; and (6) management and operational improvements to facilitate future Great Lakes-St. Lawrence River water-level management.

The Study Board concluded that, although it would be engineeringly feasible to regulate all five of the Great Lakes, the costs of such an undertaking would exceed the benefits produced, and it would have adverse environmental impacts.

A number of possible plans for regulating three of the Great Lakes (Superior, Erie and Ontario) were examined. Dredging and installation of a structure in the Niagara River would provide benefits to shoreline property owners on lakes Michigan, Huron and Erie by reducing the range and frequency of water level fluctuations. Water level and flow ranges on lakes Superior and Ontario and in the St. Lawrence River would increase. Mitigation works in the St. Lawrence River would be required. These plans would adversely affect the wetlands of the middle three lakes by reducing the range of water level fluctuations. The board concluded that, although three-lake regulation is engineeringly feasible and would reduce flooding and erosion damage on the middle three lakes, the potential economic and environmental costs were too high to justify such a project.

The Study Board also recommended some operational improvements to the already partially-regulated lakes Superior and Ontario. The Study Board recommended several emergency preparedness actions that should be taken as soon as possible. These include increasing the flow capacity of the Black Rock Lock in the Niagara River, installation of an ice boom at the head of the St. Clair River, and examination of the potential effects of changing the flows through the four major Great Lakes-St. Lawrence River diversions during high or low water crises. The board further recommended that comprehensive emergency preparedness planning by all levels of government begin immediately.

In addition, the board recommended comprehensive and coordinated land use and shoreline management measures, as well as improvements to operational capabilities, that should be undertaken over the long term. Further recommendations for changes to institutional structures and public communications practices were also put forward to achieve long-term improvements in the way governments, together with citizens and interest groups, address water level issues in the Great Lakes-St. Lawrence River Basin.

The IJC submitted its report to the governments of the United States and Canada in December 1993. Governments have not formally responded to this report. Some of the study board's recommendations will require action on the part of the governments. Others, of an operational nature, can be implemented by the Commission at its discretion.

The IJC has begun to implement several of the study board's recommendations which it can do on its own. For example, it has requested the Lake Superior and St. Lawrence River Boards of Control to begin the process of examining the regulation criteria established for each board. It has also increased the membership of the St. Lawrence Board. Other study board recommendations are being studied for possible implementation.

Great Lakes Connecting Channels

Commercial Navigation Project Underway

(Detroit District)

The Connecting Channels system includes the waterways between lakes Superior and Huron, lakes Huron and Michigan and lakes Huron and Erie.

These vital links provide for deep-draft navigation between the upper and lower Great Lakes and associated deep-draft harbors serving the tributary area. The St. Mary's River, Straits of Mackinac, St. Clair River, Lake St. Clair and Detroit River constitute the connecting channels. Deep-draft vessels plying these channels carry bulk and general cargo essential to the nation's economy at far less cost than alternative modes of transportation.

Presently, improvements authorized by the 1946 and 1956 River and Harbor Acts essentially are complete and provide generally for a minimum project depth of 27 feet in the connecting channels.

This provides a safe draft of 25.5 feet for Great Lakes freighters when the level is at low water datum. The difference between project depth and safe draft allows for squat of a vessel when underway and clearance due to exposure to wave action. These project depths have been available through the connecting channels since June 1962.

The St. Clair River, Michigan Compensating Works, authorized by the River and Harbor Act of 1946 and the Detroit River Compensating Works, authorized by the River and Harbor Acts of 1946 and 1956, were deauthorized on December 31, 1989, in accordance with the Water Resources Development Act of 1986 (Public Law 99-662, Section 1001).

Construction costs of channel improvements has amounted to over $272 million. Cost of maintenance through fiscal year 1992 totaled about $416 million.

Great Lakes and St. Lawrence Seaway Navigation Season Extension Program

Commercial Navigation Study Completed

(Detroit District)

The purpose of this program was twofold: (1) to determine the feasibility of extending the navigation season and the extent of federal participation, and (2) to demonstrate the practicability of extending the season.

Feasibility is determined by evaluating the engineering, economic, environmental and social aspects and impacts collectively of a project and making a judgment as to whether the project is justified and is in the interest of the United States. Practicability is determined by actually demonstrating the means for extending the navigation season during the winter using air bubblers, icebreaking and ice booms to transit vessels.

The Great Lakes-St. Lawrence Seaway system extends from Montreal to Duluth, a route of 2,342 miles. It provides low-cost, energy-efficient marine transportation to and from the nation's heartland. Each year, prior to the beginning of the navigation season program, this important waterway was normally forced to close in mid-December due to weather and ice conditions—remaining closed until early April. Industry had to resort to stockpiling or shift to more expensive and less energy-efficient modes of transportation during the winter months. Great Lakes bulk carriers laid their fleet each winter, resulting in increased costs of operation. The potential navigation season extension would increase the utilization of the fleet and navigation facilities and enhance the present investment in this water resource.

The study, authorized by Public Law 91-611 and amended by Public Laws 93-251 and 93-587, consists of three parts:

1. A Feasibility (Survey) Study
2. A Demonstration Program
3. An Insurance Study, which was completed by the Maritime Administration in 1972. The purpose of this study was to evaluate ways and means to provide reasonable insurance rates for shippers and vessels engaged in waterborne commerce on the Lakes-Seaway system during the winter months.

Status: The final demonstration program report was completed in September 1979. This report provided to Congress a comprehensive accounting of program accomplishments and findings and conclusions reached during the eight years of the program.

An Interim Feasibility Report on a limited extension to January 31 (plus or minus two weeks) in the four upper Great Lakes was completed by the North Central Division Engineer on March 2, 1976, and forwarded to Congress for information by the Secretary of the Army on August 3, 1979 (House Document No. 96-181) for information only, because the measures recommended were primarily operational.

The Final Feasibility Report on season extension was completed in August 1979. The Chief of Engineers concluded that extending the navigation season up to 10 months on the St. Lawrence Seaway-Great Lakes System and up to 10 3/4 months on the upper four Great Lakes is economically justified.

The final report was sent to Congress for information only. The study authority was subsequently deauthorized.

In September 1989, a supplement to the operations and maintenance EIS was completed addressing lock operation to as late as 31 January + 2 weeks. In the August 1990 Record of Decision for the project, it was determined to operate locks annually as late as January 15th.

Great Lakes Connecting Channels and Harbors

Commercial Navigation Study Underway

(Detroit District)

The Great Lakes - St. Lawrence Seaway System extends from the Gulf of St. Lawrence on the Atlantic Ocean to the western end of Lake Superior—a steamer track distance of over 2,000 miles. The U.S. Army Corps of Engineers Detroit District has maintained its support of commercial navigation on the upper four Great Lakes (Superior, Michigan, Huron and Erie) and the Connecting Channels since the late 1860s. The current system, which provides a maximum safe vessel draft of 25.5 feet at lower water datum, was completed in the early 1960s. The last major civil works project on the

upper system was the construction of the Poe Lock on the St. Mary's Falls Canal, Sault Ste. Marie, Mich., in 1968. There are 60 public and 15 private commercial harbors.

The Great Lakes Connecting Channels and Harbors Study was authorized by two resolutions of the Senate Committee on Public Works in 1960 and 1976. The purpose of the study was to determine the advisability of further improvements in the Great Lakes Connecting Channels and the commercial harbors for present and prospective commerce, and to determine the advisability of providing additional lockage facilities and increased capacity at the St. Mary's Falls Canal. Both an interim feasibility report and a final feasibility report have been completed under this study authority.

The recommended plan involves the deepening of navigation channels in the Upper St. Marys River and in Duluth Harbor to: (a) permit a maximum safe vessel draft; (b) dispose of an estimated 341,000 cubic yards of dredged material from the Upper St. Marys River in an environmentally acceptable manner by creating an island in Izaak Walton Bay to provide habitat for the federally endangered species, the Piping Plover; (c) deepening in the Cross and South Channels, West and East Gate Basins, Duluth Harbor Basin (North and South sections) and Duluth Ship Canal; (d) construction of an upland disposal area in the Lakehead area, and (e) dispose of an estimated 286,500 cubic yards of dredged material in the Lakehead upland site.

The Superior Harbor portion of the project has not been authorized, since a local sponsor has not been determined.

The total fully funded cost of the project is estimated at $15,370,000, with $10,285,000 and $5,085,000 being the federal and non-federal shares, respectively.

Funds in the amount of $288,675 were expended in fiscal year 1992 to continue the Preconstruction Engineering and Design work activities. The Design Memorandum for the Upper St. Marys River was submitted to North Central Division and approved in fiscal year 1993. Construction is scheduled to begin in 1995..

During the course of this study, system-wide deepening of connecting channels and harbors was determined to be economically infeasible. Modifications to service vessels larger than those currently operating were also not warranted.

Special Boards, Commissions and Committees

This section provides brief descriptions of some of the commissions, boards and committees involved in monitoring the use and development of water resources in the Great Lakes Region.

International Joint Commission

Over one-third of the boundary between the United States and Canada transverses the Great Lakes. Because of the nature of the lakes and their importance to the two countries, it long has been recognized that close international cooperation in their management and control is beneficial to both countries.

With the signing of the Boundary Waters Treaty of 1909, Canada and the United States established the International Joint Commission (IJC) to oversee issues concerning boundary and transboundary waters shared by the two countries, including the Great Lakes. The treaty requires the IJC approve certain issues, obstructions or diversions of boundary waters if these operations affect the natural level or flow of the boundary waters in the other country. In addition, under the treaty, Canada and the United States can ask the IJC to conduct studies and make recommendations on specific problems along the common frontier.

The six-member (three U.S. and three Canadian) IJC is supported by staff at its offices in Washington, D.C. and in Ottawa and Windsor, Ontario. The IJC also relies on the services of government and public experts from both countries to conduct its studies.

The outflows from Lake Superior and Lake Ontario are regulated in accordance with Orders of Approval issued by the IJC prior to construction of regulating works at their outlets. These Orders of Approval created Boards of Control whose function it is to oversee the operation of the control structures, formulate rules of regulation and see that the Orders of Approval are followed.

When the governments refer a problem to the IJC for study, the commission will usually establish a Study Board. The Study Board consists of qualified personnel from both countries who organize and coordinate the field work and technical studies. The board keeps the IJC informed by progress reports and, on study completion, files a final report.

After releasing the board's report, the IJC holds public hearings. All interests have the opportunity to produce evidence and express opinions on the board's report, or on an aspect of the problem that the governments have referred to the IJC. The commission formulates its own report and recommendations for submission to the two governments. The IJC's report is not binding upon the governments who have the responsibility for making the ultimate decisions.

Currently, the North Central Division of the U.S. Army Corps of Engineers is involved on the following IJC boards:

International Lake Superior Board of Control
International Niagara Board of Control
International St. Lawrence River Board of Control

These boards have operating responsibility within the Great Lakes. The North Central Division commander is the ex-officio chairman of the U.S. sections of the three control boards. North Central Division was also involved with the International Great Lakes-St. Lawrence River Water Levels Reference Study.

International Lake Superior Board of Control

This two-member board (one U.S. and one Canadian) is responsible for regulating Lake Superior outflows, under the terms of the IJC's Orders of Approval. It supervises the operations of a gated control structure built on the lake's outlet channel, and makes allocations of water to the power interests located at Sault Ste. Marie, Michigan and Ontario.

The current regulation plan used to determine monthly Lake Superior outflow incorporates the principle of balancing the levels of Lake Superior and Michigan-Huron to provide benefits to the total Great Lakes system, without undue detriment to Lake Superior interests.

International Niagara Board of Control

This is a four-member board (two U.S. and two Cana-

dian). It is responsible for supervising the maintenance and operation of remedial works on the Niagara River to preserve and enhance the scenic beauty of Niagara Falls and River while providing for the most beneficial use of waters for power generation. A gated control structure was constructed in the Niagara River under the U.S.-Canadian Treaty of 1950, to maintain the proper flow over the Falls. An ice boom at the outlet of Lake Erie, installed and removed annually by the power entities, helps to relieve some of the ice problems in the river during the winter and early spring.

International St. Lawrence River Board of Control

This board is responsible for insuring compliance with the provisions of the IJC's Orders of Approval relating to levels and outflows of Lake Ontario, the International Rapids Section of the St. Lawrence River and downstream.

The board is composed of ten members (five U.S. and five Canadian). It is responsible for coordinating the regulation of Lake Ontario outflows and supervising the operation and maintenance of the St. Lawrence Seaway and Power Projects as related to levels and flows.

International Great Lakes-St. Lawrence River Water Levels Reference Study

This study was begun in response to an August 1, 1986 reference from the governments of Canada and the United States. Under this reference the IJC was asked to examine and report upon the methods of alleviating the adverse consequences of fluctuating water levels in the Great Lakes-St. Lawrence River Basin.

The magnitude and complexity of the comprehensive study required that it be addressed in two phases. Phase I, which was completed in May 1989, identified the major types of measures which address the problems brought on by lake level fluctuations, and developed the basis for a comprehensive framework for the systematic evaluation of these measures. The IJC issued their Phase I progress report, titled "Living With the Lakes: Challenges and Opportunities," in July 1989. Phase II applied several evaluation procedures, including a further development of the evaluation framework conceptualized in Phase I, to both structural and nonstructural measures.

The measures evaluated in Phase II included shoreline management and full and partial lake regulations. The Phase II report was presented to the IJC on March 31, 1993. This report contains 42 recommendations for improving the response to fluctuating water levels.

Great Lakes Commission

The Great Lakes Commission (GLC) was established in 1955 under the Great Lakes Basin Compact, an interstate agreement designating the commission as a joint state body on Great Lakes water resource development, programs and problems. Congressional consent was granted by Public Law 90-419 in 1968. The commission is composed of three to five representatives from each of the eight states bordering the Great Lakes. It meets at least twice a year and maintains offices and a staff in Ann Arbor, Mich.

The commission has been an active advocate on behalf of Great Lakes interests and acts as the primary forum for interagency coordination of water resources planning in the Great Lakes Basin.

The primary goals of the GLC are: (a) to provide a forum for discussion and study of common interstate water-related problems and for resolution of interstate water-related conflicts; (b) to coordinate the development of consistent federal and state plans for water resources development within the basin; and (c) to develop regional priorities for federal water resources activities.

Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data

The Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data was established in 1953 in the interest of developing a basis for derivation and acceptance of identical Great Lakes hydraulic and hydrologic data by both the United States and Canada. This group was formed by interagency agreement between the two countries and is not under the jurisdiction of the IJC. The committee serves in an advisory capacity to the agencies of the United States and Canada who are charged with the responsibility of collecting and compiling Great Lakes hydraulic and hydrologic data. The committee has three subcommittees: Vertical Control-Water Levels; Hydraulics; and Hydrology. Each subcommittee has representation from both governments. Personnel from the Corps of Engineers hold membership on the committee and the subcommittees.

The ongoing responsibilities of this committee include coordination of Great Lakes water level, outflow, and water supply data; and the coordination of outflow calculation and measurement techniques. In January 1992, the committee announced the implementation of a new International Great Lakes Datum-IGLD (1985). This datum is the culmination of a complete releveling of all Great Lakes bench marks as referenced to sea level at the Gulf of St. Lawrence.

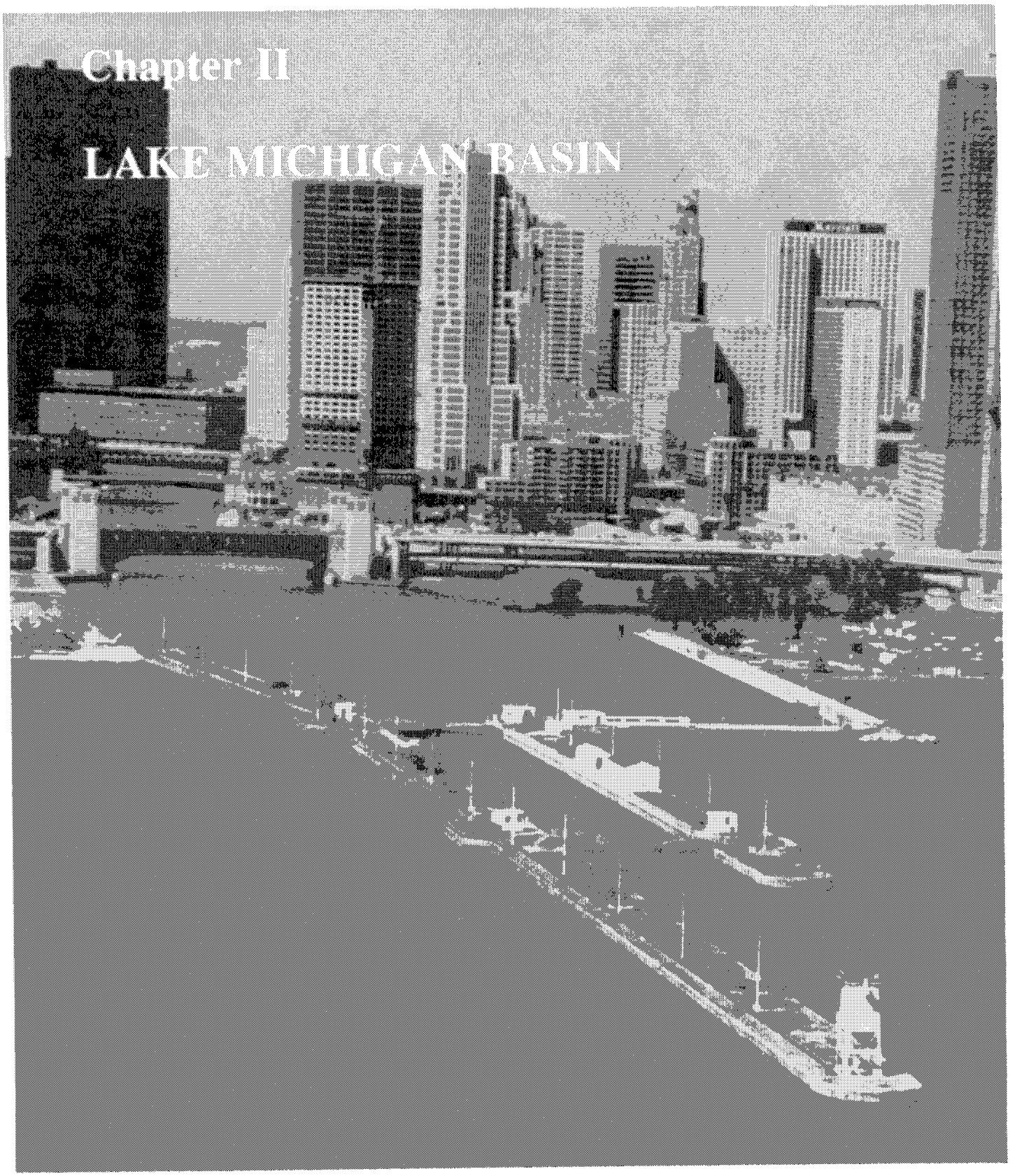
International Niagara Implementation Committee

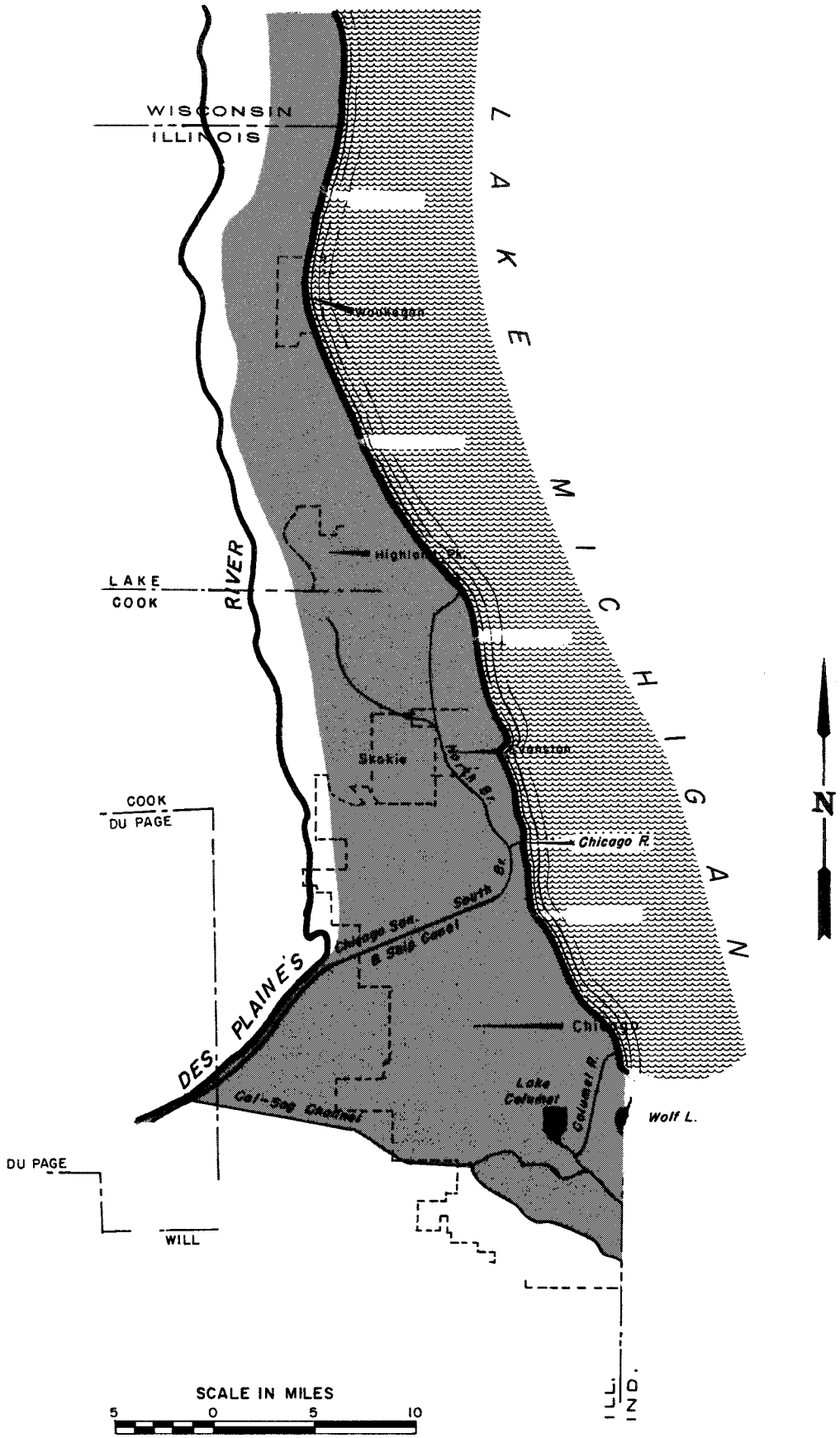
This committee was appointed by the governments of the United States and Canada. It is responsible for determining and recording Niagara River flows and diversions for hydropower production to guarantee the requirements of the Treaty of 1950. The treaty provides that waters exceeding a specified minimum flow required to maintain the Niagara Falls scenic spectacle may be diverted for power.

Committee representatives periodically inspect all power plants in service to obtain independent power output readings and check water levels used to compute flows to verify compliance with treaty provisions. Investigations are made of any discrepancies, particularly between level data recorded on official gauges and by the power entities. In case of any violations of flow requirements over the Falls, an investigation is made and a written report prepared of each hourly occurrence. Corps personnel, in support of Corps membership on the committee, verify the monthly hydraulic reports and prepare violation explanations for committee approval. The committee's annual report summarizes the monthly reports. Copies of this report are forwarded to the U.S. Department of State.

Chapter II

LAKE MICHIGAN BASIN

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Skokie
Evanston
North Br.
Chicago R.
Chicago San. & Ship Canal
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Lake Michigan Basin Description

The Geographic Area

Extending about 350 miles from north to south and about 270 miles from east to west, the Lake Michigan Basin includes some 22,300 square miles of Lake Michigan surface area and some 45,560 square miles of adjacent land and river areas draining into the lake. The basin encompasses portions of four states: Michigan, Wisconsin, Indiana and Illinois. About 62 percent of the land area draining into the lake is in Michigan, 32 percent in Wisconsin and the remaining six percent in Indiana and Illinois.

Land draining into Lake Michigan extends from just north of Chicago through Wisconsin and Michigan's Upper Peninsula to the Straits of Mackinac (the outlet of Lake Michigan). From there it extends south through Michigan and northeastern Indiana to a point just south of Chicago. The Illinois drainage area excludes the Chicago and Calumet rivers, which are now diverted out of Lake Michigan to the Mississippi River Basin.

Although generally hilly, the terrain of the basin does offer contrasts from north to south. Most of lower Michigan and southern Wisconsin have relatively low rolling relief. Northward, particularly in Upper Michigan, bedrock crops out and forms a rugged relief. Elevations exceed 1,900 feet in a few isolated peaks in Wisconsin and upper Michigan, but generally the land surface in the basin is less than 1,000 feet.

Vegetation and Wildlife

A variety of vegetation grows in the basin. Far northern areas on both sides of the lake are forested with spruce fir. In Wisconsin, at the Green Bay latitude, these forest areas become agricultural lands. The forest extends further south in Michigan to approximately the Muskegon-Clare-Midland line. Except for urban areas, land at the southern tip of the lake is agricultural.

Wildlife species in the basin's northern areas reflect the sparser human habitation of that region. Animal species include coyote, red fox, snowshoe hare, ruffed grouse, bald eagle, osprey, sharp-tailed grouse, woodcock, bobcat, lynx, furbearers and black bear. Less specialized species are found further south. These include farm game such as ring-necked pheasant, cottontail rabbit, gray and fox squirrel and white-tailed deer. The urbanized southern part of the basin supports little wildlife, although city parks and forest preserves provide habitat for small populations of rabbit, squirrels, furbearers and many species of songbirds.

Climate

In general, the tempering effects of Lake Superior and Lake Michigan are felt in all portions of the basin, especially along the shoreline counties in Michigan. Mean annual temperatures range from 41° F in the northern portion of the basin to 50° F in the south. Winds over the basin are generally from west to the southwest. Summer temperatures along the shores of the lake are typically cooler and less humid than inland areas. However, during winter months, the shores of the lake are generally warmer than inland areas. Mean maximum temperatures in the basin interior reach 70° F to 80° F January temperatures range from a mean maximum of 28° F to 32° F.

Average annual precipitation is about 30 inches over the basin with a range of 28 inches to 32 inches. The variation in an average annual snowfall over the region is wide-ranging, from as much as 120 inches in the Upper Peninsula and highland areas near Traverse City to about 20 inches in the southern portion of the basin.

Recreation

Forested lands, expanses of dune and beach areas, national parks and inland lakes are the major sources of outdoor recreation within the basin. The basin offers over four million acres of publicly owned forest land, 1,200 acres of publicly owned beaches and hundreds of inland lakes.

Of the more than four million acres of publicly owned forest lands, nearly two million acres are in national forests, 1.6 million are in state forests and one-half million acres are owned by local governments. The majority of forested areas are in the northern portion of the basin. About 90 percent of the northern one-third of the basin is forested, while only about 20 percent of the southern portion of the basin is forested.

Lake Michigan's shoreline—1,362 miles long—is the largest of any U.S. portion of the Great Lakes. Of the total shoreline, 245 miles, or 18 percent, are publicly owned, 156 miles of which are federal, state and local parks. Shoreline areas of particular interest include the Indiana Dunes National Lakeshore, various state parks and Sleeping Bear Dunes National Lakeshore.

Several river areas in the basin are also of special recreational interest. The following rivers have either been designated or are being considered for designation as wild, scenic or recreational rivers by the federal government or states: Pere Marquette, Little Manistee, Manistee, Pine, Escanaba, Whitefish, Manistique and Muskegon rivers in Michigan; the Pike, Pine, Wolf, Brule and Popple rivers in Wisconsin; the Fox River in Illinois; and the Elkhart River in Indiana.

Population and Land Use

Transportation and the availability of natural resources played major roles in the economic development and demographic distribution of the basin. Many of the cities, like Milwaukee and Chicago, had their beginnings as fur trading posts. The lumber industry grew primarily in the northern half of the basin, and together with copper and iron mining, spurred the urbanization and industrialization of the southern portion of the basin.

Commercial Navigation

About 79.4 million short tons of cargo were shipped on Lake Michigan in 1989. Of this total, approximately 70.3 million tons were domestic traffic and 9.1 million tons were foreign. Domestic traffic shipped over the lake in 1989

consisted mainly of iron ore, limestone, coal and lignite, petroleum products and grain.

Water resources development on the Lake Michigan Basin includes projects in Michigan, Wisconsin, Indiana and Illinois. Detailed descriptions of Corps projects and activities in the Illinois portion of the Lake Michigan Basin are provided in the following pages.

Corps of Engineers' Projects and Studies

Chicago Harbor, Lake Michigan

Commercial Navigation Project Completed

(Chicago District)

Chicago Harbor is located immediately east of the city's business district at the mouth of the Chicago River. Construction and improvement of the harbor were authorized by congressional acts of 1870, 1899, 1912, 1919, 1931, 1945, 1962 and 1983. Deepening the lake approach channel and maneuver area in 1966 completed the project as it is today.

The harbor includes an outer basin of about 970 acres protected by an exterior breakwater, a shore arm extension and a southern extension, all with a total length of 12,663 feet. Also included are a 224-acre inner basin protected by an inner breakwater and a detached extension, together, 6,578 feet long; a north pier 960 feet long; and an approach channel lakeward of the southern breakwater extension, 29 feet deep and 800 feet wide.

Other features include a channel and maneuver area in the outer basin, 28 feet deep and 1,300 feet wide from the entrance to the east end of Navy Pier; an entrance channel to the Chicago River extending to Rush Street, 21 feet deep and between 190 and 470 feet wide.

The project also includes operation and maintenance of the Chicago Lock. The lock is located at the mouth of the Chicago River and is 600 feet long, 80 feet wide and 23 feet deep. In 1994, 15,095 lockages were performed.

The cost of the project (all federal) through Sept. 30, 1995, was $30,863,776, of which $4,788,827 was for new work, $24,758,349 for maintenance and $1,326,600 for rehabilitation.

Cargoes include receipt of sand and gravel, fuel oil and building materials.

In 1994 60,190 vessels transited the lock. This includes commercial passenger vessels, local government vessels, towboats, barges, commercial fishing vessels and recreational boats. In 1994 commercial vessels carried 876,885 passengers through the lock.

Chicago River, Lake Michigan

Commercial Navigation Project Completed

(Chicago District)

The Chicago District is authorized to maintain a 21-foot navigation channel depth in the Chicago River in the reach between Rush Street and North Avenue, which includes the North Branch Turning Basin.

Authorized by congressional acts of 1899, 1902, 1907 and 1919, the project was completed in 1941. The cost of the project through Sept. 30, 1995, was $16,318,448, of which $1,500,565 was for new work and $14,817,883 was for maintenance.

Traffic on the river in 1993 was 1,764,000 short tons and consisted of sand and gravel, fuel oil, coal and lignite and other minerals.

Waukegan Harbor, Lake Michigan

Commercial Navigation Project Completed

(Chicago District)

Waukegan Harbor is located on the west shore of Lake Michigan, 38 miles north of Chicago. The original federal project, authorized June 14, 1880, consisted of construction of parallel piers and basins. Subsequent legislation authorized additional modifications.

The federal project at Waukegan consists of a north breakwater and shore connection with a total length of 1,894 feet to form the outer harbor; parallel entrance piers from the outer harbor; parallel entrance piers from the outer harbor to an inner basin, with the south pier diverging to the southwest at its inner end; and an entrance channel, 390 feet wide and 22 feet deep from the lake to the outer end of the north pier.

Also included are a channel between the piers, 200 feet wide and 18 feet deep to the inner basin; an inner basin, 18 feet deep and about 13 acres in area, protected by a revetment on the east side; and an anchorage area in the southwest corner of the basin, 8 feet deep and about 6 acres in area.

Construction was completed in 1966. The total cost through Sept. 30, 1995 was $13,353,656, of which $823,026 was for new work and $12,530,630 was for maintenance.

Cargoes include gypsum and building cement.

Calumet Harbor and River, Lake Michigan

Commercial Navigation Project Underway

(Chicago District)

Although Calumet Harbor is primarily located within the limits of the city of Chicago, most of the breakwaters, approach channel and outer harbor channel and anchorage area are located in Indiana. The first federal work was authorized March 3, 1899, with additional work authorized later.

The completed portion of the project consists of an outer harbor protected by a breakwater extending east and southeast from the shore for a distance of about 2.5 miles; an approach channel, 3,200 feet wide and 29 feet deep.

Also included are a river entrance channel, 290 feet wide and 27 feet deep; a channel in the Calumet River, a minimum of 200 feet wide and 27 feet deep; three turning

basins; an entrance to Lake Calumet, 400 feet wide and 27 feet deep; and a channel extending 3,000 feet into Lake Calumet, 1,000 feet wide and 27 feet deep.

The total costs through Sept. 30, 1995, were $60,246,256, of which $22,578,567 was for new work ($19,541,964 regular funds and $3,036,603 public works funds), $31,403,021 regular funds for maintenance, $836,667 non-federal funds for maintenance and $5,428,001 regular funds for rehabilitation.

Cargoes include taconite, limestone, cement, chemical fertilizers, petroleum products, grains, steel, salt and miscellaneous freight.

Hammond, Whiting, and East Chicago Illinois and Indiana

Commercial Navigation Study, Authorized Study Not Underway

(Chicago District)

This study would consider the feasibility of constructing further deep-draft navigation improvements at the south end of Lake Michigan and of combining the existing Calumet and Indiana Harbor projects. The area under consideration consists of the seven miles extending from Indiana Harbor at East Chicago to Calumet Harbor at the mouth of the Calumet River in Illinois.

Under the study proposal, an expanded deep-draft harbor would be constructed by extending the existing breakwaters at Indiana and Calumet harbors offshore and parallel to the shoreline.

Authorized by a House Public Works Committee resolution August 24, 1961, the study has been classified as inactive because of a lack of sufficient local interest.

Illinois Shore of Lake Michigan, Waukegan to Illinois-Wisconsin State Line

Recreational Navigation Study, Authorized Study Not Underway

(Chicago District)

This study concerns the feasibility of constructing additional recreational boat harbors and facilities between Waukegan, Illinois, and the Illinois-Wisconsin state line.

Authorized by a House Public Works Committee resolution adopted June 29, 1976, work on the study began in 1979 to determine the need for recreational boating facilities at Illinois Beach State Park.

A reconnaissance report presenting alternative harbor plans and locations was completed in 1981. Because of limited funds, the low priority of recreation projects by the Corps of Engineers and the wishes of the state of Illinois to move rapidly into construction, the study did not proceed further. The state of Illinois has since constructed a small-boat harbor at the state park. The harbor (North Point Marina) began operation in 1987, and has the capacity for about 1,500 boats. No further work will be completed under this study authority.

Highland Park, Illinois

Recreational Navigation Study, Authorized Study Not Underway

(Chicago District)

This study was authorized to determine the feasibility of constructing a recreational boat harbor at Highland Park.

Authorized by a House Public Works Committee resolution adopted Sep. 3, 1964, the study was begun in 1966 and considered two potential harbor sites. The Chicago District stopped work on the study in May, 1968, because the city of Highland Park could not resolve differences among local interests regarding potential harbor sites. Since then, the city has expressed renewed interest in the study, but Congress has not appropriated funds to resume the work.

Additionally, current Corps of Engineers policy places a low priority on recreational projects.

Wilmette Harbor, Illinois

Recreational Navigation Study, Authorized Study Not Underway

(Chicago District)

This study to consider the feasibility of constructing a recreational boat harbor at Wilmette was authorized by a Senate Public Works Committee resolution adopted March 30, 1957.

Lacking local interest and funding, the study is now inactive.

Evanston Shore Protection, Lake Michigan

Beach Erosion Control Project Completed

(Chicago District)

Designed to protect two beaches from further erosion and provide additional recreational areas, this project was authorized under the River and Harbor Act of October 28, 1965. Completed under the authorization were an impermeable steel-pile groin and a sand fill at both Grosse Point Park Beach and South Boulevard Beach.

Construction was completed at Grosse Point Park Beach in 1968 at a cost of $295,400, of which $206,800 was derived from federal funds and $88,600 contributed by the local sponsor. Work at South Boulevard Beach was completed late in 1978. The cost for that portion of the project was $568,127, which was paid by the city of Evanston. The city was later reimbursed $243,932—50 percent of South Boulevard cost, less the federal expenditures for an environmental impact statement, engineering reviews and studies, and inspection and administrative costs.

Illinois Shoreline Erosion, Lake Michigan

Beach Erosion Control Study Underway

(Chicago District)

Erosion problems along the entire Lake Michigan shoreline in Illinois and the feasibility of providing control measures are under investigation in this study. Two studies authorized by the House Public Works Committee on Dec. 2, 1971, and April 11, 1974, are combined in the investigation.

The study has been subdivided into four interim studies. The first addresses erosion problems along the generally undeveloped shoreline from Waukegan to the Wisconsin state line, much of which is within Illinois Beach State Park. The second interim considers the problems at Casino Beach in Chicago. The third addresses the shoreline from Wilmette to the Indiana state line. The final study will consider erosion in the reach from Waukegan Harbor to Wilmette Harbor.

A preliminary feasibility report on the Interim I reach, completed in 1975, found no economically feasible project.

The Corps resumed work on Interim I in 1980, based upon new information supplied by the state, and completed a reevaluation of the preliminary feasibility report in 1982.

Based on a subsequent Information Report prepared by the Chicago District in 1985, the project was authorized by Congress in the 1986 Water Resources Development Act, subject to processing of a feasibility report through the Board of Engineers for Rivers and Harbors (BERH). A draft of the final feasibility report was completed by the Chicago District in May 1988 and revised in 1989. In 1991, a determination was made that there was no federal interest in the proposed project.

The interim report for Casino Beach was completed in 1983. The report recommended federal participation in the repair of the existing Casino Beach jetty. This project was authorized by the 1986 Water Resources Development Act. The Chicago District received funds in fiscal year 1991 to work on the General Design Memorandum. A reanalysis of the economic justification will be included in the General Design Memorandum.

A revised draft of the final feasibility report for Interim III was completed in July 1991. That report identified serious erosion problems along the Chicago Park District property between Montrose Harbor and Fullerton Avenue, and between 26th Street and 56th Street. Pilings supporting rock revetments along the shoreline are deteriorating, and could be lost in the near future. Without shore protection, the land buffer between the lake and Lake Shore Drive will erode allowing Lake Shore Drive to flood and, in time, be lost to erosion.

The report recommended a plan consisting primarily of construction of new steel sheet-pile, step-stone revetments to replace existing Park District structures. The total cost of this plan was estimated to be $160 million. Cost-sharing would be on the basis of a less expensive rubblemound revetment plan estimated at about $130 million. The report is still in the review process.

