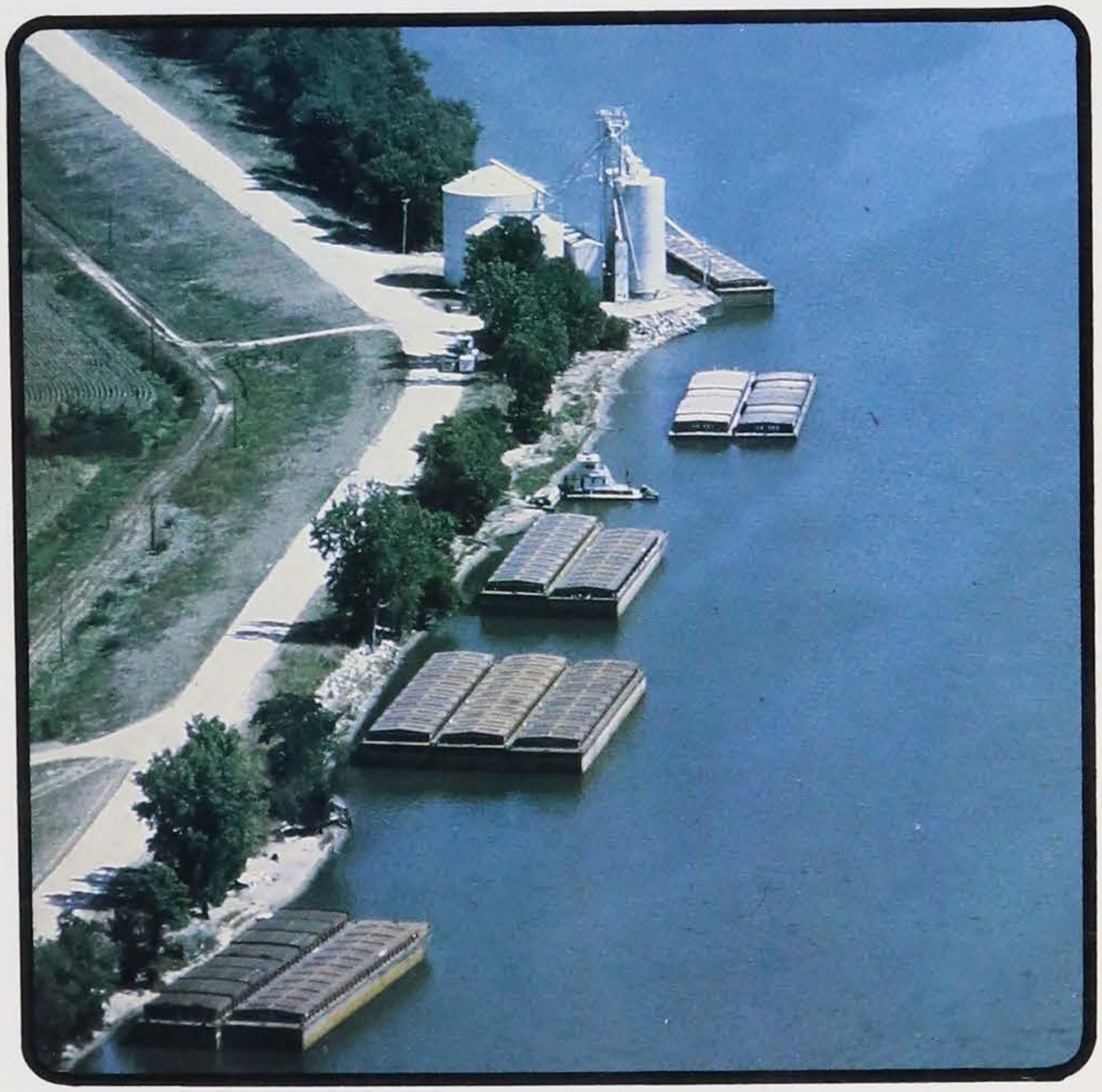
North Central Division



Water Resources Development

by the

U. S. Army Corps of Engineers in

Iowa

January 1979

WATER RESOURCES DEVELOPMENT IN IOWA, 1979

Foreword

The Corps of Engineers has been involved in water resources for over 150 years, developing and improving the Nation's water and related land resources.

Within the Continental United States the Civil Works Mission of the Corps involves 10 Divisions and 35 Districts. Divisions are named for their geographical location and have responsibilities within a major watershed. District activities are oriented around river basins. Since nature is no respecter of state boundaries, the work in many states falls within the jurisdiction of more than one District or Division.

This booklet has been prepared to provide information on Corps of Engineers activities in the State of Iowa. It illustrates the Corps role in planning, constructing, and operating projects for navigation, flood control, bank erosion control, and related water purposes. It describes projects that are completed, underway, or in the planning stage.

Projects and studies are classified as follows:

Authorized Not Underway — Projects or studies that have been authorized but not funded; or projects or studies that have been funded at one time and are now 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 — Projects or studies that are completed; or projects or studies that are completed except for some items that have been classified as inactive or deferred.

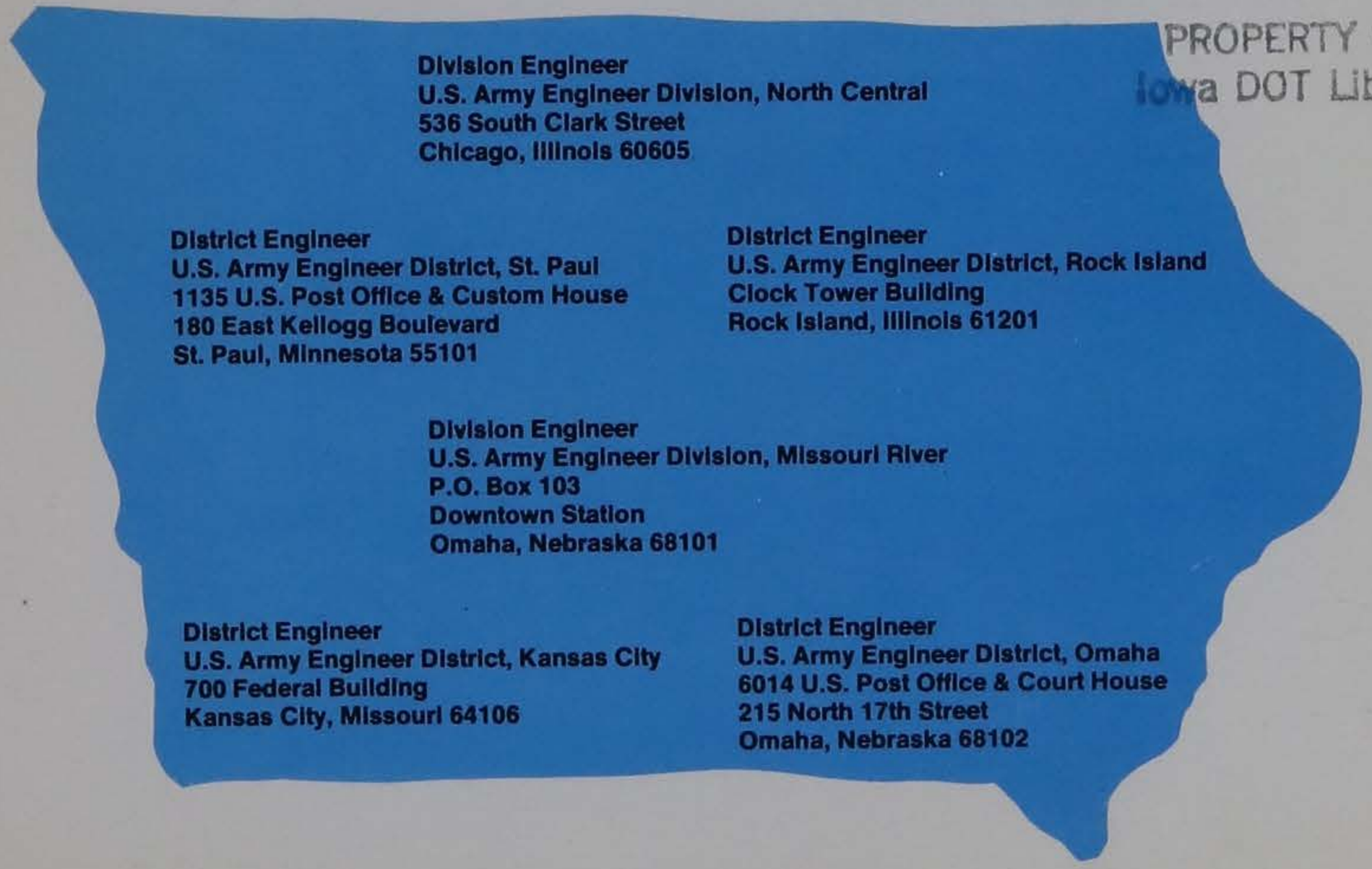
River regions and river basins are defined as follows:

River Region: A water resources 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.

River Basin: A water resource basin is a portion of a water resource region defined by a hydrological boundary which is usually the drainage area of one of the lesser streams in the region.

Work in Iowa falls within the jurisdiction of more than one Corps of Engineers Division or District Office. Throughout the booklet, the District responsible for each project is listed in parentheses following the title of the project or study.

Project locations and the boundaries of various Districts are shown on the map at the back of the booklet. Inquiries regarding specific projects should be addressed to the District or Division Engineer identified as responsible.



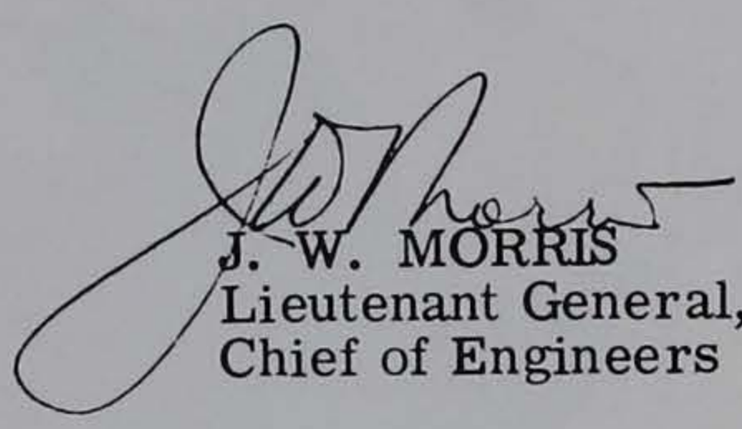
TO OUR READERS:

Water, as every American is learning, is a finite resource. And we of the United States Army Corps of Engineers are the stewards and principal developers of this most vital of the Nation's resources. This booklet is only one of a series which covers our past, current, and proposed activities for every state in the Union.

Our work began in 1824 when the Congress first directed us to begin navigation work on the waterways of the United States so that an improved transportation system could open up the West for expansion. Since that time, the Engineers have found themselves widening their efforts into flood control, water supply, hydroelectric power, recreation, and water conservation, meeting the needs and the demands of the American people. Today, there is iincreased emphasis on conservation, wetland protection, non-structural engineering solutions, metropolitan and flood plain water management, and the preservation and enhancement of the environment. We of the Corps take great satisfaction in our long record of service to meet the changing needs in water resource management.

Today, we find that our engineering experience has achieved international recognition, and demands for our services have grown into work for foreign countries. Through State Department sponsorship, we are exporting our technology to such far-flung places as Saudi Arabia and Nigeria, and overcoming some unqiue engineering challenges.

This booklet summarizes our efforts in only one state. Other booklets like this cover Corps' water resource programs in other states, possessions, and territories.



J. W. MORRIS
Lieutenant General, USA
Chief of Engineers

About the North Central Division

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

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 5 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 degradation, 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 Engineer represents the United States on several U.S.-Canadian international boards concerned with boundary water matters of the two countries.

NORTH CENTRAL DIVISION

LEGEND

- ST. PAUL DISTRICT
- CHICAGO DISTRICT
- ROCK ISLAND DISTRICT
- DETROIT DISTRICT
- BUFFALO DISTRICT

Canada
United States
Lake of the Woods
Red River of the North
NORTH DAKOTA
MINNESOTA
LAKE SUPERIOR
SOUTH DAKOTA
Minnesota River
St. Paul
Mississippi River
WISCONSIN
LAKE MICHIGAN
Manistee River
LAKE HURON
MICHIGAN
Wisconsin River
Rock River
Des Moines River
IOWA
Rock Island
Chicago
St. Joseph River
Detroit
LAKE ERIE
LAKE ONTARIO
New York State Barge Line
Buffalo
NEW YORK
Canada
United Stat
MISSOURI RIVER DIVISION
ILLINOIS
Illinois River
Maumee River
INDIANA
OHIO
PENNSYLVANIA
MISSOURI
LOWER MISS VALLEY DIVISION
OHIO RIVER DIVISION

About the Missouri River Division

Conservation and development of water resources within the 529,000 square miles of the Missouri River Region are the responsibilities of the Omaha-based Missouri River Division (MRD).

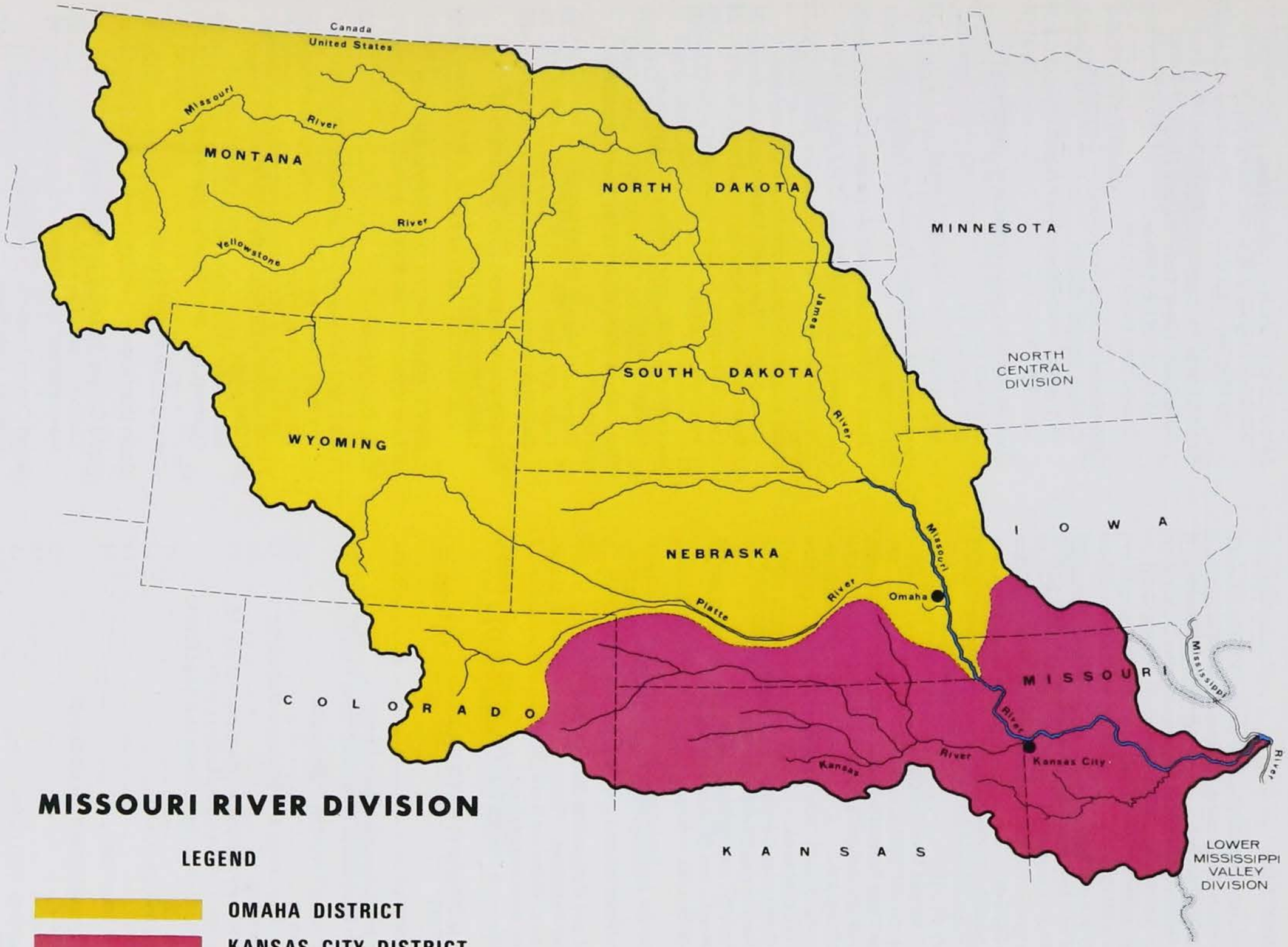
All of Nebraska and parts of nine other states are included in the Division with work in the upper reaches handled by the Omaha District and the lower reaches under control of the Kansas City District. Corps efforts within the region have prevented four billion dollars in flood damages.

The region drains one-sixth of the contiguous United States and produces almost two-thirds of the Nation's wheat, half the cattle, and a quarter of all American feed grains.

The Division designed, built, and operates two dozen dams on tributaries and provides many communities with flood control structures.

In addition, MRD built and operates the six huge multi-purpose dams on the main stem of the Missouri, the primary elements of the Pick-Sloan Program. These six have total storage capacity of 75-million acre-feet, more than three times the average annual flow of the Missouri. Each year the main stem dams produce approximately 15 billion kilowatt-hours of pollution-free energy, provide a free-flowing commercially navigable stream from Sioux City, Iowa, to the Mississippi, offer needed flood protection, enhance fish and wildlife production, and provide recreational opportunities for millions.

Erosion control, pollution reduction, ecological enhancement, wastewater management, flood damage reduction, and adequate water supplies for industry, agriculture, and municipalities are high priority items for the Missouri River Division.



MISSOURI RIVER DIVISION

LEGEND

- OMAHA DISTRICT
- KANSAS CITY DISTRICT

Table of Contents

Introduction

Our Nation's natural resources have contributed a great deal to our national wealth. Water and the surrounding air and land are our primary resources. Wise use of them is imperative.

Water is an element indispensable to life. Not only does it sustain life, but it can also be made to produce power, provide an economical means of transportation, and contribute to man's recreational enjoyment and relaxation. Increasing demands for water use, accompanied by the realization that it is in finite supply, resulted in the awareness of a need for its control, its conservation, and its management.

Participation in this endeavor is imperative for all if our natural resources are to be protected and preserved and our social and economic needs addressed.

The Federal Concern

The Federal water use policy is to maintain a reasonable balance between the water resource development implemented by the Federal Government and that implemented by the states, local governments, and private enterprise. Federal action is guided by precedent and law; the likelihood of widespread and general benefits; local ability to solve problems; and savings to the Nation that might be achieved by economies of scale. Federal objectives in water resources management are:

(1) that national economic development be promoted;

(2) that the quality of the environment be protected and enhanced as the Nation grows;

(3) that the social consequences of water resources development be given full consideration; and

(4) that regional development be fostered when compatible with national economic development.

The Corps of Engineers

The US Army Corps of Engineers has served as an engineer-advisor to Congress in the water resources field for over 150 years. Its existence dates back to the Revolutionary War.

On 16 June 1775, the day before the Battle of Bunker Hill, the Continental Congress authorized that there be one Chief Engineer for the Grand Army and two assistants under him. In December 1776, General George Washington, one of the few men with professional engineering skills adaptable to military use, was authorized by Congress to raise and organize the Corps of Engineers for a 6-month trial period.

After the Revolutionary War, the Continental Army Corps of Engineers was dissolved and the entire American Army reduced to 80 men. But by 1794, Congress feared that America might be drawn into the conflict then raging between England and revolutionary France. President Washington turned to trained military engineers in the United States to build new fortifications at principal Atlantic seaports.

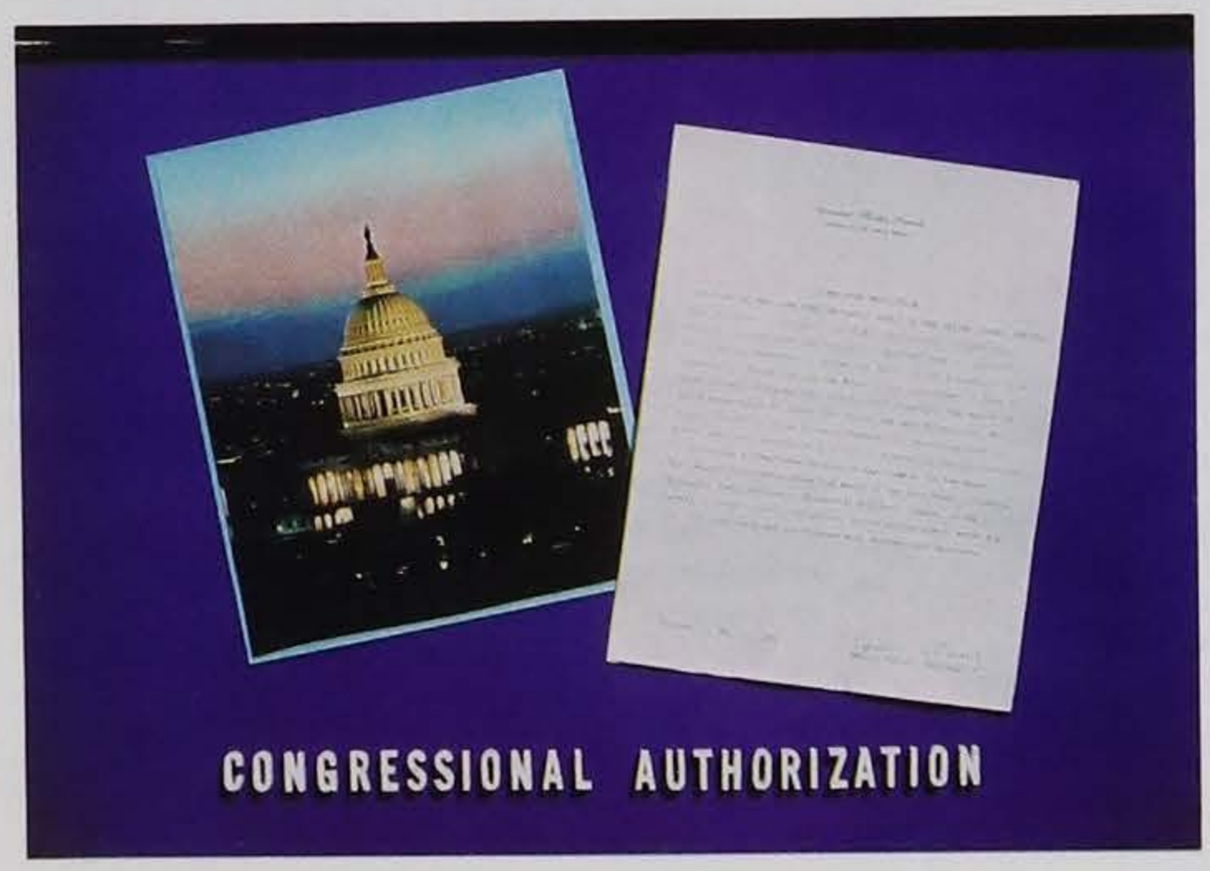
As the Country grew and expanded in the early 19th century, Congress committed the Corps to meet new challenges. In 1819, Congress recognized the vital role of the rivers in the development of the Nation and commissioned Major Stephen H. Long, a notable member of the Corps, to make several studies in the Upper Mississippi Valley. It was as a result of these studies that assigning civic duties to the Corps in times of peace became an established policy.

During the 1800's the Corps surveyed and mapped large areas of the Nation; located rail routes and led the construction of numerous roads, railroads, and canals; improved navigation in many rivers and harbors; and provided coastal defenses and lighthouses.

In 1936, the Corps became involved in floods and flood damage reduction when Congress designated the Corps of Engineers as the Federal agency to implement flood control activities.

The assignment of developing the Nation's water resources has been the most far-reaching peacetime responsibility ever assigned the Corps. The Country's early existence depended on its natural river system, and today's demands on the water resources of the Nation are ever-increasing. Today, the Corps of Engineers is involved in the entire field of water resources planning and development. Major areas of responsibility involved flood control and navigation but numerous other water resource areas are included and interrelated — hydroelectric power development, land and water recreation, irrigation, water supply, shore and beach erosion protection, hurricane protection, water quality management, and studies of urban area problems including those dealing with wastewater management.

The Project Process



Through time and our Country's growth, the Corps role in water resources development has increased. Today the role is very complex, and the project process involves a complex chain of activities.

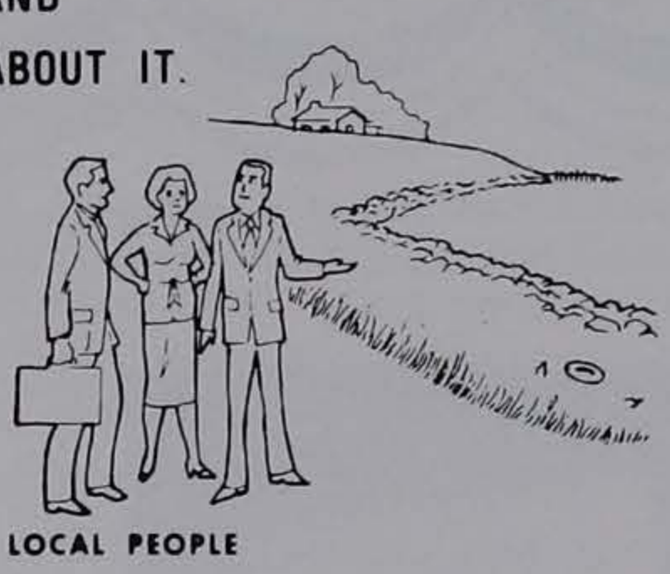
When people in a community feel that a problem or need exists, they petition their representative in Congress. The Senator or Representative then requests the appropriate Congressional Public Works Committee to direct the Corps of Engineers to make a survey and a recommendation. As soon as Congress provides funds, the comprehensive study process begins. Specific problems and needs of the area are determined, their severity is analyzed, the available alternatives are identified, and the alternatives are evaluated for their possible impacts on the human and natural environment. These alternatives are presented to the residents, concerned citizens, and agencies and are narrowed to those most highly preferred and most practical.

Responsive water resources development requires public involvement and public awareness. Public participation is encouraged in planning for all Corps projects to help insure that all views on problems, needs, and values are considered. Open communication among the public, Federal, state, and local agencies, and the Corps promotes a better understanding of the water resources problems and the alternatives to them. Coordination with other Federal and non-Federal agencies concerned with water resource planning or development assures adequate coordination with their programs. During preparation of the study, public meetings and workshops are held, and comments are solicited from those who have expressed an interest in the project.

When all the data are analyzed, all opinions heard, and a determination made of the best possible alternative, a Feasibility Report and an Environmental Impact Statement are submitted to Congress. Congress reviews the documents and may authorize the project by an Act of Congress.

HOW CORPS OF ENGINEERS' PROJECTS ARE STARTED, AUTHORIZED AND BUILT

WE HAVE A PROBLEM.
LET'S ORGANIZE AND
TELL CONGRESS ABOUT IT.



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LOCAL INTEREST'S REQUEST
HAS SUFFICIENT MERIT.

CONGRESS WILL AUTHORIZE
THE CORPS OF ENGINEERS TO
INVESTIGATE AND REPORT.

3

MAKE A SURVEY
REPORT.

4

WE NEED FUNDS TO
MAKE A SURVEY REPORT.

5

THE STUDY.
INCLUDED IN DEPARTMENT
OF THE ARMY CIVIL WORKS
APPROPRIATION BILL, PASSED
BY HOUSE AND SENATE,
AND SIGNED BY THE
PRESIDENT.

6

PUBLIC MEETING

WHAT ARE YOUR PROBLEMS
AND WHAT CAN BE DONE
ABOUT THEM.

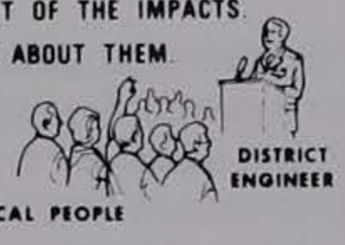
7

FEASIBILITY STUDY -
DEVELOP ALTERNATIVE SOLUTIONS
AND MAKE COMPARATIVE ESTIMATES
WITH RESPECT TO COST, BENEFITS,
ENVIRONMENTAL IMPACTS, AND
OVERALL CONSEQUENCES.

8

PUBLIC MEETING

HERE ARE POTENTIAL
ALTERNATIVES AND AN
ASSESSMENT OF THE IMPACTS.
LET'S TALK ABOUT THEM.



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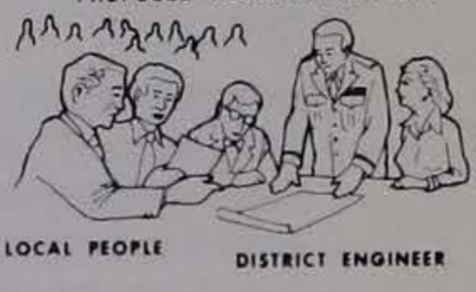
INCORPORATE VIEWS
OF LOCAL PEOPLE.
REEVALUATES ALTERNATIVES

10

PUBLIC MEETING

DISCUSS DISTRICT ENGINEER'S
PROPOSED RECOMMENDATION.



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HERE'S OUR LETTER OF ASSURANCES -
WE WILL COMPLY WITH ALL REQUIREMENTS
FOR LOCAL COOPERATION.
LOCAL INTERESTS

GOOD --- WE'LL SUBMIT THE REPORT
TO THE DIVISION ENGINEER.
DISTRICT ENGINEER

12

DISTRICT ENGINEER COMPLETES
FINAL FEASIBILITY REPORT -

SUBMITS TO DIVISION ENGINEER.

13

BOARD OF
ENGINEERS FOR
RIVERS AND
HARBORS

DIVISION ENGINEER
HERE'S A SURVEY
REPORT FROM THE
DISTRICT ENGINEER.
I HAVE REVIEWED
THE REPORT AND
CONCUR WITH RECOMMENDATIONS
OF THE DISTRICT ENGINEER.

14

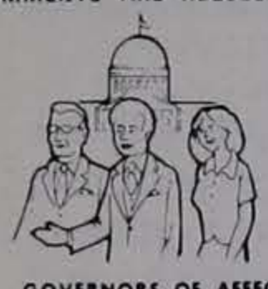
WE HAVE REVIEWED THE PLANS, THEIR
IMPACTS AND THE EVALUATION AND WE
RECOMMEND THE PROJECT.

(IF PLAN NOT FOUND
JUSTIFIED THE
UNFAVORABLE REPORT
IS TRANSMITTED TO
THE PUBLIC WORKS COMMITTEE)
BOARD OF ENGINEERS FOR RIVERS AND HARBORS

15

OFFICIAL COMMENTS ARE REQUESTED

CHIEF OF ENGINEERS



GOVERNORS OF AFFECTED STATES AND OTHER INTERESTED FEDERAL AGENCIES & PUBLIC

16

I HAVE REVIEWED THE CHIEF OF ENGINEERS' REPORT AND ENVIRONMENTAL STATEMENT. I HAVE NO OBJECTION TO SUBMITTING THE REPORT TO CONGRESS.

DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET

SECRETARY OF THE ARMY

17

HERE IS A FAVORABLE REPORT FROM THE CHIEF OF ENGINEERS RECOMMENDING THAT CONGRESS ADOPT THE PROJECT AT AN ESTIMATED COST OF $

SECRETARY OF THE ARMY

WE'LL HAVE THE REPORT PRINTED AS A PUBLIC DOCUMENT AND INCLUDE THE PROJECT IN THE NEXT WATER RESOURCES ACT.

PUBLIC WORKS COMMITTEE

18

CONGRESS PASSES WATER RESOURCES ACT INCLUDING THE PROJECT -- PRESIDENT SIGNS BILL. PROJECT NOW AUTHORIZED FOR CONSTRUCTION OR ADDITIONAL STUDY, IF NEEDED.

19

WE NEED FUNDS TO STUDY/DESIGN THE PROJECT.

CHIEF OF ENGINEERS

WILL REVIEW AND IF FAVORABLE WILL RECOMMEND FUNDS BE APPROPRIATED.

OFFICE OF MANAGEMENT & BUDGET

20

THE PROJECT, INCLUDED IN DEPARTMENT OF THE ARMY CIVIL WORKS APPROPRIATION BILL, PASSED BY HOUSE AND SENATE, AND SIGNED BY THE PRESIDENT.

21

GENERAL DESIGN MEMORANDUM- PRELIMINARY PLAN OF NEW PROJECT, UPDATED ESTIMATES OF COST AND OF PUBLIC BENEFITS EXPECTED ARE COMPILED BY THE DISTRICT ENGINEER.

22

DISCUSS TENTATIVE PLANS WITH INTERESTED PARTIES.
DEVELOP FINAL PLAN.

