

NEBRASKA NATURAL
RESOURCES COMMISSION



STATE WATER PLAN
PUBLICATION NO. 301-3

Status Summary
Volume 1
Potential Projects

THIRD REVISION
FEBRUARY 1977

STATE OF NEBRASKA

J. JAMES EXON, GOVERNOR

Nebraska Natural Resources Commission
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Reset April 4, 1977

PROGRAMS:

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STATE OF NEBRASKA

NATURAL RESOURCES COMMISSION

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January 19, 1977

The Honorable J. James Exon, Governor

and

Members of the Legislature

It is my privilege to submit on behalf of the Natural Resources Commission the third revision of Volume 1 of the Status Summary section of the State Water Plan. This volume has been revised to give current data on potential projects in response to Legislative Resolution 47 of the 1972 session, which directs that the publication be prepared and presented to the Legislature biennially.

This revised Volume 1 summarizes potential state, as well as federal, projects planned or being planned on January 1, 1977. Natural Resources District projects of the type presented in former volumes have been added to this edition. The project summaries include brief descriptions of the current status, project area, project features, and public interest in the project. This edition also includes information on the change of status of former potential projects summarized in the original volume and subsequent revisions to give some indication of progress in water resource development in the past eight years.

This publication is intended to provide those people who must make the decisions vital to Nebraska's future development a source of readily available information upon which they can base their decisions.

Very truly yours,

Jim Cook, Chairman

The State Water Advisory Team provided review and comments for this revision.

State Water Advisory Team

| | |
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Preparation and publication of this report was supported in part by grants from the Federal Water Resources Council under Title III of the 1965 Water Resources Planning Act.

NEBRASKA'S STATE WATER PLAN

Nebraska Revised Statutes § 2-1507 (7) (Supp. 1967) directs the Nebraska Natural Resources Commission to "plan, develop, and encourage the implementing of a comprehensive program of resource development, conservation and utilization for the soil and water resources of this state in cooperation with other local, state and federal agencies and organizations."

Legislative Resolution 5, of the 1967 Legislature, (Reaffirmed by L.R. #72 -- 1969 Session) specifically directed the Natural Resources Commission to "... prepare a comprehensive water and related land plan for the State of Nebraska, such framework plan to be completed no later than June 30, 1971, and to be known as the State Water Plan." In addition to an analysis and evaluation of the state's water and land resources, the Resolution directed that the State Water Plan include an examination of legal, social, and economic factors associated with resource development.

Nebraska's State Water Plan, as established by the Commission, consists of the following four sections:

Section 1. The Framework Study - The framework study is based on reconnaissance type investigations and makes use of presently available planning data in formulation of the framework plan. Basic objectives of the study were to assess the present quantity, distribution, quality, and use of Nebraska's water and land resources and to provide a broad, flexible guide to the best uses of these resources to meet current and future needs. The Report on the Framework Study was published in May 1971, and four appendices to the report have been published since that time.

Section 2. Basin Studies - This section will consist of studies of individual river basins. The studies will be made in the detail necessary to identify potential projects, estimate project costs and benefits, suggest the order of development, show the relationship of each project to the state's framework plan, and recommend local action to accelerate resource development.

Section 3. Status Summary - Significant water resource development projects planned by federal agencies and Natural Resources Districts for future development are described in the Status Summary, Volume I, Potential Projects. The present status of water resource development in the State will be summarized in Volume II of this section of the State Water Plan.

Section 4. Special Recommendations - This section consists of recommendations for action by the Legislature, Governor, and various units of government to improve the conservation, development, management, and utilization of Nebraska's land and water resources. The recommendations will be prepared as the need for action becomes apparent and are to include a thorough study of the legal, social, and economic aspects of major problems of resource development. Four special recommendations have been completed to date.

THE STATUS SUMMARY

The Status Summary, the third section of the State Water Plan, will consist of two volumes summarizing the status of water resource developments in Nebraska. Both will be revised periodically to keep them current.

Volume I provides a brief description of projects which are presently proposed for construction. Legislative Resolution 47 of the 1972 session directed that this summary be prepared biennially and presented to the Legislature each regular session of an odd-numbered year. This is the third revision of Volume I.

Volume II will deal with the existing water resource developments in Nebraska. This volume will include a summary of the physical development that has taken place or is under construction.

Purpose

The need for continued water and related land resource conservation and development in Nebraska is very evident. Floods, droughts, pollution, and erosion cost Nebraska millions of dollars annually. Water resources once considered limitless are becoming seriously depleted or polluted, while some development opportunities go untapped. The State Water Plan, as required by the Legislature, is continuously being developed and updated by the Commission to provide a guide for the wise and efficient use of our water and related land resources. A variety of projects has been proposed for construction and this volume is intended to provide the Governor, Legislature, and citizens of Nebraska with concise information regarding these potential water resource developments.