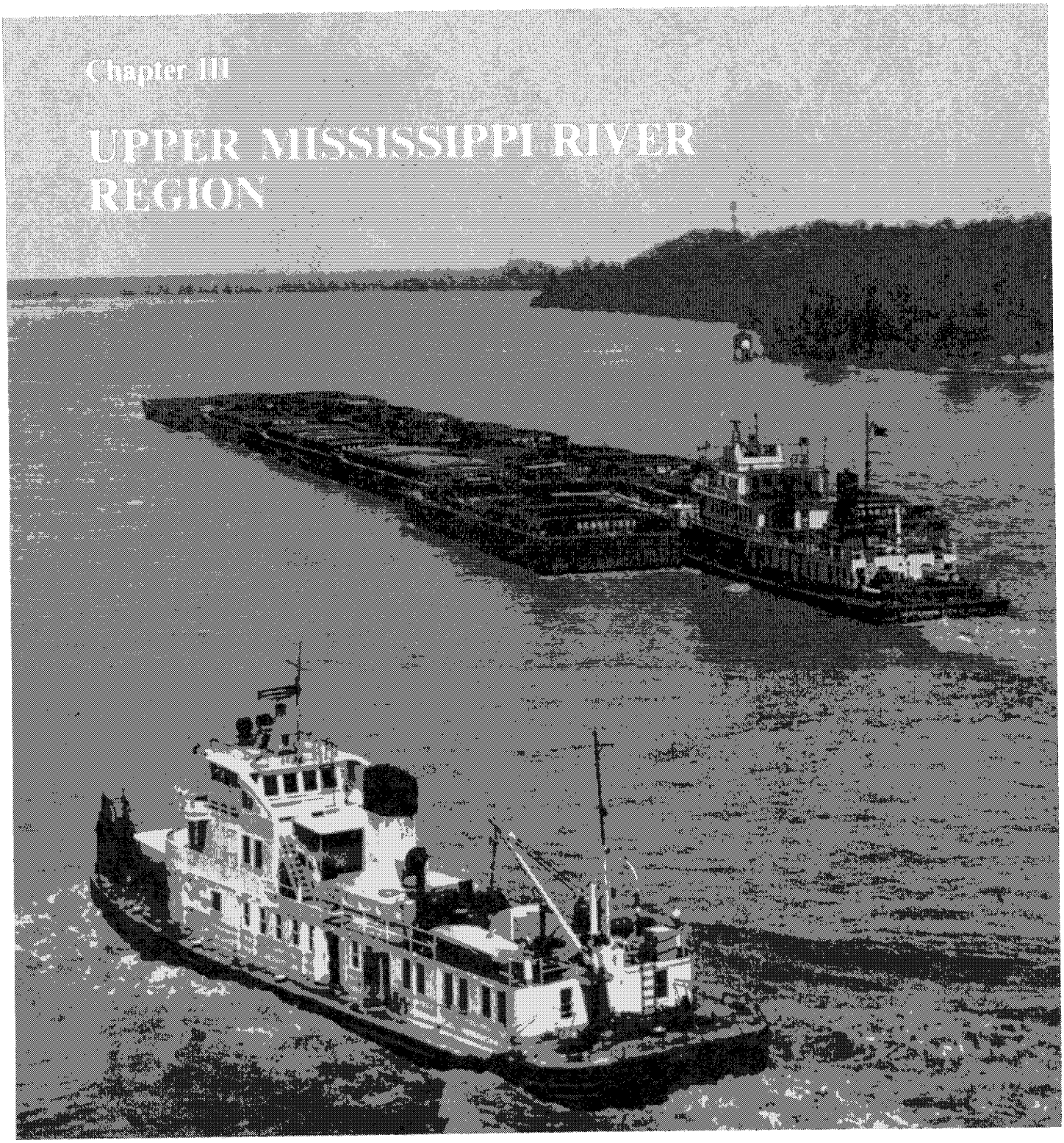
A preliminary draft of the feasibility report (reconnaissance level) for the final interim was completed in March 1989. Storm and erosion damage along this reach were caused by federal harbor structures at Great Lakes Naval Center and Waukegan.

The majority of benefits in the reach would be from reducing erosion of private property or from improving recreation at public parks.

Work is continuing on the draft feasibility report, which identified a beach nourishment plan as feasible.

Chapter III

UPPER MISSISSIPPI RIVER REGION




MINNESOTA
SOUTH DAKOTA
WISCONSIN
IOWA
INDIANA
ILLINOIS
MISSOURI
UPPER MISSISSIPPI RIVER REGION

Upper Mississippi River Region

The Upper Mississippi River region extends almost 700 miles from near the Canadian border south to the mouth of the Ohio River. From east to west it reaches about 500 miles across the Midwest, extending from Indiana to South Dakota. It covers parts of eight states, an area of almost 121 million acres. It includes that part of the United States that is drained by the Mississippi River above its junction with the Ohio River at Cairo, Ill., but the region does not include that portion drained by the Mississippi's major tributary, the Missouri River. The Missouri is the longest river in North America and drains an area about three times the size of the area drained by the Upper Mississippi River. Because of the size of its drainage area, the Missouri and its tributaries are considered a separate river region.

Environmental Setting and Natural Resources

The region is filled with beautiful and bountiful natural resources and contains some of the richest agricultural land on the continent. The north and south is mainly forest land; grasses are predominant in the east and west; and the central portion has an intermingling of grasses and forests. About three million acres of the area is covered by freshwater lakes and streams and by the Mississippi River itself. More than two-thirds of the basin is productive land suitable for agriculture. Mines, quarries and oil wells are found in some areas.

About 28 percent of the region is water, forest land and other lands with great recreational potential. Federal, state, county and local parks and recreational areas are abundant throughout the region, accommodating our highly mobile society. Twelve national wildlife refuges are found in the region.

Water and Land Resources

The Upper Mississippi River Region is one of the foremost regions in the world in both the quality and the quantity of water and land resources. Water and related land resources in the basin are diverse. Land and water resources management programs have been designed to maintain the productivity of these resources and to raise these levels in order to meet future requirements.

Land Resources

More than two-thirds of the 118 million acres of land in the Upper Mississippi River Region is used for agricultural production. Nonagricultural land use is primarily dictated by location. Urban and suburban areas have developed where population concentrations exist. Industry has located where natural resources and labor forces are most prevalent. Recreational developments exist whenever suitable and accessible.

Urban areas are expanding at a rate of 80,000 acres each year, generally spreading out over adjacent farmland. Highways and recreational needs are also changing land-use patterns rapidly. It becomes increasingly urgent to protect and conserve the land resources that we may need to use more intensively in the future.

About 80 million acres of the basin are susceptible to various types of damage that can be prevented by improved land management practices. About nine million acres are subject to flooding; another 25 million acres are being depleted by water and wind erosion. About 20 million acres have inadequate drainage. Improved flood protection, conservation and proper management could increase the productivity of these lands, enhance recreational values and safeguard our valuable resources.

Water Resources

Water is an element indispensable to life. Not only does it sustain life, it can also be made to produce power, provide an economical means of transportation and contribute to man's recreational enjoyment. Currently, surface water and ground water in the Upper Mississippi River region are sufficient for rural, municipal and industrial water supply needs. There are many times, however, in some areas, when water supply is marginal, and there are many locations where the quality of the water is poor. Sewage disposal is a problem in many communities. Sewage is discharged, treated or untreated, into lakes and streams from homes, industries and commercial sources and as a result of other urban and rural activities. Other forms of pollution also damage the natural water resources of the basin. Acid drainage, nutrient problems, thermal pollution, bacteriological pollution, oil pollution and sediment problems all impact on the quality of water. About two-thirds of the people in the Upper Mississippi region are supplied from surface water sources subject to some or all of these types of contamination.

Increasing demands for water use, accompanied by the realization that the supply is not inexhaustible, have resulted in an awareness of the need for its control and conservation. Federal and state agencies have been assigned responsibility to enhance the quality and value of water resources and to establish and monitor a national policy for preventing, controlling and abating water pollution. Water quality standards have been set by each state in the region.

Aesthetics and Cultural Resources

There are many aesthetic and cultural areas in the region—national and state parks and forests, wilderness areas and wild and scenic areas are numerous. The region is also rich in heritage and has many points of historic significance.

Fish and Wildlife

The Upper Mississippi River region originally supported a wildlife population that included large portions of forest game. Settlement of the area and subsequent clearing of vast forests, along with the development of agriculture and

industrial land uses, have changed the composition of the wildlife population toward game species—deer, cottontail, doves—that can coexist with man and his activities. Some fur-bearing animals are still plentiful, and numerous waterfowl are prominent in the region's wetlands and lakes.

The many natural lakes and streams provide excellent habitat for game fish. The Mississippi River itself provides thousands of acres of fish habitat and offers excellent fishing opportunities.

Recreational Resources

Recreational use of the region's resources has increased substantially in recent years, and at least one-fourth of the demand for outdoor recreation facilities in the region is for water-related activities. Nearly all accessible waters have experienced increasingly heavy use.

Enthusiasm for boating, camping, hiking, fishing and picnicking is great and creates a substantial impact on the available resources. There is a wide variety of recreational development in the region. Recreation has become a major industry—especially in the natural lakes portions of the region in northern Wisconsin and Minnesota. The area created by the navigation system on the Upper Mississippi River also attracts the attention of millions during their leisure hours. The many historic sites dispersed throughout the region provide still another attraction for many visitors each year.

Human Resources and Economy

The population of the Upper Mississippi River region has grown rapidly in the two centuries since its settlement and is expected to continue this trend. Most of the people within the region are historically linked to the traditional pursuits of rural farmers, rural communities and rural social life. The growth of cities and their influence have urbanized much of the area.

Major population centers of the region are Chicago, St. Louis, Minneapolis-St. Paul and the Quad Cities. There are also many thriving smaller cities in the region, reflecting our society's trend to urbanization.

Manufacturing, trade and service industries employ more than half of the work force. The mineral industry of the region is an important economic factor of both the region and the nation. Commodities of national significance are bituminous coal, iron ore, lead and zinc. Commodities of great importance to the region are sand, gravel and stone.

Per capita income in the region is above the national average. This is at least partially the result of the land and water resources of the area, its mineral resources and its central location in the nation and in the continent.

Navigation

The Upper Mississippi River region navigation system consists of about 1,250 miles of navigable streams and plays a major role in the movement of bulk commodities from within the region to the nation's manufacturing centers. The Mississippi River and the Illinois River are the major navigation arteries. Demands for commercial navigation facilities may result in the region's waterways being expanded to include additional rivers in the region. The continuing trend to larger and more efficient tows will require continuing improvement of the waterways' ability to handle growing traffic. Increased recreational demands will require providing harboring facilities for small craft and separating commercial and recreational traffic.

Mississippi River and its Valley

Distinctively beautiful, the Mississippi River and its valley have a full and interesting history. Its striking beauty was noticed and remarked upon by the earliest explorers and trappers.

The character of the Mississippi River and its valley changes several times as the river winds its restless journey of almost 2,350 miles south to the Gulf of Mexico. From its beginning at Minnesota's Lake Itasca, the "Father of Waters" meanders north to Lake Bemidji, along a lazy, winding course for about 80 miles. Downstream from Lake Bemidji, for 100 miles it runs east, stringing together a chain of azure lakes. It flows through swamps, lakes and second growth of pine forests, down small rapids and between rising banks on its journey to the Falls of St. Anthony at Minneapolis. Passing diagonally through the business district of Minneapolis for four miles, it forms the boundary between the Twin Cities. From the Twin Cities, the Minnesota River winds through an 865-mile stretch of high bluffs, rolling hills and wild wetlands, passing neat prairie farms and more than 500 forested islands. On its journey, it is joined near Prescott, Wis., by the St. Croix River. For the next 137 miles the Mississippi River forms the Minnesota-Wisconsin state line. It continues southward, and near Genoa, Wis., becomes the state line dividing Iowa and Wisconsin. The Wisconsin River flows into the Mississippi River in this stretch.

The Mississippi River forms the entire 312-mile eastern boundary of the state of Iowa and the entire western boundary of the state of Illinois. Along this reach, major Illinois tributaries and several Iowa tributaries flow into the Mississippi River. The Rock River flows into the Mississippi River immediately below Rock Island, Ill. Further downstream, the Illinois River—the largest tributary of the Mississippi River above the mouth of the Missouri River—flows into the Mississippi near Grafton, Ill. Still further south, below East St. Louis, the Kaskaskia and the Big Muddy rivers join in. Iowa tributaries include the Turkey, Maquoketa, Wapsipinicon, Iowa, Cedar, Skunk and the Des Moines rivers. The Turkey flows into the Mississippi near the northern part of the state at Guttenberg, Iowa; the Des Moines flows into the Mississippi at the southern end south of Keokuk, Iowa. The others join the Mississippi at random intervals and over the reach draining the eastern two-thirds of the state of Iowa. Tributaries draining the sections of the state of Missouri that are included in the Upper Mississippi River region are the Fox, Wyaconda and the Fabius rivers.

The Upper Mississippi River region ends at Cairo, Ill., but the mighty Mississippi itself continues southward passing through or past five more states on its journey to the Gulf of Mexico.

Corps of Engineers' Projects and Studies

Upper Mississippi River Resource Management Study (GREAT)

Special Study Completed

(St. Paul, Rock Island and St. Louis districts)

In the early 1970s, the Corps of Engineers completed an Environmental Impact Statement (EIS) that described the effects of the operation and maintenance program for the nine-foot channel project on the Upper Mississippi River. The EIS concluded that sediment from uplands and streambanks, as well as localized disposal of dredged material, was filling in the river's biologically productive backwaters, marshes and sloughs.

In response, the Corps of Engineers and the U.S. Fish and Wildlife Service established the Great River Environmental Action Teams, with the acronym "GREAT," under the sponsorship of the Upper Mississippi River Basin Commission. The Upper Mississippi River Basin Commission was composed of the state and federal agencies that had a legislated interest or mission affecting the Upper Mississippi River. The Corps of Engineers, with its many activities on the river, was a member of the commission and the lead agency in the studies.

GREAT I covered the river areas in the St. Paul District from the head of navigation through Lock and Dam No. 10 at Guttenberg, Iowa; GREAT II, covered the river areas in the Rock Island District incorporating the reach of the river from Guttenberg to Lock and Dam No. 22 at Sauerton, Mo.; and GREAT III, covered those river areas in the St. Louis District from Lock and Dam No. 22 to Cairo, Ill. The studies investigated various areas of river management, but concentrated on the Corps of Engineers' channel maintenance program, particularly the dredging and disposal of dredged sand from the river. The St. Paul and Rock Island districts later completed reports describing how they will implement the appropriate recommendations from GREAT I and GREAT II. These reports were reviewed and approved by the Board of Engineers for Rivers and Harbors on March 9, 1982. The GREAT III report was subsequently completed by the St. Louis District.

Implementation of GREAT I recommendations is coordinated through the St. Paul District's Intragency River Resources Forum. Implementation of GREAT II recommendations is coordinated through the Rock Island District's Interagency River Resources Coordination Team.

Implementation of GREAT-recommended actions is essential to the environmental preservation of the Upper Mississippi River and to the long-range operation and maintenance of the nine-foot navigation project.

The Rock Island District is undertaking the development of a Dredged Material Management Program (DMMP) as a continuation of the GREAT II process. The purpose of the DMMP's are to identify and prepare site plans for the least costly, environmentally acceptable, and operationally feasible dredged material placement sites on the Mississippi River. Dredged material placement sites are chosen and evaluated for the chronic dredge cuts that need to be dredged three times in 10 years or twice in five years. Four have been completed and nine plans are underway.

Partners For Environmental Progress (PEP) Program

(Rock Island District)

House Report No. 101-536, which accompanies the Energy and Water Development Appropriations Bill for fiscal year 1991 (Public Law 101-514) provides the congressional intent for the Corps of Engineers to conduct jointly-financed market feasibility studies in a partnership with state and local governments.

This new program initiative was designed to assist small and disadvantaged communities that do not have the capabilities or resources to construct a particular environmental infrastructure. The Corps of Engineers conducts Market Feasibility Studies (MFS) aimed at helping communities assess their environmental infrastructure needs, determine if privatization is feasible, and arrive at a partnership arrangement. The MFS is 50/50 cost-shared between the federal and non-federal partners. The non-federal share is in the form of in-kind services only.

Four Corps of Engineer districts in North Central Division (Buffalo, Chicago, Rock Island and St. Paul) received funding for MFS studies in fiscal year 1993.

Upper Mississippi-Illinois Navigation Study

Navigation Study

(St. Paul, Rock Island and St. Louis districts)

The U.S. Army Corps of Engineers employs a three-component management approach for navigation. The components include Operation and Maintenance, Major Rehabilitation, and Navigation Planning. The third component focuses on future capital investment planning and is the basis for a system feasibility study the U.S. Army Corps of Engineers is conducting.

The Upper Mississippi River and Illinois Waterway navigation systems provide critical transportation services to many users from the Nation's heartland. The Upper Mississippi River - Illinois Waterway System Navigation Study area includes the Upper Mississippi River from the confluence of the Ohio River northward to the head of navigation (Minneapolis-St. Paul, Minn.) and the Illinois River from its confluence with the Mississippi River at Grafton, Ill., to Lake Michigan in Chicago, Ill. In 1992, the system between Minneapolis and the mouth of the Ohio River transported approximately 170 million tons of commodities (Waterborne Commerce statistics). Coal, fertilizers, chemicals, and equipment are generally shipped northward for use in farm belt states and urban areas, and grain is shipped southward

through the port of New Orleans. Nearly 70 percent of this country's grain exports come from this navigation system, contributing significantly to our nation's balance of payments and overall economy.

A combination of continued increases in tonnage shipped, small lock size (110 feet x 600 feet), and barge configurations requiring double-locking has resulted in longer delays and higher costs for shippers. These problems prompted the initiation in 1989 of an investigation into the feasibility of making capital improvements to the navigation system under the authority of Section 216 of the Flood Control Act of 1970 (Public Law 91-611). Reconnaissance Reports for the Illinois Waterway and the Upper Mississippi River were completed in 1990 and 1992, respectively. In October 1991, the Chief of Engineers recommended that the St. Paul, Rock Island, and St. Louis Districts, with oversight provided by North Central and Lower Mississippi Valley Divisions, outline the scope and schedule to perform a detailed systemic feasibility study in order to complete the second step in the Corps' two-step planning process.

The Initial Project Management Plan for the feasibility phase of the study was completed in December 1992. The Initial Project Management Plan outlines a multi-disciplined approach to detailed investigations over a six-year time frame. Separate work groups have been formed from the three Corps districts to carry out the environmental impact studies, the evaluation of economic benefits, the engineering design and cost studies, and the public involvement activities. Committees have also been formed for these disciplines with membership from the Corps and other federal/state agencies to coordinate the scope, direction, and progress of the navigation study with the various interests on the river. Through the system-wide analyses, the Corps is identifying and prioritizing needs, quantifying costs and benefits, and evaluating impacts to the resources of the system. The Upper Mississippi River-Illinois Waterway System Navigation Study, estimated to cost $46 million over six years-9 months, will result in a report to Congress recommending authorization of improvements which are justified.

A toll-free number has been established to keep all interested parties informed about the study progress. To use the system, dial 1-800-872-8822. The system is interactive on touch-tone telephones and includes prerecorded messages in five mail categories: general information, economic information, engineering information, environmental information, and public involvement and meeting information. Callers using the system may record comments, ask questions, or ask to be added to the study's mailing list. Information will also be made available to the public via newsletters, public meetings/workshops, and the media.

Upper Mississippi River System Environmental Management Program

Special Project Underway

(North Central Division)

The Water Resources Development Act of 1986 (Public Law 99-662) authorized the Upper Mississippi River System - Environmental Management Program (EMP) "to ensure the coordinated development and enhancement of the Upper Mississippi River system," recognizing "that system as a nationally significant ecosystem and a nationally significant commercial navigation system." The area covered by the EMP includes the navigable portion of the Mississippi River and its tributaries upstream of its confluence with the Ohio River. The EMP has a number of elements specified in the authorizing legislation. They are: habitat rehabilitation and enhancement projects, long-term resource monitoring, recreation projects, a study of the economic impacts of recreational activities and navigation traffic monitoring.

Habitat Projects

Sedimentation is widely considered to be the most severe environmental problem on the river. Agriculture, residential and commercial development, and highway construction have contributed to excessive erosion and sedimentation. Sediment degrades habitat by destroying fish spawning areas, decreasing light penetration to aquatic plants and filling in shallow areas. Fine sediment accumulating in backwaters, low-flow areas and isolated side channels has already caused significant habitat loss.

The habitat project component consists of implementing fish and wildlife management measures that restore and preserve high value habitat areas. Each project typically involves use of one or more of the following techniques:

· Dredging to remove sediment from selected backwater and side channels to restore flow and/or provide deep water habitat.

· Levee construction to keep silt-laden water out of prime habitat areas or to control water levels. Water control structures and pump stations also may be included.

· Island construction to reduce the effect of wind, creating habitat for aquatic and terrestrial plants and animals.

Each project is closely monitored to refine techniques and to ensure optimal results. Analysis of each project helps in the design of similar projects in other areas of the river system.

A number of fisheries and waterfowl projects have been constructed along the Illinois portion of the Mississippi River including the following: Brown's Lake, Iowa; Monkey Chute, Mo.; Andalusia, Ill.; Big Timber, Iowa; Bay Island, Mo.; Clarksville Refuge, Mo.; Dresser Island, Mo.; and Pharrs Island, Mo.

Construction of the Lake Chautauqua, Ill.; Spring Lake, Ill.; Stump Lake, Ill.; Swan Lake, Ill.; Peoria Lake, Ill.; Potters Marsh, Ill.; and Cuivre Island, Mo. projects are underway. Additional projects along the Mississippi River are being designed at: Princeton Refuge, Iowa; Gardner Division, Ill.; Cottonwood Island, Mo.; Lake Odessa, Iowa; Batchtown Management Area, Ill.; and Calhoun Point, Ill. Along the Illinois Waterway, projects are being planned at Banner Marsh and Rice Lake.

Long-Term Resource Monitoring

Lack of scientific data about the river system has made it difficult for federal and state agencies to make coordinated decisions affecting the river for its various uses. While data

is available from many sources, the data have been collected with different or undocumented methods.

Monitoring the system and analyzing the results will help planners to understand the system's complex morphology, chemistry and biology.

The Long-Term Resource Monitoring Program (LTRMP) is being implemented by the U.S. Geological Survey, Division of Biological Resources, in cooperation with the five Upper Mississippi River System states (Illinois, Iowa, Minnesota, Missouri and Wisconsin), with guidance and overall program responsibility provided by the U.S. Army Corps of Engineers.

The Environmental Management Technical Center (EMTC), in Onalaska, Wis., is the U.S.G.S. facility that administers the long-term resource monitoring component of the Environmental Management Program. Six state-operated field stations have been established for data collection, research studies and assistance in habitat project evaluations. Scientific guidance is being provided by an international committee of scientists.

The Long-Term Resource Monitoring work is being carried out under four goals: Problem Analysis seeks an improved understanding of the ecosystem and its resource problems; Resource Monitoring tracks and evaluates long-term changes or trends in selected physical, chemical and biological components of the Upper Mississippi River System; Development of Management Alternatives assists the resource agencies in the development of management plans; and LTRM Information Management provides the expertise and technical support needed for proper management, distribution, and analysis, of LTRMP data and access to it.

Under the Problem Analysis goal, navigation, sediment-related problems, and water level regulation are the primary issues being addressed. Problem analysis research will provide decision makers with information on the major human-induced disturbances affecting the UMRS. Problem analysis included studies on the effects of navigation on aquatic vegetation and fishes; whether overwintering habitat is limiting populations of centrarachid fish; the importance of backwaters to the Upper Mississippi; and effects of invading species such as the Eurasian milfoils and the zebra mussel.

Under Resource monitoring goal, monitoring is focusing on selected pools and river reaches. It is carried out at six remote UMRS field stations through agreements with the state partners. Information is being collected on floodplain elevation, river discharge and elevation, water quality, aquatic and floodplain elevation, sediment distribution and transport, aquatic and floodplain habitat, selected macroinvertebrates, fish communities, and wildlife communities.

Under Development of Management Alternatives, the LTRMP has focused on such areas as optimizing the effects of water regulation on UMRS resources, determining the effects of locks and dams on the fishery, and determining the effects on island construction on the UMRS ecosystem. EMTC scientists are also engaging in development of pool scale resource management plans with river resource managers.

Under LTRM Information Management, the trend data collected are being made available to interested parties in a timely and usable format. The EMTC makes extensive use of the Internet.

Remote sensing and geographic information system (GIS) technology provide additional resource monitoring support through the Information Management. Land cover/land use, soils and geology and hydrography data have been collected and are available for use by LTRM participants. Information is continually being added to the data base from aerial photography and satellite imagery in accordance with standards and procedures developed at the EMTC. Protocols are under development to provide public use access to GIS data from remote locations as well as from the EMTC.

The Environmental Management Technical Center is used by river managers, biologists, academic personnel, other government agencies and the public. The EMTC has produced more than 170 reports covering research, quality control and results from the Trend Analysis, Ecological Problems and Information Support program elements. LTRM is also supporting Corps of Engineers missions, such as UMRS navigation studies and EMP habitat projects.

Recreation Projects

The Upper Mississippi River System is a popular site for recreation. Millions of people visit the river every year to participate in activities that depend on water—boating, swimming or simply enjoying the scenery.

The project authorization included recreation projects to make it easier for people to enjoy the river. Such projects could include: boat accesses, bank fishing and park improvements. At present, this program element is unfunded.

Study of the Economic Impacts of Recreation

Recreation is important to the economic well-being of many communities along the river. This study measured the economic importance of recreation-related expenditures to these communities. More specifically, the study produced estimates of the total number of recreation visitors (over 12 million visitor days annually), the activities they engage in, the amount of money they spend on recreation (the effects in the five UMR states is $550 million and in the nation $1.2 billion) and the patterns evident in their spending.

The surveys have been completed and the results are combined with a regional economic model which determined the overall impact of recreation on the regional economy. The study outputs—economic model and reports—have been documented in final reports that were published in fiscal year 1993.

Navigation Traffic Monitoring

During the first few years of the EMP, existing traffic data were integrated and analyzed. Further comprehensive analysis of the navigation needs of the Upper Mississippi River and the Illinois Waterway is being separately funded by the Corps of Engineers.

Traffic monitoring and analysis were initiated on the Upper Mississippi River Navigation System to help deter-

mine future navigation system problems and need. With the initiation of funding in fiscal year 1990 for navigation improvement reconnaissance studies for the Upper Mississippi River and Illinois Waterway, EMP funding of the Traffic Monitoring element was discontinued to avoid duplication of effort.

The Upper Mississippi River-Illinois Waterway Navigation System feasibility study was initiated in fiscal year 1993 and will provide the information that is necessary to assure balanced management of the river system. Growth in navigation traffic must be anticipated and considered with environmental and recreational objectives to protect the multi-use character of the river.

Management Responsibilities

In the Water Resources Development Act of 1986, Congress directed the U.S. Army Corps of Engineers to implement the EMP. The Corps must coordinate activities with the U.S. Department of the Interior, the Upper Mississippi River Basin Association and the states of Illinois, Iowa, Minnesota, Missouri and Wisconsin.

The North Central Division of the Corps directs the program. Three Corps of Engineers districts, St. Paul, Rock Island and St. Louis, manage, design and construct habitat projects within their boundaries.

The U.S. Fish and Wildlife Service of the Department of the Interior is conducting the long-term resource monitoring program. The U.S. Fish and Wildlife Service is working with federal and state agencies to implement the program and to collect and analyze data.

The Upper Mississippi River Basin Association serves as a clearinghouse for state involvement in the EMP.

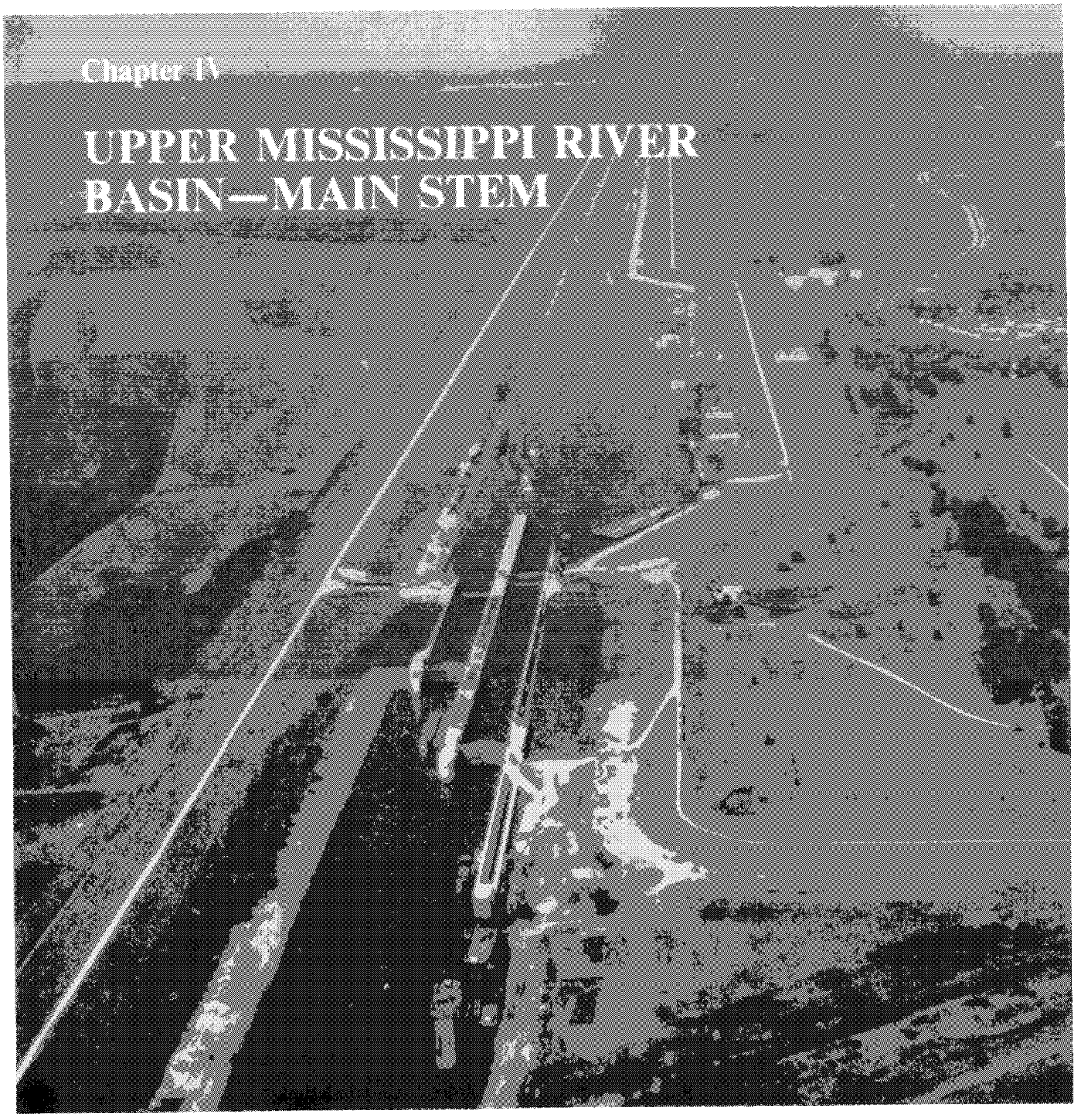
EMP Project Descriptions

Basin-wide, 14 habitat projects have been constructed. The projects are: Island 42, Minn.; Lake Onalaska, Wis.; Pool 8 Islands, Wis.; Blackhawk Park, Wis.; Guttenberg Ponds, Iowa; Bertom-McCartney Lake, Wis.; Browns Lake, Iowa; Bog Timber, Iowa; Andalusia Refuge, Ill.; Monkey Chute, Mo.; Bay Island, Mo.; Clarksville Refuge, Mo.; Pharrs Island, Mo.; and Dresser Island, Mo. Four habitat projects are under construction at various locations and nine projects are pending construction approval or construction contract award. Planning and design is ongoing at 21 other project sites. The Illinois projects included are Spring Lake, Potters Marsh, Banner Marsh, Gardner Division, Swan Lake, Stump Lake, Batchtown Management Area and Calhoun Point.

A fisheries and waterfowl project was completed in 1992 at Andalusia Refuge, Ill. The project site was a marginal wetland/shallow water habitat adjacent to Pool 16 of the Mississippi River that was rapidly converting to terrestrial habitat. The constructed features consisted of 8,600 feet of low-elevation levees, a pump station and water control structures; activities including dredging, island development and sediment diversion. The construction of these features has provided almost 130 acres of managed nesting, resting and feeding habitat for migratory birds and other wetland-dwelling species; fisheries access channels and wintering habitat.

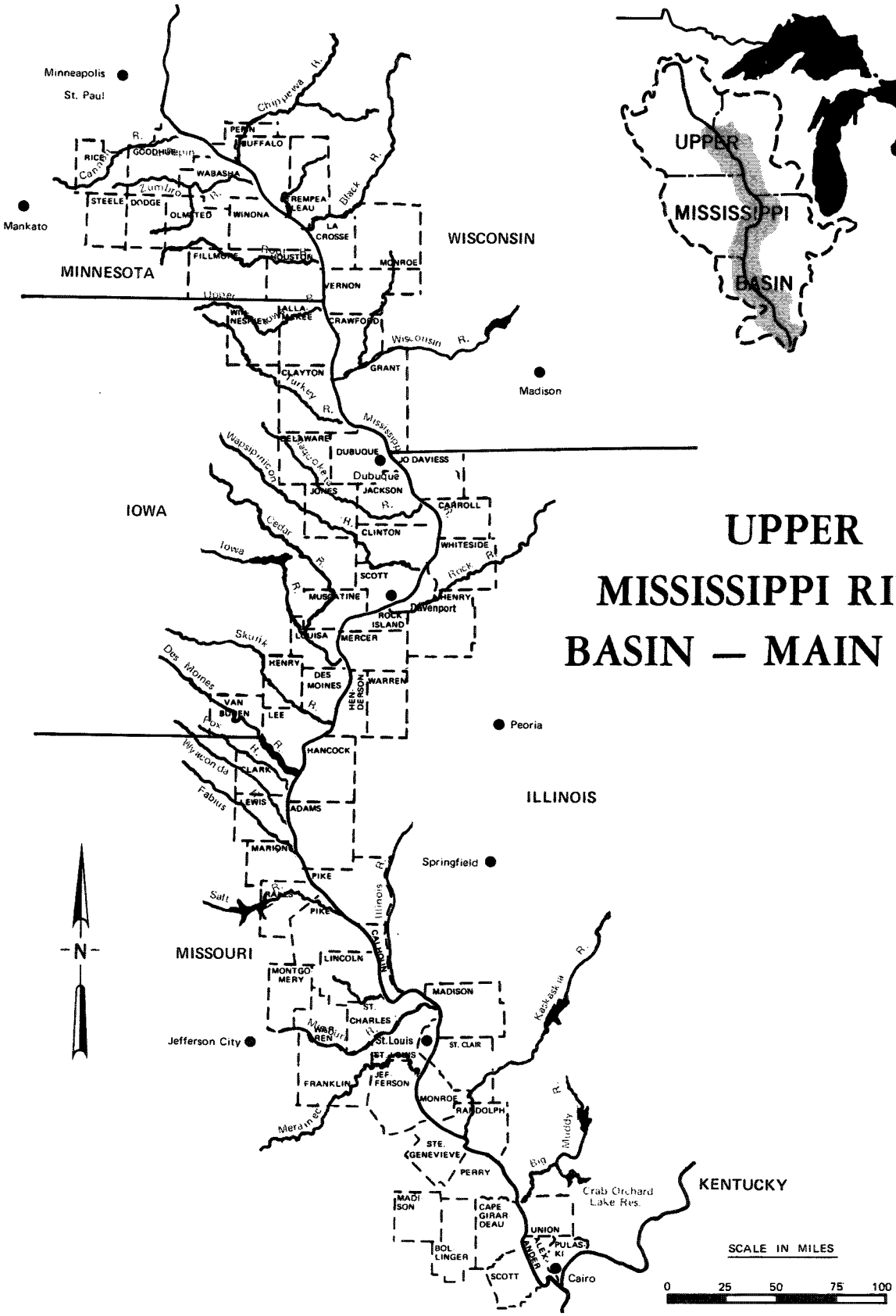
Construction was initiated in fiscal year 1992 at the Chautauqua Refuge project, located at Illinois River miles 124 to 129.5. The project will include water control features for water level management to promote improved plant growth, raising of existing levees to decrease sedimentation and extensive channel excavation that will increase aquatic habitat diversity.

Construction is also underway at Peoria Lake, Ill.; Potters Marsh, Ill.; Stump Lake, Ill.; Spring Lake, Ill.; Cuivre Island, Mo.; and Swan Lake, Ill.



Chapter IV

UPPER MISSISSIPPI RIVER BASIN—MAIN STEM



UPPER MISSISSIPPI RIVER BASIN — MAIN STEM

Upper Mississippi River Basin-Main Stem Description

The Mississippi River is one of the most commonly known geographic features of the world. This river, first called "Father of Waters" centuries ago, has played a prominent role in shaping our country's history. A pageant of history has occurred along the Mississippi. It first carried the canoes of the Indians and fur trappers; next, rafts and boats of the early homesteaders; and then logs during the booming logging era. Today, it serves as an economic and environmental lifeline for mid-America. The Mississippi River is a major carrier of goods of commerce and industry for the central part of our nation. Its most vital and important role in the domestic transportation system is the long distance movement of bulk commodities. More than 700 terminals are located along the Mississippi and its tributaries. Both the number of commercial tows and the volume of tonnage transported have increased rapidly since the entire nine-foot channel system became operational in 1940.

From north central Minnesota to St. Louis, Mo., the Mississippi winds about 1,250 miles, forming the borders between several states. Water from the Minnesota, St. Croix, Wisconsin, Rock, Turkey, Maquoketa, Wapsipinicon, Cedar, Iowa, Des Moines and the Illinois rivers, as well as smaller streams, flow into the Mississippi between Minneapolis and St. Louis. Just north of St. Louis, the mighty Missouri River flows into the Mississippi River. Still further south, at Cairo, Ill., the broad Ohio River pours in, and from there south, the Mississippi River becomes the brawling giant of legend, flowing nearly a thousand miles in great loops through its wide, fertile valley. The portion of the river from Cairo south is known as the Lower Mississippi River.

The Mississippi River and its valley are known for their striking beauty. Congress has recognized this through the establishment of the Upper Mississippi River Wildlife and Fish Refuge. The refuge follows the river from the mouth of the Chippewta to Clinton, Iowa. Throughout the woodlands, islands, marshes, natural lakes and streams is a variety of fish and wildlife. The Upper Mississippi River is a quality fishery resource, and fishing is excellent at many locations. Spectacular migration of birds is noted in the spring and fall. Even the Bald Eagle, our national symbol, winters in numbers in the refuge areas along the river. Furbearers and other mammals, plus about 40 smaller non-game species, are abundant.

The river and its resources offer splendid potential for public recreation. Each year millions of people visit the river to observe wildlife, to fish or hunt, to enjoy the pleasures of picnicking and boating, or simply to relax in the beauty and serenity of the environment. Interest in recreational boating has increased rapidly.

Corps of Engineers' Projects and Studies

Chain of Rocks Canal and Locks No. 27

Commercial Navigation Project Completed

(St. Louis District)

Chain of Rocks Canal was constructed to bypass a reach in the river where a rock shelf provided maintenance dredging which, in turn, provided sufficient depth under all flow conditions.