23

THE DISTRICT ENGINEER HAS SUBMITTED A FAVORABLE REPORT AND UPDATED ENVIRONMENTAL STATEMENT.

DIVISION ENGINEER

I CONCUR WITH HIS FINDINGS.

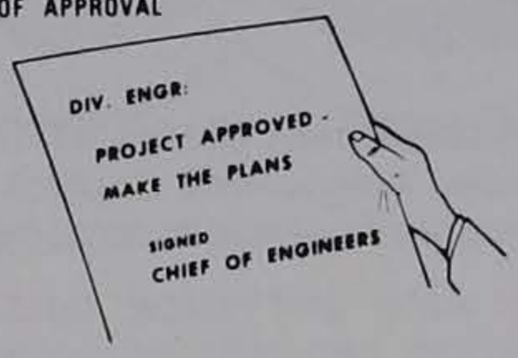
CHIEF OF ENGINEERS

24

PLANS, SPECIFICATIONS AND ESTIMATE OF COST ARE PREPARED IN THE OFFICE OF THE DISTRICT ENGINEER.

25

CHIEF OF ENGINEERS SENDS ADVICE OF APPROVAL



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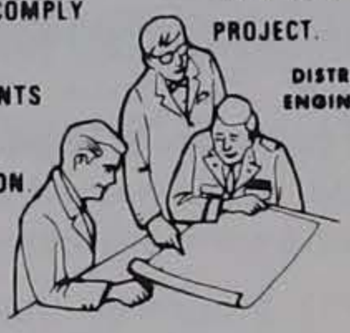
HERE'S OUR SIGNED AGREEMENT -- WE WILL COMPLY WITH ALL REQUIREMENTS FOR LOCAL COOPERATION.

LOCAL INTERESTS



WE'LL PROCEED WITH THE PROJECT.

DISTRICT ENGINEER

27

PLANS & SPECS ARE O.K. COST IS REASONABLE.

DIVISION ENGINEER

I'LL ASK FOR CONSTRUCTION FUNDS

CHIEF OF ENGINEERS

28

WE NEED FUNDS TO BUILD THIS PROJECT. THE UPDATED ENVIRONMENTAL STATEMENT HAS BEEN FILED WITH E. P. A.

CHIEF OF ENGINEERS

WILL REVIEW AND IF FAVORABLE WILL RECOMMEND FUNDS BE APPROPRIATED.

OFFICE OF MANAGEMENT & BUDGET

29

THE PROJECT, INCLUDED IN DEPT. OF ARMY CIVIL WORKS APPROPRIATION BILL. PASSED BY HOUSE AND SENATE AND SIGNED BY THE PRESIDENT.

30

INVITATIONS FOR BIDS ARE MADE PUBLIC AND MAILED TO ALL PROSPECTIVE BIDDERS.

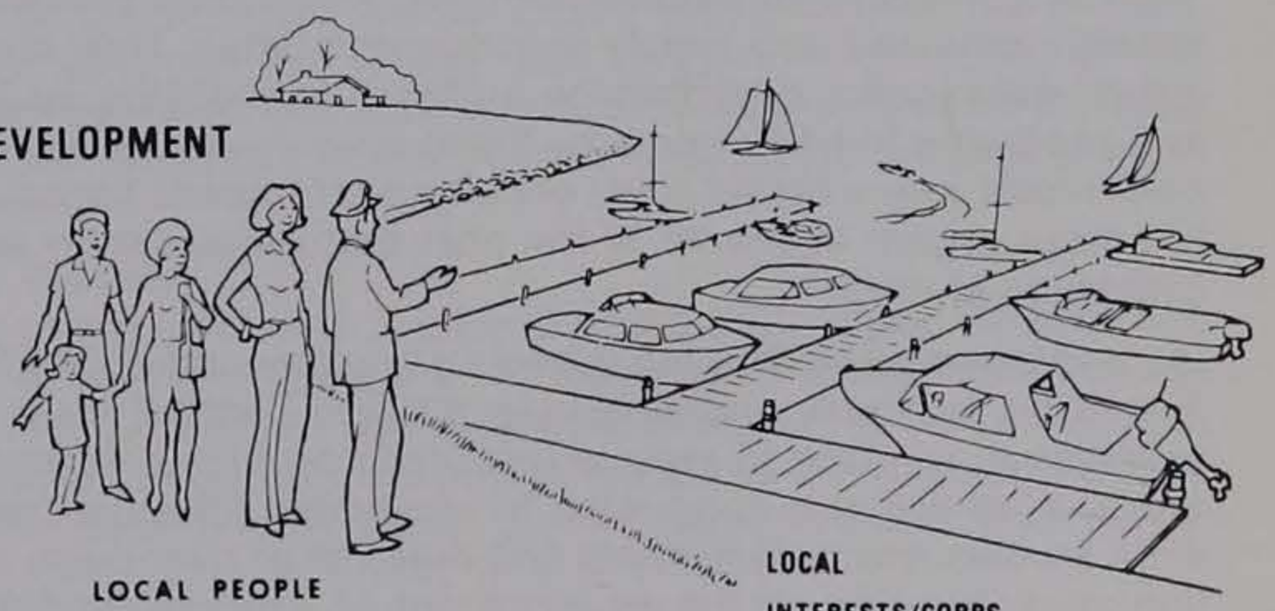
31

CONTRACTOR MOBILIZES HIS EQUIPMENT AND ACTUAL CONSTRUCTION BEGINS.

CONTRACTOR

32

NOW, THROUGH WATER RESOURCES DEVELOPMENT WE ARE PROVIDED GREATER BENEFITS.



LOCAL PEOPLE

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LOCAL INTERESTS/CORPS MUST MAINTAIN COMPLETED PROJECT.

Section 201 of the 1965 Flood Control Act, as amended, expedites the authorization of smaller projects by allowing them to be acted on by a resolution of the Committees on Public Works of the Senate and House of Representatives, rather than the Congress as a whole. The estimated Federal expense for initial project construction under Section 201 authority must be less than $15,000,000.

Congressional authorization does not include funds to start construction; it simply expresses the agreement of Congress to construct the project at some future time. Funds for the design and construction must be requested by the Corps from Congress in separate actions. There is often a lapse of time between authorization and funding, so after funds are appropriated, the plans are reviewed and updated to assure that they reflect current thinking and wishes of the community. If substantial changes occur, another environmental assessment is made and additional comments are solicited and evaluated from the interested public. After the project is reviewed and reevaluated and, in some instances, reformulated, Congress appropriates funds for actual construction. Plans and specifications are prepared, qualified contractors are invited to bid on the job, and a contract is awarded. The contractor mobilizes his equipment and personnel, and work begins under the technical direction of Corps personnel. When completed, the project is usually turned over to local interests for operation and maintenance.

Three Major Types of Study

I. **Framework Studies and Assessment (Level A)** These studies are of regional or national scope. They are directed by the Water Resources Council with the Corps, generally, a major participant. Framework studies and assessments of major regions are designed to:

(1) inventory the extent of water and related land problems, needs, and desires of people for the conservation, development, and utilization of water and land resources throughout the region;

(2) indicate the general approaches that appear appropriate for problem solution; and

(3) identify specific geographic areas with complex problems where more detailed regional, river basin, or implementation planning investigation and analysis are needed. Framework studies and assessments consider Federal, state, and local means of implementation and are multi-objective in nature. They do not normally provide a basis for recommending specific action for water resources development, except for implementation of recommendations which would not require more detailed study.

II. **Regional or River Basin Studies (Level B)** These studies are directed by the Water Resources Council generally with study participation by the Corps. They are reconnaissance-level evaluations of water and land resources more detailed in scope and more limited in area than framework studies. They are prepared to resolve complex, long-range problems identified by the framework studies and assessments and vary widely in scope and detail. They involve Federal, state, and local entities in the areas' water policy coordination and plan formulation, and they identify and recommend action plans and programs to be pursued by these individual entities. Regional or river basin planning studies are concerned with a broad array of component needs based on multiple objectives. The identification of the more urgent elements of the plan that require early action are used to guide subsequent implementation studies.

III. **Implementation Studies (Level C)** Implementation studies are detailed program or project feasibility studies generally undertaken by a single Federal, state, or local entity to recommend authorization or initiation of plans to reduce resources problems. Most Corps investigations fall into this category. The studies are also conducted to implement findings, conclusions, and recommendations of framework studies and assessments and regional or river basin studies. Plan formulation in an implementation study focuses on the development of a recommendable plan of action to meet near-term needs and to reduce problems in a manner consistent with long-range plans. Plans are oriented toward an identified set of specific components of the multiple objectives for the planning area.

(1) **Survey, Review, and Interim Studies (Feasibility Studies).** These are detailed studies for decision-making purposes concerning the need for and desirability of undertaking specific projects and programs. This is the largest class of Corps implementation studies and includes all those reports submitted to Congress for authorization. They are referred to as "Review Studies" when the study authority directs the review of a previous study. They are referred to as "Interim Studies" when accomplished as a partial implementation of a larger planning effort. While partial (Interim) response to a study authority may permit earlier consideration of high priority problems of limited scope, it may also limit possible alternatives for the subsequent comprehensive planning effort.

(2) **Investigations Under Continuing Authorities.** These implementation studies are made to determine appropriate Corps action under special continuing authorities (programs of small projects for Flood Control, Navigation, and Beach Erosion wherein legislation limits Federal expenditure per project). They differ from basic implementation studies because they usually consider smaller areas, and they do not require specific Congressional authorization. At the request of local people, a reconnaissance report (Preliminary Feasibility) study, a brief, non-detailed study, is made to determine if a feasible alternative exists, that there is a Federal interest, and that there is a local entity able and willing to provide the assurances. If so, then a Detailed Project study, which is a full implementation study, is carried out. The Detailed Project study serves as a basis for approval by the Chief of Engineers of a project for construction and also serves as a basis for preparation of contract plans and specifications.

Special Continuing Authorities

Several laws permit the Committees on Public Works of the Senate and House of Representatives, the Secretary of the Army, and the Chief of Engineers to authorize projects of limited scope. Special continuing authorities are briefly described here.

Small Flood Control Projects (Section 205, Flood Control)
Section 205 of the 1948 Flood Control Act, as amended, authorizes the Chief of Engineers to build small flood control projects that have not already been specifically authorized by Congress. The Federal share in such projects may not exceed $2,000,000, except where the project protects an area that has been declared a major disaster area in the 5-year period immediately preceding the date the Chief of Engineers deems such work advisable. Then the Federal share may not exceed $3,000,000. The work must constitute a complete solution to the flood problem in the affected area so as not to commit the United States Government to additional improvements to ensure effective operation. The local sponsor must agree to provide, without cost to the United States Government, all necessary lands, easements, and rights-of-way, including highway, highway bridge, and utility relocations and alterations; hold and save the United States Government free from damages; maintain and operate the project after completion; assume all project costs in excess of the Federal cost limitation; and prevent future encroachments on improved channels.

Snagging and Clearing (Section 208, Flood Control)
Section 208 of the 1954 Flood Control Act which amended Section 2 of the 1937 Flood Control Act, provides for clearing and straightening of stream channels and the removal of accumulated snags and other debris in the interest of flood control. A Section 208 project is designed to be complete in itself, not requiring additional work for effective flood control, and is limited to a maximum Federal expenditure of $250,000. Local cooperation is otherwise based on the same requirements as for larger authorized projects.

Small Navigation Projects (Section 107, Navigation)
Section 107 of the 1960 River and Harbor Act, as amended, authorizes the Corps of Engineers to construct small river and harbor improvement projects not specifically authorized by Congress. The Fed-

eral share in such projects may not exceed $2,000,000. These projects must be complete in themselves and not commit the United States Government to any additional improvement to ensure successful operation. Such projects are also subject to the same requirements of feasibility and economic justification as the larger projects which require specific authorization by Congress.

Small Beach Erosion Control Projects (Section 103, Beach Erosion)
Section 103 of the 1962 River and Harbor Act, as amended, provides for construction of small shore and beach restoration and protection projects (at publicly owned beaches or privately owned beaches for public use) not specifically authorized by Congress when, in the opinion of the Chief of Engineers, such works are advisable. The Federal share in such projects may not exceed $1,000,000 including any Federal share of periodic nourishment cost. The projects must be complete in themselves and not commit the United States Government to any additional improvement to insure successful operation. Such projects are subject to similar requirements of feasibility, economic justification, and cost sharing as the larger beach erosion control projects which require specific authorization by Congress.

Mitigation of Shore Damages (Section 111, Navigation)
Section 111 of the 1968 River and Harbor Act provides the authority for the Chief of Engineers to investigate, study, and construct projects for the prevention or mitigation of shore damages attributable to Federal navigation works. The cost of installing, operating, and maintaining such projects is borne entirely by the United States Government. No such project can be constructed without specific authorization by Congress if the estimated first cost exceeds $1,000,000.

Review of Completed Projects (Section 216)
Section 216 of the 1970 River and Harbor Act provides the authority for the Chief of Engineers to review the operation of completed projects, which were constructed by the Corps, in the interest of navigation, flood control, water supply, and related purposes when it is found advisable. A survey report is submitted to Congress with recommendations on the advisability of modifying the structures or their operation to improve the quality of the environment in the overall public interest.

Emergency Bank Protection (Section 14)
Section 14 of the 1946 Flood Control Act, as amended, authorizes the expenditure at a single locality of up to $250,000 per year for repair, restoration, and modification of emergency streambank and shoreline protection to prevent damages to highways, bridge approaches, and other public works and nonprofit public services.

Snagging and Clearing (Section 3, Navigation)
Section 3 of the 1945 River and Harbor Act authorizes snagging and clearing of navigable harbors, rivers, and other waterways. No limitation has been set for expenditures at a single locality, but total expenditures are limited to $300,000 a year. Work under this authority may be undertaken in emergencies to provide immediate and significant benefits to navigation through the removal of obstructions.

Removal of Wrecks and Obstructions (Public Law 189, 55th Congress)
Under this law the Corps of Engineers is authorized to investigate wrecked vessels and other obstructions to navigation and to insure removal at the expense of the owner or, under certain specific conditions, at the expense of the Federal Government.

Disaster Assistance

There has recently been a growing tendency for Congress to consider assistance to state and local authorities for recovery from major natural disasters as a Federal responsibility. A vast array of legislation now offers assistance to individuals and local government agencies in their efforts to recover from disasters such as the major 1973 floods on the Mississippi River and Hurricane Agnes in 1972. Three of these statutory atuhorities are of particular interest to the Corps of Engineers.

Emergency Flood Activities (Public Law 99, 84th Congress, 28 June 1955)
Public Law 99, as amended, authorizes an emergency fund to be used, at the discretion of the Chief of Engineers, for flood emergency preparations, flood fighting, and rescue operations, or for the repair or restoration of any flood control work threatened or destroyed by flood. This includes strengthening, raising, or extending the work or otherwise modifying it as deemed necessary for adequate functioning. It also involves emergency protection of federally authorized hurricane or shore protection structures being threatened, when such protection is warranted to protect against imminent and substantial loss of life and property; and repair and restoration of any federally authorized hurricane and shore protection structures damaged or destroyed by wind, wave, or water action of other than ordinary nature, when such repair or restoration are required for adequate functioning of the structure.

Section 206, Flood Control Act of 1962
This Act authorizes the Corps of Engineers to provide emergency protection for federally authorized hurricane and shore protection projects when threatened, and to repair and restore such works when damaged or destroyed by wind, wave, or water action of other than ordinary nature. Corps assistance under either PL 99 or Section 206 is provided upon request by local or state authorities.

Natural Disaster Assistance (Public Law 288, 93rd Congress, 24 May 1974)
Under this law the Corps of Engineers is authorized to cooperate with the Federal Disaster Assistance Administration in providing assistance to state and local governments in dealing with natural disasters. Assistance includes performing emergency work essential for the preservation and protection of life and property, conducting damage survey investigations, repairing, restoring or replacing public road facilities, and providing technical and engineering services. This law supersedes and incorporates provisions of Public Law 606, 91st Congress, as amended.

Flood Fighting

When floodwaters come and local officials find they are unable to cope with the situation, they officially request assistance from the Corps of Engineers. No red tape stands in the way of action — the men and women of the Corps are ready to respond immediately. A control center is established at Corps District headquarters to monitor the situation in the flood plain. Flood fighting teams are quickly dispatched and work begins to contain the floodwaters and protect property and lives. Corps teams work with state agencies and local officials, offering direction, expertise, materials, and manpower to help minimize damage. Corps help in fighting floods saves millions of dollars in damages annually.

Operation Foresight

Operation Foresight is a program designed to enable the Corps to react when every indication forecasts the threat of severe flooding by providing immediate assistance to communities mobilizing to avert potential disaster before it strikes.

When data gathered during the winter indicate an abnormally high snowpack or when other conditions are present which indicate a potential for severe flooding, the Chief of Engineers may decide to send Operation Foresight teams into action. Engineer teams are then sent out to meet with officials of counties and towns to help identify problem areas. Reconnaissance is made of those areas reported as potential trouble spots. Evaluations are made and work begun to prepare for the possibility of flooding.

Operation Foresight was also invoked for the Great Lakes when high water levels and winter winds combined to cause flooding in low-lying communities. Operation Foresight saves millions of dollars and, along with flood fighting, is one of the most important missions of the Army Engineers.

Flood Plain Management Services

Flooding rivers caused little damage until man began to occupy and build on the low riverbanks near the main river channel. This area is known as the flood plain. Man learned through bitter experience, however, that floods periodically cover the flood plain, damaging or sweeping away roads, buildings and homes, and posing severe threats to human life and health.

Flood protection works such as dams, channel improvements, and levees have been constructed to protect the developments of man. However, man's use of flood plain lands has been increasing faster than the construction of flood protection works. As a result, flood damage has continued to increase at unprotected flood plain locations.

Recognizing the need to prevent future losses of life and property due to the continued intrusion onto flood-prone areas, Congress enacted Section 206 of the Flood Control Act of 1960. The Act, with subsequent amendments, authorized the establishment of a Flood Plain Management Services Program in the Corps. The objective of the program is planning for flood damage prevention at all government levels to encourage and guide the wise use of flood plains for the benefit of the national economy and welfare. Flood plain information and planning and technical assistance on flood plain hazards and flood damage reduction measures are furnished to Federal, state, and local government agencies and private organizations and individuals upon request.

Technical and Planning Assistance

The Corps under the Flood Plain Management Services Program provides technical and flood plain management planning assistance to state and local governments upon request. The assistance activities include:

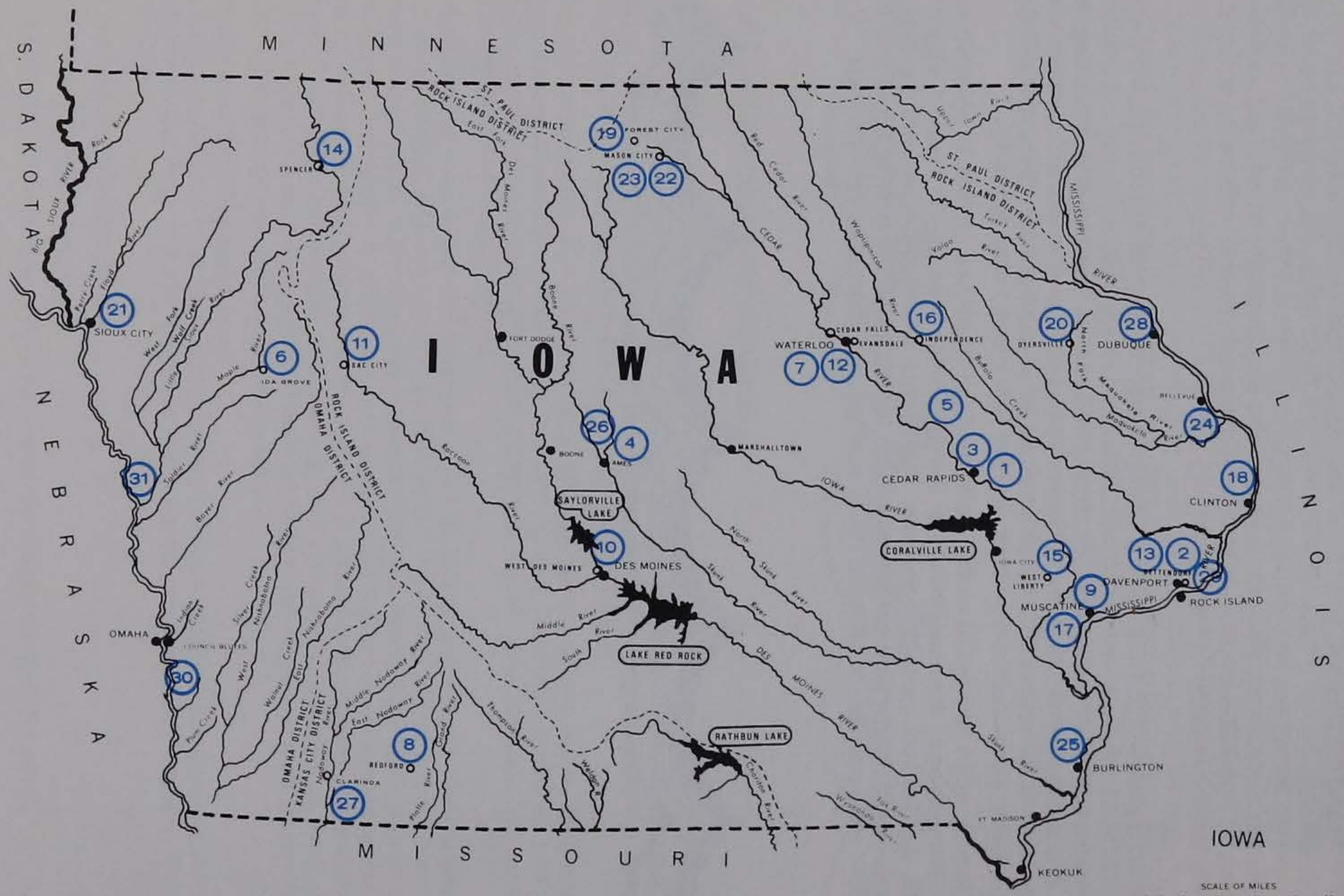
- Evaluation of flood hazards;
- Floodway determinations;
- Assistance in the preparation of rules and regulations for floodproofing;
- Architectural and engineering assistance for floodproofing;
- Assistance in the preparation of flood emergency preparedness plans;
- Flood hazard evaluations to comply with Executive Order 11988;
- Assistance in the preparation of regulations for flood-hazard areas; and
- Other flood-related issues, such as hydrology studies and coordination, urbanization effects on streamflows and flood damages, etc.

The information and guidance are intended for wise and informed decision making at the local level. Technical services and guidance constitute a major portion of the total effort. Contacts with local governments are encouraged not only because of specific concern with floods but also as they relate to local planning problems and the preparation of flood plain regulations. Professionals and elected officials are assisted in interpreting flood data. The limits of the flood areas and corresponding flood heights of specific design floods are defined. Where reports are not available, technical assistance can involve a comparably short, localized study to provide the essential information. Such assistance is also provided Federal agencies. Assistance to private organizations and individuals is limited to provision and interpretation of available information.

Flood Insurance Studies

Under the National Insurance Act of 1968 and the Flood Disaster Protection Act of 1973, the Department of Housing and Urban Development (HUD) was authorized to establish and carry out a National Flood Insurance Program. HUD is responsible for conducting studies to establish the existing flood damage potential and the risk premium rates for implementing the flood insurance program within flood-hazard areas. HUD is authorized to use the services, on a reimbursable basis, of the Departments of the Army, Interior, Agriculture, Commerce, and the Tennessee Valley Authority.

The Corps of Engineers, upon request of HUD, conducts flood insurance studies in selected communities. The flood hazards of an area are defined by using potential flood events having probabilities of occurrence of 10, 2, 1, and 0.2 percent in any year. The Federal Insurance Administration uses the study results in establishing flood insurance premium rates for the area. The information is also used by local, regional, and state planners to promote sound land use and flood plain development.



CORPS OF ENGINEERS
FLOOD PLAIN INFORMATION REPORTS
FOR IOWA

Flood Plain Information Reports

Map Key	Stream	Study Limits	District
1	Indian and Dry Creeks at Cedar Rapids	Mouth of Indian Creek to Section 30, T84N, R6W, Linn County, and mouth of Dry Creek to center of Section 33, T83N, R7W, Linn County	Rock Island
2	Duck Creek at Davenport and Bettendorf	Mouth to 17 miles upstream	Rock Island
3	Prairie Creek at Cedar Rapids	Mouth to county road 14.3 miles upstream at west line of Section 7, T82N, R8W, Linn County	Rock Island
4	Skunk River and Squaw Creek at Ames	Skunk River from a point 3.3 miles downstream from confluence with Squaw Creek to gaging station 4.9 miles upstream, mouth of Squaw Creek upstream 5.3 miles to SE corner of Section 29, T84N, R24W, Story County	Rock Island
5	Cedar River, Linn County	South Linn County line upstream 43 miles to the west Linn County line	Rock Island
6	*Badger Creek, Odebolt Creek, and Maple River at Ida Grove	Mouth of Badger Creek upstream 2 miles; mouth of Odebolt Creek upstream 2.8 miles; and Maple River from a point 1 mile downstream from confluence with Odebolt Creek to 2.3 miles upstream	Omaha
7	Black Hawk Creek, Black Hawk County	Mouth to Black Hawk County line 14.6 miles upstream	Rock Island
8	East Fork Hundred and Two River at Bedford	From County Road "K", river mile 7.5, to county road 1.5 miles upstream from Iowa Hwy 2, river mile 12.5	Kansas City
9	Mississippi River	Mile 441 to Mile 512 above Ohio River, Scott and Muscatine Counties	Rock Island
10	Des Moines River at Des Moines	From Center Street Dam in Des Moines 11 miles upstream to Saylorville Dam	Rock Island
11	North Raccoon River at Sac City	From county road in SW¼, Section 36, T88N, R36W, Sac County, upstream 8.97 miles to county road in NW½, Section 11, T88N, R36W, Sac County	Rock Island
12	Cedar River, Evansdale, Waterloo, and Cedar Falls	From a point 2.5 miles downstream of Waterloo Railroad in Evansdale to a point 5.9 miles upstream of US Hwy 218 in Cedar Falls	Rock Island
13	*Crow Creek at Bettendorf	Mouth to 0.8 mile upstream of Interstate 80	Rock Island
14	Little Sioux River, Ocheyedan River, and Muddy Creek at Spencer	Little Sioux River from a point 5.5 miles downstream of US Hwys 18 and 71 to 12.5 miles upstream, mouth of Ocheyedan River upstream 5 miles, and mouth of Muddy Creek upstream 3 miles	Omaha
15	Wapsinonoc Creek at West Liberty	From county road on south line of Section 24, T78N, R4W, to the Muscatine-Cedar County line, including the West, Middle, and East Branches	Rock Island
16	Wapsipinicon River and Malone Creek at Independence	From county road at SE corner of Section 30, Liberty Township, upstream to the north line of Section 30, Washington Township, and from mouth of Malone Creek to county road on north line of Section 24, Washington Township	Rock Island
17	*Mad Creek at Muscatine	From Clay Street to Iowa Hwy 38	Rock Island
18	Mississippi River	Mile 506.9 to mile 549.4 above Ohio River, Clinton and Jackson Counties	Rock Island
19	Winnebago River and tributaries at Forest City	Winnebago River starting at County Road "A", 7 miles downstream from the Hancock-Winnebago County line to a point 14.9 miles upstream; Silver Creek lower 1.1 miles; Bear Creek lower 1.3 miles; and Twister Creek lower 2.2 miles, Hancock and Winnebago Counties	Rock Island
20	North Fork Maquoketa River and tributaries at Dyersville	Maquoketa River from a point 5 miles downstream of US Hwy 20 in Dyersville to a point 10.8 miles upstream; lower 4.5 miles of Bear Creek; lower 3.4 miles of Hewitt Creek; and lower 1.7 miles of unnamed creek tributary of Hewitt Creek	Rock Island
21	Perry Creek at Sioux City	Mouth to a point 7 miles upstream	Omaha
22	Winnebago River at Mason City	From a point 2.8 miles downstream of USGS gage and US Hwy 18 in Mason City upstream to US Hwy 65 north of Mason City	Rock Island
23	Willow Creek and tributaries at Mason City	Mouth of Willow Creek to a point 13.4 miles upstream; mouth of Cheslea Creek to South Taft Avenue, 3.19 miles upstream; and lower 2.25 miles of Crane Creek	Rock Island
24	Mississippi River	Mile 549.4 to mile 608.5 above Ohio River, Clayton, Dubuque, and Jackson Counties	Rock Island
25	Mississippi River	Mile 361 to mile 442 above Ohio River, Lee, Des Moines, and Louisa Counties	Rock Island
26	Skunk River north of Ames	From gaging station north of Ames in Section 23, T84N, R24W, Story County, to the Story-Hamilton County line	Rock Island
27	Nodaway River and North Branch at Clarinda	Nodaway River from a point 2 miles downstream of US Hwy 71, river mile 459.5, to first county road above Washington Street, river mile 465.7; and mouth of North Branch to 16th Street	Kansas City
28	*Catfish Creek at Dubuque	Mouth of main stem to west line of Section 2, T88N, R2E, Dubuque County; mouth of South Fork to US Hwy 20; mouth of Middle Fork to north line of Section 31, T89N, R2E, Dubuque County; and mouth of North Fork to west line of Section 27, T89N, R2E, Dubuque County	Rock Island
29	**Crow Creek Basin, Scott County	Entire Crow Creek Basin in Scott County—Drainage Area — 18.15 sq. mi. (dated 1 Jun 79)	Rock Island
30	*Missouri River	Mile 581.3 to Mile 659.4 above Missouri River mouth; Mills, Pottawattamie, and Harrison Counties	Omaha
31	*Missouri River	Mile 659.4 to Mile 746.3 above Missouri River mouth; Harrison, Monona, and Woodbury Counties	Omaha

Special Flood Hazard Investigation Report
All reports were sponsored by the Iowa Natural Resources Council, and all reports are complete
***Expanded Flood Plain Information Report*

Planning Assistance to States

Section 22 of the 1974 Water Resources Development Act authorized the Secretary of the Army, acting through the Chief of Engineers, to assist any state in the preparation of comprehensive plans for the development, use, and conservation of the water and related resources of drainage basins located within its boundaries. If these plans contain projects with a Federal interest, the Chief of Engineers recommends appropriate Federal participation to Congress for authorization.

Urban Studies

People have been drawn to the flood plains of rivers and streams since the earliest exploration of our Nation. As the Nation grew and settlement and development continued, early villages sprang up at the river's edge. Industry was developed, and early highways and railroads were constructed.

Once the historical core of settlement was established, communities continued to grow. Today over 2/3 of the total population is concentrated in 243 urban areas. These growing concentrations of population, industry, and commerce pose a multitude of interrelated problems. As a result, urban planning has earned Federal attention and has led to the establishment of a Corps of Engineers Urban Studies Program. Under the program, the Corps of Engineers and other agencies serve as partners in formulating solutions to help these metropolitan areas solve their urban water and related problems, and state and local governments are responsible for implementing any alternative measures selected.

The Corps Urban Studies Program is conducted in a manner consistent with two basic principles of the Executive Department. One is that the responsibility for and leadership of urban area comprehensive planning is vested in state and local government. The second is that duplication or conflict among Federal agencies participating in Urban Area Comprehensive Planning is to be avoided.

Urban Area Comprehensive Planning is very broad in scope and includes wide comprehensive areas. The scope of the Corps Urban Studies Program involves many kinds of specific problems. Similarly, the decisions made during planning by state and local government in the context of Urban Area Comprehensive Planning are broader than the decisions made by the Corps of Engineers in the Urban Studies Program.