Scope

This volume of the Status Summary summarizes the federal projects currently being considered for development in Nebraska and projects planned by Natural Resources Districts. It includes all active projects for which a formal report of some type has been issued. Brief descriptions of the current status of the project, the project area, project features and effects, remaining problems and needs, and public interest are included in most entries. The information in this volume was compiled from the latest project reports available and from status reports or progress reports showing project status on January 1, 1977.

Acknowledgment

The Nebraska Natural Resources Commission wishes to thank all those who supplied data, participated in review, or otherwise provided assistance in the preparation of this report. To insure accuracy in this volume, the Corps of Engineers, the Bureau of Reclamation, the Soil Conservation Service, and the Natural Resources Districts reviewed and verified the data compiled from their reports.

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| Letter of Transmittal | i |
| Advisory Team | ii |
| Nebraska's State Water Plan | iii |
| The Status Summary | iv |
| Table of Contents | v |
| List of Maps | ix |
| Project Index | x |
| | <u>Page</u> |
| Chapter 1. White River-Hat Creek Basin | 2 |
| Potential Projects | 2 |
| Chapter 2. Niobrara River Basin | 5 |
| Status of Former Potential Projects | 5 |
| Niobrara Relocation | 5 |
| O'Neill Unit | 5 |
| Lavaca Flats Unit | 5 |
| Potential Projects | 5 |
| Mirage Flats Project - Supplemental Water | 5 |
| Projects in Planning | 6 |
| Boyd County Rural Water District #2 | 6 |
| Chapter 3. Missouri Tributaries River Basin | 10 |
| Status of Former Potential Projects | 10 |
| Papillion Creek Watershed | 10 |
| Aowa Creek Watershed | 10 |
| Papillion Creek and Tributaries | 10 |
| Tekamah-Mud Watershed | 10 |
| Mud Creek near Bellevue | 10 |
| Potential Projects | 10 |
| Projects in Planning | 10 |
| Pappio NRD Improvement Project Area #1 | 10 |
| Middle Missouri NRD Public Domestic Water Supply #1 | 11 |
| Crofton Unit | 11 |
| Chapter 4. North Platte River Basin | 12 |
| Status of Former Potential Projects | 12 |
| Winters Creek Watershed | 12 |
| Mitchell Irrigation District Rehabilitation | 12 |
| Creighton Valley Watershed | 12 |
| Ash-Plum Creek Watershed | 12 |
| Gering-Fort Laramie Irrigation District Rehabilitation | 12 |
| Potential Projects | 12 |
| Chapter 5. South Platte River Basin | 16 |
| Status of Former Potential Projects | 16 |
| Brule Watershed | 16 |
| Sedgwick-Sand Draws Watershed | 16 |
| Potential Projects | 16 |
| Projects in Planning | 16 |
| Oliver Dam Recreation | 16 |
| Ogallala Tributary #6 | 16 |
| North Platte Local Flood Protection | 17 |

| | <u>Page</u> |
|---|-------------|
| Chapter 6. Middle Platte River Basin | 18 |
| Status of Former Potential Projects | 18 |
| Spring Creek Watershed | 18 |
| Central Nebraska Public Power and Irrigation District | |
| E-65 Improvement | 18 |
| Fort Kearny Unit | 18 |
| Nebraska Mid-State Division | 18 |
| Potential Projects | 18 |
| Projects in Planning | 18 |
| Buffalo Creek Watershed | 18 |
| Silver Creek Watershed | 18 |
| North Dry Creek Drainage | 21 |
| Platte County Drainage | 21 |
| Nance County Drainage | 21 |
| Wood River-Prairie Creek | 22 |
| Chapter 7. Loup River Basin | 25 |
| Status of Former Potential Projects | 25 |
| Loup River at Columbus Local Flood Protection | 25 |
| North Loup Division | 25 |
| Mud Creek at Broken Bow Local Flood Protection | 25 |
| Beaver Creek at St. Edward Local Flood Protection | 25 |
| Potential Projects | 25 |
| Cedar Rapids Division | 25 |
| Chapter 8. Elkhorn River Basin | 31 |
| Status of Former Potential Projects | 31 |
| Corporation Gulch Watershed | 31 |
| Pender Local Flood Protection | 31 |
| Meadow Grove Local Flood Protection | 31 |
| Wakefield Local Flood Protection | 31 |
| Battle Creek Local Flood Protection | 31 |
| Giles Creek Local Flood Protection | 31 |
| King Lake Local Flood Protection | 31 |
| Logan Unit | 31 |
| Norfolk Unit | 31 |
| Highland Unit | 31 |
| Potential Projects | 31 |
| Projects in Planning | 31 |
| Maple Creek Watershed | 31 |
| Osmond Local Flood Protection | 32 |
| Dodge Local Flood Protection | 32 |
| Willow Creek Dam and Recreation Area | 32 |
| Scribner Local Flood Protection | 32 |
| Cuming County Rural Water District Phase 2 | 33 |
| Rawhide Creek | 33 |