Authorized by the River and Harbor Act of March 2, 1945, the project consists of a lateral canal and two locks. The downstream end of the canal is located about four miles above Eads Bridge at St. Louis, and the upstream end reenters the Mississippi River about 14 miles above the bridge. The two locks, a 110-foot by 1,200-foot main lock and a 110-foot by 600-foot auxiliary lock, are located near the downstream exit of the canal. The canal has a bottom width of 300 feet. The project was opened to traffic in February 1953, although it was not completed until June 1956.

Construction of the project was reactivated in fiscal year 1967 to add upper and lower guide wall to expedite lockages and reduce accidents. This work was completed in 1977. Traffic passing through the locks during 1990 amounted to 85,374,000 tons. Tonnage in 1995 was 84,423,500 tons.

Lock No. 19, Mississippi River

Commercial Navigation Project Completed

(Rock Island District)

New Lock No. 19 is located on the Iowa shore at Keokuk. It is one of only two 1,200-foot long locks on the Upper Mississippi River. The new lock—110 feet wide by 1,200 feet long—was built to accommodate modern river traffic and replaces the old lock, which is 110 feet wide by 358 feet long.

The original lock, drydock and dam structures were built in the early 1900s by a private power company. The lock was integrated into the nine-foot channel system, but long delays were experienced because of the lock's small size and slow operation.

To accommodate modern river traffic, construction of the new lock was authorized by the River and Harbor Act of July 3, 1930, as amended. Construction was begun in November 1952, and the lock was placed in operation in

May 1957. Remaining items of work were completed in 1962. The total cost was $13,132,000.

Mississippi River Low-Water Dam, Chain of Rocks

Commercial Navigation Project Completed

(St. Louis District)

Located 4.7 miles below the mouth of the Missouri River, this low-water dam was constructed to provide a 9-foot channel depth over the lower miter sill at Melvin Price Lock and Dam during low flows.

Authorized by the River and Harbor Act of July 3, 1958, and completed in 1964, the dam is a rock filled structure, about 3,200 feet long with a 676-foot-long notched spillway section.

The dam was named runner-up in the Corps Distinguished Engineering Achievement Award competition in 1966. It is the only permanent rock-filled dam across a major river in the United States. The federal first cost was $4,353,000, plus $7,000 for navigation aids.

Old Lock No. 14, Mississippi River

Commercial Navigation Project Completed

(Rock Island District)

This lock is located on the Mississippi River at Le Claire, Iowa, and was constructed in 1922 as part of the six-foot channel project. After construction of a newer and larger lock in 1939, the old lock was considered an auxiliary lock and was only used by Corps boats to access the Rock Island District's service and maintenance area. In 1969, it was returned to operation for pleasure craft use on weekends and holidays from Memorial Day until the first weekend in October.

The old lock was badly in need of repair. Structural and mechanical failures were common and emergency repairs were needed to keep the lock in operation.

Rehabilitation work included replacing the miter gates and the miter gate operating machinery, replacing gate valves and operating machinery, electrical rewiring, resurfacing concrete walls and providing a new control house.

The rehabilitation was begun in 1978 and completed in 1981, in time for the recreational boating season. The federal cost was $7,415,000. There was no nonfederal cost.

Old Lock No. 19, Mississippi River

Commercial Navigation Project Completed

(Rock Island District)

The project is located on the right bank of the Mississippi River at Keokuk, Iowa. Rehabilitation provided for permanent closure of Old Lock No. 19 and drydock by placement of a cellular sheetpile wall across the upstream end of the river closure, from the power company property to the riverwall of the new lock.

The old lock and drydock were completed in 1912 with nonfederal funding. A new 1,200-foot lock was constructed adjacent to the old lock in 1957. The old lock and drydock structures are in an advanced state of deterioration and do not meet Corps stability criteria.

Lock 19 has a lift of 39 feet, and impounds Pool 19, which is used for generation of commercial power.

Collapse of either the old lock or drydock could result in cessation of navigation on the Upper Mississippi River, as well as a loss of generating capacity by the Union Electric Company.

Construction on the project began in 1978 and was completed in the fall of 1979 at a cost of $5,150,000.

Sny Island Levee Drainage District, Mississippi River (Rectification of Seepage Damages)

Commercial Navigation Project Completed

(Rock Island District)

In the 1930s, Congress directed the Corps to study the seepage effects Mississippi River navigation pools have on levee and drainage districts.

In the 1950s all districts found to be affected, except the Sny Island Levee Drainage District, were compensated. At that time, the Sny Basin flood control project was newly authorized. Study of the effects on the Sny was therefore deferred until after completion of the project.

Following completion of the Sny project, local interest indicated that seepage remained a problem. A study was completed in 1974 and the Rectification of Damages Project reactivated for the Sny District. The study concluded that the navigation project has an insignificant effect on the district and found no federal obligation. The study did, however, determine that a small section of privately owned land immediately upstream of and adjacent to Lock and Dam 22 was adversely affected. In December 1982 the federal government paid $2,146,800 in compensation.

Mississippi River between the Missouri River and Minneapolis (Melvin Price Locks and Dam)

Commercial Navigation Project Underway

(St. Louis District)

Replacement of Locks and Dam No. 26 with the new Melvin Price Lock and Dam is a key unit of the inland waterways navigation system. Public Law 95-502, enacted in 1978, authorized construction of single 1,200-foot replacement lock and dam. A second lock 600 feet in length was authorized by Public Law 99-98 in 1985 and Public Law 99-662 in 1986.

The project is located on the Mississippi River, 200.8 miles upstream from the Ohio River, and about two miles downstream from the site of old Locks and Dam No. 26. The project includes one 1,200-foot main lock, one 600-foot

auxiliary lock, a dam with nine gates and an overflow dike; removal of Locks and Dam No. 26 and a railroad bridge. Construction began in late 1979. The 1,200-foot lock was placed in operation in February 1990. The second lock was completed in 1994.

The project, including two locks, is estimated to cost $960 million, based on October 1993 price levels. The total project is scheduled for completion in 2004 when cost-shared recreation in Alton, Ill. is completed.

Mississippi River between the Missouri River and Minneapolis, Nine-Foot Channel Project

Commercial Navigation Project Underway

(St. Louis, Rock Island and St. Paul districts)

The Mississippi River between the Missouri River and Minneapolis, Minn., has been improved for navigation by a system of locks and dams at 28 locations. These locks and dams have changed the river into a series of "steps," which river tows and other boats either "climb" or "descend" as they travel upstream or downstream.

The lowermost dam in the Nine-Foot Project, No. 26, is located at Alton, Ill., just above the mouth of the Missouri River; the uppermost dam, St. Anthony Falls, at Minneapolis, Minn., is 853.75 miles above the Ohio River.

Another dam, No. 27, is located just below the mouth of the Missouri River at Granite City, Ill. This dam, Chain of Rocks Canal and Locks No. 27, completes the series of locks and dams on the Upper Mississippi. It was completed under a separate authorization.

The dams are spaced at irregular intervals varying from 9.6 miles to 46.3 miles, with the average length of pools being 25 miles. The lift of the locks varies from 5.5 feet to 49.2 feet, with an average lift of 12.9 feet.

At most of the sites, a main lock 110 feet by 600 feet has been constructed, together with the upper gate bay of an auxiliary lock 110 feet by 360 feet, to be completed when required by traffic. Exceptions are as follows:

- St. Anthony Falls Upper Lock—single lock 56 feet by 400 feet
- St Anthony Falls Lower lock—single lock 56 feet by 400 feet and upper gate bay of an auxiliary lock
- Locks No. 1—twin locks 56 feet by 400 feet
- Locks No. 2—old lock, 110 feet by 500 feet; new lock 110 feet by 600 feet
- Locks No. 14—single lock, 110 feet by 600 feet; old Le Claire Canal lock, 80 feet by 320 feet
- Locks No. 15—main lock 110 feet by 600 feet; auxiliary lock, 110 feet by 360 feet
- Lock No. 19—single lock, 110 feet by 1,200 feet
- New Locks No. 26—main lock, 110 feet by 1,200 feet; auxiliary lock, 110 feet by 600 feet
- Lock No. 27—main lock 100 feet by 1,200 feet; auxiliary lock 110 feet by 600 feet

Authorized in the River and Harbor Act of July 3, 1930, the Upper Mississippi River Nine-Foot Channel Project, with the exception of the upper 4.6 miles (St. Anthony Falls Extension), has been in operation since 1940. The latter was placed in operation on Sept. 21, 1963. Improvements to the navigation channel near Rock Island, Ill., were made from 1967 through 1971 and 1986 through 1989. Sharp rock ledges and displaced rock on the channel bottom, which created hazards to navigation, were removed to widen and deepen, and in some places, realign the channel.

Federal expenditures for new work to Sept. 30, 1994, were $1,119,281,064 (including costs from inception). The cost of operation and maintenance in fiscal year 1994 was $90,511,256.

Commercial Traffic

River traffic has increased rapidly since completion of the principal features of the project. Commercial navigation traffic on the Nine-Foot Channel Project increased from 2,410,000 tons in 1939 to 72,158,000 tons in 1993. Principal commodities transported are grain, petroleum products and coal, although in recent years tonnage has become more diversified with substantial quantities of iron and steel, chemicals, and other products being moved. See the following table.

Commodity Breakdown, Mississippi River Above Mouth of Missouri River 1993*

Commodity	Short Tons (000's)
Farm and Food Products	39,111
Coal	8,371
Chemicals and Related Products	7,435
Petroleum Products	6,389
Sand and Gravel (includes clay)	3,347
Non-metallic Minerals	2,382
Cement, Lime, and Concrete	1,578
Primary Iron and Steel Products	1,500
Iron Ore and Scrap	964
Primary Non-ferrous	374
Non-ferrous Ores	294
Slag	211
Forest and Paper Products	119
Other	83
Total	72,158

***1993 was a record flood year; therefore, tonnages for that year were lower than normal (1992 was 86,187,000)**

Recreational Resources

The Upper Mississippi Nine-Foot Channel Project was originally constructed with a single purpose in mind—to provide sufficient water depth for river traffic during low flows in the river. The project, however, has also produced additional benefits.

The navigation project has improved the desirability of the Upper Mississippi River for practically all types of outdoor recreation by providing more stable water levels where formerly the river fluctuated substantially with every change in flow.

Throughout the year, the locks and dams now provide a series of slack-water pools which annually attract thousands of persons who fish, swim, boat, hunt or picnic. Recreational activity continues to increase with each passing season.

Resource Management

The management plan for the Upper Mississippi River pools considers the wild character of the river bottom lands and the desirability of preserving their wildlife resources. Most of the lands acquired for the navigation project have been made available for concurrent administration by the Fish and Wildlife Service for waterfowl management. The lands acquired by the federal government for construction of the Nine-Foot Channel Project are managed to serve the general public, and many recreational opportunities are available as the result of the present navigation system.

Generally, except for areas that are posted as waterfowl sanctuaries, these lands may be used for wilderness camping and other recreational activities. All other Corps lands not zoned for specific purposes are also open to the public.

Public Use Facilities

The Corps of Engineers operates many public use areas along the Upper Mississippi River Nine-Foot Channel Project. These range in size from one acre to 75 acres. The degree of development varies from day use areas with boat launching, picnicking and parking facilities to areas developed with camping facilities. In addition, there are a number of public-use areas on Corps land which have been developed and are operated by other agencies.

Locks and dams of the project attract many sightseers. Visitors are always welcome at the locks and dams. Observation platforms have been provided at many of the locks so that visitors may have a better, and safer, view of the lock operations.

Public use facilities are provided by the Corps of Engineers along the channel project. Detailed information on specific public use areas may be obtained by contacting the district engineers at St. Paul, Rock Island and St. Louis. District office addresses are found in the foreword of this book.

Navigation charts, on sale in some Corps district offices and at some boat docks and marinas, show federally-owned lands under the jurisdiction of the Corps of Engineers and the Fish and Wildlife Service, the road network leading to the river, river access points, facilities available at these points and commercial recreational development on both privately owned and public lands.

Mississippi River Nine-Foot Channel Project Open River Reach Regulating Works

Commercial Navigation Project Underway

(St. Louis District)

Maintenance of the middle Mississippi River navigation channel, between the mouths of the Ohio and Missouri rivers, is authorized by various River and Harbor Acts, the latest, those of January 21, 1927, and July 3, 1930.

These acts provide the authority for maintaining a minimum channel depth of 9 feet and a minimum width at low water of 300 feet, with greater widths authorized in the river bends. They also authorize a 200-foot-wide channel (with greater widths allowed in the bends) above St. Louis, extending to the mouth of the Missouri River.

In contrast to the navigation pools in the Upper Mississippi River, most of the middle Mississippi channel is maintained by "open river" techniques using stone dikes, bank revetment, and dredging, where necessary. By careful selection of dike locations and improved dike design, progress has been made in minimizing costly dredging. In conjunction with Illinois and Missouri conservation interests, alternative dike designs are also being considered to maintain and improve the fish habitat.

The total estimated cost of the regulating works project as of October 1994 is $214,000,000. This project is presently scheduled for completion in March 2000. The floods of 1993 and 1995, with budget balancing, new innovative technology, and environmental compliance resulted in schedule changes for the completion of this project.

St. Louis Harbor and Vicinity, Missouri and Illinois

Commercial Navigation Project, Authorized Project Not Underway

(St. Louis District)

The September 1982 feasibility report recommended model testing and the construction of a sediment control structure at the city of St. Louis Municipal Dock and the construction of a harbor along a portion of the Chain of Rocks Canal in Illinois. The project proposed was authorized by the Water Resources Development Act of 1986. However, the project was not funded between 1987 and 1990 because of its low priority. Funds were received in 1991, and a letter report prepared in January 1992 describes a revised sediment control structure for the St. Louis Municipal Dock and a tentative new configuration of the harbor along the Chain of Rocks Canal in Illinois. Additional studies are ongoing.

Andalusia Small-Boat Harbor, Mississippi River

Recreational Navigation Project Completed

(Rock Island District)

This harbor was one of several authorized by the River and Harbor Act of 1962. Constructed during 1965 and 1966, it has a capacity of 110 small craft.

Project work included constructing two protective dikes and a maneuvering channel 40 feet wide, 5 feet deep and 435 feet long. The federal cost of the project was $21,000 and the nonfederal contribution was $2,800.

Bay Island at Quincy, Mississippi River

Section 107, Recreational Navigation Project Completed

(Rock Island District)

Construction of an access channel across Bay Island at Quincy was authorized by Section 107 of the River and Harbor Act of 1969 as amended.

Constructed in 1969, the channel extends across Bay Island between the Mississippi River and Quincy Bay. The federal cost of the project was about $35,000.

Moline Small-Boat Harbor, Mississippi River

Recreational Navigation Project Completed

(Rock Island District)

This harbor was authorized by the River and Harbor Act of 1962. The project included constructing a rock-fill breakwater to provide a harbor 214 feet wide and 687 feet long.

The harbor was built in 1971 at a federal cost of $110,328, plus a nonfederal contribution of about $96,000. It has a capacity of 208 craft.

Quincy Small-Boat Harbor, Mississippi River

Recreational Navigation Project Completed

(Rock Island District)

The River and Harbor Act of 1962 authorized this project in Quincy Bay. Berthing facilities provided by local interests accommodate about 1,200 small craft.

The project consists of providing periodic maintenance, as required, to a natural channel of the Mississippi that is generally about 9,000 feet long, 300 feet wide and 5 feet deep (the channel is, however, reduced to a 200-foot width for about 900 feet in an area known as the "Narrows").

Rock Island Small-Boat Harbor, Mississippi River

Recreational Navigation Project Completed

(Rock Island District)

This harbor was constructed downstream of Rock Island at Lake Potter on the left bank of the Mississippi River.

Completed in 1956 under Public Law 516-81-2 at a cost of $31,000, construction included widening and deepening the entrance channel of the lake to a width of 100 feet and a depth of 6 feet. Dredged material was used to form a 3,050-foot-long levee around the major portion of the harbor area to provide protection against a 10-year flood. Local interests provided access roads, a boathouse, parking areas and service and supply facilities.

Squaw Chute at Quincy, Mississippi River

Recreational Navigation Project Completed

(Rock Island District)

When the small-boat harbor at Quincy Bay, Quincy, Ill., became excessively crowded, local interests requested assistance from the federal government under Section 107 of the River and Harbor Act of 1960, as amended. In July 1964, the Chief of Engineers authorized development of a small-boat harbor in adjoining Squaw Chute.

Work at Squaw Chute included dredging a 1,000-foot-long, 140-foot-wide maneuvering channel and constructing a breakwater to provide a harbor for 200 small craft. Construction of the harbor was completed in 1966 at a federal cost of $67,800. The nonfederal contribution was $27,000.

Warsaw Small-Boat Harbor, Mississippi River

Recreational Navigation Project Completed

(Rock Island District)

The River and Harbor Act of 1962 authorized construction of a small-boat harbor in Warsaw, Ill.

A breakwater, a short entrance channel, and a maneuvering channel (600 feet long, 50 feet wide, and 5 feet deep) were constructed. Completed in 1966 under the authorization of the River and Harbor Act of 1962, the federal construction cost was $73,000, and the nonfederal contribution was $13,500.

Although the harbor was designed to accommodate 120 small craft, it has not been used for several years because of sedimentation. Local interests are modifying the project to reduce the sedimentation and reopen the harbor.

New Boston Small-Boat Harbor, Mississippi River

Recreational Navigation Project, Authorized Project Not Underway

(Rock Island District)

Authorized by the River and Harbor Act of 1962, this project, if built, would consist of an approach channel 600 feet long, 70 feet wide, and 5 feet deep. The capacity of the harbor would be 100 craft. Lacking necessary local financial support, this project has been deauthorized.

Savanna Small-Boat Harbor, Mississippi River

Recreational Navigation Project, Authorized Project Not Underway

(Rock Island District)

This project was among those authorized by the River and Harbor Act of 1962. Plans include constructing a breakwater, a maneuvering channel, and providing an entrance channel 100 feet wide and 5 feet deep. The project would provide mooring for 370 small boats.

Although the project was classified as "deferred" for quite some time, interest revived, and it was reclassified as "active" in 1976. Planning on the project has been completed. Lacking local interest, the project has been reclassified as inactive.

Bay Island Drainage and Levee District No. 1, Mississippi River

Flood Control Project Completed

(Rock Island District)

Bay Island Drainage and Levee District No. 1 is located on the left bank of the Mississippi River, north of New Boston, Ill. It was organized as a private district in 1906 and protects some 18,350 acres.

Local interest constructed the district's original levees—slightly more than 12 miles of main river levee and eight miles of flank levees. From 1922 to 1933 the federal government improved 19.1 miles of levee under the Flood Control Acts of March 1, 1917, and May 15, 1928. Since 1934, the levees have prevented an estimated $47,081,200 in damage.

Chouteau, Nameoki and Venice Drainage and Levee District, Mississippi River

Flood Control Project Completed

(St. Louis District)

Levee improvements constructed by the St. Louis District protect about 4,800 acres within the Chouteau, Nameoki and Venice Drainage and Levee District. Bounded on the north by Cahokia diversion channel, on the east and southeast by the East Side Levee and Sanitary District and on the west by the east levee of the Chain of Rocks Canal, the district is located in Madison County, Ill.

The Flood Control Act of June 22, 1936, authorized a project to raise and enlarge the district's levee system. But with construction of the Chain of Rocks Canal, that project was modified and most of the district is protected by the Chain of Rocks Canal levee.

Completed in 1955, the project cost $196,000, including $10,000 contributed by local interests. As of September 1993, the project has prevented damages estimated at $406,340.

Clear Creek Drainage and Levee District, Mississippi River

Flood Control Project Completed

(St. Louis District)

Construction of levee improvements to protect 18,000 acres within Clear Creek Drainage and Levee District was authorized by the Flood Control Act of June 22, 1936. The district is located within Union and Alexander counties, north of McClure, Ill.

Performed under the authorization were raising and enlarging the existing levee system by reconstructing 10.9 miles of river front levee and 10.1 miles of back levee. Drainage structures and seepage control measures were also constructed, along with a service road on the levee crown.

Completed, except for the seepage control measures, the project cost $4,985,000 in federal funds and $224,000 in nonfederal expense.

In itself this project would not provide complete flood protection for the Clear Creek district. But the combination of this project and the projects for the East Cape Girardeau and Clear Creek Drainage District, North Alexander Levee and Drainage District, Miller Pond Drainage District and Preston Drainage and Levee District has prevented damages estimated at $63,440,000 through September 1993.

Columbia Drainage and Levee District No. 3, Mississippi River

Flood Control Project Completed

(St. Louis District)

This flood control project protects 14,000 acres of bottomland in Monroe County, Ill.

Authorized by the Flood Control Act of June 22, 1936, the project consisted of raising and enlarging the levee system by reconstructing 10.4 miles of river-front levee and 9.7 miles of flank levee, constructing related structures and surfacing access roads on the levee crown.

The project was completed in 1959 at a federal cost of $2,821,000 and a local cost of $235,000. It has prevented $28,271,000 in flood damage through September 1993.

Additional flood control improvements were constructed under the authorization of the Flood Control Act of 1962. The improvements included constructing pumping stations and appurtenant approach channels adjacent to the outlets of the Long Slash and Franey Lake ditches and constructing a 1,300-foot diversion ditch from Shehan Lake Ditch to Dogwood Slough and a 1,200-foot ditch to Long Slash. These improvements were completed at a federal cost of $2,818,000 and a nonfederal cost of $194,000.

Degognia and Fountain Bluff Levee and Drainage District, Mississippi River

Flood Control Project Completed

(St. Louis District)

Levee improvements constructed under authority of the Flood Control Act of June 22, 1936, protect 36,200 acres within Degognia and Fountain Bluff Levee and Drainage District located within Jackson County, Ill.

Performed under the authorization was the raising, enlarging and extending of the levee system by reconstruction of 8.7 miles of river front levee and 0.9 miles of upper flank levee along Degognia Creek. The project also included construction of 6.1 miles of river front levee and 3.7 miles of back levee along the Big Muddy River, appurtenant structures for highways and railroad, other structures for drainage by gravity, remedial measures for control of underseepage and road surfacing on the levee crown.

Completed in 1959, the project cost $6,022,000, including $147,000 in expense to local interests. As of September 1993, the project has prevented an estimated $68,212,000 in damage.

A combination of projects for this district and those for the Grand Tower Drainage and Levee District would prevent an estimated $8,900,000 in damages if the project design flood occurred.

Drury Drainage District, Mississippi River

Flood Control Project Completed

(Rock Island District)

A 4,165-acre area on the left bank of the Mississippi River opposite Muscatine, Iowa, is protected by levee improvements constructed by the federal government within Drury Drainage District.

Local interests constructed the district's original 7 miles of main levees and 2.4 miles of flank levees. Under authorization of the Flood Control Act of March 1, 1917, the federal government improved the levees in about 1920, with local interest paying a portion of the project cost.

The Flood Control Act of 1954 authorized construction of additional levee improvements. That work was begun in June 1961, and completed in August 1963, at a cost of $1,282,000. The nonfederal cost share was $137,000. Damages prevented estimated at $18,699,000 through September 1995.

East Cape Girardeau and Clear Creek Drainage District

Flood Control Project Completed

(St. Louis District)

East Cape Girardeau and Clear Creek Drainage District is bounded by the Mississippi River on the west and south, by the old channel of Clear Creek on the north and the Illinois Central Railroad on the east. The flood control project authorized by the Flood Control Act of June 22, 1936, protects 9,400 acres located in northern Alexander County.

The project included raising and enlarging the entire levee system, consisting of 10 miles of river-front levee and .9 miles of back levee; constructing appurtenant closure structures through the levee; altering one railroad crossing; surfacing service roads on the levee crown; and constructing gravity drainage structures and remedial measures for control of underseepage.

Except for construction of the seepage control measures, which have been placed in an inactive category pending acquisition of rights-of-way, this project is considered complete. The federal cost was $1,916,000, and the nonfederal expense amounted to $84,000.

This project will not in itself provide complete protection to the district. But the combination of this project and projects for the Miller Pond Drainage District, North Alexander Drainage and Levee District, Preston Drainage and Levee District and Clear Creek Drainage and Levee District has prevented damages estimated at $63,440,000 through September 1993.

East Moline

Flood Control Project Completed

(Rock Island District)

The flood problem in East Moline is concentrated in a 1,300-acre industrial area. Other property subject to flooding includes commercial sites and more than 1,000 residences, schools and churches.

The Flood Control Act of 1968 authorized construction of a project to reduce the damage. Construction was begun in July 1979, and completed in 1984. About 2.4 miles of levee, railroad raises, street raises, a closure structure, gravity drainage outlets, open ditches, ponding area and pumping plants were constructed. The project protects the city from a flood having a .5 percent probability of occurring in any given year (200-year flood).

The federal cost of construction was $9,680,000; the nonfederal cost, $1,490,000. Damages prevented estimated at $4,495,500 through September 1995.

Fort Chartres and Ivy Landing Drainage District No. 5, Mississippi River

Flood Control Project Completed

(St. Louis District)

The Flood Control Act of June 22, 1936, authorized construction of a project to provide better flood protection to 6,700 acres within the Fort Chartres and Ivy Landing Drainage District No. 5 in Monroe County, Ill.

Constructed under the authorization were about three miles of river front levee, gravity drainage structures and remedial measures for control of underseepage. Road surfacing on the levee crown also was included.

Completed in 1958, the project cost $1,165,000, including a local cost share of $15,000. Flood damage prevented is estimated at $2,883,500 through September 1993.

This project, combined with the Harrisonville and Ivy Landing District No. 2 and Stringtown-Fort Chartres and Ivy Landing projects, will protect against a flood that otherwise could cause damages currently estimated at $10,070,000.

Fulton, Mississippi River

Flood Control Project Completed

(Rock Island District)

The town of Fulton, Ill., is on the left bank of the Mississippi River opposite the city of Clinton, Iowa. Much of Fulton is built on high ground, but part of the community is on low land subject to flooding.

A severe flood occurred in 1965. Access to the community was cut off, businesses were flooded and residents forced from their homes. Damage was in excess of $2,125,000.

The Flood Control Act of 1968 authorized a protection project for Fulton. Some 10 miles of earth levee, railroad raises, road ramps, closure structures, gravity drainage outlets, ponding areas, storm sewer interceptors and pumping plants were built.

Construction began in February 1978, and the project was completed in February 1984. Local interests operate and maintain the project. The federal cost was $18,020,000; the nonfederal cost $2,150,000. Damages prevented estimated at $3,761,100 through September 1995.

Galena, Galena River

Flood Control Project Completed

(Rock Island District)

Floods of the Galena River, a tributary of the Mississippi River, have caused major losses for Galena, interrupting highway and railroad traffic and severing communications between two sections of the city on opposite banks.

To alleviate these problems, Congress authorized construction of a flood control project at Galena under the Flood Control Act of Dec. 22, 1944. Levees and flood walls, related drainage works and a pumping plant were constructed; a flood channel excavated; and obstructive bridges removed to prevent restriction of water flow in the channel. Construction was completed in July 1951 at a cost of $990,000, including $146,000 in nonfederal contributions.

The project has prevented an estimated $3,927,300 in damage.

Grand Tower Drainage and Levee District, Mississippi River

Flood Control Project Completed

(St. Louis District)

Constructed under authority of the Flood Control Act of June 28, 1938, the flood control works in this district protect 14,800 acres in Jackson County, Ill., and Perry County, Mo.

The district is bounded by the Mississippi River on the west, by the Big Muddy River on the south and southeast, by Fountain Bluff on the northwest and by Degognia and Fountain Bluff Levee and Drainage District on the north.

Project work consisted of constructing 5.3 miles of river-front levee and 11.9 miles of back and flank levee along the Big Muddy River in order to raise, enlarge and extend the levee system. Related structures for highways and railroads and for gravity drainage were also constructed. In addition, remedial measures for the control of underseepage and surfacing of service roads on the levee crown were provided.

Construction was completed in 1959 at a cost of $4,739,000, including $77,000 in nonfederal expense. As of September 1993, an estimated $27,764,000 in flood damage has been prevented by the project.

In combination with the Degognia and Fountain Bluff Levee and Drainage District project, Grand Tower's flood control works will protect against a flood that could otherwise cause damages totalling approximately $29,876,000.

Harrisonville and Ivy Landing Drainage and Levee District No. 2, Mississippi River

Flood Control Project Completed

(St. Louis District)

Construction of a levee improvement project for this district was authorized by the Flood Control Act of June 22, 1936. The project protects a 27,800-acre area bounded by Fountain Creek and the Mississippi River on the north and west, by the bluffs on the east and by Fort Chartres and Ivy Landing Drainage and Levee District on the south.

About 9.8 miles of river-front levee and 5.4 miles of flank levee were raised, enlarged and reconstructed, and 6.2 miles of a new levee was constructed. Related work consisted of constructing the Fountain Creek diversion channel, altering a railroad line at one levee crossing and providing gravity drainage structures and remedial measures for control of underseepage. Service roads on the levee crown were also surfaced.

Construction was completed in 1957 at a cost of $4,553,000, including a nonfederal cost share of $189,000. An estimated $16,563,000 in flood damage has been prevented through September 1993. Combined with the Fort Chartres and Ivy Landing Drainage and Levee District and the Stringtown-Fort Chartres and Ivy Landing projects, this project will protect against a flood that could cause an estimated $10,970,000 (Oct. 1993 price level) in damage.

Further improvements for interior flood control within the Harrisonville and Ivy Landing District were authorized by the Flood Control Act of 1962. Pumping stations and approach channels adjacent to Maeystown Creek and Fountain Creek outlet channels were constructed.

The federal cost of the interior flood control improvements was $5,829,000; the nonfederal cost was $10,000.

The project will prevent an estimated $284,000 in damages annually.

Henderson County Drainage District No. 1, Mississippi River

Flood Control Project Completed

(Rock Island District)

Henderson County Drainage District No. 1, organized in 1912 as a private district, protects 6,163 acres along the left bank of the Mississippi River opposite Burlington, Iowa.

The original levees were constructed by local interests. The federal government assisted in improving 10.3 miles of levee during 1928 and 1929 at a cost of $459,000, which included $352,000 in nonfederal expense. Additional work was completed under the Flood Control Act of 1954. Through Fiscal Year 1995, an estimated $12,534,700 in damage has been prevented.

Henderson County Drainage District No. 2, Mississippi River

Flood Control Project Completed

(Rock Island District)

Privately organized in 1911, this district protects 6,970 acres on the left bank of the Mississippi River opposite Burlington, Iowa. The original levee system was constructed by local interests. The federal government improved 4.9 miles of levee in about 1930 at a cost of $315,000, of which $265,000 was locally funded.

Further improvements to the levees were authorized by the Flood Control Act of 1954. The improvements consisted of raising and strengthening 7.2 miles of levee—2.9 miles of main river levee and 4.3 miles of flank levee—along the right bank of Ellison Creek and constructing 1.8 miles of levee along the left bank of the creek.

Construction was begun in April 1966, and completed in November 1967, at a federal cost of $1,044,000. The local cost was approximately $104,000. Through Fiscal Year 1995, an estimated $11,433,800 in damage has been prevented.

Henderson County Drainage District No. 3, Mississippi River

Flood Control Project Completed

(Rock Island District)

Located on the left bank of the Mississippi River in Oquawka, Illinois, the district was organized in 1913 and protects 2,191 acres.

The original levees were constructed by private interests in 1913. In 1925, the Corps improved the 2.3-mile Mississippi River arm of the levee under the authority of the Flood Control Act of March 1, 1917. The 4.3-mile flank levee along the Henderson River was improved in 1948 under the authority of the Flood Control Act of 1936.

The flood control improvements were constructed at a cost of $177,000, of which $134,000 was financed by local interests. Through Fiscal Year 1995, an estimated $9,541,300 in damage has been prevented.

Hunt and Lima Lake Drainage District, Mississippi River

Flood Control Project Completed

(Rock Island District)

Located on the left bank of the Mississippi River in adjacent Hancock and Adams counties, these districts have interrelated drainage and flood protection systems.

Although they were organized as separate, private drainage districts in the late 1800s, their systems were improved under a single project authorized by the Flood Control Act of 1954. Improvements consisted of raising and strengthening 32.9 miles of levee, including both mainstem and flank levees. Constructed were a detention lake on Rock Run stream and a silt detention reservoir on Jenifer Creek.

The levee improvement portion of the project was begun in July 1960 and completed in August 1963. Construction of the Rock Run detention lake was begun in September 1968 and completed in November 1971; the Jenifer detention reservoir was begun in July 1970 and completed in April 1972. The federal cost for the whole project was $4,703,000 and the nonfederal cost was $307,000.

Hunt Drainage District, Mississippi River

Flood Control Project Completed

(Rock Island District)

Organized privately in 1879, the district protects 15,307 acres located on the left bank of the Mississippi River south of Warsaw, Ill. Local interests constructed the original 10.8 miles of main levee and 2.1 miles of flank levee. Water is pumped because there is no gravity drainage.

The federal government improved 12.9 miles of levee in 1922 under authority of the Flood Control Act of March 1, 1917. Local interests assumed one-third of the cost.

An estimated $47,709,000 in flood damages has been prevented by the project through September 1995.

Indian Grave Drainage District, Mississippi River

Flood Control Project Completed

(Rock Island District)

Organized as a private drainage district in 1880, Indian Grave protects 17,777 acres fronting on the left bank of the Mississippi River north of Quincy, Ill., in Adams County. The district now has 11.6 miles of main levee and 16 miles of flank levee. The original levee was constructed by local interests.

The Flood Control Act of 1928 provided for improvements. In 1932, 14.3 miles of levee were improved by the federal government, with local interests bearing one-third of the cost.

Additional improvements of agricultural levees was authorized by the Flood Control Act of 1954. Federal costs for the work were $3,551,000, and those of local interests, $630,000. Construction began in October 1966 and was completed in September 1971.

Since 1932 the project has prevented an estimated $62,305,700 in damage.

Lima Lake Drainage District, Mississippi River

Flood Control Project Completed

(Rock Island District)

This district is located on the left bank of the Mississippi River opposite Canton, Mo. Organized in 1885 as a private district, it includes 5.6 miles of main levee and 9.5 miles of flank levee and protects 13,189 acres. The original levees were constructed by local interests. Drainage is pumped.

During the period 1922-1930, 12.1 miles of levee were improved. The Flood Control Act of March 1, 1917, and May 15, 1928, authorized these improvements. One-third of the cost was paid by local interests.

Since 1942, the project prevented an estimated $36,144,300 in damage.

Meredosia Levee and Drainage District, Mississippi and Rock rivers

Section 205, Flood Control Project Completed

(Rock Island District)

A local flood protection project was authorized for the district by the Chief of Engineers under the provisions of Section 205 of the Flood Control Act of 1948 as amended.

The project consisted of raising about two miles of levee to protect the district from Mississippi River flooding. Construction was completed in May 1977.

The project, including the nonfederal share, cost $2,310,000.

Some 10,413 acres of farmland in Rock Island and Whiteside counties are protected.

Miller Pond Drainage District, Mississippi River

Flood Control Project Completed

(St. Louis District)

Construction of flood control structures in the district was authorized by the Flood Control Act of June 28, 1938. The district protects 4,300 acres lying between the Missouri Pacific Railroad tracks to the west, the bluffs to the east, Clear Lake Drainage and Levee District to the south and Wolf Lake, Ill., to the north.

Project work included raising and enlarging a 2.8 mile levee system and constructing service roads on the levee crown. Completed in 1955, the construction cost $170,000, of which local interest contributed $6,000.

In itself, this project would not provide complete flood protection for the district. But the combination of this project and the projects for East Cape Girardeau and Clear Creek Drainage District, North Alexander Levee and Drainage District, Clear Creek Drainage and Levee District and Preston Drainage and Levee District has prevented damages estimated at $63,440,000 through September 1993.

North Alexander Drainage and Levee District, Mississippi River

Flood Control Project Completed

(St. Louis District)

The Flood Control Act of June 22, 1936, authorized construction of levee improvements to better protect 3,600 acres within the district, located in northern Alexander County, Ill.

Construction consisted of raising and enlarging the 5.2-mile levee system previously reconstructed with federal funds, altering railroads at one levee crossing and surfacing service roads on the levee crown. Gravity drainage structures were also installed.

Local interest paid $24,000 of the total project cost of $964,000. The project was completed in 1957.

This project does not in itself provide complete flood protection for the North Alexander District. But the combination of projects for the Miller Pond Drainage District, the Preston Drainage and Levee District, the Clear Creek Drainage and Levee District and the East Cape Girardeau and Clear Creek Drainage District has prevented damages estimated at $63,440,000 through September 1993.

Prairie du Pont Levee and Sanitary District, Mississippi River

Flood Control Project Completed

(St. Louis District)

Previously identified as "Wilson and Winkel and Prairie du Pont Drainage and Levee Districts," this project protects portions of Monroe and St. Clair counties, including the communities of Dupo and Prairie du Pont.

Authorized by the Flood Control Act of June 22, 1936, federal work consisted of raising and enlarging the levee system by reconstructing 6.4 miles of river-front levee and four miles of upper flank levee and constructing 1.7 miles of new lower flank levee. Related works were also constructed, including structures to permit closing highway crossings, gravity drainage structures and remedial measures. In addition, service roads on the levee crown were surfaced.

The Emergency Flood Control Act of May 29, 1964, authorized reconstruction of the design grade and section for

a three-mile portion of the river-front levee. The Flood Control Act of Sept. 3, 1964, modified the project to eliminate the lower-flank levee by substituting 2.4 miles of river-front levee and 2.04 miles of lower-flank levee along Columbia Creek. These modifications provide flood protection to an additional 2,440 acres in the Fish Lake Drainage and Levee District No. 8, Illinois. The project now contains some 12,000 acres.

Construction was completed in 1962 at a cost of $5,748,000, including $522,000 in expense to local interest. The project has prevented an estimated $76,019,000 in flood damage through September 1993.

The Flood Control Act of 1962 authorized installation of four pumping stations for interior flood control improvement. The stations were installed adjacent to the outlets of Palmer Creek (west), Falling Springs Ditch and Old Prairie du Pont Creek (east and west). The levee grade was also raised two feet for a distance of 1,000 feet on either side of each pumping station. This project was completed in 1970 at a federal cost of $769,000 and a nonfederal cost of $5,200.

Prairie du Rocher and Vicinity, Mississippi River

Flood Control Project Completed

(St. Louis District)

Located along the left bank of the Mississippi River in Randolph County, Ill., southwest of Prairie du Rocher, this project protects 16,000 acres of bottomland extending from Prairie du Rocher Creek on the north to the Kaskaskia River on the south. Some 13,000 acres and 16 miles of levee are in the Prairie du Rocher and Modoc Drainage and Levee District, and 3,000 acres and .5 mile of levee are in Edgar Lakes Drainage and Levee District.

Authorized by the Flood Control Act of July 24, 1946, project work consisted of reconstructing 2.5 miles of upper flank levee and constructing about .5 mile of upperflank levee, 10.7 miles of river-front levee and 2.8 miles of lower flank levee. Other improvements included constructing closure structures for railroads and highways, altering a railroad passage at a levee crossing, surfacing the service roads on the levee crown, incorporating gravity drainage structures and constructing remedial measures for control of underseepage.

Construction was completed in 1959 at a cost of $4,012,000, including $139,000 in expense to local interests. An estimated $103,555,000 in flood damage has been prevented by the control works through September 1993.

Preston Drainage and Levee District, Mississippi River

Flood Control Project Completed

(St. Louis District)

Construction of the flood control structures in this district was authorized by the Flood Control Act of June 22, 1936. The control works, located in Union County, Ill., protect 16,200 acres.