SCOPE OF URBAN STUDIES

- **URBAN FLOOD CONTROL**
- **FLOOD PLAIN MANAGEMENT**
- **MUNICIPAL & INDUSTRIAL WATER SUPPLY**
- **WASTEWATER MANAGEMENT**
- **BANK AND CHANNEL STABILIZATION**
- **LAKE AND OCEAN RESTORATION AND PROTECTION**
- **RECREATION MANAGEMENT AT CIVIL WORKS PROJECTS**
- **REGIONAL HARBORS AND WATERWAYS**

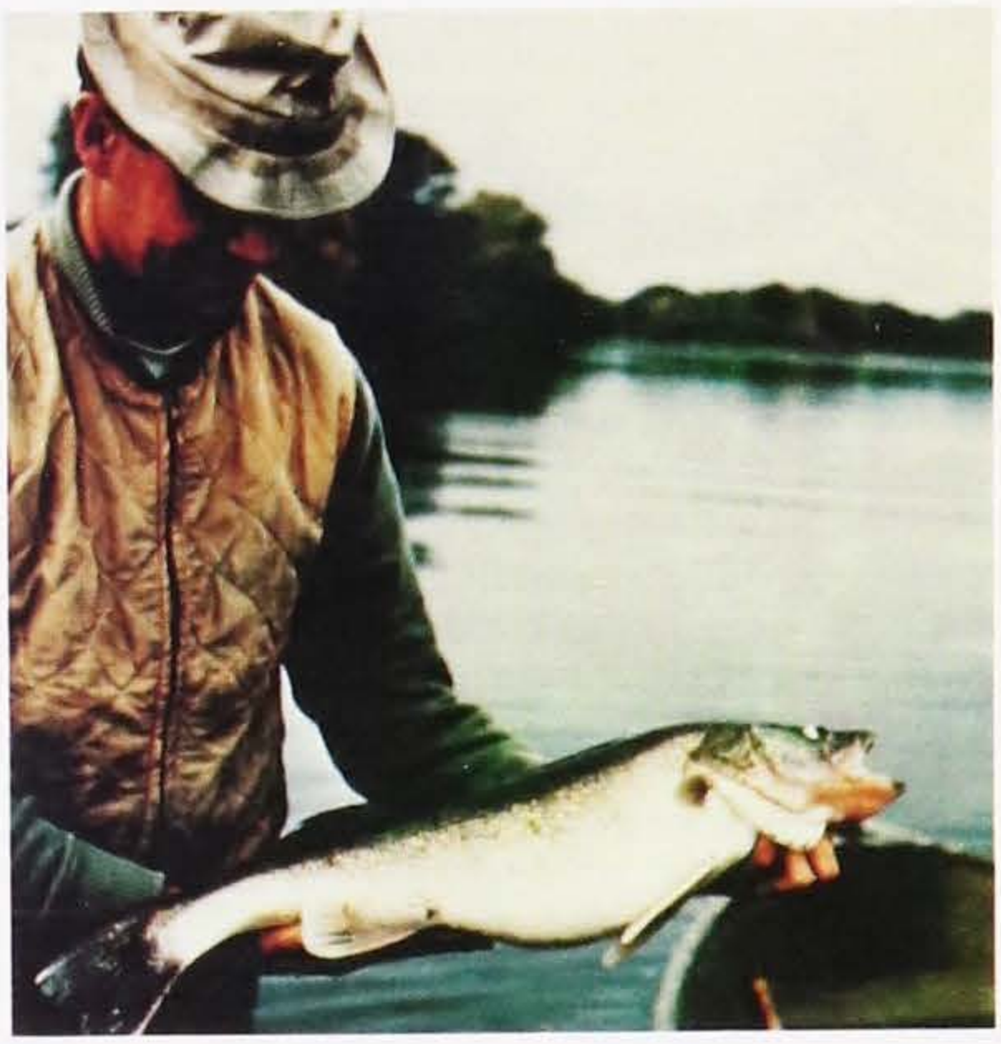
SCOPE OF URBAN AREA COMPREHENSIVE PLANNING

- **HOUSING**
- **MODEL CITIES AND COMPREHENSIVE URBAN SITE DEVELOPMENT**
- **HEALTH AND SOCIAL SERVICES**
- **URBAN RECREATION**
- **FLOOD AND WASTEWATER MANAGEMENT**
- **RENEWAL OF URBAN WATERFRONTS**
- **INTEGRATED TRANSPORTATION**
- **LAND-USE PLANNING AND ZONING**
- **SOLID WASTE MANAGEMENT**
- **WATER SUPPLY**

Corps planning in these functional water resource areas offers realistic prospects for solving specific urban water problems and, equally important, has the potential to serve as a catalyst for solving other related urban problems. Results of the Army's Urban Studies Program may be thought of as an input into Urban Area Comprehensive Planning.

The distinction between the scopes of the two and between the planning decisions required in each is the key to the principle that responsibility for the Urban Area Comprehensive Planning will remain with state and local government.

Environmental Considerations



Traditionally, Americans have sought economic expansion and development to support a growing population and to achieve a higher standard of living. It has become evident, particularly within this decade, that our natural resources are not limitless. Thus, our Nation is faced with the critical need to provide a quality environment for its citizens while prudently using its limited natural resources. Wise planning is vital to accommodate economic growth and the preservation of natural beauty. Through the enactment of the National Environmental Policy Act of 1969, the Environmental Quality Improvement Act of 1970, and other legislation, the Executive Branch and the Congress have charged the Corps of Engineers and other Federal agencies engaged in the development of natural resources, with the responsibility of seeking such

a balance. The Corps, in its comprehensive studies and project investigations, considers environmental values and needs equally with economic, engineering, and social factors. The Corps also considers these environmental values and needs in operating, regulating, and maintaining its projects.

In its planning and design process, the Corps follows the National Environmental Policy Act of 1969 which requires that all project proposals include an Environmental Impact Assessment. After the assessment is made, the District Engineer determines whether or not a full-scale impact statement is required. The Environmental Impact Statement considers the environmental impact of the proposed action; the adverse effects which cannot be avoided if the project is carried out; the alternatives to the proposed actions; the relationship between the short-term use of the environment and the maintenance of long-term productivity; and the irreversible and irretrievable commitments of resources which would be made if the project were adopted. During preparation of this statement, the Corps solicits comments from governmental agencies, conservation organizations, and concerned individuals.

The statement is then filed with the Environmental Protection Agency (EPA).

To further water pollution control, the Congress passed the Federal Water Pollution Control Act of 1972 which sets as a national goal the elimination of all pollution from America's waters by 1985. Section 101 of the Act established a national goal of eliminating all pollutant discharges into United States waters by 1985 and an interim goal of making the waters safe for fish, shellfish, wildlife, and people by 1 July 1983. In addition, the law required secondary treatment of all municipal wastes by mid-1977, and the application of more advanced disposal methods by mid-1983.

Corps Support for EPA Construction Grant Program

The Corps of Engineers and the Environmental Protection Agency entered into a joint agreement on 20 January 1978 in which the Corps of Engineers will assist the EPA in administering the municipal treatment works construction grant program authorized under Title II of the Federal Water Pollution Control Act of 1972, as amended in 1977. The mission to be accomplished under this agreement is to assure that EPA grant-assisted treatment works projects are constructed in accordance with both high standards of engineering and construction practice and with applicable Federal requirements to meet the environmental objectives of the Title II program.

Diked Disposal Area Program

The Corps began a "Pilot" study in early 1966 to determine the feasibility of alternate disposal practices for Great Lakes harbors. As a result, on 31 December 1970 Congress enacted Public Law 91-611 authorizing a ten-year program for the construction of diked disposal facilities on the Great Lakes for the confinement of polluted dredged material.

As of 1 January 1978, there were 43 proposed disposal sites to serve 61 projects in the Diked Disposal Program. Of these 43 sites, 9 have been completed. The total estimated Federal cost for construction of the 43 areas at 1 October 1977 price levels is $250,000,000.

Recreation and Fish and Wildlife

The need for development of outdoor recreational opportunities and for fish and wildlife conservation are being recognized to a far greater degree today than ever before. Many Corps projects are conducive to recreational development, and Congress has appropriated funds for that development. Congress has also directed the Corps to consider recreation in planning new facilities designed for flood control and navigation. Accordingly, in planning water resources projects, Federal agencies now consider these needs on the same basis as other needs. Planning and project development are coordinated with the Fish and Wildlife Service and the agency administering fish and wildlife resources in the state in which a project is being considered. There is also continuing coordination with Federal and state resource management agencies in managing completed projects. As a result, millions of acres of land and water at Corps projects have been made available for general recreation and for fish and wildlife management.

The Corps recreation resource management program is carefully planned to promote full use of Corps projects without damaging the natural environment. The Corps philosophy emphasizes diversification in recreation planning to satisfy as many different types of uses as possible and still preserve selected areas in or as near to their natural state as possible. People who like boating, camping, picnicking, fishing, swimming, water skiing or bird watching can generally find their specialty at a Corps lake or waterfront. Facilities usually include access roads, boat-launching ramps, navigation aids, parking areas for cars and trailers, observation points, picnic areas, campgrounds, swimming areas, and water supply. Marinas with their attendant items for sale and rent are normally located on Federal lands on a concessionaire basis. Privately owned facilities and services such as motels, restaurants, and sporting goods stores are also generally located on adjacent private lands.

National Dam Safety Program

Public Law 92-367 of 1972 authorized a national program of dam safety in the United States. Dams covered under the program include all structures over twenty-five feet high impounding over fifteen acre-feet of water, and all structures over six feet high impounding over fifty acre-feet of water; structures less than six feet high are not included. The initial efforts under the dam safety program were limited to compiling a detailed inventory of all structures included in the program. Non-Federal dams whose failure would cause loss of life or significant economic loss downstream are being inspected through Federal and state cooperation. The results of each inspection, including recommendations, are forwarded to the Governor for consideration and appropriate action. Subsequent to these initial inspections the program will revert to a continuing state program of inspection of non-Federal dams. Inspection of Federal dams is accomplished by the Federal agency having jurisdiction over those structures and most, if not all, Federal agencies have had inspection requirements and procedures in effect long before the Public Law was enacted. The Corps of Engineers, for example, has a routine inspection schedule as a part of its Operation and Maintenance Program.

Major Rehabilitation Program

A number of completed projects operated and maintained by the Corps of Engineers need significant and costly maintenance work. So that the Operation and Maintenance budget would not be unduly distorted from year to year, a Major Rehabilitation Program was established under the Construction General appropriation. This program allows costly ($2 million minimum) maintenance and rehabilitation to be done on completed projects operated and maintained by the Corps of Engineers.

Permit Program

The Corps of Engineers exercises regulatory authority in navigable waters of the United States primarily under the River and Harbor Act of 1899. Corps of Engineers permits are required for work or structures placed in navigable waters of the United States and for the discharge of dredged material or fill into navigable waters, or the transportation of dredged material for the purpose of dumping into ocean waters. Structures such as piers, wharfs, and docks and activities such as channel excavation, placement of riprap, groins, buoys, mooring devices, cables, and pipes, also require permits.

Navigable waters of the United States are those which are subject to the ebb and flow of the tide and/or those that are, or have been, or may be, susceptible for use for interstate or foreign commerce. In tidal areas, land subject to inundation by the plane of mean high water are considered navigable waters of the United States as are lands below the elevation of ordinary high water adjacent to nontidal streams and lakes.

As a result of Section 404 of the Federal Water Pollution Control Act as amended in 1972, the Corps regulatory authority was expanded to include the responsibility to regulate the discharge of dredged or fill material in the waters of the United States. The program insures that the chemical/biological integrity of the waters of the United States is protected from the irresponsible and unregulated discharge of dredged or fill material that could permanently destroy or alter the character of these valuable resources.

The Corps of Engineers evaluates each permit application to determine the benefits which reasonably may be expected from the proposal as well as the reasonably foreseeable detriments. The permits are also coordinated with other governmental agencies, such as the Environmental Protection Agency, the US Fish and Wildlife Service, and others. Factors considered include conservation, economics, aesthetics, historic values, general environmental concerns, navigation, land-use classifications, fish and wildlife, recreation, flood damage prevention, water supply, water quality, and in general, the needs and welfare of the people. Permits are issued only when determined to be in the overall public interest.

Deauthorization of Older Projects

Section 12 of the Water Resources Development Act of 1974 provides a program for the review of projects, authorized for eight or more years but not funded during that time, to determine if they should be deauthorized.

At least once each year the Secretary of the Army, acting through the Chief of Engineers, prepares a list of projects recommended for deauthorization. The list is first reviewed by interested Federal agencies and the Governors of affected states and is then submitted to Congress. After the list is delivered and Congress has been in continuous session for 90 calendar days, a project cited on the list is automatically deauthorized unless during the 90 days either the Committee on Public Works of the House or Senate adopts a resolution stating that such project shall continue to be authorized. The Secretary of the Army can also, at his discretion, withdraw any project on the list any time before the 90 days end. As of 1 May 1978 two lists of projects had been deauthorized by Congress.

Planning Objectives

The Corps of Engineers study authorities and programs respond to those multiple-objective national priorities calling for conservation, preservation, and wise development of our water and related land resources. The best existing ecological knowledge and insight are applied to management and development of our Nation's resources. Environmental values receive full consideration along with social, economic, and engineering factors. Emphasis is placed on urban as well as undeveloped areas. Historical, cultural, scenic, and natural aspects of our American heritage must be preserved and protected. In carrying out multiple-objective planning, the Corps follows the requirements established in the Water Resources Council (WRC), "Principles and Standards for Planning Water and Related Land Resources (P&S)." The P&S require that Federal and federally assisted water and related land planning be directed to achieve National Economic Development (NED) and Environmental Quality (EQ) as equal national objectives. NED is to be achieved by increasing the value of the Nation's output of goods and services and improving national economic efficiency; EQ is to be achieved by the management, conservation, preservation, creation, restoration, or improvement of the quality of certain natural and cultural resources and ecological systems. The Corps of Engineers is pledged to judiciously apply existing knowledge and insight and to consider a full range of alternatives to solve our problems and meet our needs.

To realize these goals the Corps seeks active public participation in the planning process. The Corps provides other governmental agencies and the public with timely information concerning its efforts. As a citizen interested in the future of our Nation and this state, you have opinions that are of value to the Corps of Engineers. You are encouraged to express them and to participate fully in planning for the future use of these resources.

Water Resources Development in Iowa

Water and the surrounding air and land are primary resources. Wise use of these resources is imperative. Throughout the State of Iowa, the Corps programs are striving to provide maximum use of these resources.

Iowa is unique in the Nation in that it has commercial river traffic on both its eastern and western borders. Navigation projects on both the Upper Mississippi River and the Missouri River have brought the advantages of low-cost water transportation to the state. These projects link Iowa's river ports to points on the Ohio River, the Lower Mississippi River, the Gulf Coast, the Tennessee River, and via the Illinois Waterway to the Great Lakes and the St. Lawrence Seaway. Iowa grain moves down these rivers to St. Louis, Kansas City, Memphis and even to New Orleans for shipment overseas. Coal and petroleum products move upstream.

The Upper Mississippi River became an important modern traffic artery with the construction of 26 navigation dams that provide a dependable 9-foot channel depth. The navigation improvement was largely completed by 1940 and river traffic has been increasing ever since. On the Upper Missouri River, channel work combined with water released from major reservoirs creates a 9-foot channel along the western border of the state. Traffic on that stream is also increasing.

Flooding on the Mississippi, the Missouri, and their tributaries proved the need for local flood protection projects at various locations throughout the state. The lowlands bordering the Mississippi River contain some of the most fertile farmland in the country and the areas are organized into levee and drainage districts for which flood damage reduction measures have been provided. In addition, local protection projects for individual communities such as Des Moines, Waterloo, Marshalltown, Dubuque, Clinton, Council Bluffs, and Sioux City have been or are being constructed. There are also many other projects within the state in various stages of planning and construction.

In addition to local protection projects for individual communities and drainage districts, the Corps is responsible for four flood control reservoirs within the State — Coralville Lake on the Iowa River near Iowa City, Red Rock Dam and Lake Red Rock and Saylorville Lake on the Des Moines River, and Rathbun Lake on the Chariton River — which provide a high degree of protection to the basins of those streams.

Increasing recreational use of the Nation's rivers has in turn created an increased demand for public recreation facilities. The rivers of Iowa offer a variety of recreational opportunities and facilities. Parks designed for the motorized camper, undeveloped wilderness type settings ideally suited for the canoeist and the backpacker, and various facilities in between are available for the recreational enthusiast. Along the Mississippi River eight public use areas have been developed for your use and enjoyment on land originally acquired as part of the 9-foot channel project. A number of public use recreational sites have also been built along the Iowa portion of the Missouri River, and recreational potential is being developed on oxbow lakes or cutoffs along the Missouri River between Sioux City and Omaha. Recreational sites have also been developed at each of the Corps reservoirs.

Small boat harbors to shelter recreational craft have been built by the Corps of Engineers at many locations throughout the state — Lansing, Lindsay Park in Davenport, Muscatine, and Fort Madison on the Mississippi River and at Sioux City on the Missouri River. Others have been authorized but not yet constructed. In addition, the Corps has dredged the commercial harbor at Dubuque and has dredged Beaver Slough at Clinton for commercial navigation.

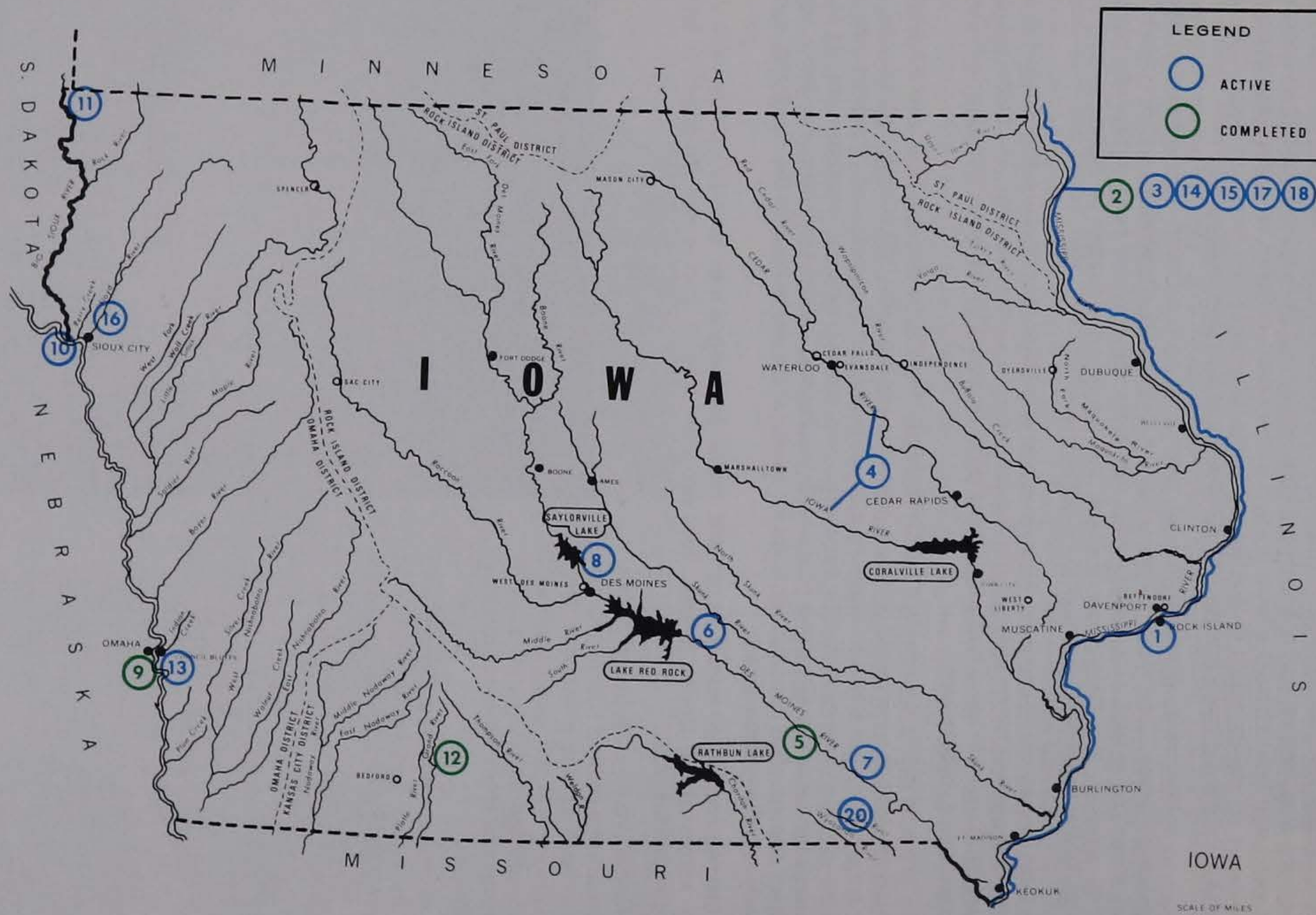
Under the Corps land management program, Federal, state, and local agencies are encouraged to assume responsibility for administering and developing land in civil works projects. At Coralville Lake, for example, over 4,100 acres of land and water have been licensed to the Iowa Conservation Commission and operated as a wildlife area.

As a part of many projects being constructed within the state, the Corps is using new and innovative approaches to help improve the aesthetic and cultural values of the area. At Clinton, for example, an old packet boat acquired by the city and used as a summer theater has been incorporated into the levee plan, improving the overall community aesthetics and the recreational opportunities. At Marshalltown, innovative landscaping was done to improve the aesthetic values of structures there. And, at Dubuque, project construction included facilities for easier and safer access to the riverfront, expecially for the elderly and the handicapped.

Today, permits are required to construct structures, make discharges into, and/or do any work that could affect the waters of the United States. This program, known as the 404 Program, is being actively enforced within the state.

The American people are now realizing the importance of water and its related sources to our everyday activities and to our existence. They see the need to insure that the water quality of public waters is protected and that our valuable resources are protected from irresponsible and unregulated activities.

To protect our resources and assure their use and enjoyment for future generations, all must join the vital effort. We encourage your help and participation.



CORPS OF ENGINEERS
WATER RESOURCE STUDIES UNDERWAY OR COMPLETED AS OF JANUARY 1979

Water Resources Studies Underway or Completed as of January 1979

1 Quad-Cities Urban Study Mississippi River (Multipurpose)

2 Mississippi River, Cassville, Wisconsin, to Mile 300 (Flood Control)

3 Mississippi River, Coon Rapids Dam to Mouth of Ohio River (Increased Degree of Flood Protection at Existing Projects)

4 Iowa-Cedar River Basin (Flood Control)

5 Des Moines River Basin (Flood Control)

6 Des Moines River (Streambank Erosion Control Downstream from Red Rock Dam)

7 Des Moines River (Water Demand and Availability Study)

8 Des Moines (Drainage and Flood Control)

9 Metropolitan Omaha, Nebraska, and Council Bluffs, Iowa (Multipurpose)

10 Perry Creek, Sioux City (Flood Control)

11 Upper Big Sioux River and Eastern South Dakota (Water Supply)

12 Grand River (Flood Control)

13 Lake Manawa (Recreation)

14 Upper Mississippi River Resource Management Study (Multipurpose)

15 Upper Mississippi Recreational Craft Locks (Recreational Navigation)

16 Metropolitan Sioux City (Multipurpose)

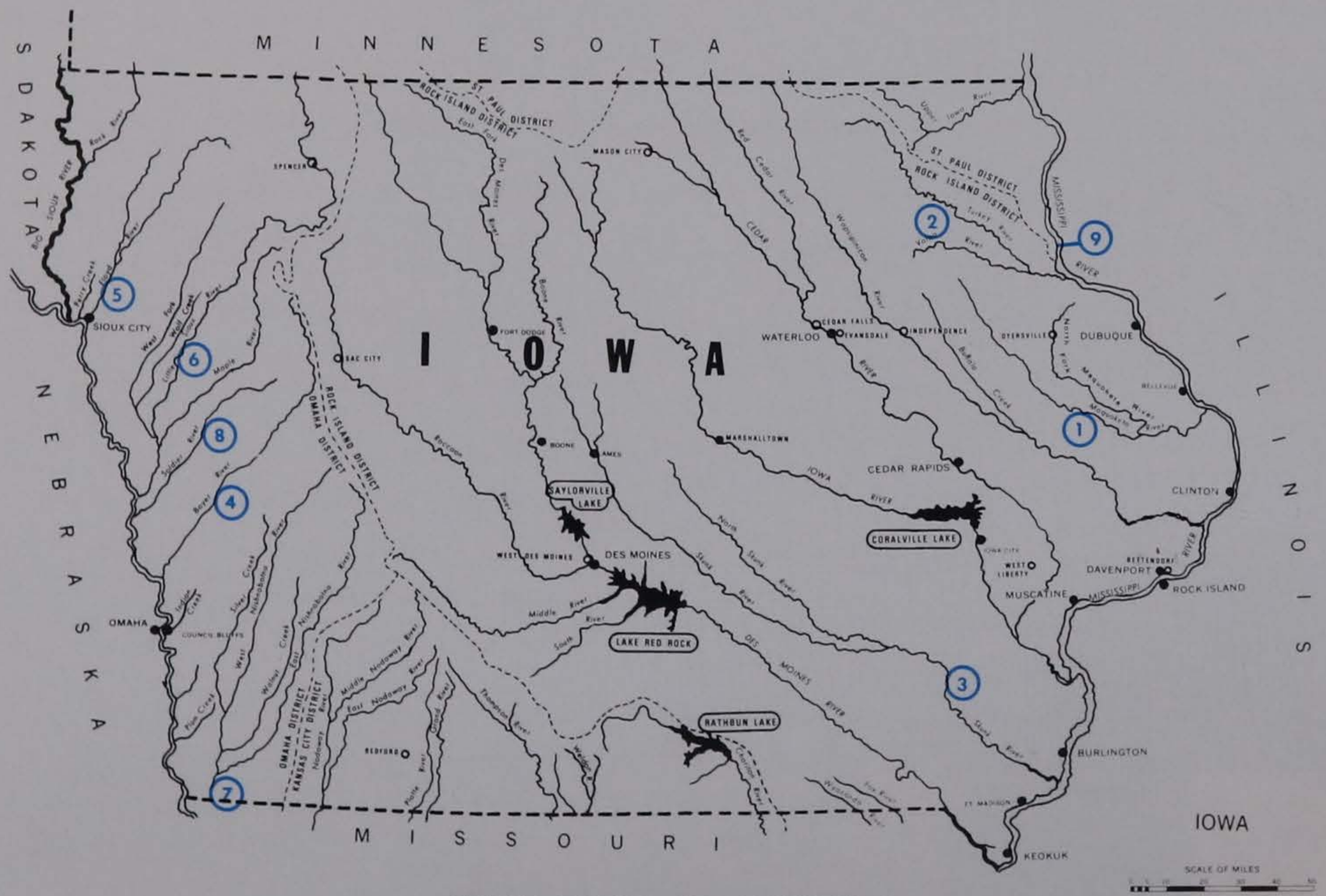
17 Mississippi River Year-Round Navigation (Commercial Navigation)

18 Upper Mississippi River Main Stem Study (National Economic Development and Environmental Quality)

19 Upper Mississippi River Comprehensive Basin Study

20 Fox River Basin (Flood Control)

(Green circle indicates completed study, blue circle indicates study underway.)



OTHER CORPS OF ENGINEERS WATER RESOURCE STUDIES AS OF JANUARY 1979

Other Water Resources Studies

Map Key	Study Name	Description	Status	District
1	Maquoketa River	To determine what measures are necessary for flood control, drainage, and other problems	Initiation of study is dependent upon allocation of funds	Rock Island
2	Turkey River	To determine what improvements are necessary for flood control, drainage, and allied purposes	Further study is dependent upon allocation of funds	Rock Island
3	Skunk River	To determine what improvements for flood control, water supply, irrigation, water-quality control, hydroelectric power, recreation, and fish and wildlife should be undertaken	A study was completed and project authorized for Ames Lake. Final report has been deferred until it can be coordinated with the State of Iowa's anticipated water plans	Rock Island
4	Boyer River	To consider development of multipurpose reservoirs for flood control, recreation, fish and wildlife conservation, and other purposes	Deferred due to limited opportunities for development coupled with current level of interest	Omaha
5	Floyd River	To determine advisability of providing flood protection and allied improvements	Deferred due to limited opportunities for development coupled with current level of interest	Omaha
6	Little Sioux River	To determine advisability of flood control and related water resource improvements	Deferred due to limited opportunities for development coupled with current level of interest	Omaha
7	Nishnabotna River	To consider a basin-wide plan for flood control and related purposes	Deferred due to limited opportunities for development coupled with current level of interest	Omaha
8	Soldier River	To determine feasibility of developing projects for flood control and erosion control	Deferred due to limited opportunities for development coupled with current level of interest	Omaha
9	Mississippi River - Illinois Waterway 12-Foot Channel Study	To determine the engineering, economic, environmental, and social feasibility of providing a 12-foot deep navigation channel of suitable widths for commercial navigation and allied purposes on the Mississippi River between Cairo and Minneapolis and on the Illinois, Minnesota, St. Croix, and Black Rivers	Deferred indefinitely due to several unresolved conflicts between navigation, environmental, and railroad interests	Chicago St. Louis Rock Island St. Paul

Upper Mississippi River Region

UPPER MISSISSIPPI RIVER REGION

The 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 near South Bend, Indiana, to Big Stone Lake in South Dakota. It covers parts of eight states, an area of almost 121 million acres. It includes that part of our Nation that is drained by the Mississippi River above its junction with the Ohio River at Cairo, Illinois, 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 3 million acres of the area is covered by freshwater lakes and streams and by the Mississippi River itself. Over two-thirds of the basin is productive land suitable for agriculture. Mines, quarries, and oil wells are found in some areas. Urban and suburban land is found throughout the region. About 28 percent of the region is water, forest land, and other lands with great recreational potential. Federal, state, county, and local parks and recreation areas are abundant throughout the region, accommodating our highly mobile society. Thirteen national wildlife refuges are found in the region.

Two of the largest combine to provide a total of nearly a quarter of a million acres of woodlands, islands, water, marshes, and sandy grassland where thousands of ducks, swans, and marsh and water birds can find refuge. Here too, the Bald Eagle finds a winter sanctuary.

WATER AND LAND RESOURCES

The Upper Mississippi River Region is one of the foremost regions of the world in both the quality and the quantity of water and land resources which are available. 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 at not less than their present level and to help raise these levels to meet future requirements.

Land Resources

Over two-thirds of the 118 million acres of land in the Upper Mississippi River Region are 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 and human resources are most prevalent. Recreational developments exist wherever suitable and accessible for people's enjoyment.

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 which 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 9 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, from industries, from 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 responsibilities 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.

FISH AND WILDLIFE

The Upper Mississippi River Region originally supported a wildlife population that included large proportions of forest game. Settlement of the area and subsequent clearing of vast forests, along with the development of agricultural and industrial land uses, have changed the composition of the wildlife population toward

game species — deer, cottontail, doves — which 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.

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.

RECREATIONAL RESOURCES

Recreational use of the region's resources has increased substantially since World War II, 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. The 1970 population in the basin was almost 21½ million people. By 1980, the population is projected to reach over 26 million. 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 the urban areas of 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. Manufacturing comprises the largest share of employment in the area although service-oriented employment is on the rise.

The mineral industry of the region is an important factor in the economy 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. These rivers and several thousand miles of smaller streams within the region are also available for recreational navigation and water-based recreation.

Demands for commercial navigation facilities and recreational navigation needs are increasing. Future needs 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 to handle growing traffic. Increased recreational demands will require providing harboring facilities for the small craft and separating commercial and recreational traffic where feasible.

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 on its restless journey of nearly 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 a hundred 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. The Minnesota River, first major tributary of the Mississippi, flows into the Mississippi at the Twin Cities. From the Twin Cities, the Mississippi River winds through an 856-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, Wisconsin, 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, Wisconsin, 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, Illinois. 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, Illinois. 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 which are included in the Upper Mississippi River region are the Fox, Wyaconda, and the Fabius Rivers.

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

THE UPPER MISSISSIPPI RIVER BASIN COMPREHENSIVE BASIN STUDY
Comprehensive Study Completed
(North Central Division)

An executive order providing for an Upper Mississippi River Basin Commission was signed by the President on 22 March 1972. The commission, composed of representatives of 6 states and 10 Federal agencies, is now operating from its offices at Fort Snelling, Twin Cities, Minnesota. The Division Engineer, North Central Division, is an active member of the Upper Mississippi River Basin Commission (UMRBC).

The establishment of the Upper Mississippi River Basin Commission provided an institutional arrangement capable of implementing the recommendations made in the Upper Mississippi River Comprehensive Basin Study completed in June 1972. The study provided a framework for future conservation and development of the water and related land resources of the region.

This central coordinating agency should be effective in fostering exchanges of views throughout the period of future studies and resource development. Periodic updating through a national assessment, a Comprehensive Coordinated Joint Plan (CCJP), and a program of Level B studies will keep the framework current in view of new population projections and continuing changes in region needs.

UPPER MISSISSIPPI RIVER RESOURCE MANAGEMENT STUDY (GREAT)
Special Study Underway
(St. Paul, Rock Island, and St. Louis Districts)

In FY 1975, under the direction of the Upper Mississippi River Basin Commission, concerned state and Federal agencies, quasi-public interest groups as well as private citizens formed Great River Environmental Action Teams (GREAT). The action teams represent the varied interests of the region in the development of comprehensive and innovative plans to guarantee the river's future use by all. Extensive collaboration and cooperation with state and local interests are part of the ongoing effort, making the best possible use of both expert knowledge and informed public opinion. The major objective of the study is to develop a resource management plan for the river that will incorporate, in a balanced manner, total river resource requirements, including commercial navigation, fish and wildlife, water quality management, and public recreation. Emphasis will be given to the problems associated with channel maintenance dredging and the placement of dredged material.