Raised and enlarged were 9.3 miles of river-front levee and 5.3 miles of upper flank levee. Related construction included highway and railroad closures, gravity drainage structures and remedial measures for control of underseepage. Roads on top of the levee were also surfaced.

The project was completed in 1959, except for construction of seepage control measures and a modification placed in the inactive category because necessary rights-of-way have not been granted.

Construction costs totalled $1,940,000, including $73,000 in local expense.

This project does not in itself provide complete protection for this district. However, in combination with the North Alexander Drainage and Levee District, the Miller Pond Drainage District, Clear Creek Drainage and Levee District and the East Cape Girardeau and Clear Creek Drainage District it has prevented damages estimated at $63,440,000 through September 1993.

Rock Island, Mississippi River

Flood Control Project Completed

(Rock Island District)

Rock Island, Ill., lies on the left bank of the Mississippi River above the mouth of the Rock River in Rock Island County. It is one of the cities forming the Quad Cities metropolitan area.

About 650 acres of the city's extensively developed industrial, commercial and residential land is subject to Mississippi River flooding. To reduce flood damage, Congress authorized this project in the Flood Control Act of 1962.

Constructed as part of the project were levees and floodwalls, including closure structures along the left bank of Sylvan Slough and along the Mississippi from the Chicago, Rock Island and Pacific Railroad embankment downstream to 18th Avenue.

The federal cost was $9,100,000; the nonfederal cost was $1,283,400. Construction began in June 1971. Drainage structures and levees were completed in November 1973. Construction of flood walls began in July 1972 and was completed in October 1974. This project has prevented an estimated $55,016,000 in flood damage through September 1995.

Sny Basin, Mississippi River

Flood Control Project Completed

(Rock Island District)

A former by-channel of the Mississippi River, the Sny Basin is located on the left bank of the Mississippi between Miles 261 and 315 above the mouth of the Ohio River in Adams, Pike and Calhoun counties, Ill.

The Sny minor tributaries—Fall, Pigeon, Horton and Dutch Creeks and several small streams—have a total

drainage area of some 150 square miles. These streams often inundate large portions of the Sny bottomland.

To alleviate the basin's flooding problem, a protection project was authorized in the Flood Control Act of July 24, 1946. Constructed under the project authorization were three major diversion channels (of McCraney and Hadley creeks, Kiser Creek, Six Mile and Bay creeks) to conduct runoff from the uplands drainage area directly to the Mississippi; two flow-retarding reservoirs (one each for Horton-Dutch and Pigeon creeks); improvement of the Sny Channel to collect bottomland runoff; three pumping stations to pump runoff; a closing levee to exclude backwater from the Mississippi; and incidental remedial improvements.

Protected by the Sny project are 125,000 acres of farmland, including 22,000 acres restored to productivity by the project. Also protected are three major railroads, two federal highways and a state highway.

The federal cost was $14,003,560; the nonfederal share, $2,430,000.

Construction was begun in August 1959 and completed in September, 1971.

South Quincy Drainage and Levee District, Mississippi River

Flood Control Project Completed

(Rock Island District)

Local interests constructed the district's flood control works, consisting of 6.4 miles of main levee and 2.2 miles of flank levee. As authorized by the Flood Control Act of June 22, 1936, the federal government assisted in improving the levee system in 1939 at a cost of $61,200.

Organized in 1913 as a private undertaking, the district protects 5,515 acres located on the left bank of the Mississippi River south of Quincy, Illinois.

Improvement of the agricultural levees was authorized by the Flood Control Act of 1954. The federal cost was approximately $1,231,000; the nonfederal expense $57,000. Construction was begun in April 1966 and completed in October 1967. Damages prevented estimated at $487,432,300.

Stringtown-Fort Chartres and Ivy Landing, Mississippi River

Flood Control Project Completed

(St. Louis District)

Located northwest of Prairie du Rocher in Monroe and Randolph counties, this project protects 12,000 acres, including all of the Stringtown Drainage and Levee District and the downstream portion of the Fort Chartres and Ivy Landing District No. 5.

Authorized by the Flood Control Act of June 28, 1938, project work consisted of raising, enlarging and extending the levee system by reconstructing 4.7 miles of existing river-front levee and 2.3 miles of lower-flank levee and constructing 2.6 miles of river-front levee and .4 mile of lower flank levee. Also constructed were highway and railroad crossings, gravity-drainage works and remedial measures for control of underseepage. In addition, levee service roads were surfaced.

Construction was completed in 1957 at a cost of $2,159,000, including $42,000 from local interests. An estimated $15,638,000 in flood damage has been prevented by the project through September 1992.

A combination of these flood-control works and those of Harrisonville and Ivy Landing Drainage and Levee District No. 2 and Fort Chartres and Ivy Landing Drainage District No. 5 protects each of the districts against a flood that could cause $10,970,000 in damages.

Subdistrict No. 1, Drainage Union No. 1, Mississippi River

Flood Control Project Completed

(Rock Island District)

Levees in Subdistrict No. 1 were originally constructed by local interests as Drainage Union No. 1. The area was organized in 1908 as a private district to include 4,370 acres fronting on the left bank of the Mississippi River near Wrayville and Eliza, Illinois.

In 1922 the federal government improved 3.1 miles of main levee and 2.1 miles of flank levee in Subdistrict No. 1. The Flood Control Act of March 1, 1917, authorized this work, contingent upon local interests contributing one-third of the cost.

Congress authorized further levee improvements in 1954 as a joint project with the adjacent Bay Island Drainage and Levee District No. 1. These improvements are discussed under "Subdistrict No. 1 of Drainage Union No. 1 and Bay Island Drainage and Levee District No. 1, Mississippi River." Damage prevented estimated at $10,006,000.

Subdistrict No. 1 of Drainage Union No. 1 and Bay Island Drainage and Levee District No. 1, Mississippi River

Flood Control Project Completed

(Rock Island District)

These districts were organized privately in the early 1900s. Levees in each were constructed separately by private interests and improved periodically with federal help.

Because the two districts are contiguous, Congress authorized a joint drainage and flood protection project in the Flood Control Act of 1954. The project protects some 23,500 acres of highly productive cropland.

Work in the Bay Island District included improving both the mainstem levee and a diversion levee along Eliza Creek, a small stream bordering the district. This portion of the project was completed in 1966. In Subdistrict No. 1 of Drainage Union No. 1, diversion levees were improved from 1964 to 1967. Federal cost of the overall project was

$3,307,000, and the local cost was $232,000.

Additional improvements constructed within the two districts are discussed under "Bay Island Drainage and Levee District No. 1, Mississippi River, Flood Control Project Completed" and "Subdistrict No. 1, Drainage Union No. 1, Mississippi River, Flood Control Project Completed."

Wood River Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Improved flood protection for this district was authorized by the Flood Control Act of June 28, 1938. The area protected, 13,700 acres, includes bottomlands between the river and bluffs and extends from Cahokia diversion channel on the south to opposite Lock and Dam 26 at Alton on the north. The industrial cities of Hartford, Wood River, Roxana, East Alton and part of the Alton river front lie within the area.

Work performed under the authorization consisted of raising, enlarging and extending the existing levee system by reconstructing 5.4 miles of flank levee along Wood River, 1.6 miles of lower-flank levee along Cahokia diversion channel and .6 mile of lower-flank levee along Indiana Creek. New levee construction consisted of 2 miles of flank levee along Wood River, 9.1 miles of river-front levee along the Mississippi River and 2.1 miles of lower-flank levee along four railroad grades.

Also constructed were gravity drainage structures, new pumping plants or alterations to existing pumping facilities, alterations to railroad tracks and bridges at levee crossings, seepage control measures and a low-water dam at the mouth of Wood River. Levee roads were also surfaced.

The project cost $17,130,000, excluding $23,000 assumed by local interest.

Improvements for control of interior flooding were authorized by the Flood Control Act of Oct. 27, 1965. The plan of improvement called for construction of a pumping station with collector ditches and necessary appurtenant facilities. Construction of this improvement has been completed.

East St. Louis and Vicinity

Flood Control Project Underway

(St. Louis District)

Construction of a levee improvement project for the East St. Louis area was authorized by the Flood Control Act of June 22, 1936. Included in the 86,000-acre protected area are the bottomlands between the bluffs on the east, the Mississippi River and Chain of Rocks Canal on the west, those between Cahokia Diversion Canal on the north and Prairie du Pont Creek on the south.

Project work consisted of raising and enlarging the existing levee system by rebuilding 4.8 miles of upperflank levee, 10.4 miles of river-front levee, and 4.6 miles of lower-flank levee (including 3.1 miles of flood wall construction). The final cost of the work completed under this authorization was $22,550,100.

Improvements for controlling interior flooding and replacing a low-water dam in the Cahokia Creek Diversion Channel were authorized by the Flood Control Act of Oct. 27, 1965. For planning purposes, the project was divided into three segments; the Cahokia Diversion Channel low-dam replacement, interior drainage facilities in the Blue Waters Ditch area and improvements in the Cahokia Canal-Harding Ditch area.

At the request of the state of Illinois, the potential sponsor, the Cahokia Diversion Channel low-dam segment was reclassified as inactive in 1981. The Cahokia Canal-Harding Ditch portion of the project was placed in the inactive category when a reevaluation plan indicated that the project was not justified under current economic evaluation criteria. A new pumping station and channels are now complete for the Blue Waters Ditch area. The total cost of this segment of the 1965 project authorization was $14,650,000, of which $3,070,000 was borne by nonfederal interests.

Rehabilitation of the project was authorized by the Energy and Water Development Appropriations Act of 1988. The authorized work includes channel rehabilitation, repair and rehabilitation of fourteen pump stations and appurtenant works and rehabilitation and replacement of bridge structures. There had been no studies made by federal interests before authorization of the rehabilitation project; therefore, a brief report known as a Scope of Planning Report was submitted in May 1989. During review of this report it was determined necessary to prepare a General Design Memorandum (GDM) for the project. The GDM was submitted in June 1990, approved in February 1991, and all GDM comments have been resolved.

The project work will be accomplished under four local cooperation agreements (LCAs). Three LCAs will be with the Metro East Sanitary District and one will be with the Canteen Creek Drainage and Levee District. The first LCA, covering small gravity drains, was executed in December 1989, and this work is essentially complete. The second LCA, covering large gravity drains and closure structures, was executed in December 1990, and this work is underway. The third LCA, covering all remaining project items, was executed in March 1992, and construction began during late fiscal year 1992. Completion of the project is scheduled for Fiscal Year 1995. The total estimated cost of the project is $40, 932,000 (Oct. 1995 price levels). The nonfederal cost of the project is estimated at $12,369,000. The state of Illinois and other local governments have agreed to assist with certain nonfederal costs, which will reduce the cost to be borne by the local sponsors.

Kaskaskia Island Drainage and Levee District, Mississippi River

Flood Control Project Completed

(St. Louis District)

A modification of the existing project for this district was authorized by the Flood Control Act of 1962. Now com-

plete, the project consisted of raising existing levees.

The project protects 9,420 acres against a flood of 50-year frequency. The federal cost of the project was $14,100,000; the nonfederal cost, $2,100,000.

The previously constructed 14.8-mile levee system was authorized by the Flood Control Act of 1938. This work was completed in 1943 at a cost of $243,000.

Prairie du Rocher, Illinois

Continuing Authority Program, Feasibility Study Underway

(St. Louis District)

This flood control study is nearing completion. The study area is the Prairie du Rocher & Modoc Levee Drainage District, and the area protected by the existing levee. The study area is located on the Illinois side of the Mississippi River, just upstream of the confluence of the Kaskaskia River, and about 40 miles southeast of St. Louis.

Problems occurring at the study area are: potential overtopping of the existing levee causing flood damage to the historic Village of Prairie du Rocher and adjacent agricultural land, diminished stability of the existing levee due to degradation of underseepage relief wells, and potential overtopping of closure structures.

The objectives of this study are to identify the plan that minimizes flood damages and maximizes net National Economic Development (NED) benefits while minimizing adverse environmental impacts.

The locally preferred and justified plan calls for a small levee raise of about 13,000 linear feet, the raising of a railroad closure structure, and for the installation and rehabilitation of underseepage relief wells.

Quad Cities Urban Study, Mississippi River

Flood Control Study Completed

(Rock Island District)

Completing an overall evaluation of land use, navigation, flood protection, water supply, water quality and water-based recreation in the Quad Cities area was the objective of this study.

Authorized in 1974, the study was endorsed by the Bi-State Metropolitan Planning Commission, a group of elected officials of cities and counties in the Quad Cities area. Although the Corps managed the study in cooperation with the planning commission, state and federal agencies involved in wastewater management and water resources also participated.

A study of flood problems along the Lower Rock River was incorporated in the study. No other flood control studies are underway in the planning area.

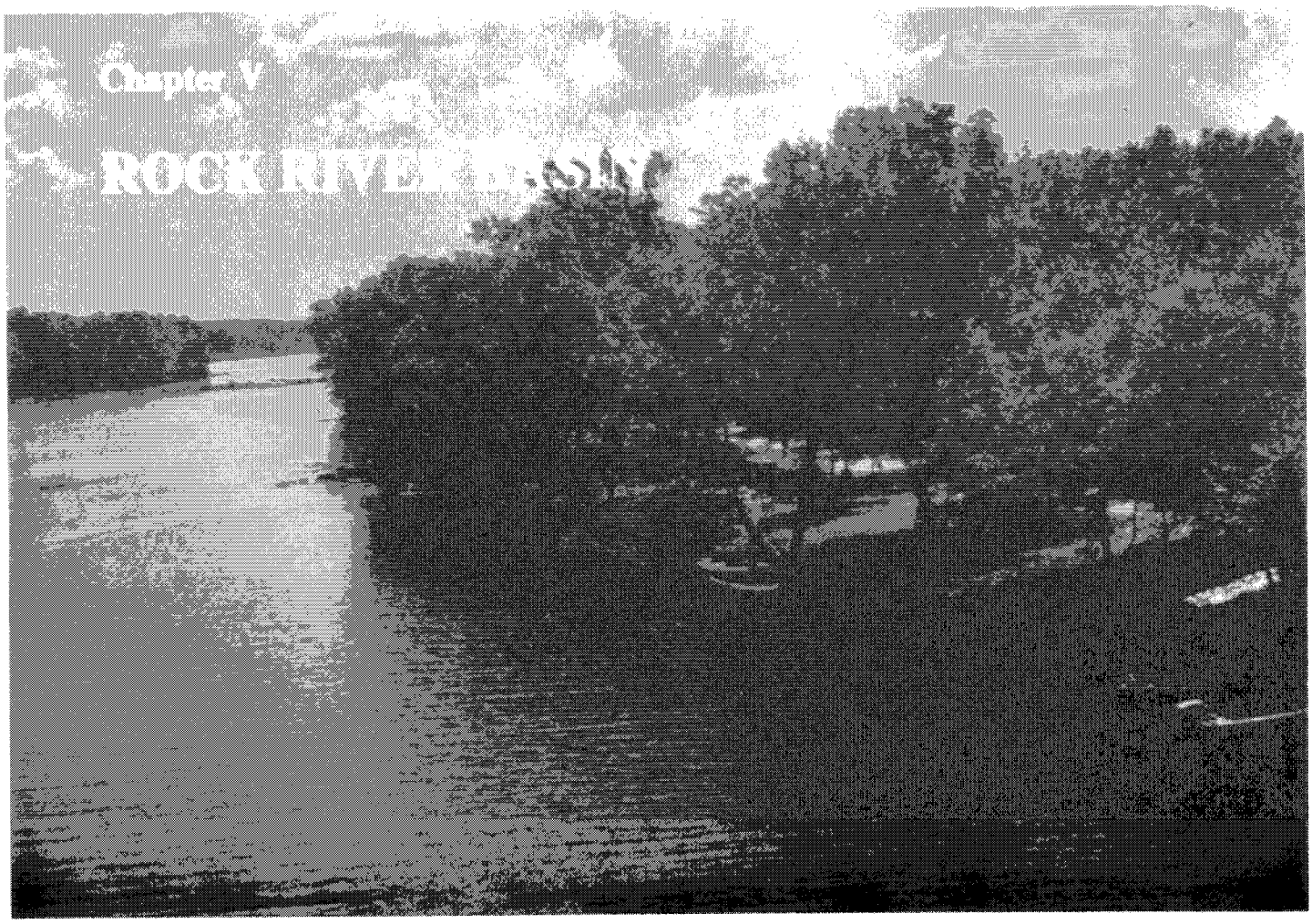
The study was completed in 1981. It found no economically feasible project.

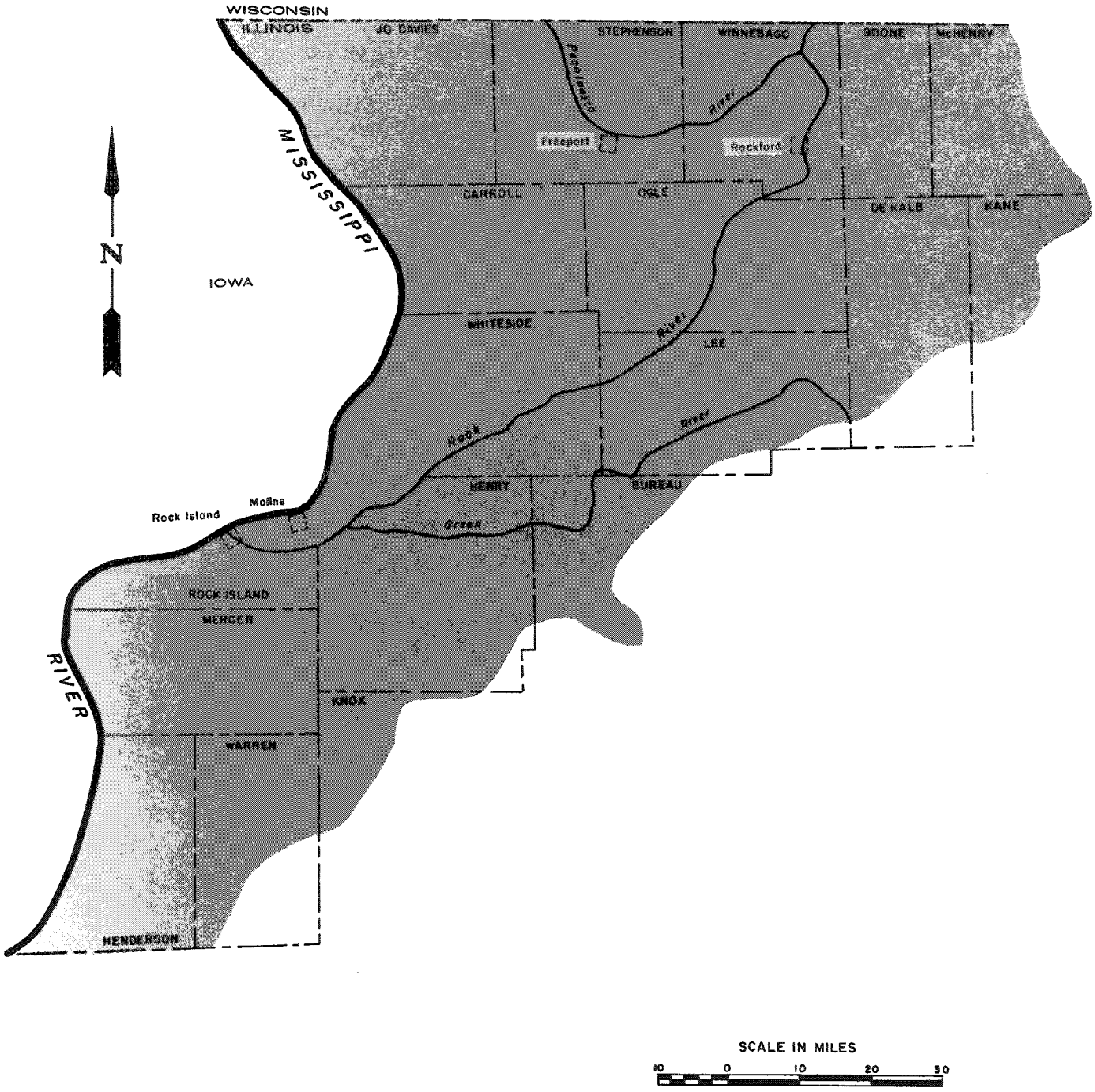
Upper Mississippi River-Illinois Waterway System Navigation Study

Commercial Navigation Study Underway

(St. Louis, Rock Island and St. Paul districts)

See write-up in the Upper Mississippi River Region section (Chapter III).


Chapter V
ROCK RIVE



ROCK RIVER BASIN

Rock River Basin Description

The Rock River originates in southeastern Wisconsin near Waupun. Flowing southeast, it enters Illinois near Beloit, Wis. Just north of Rockford, Ill., it is joined by the Pecatonica River and then continues southwest to meet the Mississippi River just below Rock Island, Ill.

Extending across northwestern Illinois and south central Wisconsin, the Rock River Basin is a 14,502-square-mile drainage area, about eight percent of the Upper Mississippi River region. Cropland constitutes about 75 percent of the basin's land area. Major urban centers are Rockford, Rock Island, Moline and Freeport, in Illinois and Madison, Janesville and Beloit in Wisconsin.

A population of 3,600,000 is projected for the basin by the year 2020, according to a demographic study conducted as part of the Upper Mississippi River Comprehensive Basin Study.

Erosion and flooding will be problems in the twenty-first century, the study predicted. Flooding is expected to cause annual damages of $27 million by the year 2020.

Game species consist mainly of migratory waterfowl, although white-tailed deer are also present. Horicon National Wildlife Refuge (31,600 acres at the north end of the basin) and the pools of the Upper Mississippi River are major gathering places for Canadian geese and ducks. Lakes Koshkonong and Mendota, the largest within the basin, are located in Wisconsin.

Corps of Engineers' Projects and Studies

Illinois and Mississippi Canal

Commercial Navigation Project Completed

(Rock Island District)

The 75-mile Illinois and Mississippi Canal was built by the Corps from 1892 to 1918, under authority of the River and Harbor Act of 1890, at a cost of $7,605,000.

The main canal includes 32 locks, each 35 feet wide and 143 feet long. It extends from the Illinois River near Bureau to the Mississippi River at the mouth of the Rock River, about three miles downstream of Rock Island. The project also includes a 29.3-mile feeder canal that extends from Rock Falls on the Rock River to the summit level of the main canal about 28 miles from the Illinois River. Channel depth in the main canal is 6.5 feet, and in the feeder canal, 5.5 feet.

Obsolete for present-day waterway navigation, the canal was transferred to the state of Illinois on August 1, 1970, for development as part of the state park system under a new name, the Hennepin Canal Parkway. Congress has authorized work preparing the canal for public recreational use at a total cost not to exceed $17,000,000.

This rehabilitation work was started and continued until three counties and the township road commissioners within those counties sued the federal government in U.S. District Court in Chicago in 1974 over maintenance of highway bridges. The government countersued the state of Illinois, claiming the state was responsible under the contract for transferring the canal to the state. In April 1980, the court entered judgment requiring the Corps of Engineers to deposit with the Clerk of Court funds to be used by the counties in repairing and rehabilitating highway bridges over the canal. In November 1981, the Corps of Engineers deposited $3,722,572 in full satisfaction of the court's judgment. The counties have completed the bridge repairs, and the Corps resumed the canal rehabilitation in 1985.

However, in 1987 the state of Illinois sued the government in the U.S. Claims Court for $4,750,000. Illinois had spent this amount repairing and replacing certain bridges with its own funds in 1975-1979 while the above-mentioned district court lawsuit was pending. In this lawsuit Illinois also sued for return of the $3,722,572, authorized and appropriated funds the Corps had deposited in the first lawsuit, claiming it was their money under the authorization. The claims court dismissed the claim for the $3,722,572 but held that a trial would be necessary on the $4,750,000 claim.

The litigating parties then succeeded in settling both lawsuits. In exchange for dismissal of both lawsuits, the government agreed to a judgment for $4,750,000, which is to come from funds authorized for I&M Canal rehabilitation, to reimburse Illinois for the work the state did with its own money, and to complete as much rehabilitation work as possible within the remaining authorized funds, approximately $3.5 million.

The government and the Illinois Department of Conservation are now negotiating a modification to the canal-transfer contract for the remaining rehabilitation work. This modification will establish priorities for work to be performed with the remaining authorized funds.

Mill Creek and South Slough at Milan

Flood Control Project Completed

(Rock Island District)

Construction of the Illinois and Mississippi Canal cut off the outlet of Mill Creek. To compensate for the eliminated outlet, the River and Harbor Act of 1927 authorized a project to protect the town of Milan from flooding.

The project consisted of constructing spillways and culverts to carry the flood waters of Mill Creek across the right-of-way of the Illinois and Mississippi Canal and into the Rock River. A levee was built on the east bank of the creek and extended west to Water Street. Obstructions in Mill Creek and South Slough were removed. The project was completed in 1932 at a cost of $64,000. Maintenance costs through 1986 were $318,459.

In 1962, the original outlet of Mill Creek was restored. The spillways, built as part of the Mill Creek-South Slough project, were removed. A channel was thereby provided for Mill Creek across the canal right-of-way. Earth embankments were positioned to close off the ends of the canal. A culvert was built under the Mill Creek channel earth embankment to serve as a siphon and thereby maintain canal water levels on both sides of the channel. Mill Creek flows are now diverted from the South Slough Channel.

A request for deauthorization of the Mill Creek South Slough project has been proposed by the Rock Island District.

Penny Slough Drainage and Levee District, Rock River

Flood Control Project Completed

(Rock Island District)

Penny Slough Drainage and Levee District is along the Rock River near Hillsdale, Ill. It was organized into a private district in 1940.

The Flood Control Act of 1936 authorized construction of nine miles of front levee and related ditches and outlets in the district. The project protects about 9,690 acres. The cost of construction was $170,000 including $84,000 in nonfederal expense. Damages prevented estimated at $20,768,300.

Milan, Rock River

Flood Control Project Completed

(Rock Island District)

Milan's business district, industries and part of its residential area are on a 950-acre flood plain subject to inundation by the Mississippi and Rock rivers and by Mill Creek, a small stream entering Milan from the south. Located in the valley of the Rock River at the south edge of Rock Island, Milan has a population of 6,264.

The Flood Control Act of 1968 authorized a project to protect the city. Construction began in fiscal year 1980 and was completed in Fiscal Year 1988. About 11 miles of earth levee, 1,120 miles of floodwalls, a closure structure, gravity drainage outlets, ponding areas and two pumping plants were constructed. The structures will protect Milan and the Big Island Conservancy District from flooding on the Rock and Mississippi rivers and Mill, Kyte and Eckhart creeks. Local interests now operate and maintain the project.

The federal construction cost was $14,300,000; the estimated nonfederal cost was $3,440,000. Damages prevented estimated at $7,473,700.

Rockford, Illinois—Kent Creek

Flood Control Project Completed

(Rock Island District)

Kent Creek has a watershed area of some 47 square miles and enters the Rock River from the west, immediately downstream from the main business district of Rockford, Ill. About a mile above this juncture, it forms two branches—the North Branch Kent Creek and the South Branch Kent Creek.

The Flood Control Act of 1962 authorized a project that includes building a retention reservoir just above Page Park on the North Branch Kent Creek and diverting about 2 square miles of South Branch drainage into this reservoir, raising Levings Park Dam to allow for storage in Levings Lake and improving channels on both the North and South branches of Kent Creek.

Construction began in Fiscal Year 1978 and was completed in Fiscal Year 1988. Local interests will operate and maintain the project after completion.

The federal construction cost was $10,600,000; the estimated nonfederal cost, $6,440,000. Damages prevented are estimated at $4,200,000.

Agricultural Areas along the Lower Rock River

Flood Control Project, Authorized Project Not Underway

(Rock Island District)

The 1958 Flood Control Act authorized construction of local flood protection projects in five agricultural areas in Rock Island, Henry, and Whiteside counties. The areas are flooded by winter and early spring floods, especially those accompanied by the ice jams that are so characteristic of the Rock River.

Authorized under the legislation were channel improvements, overbank clearing and construction of levees and related structures, all of which would make the river, in effect, a levee floodway. The projects were classified inactive in 1971, but were reclassified active in 1975 at the request of local interests.

The Rock Island District ceased work on the project because it was unable to develop an economically justified flood control plan.

Freeport, Pecatonica River

Flood Control Project, Authorized Project Not Underway

(Rock Island District)

Although a flood protection project for Freeport (on the Pecatonica River) was authorized by the Flood Control Act of 1936, construction was not begun because of a lack of local support and economic justification. The project became inactive in 1973.

After a severe flood in 1975, the city requested reactivation of the project. The project was reformulated to consider changes in local conditions, the preferences of the community and to address changes in federal criteria used in the planning process.

After reviewing the project, the Rock Island District found construction of a flood control project to be economically unjustified. The project was deauthorized in the 1986 Water Resources Act (Public Law 99-662).

The project was then reauthorized by the 1990 Water Resources Development Act after the city expressed interest in flood protection following 1990 flooding. A General Investigations reconnaissance study was completed in 1995, which presented a justified levee and floodwall plan for the east side of Freeport. The Corps and city decided to proceed to the feasibility stage. A feasibility cost-sharing agreement was executed in December 1995. The feasibility study is underway.

South Beloit, Illinois

Flood Control Project, Authorized Project Not Underway

(Rock Island District)

A protection project was authorized for South Beloit under the Flood Control Act of 1948. However, following authorization, local interest waned, and the project was classified inactive in 1961.

In April 1973, the record flood of Turtle Creek occurred, causing some $6,648,000 in damage to homes, businesses and industry and reviving interest in a flood control project. The Rock Island District resumed work on the project in 1974 and began preconstruction planning.

Later study, however, indicated the project is not economically justified. Work was discontinued in June 1979, and the project was deauthorized in the Water Resources Act of 1986 (Public Law-99-662).

Loves Park, Illinois

Flood Control Project Underway

(Rock Island District)

A feasibility study of flooding problems at Loves Park in north central Illinois near Rockford, Ill, was completed February 1979. The study recommended constructing channel improvements along Loves Park Creek (formerly a large unnamed creek) and partial diversion and storage of flood waters in two gravel pits.

A reevaluation study, authorized by Public Law 99-662, was undertaken in October 1984 to update the recommended plan to reflect current policies and changes in the floodplain since 1979. This report recommended a revised channel improvement plan, with partial flood water diversion to provide a 100-year-flood level of protection. Major components of the project include 17,900 feet of improved channel, three gravel pit storage basins, a 16,300 gallon-per-minute pump station and 27 hydraulic structures.

The estimated cost of the project is $18,300,000 (federal share) and $10,700,000 (nonfederal share), based on new cost sharing policies. The project was authorized in the Water Resources Development Act of 1986 (Public Law 99-662). Rights-of-way acquisition is underway. The initial stage of construction was completed in 1994 and two other stages of construction are now in progress. The total project is scheduled to be completed in 1998.

Kishwaukee River, Belvidere, Illinois

Flood Damage Reduction Study Underway

(Rock Island District)

The city of Belvidere, Ill. is the nonfederal sponsor for the flood damage reduction study authorized under Section 205 of the 1948 Flood Control Act, as amended.

The city of Belvidere requested assistance from the Corps of Engineers in evaluating flood control measures for a residential area along the Kishwaukee River just upstream from the Kishwaukee River dam.

A reconnaissance study is being conducted to determine if there is a federal interest in the problem, whether there are existing nonfederal entities capable of satisfying the local cooperation requirements and whether there is local interest in participating in solutions to the problem.

Rock River at Rockford, Illinois

Flood Control Study Underway

(Rock Island District)

Under investigation in this study are flooding, poor drainage, flood plain encroachment, erosion and siltation problems along the Rock River near Rockford. The study was authorized Dec. 1, 1971, by the House Public Works Committee. It is concerned with an area extending from the mouth of the Kishwaukee River to the Village of Roscoe, Ill.

The study, conducted in two phases, investigated flood damage reduction on Keith Creek, and two unnamed creek basins in Loves Park. The Rock Island District completed the study in 1980 and recommended constructing one project at Loves Park. The Loves Park project was authorized by the Water Resources Act of 1986 (Public Law 99-662).

Rock River above Rockton, Illinois and Wisconsin

Flood Control Study, Authorized Study Not Underway

(Rock Island District)

This study is concerned with the feasibility of constructing flood control improvements in the upper Rock River basin above Rockton, Ill. The study area includes the Pecatonica and Sugar Rivers and Turtle Creek.

Authorized by resolution of the House Public Works Committee October 5, 1966, the study was begun in fiscal year 1968. The study's Phase I report, completed in fiscal year 1977, recommended against constructing additional federal projects. Completion of the rest of the study has been deferred.

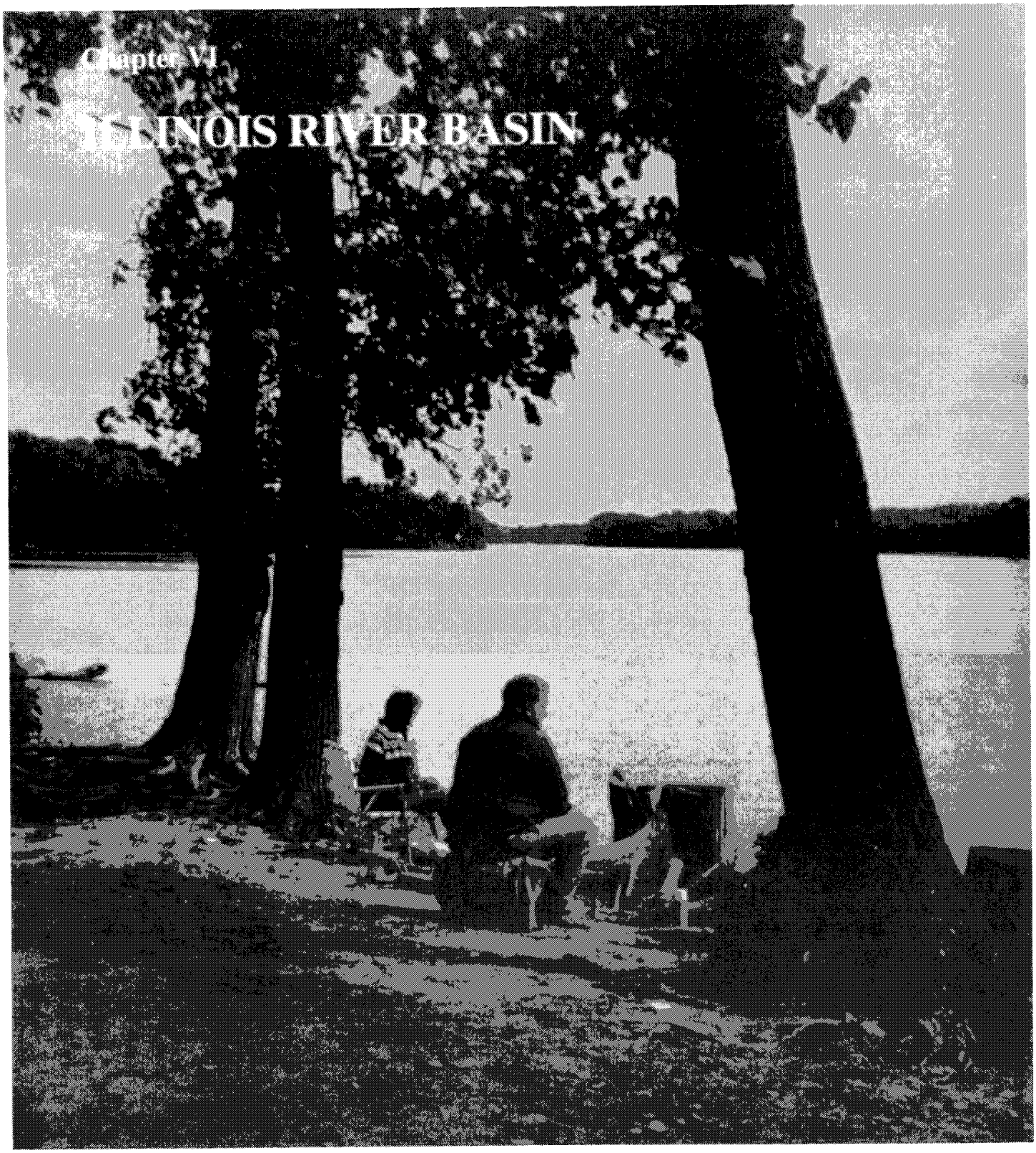
Rock River, Illinois and Wisconsin

Flood Control Study, Authorized Study Not Underway

(Rock Island District)

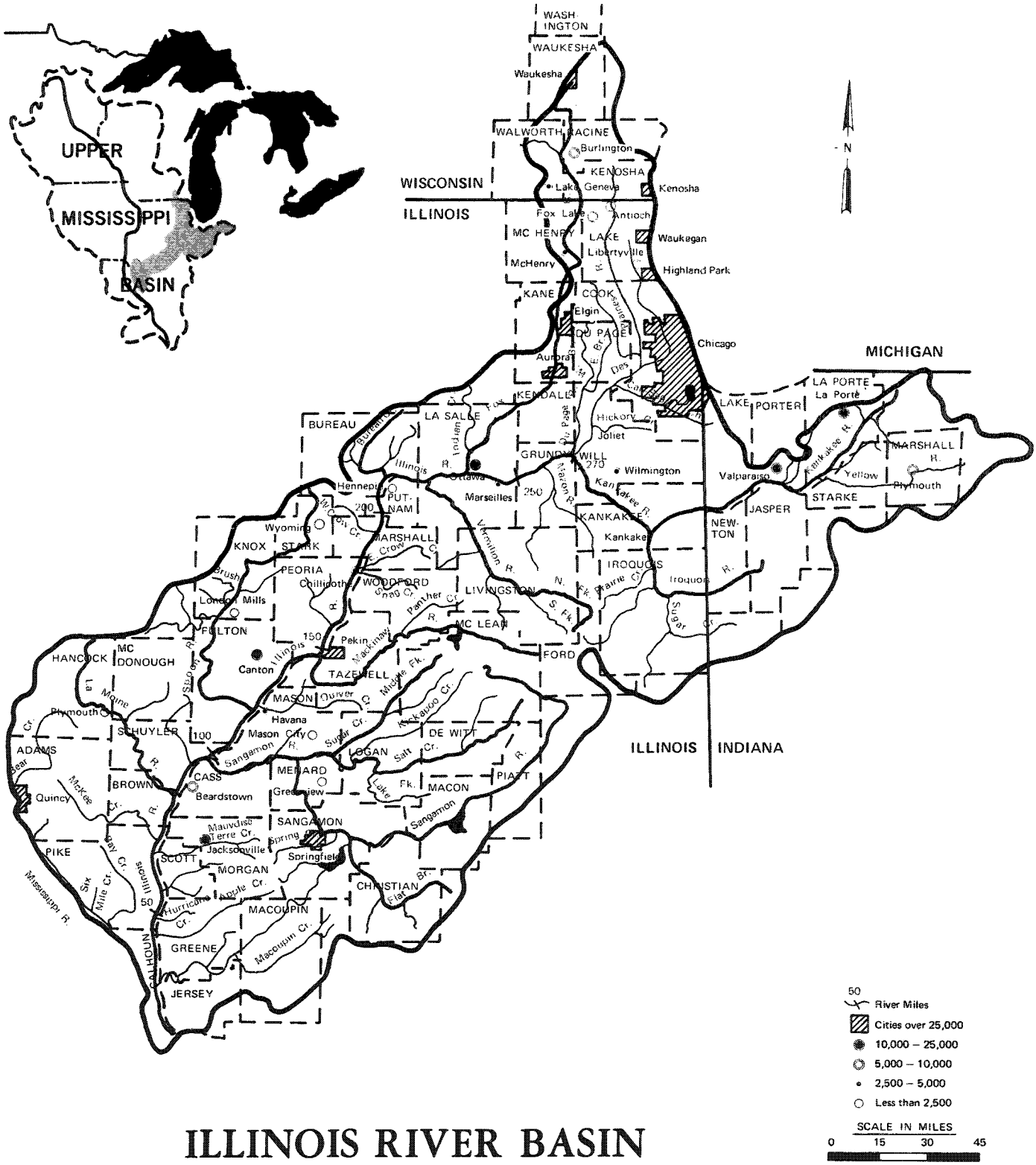
The Rock River originates in the lake region of southeastern Wisconsin and flows southward to join the Mississippi River just below Rock Island, Ill. The watershed includes all or parts of 13 counties in Wisconsin and 15 in Illinois. Major tributaries of the Rock River are: Green River, Rock Creek, Elkhorn Creek, Kishwaukee River, Pecatonica River, Sugar River, Turtle Creek and Yahara River. Communities within the basin having a history of frequent and severe flooding include: Freeport, Winslow and McConnell in Illinois and Darlington, Wis.

The study was authorized by House Resolution No. 2353, Aug. 1, 1990. To date, the study has not been funded.



Chapter VI

ILLINOIS RIVER BASIN



ILLINOIS RIVER BASIN

Illinois River Basin Description

Largest of the Mississippi River's tributaries above the mouth of the Missouri River, the Illinois River is formed by the confluence of the Kankakee and Des Plaines rivers about midway between Chicago and LaSalle. The river flows in a westerly, southwesterly and southerly direction for a distance of 273 miles and empties into the Mississippi River at Grafton, Illinois.

The course of the river from the Great Bend to its mouth is unusually direct. The fall is so slight that there is little or no erosion of banks or stream bed, and sediment is deposited near the mouths of the various tributaries of the Illinois River. Throughout the greater part of its length, particularly in the lower 60 miles, the stream follows the base of the western bluff, with occasional diversions toward the center of the valley where the stream has been pushed outward by sediment deposited at the mouth of the tributary streams.

Tributaries of the Illinois River include the Fox, Des Plaines, Chicago, Calumet, Kankakee and Sangamon rivers. The watershed of the river and its tributaries extends southwesterly across the northern half of Illinois from Chicago to the Mississippi River at Grafton, 38.7 miles above St. Louis, Missouri; northerly to just west of Milwaukee, Wis.; and easterly to South Bend, Ind.

The Illinois River's natural drainage area totals about 28,200 square miles, of which approximately 1,000 square miles are in Wisconsin, 3,200 in Indiana, and 24,000 in Illinois. About 40 percent of the state of Illinois is drained by the Illinois River. The Metropolitan Water Reclamation District of Greater Chicago, by reversing the flow of the Chicago and Calumet rivers and by intercepting certain drainage areas along the lake shore, has added about 810 square miles from the Lake Michigan watershed to the Illinois River watershed, making the Illinois watershed total 29,010 square miles. The eastern portion of the Little Calumet River watershed, comprising 335 square miles, was diverted into Lake Michigan through Burns Waterway in 1926 and is not included in the preceding total.

Wildlife population in the northern portion of the basin has been depleted, primarily as a result of urbanization, drainage of wetlands, forest removal and intensive agriculture. Little nesting cover remains and most waterfowl are migrants. Wildlife is more abundant, however, in the southern part of the basin. The Illinois and Mississippi river valleys are outstanding duck and goose shooting areas whose fame for waterfowl flight dates back to pioneer days. There are more than 300 private hunting clubs located along the lower 200 miles of the Illinois River. The fall flights of ducks and geese remain spectacular, although there has been a decline in diving duck populations in recent years. This is perhaps attributable to the disappearance of fingernail clams and other aquatic animals and plants as a result of pollution and intensive land and water use.

The basin's water resources include 3,130 million gallons per day of available groundwater and a median surface runoff of 10,000 mgd in the Illinois River at Meredosia, Ill.

Water resources developments in the basin include construction of the Illinois Waterway and other navigation projects, particularly in the Chicago area, and numerous local flood protection projects, both in urban areas and in rural levee and drainage districts.

Corps of Engineers' Projects and Studies

Illinois Waterway, Nine-Foot Navigation Project

Commercial Navigation Project Completed

(Rock Island and St. Louis districts)

The Illinois Waterway, the connecting link between the Great Lakes and the Mississippi River navigation systems, is one of the nation's busiest routes for commercial barge transportation. It handled 167,932,012 tons of commerce in 1992.

The 1992 commodity breakdown is as follows:

Farm Products	22%
Coal	21%
Petroleum	14%
Other	43%

Included in the waterway are the Chicago, Des Plaines and Illinois rivers, plus several canals, in particular the Calumet-Sag Channel and the navigable portions of the Little Calumet and Calumet rivers.

History of the Waterway

Illinois history reveals that the Illinois River was already being used as an uncharted path for Indian canoes when the early explorers Father Marquette and Jean Nicolet made use of it for their primitive craft.

As early as 1822, the U.S. Congress recognized the potential of the stream for interstate commerce and passed the first of several improvement acts, which resulted in 1848 in the completion of the Illinois and Michigan Canal linking Lake Michigan to the Illinois River at LaSalle, Ill. Mule drawn barges plied this early canal.

The state of Illinois in 1871 completed two locks and dams on the Illinois River, and the federal government built locks in 1873 at Kampsville and La Grange to provide a seven-foot depth from the mouth of the river at Grafton to LaSalle. These locks were 75 feet wide and 350 feet long.

In 1900, the upper end of the Illinois and Michigan Canal was replaced as far south as Lockport by the Chicago Sanitary and Ship Canal, which, though constructed primarily for sanitary purposes, also provided sufficient depth for navigation. In 1908, voters in the state of Illinois took a further important step by approving a $20 million bond issue to fund the canalization of the Des Plaines and Illinois

rivers from Lockport to Utica. However, construction was not begun until 1921.

In 1922, the Metropolitan Sanitary District of Greater Chicago completed construction of the Calumet-Sag Channel to prevent pollution of Lake Michigan by reversing the flow of the Calumet River. The channel connected the heavily industrial area surrounding the Calumet River with the waterway.

In 1930 the federal government, by authority of the Rivers and Harbors Act enacted in that year, assumed responsibility for the still unfinished improvement, completed the project and opened the Illinois Waterway to navigation three years later. Since that time it has been maintained and operated by the U.S. Army Corps of Engineers.

Since 1988, the Illinois River has been studied in order to determine what navigation structure improvements, if any, need to be made to usher the waterway into the next century and beyond. The Corps' 1988 Inland Waterway Review identified La Grange, Peoria, Lockport and Marseilles locks as being among the 20 locks in the country with the highest average delays in 1987 and in the greatest need of improvement.

The St. Paul, Rock Island and St. Louis districts have recently undertaken an Upper Mississippi-Illinois Navigation Study performing detailed systemic environmental, engineering and economic studies with the goal of prioritizing capital improvements to the navigation system. This study is also described in this chapter.

The Illinois Waterway was further improved during the years 1936 to 1938 with the construction of two modern lock and dams, Peoria and La Grange, which replaced four outmoded installations between Utica and Grafton. In 1960 the Thomas J. O'Brien Lock and Controlling Works was completed on the Calumet River. Today, the waterway is completely canalized with a minimum depth of nine feet over its entire stretch of 327 miles, from its junction with the Mississippi at Grafton to Lake Michigan at Chicago Harbor and at Calumet Harbor and River.

The Waterway at Work

The principal commodities moved on the Illinois Waterway are coal, petroleum products, grain, soy beans, sand and gravel, sulphur and other chemicals and iron and steel products. Cargo is carried in open or covered barges made up in tows of from one to 17 barges pushed by towboats. In 1935, the commercial traffic on the waterway amounted to 1,695,000 tons, but by 1975 it had climbed progressively to a record-breaking 47,242,597 tons.

Recreation

Pleasure craft are heavy users of the waterway, which also provides many recreational opportunities, including parks at the locks themselves, 10 state and several municipal parks, a state forest and 14 conservation areas along the waterway banks. In addition, 39 boat clubs, marinas and service areas for small boats are maintained by communities or organizations, encouraging residents and visitors to enjoy the tributaries of the waterway.

The Locks and Dams

The waterway section from Lake Michigan to Lockport is about 36 miles long. It is controlled at one end by the Thomas J. O'Brien Lock and Dam located near the Lake Calumet area and at the other end by Lockport Lock and Power House. Passing through the Chicago metropolitan area, the waterway uses the Chicago River, the south branch of that river and the Chicago Sanitary and Ship Canal as well as the Calumet and Little Calumet rivers and the Calumet-sag Channel. The waterway can be entered from Lake Michigan through the Chicago Lock (on the Chicago River) operated by the Chicago District, U.S. Army Corps of Engineers, or through Calumet Harbor and River.

From Lockport south, some 60 miles downstream, the waterway falls 139 feet. In this stretch it uses the Des Plaines and Illinois rivers and consists of a series of four pools that have been created by permanent dams and locks. Locks and dams controlling navigation along this stretch include Brandon Road, Dresden Island, Marseilles and Starved Rock. The lifts at each of the locks are: Lockport, 39.5 feet; Brandon Road 35 feet; Dresden Island, 21.75 feet; Marseilles, 24.75 feet; and Starved Rock, 18.5 feet.

Through the 231 miles from Starved Rock to Grafton, the waterway falls more gently. There are lifts of 11 feet at Peoria Lock and 10 feet at La Grange Lock. Below La Grange, to Grafton, a distance of 80 miles, the route is maintained for barge traffic by Lock and Dam No. 26 in the Mississippi River at Alton.

Nine-foot depths are provided by two navigable movable dams located at Peoria and La Grange. During periods of low water, these dams are raised to provide sufficient depths. Navigation utilizes the locks to move progressively from one pool to the next. During period of high water, when ample depths are available, the dams are lowered to the bottom and navigation passes freely over the lowered dams without the necessity of lockages.

Seven of the eight locks on the Illinois Waterway are 110 feet in width by 600 feet in length. The Thomas J. O'Brien Lock on the Calumet River is 100 feet in width by 1,000 feet in length.

All eight locks can handle a towboat and eight jumbo barges in one lockage. In the upper sections of the waterway, the six locks are electrically controlled; the lower locks are hydraulically operated.

Grafton to Chicago

From Grafton, Ill., to Chicago, the Nine-Foot Navigation Project includes the following: (1) seven locks, six dams and a navigation channel nine feet in depth and 300 feet in width from Grafton to Lockport; (2) a channel in the Chicago Sanitary and Ship Canal nine feet deep and 200 feet to 300 feet wide from Lockport to the controlling works, from there 160 feet wide to the junction with the Calumet-Sag Channel and 175 feet to 300 feet wide from the Sag Junction to Lake Street in Chicago on the South Branch of the Chicago River; (3) a small-boat harbor at Peoria. This portion of the project is essentially complete with only minor widening remaining to be done.

Calumet-Sag Modification

The Calumet-Sag Channel, originally 60 feet wide and having many restrictive bridges, was a navigation bottleneck

for many years. This channel could only accommodate tows of two or three barges and required special towboats with telescoping pilothouses. The Calumet-Sag modification, described as follows, was authorized by the River and Harbor Act of 1946 to allow full-sized tows to operate between the Chicago Sanitary and Ship Canal and Turning Basin No. 5 in the Calumet River. The modification consists of three parts.

Part I is 99 percent complete. The authorization called for construction of a nine-foot-deep, 225-foot-wide channel in the Calumet-Sag Channel to its junction with the Little Calumet River to Lake Calumet; construction of a lock and dam in the Calumet River and removal of the old Blue Island controlling lock; replacement or alteration of 14 railroad bridges and 17 highway bridges crossing the Calumet-Sag Channel and Little Calumet and Calumet rivers; and removal of six small highway bridges also was authorized.

Part II is now deauthorized because it was not economically justified. The project authorization called for construction of the following: a lock and controlling works; a nine-foot-deep channel that is 225 feet wide along the general route of the Grand Calumet River from its junction with the Little Calumet River to the Indiana Harbor Canal and from there is 160 feet wide to a proposed terminal in Gary, Indiana; a nine-foot-deep channel that is 225 feet wide in the Indiana Harbor Canal from the Grand Calumet River to the head of deep-draft navigation. Altering or rebuilding nine railroad and eight highway bridges.

Part III provides for widening the Chicago Sanitary and Ship Canal to 225 feet from the Sag Junction to Lockport; replacing three highway bridges in this reach and two in Joliet; and replacing the existing emergency dam above Lockport. Part III has been deferred for further study.

Legislation authorizing the Calumet-Sag modification required that local interests furnish all necessary rights-of-way and disposal areas for dredged materials, that they assume responsibility for altering or relocating obstructive utilities, and, in the case of Part III, that they assume responsibility for altering or replacing highway bridges. For Part I of the project, the Metropolitan Water Reclamation District of Greater Chicago agreed to serve as the responsible local interest and as such provided much of its own lands, acquired privately owned land and altered utility lines. Many other state, county, city and private agencies also rendered invaluable assistance.

The work completed on the Calumet-Sag modification includes widening 16.2 miles of channel from the Sag Junction through Blue Island, widening channel walls immediately east of that city and widening the channel at Acme Bend in the Little Calumet River. The Gulf, Mobile and Ohio; Wabash; Baltimore and Ohio Chicago Terminal; Grand Trunk Western; and the Chicago, Rock Island and Pacific railroad bridges across the Calumet-Sag Channel were altered. The Pennsylvania, Chicago and Western Indiana, Illinois Central Gulf and Penn Central railroad bridges across the Little Calumet River also were altered. In addition, a railway bridge was completed over the Little Calumet River for the Illinois Central Railroad.

Ten new highway bridges were constructed across the navigation channel at 104, 95th, Harlem, Kedzie, Western, Ridgeland, Francisco and Indiana avenues and at Chatham, Division and 127th streets. Pier conversion was also completed for five bridges at Cicero, Crawford and Ashland avenues and at Southwest Highway and Halsted Street.

Thomas J. O'Brien Lock

Construction of the Thomas J. O'Brien Lock and Controlling Works in the Calumet River was authorized under Part I of the Calumet-Sag modification and completed in 1960. Measuring 110 feet in width by 1,000 feet in length, the lock permits the ready movement of tows consisting of 14 barges and a towboat. No rearrangement is necessary before the tows enter the chamber.

Together, the lock and controlling works are designed to prevent the flow of polluted water from the Little Calumet and Grand Calumet rivers into Lake Michigan. The lock and controlling works also control water levels landward of the lock and dam.

Duplicate Locks

Commercial traffic on the Illinois Waterway increased from 1.7 million in 1935 to a record-breaking 47.2 million tons in 1975. Anticipating a need to handle increasing traffic on the waterway, Congress, in the River and Harbor Act of 1962, approved a project modification to construct supplemental locks 110 feet wide by 1,200 feet long at Lockport, Brandon Road, Dresden Island, Marseilles, Peoria, Starved Rock and La Grange. The legislation authorized $40 million to begin and partially complete the improvement, estimated to cost $1,719.6 million (1993 price levels). Preconstruction planning of the modification was begun in 1967.

In 1971, the state of Illinois, Division of Waterways, published a report recommending a substantially different project for the Lockport-Brandon Road reach of the waterway. In the state report titled "Through and Across Joliet," dated March, 1971, the Division of Waterways recommended removal of the Brandon Road Lock and Dam, extension of the Dresden Island pool through the City of Joliet to Ninth Street in Lockport, and construction of a new lock and dam at the Ninth Street location. The existing Lockport Lock and Dam would be removed.

In the fall of 1971, General Design Memorandum Phase I studies were begun with the objective of either reaffirming the original authorization or reformulating the project to respond to changes since authorization. In April 1975, the General Design Memorandum Phase I Report and the Environmental Impact Statement were completed. A reformulated project was recommended to consist of six locks instead of the seven originally authorized. Supplemental locks 110 feet wide by 1,200 feet long were recommended for construction at Dresden Island, Marseilles, Starved Rock, Peoria and La Grange.

The reformulated project also would have removed the Brandon Road and Lockport locks and dams and replaced them with a new lock and dam near the existing Lockport site. The new Lockport Lock would have been 110 feet wide by 1,200 feet long and would have had a 73-foot lift to equal the combined lifts of the existing Lockport and Brandon Road locks. Extension of the Dresden Island pool through Joliet to the new Lockport Lock and Dam would have required lowering the present navigation channel by 34 feet

and removing and replacing seven highway bridges and two railroad bridges and modifying the Interstate 80 bridge piers.

The duplicate locks project modification has been deauthorized.

Dredged Material Management Plans

As on the Mississippi River, the Rock Island District is also undertaking the development of a Dredged Material Management Program (DMMP) on the Illinois River. The purpose of the DMMP's are to identify and prepare site plans for the least costly, environmentally acceptable, and operationally feasible dredged material placement sites on the Illinois Waterway. Four DMMP's have been completed and six additional plans are underway. The acquisition of property for one plan on the Illinois Waterway is underway. This plan should be under construction and fully implemented during FY97.

Wabash Railroad Bridges, Meredosia and Valley City

Commercial Navigation Project Completed

(St. Louis District)

A serious hazard to navigation on the Illinois River was eliminated by removing the Wabash Railroad Bridges at Meredosia and Valley City and constructing a new bridge at another Valley City site.

Authorized by the Truman-Hobbs Act of June 21, 1940, this project was completed in 1961. Costs were shared by the railroad and the U.S. government, with total federal cost amounting to $2,653,000.

Calumet River, Extension of Channel

Commercial Navigation Study, Authorized Study Not Underway

(Rock Island District)

The feasibility of extending the deep-draft Calumet River Channel from Turning Basin No. 5 to Thomas J. O'Brien Lock and Dam would be investigated in this study, authorized by the House Public Works Committee July 31, 1957.

Lacking local interest, the study has been classified inactive.

Illinois Waterway, Brandon Road Lock to Sag Junction

Commercial Navigation Study, Authorized Study Not Underway

(Rock Island District)

The need for additional channel and bridge improvements between Brandon Road Lock and the Calumet-Sag junction would be determined in this study, authorized by a Senate Public Works Committee resolution dated July 30, 1957.

Reviewed in the study would be the authorized, but unconstructed, Calumet-Sag Navigation Project, Part III. The social, economic and environmental feasibility of constructing the navigation improvements also would be examined.

Lacking sufficient local interest, the study has been deferred.

Upper Mississippi-Illinois Navigation Study

Commercial Navigation Study Underway

(St. Louis, Rock Island and St. Paul districts)

The Upper Mississippi-Illinois Navigation Study is a general investigation study to investigate the need/feasibility for navigation improvements on the Upper Mississippi and Illinois Rivers to reduce navigation impacts to the ecosystem and otherwise restore fish and wildlife habitat within the system.

The study addresses the Upper Mississippi River from the confluence of the Ohio River northward to the head of navigation (Minneapolis-St. Paul, Minnesota) and the entire Illinois Waterway from Lake Michigan in Chicago to its confluence with the Mississippi River at Grafton, Ill. The study is being jointly conducted by the St. Louis, Rock Island and St. Paul districts.

The feasibility phase was initiated in 1993. This will result in an authorization report to Congress if feasible improvements are identified. The overall system study component includes study areas of economics, engineering, environmental, and historic properties. See detailed write-up in the Upper Mississippi River Region section. (Chapter III).

Muscooten Bay, Illinois, Small-Boat Harbor

Recreational Navigation Project Completed

(Rock Island District)

In 1984 the Rock Island District dredged an access channel from the Illinois Waterway to the Muscooten Bay Small-Boat Harbor near Beardstown, Ill., and it built a diversion dike to protect the channel from the nearby Sangamon River.

The access channel is 2,000 feet long, 70 feet wide and 5 feet deep. The 1,100-foot diversion dike is between the access channel and the Sangamon River.

The project was constructed under the authorization of Section 107 of the 1960 River and Harbor Act as amended, at a federal cost of $265,000 and a local cost of $124,000.

Illinois River, Small-Boat Harbor at Henry, Illinois

Recreational Navigation Study, Authorized Study Not Underway

(Rock Island District)

This study was authorized in a resolution of the House

Committee on Public Works adopted June 3, 1959, to determine the need and feasibility of making harbor improvements.

Lacking local interest, the study was classified inactive.

Little Calumet River, Illinois

Debris Removal Project Underway

(Chicago District)

A project to clear a 12-mile reach of the Little Calumet River was authorized in the Water Resources Development Act of 1974. The Water Resources Development Act of 1986 authorized the Corps to continue a maintenance cleanup program and specified cost-sharing arrangements for all future activities. The reach is located in southern Cook County and flows west from the Indiana state line to the Calumet-Sag Channel in Illinois. Because the original authorizing legislation called for two different types of work, the project was divided into two phases.

Phase I covers the removal of fallen trees, roots, silt, discarded appliances and other debris. One cleanup was completed in October 1976. Performing additional cleanups was authorized by the 1986 Water Resources Development Act.

Phase II consists of removing polluted bottom sediments and placing them in approved confined disposal areas provided by a public sponsor. Planning this phase of the project began in 1980. A study to determine the amount of dredging required and to locate disposal areas was completed in 1983. It recommended deferring the dredging until water quality improvements are completed to prevent the discharge of pollutants into the Little Calumet River.

North Branch, Chicago River

Debris Removal Project Underway

(Chicago District)

The North Branch is located in Northern Illinois, in Cook and Lake counties.

The existing project provides for clearing the channel of the North Branch of the Chicago River, Ill., of fallen trees, roots and other debris and objects which contribute to the flooding, unsightliness and pollution of the river. The project extends from Wolf Point in Chicago, Ill., to its source just south of Rockland Road east of Libertyville, Ill. The project was authorized by the River and Harbor Act of December 31, 1970 (Section 116) and amended by the River and Harbor Act of March 7, 1974 and the Water Resources Development Act of 1986.

Local Cooperation: The 1970 Act provided that local interests furnish without cost to the United States all lands, easements, rights-of-way and disposal areas necessary for construction of the project; hold and save the United States free from damages due to construction; maintain and operate all works after completion without cost to the United States; and agree to bear all costs in excess of $200,000 for completing construction. The 1974 Act provided that the United States will maintain the channel free of trees, roots, debris and objects at a cost not to exceed $150,000 a year with nonfederal interests paying 25 percent of the cost of maintenance. The 1986 Water Resources Development Act changed the cost sharing to require that nonfederal interests pay 50 percent of the cost of maintenance plus cost of disposal.

Maintenance: fiscal year 1991 - fiscal year 1992 construction costs were $49,253. Supervision and administration costs were $18,602. Fiscal year 1993 contract cost was $90,708. E&D and Real estate were performed by hired labor at a cost of $12,407 and $5,203, respectively. The total federal and nonfederal expenditures were $176,173 and $246,753.

Total cost of existing project to Sept. 30, 1993 was $3,298,885 of which $231,884 was for new work ($191,884 regular funds and $40,000 contributed funds), and $3,485,698 was for maintenance ($2,326,212 federal funds and $1,159,486 nonfederal contributed funds).

Banner Special Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

The project consisted of rebuilding and enlarging about 7.1 miles of river-front levee and 3.7 miles of flank levees along Dry Run and Copperas Creek and clearing the channels. The work was authorized by the Flood Control Act of June 22, 1936.

Banner District's levee system protects 3,600 acres—400 of farmland and industrial facilities in the northern sections, 900 acres of farmland and pasture in the southern. The remaining area consists of strip-mined land.

Completed in 1941, the project cost $291,000, which included $16,000 in nonfederal expense. Federally funded repairs were made after the floods of 1943 and 1955 at costs of $220,030 and $75,000, respectively. Emergency levee repairs were made in 1977 at a federal cost of $217,850.

The project has prevented an estimated $934,500 in flood damage.

Big Lake Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

Authorized by the Flood Control Acts of June 22, 1936, and June 28, 1938, this project consisted of reconstructing 5.3 miles of river-front levee along Elm Creek and 1.5 miles of levee along Wilson Creek. Work was completed in 1943.

The project protects some 3,290 acres of farmland. It was completed at a federal cost of $144,910 and a nonfederal cost of $4,000. The federal government repaired the levee at a cost of $206,015 in 1974 and $420,383 in 1984.

The project has prevented an estimated $323,500 in flood damage.

Big Swan Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Construction of flood protection improvements within the Big Swan Drainage and Levee District was authorized by the Flood Control Act of May 15, 1928. Protected are 12,300 acres along the left bank of the Illinois River across from Florence.

Completed in 1934, work consisted of reconstruction of 6.7 miles of river-front levee and 4.6 miles of flank levee along Big Sandy and Walnut creeks.

The Flood Control Act of 1962 authorized further improvements. These would have consisted of raising and enlarging 13.6 miles of levee, altering the discharge line of a pumping station and constructing closure structures and seepage control measures. The estimated cost of this work (October 1993 price levels) is $17,680,000 in federal funds and $2,067,200 in nonfederal expenses. The project was deauthorized by the Water Resources Development Act of 1986, Public Law 99-662.

Coal Creek Drainage and Levee District

Flood Control Project Completed

(Rock Island District)

This project consisted of constructing a setback levee, lowering a portion of the riverfront levee, reconstructing the lower-flank and bluff levees, and altering a highway bridge and pumping station. Work was authorized by the Flood Control Acts of June 22, 1936, and June 28, 1938 and completed in 1954.

Construction costs of $1,995,000 included $83,000 from nonfederal sources. The levees were repaired in 1955, 1958 and 1961 at additional federal costs of $25,000, $5,000 and $8,000, respectively.

The project protects about 6,800 acres of farmland and a state highway, and has prevented an estimated $6,028,400 in damages.

Coon Run Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Levee improvements in the Coon Run Drainage and Levee District were authorized by the Flood Control Act of May 15, 1928. Protected are 4,600 acres along the left bank of the Illinois River near Meredosia.

Three-tenths mile of new levee was constructed along Eagle Run, and nine miles of flank levees were reconstructed. Completed in 1938, the project cost $98,000, including $33,000 in nonfederal expense. It has prevented an estimated $2,462,000 in flood damage, through September 1993.

The Flood Control Act of 1962 authorized increased protection for the area. However, work on the improvements has been deferred.

Crane Creek Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

The project protects about 5,240 acres. It was authorized by the Flood Control Acts of May 15, 1928 and June 28, 1938.

Work involved extending the flank levee along Crane Creek, reconstructing the riverfront levee along the Illinois River and reconstructing the flank levees along Crane Creek and the La Moine River.

Completed in 1941, the project was constructed at a cost of $71,000, including $2,000 in nonfederal expense. Since 1943, the federal government has spent an additional $250,550 to repair the levee.

The project has prevented an estimated $8,461,000 in damage.

East Liverpool Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

This project, constructed under the Flood Control Act of June 22, 1936, protects some 3,000 acres of farmland and 1.5 miles of highway along the west bank of the Illinois River just northwest of Liverpool.

Reconstruction of about 2.7 miles of riverfront levee, 3.7 miles of flank levees along Duck and Buckheart Creeks, and .7 miles of setback levee along the river was completed in 1941. The cost was $207,826 in federal funds and $14,000 in nonfederal expense. Additionally, the federal government spent $21,070 to repair erosion damage in 1947 and 1948. Emergency levee repairs were performed in 1971 under Public Law 84-99 at a cost of $1,450,000.

The project has prevented an estimated $367,000 in damage.

East Peoria Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

Completed in 1945, this project consisted of raising and strengthening 1.5 miles of riverfront levee, .8 miles of upriver flank levee along Farm Creek and .8 miles of downriver flank levee. The work was authorized by the Flood Control Act of June 22, 1936.

In 1953 local interests raised the riverfront levee and a

portion of the up-river flank levee about three feet above the authorized federal project grade.

Construction of the project cost $297,000, including $17,000 in nonfederal expense. An estimated $19,779,500 in damage has been prevented.

Farm Creek

Flood Control Project Completed

(Rock Island District)

This project protects residential, business and highly developed industrial areas in East Peoria. The flood control structures are located in the Farm Creek watershed in Tazewell County. They include compacted earth dams, spillways and two detention reservoirs on Fondulac and Farm creeks. Channel improvements were also constructed on Farm Creek and its tributaries, Cole and Kerfoot creeks.

Hartwell Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Improvement of Hartwell Drainage and Levee District's flood control works was authorized by the Flood Control Act of May 15, 1928. The district protects 9,630 acres located on the left bank of the Illinois River across and downstream from Pearl.

The improvements, completed in 1933, consisted of reconstruction of about five miles of riverfront levee and 7.2 miles of flank levees along Hurricane and Apple creeks. The cost was $233,000, including $78,000 in nonfederal expense. The project has prevented an estimated $6,751,000 in flood damage, through September 1993.

The Flood Control Act of 1962 authorized further improvements, consisting of raising and enlarging 12.3 miles of levees, altering the discharge line of the pumping station and constructing seepage control measures.

Preconstruction planning was completed in fiscal year 1985. It was determined that the project was not justified at the discount rate applicable to projects under consideration. The project has been placed in the deferred category.

Hennepin Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

Authorized by the Flood Control Act of June 22, 1946, this project consisted of rebuilding and enlarging 4.7 miles of riverfront levee and 1.2 miles of northern flank levee along Coffee Creek, which will also be enlarged.

Completed in 1940, the project protects about 2,900 acres on the east bank of the Illinois River immediately south of Hennepin. Construction cost is $116,000, including $7,000 in nonfederal expenses. Emergency levee repairs were performed in 1985 under Public Law 84-99 at a cost of $110,400.

It has prevented an estimated $2,944,500 in damage.

Hillview Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Construction of flood protection improvements within the Hillview Drainage and Levee District was authorized by the Flood Control Act of May 15, 1928. Protected are 13,070 acres along the left bank of the Illinois River northeast of Pearl.

Completed in 1934, work consisted of reconstruction of about seven miles of riverfront levee and 5.8 miles of flank levee along Little Sandy and Hurricane creeks. The project cost $208,000, including $69,000 in nonfederal expense. Flood damage estimated at $10,440,000 has been prevented through September 1993.

The Flood Control Act of 1962 authorized further improvements. These would consist of raising and enlarging 14.3 miles of levees, altering the discharge lines of two pumping stations and constructing a closure structure and seepage control measures.

Preconstruction planning was completed in fiscal year 1985. It was determined that the project was not justified at the discount rate applicable to projects under consideration. The project has been deauthorized.

Keach Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Keach Drainage and Levee District flood control structures protect a 9,340-acre area near Kampsville, Ill. The project was authorized by the Flood Control Act of May 15, 1928.

Work included reconstructing 5.7 miles of riverfront levee and 6.7 miles of flank levees along Apple Creek and Columbiana Slough. Work was completed in 1933 at a cost of $357,000, including $119,000 in nonfederal cost. As of September 1993, the project has prevented an estimated $7,571,000 in flood damage, through September 1993.

Lacy, Langellier, West Matanzas and Kerton Valley Drainage and Levee Districts, Illinois River

Flood Control Project Completed

(Rock Island District)

Flood control measures constructed under the Flood Control Acts of May 15, 1928, and June 22, 1936, protect about 7,800 acres of farmland and buildings in this district.

Completed in 1949, the flood control improvements are located on the west bank of the Illinois River, four miles

southeast of Havana. Construction included enlarging the upper (north) flank levee, raising and enlarging the riverfront levee while another portion of it was lowered, raising and enlarging the lower (south) flank levee and altering the pumping stations to handle a greater capacity. The cost of the work was $1,290,000 in federal funds and $36,000 in nonfederal expense.

Additional federal funds totalling $67,827 were spent to repair the levee in 1952 and 1953. In 1974 and 1985 other levee repairs were made under Public Law 84-99 at a federal cost of $28,410 and $247,800.

It has prevented an estimated $20,887,400 in flood damage.

Liverpool Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

This project consisted of reconstructing 1.4 miles of riverfront levee and 4.8 miles of flank levees along the Buckheart, Big Sister and Little Sister Creeks and constructing .7 mile of setback levee along the river. The work was authorized by the Flood Control Act of June 22, 1936.

The project protects a portion of Liverpool, including 22 buildings; a cemetery and a school; about 3,030 acres of farmland; 5 miles of dirt and gravel road; and farm buildings and equipment.

Completed in 1941, the project cost $125,000, including $7,000 in nonfederal expense. Damage prevented is $7,128,200.

Lost Creek Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

About 3,300 acres of farmland are protected by flood control works constructed in Lost Creek Drainage and Levee District. The construction was authorized by the Flood Control Act of May 15, 1928, and June 22, 1936. The protected area is located on the east bank of the Illinois River near Beardstown.

Completed in 1937, the project cost $152,000, including $52,000 in nonfederal expense.

Mason and Menard Drainage District, Sangamon River

Flood Control Project Completed

(Rock Island District)

Some 5,870 acres of farmland and buildings and several miles of highways on the north bank of the Sangamon about six miles northeast of Oakford are protected by this project.

Authorized by the Flood Control Act of June 22, 1936, the project consisted of reconstructing the levee, constructing a new levee along the riverfront and reconstructing the flank levee along Salt Creek. Work was completed in 1939 at a cost of $98,000, including $4,000 in nonfederal expense.

Mauvaise Terre Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Construction within this district was authorized by the Flood Control Act of May 15, 1928. The flood control structures, located about four miles north of Meredosia, protect 4,040 acres.

Work included reconstruction of .5 mile of riverfront levee and 4.5 miles of flank levee along Coon Run and Mauvaise Terre Creek.

The project was completed in 1936 at a cost of $87,000, including $29,000 in nonfederal expense. It has prevented an estimated $5,715,000 in flood damage through September 1993.

Meredosia Lake and Willow Creek Drainage and Levee districts

Flood Control Project Completed

(St. Louis District)

Improvements for the Meredosia Lake and Willow Creek Drainage and Levee districts were authorized by the Flood Control Act of June 28, 1938, to protect 8,116 acres along the left bank of the Illinois River near Meredosia.

Work consisted of reconstructing about 1.4 miles of riverfront levee and 1.1 miles of flank levee along Indian Creek; constructing 4.1 miles of new riverfront levee, 4.3 miles of new flank levee along Willow Creek and 11 gravity drains; and extending a gravity drain. The project was completed in 1944 at a cost of $278,000, which included $21,000 in nonfederal expense. An estimated $11,772,000 in flood damage has been prevented through September 1993.

Further improvements were authorized by the Flood Control Act of 1962. These would consist of constructing 15.9 miles of new or enlarged levee, closure structures, drainage facilities and seepage control measures and altering the discharge line of the pumping station. The estimated cost of construction (October 1986 price levels) is $7,920,000 in federal funds and $2,640,000 in nonfederal expense. These improvements have been deferred.

New Pankey's Pond, Special Drainage District

Flood Control Project Completed

(St. Louis District)

About 1,703 acres near Meredosia, Ill. are protected by this project authorized by the Flood Control Act of May 15, 1928.

The flood control improvements consisted of constructing approximately one mile of new levee along Indian Creek and reconstructing .4 mile of levee. Local interests assumed the cost of excavating .4 mile of cut-off channel, constructing two drainage structures and reconstructing .9 mile of levee along Indian Creek.

Completed in 1940, the project cost $21,500, including $9,900 in nonfederal expense. It has prevented an estimated $413,668 in damage through September 1993.

Nutwood Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Improvements for the Nutwood Drainage and Levee District were authorized by the Flood Control Act of May 15, 1928. Completed in 1932, they consisted of reconstructing about 7.8 miles of riverfront levee and 4.5 miles of flank levee along Macoupin and Otter creeks. Protected are 10,360 acres on the left bank of the Illinois River across from Hardin. Damage prevented through September 1993 totalled $13,830,000.

The Flood Control Act of 1962 authorized further improvements that would require constructing 12.4 miles of new or enlarged levee, altering the discharge line of the pumping station and constructing seepage control measures.

Preconstruction planning was completed in fiscal year 1986. Studies determined that the project was not justified at the applicable discount rate. This project has been placed in an inactive category.

Nutwood Drainage and Levee District

Levee Raise, Authorized Project Not Underway

(St. Louis District)

Under authority of Public Law 87-874 enacted on 23 October 1962, a Reevaluation Report for the Nutwood Drainage and Levee District was conducted in October 1984. This report recommended a levee raise to the authorized flood profile plus 2 feet for freeboard and included measures for seepage control and additional pumping capacity. The authorized flood profile was based upon the May 1943 peak flood discharge at Beardstown (115,000 cfs) coincident with a 2 percent chance (50-year recurrence interval) elevation from the Mississippi River at Grafton, Illinois. The Reevaluation Report was approved, but with the benefit-to-cost ratio less than unity at the then current interest rate, the project was not recommended for construction.

In October 1986, a General Design Memorandum (GDM) was prepared with basically the same approved plan as in the Reevaluation Report but varied in which the authorized flood profile would be accomplished. The GDM was approved, subject to Division comments, but not recommended for construction since the project was not economically justified at the then current interest rate. Consequently, the Nutwood D&LD was not funded and declared inactive on 3 June 1987.

On 18 July 1993, the riverfront levee breached and flooded approximately 10,360 acres of prime agricultural farmland as well as Illinois Routes 16 and 100 within the Nutwood D&LD. Illinois Routes 16 and 100 were under water for three months disrupting transportation access to Calhoun and Greene Counties. It is believed that transportation benefits from Illinois Routes 16 and 100 may have a significant impact on this project. Thus, fiscal year 1995 Appropriations Bill for Energy and Water Development funded the resumption of Preconstruction Engineering and Design (PED) in the form of a reconnaissance study to determine if the authorized project is justified and meets current days needs.

The ongoing reconnaissance study was initiated in September 1995 to update flood damage data and reexamine the authorized project to determine if it is economically justified. If not, and if a justified alternative is possible, then a cost shared feasibility study will be conducted. The Illinois Department of Transportation and the Nutwood D&LD are interested in implementing improvements of which one or both may serve as a nonfederal sponsor.

Total estimated cost of the Nutwood D&LD project as it appears in the GDM, price leveled to October 1995, is $9,940,000.

Oakford Special Drainage District, Sangamon River

Flood Control Project Completed

(Rock Island District)

This project consisted of reconstructing the riverfront levee and flank levee along Tar Creek. The work was authorized by the Flood Control Act of June 22, 1936, and completed in 1939.

The project protects about 2,600 acres of farmland and 3 miles of graded roads on the left bank of the Sangamon River just northeast of Oakford.

Construction cost $41,000 including $2,000 in nonfederal expense.

Pekin and La Marsh Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

Construction of flood control improvements within the Pekin and La Marsh Drainage and Levee District was authorized by the Flood Control Act of December 22, 1936. The work included raising and enlarging 5.6 miles of riverfront levee and .7 mile of flank levee along the creek. Although this work was completed in 1940, additional

raising and strengthening of the riverfront and upper-flank levees were completed in 1954.

About 3,010 acres of farmland and 1.6 miles of concrete highway on the west bank of the Illinois River opposite Pekin are protected by the structures.

Construction of the project cost $165,000, including $7,000 in nonfederal expense. Damages prevented are estimated at $716,700.