The study effort is divided into three separate but related reaches of the Mississippi River — GREAT I which incorporates the reach of the river within the St. Paul District from the head of navigation at Minneapolis-St. Paul to Guttenberg, Iowa; GREAT II which incorporates the reach of the river within the Rock Island District from Guttenberg to Lock and Dam No. 22 at Saverton, Missouri; and GREAT III which incorporates the reach of the river within the St. Louis District from Saverton, Missouri, to the confluence with the Ohio River at Cairo, Illinois. Funds were received in FY 1975 to initiate, and in FYs 1976, 1977, 1978, and 1979 to continue, the segment of the study within the St. Paul District (GREAT I) from the head of navigation through Lock and Dam No. 10 at Guttenberg, Iowa. GREAT I is scheduled for completion in 1979. Work within the segment of study of the Rock Island District (GREAT II) has been funded in FYs 1977, 1978 and 1979. GREAT II is scheduled for completion in 1981. Funds were received in FY 1977 to initiate, and in FYs 1978 and 1979 to continue, the segment of the study within the St. Louis District (GREAT III). GREAT III is scheduled for completion in 1982.

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Upper Mississippi River Basin Main Stem

UPPER MISSISSIPPI RIVER BASIN — MAIN STEM

Upper Mississippi River Basin — Main Stem

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. Over 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, Missouri, 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 massive Missouri River flows into the Mississippi River. Still further south, at Cairo, Illinois, 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. 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 various 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. Fur-bearers and other mammals, plus about 40 smaller nongame 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.

UPPER MISSISSIPPI RIVER
MAIN STEM STUDY
Comprehensive Study Underway
(St. Paul, Rock Island, and St. Louis Districts)

The Upper Mississippi River Main Stem Level B Study Area is defined as the river and its flood plain between bluffs from Cairo, Illinois, to Hastings, Minnesota, a total area of 2,900 square miles. The study being conducted under the direction of the Upper Mississippi River Basin Commission will develop a comprehensive, coordinated Federal-state-local overview of critical regional resources and formulate an integrated set of recommendations for planning and managing water and related land resources. The study will produce a regional plan that will incorporate the findings of ongoing

studies in the context of two broad objectives: national economic development and environmental quality. Total estimated cost for the study is $1,200,000 ($900,000 Federal and $300,000 state). The Corps of Engineers share of the Federal cost is $120,000. Three Corps Districts are involved in the study and are funded as follows: St. Paul, $12,000; Rock Island, $52,000; and St. Louis, $56,000.

Preliminary planning for the Corps of Engineers portion of the study began in late 1976. Completion of the Corps of Engineers portion of the study is scheduled for 1978.

DUBUQUE, MISSISSIPPI RIVER
Completed Project, Flood Control -
Local Protection
(Rock Island District)

The city of Dubuque lies on the right bank of the Mississippi River in Dubuque County. The flood plain area within the city covers about 1,100 acres, practically all of which has been extensively developed for industrial, commercial, and residential purposes.

A project to protect this area from Mississippi River floods was authorized by the Flood Control Act of 1962. It consisted of the construction of levees and floodwalls along the entire Dubuque riverfront from the Eagle Point Bridge to the downstream end of the city; a 73-foot navigable opening into Dubuque Harbor by means of two miter gates with the sill 11 feet below flat pool; and three pumping stations and related interior drainage facilities. Construction began in 1968 and was completed in 1973. In 1974, approval was granted for construction of facilities for easier and safer access to the riverfront, especially for the elderly and the handicapped. The approved mitigation included steps and surfaced walkways to the river's edge. Construction was started in 1976 and was completed in 1978.

The Charles Dove Overlook is one of the major features of development. It is an historic native stone structure north of the Illinois Central Railroad Bridge built with stone identical to an original overlook structure.

Charles Dove Overlook

Dubuque local protection project showing floodwalls and closure structure at commercial harbor. During high water, gates in center of photograph would be closed to prevent flooding of the harbor.

Federal cost of the completed Dubuque project was $10,861,000; non-Federal cost was $1,330,-000.

Net cumulative damage prevented by the project through September 1977 is estimated at $4,779,000. The project is operated and maintained by local interests.

GREEN BAY LEVEE AND DRAINAGE DISTRICT NO. 2, MISSISSIPPI RIVER
Completed Project, Flood Control -
Local Protection
(Rock Island District)

Green Bay Levee and Drainage District No. 2, organized as a private district in 1916, covers an area of 13,337 acres fronting on the Mississippi River in Lee County, Iowa, downstream from the city of Burlington. The district is flanked by the Skunk River at its upper end. The levees along the Mississippi River and Skunk River were originally constructed by local interests and were improved by the United States in 1948. The total cost of these earlier improvements was $299,000 Federal and $691,000 non-Federal.

The Flood Control Act of 1954 authorized further improvement of the 19.5 miles of levee in the district to provide increased protection. Construction was initiated in 1964 and completed in 1966. Federal cost was $1,728,000 and non-Federal cost was estimated at $108,000.

The net cumulative damage prevented by the project (1948 through September 1977) is estimated at $21,169,000. The project is operated and maintained by local interests.

GUTTENBERG, MISSISSIPPI RIVER
Completed Project, Flood Control -
Local Protection
(St. Paul District)

This project, authorized by the Flood Control Act of 23 October 1962, provides for protection at Guttenberg by means of levees and an interior drainage system. A levee at the north end of town is about 7,500 feet in length; a second levee at the south end of town is about 2,800 feet in length. Two pumping stations and appurtenant works, including temporary ponding areas, are provided to handle the drainage within the levees. Aesthetic and public use features for the reach along the north levee adjacent to existing city parks are also provided. These facilities include stairs and walkways for access to the river. The project was completed in 1973. Total cost of the project was $2,462,000 Federal and $253,000 non-Federal.

The net cumulative damage prevented since the project has been in operation is estimated at $2,422,220. The project is operated and maintained by local interests.

IOWA RIVER - FLINT CREEK LEVEE DISTRICT NO. 16, MISSISSIPPI RIVER
Completed Project, Flood Control -
Local Protection
(Rock Island District)

This levee district of about 48,800 acres is located near Wapello, Iowa. It extends along the Mississippi River for about 29 miles in Louisa and Des Moines Counties. The highly productive bottom lands of the district have been extensively developed for agriculture.

The original levees were constructed by the United States between 1886 and 1900 as an aid to navigation. After organization of the levee district in 1895, the United States further participated in improvement of the levee system from time to time. The cost of these earlier improvements was $789,000 Federal and $1,774,000 non-Federal.

The Flood Control Act of 1954 authorized further improvement of the levees of the district to provide increased flood protection. Construction began in 1962 and was completed in 1971. Federal cost was $6,044,000; non-Federal cost was estimated at $580,000.

In addition, Federal funds for repair of eroding riverbanks were authorized under Public Law 84-99. These repairs were completed in 1977.

The net cumulative damage prevented since the project has been in operation (1900 through September 1977) is estimated at $47,508,400. The project is operated and maintained by local interests.

MUSCATINE ISLAND LEVEE DISTRICT AND MUSCATINE-LOUISA COUNTY DRAINAGE DISTRICT NO. 13, MISSISSIPPI RIVER
Completed Project, Flood Control -
Local Protection
(Rock Island District)

The Muscatine Island Levee District and the Muscatine-Louisa County Drainage District No. 13, together with the upper one-half mile of Louisa County Levee District No. 15, form a joint drainage and flood protection system for 26,478 acres of bottom land. They are located immediately downstream from the city of Muscatine in Muscatine and Louisa Counties.

The area is mainly agricultural, but the downstream portion of the city of Muscatine also lies within the area protected by this system. This

portion of Muscatine contains the municipal water and light plant, a number of commercial and industrial establishments, many dwellings, and some undeveloped fringe. A small airport used by private planes, railroad lines, and highways also lie within the protected area.

Local interests originally constructed 14 miles of main levee and 1.6 miles of flank levee to protect the area from Mississippi River floods. In 1924, the Federal Government participated in improvement of the levee system. The total cost of these earlier improvements was $1,180,000 Federal and $919,000 non-Federal.

The Flood Control Act of 1954 authorized further improvement of levees within the districts, consisting of raising and strengthening the existing system. Those levees which protect urban areas of the city of Muscatine were built to withstand floods of 100-year frequency; levees protecting rural areas were built to withstand floods of 50-year frequency. Some remedial work was required at the Muscatine municipal water and light plant and in connection with railroads, highways, bridges, and interior drainage. Construction began in 1960 and was completed in 1969. The Federal cost of the project was $3,293,000; non-Federal cost was $422,000.

The net cumulative damage prevented since the project has been in operation (1924 through September 1977) is estimated at $79,157,000. The project is operated and maintained by local interests.

MUSCATINE, MAD CREEK
MISSISSIPPI RIVER
Completed Project, Flood Control -
Local Protection
(Rock Island District)

The city of Muscatine lies on the right bank of the Mississippi River in Muscatine County. Mad Creek, a small tributary of the Mississippi River with a drainage area of about 17 square miles, bisects the city. Parts or all of some 17 city blocks, mainly industrial, in a roughly triangular area, lie between the right bank of Mad Creek and the Mississippi River and have been flooded frequently during periods of moderately high water on the latter stream.

A project for local flood protection along Mad Creek at Muscatine was authorized in the Flood Control Act of 1954. The plan of improvement consisted of the construction of a system of floodwalls and levees beginning at Mulberry Street and extending northward for about 1,600 feet along the Mississippi River and thence up the right bank of Mad Creek for about 2,700 feet to high ground north of East 6th Street. Appurtenant works included an intercepting sewer and pumping plant.

Construction of the project began in 1958 and was completed in 1960. The Federal cost of the project was $1,169,000; non-Federal cost was $32,000.

The net cumulative damage prevented since the project has been in operation (1959 through September 1977) is estimated at $5,383,000. The project is operated and maintained by local interests.

SABULA, MISSISSIPPI RIVER
Completed Project, Flood Control -
Local Protection
(Rock Island District)

The small town of Sabula, with a population of 845, is located on a sandy ridge along the right bank of the Mississippi River in Jackson County. This ridge is separated from the bluffs on the Iowa shore by a wide slough, across which embankments have been built to protect the town from invasion by floodwaters from that side. A high natural bank along most of the town's Mississippi River frontage protects the town on the east.

The Flood Control Act of 1954 authorized a plan of improvement consisting of construction of several reaches of new levee, raising and strengthening the existing embankments, and constructing appurtenant drainage works. Construction of the project began in 1956 and was completed the following year. The Federal cost was $412,000; non-Federal cost was $12,000.

The net cumulative damage prevented since the project has been in operation (1957 through September 1977) is estimated at $505,700. The project is operated and maintained by local interests.

UPPER IOWA RIVER
Completed Project, Flood Control -
Local Protection
(St. Paul District)

This project, authorized in the Flood Control Act of 1954, provides a new and improved outlet for the Upper Iowa River to the Mississippi River near New Albin, extending from the vicinity of the Chicago, Milwaukee, St. Paul and Pacific Railroad Bridge to Minnesota Slough, together with channel enlargement above the bridge for about 4 miles. Spoil material placed along the banks gives agricultural lands maximum protection from the design flood.

The project was completed in 1959 except for an upstream extension which was built in 1964. Federal cost was $888,000; non-Federal cost was $58,000.

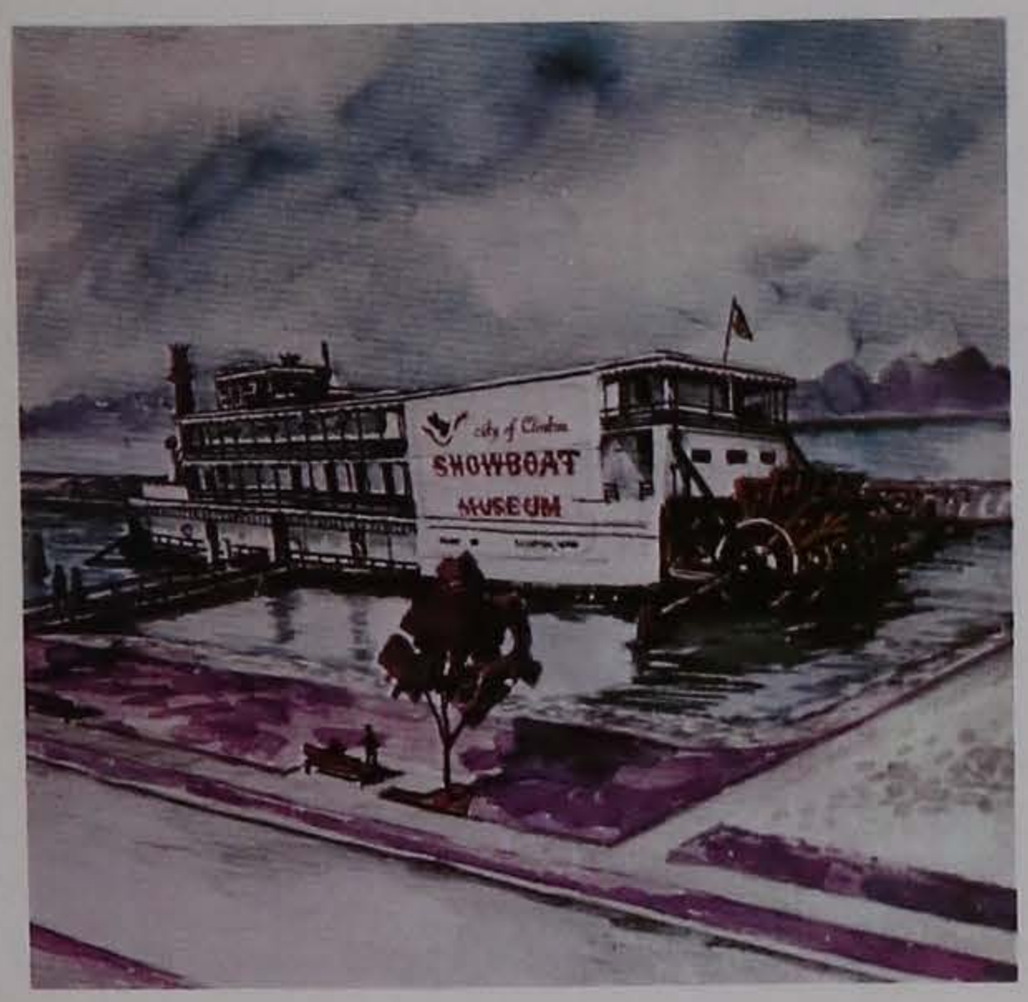
The net cumulative damage prevented since construction of the project is estimated at $207,400. The project is operated and maintained by local interests.

CLINTON, MISSISSIPPI RIVER
Project Underway, Flood Control -
Local Protection
(Rock Island District)

The city of Clinton, located at river mile 518.2 above the mouth of the Ohio River, is the county seat of Clinton County and an important manufacturing and retail center of eastern Iowa.

In the record flood of 1965, flood damage at Clinton amounted to over 5½ million dollars. Over 50 business and industrial firms were temporarily out of operation, and about 50 square blocks of residential area in the northern and southwestern portions of the city were flooded. Extensive emergency protection works spared the city from even heavier damage.

The Flood Control Act of 1968 authorized a project for the protection of the city from floods having a recurrence interval of once in 200 years. The plan which includes two segments — one along the Mississippi River and Mill Creek and one along Beaver Slough — provides for construction of about 8.1 miles of earth levee and about 3/4 mile of concrete floodwall along most of the city's waterfront. Railroad raises, street ramps, closure structures, pumping plants, and gravity drainage outlets also form a part of the plan. Estimated Federal cost of the project is $25,700,000 based on 1 October 1978 price levels; non-Federal cost is estimated at $4,340,-000.



As a part of the Clinton flood control project, the Corps of Engineers agreed to permanently locate the old sternwheel steamboat "Rhododendron" in a protective lagoon. The boat will be in the center of Riverview Park. Other aesthetic and recreation features such as walkways to a World War I memorial and walkways along the riverside of the levee, trees and flowering shrubs, a paved bicycle path, a playground, and picnic tables are being included in the Clinton project as a part of the Corps efforts to achieve environmental harmony in water resources development projects.

Construction of the Clinton project began in August 1974 and is scheduled for completion in 1980. Local interests will operate and maintain the project after completion.

DAVENPORT, MISSISSIPPI RIVER
Project Underway, Flood Control -
Local Protection
(Rock Island District)

Davenport is on the right bank of the Mississippi River in Scott County. It is one of a group of cities which extends for about 10 miles along both banks of the Mississippi River in Scott County, Iowa, and Rock Island County, Illinois, forming a continuous metropolitan area.

About 1,700 acres of Davenport, extensively developed for industrial, commercial, and residential purposes, is subject to flooding from the Mississippi River. In addition, a large residential development in the western part of the city is affected by flooding of Blackhawk Creek, as well as from Mississippi River backwater in the creek.

A project was authorized in the 1970 Flood Control Act which would provide protection from floods having a recurrence interval of once in 200 years. In coordination with the Davenport officials, the authorized plan was reviewed and modified to reflect current problems, needs, and community preferences. The modified plan includes channel improvements on Blackhawk Creek instead of a multi-purpose reservoir, which was originally planned, construction of earth levees and floodwalls with appurtenant features, structures at streets and railroads, miscellaneous relocation items, a nonstructural flood plain management program for a portion of the city, and structural protection for the city's water company. Federal cost is estimated

Davenport in 1965 flood.

at $23,100,000 based on 1 October 1978 price levels; non-Federal cost is estimated at $5,685,000. Advance engineering and design work is nearing completion.

MUSCATINE, MAD CREEK,
MISSISSIPPI RIVER
Project Underway
Section 205 - Flood Control
(Rock Island District)

A detailed project report has been approved for construction of improvements along the right bank of Mad Creek at Muscatine to protect an industrial and commercial area of about 75 acres from coincidental floods on Mad Creek and the Mississippi River. The area to be protected lies upstream from the completed Federal project on Mad Creek, described elsewhere in this booklet.

The plan of protection consists of 3,170 feet of earth levee, 240 feet of floodwall, one street closure structure, a ponding area, and new sewers and associated facilities.

Construction began in November 1977 and is scheduled for completion in Fiscal Year 1979. Federal costs for the project are estimated to be $750,000 and non-Federal costs are estimated to be $118,000.

BURLINGTON, MISSISSIPPI RIVER
Project Underway
Secion 205 - Flood Control
(Rock Island District)

Burlington lies on the right bank of the Mississippi River in Des Moines County, Iowa. An industrial area of about 223 acres of the community is on low ground and subject to flooding from the Mississippi River and from Flint Creek, a small tributary stream.

Consideration is being given to providing flood protection to the industrial area which lies downstream from the mouth of Flint Creek. The project would consist of about 1½ miles of earth levee, a section of concrete floodwall, interior drainage facilities, and two railroad closure structures.

A detailed project report was approved in May 1977. Work on plans and specifications will be initiated when local cooperation agreements are completed. Based on 1974 price levels, the estimated Federal cost of the proposed project is $2,210,000; non-Federal cost is estimated at $477,000.

BETTENDORF, MISSISSIPPI RIVER
Authorized Project Not Underway
Flood Control - Local Protection
(Rock Island District)

The city of Bettendorf is located on the right bank of the Mississippi River at river mile 485.7 above the mouth of the Ohio River. It is one of a group of cities which extends for about 10 miles along both banks of the Mississippi River in Scott County, Iowa, and Rock Island County, Illinois, forming a continuous metropolitan area.

Bettendorf has grown rapidly in the past decade, both as an industrial and residential city.

In the record flood of 1965, flood damage at Bettendorf amounted to $1,300,000. The flood problem area consists of about 325 acres, which has been extensively developed for industrial and commercial purposes. Only a few residential units are located in the area.

The Flood Control Act of 1968 authorized a project for the protection of the city from floods having a recurrence interval of once in 200 years. The plan provided for the construction of about 3 miles of earth levee, railroad raises, closure structures, and street raises and ramps. Estimated Federal cost is $4,940,000; non-Federal cost is estimated at $705,000 based on 1 October 1976 price levels.

In November 1975 a referendum to provide local cooperation funding for the project was defeated. As a result, in 1976, the project was reclassified to the "inactive" category.

MISSISSIPPI RIVER, CASSVILLE, WISCONSIN, TO MILE 300
Study Completed, Flood Control
Local Protection
(Rock Island District)

The purpose of this study, originally authorized by resolution of the House Committee on Flood Control on 18 September 1944, with later modifications, is to determine the advisability of improvements on the Mississippi River to meet current and future needs for urban and rural flood damage reduction, bank and channel stabilization, and outdoor recreation.

Several interim reports have been prepared under this authority. The first interim report resulted in Congressional authorization of flood control projects at Clinton and Bettendorf in 1968.

A second interim report resulted in Congressional authorization of a flood control project at Davenport in 1970.

A final report under this authority considered remaining flood problem areas in the study reach, including Fort Madison, Burlington, Muscatine, Fairport, Buffalo, Linwood, Pleasant Valley, LeClaire, Princeton, Camanche, Bellevue, and in the Green Island Levee and Drainage District No. 1

Both nonstructural and structural alternatives were considered. Based on the analyses of economic and environmental considerations, Corps of Engineers involvement in flood damage reduction measures could not be economically justified nor recommended. However, the Rock Island District prepared technical summary reports which were provided to local interests to aid them in the development and implementation of flood plain management programs.

The final report was completed in 1977.

MISSISSIPPI RIVER, COON RAPIDS DAM TO MOUTH OF OHIO RIVER
Study Underway, Flood Control - Local Protection
(Rock Island District)

The purpose of this study, authorized by resolution of the House Committee on Public Works on 11 December 1969 is to determine whether any modifications of existing projects should be made at this time in the interest of providing increased flood control and for allied purposes. The study is primarily concerned with increasing the degree of protection in drainage and levee districts where extensive urban development has taken place in recent years.

Two interim reports have been completed under this authority recommending improvement of the existing projects in the Muscatine Island Levee District and in the Green Bay Levee and Drainage District No. 2. Considerable coordination efforts were required to develop an environmentally acceptable plan for the Green Bay District because of the national significance of certain species of waterfowl which use the areas. Further action toward construction will depend upon authorization of the projects by Congress and the subsequent appropriation of the necessary funds.

A final report under this authority will consider improvement of the remaining existing projects. The final report is scheduled for completion in Fiscal Year 1984.

QUAD-CITIES URBAN STUDY, MISSISSIPPI RIVER
Study Underway, Flood Control - Local Protection
(Rock Island District)

This study was authorized in 1974 and has been indorsed by the Bi-State Metropolitan Planning Commission, a group comprised of elected officials of various cities and counties in the Quad-City area. The commission directs the regional planning effort of the Davenport-Rock Island-Moline, Iowa-Illinois Standard Metropolitan Statistical Area, which is a major manufacturing, wholesale, and retail trade center. The study objectives are to make an overall evaluation of land use, navigation, flood protection, water supply, water quality, and water-based recreation.

The study will require participation at all levels of government. Federal and state agencies in-

volved in wastewater management and water resources will participate. The Corps of Engineers is managing the study in cooperation with the planning commission.

A study of the flood problems in the Lower Rock River has been combined with the Urban Study. There are no other flood control studies underway in the planning area, although there are authorized flood control projects for Davenport and Bettendorf in Iowa, and for Rock Island, Moline, East Moline, and Milan in Illinois. These projects are in various stages of design and construction.

The Plan of Study for the Quad-City Urban Study is being revised. Stage II planning for flood-related problems was started in FY 1978. The overall study is scheduled for completion in FY 1982.

CLINTON, BEAVER SLOUGH,
MISSISSIPPI RIVER
Completed Project - Commercial Navigation
(Rock Island District)

Beaver Slough is a by-channel of the Mississippi River, 4.8 miles in length, at Clinton. It is separated from the Mississippi River main channel by Beaver Island and lies within Pool 14 of the canalized river. Several important docking facilities are located along the mainland shore on Beaver Slough, including a municipal river terminal built and controlled by the city of Clinton and dockage facilities of a milling company and of a power company.

Congress authorized improvement of Beaver Slough in 1958 as a feature of the Upper Mississippi River Nine-Foot Channel Project to assure continued operation of existing terminal facilities. The improvement consisted of dredging a channel 9 feet deep and 250 feet wide through the slough and constructing a rock-dike regulating structure at the head of Beaver Island. The regulating structure constricts the channel at the head of the slough and increases the velocity of flow in the reach adjacent to the terminal, thus reducing silt deposition in that area.

Construction was accomplished in 1961-62 at a Federal cost of $193,600. The Federal Government performs periodic maintenance dredging.

DUBUQUE COMMERCIAL HARBOR,
MISSISSIPPI RIVER
Completed Project - Commercial Navigation
(Rock Island District)

The Dubuque commercial harbor is located in a small bay of the Mississippi River, approximately 1,200 feet long and 400 feet wide, along the city's riverfront. The River and Harbor Act of 1960 authorized Federal improvement of the harbor as a feature of the Upper Mississippi River Nine-Foot Channel Project. The harbor was dredged to a project depth of 9 feet so as to permit its use by commercial traffic operating on the upper Mississippi River.

The dredging project was accomplished in 1961 at a Federal cost of $55,200. The Federal Government performs periodic maintenance dredging.

LOCK NO. 19, MISSISSIPPI RIVER
Completed Project - Commercial Navigation
(Rock Island District)

New Lock No. 19 is located on the Iowa shore at Keokuk. It is somewhat unique in that 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 at this location which is 110 feet wide by 358 feet long.

The original lock, drydock, and dam structures were built in the early 1900's by a private power company. The lock was integrated into the 9-foot channel system, but long delays were experienced by the small, slow operating lock.

To accommodate modern river traffic, construction of the new 110-foot wide and 1,200-foot long lock was authorized by the River and Harbor Act of 3 July 1930, as amended. Construction began 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.

OLD LOCK NO. 19, MISSISSIPPI RIVER
Project Underway
Major Rehabilitation - Commercial Navigation
(Rock Island District)

The project is located on the right bank of the Mississippi River at Keokuk, Iowa. The rehabilitation project consists of providing a permanent closure of Old Lock No. 19 and Drydock by the placement of a cellular sheet pile 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 structures were completed in 1912 with non-Federal 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 of Engineers stability criteria.

Lock 19 has a lift of 39 feet, and impounds Pool 19 which is used for generation of commercial power, in addition to being an integral part of the 9-foot channel project. The collapse of

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

The current Federal cost estimate at October 1977 price levels is $5,020,000, and there is no non-Federal cost. Project construction was begun in 1978 and is scheduled for completion in 1979.

OLD LOCK NO. 14, MISSISSIPPI RIVER
Project Underway
Major Rehabilitation - Commercial Navigation
(Rock Island District)

This project is located on the right bank of the Mississippi River at LeClaire, Iowa. Rehabilitation work on the lock includes replacing the miter gates and the miter gate operating machinery, replacing gate valves and operating machinery, replacing or rewiring electrical service, resurfacing concrete walls, and providing a new control house.

This lock was constructed in 1922 as part of the 6-foot channel project. After construction of the newer and larger lock in 1939, this lock was considered an auxiliary lock and used only for access of Corps of Engineers boats to the Rock Island District's service and maintenance area until 1969 when 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 is in the advanced stages of structural and mechanical deterioration. Structural and mechanical failures are common and require emergency repairs to keep the facility in operation.

The current Federal cost estimate is $3,240,000, and there is no non-Federal cost. Project construction was begun in 1978 and is scheduled for completion in 1980.

MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, NINE-FOOT CHANNEL PROJECT
Project Underway - Commercial Navigation
(St. Louis, Rock Island, and St. Paul Districts)

The Upper Mississippi River between the Missouri River and Minneapolis, Minnesota, has been improved for navigation by a system of 28 locks and dams. 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 9-foot project, No. 26, is located at Alton, Illinois, just above the mouth of the Missouri River, and the uppermost dam (St. Anthony Falls) at Minneapolis, Minnesota, is 853.7 miles above the mouth of the Ohio River.

Another dam, No. 27, is located just below the mouth of the Missouri River at Granite City, Illinois. This dam, Chain of Rocks Canal, and Locks No. 27, complete the series of locks and dams on the Upper Mississippi. They were completed under separate authorization.

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

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

St. Anthony Falls Upper Lock - Single lock 56 by 400 feet
St. Anthony Falls Lower Lock - Single lock 56 by 400 feet and upper gate bay of an auxiliary lock
Locks No. 1 - Twin locks 56 by 400 feet
Locks No. 2 - Old lock 110 by 500 feet; new lock 110 by 600 feet
Locks No. 14 - Single lock 110 by 600 feet; old LeClaire Canal Lock 80 by 320 feet
Locks No. 15 - Main lock 110 by 600 feet; auxiliary lock 110 by 360 feet
Lock No. 19 - Main lock 110 by 1,200 feet
Locks No. 26 - Main lock 110 by 600 feet; old lock 110 by 360 feet
Lock No. 27 - Main lock 110 by 1,200 feet

Authorized in the River and Harbor Act of 3 July 1930, the Upper Mississippi River 9-Foot Channel Project, with the exception of the upper 4.6 miles (St. Anthony Falls extension), has been in operation since 1940. The latter project was placed in operation on 21 September 1963. Improvements to the navigation channel near Davenport, Iowa, were made from 1967 through 1971. Sharp rock ledges and displaced rock on the channel bottom which created a hazard to navigation were removed to widen and deepen and, in some places, realign the channel.

Rehabilitation work is currently underway at two of the navigation locks. At Lock No. 19 at Keokuk, Iowa, a 1200-foot long lock was completed in 1957 to replace the original structure. The original lock had been built in the early 1900's and was much smaller than the other locks in

Mississippi River Lock and Dam 12 at Bellevue.

the 9-foot system creating long delays. After the new lock was completed in 1957, the old lock was used infrequently and eventually closed. The old lock and drydock structures are in an advanced state of deterioration. The collapse of either the old lock or drydock will result in cessation of navigation on the Upper Mississippi River, as well as a loss of generating capacity by the Union Electric Company. Work is currently underway to permanently close the old lock. This effort is expected to be completed by the end of 1979. A project is also underway to rehabilitate the Old LeClaire Lock (Old Lock No. 14), which was constructed near LeClaire, Iowa, in 1922 as part of the 6-foot channel project. The rehabilitation project will allow the facility to be used for passage of recreational craft thereby eliminating congestion and delays at the nearby Lock No. 14. Still to be completed in the St. Paul District are the Guide Wall Extension at Lock No. 3, and Harriet Island Small Boat Harbor projects. The Federal expenditure for new work to 30 September 1977 was $265,000,000, including costs from inception. The cost of maintenance in fiscal year 1977 was about $26,400,000.

Commercial Traffic

River traffic has increased rapidly since completion of the principal features of the project. Total commerce moved between Minneapolis and the mouth of the Missouri River increased from 2,410,000 tons in 1939 to 68,420,307 tons in 1976. Principal commodities transported are grain, petroleum products, and coal, although in recent years tonnage has become more diversi-

fied with substantial quantities of iron and steel, chemicals, fertilizers, and other products being moved.

Recreational Resources

The 9-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 many additional benefits.

The navigation project has improved the desirability of the beautiful 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.