Remedial Work—Mouth of Sangamon River

Flood Control Project Completed

(Rock Island District)

The 250-mile-long Sangamon River, the largest tributary of the Illinois River, flows through central Illinois, forming a 5,140-square-mile watershed.

To alleviate flood damage to urban and agricultural areas within the watershed, construction of a new Sangamon River outlet channel was authorized by the Flood Control Act of June 22, 1936, and completed in 1949.

The new channel deprived adjacent refuge, hunting and fishing areas of water, affecting about 1,400 acres of prime waterfowl habitat. Areas that had formerly attracted hundreds of thousands of migratory waterfowl became barren waste mudland.

To again supply water for hunting areas, the Flood Control Act of 1962 authorized modification of the Sangamon River project. As first proposed, the modification was to consist of constructing a diversion channel, a controlling weir and a diking system. But after more detailed study, it became apparent that construction of a well system for providing and distributing water to the affected Sangamon bottoms would be more feasible.

The completed system, featuring six shallow wells, is capable of providing water on a seasonal basis and of maintaining adequate pond levels in game and fish conservation areas.

Water from the wells flows by gravity to the required locations, providing new breeding grounds and nesting areas for many species of migratory waterfowl. The modification provides optimum conditions for waterfowl reproduction in state and privately managed areas, even during drought years.

The modification project is considered a necessary part of the Mouth of the Sangamon River Flood Control Project. Its monetary benefits have not been evaluated, but the project is considered to have justification on the basis of intangible ecological benefits.

Rocky Ford Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

This project protects about 1,615 acres of farmland and several farm buildings along the Illinois River near Pekin. The project was authorized by the Flood Control Act of June 22, 1936.

About 2.6 miles of riverfront levee were raised and enlarged, 2.5 miles of flank levee were reconstructed, and .5 mile of new flank levee was constructed along the old and new channels of the Mackinaw River.

Completed in 1940, the project cost $116,000, including $8,000 in nonfederal expense.

Sangamon River near Springfield

Flood Control Project Completed

(Rock Island District)

This project improved the Sangamon River floodway by altering the Chicago and Illinois Midland Railroad Bridge over the river. The project site is about 30 miles northwest of Springfield. The construction was authorized by the Flood Control Act of 1936.

Construction was completed in 1940 at a cost of $98,000. No contribution was required from local interests.

Scott County Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

Reconstruction of about 6.3 miles of riverfront levee and four miles of flank levees along Mauvaise Terre and Walnut creeks in Scott County Drainage and Levee District was authorized by the Flood Control Act of May 15, 1928.

Completed in 1933, the project cost $173,000, including $58,000 in nonfederal expenses. Protecting 11,900 acres along the left bank of the Illinois River south of Naples, it has prevented an estimated $7,632,000 (through September 1993) in flood damage.

The Flood Control Act of 1962 authorized further improvements consisting of construction of 16.8 miles of new or enlarged levees, alteration of a discharge line at a pumping station and construction of closure structures and seepage control measures. Funds were never appropriated for these improvements, and this portion of the project was deauthorized by the Water Resources Act of 1986.

Seahorn Drainage and Levee District

Flood Control Project Completed

(Rock Island District)

This project, to raise and enlarge the levee system within the Seahorn Drainage and Levee District, was authorized by the Flood Control Act of June 22, 1936. The improvements are located along the west bank of the Illinois River about seven miles southwest of Havana.

Completed in 1939, the project cost $34,000, including $2,000 in nonfederal expense.

Sid Simpson Flood Control Project, Illinois River at Beardstown

Flood Control Project Completed

(Rock Island District)

Construction of flood control improvements along the Illinois River at Beardstown was authorized by the Flood Control Act of 1950.

Performed under the authorization were construction of a new section of floodwall to replace that lost and damaged and raising, strengthening and extending the remaining portion of the floodwall and adjacent levees of the South Beardstown Valley and Lost Creek Drainage and Levee districts. Work was completed in 1967 at a federal cost of $5,789,800.

The project protects against damage that would result from a recurrence of the Illinois River flood of record, which occurred in May 1943 and from the superimposing Illinois River backwater effect that could result from a 50-year flood on the Mississippi River. An estimated $75,858,100 in damage has been prevented by the project.

South Beardstown and Valley Drainage and Levee districts, Illinois River

Flood Control Project Completed

(Rock Island District)

Flood control improvements for the South Beardstown and Valley drainage and levee districts were constructed at Beardstown under authorization of the Flood Control Act of May 15, 1928, June 11, 1936, and June 28, 1938.

The project consisted of constructing 3.3 miles of setback levee along the river, degrading 1.2 miles of riverfront levee, reconstructing 3.7 miles of riverfront levee and approximately 3.8 miles of lower-flank levee and extending .1 mile of lower-flank levee.

Completed in 1941, the improvements protect about 10,300 acres of farmland. Construction cost was $442,000, including $50,000 in nonfederal expense.

Other flood control improvements at Beardstown are discussed under "Sid Simpson Flood Control Project, Illinois River at Beardstown, Flood Control Project Completed."

Spring Lake Drainage and Levee District, Illinois River

Flood Control Project Completed

(Rock Island District)

Construction of a flood control project for this district was authorized by the Flood Control Act of June 22, 1936, to protect about 13,120 acres of farmland, 1.5 miles of highway, 69 homes, 3 schools and a state fish and game preserve. The protected area is located on the east bank of the Illinois River about 12 miles southeast of Pekin.

Completed in 1941, the project consisted of raising and enlarging 13.3 miles of riverfront levee, 1.9 miles of upper-flank levee along the Mackinaw River and .6 mile of lower-flank levee (southern). Construction cost $197,000, including $11,000 in nonfederal expense. Damages prevented estimated at $21,829,900.

McGee Creek Drainage and Levee District

Flood Control Project Completed

(St. Louis District)

A flood protection project for McGee Creek Drainage and Levee District, opposite Meredosia, was authorized by the Flood Control Act of 1962.

The work consisted of reconstruction of 15.7 miles of levee, including the set back of approximately 6,000 feet of riverfront levee and construction of a new pumping plant, closure structures and measures to control underseepage. The project protects about 12,080 acres of farmland from the 100-year flood.

The cost of the project was $25,500,000 in federal funds and $930,000 in nonfederal expense. Construction was completed in January 1986.

North Branch, Chicago River

Flood Control Project Underway

(Chicago District)

Construction of reservoirs at Bannockburn and Deerfield on the West Fork and at Green Oaks on the Middle Fork was authorized by the Water Resources Development Act of 1986. Also authorized was reimbursement to local interests of 50 percent of the planning and construction costs for three existing reservoirs on the West Fork and an existing reservoir on the Middle Fork.

Construction of the Bannockburn Reservoir was started in August 1988 and completed in June 1990.

Construction of the Deerfield Reservoir was initiated in July 1990 at a federal cost of $4,775,790. Construction was completed in July 1994.

The construction contract for the Green Oaks Reservoir was awarded in August 1990. Construction was completed October 1992 at a total cost of $3,768,707.

Total construction cost of the project to September 30, 1993, was $12,904,047. Of this amount, $11,462,567 was federal funds, and $1,441,480 was nonfederal funds.

Chicagoland Underflow Plan—O'Hare Reservoir

Flood Control Project, Authorized Project Underway

(Chicago District)

In the Water Resources Development Act of 1986,

Congress authorized construction of a 1,050-acre-foot reservoir in the O'Hare system, one of four combined sewer systems included in the Tunnel and Reservoir Plan. (That plan proposes a system of tunnels and reservoirs to alleviate pollution and flooding problems caused by inadequate watercourse capacity in Metropolitan Chicago's combined sewer area).

The estimated cost of the authorized reservoir is $32.8 million. Two local cooperation agreements have been signed—the first in July 1990; the second in July 1991. The local sponsor is the Metropolitan Water Reclamation District of Greater Chicago.

The first construction contract ($300,000) was completed in June 1991. The second construction contract ($10.3 million) was initiated in October 1991. The reservoir is scheduled to be completed in 1996.

Chicagoland Underflow Plan (McCook and Thornton reservoirs)

Flood Control Project, Authorized Project Underway

(Chicago District)

Along with the Chicagoland Underflow Plan O'Hare Reservoir, this project is intended to alleviate sewer backup flooding within the combined sewer area of Metropolitan Chicago.

Authorized by the Water Resources Development Act of 1988, this project will consist of constructing a 32,100-acre-foot reservoir in McCook, Ill., and a 14,600-acre-foot reservoir at the Thornton Quarry in Thornton, Ill. The Thornton Reservoir will be combined with a congressionally authorized, but unconstructed U.S. Soil Conservation Service reservoir (9,600-acre-foot capacity.)

The estimated construction cost of the McCook Reservoir is $481.6 million ($361.1 million federal; $120.5 million nonfederal). The estimated cost of the Thornton Reservoir is $154.4 million ($115.9 million federal; $38.5 million nonfederal). The scheduled construction start is dependent upon the availability of funds. The local sponsor for the reservoirs will be the Metropolitan Water Reclamation District of Greater Chicago.

Farmer's Drainage and Levee District, Sangamon River

Flood Control Project, Authorized Project Not Underway

(Rock Island District)

The first federal project constructed in Farmer's Drainage and Levee District was authorized by the Flood Control Act of June 22, 1936. Completed in 1941, it consisted of rebuilding the riverfront levee along the Sangamon River and building new riverfront and flank levees. The cost was $160,000, including $4,000 in nonfederal expense.

A modification of the original project was authorized in 1962. Under this authorization, low sections of the levee would be raised and the downstream levee would be extended for about 2.4 miles. The estimated cost is $3,548,000 of which $3,500,000 would be federal expense and $48,000 nonfederal.

Farmer's and Herget Drainage and Levee districts were inundated by the record flood of May, 1943. If the 1962 modification were constructed, the two districts would be protected from a recurrence of the 1943 flood. Included in the flood plain that would be protected are 7,950 acres of farmland, one mile of railroad and several highways and farm buildings.

The 1962 modification has never been funded. The project was deauthorized in 1986.

Kankakee River, Illinois

Flood Control Project, Authorized Project Not Underway

(Chicago District)

The Water Resources Development Act of 1986 authorized a project to control ice on the Kankakee River near Wilmington, Ill. But before the act was passed, a temporary project was begun under another authority, the River Ice Management Program of the Cold Regions Research and Engineering Laboratory (CRREL), a Corps research laboratory in Hanover, N.H.

The River Ice Management Program is a research and development program for controlling river ice. The Kankakee River project is an effort to demonstrate the effectiveness of using a thermal discharge from the Dresden Power Station cooling lake to break up ice before jam conditions develop during the spring thaw.

Installation of three pipelines to convey water from the cooling ponds to the river was completed in the spring of 1987 under a contract for $517,000.

The effectiveness of the plan was tested in January and February of 1988. It was operated twice during the winter and both times an ice free channel was opened through dangerous ice jams. When the break-up occurred in late winter, ice from upstream flowed unobstructed through the project area into the Illinois River. The project was considered to be highly successful since there was no flooding damage reported in the area.

The Chicago District is conducting a flood control study for the city of Wilmington and Will County under authority of the 1948 Flood Control Act. The district is determining whether installing an ice control structure, or ice boom, upstream of the Wilmington dam and raising the dam is an economically feasible way to reduce ice jam flooding within the city of Wilmington. Also, this study will propose to convert the thermal discharge project to a permanent installation and then turn it over to a local sponsor for operation in future years.

Little Calumet River and Tributaries, Illinois and Indiana

Flood Control Project, Authorized Project Underway

(Chicago District)

A flood control plan for the Indiana portion of the project area was authorized by the 1986 Water Resources Development Act. The plan is discussed under "Little Calumet River, Indiana" in the Indiana state book.

Meredosia, Illinois, and Meredosia, Willow Creek, and Coon Run Drainage and Levee districts

Flood Control Project, Authorized Project Not Underway

(St. Louis District)

This project, authorized by the Flood Control Act of Oct. 23, 1962, will protect the community of Meredosia and the Meredosia, Willow Creek and Coon Run Drainage and Levee districts.

Included in the project will be construction of 18,400 feet of new levee and reconstruction of 8,200 feet of levees between miles 67 and 72.2 on the left bank of the Illinois River. Other improvements will consist of seepage control measures, a closure structure, two pumps, an interceptor sewer and gravity drains.

The estimated cost of the project (October 1993 price levels) is $6,496,330 in federal funds and $2,164,480 in nonfederal expense. This project has been placed in the inactive category.

Peoria Levees, Illinois

Flood Control Project, Authorized Project Not Underway

(Rock Island District)

The Flood Control Act of 1962 authorized a project to reduce flood damage along Peoria's waterfront. Construction would include earth levees, a concrete flood wall, two pumping plants and modification of existing interior drainage facilities.

The estimated cost is $26,650,000 (1971 price levels), of which $23,200,000 would be the federal share and $3,450,000, the nonfederal.

The project was deauthorized in fiscal year 1986.

William L. Springer Lake

Flood Control Project, Authorized Project Not Underway

(Rock Island District)

The Flood Control Act of 1962 authorized construction of a multipurpose reservoir at Oakley, Illinois. Project components would consist of a multipurpose dam and lake, a subimpoundment near the mouth of Friends Creek and a dual-use recreation channel and floodway extending from Decatur downstream to the mouth of Salt Creek.

The project would provide flood control, water supply, recreation and fish and wildlife benefits. The project has been deauthorized.

Illinois and Fox rivers, LaSalle County, S.E. Ottawa, Illinois

Flood Control Project Underway

(Rock Island District)

The April 1989 Definite Project Report recommended construction of 4,800 linear feet of levee and 300 feet of floodwall to protect a residential community, including a local high school. Plans and specifications were completed in late 1993; construction of the project is tentatively scheduled to begin in 1997, subject to project funding. There is no FY96 funding for this project.

The construction cost estimate is $2.8 million, including a local share of $702,000. Projected annual benefits are approximately $237,300.

Illinois River, Liverpool, Illinois

Flood Control Project Underway

(Rock Island District)

The Liverpool, Ill., Definite Project Report with Environmental Impact Statement, dated October 1989, recommended construction of a 50-year levee to protect the Village of Liverpool from flooding by the Illinois River. The total cost of the project is estimated to be $2.1 million, with a nonfederal share of $525,000. Construction is scheduled to begin in 1996.

Mackinaw River Basin, Illinois

Flood Control Study Completed

(Rock Island District)

This study would determine the feasibility of constructing improvements in the Mackinaw River Basin for flood control, water supply, recreation, water conservation, and other related purposes. It was authorized June 23, 1964, by the House Public Works Committee.

Water-related problems in the basin are varied. The Mackinaw frequently overflows, damaging highly productive farmland. Floods also often damage private levees. Bloomington and Normal, Ill., both have long-range water supply needs. Woodford County is opposed to dam and reservoir construction there.

The Corps held a preliminary meeting May 17, 1966, at Eureka, Ill., to obtain public comment, and also coordinated with local, state and federal agencies. Lacking local interest, this study was classified as inactive. The study was reactivated, however, in fiscal year 1983, and funds were appropriated to begin a reconnaissance study in fiscal year 1984. This study was completed in 1986, but no project was recommended.

Vermillion River, Illinois

Flood Control Study Completed

(Rock Island District)

The Vermillion River, a tributary of the Illinois River, drains an area of about 1,315 square miles. Except for an improved reach upstream from river mile 86.4, the river follows a meandering course for a distance of about 110 miles. The greater part of the watershed is a nearly level plain ranging in elevation from 600 to 650 feet above mean sea level. The basin has a history of flooding, both urban and rural. Pontiac and Streator, Ill., sustain flood damage, as do agricultural areas near Pontiac.

The committee on Public Works and Transportation authorized a study of the Vermillion River Basin on Sept. 23, 1982. The study, which investigated flood control, recreation, water supply and low-flow augmentation needs, was begun in October 1983. It was completed in September 1986. No project was recommended under the authorization.

Fox River, Illinois

Flood Control Study Underway

(Chicago District)

The purpose of this study is to investigate the nature and severity of flooding on the Fox River, to investigate alternative measures and formulate plans to reduce the problem, to evaluate the economic and environmental impacts and feasibility of the considered plans and to determine the federal interest in implementation of feasible alternatives.

The original study was authorized July 6, 1949, by a Resolution of the House Public Works Committee, with later modifications. That study, completed in September 1984, concluded that modification of the McHenry and Algonquin dams in McHenry County and floodproofing of homes in Kane County are economically justified. In order to expedite the construction time, the plan is presently being studied under authority of Section 205 of the 1948 Flood Control Act, as amended. This authority is used to construct smaller-scale flood control projects.

The 205 study will present a more detailed analysis of the dam modifications and the floodproofing measures. State efforts to model the river will be incorporated in the final study.

Henry to Naples, Illinois River, Illinois

Flood Control and Siltation Study Completed

(Rock Island District)

This study addressed alternatives for flood and siltation control in the 130-mile reach of Illinois River between Henry and Naples, Ill., including Peoria Lake.

Authorized by Public Law 98-181 in the fiscal year 1984 Supplemental Appropriations Bill, the study was begun in 1984.

A reconnaissance report for the area upstream of Peoria was completed in April 1987 and recommended a levee improvement project for the East Peoria Drainage and Levee District. This project is proceeding under authority of Section 205 of the 1948 Flood Control Act, as amended. Another project investigated in this report involves removing sedimentation from Peoria pool and was pursued under the Upper Mississippi River System Environmental Management Program.

Another reconnaissance report was completed for the area downstream of Peoria in 1987. This report concluded that a levee improvement project was warranted for the Pekin and LaMarsh Drainage and Levee District Study, however, there was no local support expressed to financially participate in further studies at that time.

La Moine River, Illinois

Flood Control Study Underway

(Rock Island District)

The need and economic justification for constructing improvements for flood control, recreation, water conservation and related purposes in the La Moine River Basin has been under investigation in this study. It was authorized by the Senate and House Public Works committees on July 11, 1967, and Oct. 19, 1967, respectively.

The Corps held a public meeting July 24, 1970, at Carthage, Ill., to determine the water resources needs of La Moine River Basin residents. The La Moine Valley Association said a multiple-purpose reservoir was needed for flood control, water supply and recreation.

Coordinating with federal, state and local agencies, the Corps conducted a preliminary feasibility study of the basin's water resources needs. The preliminary study investigated four alternative plans—combinations of mainstream and tributary reservoirs and downstream channel improvements. None of the plans proved to be economically justified.

The Corps discussed the results of the preliminary study at another public meeting Feb. 13, 1975, in Carthage. Later, the La Moine Valley Association requested a study of two additional reservoir plans. The study of these two plans is now complete, and neither is economically justified.

The Corps submitted a final report to Congress on the La Moine River Study. It found that all plans investigated lacked economic justification.

Upper Des Plaines River Basin, Illinois and Wisconsin

Flood Control Study Underway

(Chicago District)

The Upper Des Plaines River Flood Damage Reduction Study was initiated in response to a request by the state of Illinois after the flood of September 1986-October 1986. This flood caused damage estimated at $40 million, the

evacuation of 15,000 residents and damage to 10,000 homes and 263 businesses.

Work on the reconnaissance phase of this study under the Chicago-South End of Lake Michigan authority began in February 1988 and was completed in February 1989. The reconnaissance study showed that there are feasible flood control opportunities that would be of federal interest and recommends the undertaking of the feasibility study.

The district is coordinating with the state of Illinois on a Feasibility Cost Sharing Agreement. The district is currently conducting a feasibility study that is cost-shared by the state.

Claypool Drainage and Levee District, Illinois

Flood Control Study, Authorized Study Not Underway

(Rock Island District)

Authorized October 8, 1958, by a resolution of the Senate Public Works Committee, this study would determine the advisability of providing flood control and major drainage improvements within the Claypool Drainage and Levee District.

Lacking local support, this study is inactive.

Farmdale Reservoir, Tazewell County

Flood Control Study, Authorized Study Not Underway

(Rock Island District)

Farmdale Reservoir is a single-purpose (flood control) dry reservoir completed in 1954 as part of the Farm Creek project. Authorized May 5, 1966, by resolution of the House Public Works Committee, this study would determine the feasibility of constructing a permanent recreation lake at Farmdale.

The Corps held a public meeting on the study in Pekin, Ill., April 28, 1967. At the meeting, local interest favored a recreational lake with at least 200 acres of surface area. Interest following the meeting, however, was insufficient to warrant planning, and the study was deferred.

Kickapoo Creek, Peoria County, Illinois

Flood Control Study, Authorized Study Not Underway

(Rock Island District)

The purpose of this study was twofold—to determine the feasibility of constructing a project to reduce urban and agricultural flooding and to define recreation, water supply and related water and land resources needs. The study was authorized October 5, 1966, by the House Public Works Committee.

Although local interests wanted a reservoir for flood control, water supply and recreation purposes, interest was insufficient to warrant continuing the study, and it is now classified inactive.

Spoon River, Illinois

Flood Control Study, Authorized Study Not Underway

(Rock Island District)

Water resource problems in Fulton County, Ill., are under investigation in this study, authorized by Section 208 of the Flood Control Act of October 27, 1965.

The Corps held a public meeting March 26, 1968, to determine the area's water resource problems. Construction of a lake for flood control and recreation was proposed. However, many local residents opposed the plan.

Lacking sufficient local interest, this study was classified inactive.

Upper Sangamon River, Including Goose Creek, Illinois

Flood Control Study, Authorized Study Not Underway

(Rock Island District)

Modifying the authorized Springer Lake project on the Sangamon River to provide a subimpoundment on Goose Creek in the vicinity of Monticello, Illinois, is under consideration in this study.

Authorized by two resolutions adopted April 5, 1965, and Aug. 23, 1966, by the Senate Public Works Committee, the study would also investigate the feasibility of providing improvements in the Upper Sangamon River in the vicinity of Mahomet and Monticello for flood control, recreation, water supply, low-flow augmentation and other related water and land resource purposes.

Lacking local interest and support, the study was classified inactive.

Illinois River, East Peoria, Illinois

Flood Control Study Underway

(Rock Island District)

The East Peoria Drainage and Levee District is the nonfederal sponsor for the East Peoria, Ill., flood damage reduction study authorized under Section 205 of the 1948 Flood Control Act, as amended.

The study evaluated a levee raise to the existing levee system that protects about 600 industrial and 400 residential acres. Three levels of protection were evaluated. The cost of the project will vary from $5.5 million (200-year) to nearly $8 million (standard project flood). The benefit-to-cost ratios for the three levels approximate 10.

Sangamon River, Chandlerville, Illinois

Flood Control Study Underway

(Rock Island District)

The ongoing feasibility study is being conducted under Section 205 of the 1948 Flood Control Act, as amended. The investigation addresses improvements to two existing levees—Bell and Town Levees—that currently provide a 2-year level of protection from Sangamon River flooding at Chandlerville.

Stevens Creek, Village of Forsyth, Illinois

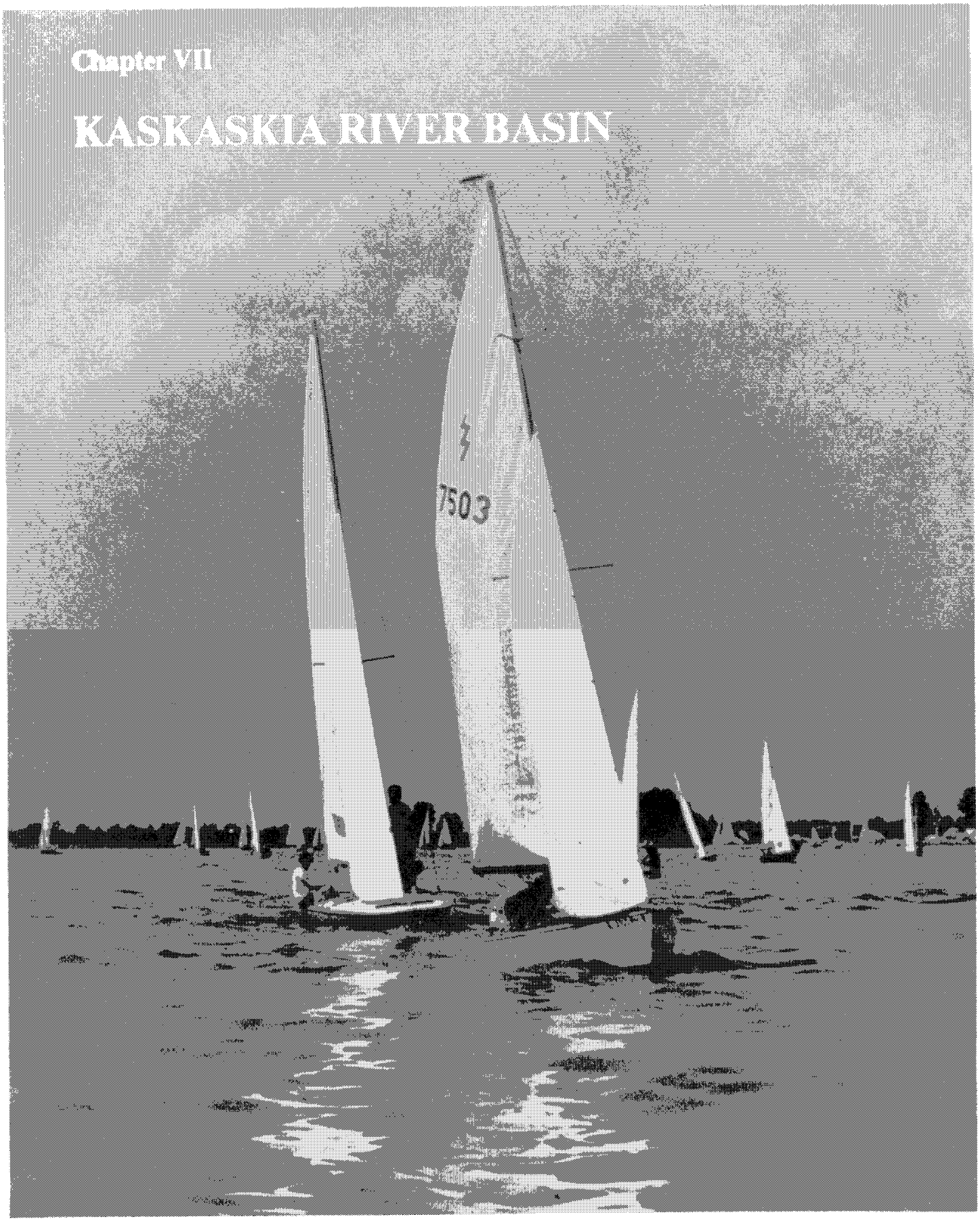
Flood Control Study Underway

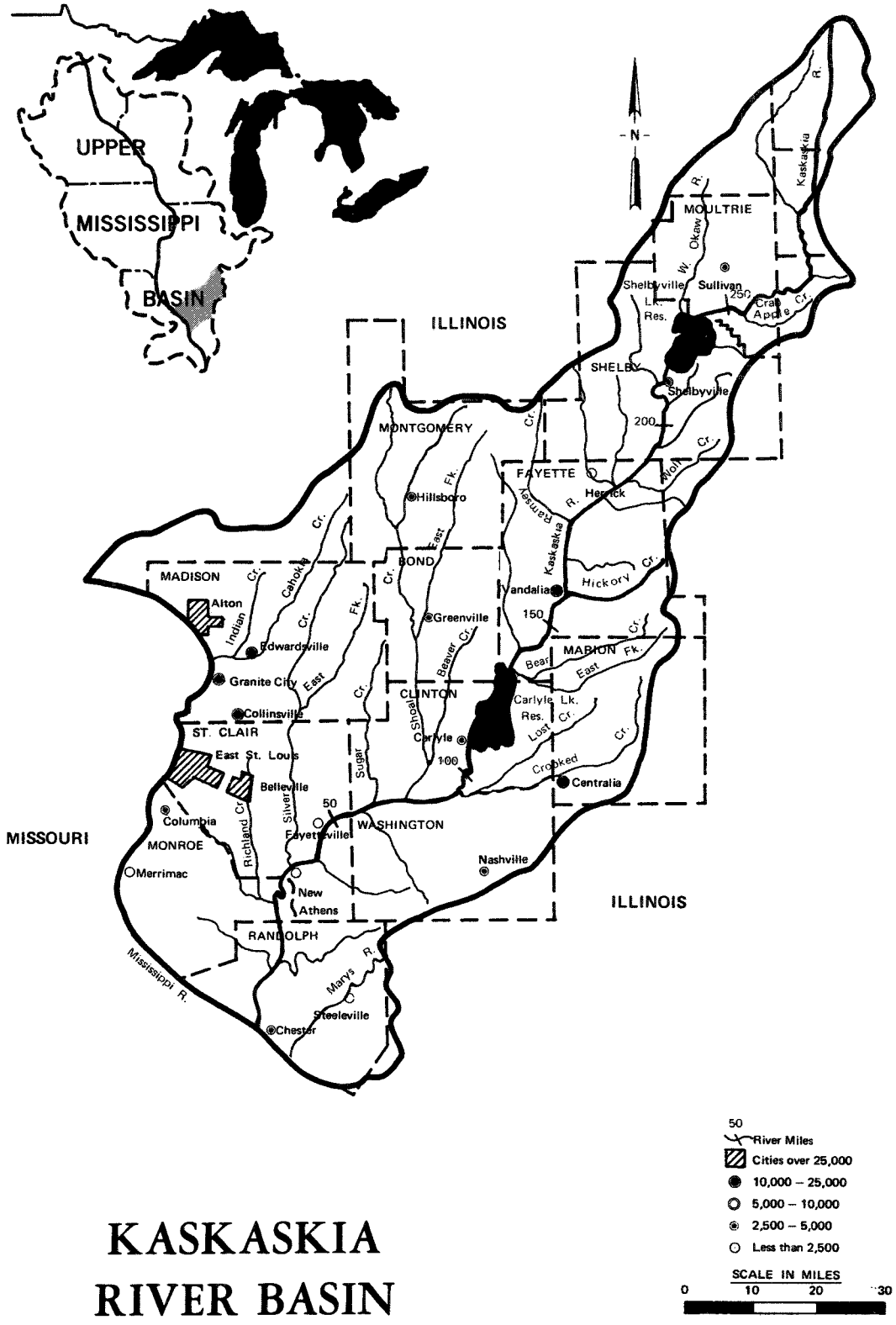
(Rock Island District)

A Section 205 reconnaissance study was initiated in fiscal year 1992 to investigate flooding in a residential neighborhood on Stevens Creek. Due to flooding restrictions, the Corps will be investigating a nonstructural alternative for flood damage reduction.

Chapter VII

KASKASKIA RIVER BASIN





KASKASKIA RIVER BASIN

Kaskaskia River Basin Description

The Kaskaskia River rises in central Champaign County, flows southwesterly in a meandering course for about 325 miles, and empties into the Mississippi River at Mile 118 above the mouth of the Ohio River. Its basin comprises an area of about 5,840 square miles and includes parts of 12 counties in the central to southwestern portion of Illinois.

Elevations in the basin vary from 740 feet above mean sea level (m.s.l.) at the headwaters to 385 feet above m.s.l. at the emergence of the river into the Mississippi River floodplain. The terrain is mostly flat but becomes somewhat hilly toward the southwest. Most of the basin was crossed by ice sheets during the glacial periods, but glaciation had little influence on the general topography. Karst (sink-hole) topography is evident near the edge of the basin, to the east of the Mississippi River bluffs in the Dupo-Columbia vicinity.

Climate is moderate, with a mean annual temperature of 54.7 degrees (Fahrenheit), but with extremes ranging from -27 degrees to 115 degrees. Average annual rainfall is 38.7 inches. Snowfall averages about 20 inches per year. These averages tend to mask the fact that the basin is subject to frequent weather changes and temperature fluctuations throughout the year. Heavy rainfall may continue over several days. During August 1946, for example, 17.5 inches of rainfall were recorded during an eight-day period.

Before reservoirs were available to help regulate the river, the Kaskaskia was noted for its variable flows. Although average flows at New Athens were on the order of 3,774 cubic feet per second (c.f.s.), the median (the flow expected 50 percent of the time) was only 1,290 c.f.s. Extremes recorded at New Athens varied from a 1943 high of 83,000 c.f.s. to a 1954 low of 40 c.f.s.

Farming is a major occupation in the basin. About 87 percent of the land area is classified as cropland, pasture or forest, and more than 40 percent of the population is engaged in agribusiness. Industrial activities include oil and gas production coal mining, petrochemical production and miscellaneous small-scale manufacturing.

The projects discussed in the following paragraphs have helped or will help to satisfy basin needs for flood control, water supply, water quality, land-based recreations, fish and wildlife preservation, pleasure boating and navigation.

Corps of Engineers' Projects and Studies

Kaskaskia River Navigation

Commercial Navigation Project Completed

(St. Louis District)

The River and Harbor Act of Oct. 23, 1962, authorized this project to improve navigation on the lower 50 miles of the 325-mile-long Kaskaskia River. The improvement consisted of constructing a 9-foot-deep, 225-foot-wide channel to upstream Fayetteville, Ill. The channel was enlarged where required; sharp bends in the channel were eliminated; necessary bridge and utility alterations were made; and a dam with a single lock, 84 feet wide and 600 feet long, was constructed at mile .8. The project reduces storage allocations in Carlyle and Shelbyville lakes to provide water for navigation.

In addition to assuming a portion of the construction costs, local interests were required to establish an appropriate agency empowered to restrict the withdrawal of water from the river below Carlyle Dam and to ensure replenishment of withdrawn water.

The federal cost of construction was $146,000,000; the local contribution was $7,227,000. Construction was completed in August 1989. Over 4 million tons of commodities were locked through the lock in 1989. Tonnage in 1995 was 1,134,800 tons.

Benefits resulting from the project consist of savings in the cost of transporting commodities to markets that are located along the inland water system.

Carlyle Lake, Kaskaskia River

Flood Control Project Completed

(St. Louis District)

Operation of Carlyle Lake, constructed under authorization of the Flood Control Act of June 28, 1938, partially protects about 75,000 acres downstream on the Kaskaskia River from flooding and reduces flood stages on the middle and lower Mississippi River. The reservoir is located at Mile 107 on the Kaskaskia, about one mile above Carlyle, Ill.

Constructed as part of the project was a compacted earth-fill dam with a concrete spillway section. The crest of the dam rises 67 feet above the stream bed and is 6,570 feet long.

Topography near the dam necessitated construction of two earth-fill saddle dams east of Carlyle to contain the maximum pool level proposed for the reservoir. The maximum reservoir area is 57,500 acres, and the maximum storage capacity is 983,000 acre-feet. Of this amount, 700,000 acre-feet is reserved for flood storage, 233,000 for joint-use purposes and 50,000 held for conservation and sediment retention.

Public facilities for picnicking and camping, boating (launching ramps and docks) and related activities are available at Carlyle Lake. Five major recreation areas (more than 800 acres) are operated by the Corps. The Illinois Department of Conservation operates two other sites - the 400-acre South Shore State Park and the 3,000-acre Hazlet State Park. In addition, two subimpoundment areas of about 3,700 acres are operated by the Illinois Department of Conservation of waterfowl management.

The project cost was $46,458,000, which included $3,639,000 in nonfederal contributions for water supply.

Dively Drainage and Levee District No. 23

Flood Control Project Completed

(St. Louis District)

Authorized by the Flood Control Act of July 3, 1958, this project protects 1,100 acres of farmland in Fayette County, Ill.

Constructed were 3.5 miles of new and enlarged earth levee, drainage structures and necessary closure structures. The work also included minor Kaskaskia River channel straightening.

The project was completed in October 1975, at a federal cost of $1,720,000 and a nonfederal expense of $100,000.

Lake Shelbyville, Kaskaskia River

Flood Control Project Completed

(St. Louis District)

In conjunction with Carlyle Dam, Lake Shelbyville benefits the Kaskaskia River Basin by providing flood control, water supply, fish and wildlife conservation, recreational development and low-flow augmentation. It also reduces Mississippi River flooding.

The project was authorized by the Flood Control Act of July 3, 1958, and consists of a compacted earth-fill dam with a concrete spillway section. The crest of the dam is 108 feet above stream bed and extends some 3,000 feet in length. The project is located adjacent to the city of Shelbyville, Ill., about 222 miles above the mouth of the Kaskaskia River.

The maximum lake area is 25,300 acres and maximum storage capacity is 684,000 acre-feet. About 474,000 acre-feet are reserved for flood control, 180,000 acre-feet for joint-use purposes and 30,000 acre-feet for sediment retention.

Recreational facilities include picnicking, camping, boating, fishing and related activities. The Corps operates 10 major sites, totalling about 2,450 acres.

Two major state parks, totalling about 2,950 acres, are managed by the Illinois Department of Conservation. In addition, two areas on the West and Upper Kaskaskia arms, totalling about 2,800 acres and 3,500 acres, respectively, are managed by the Illinois Department of Conservation for intense wildlife management.

Construction began in April 1963 and is complete. The project cost $44,000,000 in federal expenditures and $17,050,000 in nonfederal expenditures.

New Athens, Kaskaskia River

Flood Control Project Completed

(St. Louis District)

This St. Clair community was subject to severe and costly flooding. To remedy the problem, Congress authorized a project in the Flood Control Act of July 3, 1958, to protect the town against the 50-year flood.

Constructed were 6,875 feet of earth levee, a pumping station, drainage structures, necessary closure structures and sewer alterations.

Completed in 1981, the project cost $1,983,000 in federal funds and $134,000 in nonfederal expenditure.

Shoal Creek, Illinois

Flood Control Study Completed

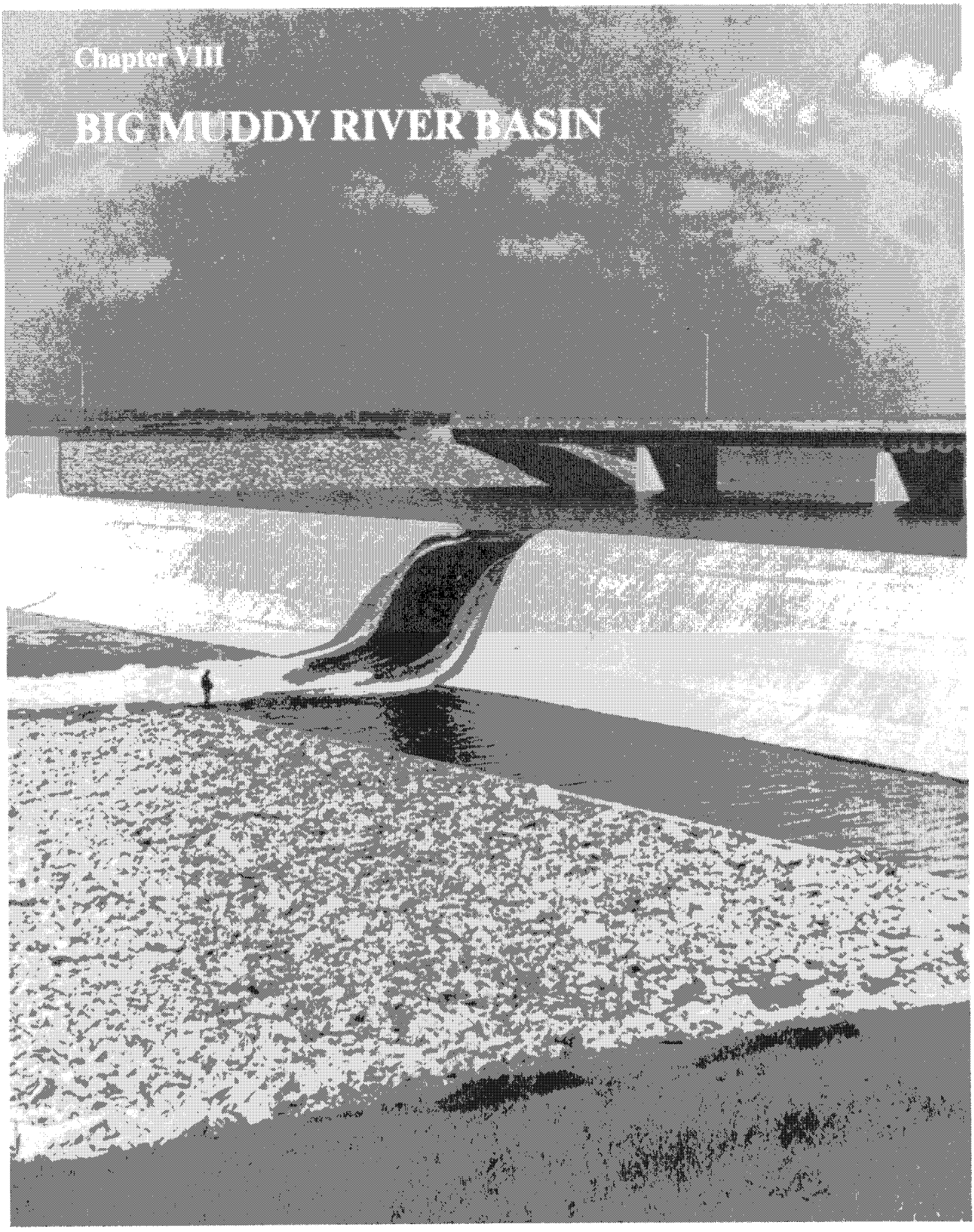
(St. Louis District)

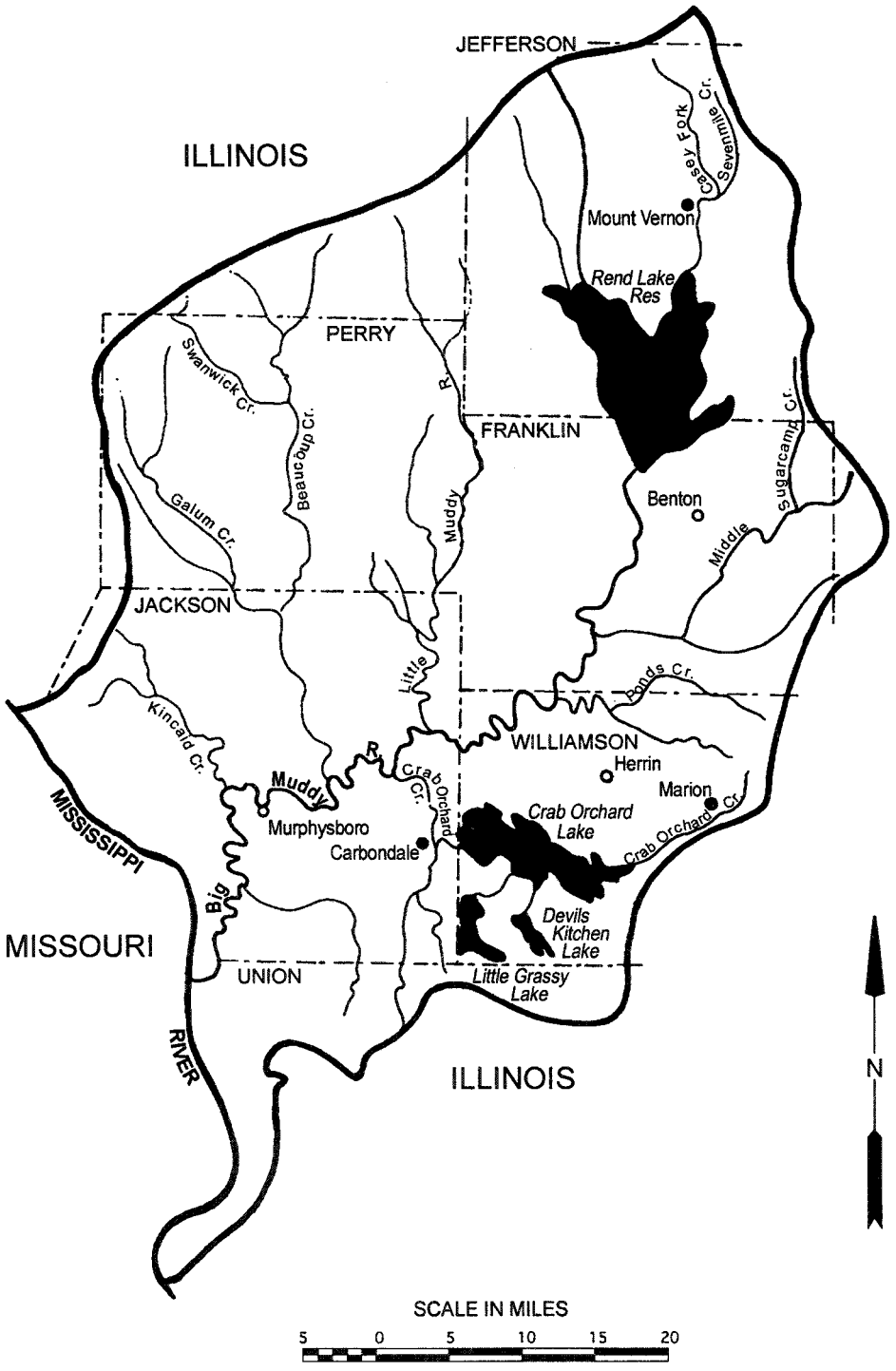
Under consideration in this study was the advisability of constructing a project for flood control, municipal and industrial water supply, and related water and land resources uses in the Shoal Creek area. A tributary of the Kaskaskia River, Shoal Creek has 955-square-mile drainage area.

None of the proposed improvements was found to be economically justified. Work on the study was therefore suspended.

Chapter VIII

BIG MUDDY RIVER BASIN





BIG MUDDY RIVER BASIN

Big Muddy River Basin Description

Located in the southwestern portion of Illinois, the Big Muddy River Basin includes parts of 11 counties, but five of these form the major portion of its 2,387-square-mile area.

The source of the Big Muddy River is in northern Jefferson County. The river flows in a southwesterly direction for 155 miles to the Mississippi, into which it drains at Mile 75.5 above the mouth of the Ohio River. The Big Muddy's average flow (measured at Murphysboro) is 1,788 cubic feet per second (c.f.s.), although an extreme low of zero discharge was recorded during the 1940-1941 drought and a record high flow of 42,900 c.f.s. was measured at Plumfield in May 1961.

Terrain within the basin varies from flatlands and gently rolling hills in the glaciated northern section to hills in the central and eastern portions and, finally, to flat lowlands near the mouth. Elevations in the basin vary from about 310 feet above mean sea level (m.s.l.) to 1,030 feet above m.s.l.

The climate is typical of the mid-Mississippi River area: mean monthly temperatures peak at 78 degrees Fahrenheit in the summer and decline to 36 degrees in the winter. Average annual rainfall is about 42 inches, although a high of 65 and a low of 29 inches have been recorded. Snowfall averages 13 inches annually.

More than 50 percent of the basin is cropland and another 30 percent is forest. Pasture and urban areas constitute about 5 percent of the basin area.

Declining employment opportunities in agriculture and mining, the basin's major industries, have caused a decrease in the basin's population since the 1930s. Inadequate supplies of municipal and industrial water have frustrated attempts to expand the economic base of the area. Although population is projected to increase over the next 50 years, the rate of increase will probably be less than the national average and below that of many other basins throughout Illinois.

Corps of Engineers' projects in the basin are discussed in the following paragraphs. These projects offer a means of expanding the economy of the area by providing flood control, water supply, improved water quality and recreational benefits.

Corps of Engineers' Projects and Studies

Big Muddy River Comprehensive Basin Study

Comprehensive Study Completed

(St. Louis District)

The Big Muddy River Basin was one of 16 river basins selected for study by the interdepartmental staff committee of the Ad Hoc Water Resources Council (WRC).

Incorporated into the Big Muddy study was an already underway study of the feasibility of improving the Big Muddy and Beaucoup Creek for navigation.

Recommended as a result of the Big Muddy Study were water resource plans and programs for further study. Included in the final study report was a proposal for a system of multipurpose improvements and floodplain zoning.

The report was submitted to the WRC on May 3, 1971, and forwarded to the Council on Environmental Quality in July 1972.

Rend Lake

Multi-Purpose Project Completed

(St. Louis District)

Construction of this multipurpose lake on the Big Muddy River was authorized by the Flood Control Act of Oct. 23, 1962. It is located in Jefferson and Franklin counties, about three miles northwest of Benton, Ill.

The Rend Lake dam consists of a compacted earth embankment, which crests approximately 54 feet above the valley floor. The dam has a reinforced concrete spillway and an auxiliary earth spillway in the east abutment. The combined length of the dam and spillway is about 10,600 feet. The lake has a surface area of 24,800 acres and provides storage for 294,000 acre-feet of water at full pool. Of this amount 109,000 acre-feet are reserved for flood storage, 160,000 acre-feet for joint use purposes and 25,000 acre-feet for conservation and sediment retention.

Rend Lake substantially reduced flooding in the Big Muddy River Valley and has some effect on Mississippi River floods. It also provides an assured source of water supply for present and future needs, fish and wildlife conservation and recreation. In addition to these primary benefits, the project contributes to the reorientation of the depressed economy of the region.

Two subimpoundment dams have been constructed on upper arms of the lake to enhance the fish and wildlife value of the project. Recreational facilities have been developed for picnicking and camping, boating (launching ramps and docks) and related activities.

Construction of the project is complete. The cost was $53,700,000, of which $44,700,000 was paid by the federal government and $10,000,000 by nonfederal interests for water supply.

Carbondale Model City Neighborhood

Flood Control Project Completed

(St. Louis District)

A reconnaissance study of the flooding problem at the

Carbondale Model City Neighborhood was authorized April 13, 1970, under Section 205 of the Flood Control Act of 1948, as amended.

The study report, completed at a cost of $8,000, proposed construction of storm sewers and ditches to complement Department of Housing and Urban Development urban renewal projects in the Model City neighborhood. A review indicated that construction of storm sewers and ditches was beyond the scope of the Section 205 authority. The scope of the proposed work was therefore reduced to include construction of ditches only. The project was authorized May 13, 1975.

Construction began November 29, 1977, and was completed in May 1979 at a cost of $610,000.

Devil's Kitchen Dam, Grassy Creek

Flood Control Project Completed

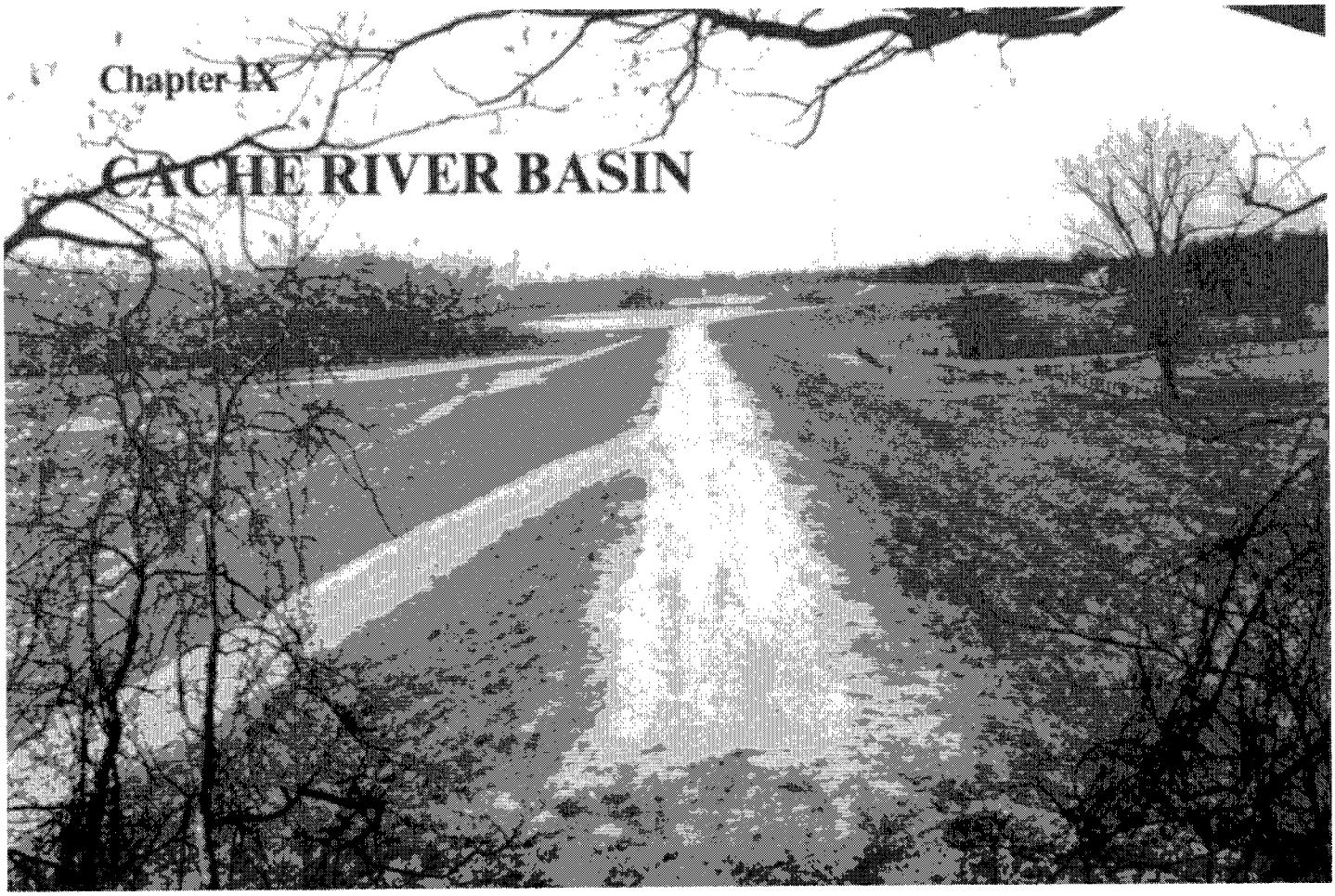
(St. Louis District)

Devil's Kitchen Dam Project is located in Williamson county on Grassy Creek, about 8.5 miles southeast of Carbondale. It is one of three structures along with Little Grassy Dam and Crab Orchard Dam that impound water for the Crab Orchard National Wildlife Refuge.

Begun as a land utilization project of the Resettlement Administration, Devil's Kitchen Dam was authorized by presidential approval. It was originally placed under the jurisdiction of the Soil Conservation Service. Construction of the project began in December 1940. In December 1942, the War Production Board stopped construction after concrete had been placed high enough to assure that the structure would be safe for an indefinite period. At that time, the project was about 40 percent complete.

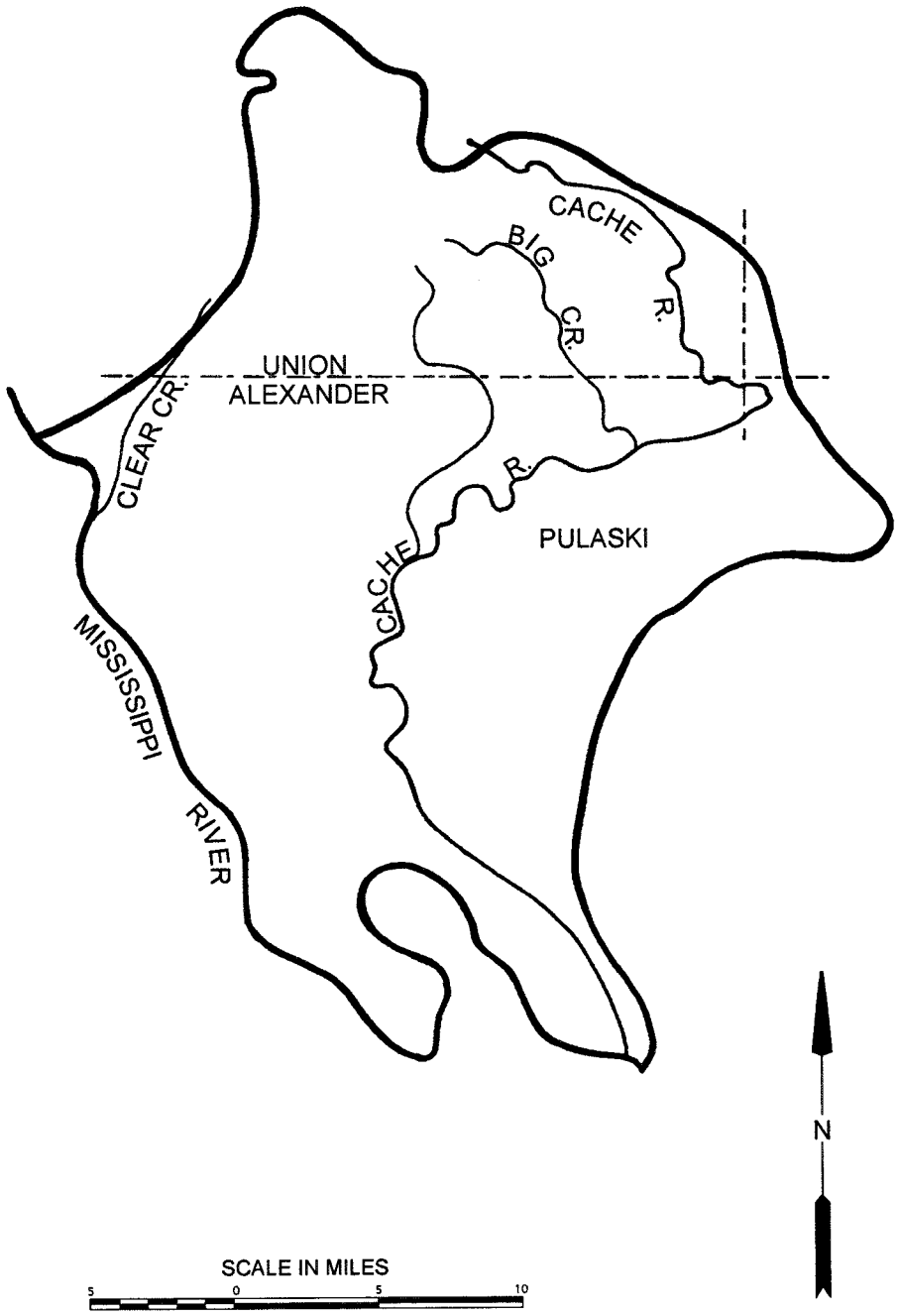
The Soil Conservation Service later transferred the project to the Fish and Wildlife Service. The Department of Interior Appropriation Act of 1955 officially authorized completion of the project by the Corps, and in 1955 $1 million was made available to resume construction. From 1957 to 1960, an additional $2.3 million was appropriated to complete the dam and lake clearing and partially complete roads and recreational facilities. In 1959, the dam and lake were turned over to the U.S. Fish and Wildlife Service. In 1963, $700,000 was made available to the Bureau of Sport Fisheries and Wildlife for completion of the project.

The completed dam impounds runoff from the 34-square-mile Grassy Creek watershed.



Chapter IX

CACHE RIVER BASIN



CACHE RIVER BASIN

Cache River Basin Description

The Cache River was divided into two separate reaches for flood control purposes. The upper reach, in the Louisville District, was diverted to flow south by southeast to the Ohio River through the Post Creek Cutoff south of Karnak. The lower reach, in the St. Louis District, flows southwest for 32 miles from the Post Creek Cutoff to the exit of the Cache River Diversion Channel at the Mississippi River, about 13 miles above the mouth of the Ohio. Before construction of the diversion channel, authorized in 1938, the river drained into the Ohio River between Cairo and Mound City.

The lower Cache River has several unusual characteristics that can be explained by the nature of the area's geology and drainage history. For example, the flood plain of the main stem averages some two miles in width. This figure seems out of proportion for a small river that extends only about 55 feet between high banks at the midpoint of the lower reach. This fact suggests that the present Cache River occupies an abandoned channel of the Ohio River.

Another unusual feature of the flood plain is the high relief of its north edge, which is in contrast to the gentle rise in elevation to the south. This contrast is explained by the fact that hard, durable limestone is under the hills to the north, and younger, weaker, and more erodible strata are under the lands to the south.

The rugged terrain to the north provides steep gradients to the tributary streams that enter the main stem from the north. During heavy rains, rapid runoff enters the rather sluggish river, causing flooding. The river then backs up and flows "upstream" to partially discharge into the Ohio River via the Post Creek Cutoff.

The lower Cache River basin extends in a rough line from Karnak on the east to Beechridge in the southwest corner. It includes parts of three counties, is bounded on the north by the town of Anna and covers a 360-square-mile area.

Temperatures in the Lower Cache River basin average 37.4 degrees Fahrenheit in January and 81.2 degrees in July. The average annual rainfall is about 45.7 inches.

Having only three communities with populations greater than 600, the area is predominantly rural in character. The dominant occupation is farming. Local industries consist of small-scale limestone quarry operations, lumbering and saw mill operations, box manufacturing and recreation-based enterprises. The city of Cairo, located beyond the southern limit of the basin, serves as the principal market center.

The Corps of Engineers is working on a study in the Cache River area, entitled "Alexander and Pulaski Counties, Ill." The findings of the study thus far are that there are no new economically viable flood control measures in the area, but that an opportunity exists for implementing measures aimed at the restoration of wetland habitat degraded by prior Corps of Engineers projects.

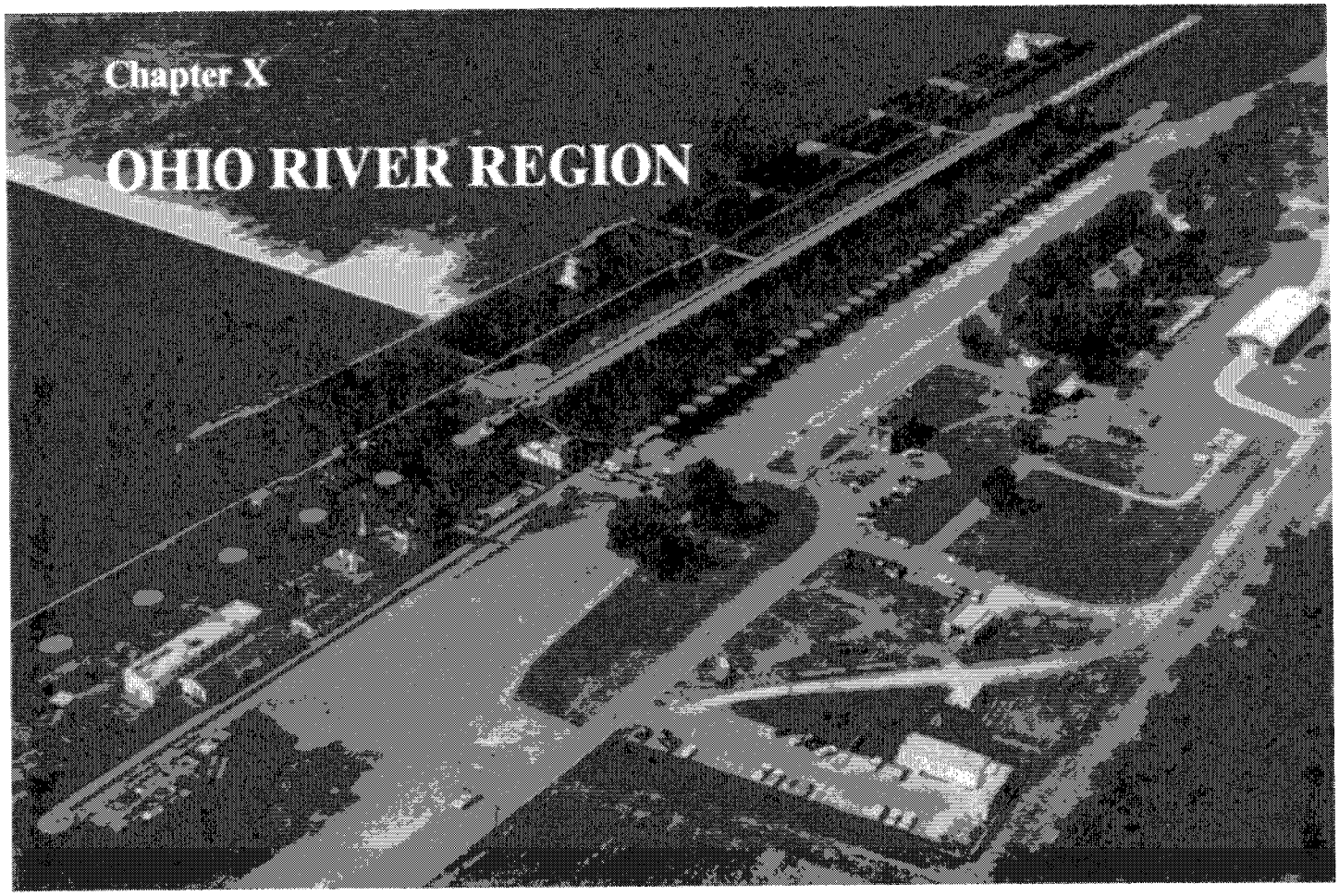
Corps of Engineers' Projects and Studies

Alexander and Pulaski Counties, Illinois

Habitat Restoration Project, Project Study Underway

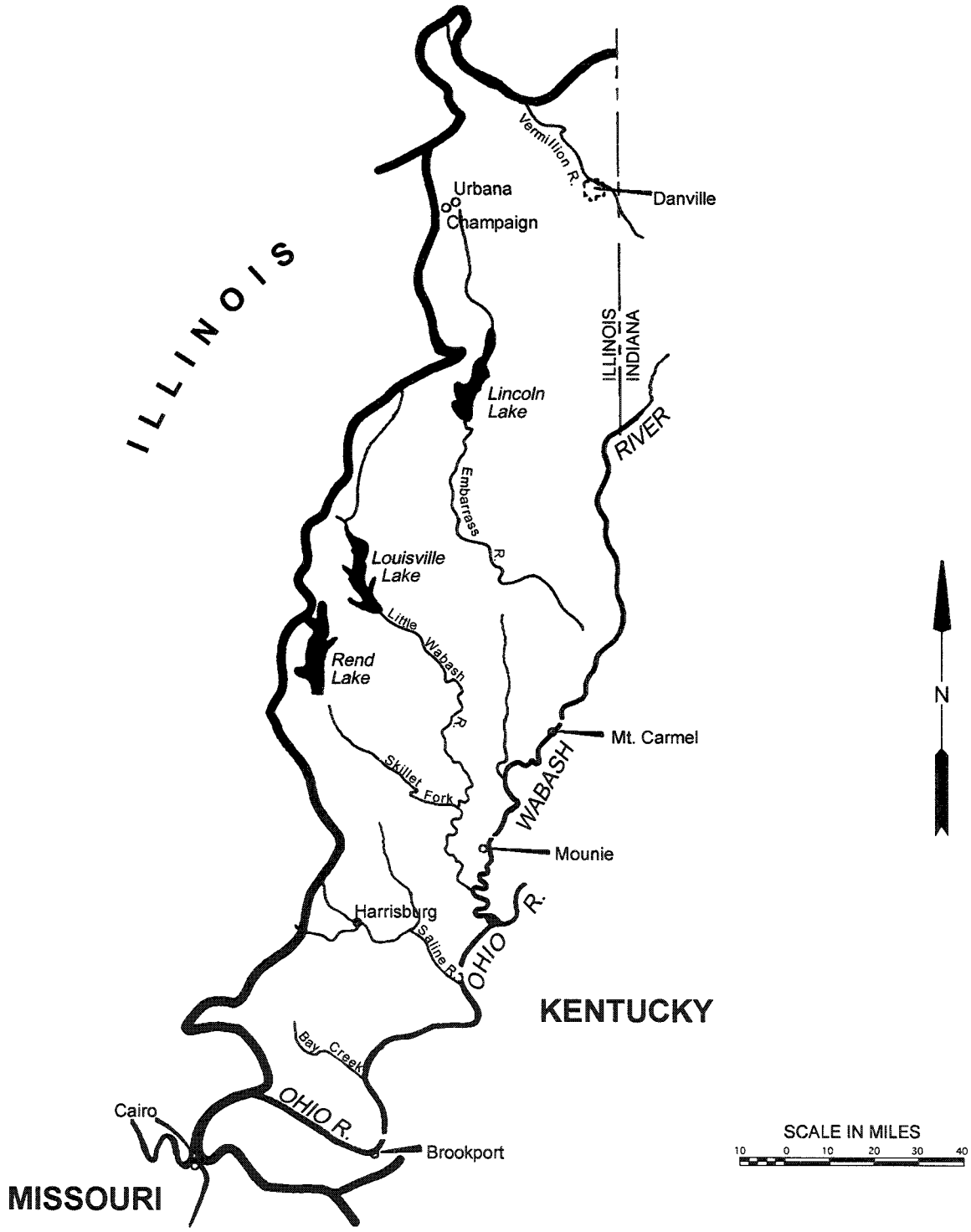
(St. Louis District)

The 1992 Reconnaissance Report found no economically viable flood control measures for the Cache River basin. However, the report did recommend that a feasibility level investigation of habitat restoration be conducted. The now ongoing feasibility study is being cost-shared between the Corps of Engineers and the Illinois Department of Conservation. The primary focus of the study is on the Cache River State Natural Area that includes two national natural landmarks—Lower Cache River Swamp, and Heron Pond-Little Black Slough. Lower Cache River Swamp has been severely impacted by sedimentation, and Heron Pond-Little Black Slough has been severely impacted by river entrenchment. Potential solutions being studied include the placement of water control structures, grade control structures, sediment retention basins, water diversions, and selective dredgings. The draft feasibility report is scheduled for a March 1997 completion.



Chapter X

OHIO RIVER REGION



OHIO RIVER BASIN

Ohio River Region Description

The Ohio River region has a 204,000-square-mile area, extending over parts of 14 states in the middle-eastern portion of the nation.

The topography of the region varies from mountains to plains. The eastern portion is dominated by the rugged terrain of the Appalachian Mountains, which extend from southwestern New York to North Carolina. West of the Appalachians and south of the Ohio River, the terrain gradually changes to rolling plains through central and western Kentucky and Tennessee. North of the Ohio River, in central and southwestern Ohio, central and southern Indiana and southeastern Illinois, are broad valleys with minor relief.

The region's climate is temperate. Summers are warm and humid, and winters range from moderately cold in the southwest to severe in the extreme northeast. Precipitation averages about 45 inches annually and is usually greatest in June and July and least in October. Runoff varies considerably over the year; nevertheless, flood flows may occur during any season. Major basin wide floods generally occur between January and March, but intense thunderstorms have caused maximum runoff from small drainage districts in spring and summer. Often, during late summer and early fall, stream flow from precipitation is negligible.

During the record low flow of 1963, there was sufficient reservoir storage to more than double the Ohio River flow at Cincinnati. Storage for water supply is also available at some Corps projects.

Corps projects in the region can generate up to 914,000 kilowatts of hydropower, and private power companies produce additional power at several projects by license agreements administered by the Federal Energy Regulatory Commission. Commercial navigation on canalized basin streams amount to about one-quarter of the total inland waterway freight tonnage in the United States. Water surface and adjacent developed project lands attract millions of recreation visitors each year.

The southeastern portion of Illinois is in the Ohio River region. Several local protection projects have been completed in this area, and others have been authorized but not started. Navigation projects have been completed and a multipurpose project is authorized. The upstream multipurpose projects on Ohio River tributaries have a major effect on reducing flood heights and increasing low flows of the Ohio and Wabash Rivers, which are the borders for much of southeastern Illinois.

Survey studies are planned for those areas where water resource problems are known to exist. Detailed descriptions of all Corps projects and studies in the Illinois portion of the Ohio River region follow.

Corps of Engineers' Projects and Studies

Locks and Dam 52, Kentucky and Illinois

Commercial Navigation Project Completed

(Louisville District)

Locks and Dam 52 is on the Ohio River 939 miles below Pittsburgh, Pa. Brookport, the nearest town, is about one mile upstream. The project is just across the Ohio from Paducah, Ky. This project was authorized by the River and Harbor Acts of 1909, 1910 and 1918, and was placed in operation in 1929. The dam consists of a 1,248-foot navigable pass section, a 540-foot chanoine weir section, a 160-foot bebout weir section, three 91-foot beartrap sections and a 725-foot fixed weir section. During favorable pool conditions, tows can pass over the dam 60 percent of the time thus eliminating the need for lockage. The original lock, with dimensions of 600 feet by 110 feet, has a lift of 12 feet and is located on the Illinois side of the river.

Construction of a temporary additional lock for this project was started in May 1968, and completed in December 1969. It has a chamber 110 feet by 1,200 feet in usable dimensions and is located 100 feet landward of the 600-foot lock. The temporary provides additional capacity for passage of navigation traffic. The Louisville District won an "Outstanding Engineering Design Award" from the Chief of Engineers for this project.

Substantial savings in transportation costs has resulted with the reduction of waiting time as well as easing maneuvering for locking and negotiating the lock approaches. In FY95, 99.4 million tons of commerce was passed through the project. The actual federal cost (1 Oct 1995) of the original lock and dam is $4,462,000 and the temporary lock is $10,198,000.

Major rehabilitation of the project was begun in September 1978. The rehabilitation work involved structural repairs to and replacement of several components of the dam, restoration of walls and new gates for the 600-foot lock, and replacement of mechanical and electrical operating systems. The actual federal cost (1 Oct 1995) of the rehabilitation was $8,876,000. In FY95, 13,600 visits and 19,100 visitor hours were recorded at the project.

Locks and Dam 53, Kentucky and Illinois

Commercial Navigation Project Completed

(Louisville District)

Locks and Dam 53 is on the Ohio River, 963 miles below

Pittsburgh, Pa. This project was authorized by the River and Harbor Acts of 1909, 1910 and 1918. The structure was placed in operation in 1929. The dam consists of 932-foot navigable pass section, a 340-foot chanoine weir section, a 160-foot bebout weir section, two 91-foot beartrap sections, and a 2,000-foot fixed weir section. The lock, with dimensions of 600 feet by 110 feet, has a lift of about 13 feet. The lock is located on the Illinois side of the river and is accessible from Illinois State Highway 37. Olmstead, the nearest town, is about 20 miles to the northeast of Cairo, Ill.

Construction of a new temporary additional lock for this project was started in May 1974 and was completed in May 1982. It has a lock chamber of 110 feet by 1,200 feet in usable dimensions and is located riverward, adjacent to the existing 600-foot lock. The temporary lock provides additional capacity for passage of navigation traffic. In FY95, approximately 85.2 million tons of commerce was transported through the project.

Substantial savings in transportation costs have resulted from the reduction in traffic delays. The actual federal cost (1 Oct. 1995) of the temporary lock is $38,571,000 and of the original lock and dam is $5,411,000.

Major rehabilitation of the project was begun in September 1979. The rehabilitation work consisted of structural repairs to the dam, restoration of walls and new gates for the 600-foot lock, and replacement of mechanical and electrical operating systems. The actual federal cost (1 Oct. 1995) was $4,594,000. In FY95, 7,700 visits and 10,600 visitor hours were recorded at the project.

Smithland Locks and Dam, Ohio River

Commercial Navigation Project Completed

(Louisville District)

Smithland Locks and Dam was authorized as a replacement for Lock and Dams 50 and 51 in 1965 under the authority of the River and Harbor Act of March 1909. The site is at River Mile 918.5, below Pittsburgh, about 2 miles above the mouth of the Cumberland River. A 72 mile long pool above the dam provides slackwater navigation to Uniontown Locks and Dam. One lockage in this reach of the river has been eliminated. The locks are located on the Illinois side of the river and are accessible by a secondary paved road from U.S. Highway 45 at Brookport, Ill. to Hamletsburg and from this point via a gravel road for 2 miles to the site.

The two Smithland Locks, each 110 feet wide and 1,200 feet long, are the first dual structures of this size on the Ohio River and the world's largest twin navigational locks system. In FY95, 90.8 million tons of commerce transported through the locks. The overall length of the river lock wall, including the guard walls, is approximately three-quarters of a mile. The locks contain four horizontally framed miter gates. Each miter gate leaf, or door, weighs 250 tons. The miter gates and culvert valve machinery are hydraulically operated, and the filling and emptying of the lock chambers are by a side wall port system. Filling each lock chamber requires 9 minutes. By the use of bulkheads, each of the culvert valves, the miter gates, and the entire lock chambers are designed for dewatering to facilitate maintenance.

The Smithland dam structure extends from the river lock wall to the Kentucky shore and is approximately three-quarters of a mile long. The dam consists of a gated section containing 11 tainter gates and a 1,572-foot fixed weir section at elevation 326.2 feet above the upstream normal pool. Each of the 11 tainter gates is electronically driven. The gated section of the dam is topped with a prestressed concrete service bridge which includes a locomotive type crane for lifting the upstream emergency bulkheads. Associated with the construction of the dam was the dredging of a new navigation channel. Downstream of the locks and dam, the new channel is over 3 miles long and routes river traffic west of Cumberland Island. This shortens the route of travel near Smithland, Ky, where the sailing line was east of the island. The actual federal cost (1 Oct. 1995) of the project is $273,725,000. In FY95, 37,900 visits and 51,100 visitor hours were recorded at the project.

Lower Ohio River, Illinois and Kentucky (Olmsted Lock and Dam)

Authorized Navigation Project Underway

(Louisville District)

The Olmsted Locks and Dam project was authorized by Congress on Nov. 17, 1988 (Public Law 100-676). The new project will replace the existing Ohio River Locks and Dam 52 and Locks and Dam 53 located between Paducah, Ky., and Cairo, Ill. The Olmsted project site is located approximately 1.8 miles downstream of the existing Locks and Dam 53 at Ohio River Mile 964.4. The community of Olmsted, Ill. is located near the project site.

The project area is at a strategic location on the inland waterway system. Virtually all waterway traffic moving between the Ohio River and tributaries and the Mississippi River and tributaries passes through the project area. Wear and tear on the existing Locks and Dams 52 and 53 reflect the 60 years of service provided by these original structures. Both projects have a temporary lock chamber that is inefficient and neither project conforms to current design criteria for structural stability. In fiscal year 1995, approximately 85.2 million tons passed through the project.

The Olmsted project consists of twin 110-feet wide by 1200-feet long lock chambers located near the Illinois shoreline. The dimensions of the lock chambers will be the same as at Smithland Locks and Dam, located just upstream of Paducah, Ky. The lock chambers will be capable of efficiently processing projected tow traffic through the area during the 50-year economic life of the project.

The current plan consists of tainter gates, a boat operated wicket navigable pass, and a short section of fixed weir along the Kentucky bank.

The final Environmental Impact Statement (FEIS) was completed in November 1985 and the Record of Decision (ROD) was signed on October 26, 1987. A Final Supplement I Environmental Impact Statement (FSEIS) was prepared to address the design changes since the FEIS. The

ROD was signed on May 5, 1993.