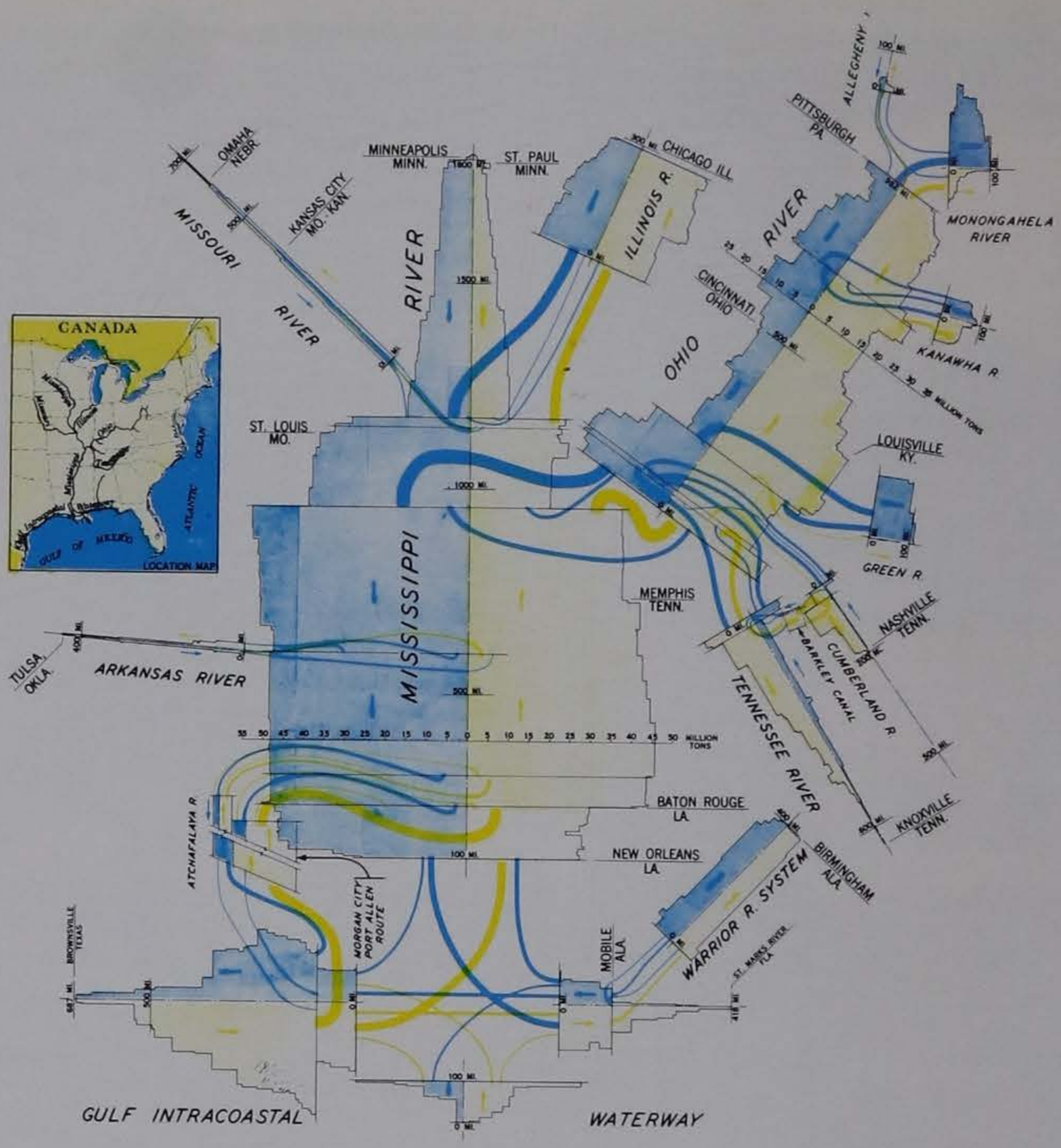
Throughout the year, the locks and dams now provide a series of slack-water pools which attract thousands of people who come to fish, swim, boat, hunt, or picnic. The number of small pleasure craft on the river increases every summer, and each fall finds more hunters in the marshes.

Resource Management

The lands acquired by the Federal Government for construction of the 9-Foot Channel Project are managed to serve the general public, and many recreational opportunities are available as the result of the present navigation system.

The management plan for the Upper Mississippi River pools considers the unique 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. Generally, except for areas which are posted as waterfowl sanctuaries, these same lands may be used for wilderness camping and other recreational activities. All other Federal lands not leased or licensed for special purposes are also open to free public use.

Mississippi River Lock and Dam No. 13, upstream from Clinton.

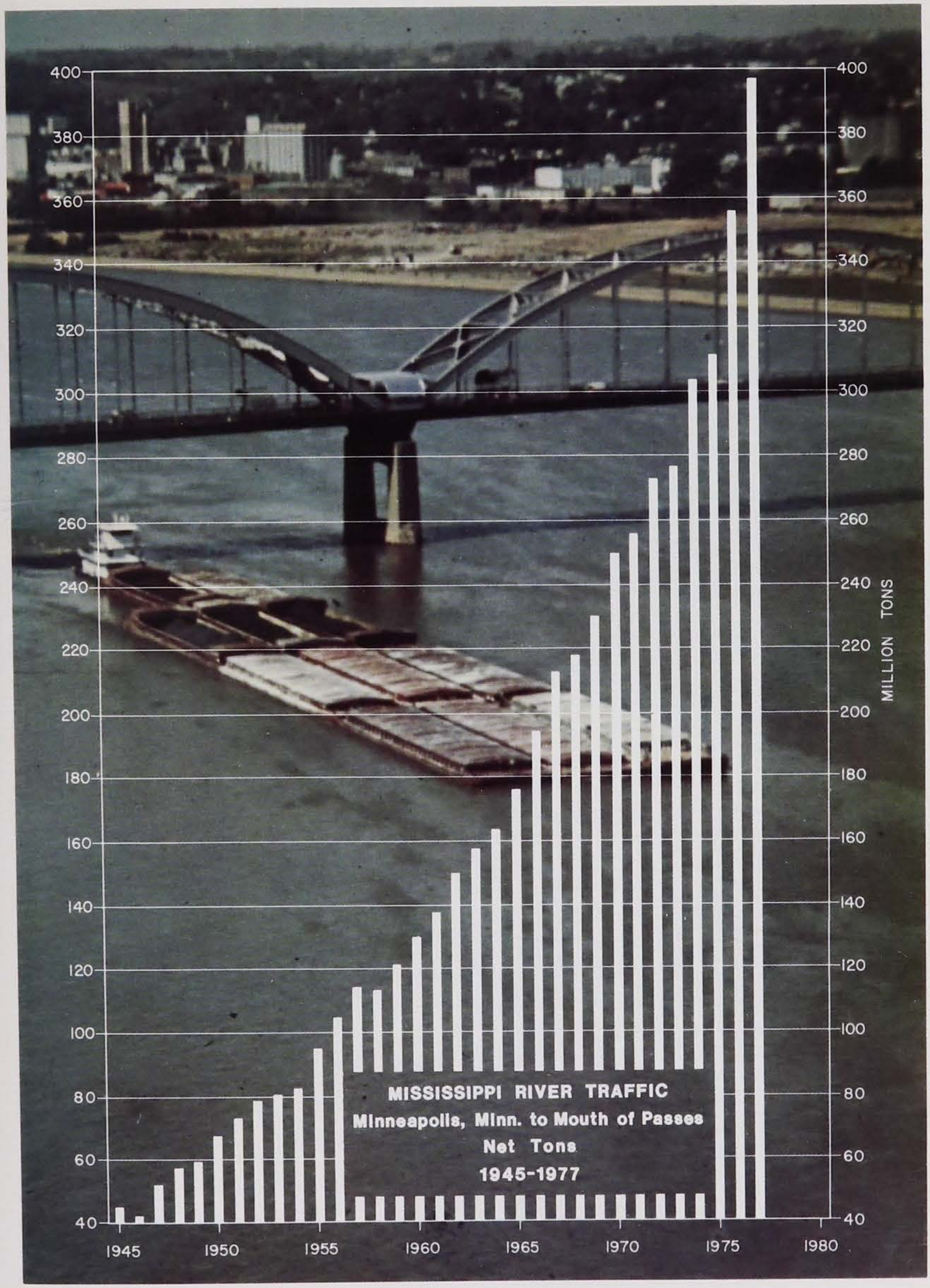


INLAND FREIGHT TONNAGE ON THE MISSISSIPPI RIVER SYSTEM
AND THE GULF INTRACOASTAL WATERWAY 1974

Commodity Breakdown
Mississippi River
Minneapolis, Minnesota, to Mouth of Missouri River
1976

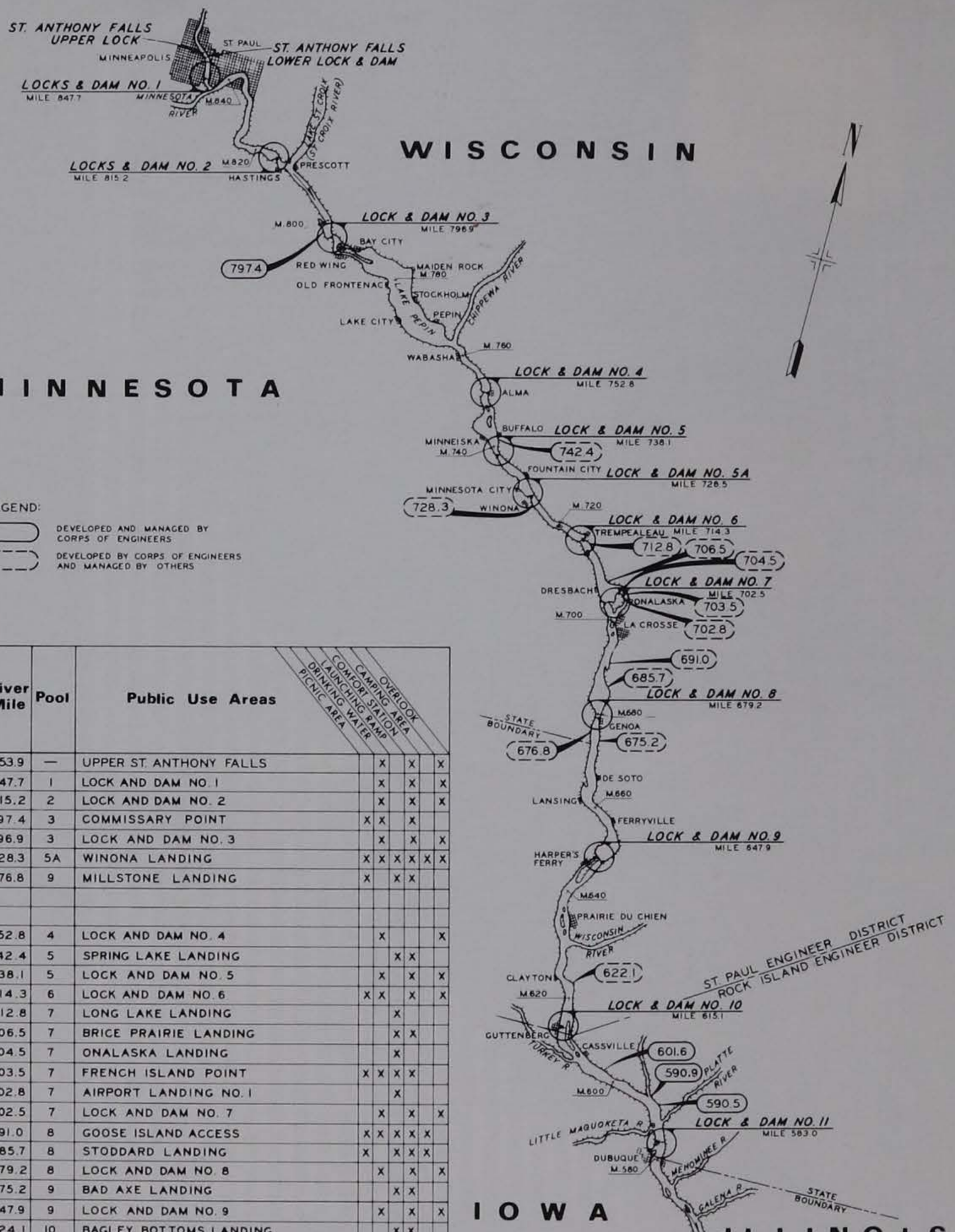
Commodity	*Short Tons*
Farm Products	28,980,788
Fresh Fish and Other Marine Products	13,222
Metallic Ores	163,728
Coal	7,680,252
Crude Petroleum	848,337
Nonmetallic Minerals, Except Fuels	4,813,218
Food and Kindred Products	3,429,998
Basic Textiles	4,599
Lumber and Wood Products, Except Furniture	120,764
Pulp, Paper and Allied Products	40,260
Chemicals and Allied Products	5,956,544
Petroleum and Coal Products	11,805,389
Leather and Leather Products	30
Stone, Clay, Glass and Concrete Products	1,655,473
Primary Metal Products	2,293,071
Fabricated Metal Products, Except Ordnance, Machinery, and Transportation Equipment	35,026
Machinery, Except Electrical	7,769
Electrical Machinery, Equipment and Supplies	4,197
Transportation Equipment	11,274
Waste and Scrap Materials	544,113
Special Items	12,255
Total	68,420,307

1940-1976


400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
MILLION TONS
MISSISSIPPI RIVER TRAFFIC
Minneapolis, Minn. to Mouth of Passes
Net Tons
1945-1977
1945
1950
1955
1960
1965
1970
1975
1980

CORPS OF ENGINEERS

U.S. ARMY



LEGEND:

- DEVELOPED AND MANAGED BY CORPS OF ENGINEERS
- DEVELOPED BY CORPS OF ENGINEERS AND MANAGED BY OTHERS

State	River Mile	Pool	Public Use Areas	Picnic Area	Drinking Water	Launching Ramp	Comfort Station	Camping Area	Overlook
Minnesota	853.9	—	UPPER ST. ANTHONY FALLS		X		X		X
	847.7	1	LOCK AND DAM NO. 1		X		X		X
	815.2	2	LOCK AND DAM NO. 2		X		X		X
	797.4	3	COMMISSARY POINT	X	X		X		
	796.9	3	LOCK AND DAM NO. 3		X		X		X
	728.3	5A	WINONA LANDING	X	X	X	X	X	X
	676.8	9	MILLSTONE LANDING	X		X	X		
Wisconsin	752.8	4	LOCK AND DAM NO. 4		X				X
	742.4	5	SPRING LAKE LANDING			X	X		
	738.1	5	LOCK AND DAM NO. 5		X		X		X
	714.3	6	LOCK AND DAM NO. 6	X	X		X		X
	712.8	7	LONG LAKE LANDING			X			
	706.5	7	BRICE PRAIRIE LANDING			X	X		
	704.5	7	ONALASKA LANDING			X			
	703.5	7	FRENCH ISLAND POINT	X	X	X	X		
	702.8	7	AIRPORT LANDING NO. 1			X			
	702.5	7	LOCK AND DAM NO. 7		X		X		X
	691.0	8	GOOSE ISLAND ACCESS	X	X	X	X	X	
	685.7	8	STODDARD LANDING	X		X	X	X	
	679.2	8	LOCK AND DAM NO. 8		X		X		X
	675.2	9	BAD AXE LANDING			X	X		
	647.9	9	LOCK AND DAM NO. 9		X		X		X
	624.1	10	BAGLEY BOTTOMS LANDING			X	X		
	622.1	10	JAYS LAKE LANDING	X		X	X	X	
	601.6	11	BERTOM LAKE	X		X	X		
	590.9	11	GRANT RIVER	X	X		X	X	
	590.5	11	SOUTH POTOSI			X			
Iowa									
	615.1	10	LOCK AND DAM NO. 10		X		X		X

MISSISSIPPI RIVER

MISSOURI RIVER TO MINNEAPOLIS, MINNESOTA

CORPS OF ENGINEERS RECREATION AREAS

10 5 0 10 20

SCALE IN MILES

CORPS OF ENGINEERS, U. S. ARMY — SEPTEMBER 1978

ST. PAUL DISTRICT · ROCK ISLAND DISTRICT · ST. LOUIS DISTRICT

State	River Mile	Pool	Public Use Areas	Picnic Area	Drinking Water	Launching Ramp	Comfort Station	Camping Area	Overlook	
Iowa	553.0	13	PLEASANT CREEK	X	X	X	X	X		
	525.5	13	BULGER'S HOLLOW	X	X	X	X	X		
	493.1	14	LOCK AND DAM NO. 14	X	X		X			
	468.3	16	MONTPELIER	X	X	X	X			
	464.8	16	SHADY CREEK	X	X	X	X	X		
	446.8	17	KILPECK LANDING		X	X				
	433.5	18	FERRY LANDING	X	X	X	X	X		
Illinois	558.5	12	BLANDING LANDING	X	X	X	X	X		
	531.0	13	BIG SLOUGH	X	X	X	X	X		
	526.0	13	THOMSON CAUSEWAY	X	X		X	X		
	522.5	13	LOCK AND DAM NO. 13	X	X	X	X	X	X	
	517.6	14	CATTAIL SLOUGH	X	X	X	X	X		
	493.2	15	FISHERMAN'S CORNER	X	X		X	X		
	482.9	15	LOCKS AND DAM NO. 15				X		X	
	470.6	16	ANDALUSIA SLOUGH	X	X	X	X	X		
	449.8	17	BLANCHARD ISLAND CHUTE	X	X	X	X	X		
	340.8	21	BEAR CREEK	X	X	X	X	X		
	331.6	21	CANTON CHUTE	X	X	X	X	X		
	309.1	22	JOHN HAY	X	X	X	X	X		
	301.1	22	PARK-N-FISH	X	X		X	X		
	202.8	26	LOCKS AND DAM NO. 26						X	
Missouri										
	347.7	20	FENWAY LANDING	X	X	X	X	X		
	343.3	20	LOCK AND DAM NO. 20	X						
	301.0	24	LOCK AND DAM NO. 22			X				
	273.4	24	LOCK AND DAM NO 24						X	
	241.5	25	LOCK AND DAM NO. 25						X	
	241.4	25	WINFIELD ACCESS	X	X		X			
	202.9	26	WEST ALTON ACCESS	X	X	X	X			

Public Use Facilities

The Corps of Engineers operates many public use areas along the Upper Mississippi River 9-Foot Channel Project. These range in size from one to twelve acres. The degree of development varies from simple parking lots for fishermen to areas with boat-launching ramps and basic picnic and 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.

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

The charts on the preceding pages list the locations and types of public use facilities provided by the Corps of Engineers along the channel project. More detailed information on specific public use areas may be obtained by contacting the appropriate District Engineer. The boundaries of the St. Paul, Rock Island, and St. Louis Districts are included in the chart. District office addresses are presented in the "Foreword" to this booklet.

Navigation charts, on sale in 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, established river access points, facilities available at these points of access, and commercial recreational development on both privately owned and public lands.

Fish and Wildlife

Waterfowl food plants abound and great numbers of ducks and geese rest and feed in the project pools during fall and spring migrations. The waterfowl hunting season is long and highly productive. Sport fishermen find the pools attractive even in the winter, and their shanties dot the ice in many sloughs and backwaters. Commercial fishing is also a profitable undertaking which makes a contribution to the economy of the valley.

FORT MADISON COMMERCIAL HARBOR,
MISSISSIPPI RIVER
Authorized Project Not Underway -
Commercial Navigation
(Rock Island District)

The River and Harbor Act of 1966 authorized an improvement for commercial navigation downstream from the city of Fort Madison as a feature of the Upper Mississippi River Nine-Foot Channel Project. The project would consist of an access channel for barge traffic from the Missis-

sippi River main channel to an industrial site. The access channel, which would be 8,700 feet in length with bottom width of 200 feet, would be dredged to a depth of 9 feet below flat pool. It would permit commercial navigation to approach the Iowa shore in the industrial area.

The project was reclassified "inactive" in 1974 because of lack of local support. Estimated costs of the project, last revised in 1970, were $920,000 Federal and $370,000 non-Federal.

MISSISSIPPI RIVER,
YEAR-ROUND NAVIGATION
MOUTH OF OHIO RIVER TO
MINNEAPOLIS, MINNESOTA
Study Underway - Commercial Navigation
(St. Paul, Rock Island, and St. Louis Districts)

Two Congressional resolutions were adopted which authorized the study of year-round navigation on the Mississippi River, one by the Senate Committee on Public Works on 6 April 1966 and one by the House Committee on Public Works on 5 May 1966. This study will investigate the practicability of measures that could be used to maintain a 12-month navigation season. It will include both the economic justification and the environmental impacts involved.

The Mississippi River is normally navigated throughout the year as far north as the mouth of the Illinois River at Grafton. Above Grafton, however, tows operate on the Mississippi only as long as ice conditions permit.

Many large and diversified industries vital to the commerce of the Nation have located themselves along the waterway system. In addition, since World War II, shipping demands and the use of more powerful steel-hulled towboats and barges have increased. As a result of these factors, the winter navigation season has gradually but inconsistently been extended. In recent years towboats have been able to navigate upstream as far as Lock No. 19 at Keokuk throughout the winter. Above Keokuk, however, the season ends about mid-December and begins about mid-March.

Solid ice from 4 to 6 inches thick does not really impede the movement of towboats. Six to eight inches of solid ice, however, does create hardship for the movement of towboats and interferes with the operation of the lock gates. Frequently, ice jams develop early in the winter when ice forms and continues to drift until it reaches into a constricted point in the navigation pool. In these areas ice may jam to depths of several feet becoming a formidable barrier to the movement of river traffic. Thick ice makes access to docks and wharves difficult since traffic in the approach channels is much less frequent.

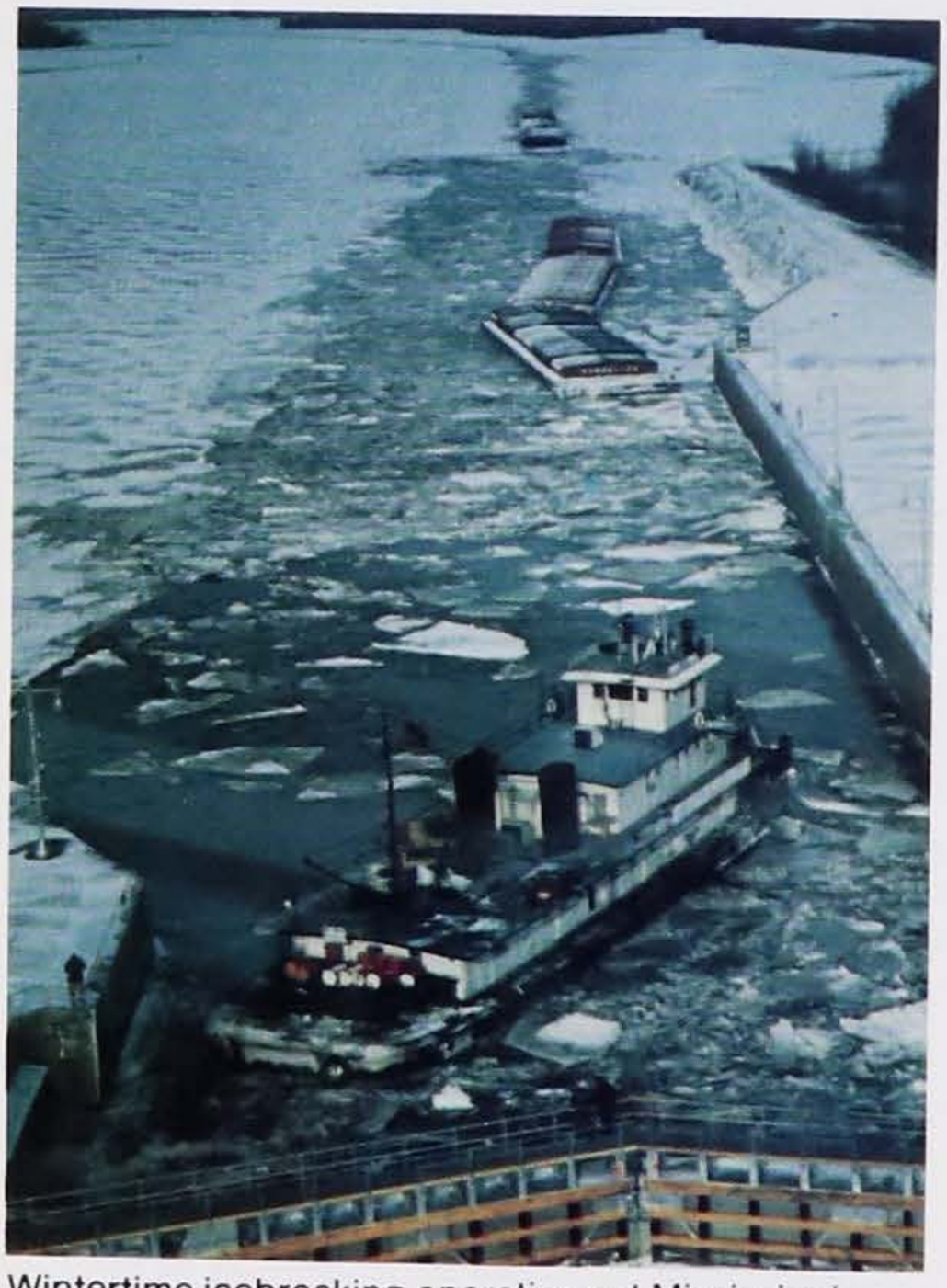
Additionally, wintertime operations were not planned when the locks were designed and constructed. Consequently, certain unanticipated problems occur during winter operations. Broken ice being pushed by the tow must be locked through before the tow. This significantly increases lockage time. Broken ice drifts into the miter gate recesses making it difficult to fully open the gates. Ice accumulates on the lock walls and gates and restricts the size of the tows entering the locks. Ice also builds up on the bottom of tows and prevents them from crossing the miter gate sill. Thus, ice accumulation seriously impedes winter navigation. Winter lockages have only been accomplished successfully through the cooperative efforts of the barge lines and the Corps of Engineers.

Increased demands on shipping and more durable and powerful tows and barges are now creating an impetus for a year-round navigation season on the Mississippi River. At the same time, the National Environmental Policy Act has prompted more detailed consideration of the environmental impacts an extended navigation season may have on the wildlife habitat and population. The river plays an important part in the economic growth of the Mississippi River Valley and year-round navigation may greatly increase the value of the existing navigation project. However, the river also plays an important role in such winter activities as sport and commercial fishing, snowmobiling, ice boating, and wildlife movement and habitat which could be adversely impacted if the channel were open year round. These factors will be major considerations in the study.

There are many alternatives and combinations involved in evaluating proposals for navigation improvements that would extend the navigation season through the entire winter. Experience gained through wintertime operations on European rivers, other rivers of the United States, and on the Great Lakes are being used in the study. Engineering costs and economic benefits will be developed. To date, several public hearings have been held and various alternatives have been considered involving extending the navigation season at several points along the river for varying durations. Alternatives ranged from a 52-week season all the way to the Twin Cities in Minnesota to a closed navigation season upstream from Burlington, Iowa. Investigations completed thus far have indicated that extension of the navigation season from Minneap-

olis, Minnesota, downstream to Cassville, Wisconsin, is not economically justified.

STATUS: The study is underway with emphasis on the reach of the Upper Mississippi River from Cassville, Wisconsin, downstream. A major portion of the study will concentrate on environmental considerations. The study will also consider establishing a closed navigation period on portions of the river for certain winter months. St. Paul District, for example, has prepared a report considering a closed navigation season north of Cassville. The overall study is scheduled for completion in FY 1980, dependent upon future allocation of funds.



Wintertime icebreaking operations at Mississippi River Lock and Dam No. 17 about 18 miles downstream from Muscatine.

DAVENPORT LINDSAY PARK HARBOR, MISSISSIPPI RIVER
Completed Project - Recreational Navigation
(Rock Island District)

This harbor was authorized in 1950 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It is located on the right bank of the Mississippi River near the upstream limits of Davenport, about 1.2 miles upstream from Locks and Dam 15. It consists of a rock breakwater inclosure to accommodate 200 resident craft plus transient craft. The harbor depth is 5 feet.

The harbor was built in 1961 at a Federal cost of $262,100. Local interests are required to operate the project, with the Federal Government performing periodic maintenance dredging.

FORT MADISON HARBOR,
MISSISSIPPI RIVER
Completed Project - Recreational Navigation
(Rock Island District)

The small-boat harbor at Fort Madison was authorized in 1948 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It consists of a breakwater and the dredging of a protected area and entrance channel to a project depth of 5 feet.

The harbor was built in 1960-1961 at a Federal cost of $184,200. Local interests are required to operate the project, with the Federal Government performing periodic maintenance dredging.

LANSING HARBOR, MISSISSIPPI RIVER
Completed Project - Recreational Navigation
(St. Paul District)

The small-boat harbor at Lansing was authorized in 1946 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It consists of an L-shaped breakwater to protect an area 170 feet wide by 500 feet long and excavation within the protected area to a project depth of 5 feet.

The harbor was built in 1958 at a Federal cost of $98,000. Local interests are required to operate the project, with the Federal Government performing periodic maintenance dredging.

MUSCATINE HARBOR, MISSISSIPPI RIVER
Completed Project - Recreational Navigation
(Rock Island District)

The small-boat harbor at Muscatine was authorized in 1950 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It consists of a breakwater and the dredging within the protected area to a project depth of 5 feet.

The harbor was built in 1959-1961. A downstream arm was added to the harbor in 1964 to protect small craft in the harbor from prevailing westerly winds. Federal cost of the project was $353,000. Local interests are required to operate the project, with the Federal Government performing periodic maintenance dredging.

Muscatine small-boat harbor.

CLINTON HARBOR, MISSISSIPPI RIVER
Project Underway - Recreational Navigation
(Rock Island District)

The small-boat harbor at Clinton was authorized in 1962 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It consists of a breakwater between Joyce Island and Willow Island and the dredging of the protected area to a project depth of 5 feet.

Based on 1 October 1978 price levels, the estimated Federal cost for construction is $118,000; non-Federal cost is estimated at $66,000. Planning has been completed. Construction is dependent upon the appropriation of funds.

DAVENPORT HARBOR, CREDIT ISLAND, MISSISSIPPI RIVER
Authorized Project Not Underway -
Recreational Navigation
(Rock Island District)

The small-boat harbor at Credit Island, Davenport, was authorized in 1962 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It would consist of a protective dike on the west shore of Credit Island, an approach channel 2,000 feet long and 150 feet wide, and two maneuvering channels with combined length of 2,400 feet and 5-foot project depth. Federal cost for construction is estimated at $160,000; non-Federal cost is estimated at $90,000, a cash contribution, the estimates being based on 1 October 1976 price levels.

The small-boat harbor project is incompatible with the Davenport local flood control project and is no longer supported by local interests.

KEOKUK HARBOR, MISSISSIPPI RIVER
Authorized Project Not Underway -
Recreational Navigation
(Rock Island District)

The small-boat harbor at Keokuk was authorized in 1962 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It would consist of a breakwater, a short entrance channel, and a maneuvering channel 1,015 feet long, 60 feet wide, and 5 feet deep. Based on 1 October 1976 price levels, the estimated Federal cost is $496,000, and the non-Federal cost is estimated at $169,000, which would be a cash contribution.

The project currently lacks local support.

BELLEVUE HARBOR, MISSISSIPPI RIVER
Authorized Project Not Underway -
Recreational Navigation
(Rock Island District)

A small-boat harbor at Bellevue was authorized

in 1962 as a feature of the Upper Mississippi River Nine-Foot Channel Project to accommodate recreational vessels and other small craft. It would consist of a breakwater, an entrance channel, and a maneuvering channel 850 feet long, 50 feet wide, and 5 feet deep.

The project lacked local support and was deauthorized in August 1977.

UPPER MISSISSIPPI RIVER
RECREATIONAL CRAFT LOCKS
Study Underway - Recreational Navigation
(St. Paul, Rock Island, and St. Louis Districts)

The study area encompasses that reach of the Mississippi River from the mouth of the Missouri River to Minneapolis. There are 28 control dams in that reach of the Mississippi, each with a lock designed to accommodate commercial towboats and barges. During the summer months, large numbers of recreational boats also travel the river causing congestion and hazardous navigation conditions near many of the locks.

The study, authorized by resolution of the House Committee on Public Works on 11 April 1974, will determine the need and advisability of providing for the independent passage of recreational craft by completion of the auxiliary locks or by other means.

Local, state, and Federal agencies were contacted, and a series of public meetings held in 1975. In 1977 a series of public workshops were conducted. Study support was demonstrated by organizations and individuals, and a cooperative Federal-state study advisory planning team has been formed. A preliminary feasibility report was submitted at the end of FY 1977.

Studies to date indicate that, with the possible exception of rehabilitation of the second lock at Locks and Dam No. 2, Hastings, Minnesota, structural measures for moving recreational craft from one pool to the next are not economically feasible at this time. Further consideration is being given to several management alternatives including development and marking of waiting areas for recreational craft.

Turkey, Maquoketa, Wapsipinicon and Upper Iowa Rivers Basin

TURKEY, MAQUOKETA WAPSIPINICON, & UPPER IOWA RIVERS BASIN

Turkey, Maquoketa, Wapsipinicon and Upper Iowa Rivers Basin

This area extends across northeastern Iowa. The Turkey, Maquoketa, Wapsipinicon, and Upper Iowa are the largest rivers in the area, draining 82 percent of the 8,792 square miles. Davenport, Dubuque, and Clinton are the largest population centers. This area contains 5.6 million acres of land and 5,000 acres of water surface. The population is about 500,000 and projected to be over 1,000,000 by year 2020. Seventy-five percent of the population was urban in 1960 and is projected to be 95 percent by 2020 as the trend toward urbanization continues. The rising population and increased economic activity will result in much larger demands for municipal and industrial water in the basin.

Existing water resource developments in the basin include four hydroelectric powerplants and local flood protection facilities.

Some of the most picturesque regions of Iowa are located within this basin. There are two major physiological subdivisions; a rugged erodible topography to the east along the Mississippi River, and a gentle rolling topography to the west and south. Although glaciers probably covered most of the area, in the rugged eastern section erosion has stripped the glacial materials from all but limited areas of the upland.

Some game species dominate the wildlife population. Wild turkeys and ruffed grouse, uncommon or missing in other parts of Iowa, are found in this basin, and wild turkeys have been restocked at Yellow River State Forest. Some of the highest populations of whitetail deer in Iowa are found in the area, and large numbers of wood ducks are found in the counties bordering the Mississippi River.

The fish habitat of lakes and streams is centered in Allamakee, Clayton, Clinton, Dubuque, Jackson, and Scott Counties, comprising about 59,000 surface acres. Fish habitat ranges from good to excellent. The largest share of Iowa's trout habitat for brown, rainbow, and brook trout is also found in this basin.

Major problems include urban and rural flood damage, limited recreational opportunities, and preservation of the environment. These problems are particularly severe in the Turkey and Wapsipinicon Rivers basin. In addition, land and water problems in upstream watersheds require treatment. Sediment yields are also a concern. Lake eutrophication and the preservation of wild, unique, scenic, and recreation areas require further study.

DRY RUN, UPPER IOWA RIVER
Completed Project, Flood Control—
Local Protection
(St. Paul District)

Authorized by the 1936 Flood Control Act and completed in 1960, this project provides for diversion of Dry Run into the Upper Iowa River. The diversion is accomplished by a 3,200-foot diversion channel from a point about one mile southwest of Decorah, Iowa, through high ground to the Upper Iowa River on the north, with a levee system along the Upper Iowa River in Decorah. It protects residential, commercial, and industrial areas in Decorah from floods on Dry Run and on the Upper Iowa River.

The Federal cost of the project, including remedial work completed in 1966, was about $1,800,000. Non-Federal costs were about $43,000. The net cumulative damage prevented since the project has been in operation is estimated at $161,900. Local interests operate and maintain the project.

Modifications to the existing project are being studied under the authority of Section 216 of the 1970 Flood Control Act. The addition of pumping stations and modifications to existing connecting works and gravity outlets are being evaluated for solution of existing seepage and interior drainage problems. The restudy is scheduled for completion in 1978.

ELKPORT, TURKEY RIVER
Completed Project, Flood Control —
Local Protection
(Rock Island District)

The town of Elkport, in Clayton County, lies at the junction of the Turkey River and Elk Creek. Floods on those streams, particularly Elk Creek, which originates in steep terrain and has a high stream gradient, have threatened the town in the past.

A local flood protection project at Elkport was authorized in 1944. Construction of the project, which consisted of a levee and appurtenant works for protection of the town, was completed in 1949. Cost of the project included $34,200 Federal expense and $5,000 non-Federal expense. The net cumulative damage prevented

since completion of the project (1949 through September 1977) is estimated to be $141,000. Local interests operate and maintain the project.

MONTICELLO, MAQUOKETA RIVER
Authorized Project Not Underway, Section 205
Local Protection
(Rock Island District)

A detailed project report has been approved for construction of flood protection works along the Maquoketa River and Kitty Creek at Monticello. Flooding from the two streams has resulted in damage to residential and commercial properties and to the city sewage treatment plant.

The recommended plan of protection consisted of a system of levees, interior drainage facilities, a road ramp, and beautification of the levees and adjacent areas. Estimated Federal cost of the project was $507,000; non-Federal costs were estimated at $86,000.

In May 1977, the Monticello City Council voted not to proceed with the project for financial reasons.

Approval of the project has been withdrawn and efforts on it terminated.

CENTRAL CITY LAKE
WAPSIPINICON RIVER
Authorized Project Not Underway
Flood Control — Reservoir
(Rock Island District)

The Central City Lake, proposed to be located on the Wapsipinicon River near Central City, Iowa, is a unit of the comprehensive plan for flood control and other purposes in the Upper Mississippi River Basin authorized by the 1938 Flood Control Act. Impoundment of floodwaters in the lake would reduce local floods on the Wapsipinicon River and would assist in the reduction of flood heights on the Mississippi River.

The project has never been funded for further study, and since little or no interest has been expressed in its construction, it was deauthorized in August 1977.

Iowa-Cedar Rivers Basin

IOWA — CEDAR RIVERS BASIN

Iowa-Cedar Rivers Basin

This area extends across east-central Iowa to the Mississippi River. The Iowa and Cedar Rivers drain almost all of the 12,776 square miles in the basin. The population of 772,000 in 1960 was 22 percent farm. Cedar Rapids, Waterloo, Iowa City, Mason City, Cedar Falls, Marshalltown, and Muscatine are the largest population centers. By the year 2020, population in the basin is expected to reach nearly 2,000,000, of which farm population will comprise only 4 percent. This basin contains 8.2 million acres of land and 22,000 acres of water surface.

The use of water for municipal and industrial needs is expected to grow at a much faster rate than population and may create problems in several locations by the year 2000. Future demand for irrigation water may also have a significant impact in some areas.

Existing water resources developments in the basin include Coralville Lake on the Iowa River, seven hydropower developments, local flood protection facilities, and agricultural levees.

Generally, the Iowa-Cedar Basin is gently rolling prairie land. All of the basin has been glaciated at least twice. Streams have cut deeply into these deposits, and wide flood plains are common.

Nearly all hunting in the basin is for small game, such as pheasant, cottontail rabbits, and fox squirrels. The whitetail deer is the only big game animal in the basin. Highest populations of deer are in Floyd and Butler Counties. Waterfowl production is limited with the exception of wood ducks. Major fish habitats are in Louisa and Muscatine Counties.

The major problem areas include water quality, water supply, flood damage, limited recreational opportunities, and preservation of the environment. Sedimentation is a problem in the lower one-third of the basin and land and water problems in upstream watersheds also require treatment. There are also problems of lake euthrophication and the preservation of wild, unique, scenic, and recreational areas.

Coralville Lake

Administration Building at Coralville Lake.

CORALVILLE LAKE, IOWA RIVER
Completed Project — Flood Control
Reservoir
(Rock Island District)

The Coralville Lake project is located on the Iowa River upstream from Iowa City in Johnson County and is a unit in the general comprehensive plan for flood control and other purposes in the Upper Mississippi River Region.

The project was constructed under the general authorization contained in the Flood Control Act approved 28 June 1938. It consists of an earth-fill dam rising approximately 100 feet above the streambed, a 500-foot uncontrolled spillway, outlet works to control the flow of the river to bank-full stage below the dam, and a reservoir providing for a flood control pool of 475,000 acre feet. In addition, a conservation pool is provided which varies from 17,000 acre feet from February through June of each year, to 53,750 acre feet from June to February. Construction of the project was begun in July 1949. The project is complete and has been in useful operation since February 1958. The cost was $17,508,000.

As a modification of the project, Congress authorized the construction of a highway bridge across the lake at the Mehaffey site in 1960. Construction of the Mehaffey Bridge was started in June 1964 and was completed late in 1966. Federal cost was $1,365,000. Johnson County, Iowa, made a cash contribution of $100,000 toward the bridge. The completed bridge is being maintained by the County.

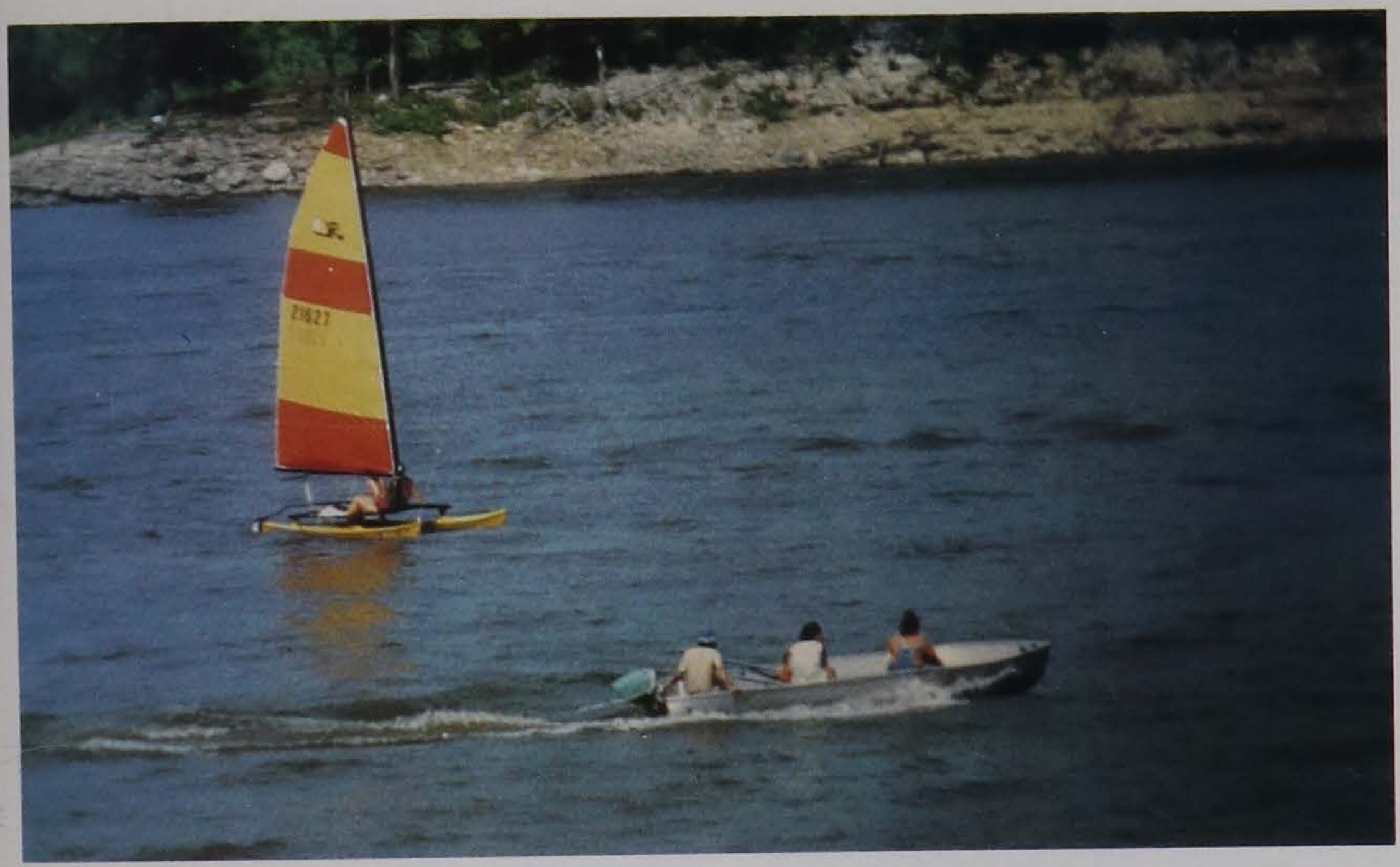
Coralville Lake substantially reduces the average annual flood damage for urban areas and agricultural lands along the Iowa River below the dam. It also reduces flood crests on the Mississippi River below the mouth of the Iowa River. Benefits also accrue to conservation and recreation. The net cumulative damages prevented since the project has been in operation (1958 to 30 June 1977) are estimated at $16,771,300.

At summer level Coralville Lake has a surface area of 4,900 acres, the fourth largest body of water which now exists in the State of Iowa. Because of its proximity to Iowa City and Cedar Rapids, and its location in a prosperous, well-populated farming area, the project has become an excellent recreation area, supplementing the facilities provided by the state at adjacent Lake MacBride State Park. A comprehensive master plan for recreational purposes and land management has been prepared in cooperation with a number of Federal agencies, state agencies, and local interests in order that the best possible use be made of the lake area.

As a result, significant recreational benefits are being realized by the general public. Visitation at the project was 3,032,000 in 1977.

The aesthetic appeal of the lake setting attracts

Tailwater Camping Area at Coralville project.



Boating is popular on Coralville Lake.

many forms of outdoor recreation, such as pleasure boating, water skiing, and other related water sports. The camper will find shaded camp sites with basic facilities to serve his needs. The casual visitor will find ample opportunity for sightseeing, picnicking, or relaxing under the shade of a tree to enjoy the great out-of-doors.

Bass, bluegill, crappie, and channel catfish, along with many other species of fish, lurk within the waters of the lake to challenge the skill of the fisherman, whether an experienced angler or novice. Flows through the outlet works of the dam create fishing opportunities unique in this reach of the Iowa River. Fishing is not restricted to the summer months since ice cover on the lake provides the setting for the hardy sport of ice fishing.

Throughout much of the lake area, especially in the upper reaches, the hunter finds squirrel, rabbit, pheasant, whitetail deer, and many species of waterfowl.

Basic recreational facilities are provided by the Corps of Engineers at eight sites within the lake area. For the convenience of the recreating public, three commercial concession leases have been granted at strategic points along the lake. These concessions have such items as marine gas, oil, bait, tackle, ranted boats, and numerous other services disired by the public. Picnic tables, fireplaces, water supply systems and other facilities are available at the Corps-developed recreational areas. A tract of 638 acres has been licensed to the University of Iowa for development as a recreational area and for field study and outdoor laboratory work. A tract of 13,048 acres has been licensed to the Iowa State Conservation Commission for wildlife conservation and management.

The Coralville Lake project is maintained and operated by the Corps of Engineers.

The Coralville Lake project has been in operation since 1958. It is proposed to acquire additional interests in flowage easement lands that are being flooded substantially more than was predicted during the period of initial land acquisition. The proposed additional acquisition would satisfy the reservoir's present plan of operation and any known future operational needs of the project.

It is also proposed to provide for payment to Johnson County for damages to certain flowage easement roads located in the upper limits of the permanent pool in Johnson County. The Coralville Lake Operational plan was modified in 1958 to provide for seasonal operation of the lake's conservation pool. The change in operation has resulted in additional county road damage caused by more frequent and longer duration flooding of flowage easements lands. Payment for damages would be based on modifica-

Artist's drawing of a portion of the Marshalltown project, showing architectural blending of floodwalls with surrounding environment.

tions to the existing relocations agreement with Johnson County.

The current estimate for these proposals, all of which is Federal, is $6,500,000. Initiation of this work is dependent upon allocation of funds.

MARSHALLTOWN, IOWA RIVER
Completed Project, Flood Control —
Local Protection
(Rock Island District)

The city of Marshalltown is located on the Iowa River in Marshall County. Approximately 725 acres of the city are located in the Iowa River flood plain and about 500 acres are located in the flood plain of Linn Creek, a tributary stream.

A project to provide flood protection at Marshalltown was authorized in the 1965 Flood Control Act. It consists of levees, floodwalls, bridges, channel improvements, and interior drainage facilities on the Iowa River and Linn Creek. As a part of this project, the Corps of Engineers took advantage of a unique opportunity to blend portions of the project into the environmental surroundings. Special attention was given to imaginative planning and innovative landscaping to improve the aesthetic values.

Federal cost was $8,335,000. Estimated non-Federal cost was $2,190,000. Construction began in May 1972 and was completed in 1977. Local interests will operate and maintain the project.

CHELSEA, IOWA RIVER
Project Underway, Section 205 —
Flood Control
(Rock Island District)

A detailed project report to consider providing flood protection for the city of Chelsea, located on the Iowa River in Tama County, has been completed. The entire community is located in the flood plain of the Iowa River and has been subject to recurring floods.

A detailed project report was submitted in 1975 and approved in 1977. Plans and specifications will be prepared when local cooperation agreements are completed. Construction is currently expected to begin in the spring of 1979. Estimated Federal cost is $1,350,000; non-Federal cost is estimated at $135,000.

EVANSDALE, CEDAR RIVER
Project Underway, Flood Control —
Local Protection
(Rock Island District)

Evansdale lies on the left bank of the Cedar River immediately downstream from Waterloo in Black Hawk County. Most of the city is subject to flooding from Cedar River floods. Flash flooding from Elk Run Creek, a tributary stream, also causes damage in part of the city.

Protection at Evansdale was recommended in an interim report of the Iowa-Cedar Rivers Basin. The plan includes levees to protect the part of the city west of Elk Run Creek, interior drainage facilities, road ramps, a railroad closure structure, and beautification.

The project was authorized in 1976 under the provisions of Section 201 of the Flood Control Act of 1965. Based on 1 October 1978 price levels, the Federal cost is estimated at $2,570,000; non-Federal cost is estimated at $370,000. Preconstruction planning is in progress.

MARENGO, IOWA RIVER
Project Underway, Section 205 —
Flood Control
(Rock Island District)

Marengo, located on the Iowa River in Iowa County, has sustained flood damage from high flows on the Iowa River and from Bear Creek, a tributary. A detailed project report to consider flood protection at the city of Marengo, has been completed.

The report recommends Federal participation in construction of flood protection facilities, consisting of improvement of an existing levee, construction of a reach of new levee, and improvement of the existing interior drainage system. Based on 1975 price levels, the Federal cost is estimated at $1,900,000; non-Federal cost is estimated at $130,000. A contract has been awarded for construction and is to be completed by the end of Fiscal Year 1979. The second stage of the project, which will complete it, is scheduled for construction in September 1980.

WATERLOO, CEDAR RIVER
Project Underway, Flood Control —
Local Protection
(Rock Island District)

The city of Waterloo is located along both banks of the Cedar River in Black Hawk County. Black Hawk Creek is a right-bank tributary entering the Cedar River within the city. Waterloo is a rapidly growing industrial city, with major manufacturing and commercial development along the riverbanks. On a number of occasions, ex-

Levees and new railroad bridge, Waterloo project.

tensive damage in the city has been caused by floods on the Cedar River and Black Hawk Creek.

The Flood Control Act of 1965 authorized a project along both banks of the Cedar River and Black Hawk Creek within the city to protect against floods having an average recurrence interval of 100 years. A levee and floodwall system about 17 miles long is being built. Related improvements will include eight pumping plants, pondage areas, modification of interior drainage facilities, numerous closure structures for streets and railroads, a ring levee around the city sewage treatment plant, a small dam and storage reservoir on Virden Creek, and other works. The Corps project has been coordinated with a plan for renewal and beautification of the city's downtown central area.

One of the borrow areas used for the project is being developed into a public recreational lake for fishing, boating, swimming, and nature hiking. The lake has been stocked by the Iowa Conservation Commission for several years. In addition, the area was seeded, trees were planted, and a parking lot was developed to accommodate the public using the area.

Aesthetics were considered in the floodwall design. Portions of the floodwall were lowered to allow the public a better view of the Cedar River. Trees and shrubs are being planted along the levees and floodwalls, and park benches will be included so the public can enjoy a blend of natural and manmade environment in park-like atmosphere.

Estimated Federal cost of the project, based on 1 October 1978, price levels, is $39,300,000. Non-Federal cost is estimated at $10,140,000 for right-of-way and relocations. Construction began in September 1972 and is scheduled for completion in 1981. Local interests will operate and maintain the project after completion.

ROCHESTER LAKE, CEDAR RIVER
Authorized Project Not Underway,
Flood Control - Reservoir
(Rock Island District)

The Rochester Lake, proposed to be located on the Cedar River 2 miles north of Rochester in Cedar County, is a unit of the comprehensive plan for flood control and other purposes in the Upper Mississippi River Basin authorized by the 1938 Flood Control Act. Impoundment of floodwaters in the lake would reduce local floods on the Cedar River and would assist in the reduction of flood heights on the Mississippi River.

The project has never been funded for further study, and little or no interest has been expressed in its construction. The project was deauthorized in 1978.

Riverfront enhancement, Waterloo project.

IOWA AND CEDAR RIVERS,
IOWA AND MINNESOTA
Study Underway, Flood Control -
Local Protection
(Rock Island District)

A study of the Iowa and Cedar Rivers was authorized by resolution of the House Committee on Flood Control on 16 July 1945 and by resolution of the Senate Committee on Commerce on 6 August 1945, with later modifications. Its purpose is to investigate the advisability of providing flood protection and to consider related water needs within the river basins.

A study to determine what improvements for bank erosion control, drainage, and allied purposes should be made on the Iowa River near Wapello was combined with the survey, and possible measures to prevent bank erosion have been considered.

Public meetings were held in 1966 to help identify and discuss problems and needs. Preliminary investigations of urban and rural flood problems and drainage problems have been completed for various locations throughout the basin.

Three projects have been authorized for construction as a result of the reports submitted under this investigation — Waterloo, Marshalltown, and Evansdale. Each is described further elsewhere in this book. A final report considering the remaining flood problems in the river basin is scheduled to be completed in Fiscal Year 1981.

IOWA CITY, IOWA - RALSTON CREEK
Study Underway, Flood Control -
Local Protection
(Rock Island District)

A reconnaissance investigation was made under the authority of Section 205 of the 1948 Flood Control Act, as amended, to consider the feasibility of providing flood protection along Ralston Creek in Iowa City. The study considered the feasibility of a diversion channel in conjunction with a US Department of Agriculture Soil Conservation Service watershed program for the Upper Ralston Creek watershed. Based on 1973 price levels, the estimated cost of the joint plan is $3,000,000. A reconnaissance report recommended that a detailed project report be prepared. A study and detailed project report will be made when funds become available.

WAPELLO, IOWA RIVER
Streambank Erosion Demonstration Project
(Rock Island District)

Wapello lies on the right bank of the Iowa River about 16 miles above its confluence with the Mississippi River. The river makes approximately a 90-degree bend at the upstream end of the community, and the riverbank there has been eroding.

Improvements for bank erosion control at Wapello were considered as a part of the Iowa and Cedar River Study discussed above. Investigations indicated that improvements were not economically justifiable under that authority.

The erosion problem at Wapello, however, was selected as one of the demonstration projects under the 1974 streambank erosion prevention and control demonstration program. The demonstration project plan at Wapello consisted of the construction of a combination of permeable timber jetties, erosion control mat, and steel jacks to control the bank erosion. Construction of the project was completed in 1978.

As a part of the demonstration program, the completed project will be monitored for the next 4 years to evaluate the success of the project. At the end of the monitoring period, a project evaluation report will be prepared.

Skunk River Basin

SKUNK RIVER BASIN

SKUNK RIVER BASIN

This basin extends southeasterly from central Iowa to the Mississippi River. The Skunk River drains about 95 percent of the 4,595 square miles in this basin. In general, the Skunk River flows through a shallow valley, excepting the reach in Henry County where the river enters a narrow steep-walled valley with many rock outcrops. About 30 percent of the population is in the two largest cities, Ames and Burlington. Newton, Fairfield, Oskaloosa, Mount Pleasant, and Washington are other larger communities in the basin. Total basin population was 222,000 in 1960, of which 76 percent was urban. The urban population is expected to increase to 96 percent of the estimated 545,000 population in 2020. This basin contains 2.9 million acres of land and 13,000 acres of water surface. The use of water is expected to increase markedly as the rising population creates larger municipal and industrial demands.

Most hunting is for small game although good populations of whitetail deer are found in Des Moines, Henry, Jefferson, and Washington Counties. Major fish habitats are mostly in Des Moines County. Quality varies, depending upon location.

Problems and needs in the basin comprise water quality, flood damage, limited recreational opportunities and preservation of the environment.

The Iowa Conservation Commission has designated a 50-mile reach of the lower Skunk River as having scenic potential.

Existing water resource developments include channel improvements and agricultural levees. Ames Lake on the Skunk River upstream from Ames has been authorized by Congress but has been declared inactive because the State of Iowa has expressed general opposition to the project at this time.

AMES LAKE, SKUNK RIVER
Authorized Project Not Underway
Flood Control - Reservoir
(Rock Island District)

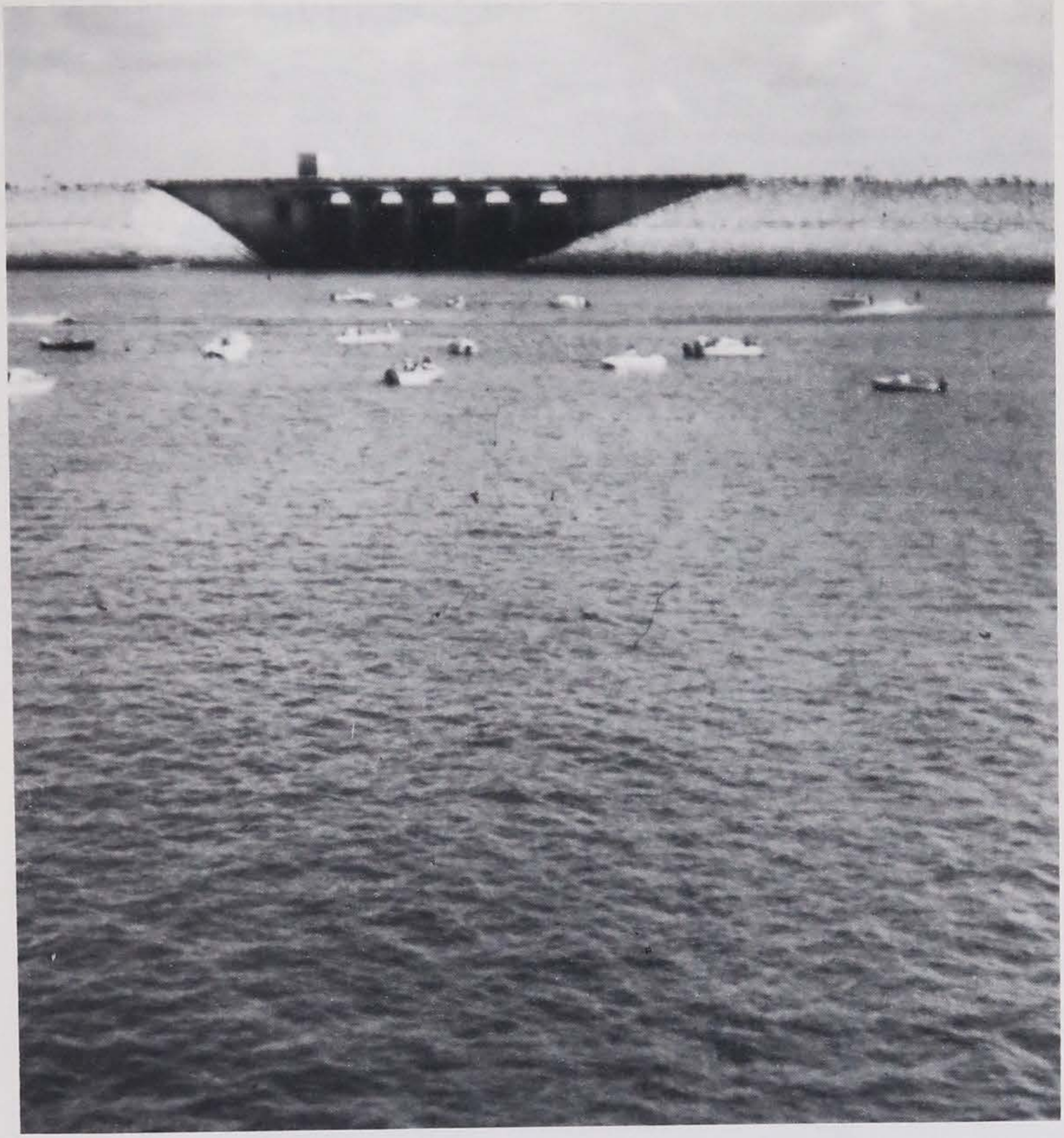
The Ames Lake would be located on Skunk River in Story County about five river miles upstream from the city of Ames. The lake would cover about 5,000 acres at full pool elevation and would extend about 9 miles above the dam. The project was authorized by the Flood Control Act of 1965 and would be operated for flood control, water quality control, recreation, and fish and wildlife enhancement. Local interests would be required to reimburse the Federal Government for one-half of the separable first costs allocated to receation and to fish and wildlife enhancement. Estimated Federal cost is $21,900,000 based on July 1973 price levels.

The project was classified inactive on 20 June 1974, because of general opposition to the project by the State of Iowa.

SNAGGING AND CLEARING, SKUNK RIVER
Completed Project, Section 208 -
Flood Control
(Rock Island District)

Section 208 of the Flood Control Act of 1954 authorizes the Corps of Engineers to spend up to $250,000 on any single tributary during any one fiscal year for removal of accumulated snags and other debris, and for the clearing and straightening of stream channels when, in the opinion of the Chief of Engineers, such work is definitely in the interest of flood control.

In 1969-70, a new channel about 1,000 feet in length was cut for the Skunk River in Steady Run Township, Keokuk County, to by-pass a reach obstructed by drift and debris. Federal cost was $40,195.



Des Moines River Basin

DES MOINES RIVER BASIN

DES MOINES RIVER BASIN

This basin extends across central Iowa to the southeastern part of Iowa. The Des Moines River drains about 98 percent of the 14,802 square miles in this basin. Des Moines, Ottumwa, and Fort Dodge are the largest population centers. This basin contains 9.4 million acres of land and 42,000 acres of water surface. Population growth and economic development are basic factors in determining future resource needs. The population in the Des Moines Basin has been projected to grow from 845,000 in 1960 to nearly 2,000,000 by 2020. The trend toward urbanization is expected to continue as farm population decreases from 23 percent of the total in 1960 to only 5 percent of the total population by 2020.

Small game species dominate wildlife populations in this basin. Although wild turkeys and prairie chickens are now extinct, ruffed grouse have been restocked in Shimek State Forest. Whitetail deer comprise the only big game species. Although most hunting is on private lands, there are 41,500 acres of state-owned lands on 123 separate tracts managed for hunting. The quality of the fishery varies considerably depending on the habitat and species composition. Pollution is a problem on reaches of the Des Moines, Boone, and North Raccoon Rivers.

Existing and future problems and needs include water supply, water quality, flood damage, limited recreational opportunities, and preservation of the environment.

Existing water resource development in the basin include Red Rock Dam and Lake Red Rock, Saylorville Lake, several local flood protection facilities, and agricultural levees.

Red Rock Dam.

RED ROCK DAM AND LAKE RED ROCK
DES MOINES RIVER
Completed Project, Flood Control - Reservoir
(Rock Island District)

The Red Rock Dam and Lake Red Rock project on the Des Moines River is chiefly in Marion County, but extends into Jasper, Warren, and Polk Counties. The dam is approximately 60 miles downstream from the city of Des Moines. The project is a unit of the comprehensive plan for flood control and other purposes in the Upper Mississippi River Region. Flood protection is provided to 36,000 acres of agricultural lands in the Des Moines River Basin and to the cities and towns of Ottumwa, Eldon, Eddyville, Keosauqua, and Farmington. Along the Mississippi River downstream from the mouth of the Des Moines River, levee districts and the cities of Quincy, Illinois, and Canton, La Grange, and Hannibal in Missouri are benefited. With the reservoir in operation, damages in the Des Moines River Basin from the floods of 1944 and 1947 would have been reduced by $3,060,000 and $19,530,000, respectively, and significant reduction of flood crests on the Mississippi River would also have been afforded.

The net cumulative damage prevented since the project has been in operation (1969 through June 1977) is estimated at $28,874,700.

The project was authorized under the general authorization contained in the Flood Control Act approved 28 June 1938. The plan of improvement provided for construction of a dam consisting of a rolled earthfill embankment and a gravity-type concrete spillway with crest gates, located near the center of the valley, each end of which is tied into the embankment by a gravity-type non-overflow, concrete section. The dam, at crest elevation of 797 feet above mean sea level, is approximately 5,670 feet long and a maximum height of 110 feet above the valley floor. The drainage area above the dam site is 12,323 square miles. With the flood control pool full, the reservoir area is about 65,500 acres. A permanent lake of 8,950 acres is formed behind the dam. Federal cost of the project was $88,835,000, to September 1977.

The Red Rock project was designed primarily to protect life and property. It protects an area of rich heritage and a region of productive agricultural land. The project also provides, however, new recreational opportunities for central Iowa.

The 8,950 acre surface area of Lake Red Rock provides the nucleus for a multitude of recreational activities. Twelve recreation areas are available for public use. The Corps of Engineers manages nine of the areas; the State of Iowa manages two, and Marion County manages one.

These areas provide basic facilities such as access roads, boat-launching ramps, fresh running water, camping, and picnic areas, and include two overlook areas where visitors may sightsee or just enjoy the beauty of a summer day. Boats, bait, gasoline, food, and other items

are provided by two concessionaires operating by lease under the supervision of the Corps. One of the areas managed by the State of Iowa incudes 25,452 acres of land at the upper end of the Lake that has been licensed to the Conservation Commission for wildlife conservation and management.

Boating, camping, and fishing are the most popular activities today; but after development of certain project lands, waterfowl hunting may become one of the dominant recreational pursuits during the fall.

Over 996,000 persons visited the project in 1977. A new camping area was built recently at Red Rock through specifically authorized funds. Development of future sites will be done as the need and demand require. The development will be accomplished through coordination and cooperative development with other non-Federal agencies.