Current project-related activities include engineering and construction efforts; about 48 percent of the overall project design effort has been completed. A General Design Memorandum (GDM) for the overall project was completed in 1989. A supplement to the GDM, which presented modifications to the scope of the project as contained in the GDM, was completed in 1990. Feature design efforts are now underway for several project components including approach walls, dam, and waterfowl improvements at Ballard Wildlife Management Area.

Construction across the river will be accomplished in separate stages beginning with the locks along the Illinois shore in the first stage and progressing across the river with the dam in the succeeding stages. This multistage construction is necessary to allow navigation to continue throughout the construction period. The method of construction will be studied as part of the Dam FDM.

Construction has been completed on the Access Road, Resident Engineer's Office, and the Cofferdam and Slide Repair. The contract for the lock was awarded in December 1995. The current project schedule is to complete the overall construction in 2006.

Wabash River Navigation Studies, Indiana, Illinois and Ohio

Commercial Navigation Study Completed

(Louisville District)

Studies of the need for navigation improvements along the Wabash River and tributaries were authorized by eight Senate and House Public Works Committee resolutions between 1967 and 1975. These studies reviewed previously completed reports to determine the feasibility of constructing a waterway for barge traffic from the Ohio River to lakes Erie and Michigan via the Wabash River and adjacent streams. The studies examined routes terminating at Chicago, Ill.; Gary, Ind.; and Toledo, Ohio, and considered requirements for small boats, recreation, water supply, fish and wildlife and other related purposes.

The studies also considered the feasibility of constructing a waterway for barge traffic from the Ohio River to Mt. Carmel, Ill., and of building a connecting channel to the Little Wabash River near Carmi, Ill. In addition, the studies considered opening the Wabash River to navigation as far as Terre Haute.

Because of limited depth, there is now no navigation on the Wabash River, except for ferries and sand and gravel dredging operations near the mouth; likewise, there is no navigation on the Maumee River, except on the lower seven miles where deep draft is available in Toledo Harbor. If the Illinois River above the Kankakee were used as part of a waterway to Chicago, its enlargement would be necessary since its present capacity is limited to Illinois Waterway traffic. The waterway routes under consideration would connect heavy traffic concentrations on the Ohio River and the Great Lakes and would cross a large area with a potential for generating traffic.

Phase I of the Wabash River navigation studies began in Fiscal Year 1968. It identified waterway routes with potential economic justification. In 1971, an interim reconnaissance report on the lower Wabash River recommended further (survey scope) study on the lower segment of the Wabash from the Ohio River to Mt. Carmel, Ill. The survey scope, completed in August 1977, found no economically justified plan. A negative reconnaissance report on the upper Wabash River (all routes) was completed in August 1972. The most recent study of the feasibility of providing navigation improvements on the Wabash River resulted from an appropriation in the Fiscal Year 1985 Supplemental Appropriation Bill for conducting a reconnaissance-level investigation. Emphasis during the study was given to an all-river route with termini at Terre Haute and Mt. Carmel. Numerous alternative concepts and designs were considered and analyzed. The reconnaissance report, completed in April 1987, found no feasible alternatives and no further studies have been undertaken.

Brookport, Ohio River

Flood Control Project Completed

(Louisville District)

This project consists of 3.7 miles of earth levee, .7 mile of concrete wall, three pumping plants and related works. It protects Brookport from Ohio River floods equal to the maximum on record (1937) with three feet of freeboard. The report was authorized by the Flood Control Act of August 28, 1937.

Construction of the project was begun in 1940 and completed in 1942 except for installation of movable closures, which was finished in 1949. The total cost was $606,000 including $8,500 in nonfederal expenditures.

The project has prevented an estimated $12,264,000 in damage through Fiscal Year 1995. Operation and maintenance of the flood control works have been the responsibility of the city of Brookport since 1949.

The project is part of the comprehensive plan for flood control in the Ohio River Basin. It is supplemented by a now partially completed system of upstream reservoirs.

Cottonwood Slough Pumping Station, Cairo Drainage District, Ohio River

Flood Control Project Completed

(Memphis District)

Construction of a pumping station at Cottonwood Slough to remove the runoff from 4,620 acres was authorized in February 1962 and completed in May 1964 at a federal cost of $147,000.

Operated only during a flood season (about once every six years), the station's two pumps discharge into the Ohio River with a combined capacity of 50 cubic feet per second at a static level of 25 feet.

Annual operation and maintenance cost, assumed by local interests, is about $7,000 during a flood year and about $500 during a normal year.

Embarras River, Ste. Marie Levee, Ste. Marie, Illinois

Section 14 Project Completed

(Louisville District)

A streambank protection project was completed near Ste. Marie, Ill. in November 1994 under authority of Section 14, 1946 Flood Control Act.

The Ste. Marie Levee is located upstream and to the northwest of Ste. Marie, Ill. It provides protection to 2,000 acres of prime cropland.

The project consists of placing riprap protection along a slope approximately 740 feet in length. Actual cost of the project was $158,000 federal and $51,000 nonfederal cost.

The project was transferred to the local sponsor on 17 May 1995 for operation and maintenance.

England Pond Levee, Wabash River

Flood Control Project Completed

(Louisville District)

This project protects 4,950 acres of agricultural land in southeastern Lawrence County near St. Francisville in the flood plain of the Wabash and Embarras rivers. It was authorized by the 1946 Flood Control Act.

The project plan called for raising and enlarging about six miles of earth levee to an average height of 13 feet and constructing drainage structures. The levee grade is in accordance with the Wabash River comprehensive levee plan approved in the Flood Control Act of 1946. The grade protects against a seven percent chance annual recurrence flood.

Construction was started in July 1970 and completed in May 1972. The actual project cost $841,000 of which $107,000 was contributed by a local sponsor that began operating and maintaining the project in 1972. Flood damage estimated at $11,317,000 has been prevented through Fiscal Year 1995.

This project is a unit of the comprehensive plan for flood control in the Ohio River basin. The system of upstream reservoirs constructed under the plan supplements local protection works by reducing downstream flood stages.

Golconda, Ohio River

Flood Control Project Completed

(Louisville District)

This project in Pope County includes one mile of earth levee, .2 mile of concrete wall, three pumping plants and related works. Construction of the project was begun in 1940 and completed in 1941, except for the movable closures that were completed in 1950. An additional levee crossing was installed in 1960. The project was authorized by the Flood Control Act of August 28, 1937.

Designed to protect the city of Golconda from a flood equal to that of 1937, the flood of record, the project was constructed at a cost of $576,000, including a nonfederal contribution of $11,000. Flood damages prevented through FY95 are estimated at $1,064,000.

This project is a unit comprehensive plan for flood control in the Ohio River basin. The partially completed system of upstream reservoirs constructed under the plan supplements local projects by reducing downstream flood stages.

Mt. Carmel, Wabash River

Flood Control Project Completed

(Louisville District)

The project protects against a one percent annual recurring flood. The flood control works protect 160 acres of low-lying land in the town of Mt. Carmel, as well as some 380 acres of adjacent agricultural land. This project was authorized by the Flood Control Act of Oct. 23, 1962.

The flood control structures consist of three miles of earth levee and .31 mile of concrete wall averaging 13 feet in height. The project also includes three pumping plants for removal of interior drainage and sewage, gravity drainage outlets and necessary levee crossings and closures.

Construction was begun in December 1966 and was completed in October 1969, when the project was assigned to local interests for operation and maintenance.

The federal cost of the project was $1,981,000 and the nonfederal cost was $113,000. Cumulative flood damage of $2,190,000 has been prevented through fiscal year 1995.

New Harmony Bridge Bank Stabilization, Wabash River, Indiana and Illinois

Flood Control Project Completed

(Louisville District)

The Flood Control Act of May 17, 1950, authorized this project to stabilize a caving bank that was endangering the New Harmony Bridge and its western approach. The bridge, carrying U.S. Highway 460, spans the Wabash River between New Harmony, Ind. and White County, Ill.

Project work consisted of enlarging an existing cutoff channel above the bridge and building a dike to close the old river channel. Construction was started in July 1957 and completed in February 1958.

The estimated cost of the completed project was $1,061,000, including $99,000 in nonfederal expense. Remaining work was deauthorized in 1992.

Pumping Stations-Cairo and Cairo Drainage District

Flood Control Project Completed

(Memphis District)

Work on this project consisted of constructing 65-cubic-feet-per-second pumping stations and 60-inch reinforced concrete gravity outlets at 10th and 28th streets in Cairo, Ill. Pumping stations at 10th, 28th and 38th streets were abandoned and the old gravity outlets plugged with concrete.

Construction was begun in May 1977 and completed in 1982. The federal cost was $6,445,000. An additional $490,000 in federal funds has been spent for a major repair.

Construction of another Cairo pumping station, Goose Pond, was completed in June 1976. The federal cost was $1,800,000.

Reeseville and Cache River Levees, Ohio River

Flood Control Project Completed

(Louisville District)

Located in the Bay Creek-Cache River Valley in Pope, Massac, Johnson and Pulaski counties, the levees were constructed under the authorization of the Flood Control Act of June 28, 1938. The flood control works consisted of 4.9 miles of earth levee east of Reeseville and 3.7 miles of levee east of Belknap and Karnak.

The levee project was constructed between July 1949 and September 1952 at a federal cost of $600,000, with an additional nonfederal expense estimated at $40,000. It protects 23,500 acres of agricultural land; the towns of Karnak, Belknap and Ullin, seven smaller communities and the highway and rail routes across the Cache valley against overflow from Bay Creek and the Ohio River crossing from the divide into the Cache River basin. The area is protected against a flood equal to the maximum event on record, elevation 355.5, February 1937.

Local interests have been responsible for operation and maintenance of the project since 1954.

Rochester and McCleary's Bluff Levee, Wabash River

Flood Control Project Completed

(Louisville District)

Consisting of 9.1 miles of earth levee and related works, this project protects about 5,400 acres of agricultural land in Wabash County near Keensburg. The project was authorized by the Flood Control Act of July 24, 1946.

Construction was started in July 1970 and completed in November 1971. The actual cost of the project was $1,179,000, of which $100,000 was nonfederal cost.

In 1972, the project was assigned to local interests, who are responsible for its operation and maintenance. Cumulative flood damage prevented by the project through fiscal year 1995 totals $13,827,000.

The project is a unit of the comprehensive levee plan for the Wabash River Basin approved by the Flood Control Act of 1946. This plan specified a level of protection against a seven percent chance flood.

Rosiclare, Ohio River

Flood Control Project Completed

(Louisville District)

Rosiclare is on the right bank of the Ohio River, in Hardin County. This project, authorized by the Flood Control Act of 1948, provides protection for the city of Rosiclare and vicinity against a flood equal to the maximum on record, elevation 364.3 feet, in February 1937.

The project work, carried out between June 1950 and June 1953, included construction of .7 mile of earth levee, required sewer alterations, a pumping plant and related items.

Actual cost of the completed project was $736,000, including $114,000 in nonfederal expense. An estimated $668,000 in cumulative damage has been prevented by the project through Fiscal Year 1995.

Local interests have been responsible for operation and maintenance of the project since September 1953.

Saline River and Tributaries

Flood Control Project Completed

(Louisville District)

A channel improvement project in Gallatin, Hamilton and Saline counties, the Saline River and Tributaries Project was authorized by the Flood Control Act of 1958. The project consists of 9.9 miles of channel enlargement on the Saline River, 1.2 miles of clearing and cleaning, 29.8 miles of channel enlargement on the Middle Fork and 14.2 miles of clearing and cleaning on the South Fork. These improved channels significantly reduce flood damage to farm land and protects the area against a headwater flood occurring on an average of not more than once in two years.

The first construction on the project, the Saline River Channel Section, was started in July 1968 and completed in October 1970. Work on the next part, the lower section of the North Fork Channel, was begun in July 1970 and completed in March 1973. Construction of the North Fork Channel was started in June 1971 and completed in December 1973. Improvements in the Middle Fork Channel section were started in January 1972 and completed in August 1976. Construction of the remaining South Fork clearing section was started in December 1976 and completed in October 1980. The total cost of the project was $7,826,000 (federal) and $991,000 (nonfederal).

Mounds and Mound City, Ohio River Basin

Flood Control Project Underway

(Memphis District)

A project to provide flood protection for the cities of Mounds and Mound City was authorized by the Flood Control Act of 1938. Work included raising and enlarging 3.8 miles of levee; constructing 2.4 miles of new levee, .15 mile of concrete wall and a pumping station at Cache River; and diverting the river with a new one-mile-long channel.

Levees and a small section of concrete wall join the levee of the Cairo Drainage District to form a continuous line of flood protection for Cairo, the Cairo Drainage District and the Mounds-Mound City area.

The Mounds and Mound City project is located along the right bank of the Ohio River in Pulaski County, about one mile above the old mouth of the Cache River.

Construction of an outlet channel into the Cache River to replace the Mound City pumping stations was authorized by the Flood Control Act of 1965. Studies conducted under the authorization resulted in a recommendation for construction of the following: a pumping station at Cache River, an outlet channel from Mound City to the Cache River pumping station, a diversion ditch to route high flows of Mounds Creek to the Cache River and a low-water weir to improve the fish and wildlife habitat during low-flow periods.

The estimated cost of these improvements (October 1992 price levels) is $8,185,000, of which $5,663,000 would be from federal funds and $2,522,000 from nonfederal funds.

A seepage investigation has been completed on the levee along the Ohio River from levee mile 2, above Mound City, to 5.7+65 at the Cache River. The investigation indicated a need for 3.1 miles of slurry trench cut-off wall, which has been completed at a federal cost of $7,100,000.

Louisville Lake, Little Wabash River

Flood Control Project, Authorized Project Not Underway

(Louisville District)

A proposed multipurpose development for flood control, general recreation, fish and wildlife enhancement, water supply and water quality control, the Louisville Lake project was authorized by the Flood Control Act of 1968. The lake would be formed by construction of a dam on the Little Wabash River, about 165 miles above the river mouth and about 3.5 miles northwest of Louisville, Ill.

The dam would be composed of a concrete spillway section located at the face of the right abutment and flanked by a rolled earth fill embankment that extends to the left abutment. The concrete gravity overflow spillway would be equipped with four tainter gates, 40 feet wide by 40 feet high, and three sluices, 4 feet wide by 45 feet high, through the spillway section with the slide gates at the upstream ends to provide for regulated flood releases and low flow control. Two small multistage outlets with facilities for reoxygenation would provide for low flow control and enhancement of downstream fishing.

At the full flood control pool level, the lake would extend 21 miles upstream into Clay and Effingham counties. The controlled drainage area would be 661 square miles, or 20 percent of the Little Wabash River watershed. Flood control storage would be 119,079 acre-feet during the winter and 93,063 acre-feet in the summer.

The lake area, at flood control pool level, would be 13,500 acres. The seasonal recreation pool would have an area of 9,300 acres. About 44,000 acre-feet in storage area would be allocated for water supply and water quality control.

Where compatible with other project purposes, lands would be available for recreation. Facilities would include those for picnicking, fishing, boating, tent and trailer camping, swimming and hunting. The management of wildlife on the project lands and on an additional 6,500 acres, which would be acquired to offset losses of upland game habitat, would be compatible with other project uses.

The estimated cost of the project (calculated at October 1, 1982, price levels) is $118,166,000, which includes a nonfederal contribution of $17,018,000, based on cost sharing requirements in effect in 1982. Average annual benefits expected from Louisville Lake in flood control, general recreation, fish and wildlife enhancement, water supply and water quality control were estimated in 1982 at $5,013,000. Preconstruction engineering and design activities were undertaken sporadically between 1971 and 1983.

The Louisville Lake project is currently in an inactive category of Civil Works projects. No further work has been completed on the project since Fiscal Year 1983.

Saline River and Tributaries

Flood Control Study Underway

(Louisville District)

A tributary of the Ohio River, the Saline River in southeastern Illinois, has a 1,175-square-mile river basin of generally rolling to hilly terrain, although flat valleys form about one-fifth of the area. Harrisburg, the principal city in the basin, is protected by federally built levees, flood walls and appurtenances.

Flooding in the basin is caused by headwater runoff, backwater from the Ohio River, or a combination of the two. Channel improvement of the Saline River and tributaries was authorized by the Flood Control Act of 1958. A description of this project appears elsewhere in this booklet.

Authorized May 21, 1962, by the Senate Public Works Committee, the Saline River and Tributaries Study is an overall investigation of water resources in the Saline River watershed. Studies started in 1966 under the authorization included consideration of improvements for flood control, drainage, navigation, recreation, water supply, water quality and related purposes. A later authorization directed the Corps to conduct specific studies of potential navigation improvements. (See "Saline River Navigation, Commercial Navigation Study.")

The Louisville District completed Phase I studies (prelimi-

nary overall investigation of the flooding problem) in October 1970. The report concluded that further study was warranted on one proposed reservoir project (Stonefort Bluff Lake) that would have extensive recreation benefits. The state of Illinois subsequently requested a temporary suspension of the study pending completion of its own study. In 1974, the state requested a reactivation of the study.

The study was completed in February 1979 and recommended no further federal action at that time. The feasibility study determined that the Stonefort Bluff Lake had a benefit to cost ratio of .5.

Cache River

Flood Control Study, Authorized Study Not Underway

(Louisville District)

The Cache River Study was authorized by a resolution passed March 5, 1950, by the Senate Public Works Committee and by resolutions passed June 27, 1950, and July 26, 1951, by the House Public Works Committee. The purpose of the study is to investigate flood problems and drainage conditions upstream from the Karnak Levee.

As authorized, the study was to analyze the nature and extent of damage suffered in the upper Cache River Basin from headwater runoff. Additionally, it was to ascertain if this problem could be solved through construction of flood control structures and channel improvements in the area. The study was delayed pending the outcome of a Soil Conservation Service study of the flooding problem. Any further Corps studies of the problem will be funded through the St. Louis District's Alexander-Pulaski counties studies.

Lusk Creek, Golconda, Illinois

Section 14, Emergency Bank Protection, Continuing Authority Project Completed

(Louisville District)

A project to protect a Golconda cemetery, along Lusk Creek, endangered by streambank erosion, was authorized by the Chief of Engineers on August 28, 1980.

The project was constructed between May and August 1983, at an actual cost of $86,900, of which $800 was nonfederal expense.

The project consisted of removing the brush along the bank, shaping the slope to a more suitable configuration, and installing about two feet of quarry stone on the slope.

Ohio River, Fort Massac, Illinois

Section 14, Emergency Bank Protection, Continuing Authority Project Completed

(Louisville District)

A project to protect parts of Fort Massac State Park, endangered by streambank erosion, was authorized by the Chief of Engineers on August 31, 1981. The project was completed in June 1986.

Work consists of providing riprap protection along 1,820 feet of the Ohio River streambank at Fort Massac State Park.

The total cost of the project (federal) was $152,200.

Grayville, Illinois, Cut-off Channel, Wabash River

Streambank Erosion Control Project, Authorized Project Not Underway

(Louisville District)

A streambank erosion control project to be built near Grayville, Ill., was authorized by the Water Resources Development Act of 1986 (Public Law 99-662). The project would consist of construction of a low-level weir across the cutoff channel to restore the river flow to its original channel and prevent streambank erosion and damage to public and private facilities.

The authorization limits the federal share of the cost of this project to $5 million; federal funding is contingent upon the economic feasibility of the project, that is, the costs cannot exceed the benefits.

A nonfederal interest will have to provide all lands, easements and rights-of-way for the project construction and maintenance and agree to operate and maintain the project. In addition, the nonfederal sponsor will pay 25 percent of the project costs.

The Louisville District completed a study of the authorized weir project in 1987. A local sponsor, capable of cost sharing in the project, was not identified, no further activities have been undertaken.

Wabash River Russell-Allison Levee, Illinois

Section 14, Emergency Bank Protection,

Project Underway

(Louisville District)

A project to protect the Russell-Allison levee from erosion was authorized in 1995 under the authority of Section 14 of the 1946 FCA. The project consists of 1,200 feet of riprap bank protection at an estimated cost of $322,000. Failure of the levee due to erosion would jeopardize flood protection for 28,000 acres. The project is expected to be completed in 1996.

GLOSSARY

Acre-foot: An area of one acre covered with water to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons.

Advance engineering and design work: Work done by Corps of Engineers' offices in preparing a project for construction.

Agricultural levee: A levee that protects agricultural areas. The degree of protection is usually less than that of a flood control levee.

Air bubbler: A device on the bottom of a body of water that releases compressed air forming air bubbles that transport warmer bottom water to the surface to retard ice formation.

Appropriation: The setting aside of money by Congress, through legislation, for a specific use.

Authorization: House and Senate Public Works Committee resolutions or specific legislation that provides the legal basis for conducting studies or constructing projects. The money necessary for accomplishing the work is not a part of the authorization but must come from an appropriation by Congress.

Bank and channel stabilization: The process of preventing bank erosion and channel degradation.

Basin: (1) Drainage area of a lake or stream, such as a river basin; (2) a naturally or artificially enclosed harbor for small craft, such as a yacht basin.

Beam: The maximum port-to-starboard width of a ship, boat, or other vessel.

Biochemical oxygen demand: The amount of dissolved oxygen in parts per million required by organisms to enable them to decompose the organic matter present in the water.

By-channel: A channel formed around the side of a reservoir past the end of the dam to convey flood discharge from the stream above the reservoir into the stream below the dam.

Clear blue ice: Ice of low air-content that has frozen rapidly in unagitated water.

Closure structure: A structure built along low points of a levee or floodwall such as a street or railroad intersection to prevent flood waters from flooding the area protected by the levee or floodwall.

Confluence: The place where streams meet.

Control dam: A dam or structure with gates to control the discharge from the upstream reservoir or lake.

Crest length: The length of a wave along its crest.

Dam: A barrier constructed across a valley for impounding water or creating a reservoir.

Damages prevented: The difference between damages that would occur without the project and the damages occurring with the project in place.

Deep-draft harbor: A harbor designed to accommodate commercial cargo vessels having drafts greater than about 15 feet.

Deep-girder channel span: A structure, usually a bridge made up of steel plates, angles, etc., to span navigation and flood control channels.

Degree of protection: The amount of protection that a flood control measure is designed for as determined by engineering feasibility, economic criteria, social environmental, and other considerations.

Dike: An embankment to confine or control water and/or soil.

Diversion channel: (I) An artificial channel constructed around a town or other point of high potential flood damages to divert flood water from the main channel to minimize flood damages; (2) a channel carrying water from a diversion dam.

Draft: The vertical distance from the waterline to the bottom of a floating vessel.

Dredged material: The material removed in excavation or dredging in access canals, boat or navigation channels, drainage ditches, and lakes.

Earth-fill dam: A dam, the main section of which, is composed principally of earth, gravel, sand, silt, and clay.

Environmental assessment (EA): A planning report that presents the first thorough examination of alternative plans to positively demonstrate that the environmental and social consequences of a federal action were considered. If the EA concludes that the proposal is a major federal action significantly impacting on the quality of the human environment, or if it determines that the project will be environmentally controversial, an environmental impact statement will be required.

Environmental impact statement (EIS): A report required by Section 102(2)(c) of Public Law 91-190 for all federal actions which significantly impact on the quality of the human environment or are environmentally controversial. The EIS is a detailed and formal evaluation of the favorable and adverse environmental and social impacts of a proposed project and its alternatives.

Flank levee: A levee constructed nearly perpendicular to the stream flow.

Flat pool: The pool on the upstream side of a navigation lock and dam where the water surface level is nearly horizontal or has a very mild slope.

Flood (1 percent): This is the same as a 100-year flood and is a flood that has a 1 percent chance of occurrence in any year.

Flood capacity: The flow carried by a stream or floodway at bank-full water level. Also, the storage capacity of the flood pool at a reservoir.

Flood crest: The highest or peak elevation of the water level during a flood in a stream.

Flood plain: Valley land along the course of a stream that is subject to inundation during periods of high water that exceeds normal bankfull elevation.

Floodproofing: Techniques for preventing flood damage

to the structure and contents of buildings in a flood hazard area.

Floodwall: Wall, usually built of reinforced concrete, to confine streamflow to prevent flooding.

Freeboard: (I) Vertical distance between the normal maximum level of the surface of the liquid in a conduit, reservoir, tank, canal, etc., and the top of the sides of the conduit, reservoir, canal, etc.; (2) an allowance in protection above the design water surface level.

Gate bay walls: The gate bay walls include those portions of the lock in which the gate recesses, gate anchor ages, gate machinery, and sometimes culvert valves and culvert bulkheads are located.

Gravity drainage outlet: (1) Outlets for gravity drains such as tiles, perforated conduits, etc., serving an agricultural area and discharging into a drainage ditch; (2) pipe, culvert, etc., used for dewatering ponded water by gravity.

Groin: A wall-like structure built perpendicular to the shore to trap sand and prevent beach erosion.

Guide pier: A structure that extends from the entrance to a lock, used to guide vessels safely into the lock.

Habitat: The total of the environmental conditions that affect the life of plants and animals.

Headwaters: (I) The upper reaches of a stream near its source; (2) the region where groundwaters emerge to form a surface stream; (3) the water upstream from a structure.

Ice booms: Structures installed across channels to retard the flow of ice but not that of water.

Ice floes: Free-floating sheets of ice, usually at least several inches thick, on a stream, lake, or sea.

Ice jam: Accumulation of ice packed together and piled up, choking the stream channel and causing a rise in water level above the jam.

Intercepting sewer: A conduit that receives flow from a number of transverse sewers or outlets and conducts such waters to a point for treatment or disposal.

Jetty: On open water, a structure extending into a body of water designed to prevent shoaling of a channel by littoral material and to direct stream or tidal flow. Usually built at the mouth of a river to help deepen and stabilize a channel.

Left or right bank of river: The left-hand or right-hand bank of a stream when the observer faces downstream.

Levee: A dike or embankment, generally constructed close to the banks of the stream, lake, or other body of water, intended to protect the landside from inundation or to confine the streamflow to its regular channel.

Lift: The difference in elevation between the upstream and downstream water surface levels in a lock and dam system.

Lift lock: A canal lock serving to lift a vessel from one reach of water to another such as from the downstream side to the upstream side of a navigation lock and dam system.

Lift span bridge: A bridge having a movable span that remains horizontal while being lifted vertically by cables arranged through towers at both ends.

Lift station: A small wastewater pumping station that lifts the wastewater to a higher elevation when the continuance of the sewer at reasonable slopes would involve excessive depths of trench.

Light-draft craft: A small boat, usually recreational, having a draft of about 10 feet or less.

Littoral drift: Material such as sand that is swept along the littoral zone by waves and current.

Littoral zone: The narrow area, including the land and water, bordering the shoreline.

Lock: An enclosed part of a canal, waterway, etc., equipped with gates so that the level of the water can be changed to raise or lower boats from one level to another.

Lock operation: Locks fill and empty by gravity, with no pumps required to raise or lower the water level. To raise the water level valves are opened above the upper gates and water flows into the lock through tunnels in both lock walls. This process is reversed to lower water in the lock. Valves are opened below the lower gates and water drains out of the lock through the tunnels. Gates at both ends of the lock open and close electrically after the proper water level has been reached.

Low water datum: A standard reference elevation, unique for each Great Lake, to which all depths on hydrographic charts are referred.

Maneuvering channel: A channel intended to facilitate maneuvering of vessels into and out of slips.

Meander: The name given to the winding course of a stream or river.

Miter gates: A type of gate commonly used to trap the water in a lock chamber.

Mouth of river: The exit or point of discharge of a stream into another stream, a lake, or the sea.

Oxbow lake: A lake formed in the meander of a stream, resulting from the abandonment of the meandering course because of the formation of a new channel course.

Pier: A structure which extends from the shore out into the lake and serves primarily for mooring and landing of boats. Also, the term is sometimes used synonymously with jetty.

Pile dike: A dike constructed of posts or similar piling driven into the soil.

Ponding area: An area reserved for collecting excess runoff preparatory to being discharged either by gravity or by pumping.

Pool: A small and rather deep body of quiet water, as water behind a dam.

Preconstruction planning: Planning before construction usually done during a project's post-authorization stage.

Pumping station: A structure containing pumps that are used to evacuate runoff from behind levees during periods when high river levels prevent gravity drainage.

Reach: A length, distance, or leg of a channel or other watercourse.

Recurrence interval: The average time interval between actual occurrences of a flood of a given magnitude.

Rehabilitation: A major repair job. Usually involves

considerable reconstruction of already-existing structures.

Reservoir: A pond, lake, tank, basin, or other space, either natural or created in whole or in part by the building of a structure such as a dam, that is used for storage, regulation, and control of water for power, navigation, recreation, etc.

Retarding dam: A dam used to reduce the flood flows of a stream through temporary storage.

Revetment: (1) A facing of stone, concrete, sandbags, etc., to protect a bank of earth from erosion; (2) a retaining wall.

Riprap: A layer, facing, or protective mound of randomly placed stones to prevent erosion, scour, or sloughing of a structure or embankment. The stone so used for this purpose is also called riprap.

River basin: A water resource basin is a portion of a water resource region defined by a hydrological boundary that is usually the drainage area of one of the lesser streams in the region.

River region: A water resource region is a major hydrologic area consisting of either the drainage area of a major river, such as the Missouri River, or the combined drainage areas of a series of streams.

Stage: The elevation of the water surface above or below an arbitrary datum.

Standard project flood: A flood that may be expected from the most severe combination of meteorological and hydrological conditions that are reasonably characteristic of the geographical region involved, excluding extremely rare combinations.

Stop-log closure: Logs, planks, cut timber, or steel or concrete beams fitting into end guides between walls or piers to close an opening in a dam or conduit to the passage of water. The logs are usually placed one at a time.

Swale: (1) A slight depression, often wet and covered with vegetation; (2) a wide, shallow ditch, usually grassed or paved.

Swing span bridge: This is the span of a bridge across a navigable stream that rotates to allow tall ships to pass through the bridge.

Tainter gate: A semicircular gate that opens and closes through pivoting on a shaft and is used to control the flow of water over spillways.

Thermal discharge: Heated water, such as that from nuclear power plants, that is discharged into a stream or other body of water.

Tributary: A stream or other body of water that contributes its water to another stream or body of water.

Truss span: A structure made up of a number of bars, fastened together at their ends to form a rigid framework.

Turning basin: A widened area in a navigation channel or harbor area intended to allow vessels to turn around.

Uncontrolled spillway: An overflow spillway having no control gates.

Vertical lift gate: A gate that moves vertically in slots or tracks in masonry piers and consists of a skin plate and horizontal girders that transmit the water load into the piers.

Watershed: The whole surface drainage area that contributes water to a collecting river or lake.

Wave-absorbing breakwater: A breakwater is a structure protecting a shore area, harbor, anchorage or basin from waves. A wave-absorbing breakwater protects by absorbing rather than reflecting the wave energy.

Wing dam: A wall, crib, row of pilings, stone jetty, or other barrier projecting from the bank into a stream for protecting the bank from erosion, arresting sand movement, or for concentrating the low flow of a stream into a smaller channel.

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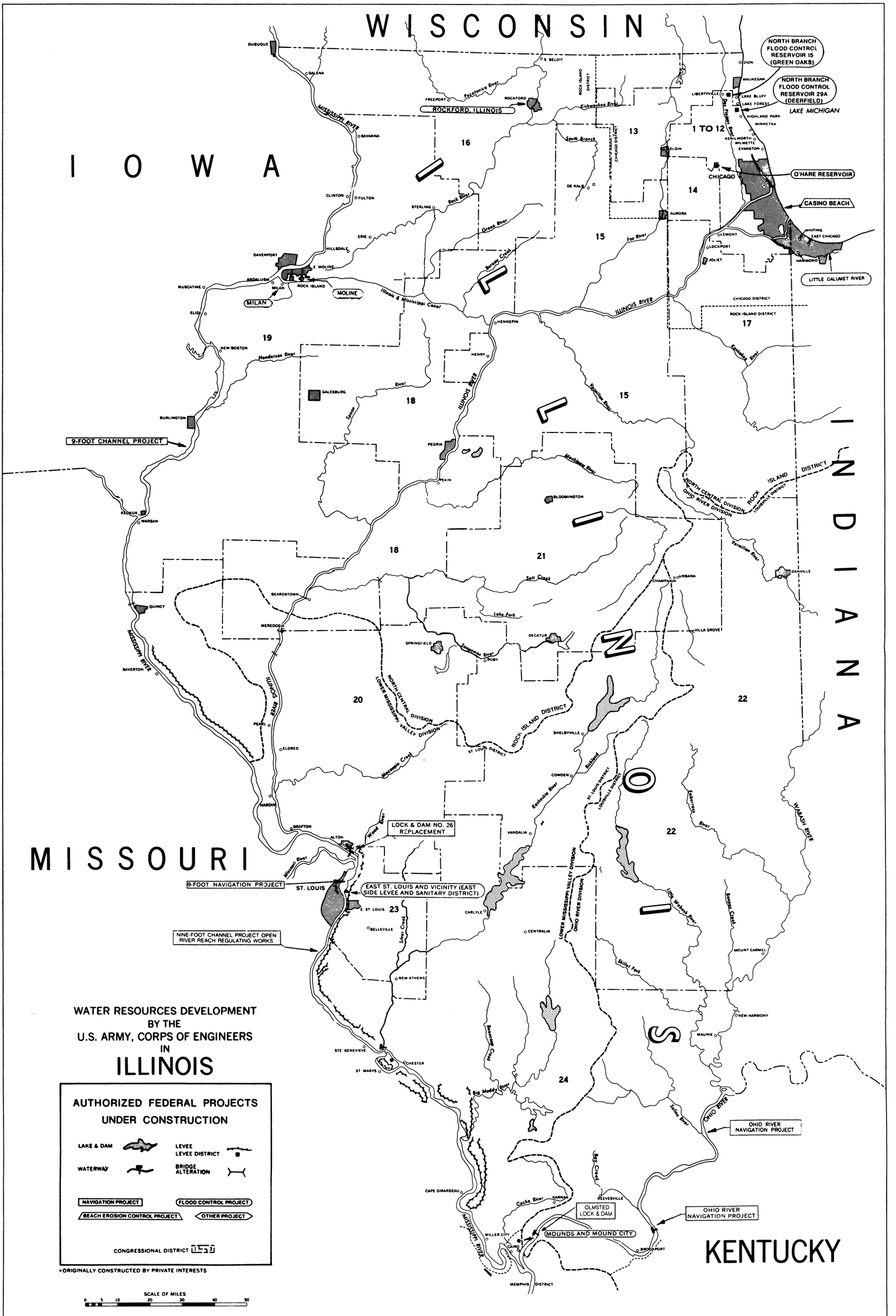
SCALE OF MILES
0 5 10 20 30 40 50
USCOMM-NOAA-DC - 1975 RS657



WATER RESOURCES DEVELOPMENT
BY THE
U.S. ARMY, CORPS OF ENGINEERS
IN

ILLINOIS

AUTHORIZED FEDERAL PROJECTS UNDER CONSTRUCTION

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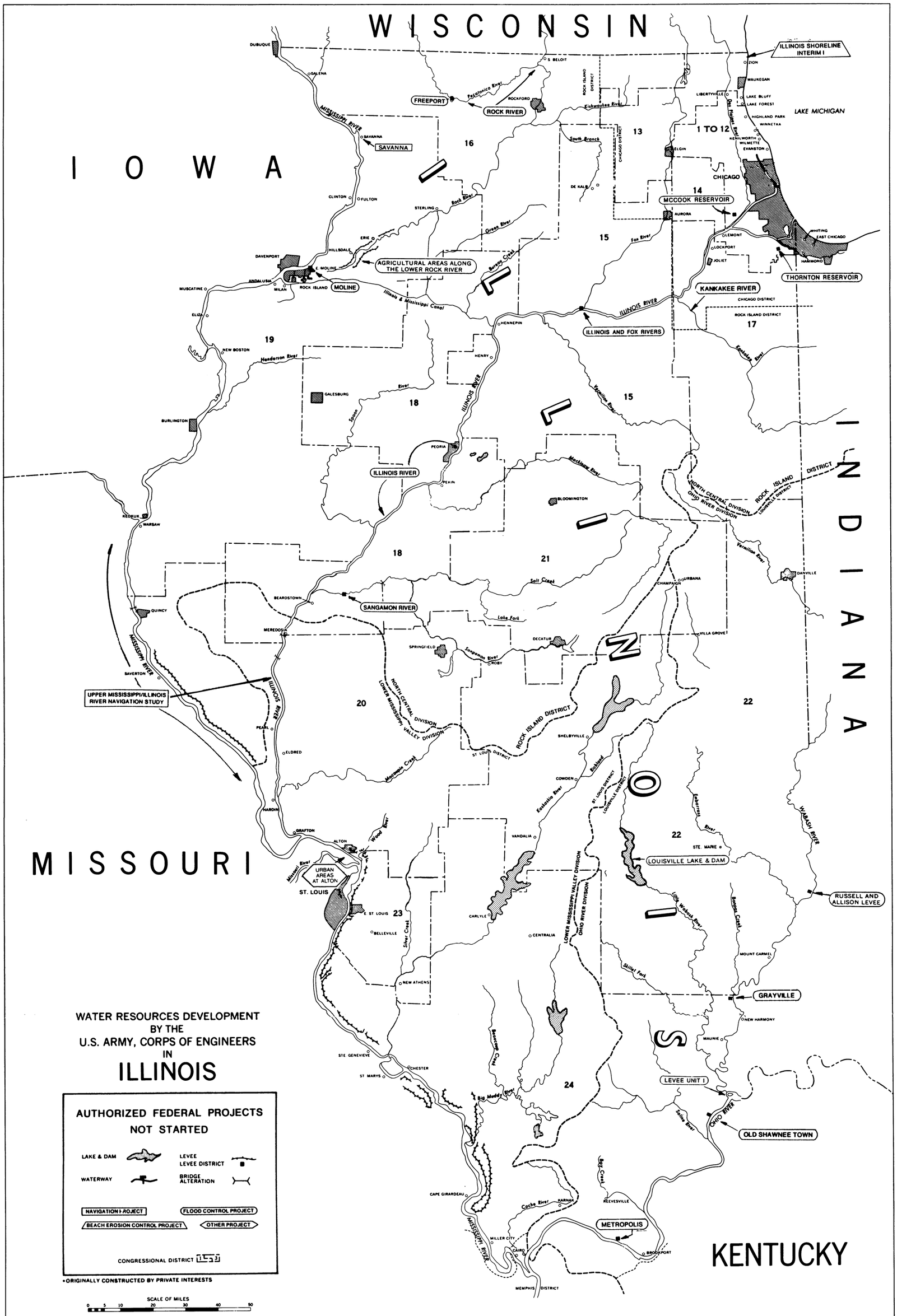
*ORIGINALLY CONSTRUCTED BY PRIVATE INTERESTS

SCALE OF MILES 0 5 10 20 30 40 50

USCOMM-NOAA-DC - 1975 R5657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BY THE
U.S. ARMY, CORPS OF ENGINEERS
IN
ILLINOIS
AUTHORIZED FEDERAL PROJECTS
NOT STARTED
LAKE & DAM
LEVEE
LEVEE DISTRICT
WATERWAY
BRIDGE
ALTERATION
NAVIGATION PROJECT
FLOOD CONTROL PROJECT
BEACH EROSION CONTROL PROJECT
OTHER PROJECT
CONGRESSIONAL DISTRICT
*ORIGINALLY CONSTRUCTED BY PRIVATE INTERESTS
SCALE OF MILES
0 5 10 20 30 40 50
USCOMM-NOAA-DC - 1975 R5657