The Red Rock Dam and Lake Red Rock project is operated and maintained by the Corps of Engineers.

DES MOINES, DES MOINES RIVER
Completed Project, Flood Control -
Local Protection
(Rock Island District)

This project, authorized by the 1944 Flood Control Act, protects the city of Des Moines from Des Moines and Raccoon River floods up to a frequency of once in 100 years. It includes a system of levees and floodwalls, bridge raises, and the repair and provision of gates on existing sewerage outlets.

The Federal cost of the project was $4,993,000; non-Federal costs were $407,000. Construction of this project began in 1966 and was completed in 1971. Total damages prevented to 30 June 1977 are estimated to be $1,499,000. The project is operated and maintained by local interests.

OTTUMWA, DES MOINES RIVER
Project Completed, Flood Control
(Rock Island District)

The city of Ottumwa constructed a flood protection system along the Des Moines River in the period 1956-1964, consisting of levees, floodwalls, channel improvements, interceptor sewers, and pumping plants. A narrow strip of flood plain about three-quarters of a mile long on the left bank of the river, containing part of the city's business district, remained subject to basement flooding when the combined north side storm and sanitary sewer was overtaxed by heavy local runoff. The Federal project consisted of improvement of the discharge efficiency of the sewer by providing additional gated openings in the sewer, through which high flows would discharge directly into the Des Moines River. Construction began in 1976 and was completed in March 1977. Total Federal cost of the project was $233,000.

VAN METER, RACCOON RIVER
Completed Project, Section 205 -
Flood Control
(Rock Island District)

The town of Van Meter is located on the right bank of the Raccoon River, a tributary of the Des Moines River, in Dallas County, in central Iowa. A small, unnamed creek rises in the bluffs south of the town, passes through the town, and enters the Raccoon River. Floods on the creek are flashy in nature, and damage has been sustained throughout almost the entire town on several occasions.

The work consisted of an enlarged and straightened channel for the creek through the town, an earth levee paralleling the left bank of the new channel, and modification of drainage facilities. Construction of this project began in July 1964 and was completed in November 1964 at a Federal cost of $113,842; non-Federal costs were $22,000. Total damages prevented to 30 June 1977 are estimated to be $682,000. The project is operated and maintained by local interests.

EMERGENCY BANK PROTECTION
DES MOINES RIVER BASIN
Completed Projects, Section 14 -
Flood Control
(Rock Island District)

Emergency bank protection work has been done at several locations in the Des Moines River Basin under the Section 14 authority.

In 1955, a bank protection project was completed to protect the water supply facilities of the city of Boone, which are located on an island in the Des Moines River about 3 miles northwest of the city. Federal costs of that project were $13,900.

Additionally, in May 1966, a bank erosion problem on the Raccoon River which threatened local water supply at Adel was corrected. The Federal cost of this project was $12,854.

In December 1976, a bank erosion project was completed on the Raccoon River at Des Moines. The project involved an area on the left bank of the Raccoon River just upstream from the confluence of the Des Moines and Raccoon Rivers. Total Federal cost of the project was $83,370.

SAYLORVILLE LAKE
DES MOINES RIVER
Project Underway, Flood Control - Reservoir
(Rock Island District)

In 1958, Congress authorized construction of Saylorville Lake on the Des Moines River at a site about 11 miles upstream from the city of Des Moines.

Visitors' Center at Saylorville Lake.

The principal purpose of the Saylorville project is to furnish needed additional storage to supplement the flood control capacity of the downstream Red Rock Dam and Lake Red Rock to reduce flood crests below the latter on the Des Moines and Mississippi Rivers. Saylorville Lake, acting in conjunction with the completed local protection work at the city of Des Moines, also provides a high degree of flood protection to that city. The permanent conservation pool forms a lake of about 5,400 acres and extends some 17 miles upstream from the dam. Water stored in the conservation pool will, during times of drought, be released in sufficient quantities to provide a minimum flow of 200 cubic feet per second at Des Moines.

The plan of improvement provided for construction of a rolled earthfill embankment and a concrete spillway. The concrete spillway consists of an overflow section and a concrete chute below the spillway crest. The dam at crest elevation of 915.5 feet above mean sea level is about 6,750 feet long and 105 feet high. The watershed above the dam is 5,823 square miles. The reservoir has a total capacity of 676,000 acre-feet and covers about 16,700 acres. Of the 676,000 acre-foot capacity, 602,000 acre feet is allocated to floodwater storage and the remaining 74,000 acre-feet forms a 5,400-acre lake behind the dam.

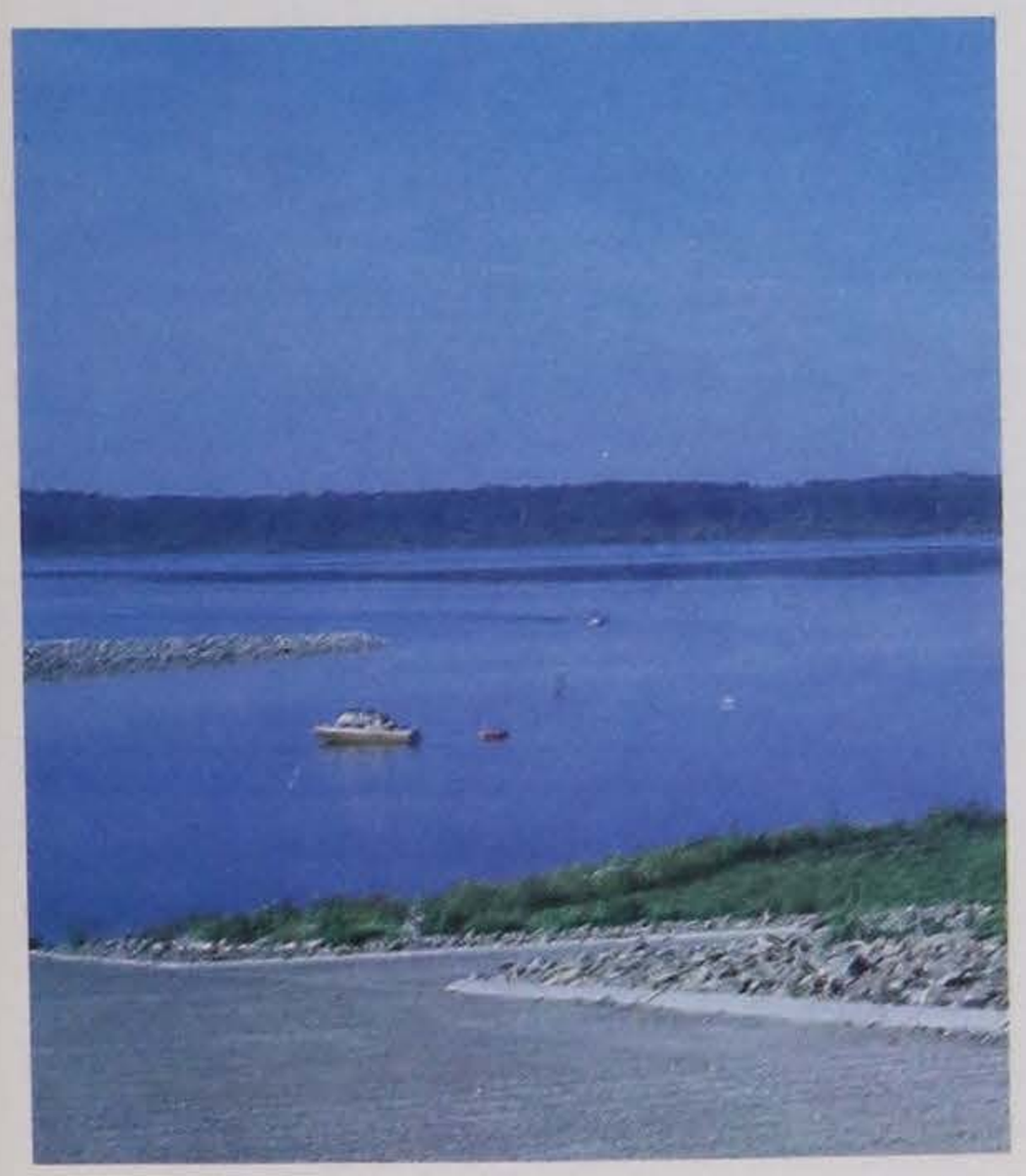
A barrier dam south of Polk City and a diversion dam above Polk City were constructed as a part of the Saylorville Project. The two dams combine to protect Polk City from the floodwaters temporarily stored in the Saylorville Lake and from floods on Big Creek. Big Creek Lake, created by the project, has become a popular recreational area for central Iowa. The State of Iowa expressed a desire to develop the area around Big Creek Lake into a State Park and contributed funds toward the cost of the project. A total of 2,025 acres of land and water have been leased to the Iowa Conservation Commission for use as a State Park. The lake provides excellent fishing, swimming, and boating opportunities for the public. In addition, the Conservation Commission is developing roads, boat ramps, and picnic areas around the lake.

Major environmental concerns resulted in changes to the Saylorville project that would minimize the adverse impacts on Ledges State Park. A special report recommended post-authorization changes, and they were authorized in the 1976 Water Resources Development Act. The changes included modification to the release rates and acquisition of certain lands that would provide a downstream corridor between the Saylorville Dam and the city of Des Moines. The corridor will allow greater flexibility in releasing water from the dam. It will also provide a greenbelt that is aesthetically desirable and will provide recreational opportunities including hiking and bicycle trails, fishing, picnicking, and other activities. Recreational facilities are being developed in coordination with the Iowa Conservation Commission and the city of Des Moines which will share the cost of development of the facilities and will operate them.

Saylorville Lake is designed to protect life and property from floods. It also provides recreational opportunities for central Iowa. The 5,400-acre surface area of the Saylorville Lake provides a multitude of recreational opportunities.

In 1977, even though only three of Saylorville's seven recreational areas were open, total visitation exceeded the one million mark. In 1978, a new campground, a new picnic area, and a commercial marina were opened, all providing more opportunity for public use of the lake. By the end of 1978, Saylorville provided some of the most modern camping facilities in the state, as well as tent camping areas, picnic facilities for a family of two or two hundred, trails for hiking or snowmobiling, and boat facilities for almost any size craft. A visitor center with an exhibit area is among the facilities available to the public.

New bridges were an important feature of the Saylorville Lake project.



Relaxation at Saylorville Lake.

Additional areas and facilities will be developed in the future. Sites have been tentatively selected, and planning is being coordinated with non-Federal agencies to effect cooperative development. These new facilities include biking and hiking trails, new camping, and new picnic facilities.

Services such as boats, bait, gasoline, and food are provided by one concessionaire operating by lease and under the supervision of the Corps.

The Saylorville Lake project is scheduled for completion in 1981. It is operated and maintained by the Corps of Engineers. Based on costs as of 1 October 1978, the estimated Federal cost of the project is $95,000,000 and non-Federal costs are estimated at $950,000. The Federal cost figure includes construction of the dam, relocation works, land acquisition, recreation facilities, access roads, buildings, grounds and facilities, and operating equipment.

DES MOINES RIVER,
IOWA AND MINNESOTA
Completed Study, Flood Control -
Local Protection
(Rock Island District)

The study purpose was to consider flood control and related concerns in the Des Moines River Basin, particularly in that part of the basin upstream from Red Rock Dam and Lake Red Rock. Five public hearings were held in 1959 at the initiation of the study. Late-stage public hearings were held on 23 and 24 June 1970 at Scranton, Humboldt, and West Des Moines. Coordination with appropriate Federal and State agencies was maintained during the course of the study.

The report was completed in 1975. The only project recommended for authorization was one for local flood protection at the city of West Des Moines and a portion of the city of Des Moines, which consists of about 5 miles of new and improved earth levee and 600 feet of concrete floodwall which would provide protection from flooding on the Raccoon River, Walnut Creek, and Jordan Creek. Project authorization is pending.

DES MOINES, IOWA
Completed Study, Section 216 -
Review of Completed Project
(Rock Island District)

A local flood protection project for the city of Des Moines was completed in 1971. (See Des Moines, Des Moines River, Completed Project, Flood Control - Local Protection.) That project, together with the Saylorville Lake project upstream, provides protection against a flood with an occurrence interval of 100 years, but provides questionable protection in relation to interior flooding. Pumping plants were not considered economically feasible at the time of the project authorization.

The study, initiated in Fiscal Year 1977 at the request of local interests, was to determine whether, because of changed conditions at Des Moines, provision of interior drainage facilities is now economically justified. The study was completed in 1978 with negative findings.

DES MOINES RIVER, BANK EROSION,
IOWA AND MISSOURI
Study Underway, Flood Control -
Local Protection
(Rock Island District)

This study was authorized in 1974, by resolution of the Committee on Public Works of the Senate, for the purpose of studying streambank erosion on the lower Des Moines River downstream from the Red Rock Dam. Local governments and private landowners have attributed the erosion damage to long-duration releases of bankfull flow from Red Rock Dam following a period of high inflow to the reservoir. The investigation was started in February 1976 and funded through Fiscal Year 1978. No funds were appropriated for the study in Fiscal Year 1979.

IOWA SECTION 22 STUDIES
Study Underway, Section 22 -
Water Resources Development
(Rock Island District)

Demands for water are projected to increase significantly in the middle and lower Des Moines River Basin in the future. This study, initiated in Fiscal Year 1976 at the request of the Iowa Natural Resources Council, is to develop a comprehensive plan for providing increased supplies of water for domestic, municipal, agricultural, and industrial uses. The potential sources to be investigated include the existing Saylorville and Red Rock reservoir projects constructed by the Corps of Engineers; other surface storage sites; increased use of ground water; and water recycling.

In Fiscal Year 1977, studies concentrated on evaluating the potential of Red Rock and Saylorville to provide additional storage for water supplies to downstream users. Alternative sources of water supply were investigated in Fiscal Year 1978.

The overall study, authorized under Section 22 of the 1974 Water Resources Development Act, is scheduled for completion in Fiscal Year 1980.

Fox, Wyaconda, and Fabius Rivers Basin

FOX, WYACONDA, & FABIUS RIVERS BASIN

Fox, Wyaconda, and Fabius Rivers Basin

The entire basin in both Iowa and Missouri contains 1.9 million acres of land and 9,000 acres of water surface. Only about 16 percent of the basin (the upstream portion) is located in Iowa. This portion of the basin is agricultural.

FOX RIVER, IOWA AND MISSOURI
Study Underway - Flood Control
Local Protection
(Rock Island District)

An early study addressed flood control and related purposes in the Fox River Basin but determined that economic justification for improvements in the basin was lacking except in the Mississippi-Fox River Drainage District No. 2. At that time, there was no local entity to support a project and the report recommendation was negative. The study authority was held open, however, for later consideration. In 1968, the Mississippi-Fox River Drainage District was organized under the statutes of the State of Missouri. In July 1975, the limits of the Mississippi-Fox River Drainage District were expanded. A resolution adopted in 1976 by the Committee on Public Works and Transportation of the House of Representatives requested a study for flood control and allied purposes in the Drainage District. This new study was combined with the outstanding study on the Fox River, and the study was resumed with the appropriation of study funds in FY 1978.

Missouri River Region

MISSOURI RIVER REGION

Missouri River Region

The Missouri River forms the western boundary of the State of Iowa from the Missouri state line north to Sioux City, Iowa, a distance of about 182 miles. The Big Sioux River forms the remainder of Iowa's western boundary, from Sioux City north to the Minnesota state line. The Missouri, traditionally a wild, free-flowing river with frequent changes in the river channel, is now well under control, thanks to six huge reservoirs in Montana, North Dakota, South Dakota, and Nebraska.

Along the Iowa portion of the Missouri River, the Corps of Engineers has built levees and a nine-foot channel for commercial river traffic. This was done by dikes and revetments, together with regulated flows from the upstream reservoir system, rather than by locks and dams. Commercial river traffic on the Iowa portion of the Missouri River began in 1953 when two barge firms began shipping cargoes upstream to Omaha. Cargo traffic has increased greatly in the past 20 years.

Several public use recreational sites have been developed in Iowa along the Missouri River. Recreational potential is also being developed on the oxbow lakes at various locations along the river between Sioux City and Omaha. These oxbows or cutoffs resulted from the elimination of sharp curves and bends as part of the stabilization of the Missouri River channel by the Corps of Engineers.

METROPOLITAN OMAHA, NEBRASKA,
AND COUNCIL BLUFFS, IOWA
Completed Study - Multipurpose
(Omaha District)

A survey study was initiated in January 1972 to provide a plan for the development, utilization, and conservation of water and related land resources of the metropolitan region of Omaha and Council Bluffs. The study area encompasses Washington, Douglas, Sarpy, and Cass Counties in Nebraska, and Harrison, Pottawattamie, and Mills Counties in Iowa.

Existing and future needs of the metropolitan region were studied, with specific emphasis placed on flood control and flood plain management, wastewater management, water quality management, water-related recreation, and conservation and enhancement of fish and wildlife resources. The study was a cooperative effort which included the immediate and long-range plans of other Federal agencies, of the States of Nebraska and Iowa, and of the counties and municipal governments within the study area.

The survey was accomplished in two phases. Phase I, completed in 1973, was a gross appraisal of needs, alternative plans, and data inputs from all cooperating agencies. Phase II, completed in June 1975, was a detailed study of alternatives developed during the Phase I studies.

Within the Iowa segment of the study area, flooding and other water-related problems were considered with respect to the Boyer River and Indian and Mosquito Creeks. The most frequent flooding in the Boyer River Basin occurs in the vicinity of Missouri Valley. Flood problems are aggravated by the effects of locally constructed levees along the Boyer River and Willow Creek. Failure of these levees results in the ponding of water behind the levees at the junction of the Boyer River and Willow Creek levee units. This ponding has resulted in flooding at Missouri Valley to record depths of 5 feet.

Flooding on Indian Creek is caused by high intensity rainfall of short duration. The creek runs through Council Bluffs and consists of an open concrete channel, a concrete conduit, and an open, earth-lined channel. The Soil Conservation Service is nearing completion of a watershed program involving 11 erosion-control structures in the Indian Creek Basin.

The flood problem on Indian Creek is aggravated by two conditions: (1) channel capacities can vary between 3,500 cubic feet per second and 6,000 cubic feet per second depending on the amount of sediment and debris in the channel; and (2) an urban renewal project located in the main business district of Council Bluffs is situated across the creek's flood plain. The urban renewal project can affect and be affected by major flood events.

The flood plain of Mosquito Creek, east and southeast of Council Bluffs is predominantly in agricultural land use. Flooding on Mosquito Creek is infrequent. The downstream end of the creek lies in the flat Missouri River flood plain. The reach from the creek's mouth upstream for about 3.5 miles is protected by Missouri River Levee Unit L-624 tieback levees. A watershed work plan prepared by the Soil Conservation Service in 1965 proposed 57 erosion-control

structures within the Mosquito Creek Basin in Harrison County. Two of the structures have been completed.

Nine alternatives were considered for solving flood problems at Missouri Valley. All structural alternatives are economically infeasible. The Soil Conservation Service is compiling a flood hazard map for the area. Flood hazard areas should be zoned and owners of property in such areas should apply for flood insurance.

Structural alternatives consisting of dams for Indian Creek were found to be economically feasible; however, local cost-sharing could be as high as 50 percent of total project costs which, based on past experience, has made the project publicly unacceptable. Flood plain regulation and flood insurance are perhaps the only feasible alternatives for Indian Creek. The nearly completed Soil Conservation Service Watershed Program for Indian Creek will provide limited flood protection for Council Bluffs.

Structural measures for Mosquito Creek were found to be economically infeasible. Flood hazard areas should be mapped and zoned, and residents living in the areas should be encouraged to apply for flood insurance.

Detailed information pertaining to water and related land resources management in Harrison, Pottawattamie, and Mills Counties in Iowa is presented in the Metropolitan Omaha, Nebraska-Council Bluffs, Iowa review report.

COUNCIL BLUFFS, MISSOURI RIVER
Completed Project, Flood Control -
Local Protection
(Omaha District)

The Council Bluffs local protection project is one of four authorized urban protection projects on the Missouri River. Consisting essentially of an earthen levee about 9 miles in length and averaging 12 feet in height, it was completed in 1954 and turned over to local interests for operation and maintenance.

The project was designed to operate in conjunction with the chain of large reservoirs under construction on the Missouri River above Sioux City. The effectiveness of this project is illustrated by its performance during the spring of 1952 when the greatest flood of record on the Missouri, which was in excess of the design flood for the project, threatened to overtop or breach the levee. With only one upstream dam exercising flow reduction, the levee passed the test after a successful flood fight was waged and won, resulting in a damage prevention at Council Bluffs of about $36,000,000.

The project was constructed at a total cost of $2,703,480, of which $145,800 was expended by local interests. With the advancing state of flood control capability added by the reservoir system of the Missouri, the project today provides protection against floods having an extremely rare chance of occurrence. Flood damages in excess of $90,070,000 have been prevented by the project. The project is operated and maintained by local interests.

MISSOURI RIVER LEVEE SYSTEM,
SIOUX CITY, IOWA, TO THE MOUTH
Project Underway, Flood Control -
Local Protection
(Omaha and Kansas City Districts)

Nearly 1,500 miles of levees along both banks of the Missouri River from Sioux City to the mouth was authorized by the Flood Control Act of 1944. These levees were designed to operate in conjunction with the six-reservoir system, on the upper Missouri River and with tributary reservoirs located in the lower part of the Missouri River Basin. Many of these reservoirs have been completed and others are in a construction status.

The levees which make up the Missouri River Levee System are constructed of semi-compacted earthfill. The average height of the levees is 14 feet and the top width is 10 feet. Drainage structures through the levees are provided to minimize ponding water on the protected land.

Of the 150 units originally contemplated in the system, 20 of the units were to be constructed in the State of Iowa. Of these Iowa units, five have been completed, two are in the planning stage, and the remainder (all upstream from Council Bluffs) are in an "inactive" status. As the result of an economic reevaluation, the inactive units were found to be economically infeasible in light of the effective control of river stages by the main stem dams in the upper Missouri River.

Two of the completed units (L-624-627) are an integral part of the Council Bluffs Levee Project. A third unit (L-575) extends south from Thurman, Iowa, to the Missouri state line. Unit L-594 extends north from Thurman to Bartlett, and the fifth unit (L-601) continues northward from Bartlett to the town of Pacific Junction.

Unit L-614, previously classified as "deferred," has been reclassified "active" and combined with Unit L-611. Planning for Unit L-611-614 is in progress. The project will extend from the vicinity of Pacific Junction north to the southeastern

edge of Council Bluffs. It will consist of 18 miles of levee and underseepage berms along the Missouri River and about 9 miles of tieback levee along Pony Creek, plus necessary drainage structures to facilitate and improve interior drainage. Construction of these units will complete the authorized left-bank levee protection between Council Bluffs and the Missouri state line. It is anticipated that initial construction may begin in Fiscal Year 1979.

The five completed levee units in Iowa, have a combined length of 71.4 miles, protect more than 80,000 acres and have prevented flood damages estimated at over $148,146,000 through December 1977.

COMPREHENSIVE PLAN,
MISSOURI RIVER BASIN
Project Underway, Flood Control - Reservoirs
(Missouri River Division)

The 1944 Flood Control Act gave birth to the Nation's first attempt at solving its water resource problems through a comprehensive approach to river basin development. The legislation, which has come to be known as the Pick-Sloan Plan, was based upon separate proposals recommended by the Corps of Engineers and the Bureau of Reclamation.

Designed primarily to provide four basic benefits — flood control, irrigation, generation of hydroelectric power, and improvement of navigation on the lower Missouri River — the measure has since incorporated benefits to improve municipal and industrial water supplies, land treatment and enhancement, water quality control, conservation of fish and wildlife, and public recreation.

The plan originally provided for building some 103 dams and reservoirs to provide storage capacity of approximately 110,000,000 acre-feet for multiple-purpose use; local levees and floodwalls to protect municipal, industrial, and agricultural areas; and a system of levees on both sides of the Missouri River between Sioux City, Iowa, and the mouth to protect hundreds of thousands of acres of bottom lands against flooding. Planned uses of stored water included the irrigation of some 4 million acres of land and the generation, ultimately, of 13 billion kilowatt-hours of hydroelectric power annually for industrial and municipal expansion, pumping of irrigation water, and other domestic uses. In addition, the regulation of riverflows provided by planned reservoirs is essential to navigation on the Missouri River.

New projects have been and are being authorized by Congress as their need becomes apparent, and are added to the overall development. In the project formulation stages the Corps of Engineers actively cooperates with local, state, and other Federal interests to determine the best solutions for flood problems and related water resources needs.

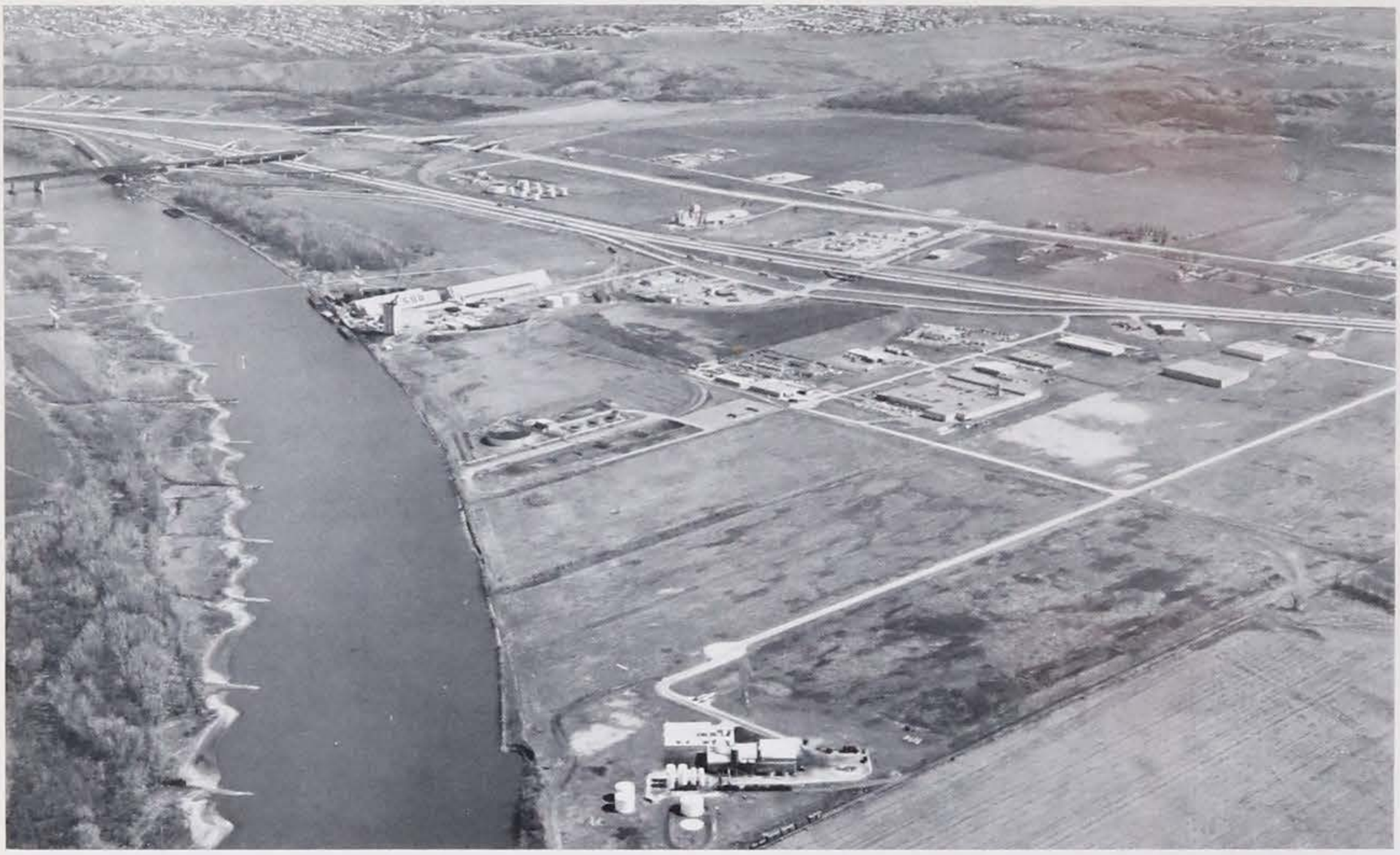
By the end of 1977 the Corps of Engineers and the Bureau of Reclamation had placed 93 reservoir projects in operation in the Missouri River Basin. These reservoirs have a combined storage capacity of about 100 million acre-feet. Construction of 12 additional reservoir projects is underway, which will provide further storage capacity of about 8 million acre-feet. The Corps of Engineers has completed 66 local protection projects in the Missouri River Basin, and has 11 others under construction. The latter figure includes the Missouri River Levee System as a single project.

An outstanding feature of the program is the control of the upper Missouri River, effected principally by a system of six reservoirs on the main stem to regulate the runoff from the entire upper half of the basin. These reservoirs were formed by the construction of Fort Peck Dam in Montana, Garrison Dam in North Dakota, Oahe, Big Bend, and Fort Randall Dams in South Dakota, and Gavins Point Dam in Nebraska and South Dakota. The system has a combined capacity of 75 million acre-feet, of which more than 16 million acre-feet is for flood control.

As these six reservoirs comprise the backbone of the basin's water storage system for multiple-purpose services, a sound plan for their operation is essential. This is accomplished through the Reservoir Control Center at the Corps Division Office in Omaha. Guided by the recommendations of a special coordinating committee of state and Federal agency representatives, an annual operating plan is developed by the Center to guide the operation of the reservoirs through each ensuing year.

Completed and partially completed flood control projects in the Missouri River Basin have prevented nearly 4 billion dollars in flood damages through calendar year 1977. The six main stem reservoirs generated 9.1 billion kilowatt-hours during calendar year 1977. Total power generation by all of the hydropower projects in the upper Missouri Basin system amounted to 9.9 billion kilowatt-hours during the same period.

Over 10.6 million recreation days of use were generated by visitors in 1977 at the six main stem projects, whereas over 28 million recreation days were generated by projects within the Missouri River Division.



Industrial Interchange, Missouri River at Sioux City.

Operation of the six main stem reservoirs during calendar year 1977 made possible the movement of approximately 3.3 million tons of commerce on the Missouri River in the reach from Sioux City to the mouth.

The Missouri River main stem reservoir system was filled to normal operating levels for the first time in 1967. Since that time, inflows into the reservoir system have averaged above normal during 8 of the 11 years, thereby assuring continued excellent service to all functions. However, in 1977 the runoff from the total basin above the lowermost project, Gavins Point, was only two-thirds of normal and it was necessary to withdraw about 7 million acre-feet from the 40 million acre-foot carryover storage zone to provide full service flows for navigation and power.

MISSOURI RIVER STABILIZATION AND NAVIGATION PROJECT
Project Underway - Commercial Navigation
(Omaha and Kansas City Districts)

The unimproved Missouri River was a wild unpredictable stream, many channeled and meandering, virtually useless for commercial navigation and a constant threat to any improvements along its banks. The stabilization and navigation project is designed to stop bank erosion and meandering and to provide for the low-cost transportation necessary for full economic development of the region served.

The existing project, as modified by Congress in the River and Harbor Act of 1945, provides for a 9-foot channel, 300 feet wide, from the mouth of the river to Sioux City, a distance of 735 miles, of which about 182 miles is along the western boundary of Iowa. Both distances reflect an adjustment of river mileages made in 1960.

The project is of the open-river regulation type, with no dams or barriers to form slack-water pools. Instead the tremendous energy of the flowing river is put to work to continually maintain its own channel in an alignment fixed by means of dikes and revetment to favor the movement of barges and tows. With the riverbanks permanently secured in the desired alignment, the scouring action of the flowing water, on the riverbed rather than on the banks, is expected to maintain the desired channel depth and width.

Work completed through September 1977 had a total Federal cost of about $410 million.

In 1953, two privately owned common carriers started regularly scheduled operations on the river as far upstream as Omaha. These opera-

tions have been supplemented in recent years by several contract carriers. Commercial tonnages have increased from a mere 152,000 tons in 1953 to a high of nearly 3.3 million tons in 1977. The main commodities being shipped are grain, steel products, petroleum products, coke, chemicals, fertilizer, minerals, molasses, building materials, machinery, and vegetable and animal products.

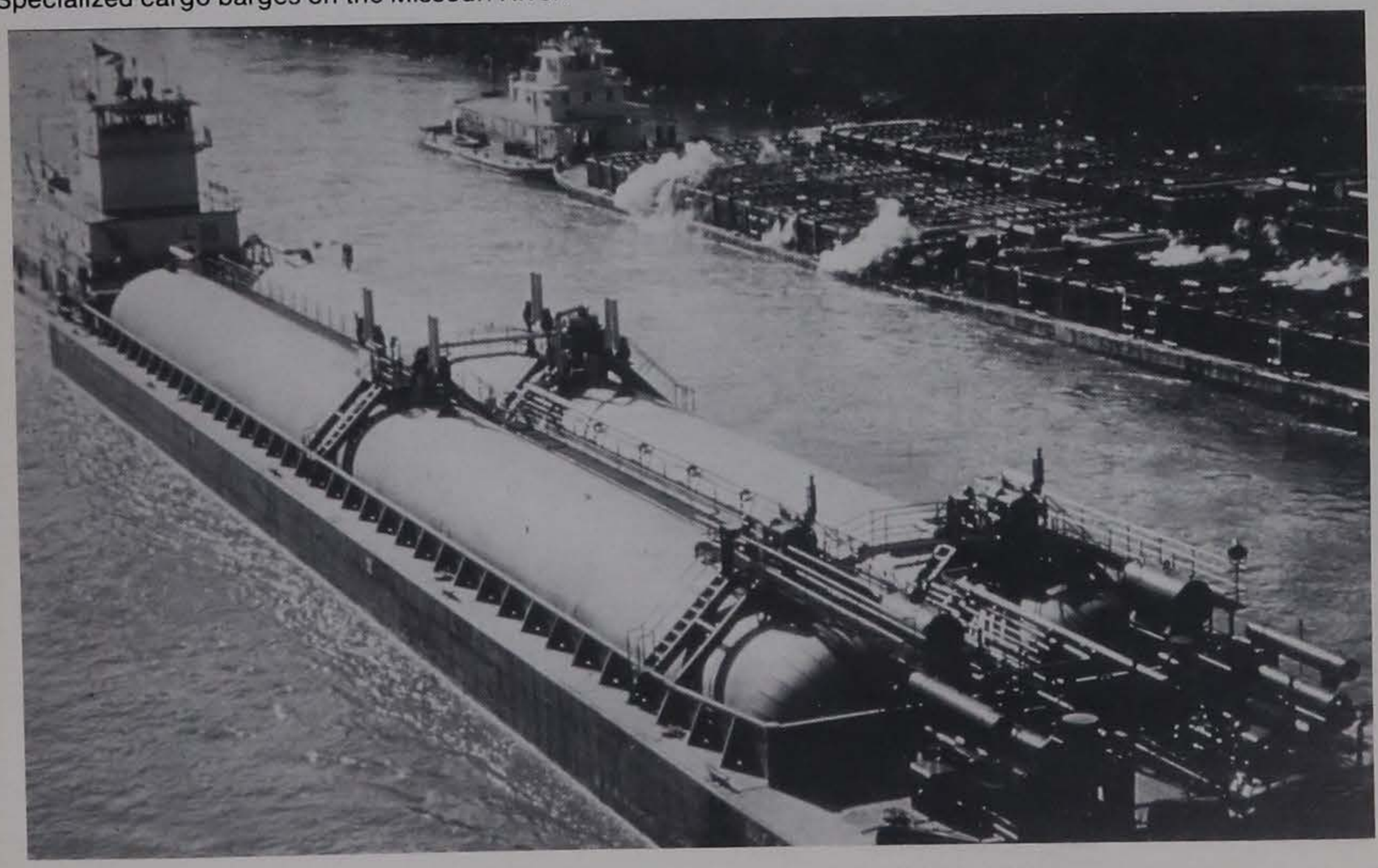
Although navigation on the Missouri River is still in its infancy as compared with other inland waterways, there is a substantial potential tonnage available. A survey of nearly 1,500 industrial plants, milling interests, grain companies, steel firms, and other manufacturers was made in 1950, and on the basis of these contacts, it was estimated that potential commerce of approximately 5,000,000 tons annually could be expected to develop for shipment on the Missouri River. Representatives of some of the firms operating barges on the river believe the potential tonnage now greatly exceeds that figure.

The stabilization works perform additional important functions as part of the comprehensive program for the Missouri River Basin. The completed works will prevent the annual destruction by erosion of more than 9,000 acres of farmland and will open up an additional 188,000 acres of new land to agriculture. Permanently secured riverbanks are necessary before the authorized levee system along the Missouri River below Sioux City can be constructed. The levees are a vital part of the flood control program for the main river.

Although no recreational facilities were included in the initial project authorization, Section 207 of the 1962 Flood Control Act provided authority under which plans were initiated in 1965 for development of public use recreational sites along both banks of the Missouri River from Sioux City to the mouth. A total of more than 60 recreational areas are envisioned for the entire length of the river. By January 1978, 22 sites had been completed. The overall plan calls for development of 8 recreational areas in Iowa, and 4 of these are now complete. The construction of these recreational facilities requires cost-sharing and other participation by non-Federal local interests.

Also under the authority of Section 207, planning is well advanced for the development of the recreational potential of oxbow lakes at various locations along the Missouri River between Sioux City and Omaha. Some of the oxbows, or cutoffs, which resulted from the elimination of sharp curves and bends as a part of stabilizing the Missouri River channel represent excellent potential as recreational lakes. Sites selected for possible development are identified as the

Specialized cargo barges on the Missouri River.



Blackbird-Tieville-Decatur Complex, the Snyder-Winnebago Complex, and Glovers Point Bend. When completed, these lakes will provide a total water surface area of more than 4,000 acres and will attract an estimated 600,000 persons annually. The development will be accomplished through joint planning and cost-sharing by non-Federal interests.

The provisions of the Fish and Wildlife Coordination Act were determined to apply to the Missouri River project because it was less than 60 percent complete in 1958. A mitigation study has been initiated by the Omaha and Kansas City Districts under the active lead of Missouri River Division. The main thrust is to develop some kind of Fish and Wildlife Mitigation Plan that is reasonable and supportable. Congressional authorization will be required. A Plan of Study has been prepared to guide the study. The study is scheduled for completion in July 1979 at a cost of $100,000. Work has been started by both districts.

SIOUX CITY MARINA, MISSOURI RIVER
Completed Project -
Recreational Navigation
(Omaha District)

Under the authority of the Missouri River Stabilization and Navigation Project, a small-boat harbor in the vicinity of Sioux City was authorized by the Chief of Engineers in 1966. The project consists of a breakwater, a short entrance channel, and a maneuvering channel 600 feet long and 100 feet wide with a minimum operating depth of 5 feet. Berthing facilities are available for 450 small boats. Construction of this project was initiated in 1968, and it was completed in 1969. Cost of the project was approximately $87,200, including $43,600 in non-Federal funds.

DE SOTO BEND, IOWA AND NEBRASKA
Completed Project -
Recreational Navigation
(Omaha District)

In connection with the Navigation and Bank Stabilization Project on the Missouri River, which is currently under construction, the Eighty-fifth Congress authorized the Corps of Engineers to make a cutoff of the river at De Soto Bend near Blair, Nebraska.

The primary development in the area is a wildlife refuge along the Central Flyway. However, the refuge area, when not in use for migratory waterfowl, is opened to the public for fishing, hunting, boating, swimming, and related activities.

The Corps completed the cutoff and other pertinent control structures necessary for establishing the oxbow lake in the fall of 1960. The U.S. Fish and Wildlife Service has developed the recreational and refuge features of the project and is planning expansion of recreational facilities. More than 375,000 people took part in some form of recreational activity at De Soto Bend during 1977.

Middle Missouri River Basin

MIDDLE MISSOURI RIVER BASIN

Middle Missouri River Basin

The Missouri River Region, biggest of the nation's 18 major regions, embraces 513,000 square miles within the United States, 328 million acres within all or part of 10 states. Because it is too big and varied to be treated as a single unit, the Missouri River Region has been divided into eight basins identified as the Upper Missouri, the Yellowstone, the Western Dakota, the Eastern Dakota, the Platte-Niobrara, the Middle Missouri, the Kansas River, and the Lower Missouri. Three of these basins, the Middle Missouri, the Eastern Dakota, and the Lower Missouri, include portions of Iowa. As shown on the map of the Middle Missouri, the Eastern Dakota Basin includes only a small portion of Iowa and is not commented on separately in this booklet.

The Middle Missouri is the smallest of the basins; it encompasses an area of 24,600 square miles, the bulk of which lies in extreme western Iowa. Seventy-six percent of the land is under cultivation, but soil erosion is a major problem. Several large and growing urban centers, Sioux City, Omaha, Council Bluffs, Atchison, Leavenworth, and St. Joseph, find ample water in the Missouri River for their needs. In the past, before the era of the comprehensive Pick-Sloan plan for water resources development, these cities were subject to the onslaught of uncontrolled floods on the Missouri and its tributaries. Today, dams, floodwalls, levees, and other projects built by the Corps of Engineers protect these centers of population against the tragedy of destructive floods. The rich agricultural bottom lands that border the Missouri also benefit from the system of levees which stretch from Council Bluffs south to the Iowa-Missouri state line and beyond.

FLOYD RIVER AT SIOUX CITY
Completed Project, Flood Control -
Local Protection
(Omaha District)

This project, authorized by the Flood Control Act of 1958, is designed to protect highly developed commercial, industrial, and residential areas located in the Floyd River flood plain in Sioux City. The Floyd River at Sioux City had a history of severe floods that culminated in the disastrous 1953 flood which caused more than $23,000,000 in damage and the loss of 14 lives. Construction was started in 1961 and completed in 1966. The project consists of channel straightening and enlargement, earth levees, and extensive construction or modification of a number of street and railroad bridges, and utilities.

Cost of the project was $18,356,700, including $6,800,000 borne by local interests. Damage prevented by this project since its completion is estimated to be $8,500,000. Local interests operate and maintain the project.

LITTLE SIOUX RIVER BASIN
Completed Project, Flood Control -
Local Protection
(Omaha District)

This project was authorized by the 1954 Flood Control Act. It is designed to protect about 188,000 acres of highly productive farmland and several small communities located along the Little Sioux River from its mouth to the town of Smithland. The project consists of approximately 62 miles of channel improvement and enlargement, and 138 miles of levee.

Construction was started in 1956 and completed in 1966. Since 1959, when it became partially operational, the project has prevented flood damage estimated at more than $19,580,000. Cost of the project was $18,483,000, including $3,000,000 non-Federal cost. Local interests operate and maintain the project.

MAPLE RIVER AND ODEBOLT CREEK,
IDA GROVE
Completed Project, Flood Control -
Local Protection
(Omaha District)

A portion of the town of Ida Grove, containing municipal, commercial, and residential developments, is subject to recurring flood damage from the overflows of both the Maple River and Odebolt Creek.

The authorized plan for alleviation of the flood problem at Ida Grove consists of channel improvement and realignment and levees along both Maple River and Odebolt Creek.

Construction of the project was started in 1968 and completed in 1970. Project costs were $541,300, including $19,000 non-Federal cost. The project has prevented more than $90,000 in flood damage. Local interests operate and maintain the project.

NISHNABOTNA RIVER AT HAMBURG
Completed Project, Flood Control -
Local Protection
(Omaha District)

This project, completed in 1947, provides a high degree of flood protection for the town of Hamburg. It consists essentially of 1,800 feet of channel straightening and about 2 miles of levee along the Nishnabotna River. The project joins Missouri River Levee System Unit L-575 south of Hamburg, and as such is an integral part of the Missouri River Levee System Project.

During extremely severe flooding in 1972, the project prevented an estimated $3,500,000 in damage. Again, during the spring flood of 1973, the project prevented an additional $250,000 in damage. Since its completion, the project is credited with preventing in excess of $9,380,000 in flood damage.

Cost of the project was $262,000, of which $26,000 was assumed by local interests. Local interests operate and maintain the project.

NISHNABOTNA RIVER AT RED OAK
Completed Project, Flood Control -
Local Protection
(Omaha District)

A local protection project, consisting of a levee and appurtenant works on the left bank of the East Nishnabotna River, was completed in 1962. The city of Red Oak is now assured protection against such disastrous floods as occurred in 1947 and 1958 with losses from those floods of over $1,000,000. The project, designed to contain floods about 1½ times greater than the maximum historical flood, will also minimize the threat to lives of the residents. Past floods have resulted in several drownings in the Nishnabotna River.

In 1972, the project was credited with preventing an estimated $2,400,000 in flood damage. Total damage prevented is estimated at $2,775,000. Cost of the project was $443,000, including $43,000 in non-Federal cost. Local interests operate and maintain the project.

DRY CREEK AT HAWARDEN
Completed Project, Section 205 -
Flood Control
(Omaha District)

Construction of a leveed diversion channel to divert floodflows on Dry Creek south of the town of Hawarden was started in 1962 and completed in 1963 under the provisions of Section 205 of the 1948 Flood Control Act.

The project protects the main business district and a large residential area of Hawarden.

Cost of the project was $500,134, including $100,135 in non-Federal funds. Through June 1976, the project has prevented an estimated $40,000 in flood damage. Local interests operate and maintain the project.

BIG SIOUX RIVER AT SIOUX CITY, IOWA,
AND NORTH SIOUX CITY, SOUTH DAKOTA
Project Underway, Flood Control -
Local Protection
(Omaha District)

The Flood Control Act of 1968 authorized a project for improving the Big Sioux River channel from its mouth near Sioux City, Iowa to a point 5.5 miles upstream. Post-authorization reformulation studies developed a plan of improvement which deviated somewhat from the plan as originally authorized. Improvements will consist of channel enlargement, bank stabilization, and levees to protect some 1,600 acres from a Standard Project Flood event. A channel relocation at the mouth of the Big Sioux River was dropped from the plan for economic reasons. The estimated Federal cost as of 1 October 1977 is $6,650,000; non-Federal costs are estimated to be $390,000. Project construction was initiated in the spring of 1977 and is scheduled for completion by fall of 1979.

EMERGENCY BANK PROTECTION -
MIDDLE MISSOURI RIVER BASIN
Project Underway, Flood Control -
Local Protection
(Omaha District)

An emergency bank protection project has been approved to provide protection to the abutments of Bridge VA-21 on County Road G-30 over the West Nishnabotna River, 4 miles west of the town of Hancock.

LOWER BIG SIOUX RIVER AND TRIBUTARIES,
IOWA AND SOUTH DAKOTA
Authorized Project Not Underway,
Flood Control - Local Protection
(Omaha District)

The Flood Control Act of 1965 authorized a project for improving the lower Big Sioux River channel from its mouth near Sioux City to a point approximately 2 miles north of Akron, Iowa. Improvements would consist of channel cutoffs and cleaning, deepening, and enlarging the existing channel where necessary.

The lower 5.5 miles of this project were

deauthorized by the Flood Control Act of 1968. The improvements for this reach of the river are contained in the project for the Big Sioux River at Sioux City, Iowa, and North Sioux City, South Dakota, described elsewhere in this booklet.

The remainder of the project was recommended for deauthorization in 1975, but the project was removed from the listing of projects eligible for deauthorization by Congressional Resolution.

DAVIDS CREEK DAM AND LAKE
Authorized Project Not Underway,
Flood Control - Reservoir
(Omaha District)

The Davids Creek Dam and Lake is a unit in the flood control and water resources development plan for the Nishnabotna River Basin. The plan for the Davids Creek project was approved in the Flood Control Act of 1968. The dam would be located on Davids Creek, a left bank tributary of the East Nishnabotna River, about one-half mile upstream from the town of Exira.

The rolled earth dam would be 1,800 feet long, would rise to a height of 62 feet above the creek bed, and would control the runoff from a drainage area of more than 60 square miles. The lake would have a storage capacity of 60,000 acre-feet at maximum pool level, of which 21,100 acre-feet would be allocated to flood control storage.

The project is inactive because of lack of local support.

INDIAN CREEK WATERSHED
Authorized Project Not Underway
Flood Control - Reservoir
(Omaha District)

This project was authorized by the 1962 Flood Control Act as an element of a comprehensive plan of improvement developed jointly by the Soil Conservation Service and the Corps of Engineers. The comprehensive plan envisioned the installation of an upper watershed erosion control program and a major dam and reservoir on Indian Creek located at the north city limits of Council Bluffs. The erosion measures were to be installed under the direction of the Soil Conservation Service, while the dam and reservoir were to be constructed by the Corps. The purpose of the project was to stabilize the upper watershed area and prevent downstream accumulation of sediment and to control potentially disastrous flooding in Council Bluffs.

The dam and reservoir were deauthorized due to the lack of local support. The water and related land resources problems of the Indian Creek Basin were investigated, however, under the Omaha, Nebraska - Council Bluffs, Iowa, urban study described elsewhere in this booklet.

PERRY CREEK, SIOUX CITY
Study Underway, Flood Control - Reservoir
(Omaha District)

This study was completed in 1970. It recommended a multipurpose dam on Perry Creek and 3 smaller multipurpose dams on tributary streams. The report has been returned for further consideration as part of the Metropolitan Sioux City Study.

UPPER BIG SIOUX RIVER AND
EASTERN SOUTH DAKOTA WATER SUPPLY
Study Underway, Flood Control - Reservoir
(Omaha District)

This study is to determine the advisability of multipurpose reservoir storage on the Big Sioux River and tributaries above the Rock River and including the Rock River Basin, and to determine the advisability of constructing a pipeline from the Missouri River to Sioux Falls, South Dakota, to provide water supply for Sioux Falls and intervening areas.

The study was initiated in Fiscal Year 1976.

METROPOLITAN SIOUX CITY
Study Underway, Flood Control -
Local Protection
(Omaha District)

This study was authorized by resolution of the House Public Works Committee on 10 April 1974. The study will consider the following needs: water quality; wastewater management to address the goals of Public Law 92-500; alternative flood control and flood plain management plans; water supply; outdoor recreation and fish and wildlife resources management; and the development of a land and water resources management plan for areas bordering the Missouri River from Gavins Point Dam to the confluence of the Little Sioux and Missouri Rivers. The study will include reformulation of a plan for flood control and recreation on Perry Creek in the Sioux City area. The study was initiated in Fiscal Year 1977 and is scheduled for completion in Fiscal Year 1980.

LAKE MANAWA
Study Underway - Recreation
(Omaha District)

The purpose of this study is to determine the feasibility of dredging lake Manawa, south of Council Bluffs, to improve recreational opportunities in the Council Bluffs area. The study will be completed in Fiscal Year 1979.

Lower Missouri River Basin

LOWER MISSOURI RIVER BASIN

Lower Missouri River Basin

This area is located in south-central Iowa and includes the upper portion of several rivers, the Nodaway, Platte, Grand, Thompson, Weldon, Locust, and Chariton Rivers. The major project in this basin is Rathbun Lake on the upper part of the Chariton River. A second project, Mercer Lake, has been authorized by Congress, but has been placed in the inactive status because it is not economically feasible.

RATHBUN LAKE ON THE CHARITON RIVER
Completed Project, Flood Control - Reservoir
(Kansas City District)

The Rathbun Lake project is located on the Chariton River, 7 miles north of Centerville, Iowa, and 1 mile north of Rathbun, Iowa. The project was authorized in 1954.

The Chariton River Basin, encompassing 2,309 square miles of which 925 are in Iowa and 1,384 are in Missouri, is subject to violent rainstorms and severe floods. The maximum flood of record at Centerville was in March 1960, when overflows were extensive from the headwaters to the mouth.

At its location on the Chariton River, the Rathbun Dam controls runoff from a drainage area of 549 square miles in the Iowa portion of the basin. An earth dam about 2 miles long, rising 86 feet above the valley floor, is backed by a lake with a gross capacity of 552,000 acre-feet, of which 189,000 acre-feet is for water conservation uses and 24,000 acre-feet is for sedimentation reserve. At full pool level the water would temporarily cover about 21,000 acres. The multipurpose pool has a surface area of about 11,000 acres and is the largest body of water in the State of Iowa.

Eight public-use areas have been developed to provide for recreation use of Rathbun Lake. One area has been licensed to the Iowa State Conservation Commission for development and operation as a state park. The facilities developed in the public-use areas provide for boat launching, swimming, fishing, picnicking, and camping. In addition to the developed public-use areas, 13,729 acres of land and water in the upper reaches of the lake are managed by the Iowa State Conservation Commission for further propagation and hunting of upland game and waterfowl through the provision of additional planned habitat.

The Commission also licensed an additional 375 acres below the dam for the Rathbun Fish Hatchery which was completed in 1977 and is now in operation. The Corps of Engineers was directed by Congress in Section 102 of the Water Resources Development Act of 1974 to make a payment of $700,000 to the Commission toward the cost of the hatchery which cost a total of $4,300,000.

Public visitation at Rathbun Lake totaled 1,482,000 in 1977.

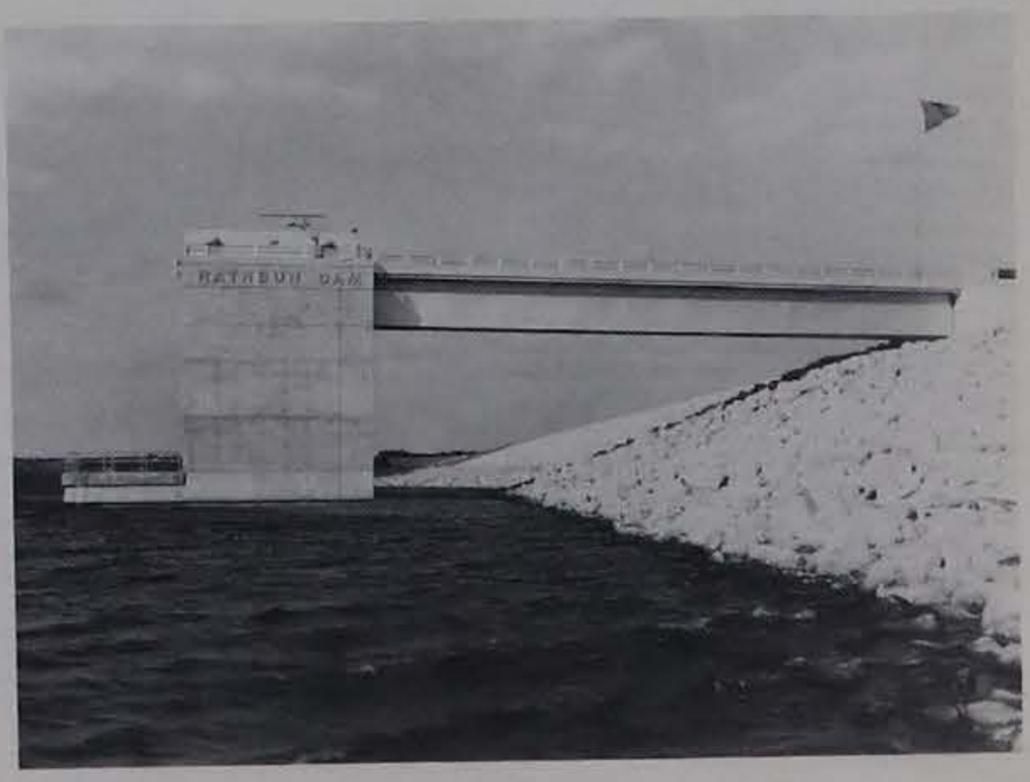
Surplus water from the lake discharged through the dam is now being sold to the Rathbun Regional Water Association, Inc., under provisions of Section 6 of the Flood Control Act of 1944. The Water Association now serves a five-county Rathbun area in southern Iowa.

Rathbun Lake provides flood control benefits to 148,000 acres of land in the Chariton River Basin. Operation of Rathbun Lake contemplates the maintenance of a minimum flow of at least 11 cubic feet per second, plus 13 cubic feet per second through the fish hatchery.

Construction of the Rathbun Lake project was begun in 1964, and filling of the multipurpose pool was begun in 1969. The President of the United States formally dedicated Rathbun Lake on 31 July 1971.

In accordance with Executive Order 11593, "Preservation and Enhancement of the Cultural Environment," a Preliminary Cultural Resources Management Plan is being prepared for Rathbun Lake, funded under Public Law 93-291, "Archeological and Historic Data Preservation

Rathbun Dam Control Tower.



Act of 1974." Additional testing of an archaic (about 8000-5000 B.C.) archeological site at the base of the dam was undertaken in the spring of 1978 by archeologists from Luther College, Iowa, through the Iowa State Historical Department.

Federal cost of the Rathbun Lake project was $27,028,000. Through 1977 flood damage prevented by the project has totaled $8,703,000. The project is operated and maintained by the Corps of Engineers.

EAST FORK HUNDRED AND
TWO RIVER AT BEDFORD
Completed Project, Flood Control -
Local Protection
(Kansas City District)

Bedford, the county seat of Taylor County, is located about 8 miles north of the Missouri-Iowa state line on the East Fork Hundred and Two River, a tributary of the Platte River. Low-lying portions of the city, containing municipal, commercial, and residential development, are subject to flooding from East Fork overflow.

The plan for alleviation of flood damage consisted of channel enlargement and straightening in the vicinity of Bedford and removal of part of a quarry dump which constricted the overflow area on the left bank.

Initial project construction began in 1966 and was completed the following year at a Federal cost of $465,000 and non-Federal cost of $29,500. In 1973, a channel rehabilitation contract was completed. Cost of this rehabilitation was $124,000. During 1974, channel work was constructed under emergency authority to protect the water treatment plant, the sewer treatment plant, and a highway bridge at a cost of $126,000. The city of Bedford operates and maintains the project.

MERCER LAKE
Authorized Project Not Underway
Flood Control - Reservoir
(Kansas City District)

The Mercer Lake, a unit in the flood control and water resource development plan for the Grand River Basin, was authorized for construction by the Flood Control Act of 1965. The dam would be located on the Weldon River six miles south of Princeton, Missouri, and three miles southwest of Mercer, Missouri, in Mercer County, with reservoir arms extending into Decatur and Wayne Counties, Iowa.

The earthfill dam would be 6,700 feet long, would rise to a height of 91 feet above the valley floor, and would control the runoff from a drainage area of 427 square miles. The lake would have a gross capacity of 625,700 acre-feet, of which 326,000 acre-feet are allocated to flood control storage and 299,700 acre-feet for multipurpose uses and sedimentation. At full flood control pool, the lake would cover 19,800 acres in Missouri and Iowa. The multipurpose pool would have a surface area of 12,600 acres in the two states.

A reanalysis of the Grand River Basin projects including Mercer Lake was initiated in the fall of 1973 because of changed economic conditions in the basin. The results of the reanalysis were included in the initial preconstruction planning report on the Grand River projects published in November 1975. The reanalysis indicated that Mercer Lake is not economically feasible at this time and the project has been placed in the inactive status.

GRAND RIVER, MISSOURI AND IOWA
Completed Study, Flood Control - Reservoir
(Kansas City District)

A reanalysis of the Grand River Basin was completed in 1975. The reanalysis included five authorized lake projects: Pattonsburg, Brookfield, Trenton, Braymer, Mercer; three authorized local protection projects — East Muddy Creek project and the Upper and Lower Grand River levee systems; two lakes previously recommended for authorization — Linneus and St. Catherine; and the previously recommended Honey and No Creek channel project. The Pattonsburg Lake project was reviewed with and without the inclusion of hydropower facilities.

The reanalysis indicated that none of the projects reviewed were economically feasible with the possible exception of one levee unit on the lower Grand River. Except for the lower Grand Levee, Missouri, the Grand River projects have been placed in the inactive status. The estimated Federal cost of the lower Grand River Levee, as of 1 October 1977, is $24,400,000; non-Federal cost is estimated at $590,000.

Flotilla of Sailboats at Anchor in Marina at Rathbun Lake.

Downstream face of Rathbun Dam.

GLOSSARY

Acre-foot: An area of one acre covered with water to a depth of one foot. One acre-foot is 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 where 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 which releases compressed air forming air bubbles that transports 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 which provide 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 as: river basin.
(2) A naturally or artificially enclosed harbor for small craft as: 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 which 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 floodwaters 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 occurring without the project and the damages with the project in place.

Deep-draft harbor: A harbor designed to ac ommodate commercial cargo vessels having drafts greater than about fifteen 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: (1) An artificial channel constructed around a town or other point of high potential flood damages to divert floodwater 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.

Earthfill dam: A dam the main section of which is composed principally of earth, gravel, sand, silt, and clay.

Environmental assessment (EA): A planning report which presents the first thorough examination of alternative plans that positively demonstrates 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 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 streamflow.

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.

1% Flood: This is the same as a 100-year flood and is a flood which has a 1% 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 which is subject to inundation during periods of high water that exceed normal bank-full 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: (1) 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 anchorages, gate machinery and sometimes culvert valves and culvert bulkheads are located.

Gravity drainage outlets: (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 which extends from the entrance to a lock, used to guide vessels safely into the lock.

Habitat: The total of the environmental conditions which affect the life of plants and animals.

Headwaters: (1) 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 which 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 ten 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 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 due to 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 which is 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, which is used for storage, regulation, and control of water for power, navigation, recreation, etc.

Retarding dam: A dam used to reduce the floodflow 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 which 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.

River tow: An assemblage of one or more barges propelled by a towboat in a riverine waterway.

Rock dike: An embankment built principally of rock.

Sandbag closure: A temporary closure structure consisting of sandbags. This closure may be found where a levee or floodwall has a sudden break in grade such as in a street crossing. Sandbags are used to close the street in times of high water to prevent flooding.

Sedimentation basin: A basin or tank in which water or wastewater containing settleable solids is retained to remove (by gravity) a part of the suspended matter.

Sediment load: The total sediment composed of suspended load and bed load transported by a stream. The suspended load is composed of fine sediment transported in suspension while bed load is composed of relatively coarse material transported along or near the bottom.

Self-liquidating facilities: Facilities provided by local interests at a project site in addition to facilities which are part of the federally cost-shared project features. These facilities are considered to be self-liquidating in that they can be paid for through user fees charged the public. These facilities might include such things as a public wharf, mooring facilities, parking areas, etc.

Shoal area: Patches of sand, gravel, or other hard bottom lying at shallow depths.

Sill: (1) A horizontal beam forming the bottom of an entrance to a lock.

(2) Also, a low, submerged damlike structure built to control riverbed scour and current speeds.

Slack-water area: (1) In tidal waters, the area where tidal current velocity is at a minimum; especially the moment when a reversing current changes direction and its velocity is zero.

(2) In streams, a place where there is very little current.

Slough: (1) A small muddy marshland or tidal waterway, which usually connects other tidal areas.

(2) A tide land or bottom land creek. A side channel or inlet, as from a river or bayou, that may be connected at both ends to a parent body of water.

Spending beach: A beach inside a harbor, designed to reduce wave action by absorbing wave energy.

Spillway: A waterway or a dam or other hydraulic structure used to discharge excess water to avoid overtopping of a dam.

Spoil material: (See "Dredged material")

Squat: The vertical downward displacement of a craft under power with respect to its position in the water when not underway.

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.

Thermal discharge: The 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 which 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.

Tainter gate: A semi-circular gate which opens and closes through pivoting on a shaft and is used to control the flow of water over spillways.

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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MINNESOTA

SOUTH DAKOTA

NEBRASKA

IOWA

MISSOURI

ESTHERVILLE

ST. PAUL DISTRICT

ROCK ISLAND DISTRICT

East Fork Des Moines River

Rock River

BIG SIOUX RIVER

HAWARDEN

DRY CREEK

AKRON

LOWER BIG SIOUX RIVER

Perry Creek

Floyd River

SIOUX CITY MARINA

SIOUX CITY

West Fork Wolf Creek

Little Sioux River

FLOYD RIVER AT SIOUX CITY

BIG SIOUX RIVER AT SIOUX CITY AND NORTH SIOUX CITY

Snyder Bend

Maple River

IDA GROVE

MISSOURI RIVER

Decatur Bend

LITTLE SIOUX R.

Soldier River

Boyer River

MISSOURI RIVER LEVEE SYSTEM

De Soto Bend

OMAHA

Indian Creek

Silver Creek

Nishnabotna River

COUNCIL BLUFFS

COUNCIL BLUFFS 624-627 L

West Nishnabotna River

EMERSON

Walnut Creek

East Nishnabotna River

601 L

Plum Creek

594 L

575 L

HAMBURG

RED OAK

COMPREHENSIVE PLAN MISSOURI RIVER BASIN

MISSOURI RIVER STAB. AND NAV. PROJECT (9-FOOT CHANNEL)

OMAHA DISTRICT

KANSAS CITY DISTRICT

ROCK ISLAND DISTRICT

NORTH MISSOURI

OMAHA DIVISION

CENTRAL DIVISION

FORT DODGE

WEBSTER CITY

Boone River

JEFFERSON

Raccoon River

BOONE

AMES

AMES L

SAYLORVILLE LAKE

SAYLORVILL

DES

DAVIDS CREEK LAKE

EXIRA

ADEL

VAN METER

DES MOINES

Middle River

South River

RED ROCK AND LAKE RED

Middle Nodaway River

East Nodaway River

Grand River

Thompson River

Weldon R.

MERC LA

BEDFORD

Platte River

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