| | <u>Page</u> |
|---|-------------|
| Chapter 9. Lower Platte River Basin | 35 |
| Status of Former Potential Projects | 35 |
| Platte River and Lost Creek, Schuyler Local Flood Protection | 35 |
| Clear Creek Watershed | 35 |
| Shell Creek and Tributaries | 35 |
| Linwood Unit | 35 |
| Potential Projects | 35 |
| Projects in Planning | 35 |
| Bone Creek Watershed | 35 |
| Lost Creek North of Columbus Local Flood Protection | 35 |
| Cass County Rural Water District #2 | 36 |
| Chapter 10. Republican River Basin | 39 |
| Status of Former Potential Projects | 39 |
| Medicine Creek (Upper and Lower) Watershed | 39 |
| Frenchman-Cambridge Division Supplemental Water Supply | 39 |
| Potential Projects | 39 |
| Blackwood Creek Watershed | 39 |
| Projects in Planning | 42 |
| Frenchman-Cambridge Irrigation District Rehabilitation and Betterment | 42 |
| H&RW and Frenchman Valley, Rehabilitation and Betterment | 42 |
| McCook Flood Control | 42 |
| Chapter 11. Little Blue River Basin | 44 |
| Potential Projects | 44 |
| Little Blue Unit | 44 |
| Projects in Planning | 48 |
| Little Blue Water Resources | 48 |
| Chapter 12. Big Blue River Basin | 50 |
| Status of Former Potential Projects | 50 |
| Clatonia Creek Watershed | 50 |
| Shestak Reservoir | 50 |
| Seward View Reservoir | 50 |
| Surprise Reservoir | 50 |
| Potential Projects | 50 |
| Sunbeam Unit | 50 |
| Walnut Creek | 55 |
| Projects in Planning | 58 |
| Swan Creek Watershed | 58 |
| Wolf-Wildcat Creek Watershed | 58 |
| Beatrice Local Flood Protection | 58 |
| Plum Creek Watershed | 58 |
| Chapter 13. Nemaha River Basin | 60 |
| Status of Former Potential Projects | 60 |
| Winnebago-Bean Creek Watershed | 60 |
| South Fork Watershed | 60 |
| Long Branch Watershed | 60 |

| | |
|--|-------------|
| Chapter 13. Nemaha River Basin (cont.) | <u>Page</u> |
| Little Nemaha River Levee | 60 |
| Potential Projects | 60 |
| Projects in Planning | 60 |
| Middle Big Nemaha Watershed | 60 |
| South Branch Little Nemaha Watershed | 60 |
| Upper Little Nemaha Watershed | 61 |
| Chapter 14. Other Studies of Potential Projects | 62 |
| Inter-State and Regional Studies | 62 |
| Beck Plan | 62 |
| NAWAPA | 62 |
| Western States Water Augmentation Concept | 62 |
| Platte River Waterfowl Habitat Preservation Study | 63 |
| Studies in Nebraska | 63 |
| Bureau of Reclamation | 63 |
| Upper Republican River Water Management Study | 63 |
| Corps of Engineers | 64 |
| Niobrara River Basin, Nebraska, Wyoming, and South Dakota Review Study | 64 |
| Nemaha and Little Nemaha River Basin, Nebraska and Kansas | 64 |
| Missouri River from Three Forks, Montana to Sioux City, Iowa | 64 |
| South Platte River and Tributaries, Colorado, Wyoming and Nebraska Review study | 64 |
| North Platte River Basin, Nebraska, Colorado, and Wyoming Review Study | 64 |
| Metropolitan Omaha, Nebraska-Council Bluffs, Iowa | 64 |
| Metropolitan Sioux City and Missouri River, Iowa, Nebraska, and South Dakota Water and Related Land Resources Management Study | 65 |
| Soil Conservation Service | 65 |
| Republican Basin Study | 65 |
| Preliminary Watershed Studies | 65 |
| Squaw-Camp Creeks | 65 |
| Peru-Brownville | 65 |
| Turkey Creek | 65 |
| Big Muddy | 65 |
| Lower Big Nemaha | 65 |
| Lower Little Nemaha | 65 |
| Wahoo Creek | 65 |
| Southern Sarpy | 65 |
| Stevens-Callahan | 65 |
| Northeast Cass | 65 |
| Rock Creek | 65 |
| Weeping Water | 65 |
| Ogallala Tribs | 65 |
| Appendix | 66 |
| Project Development by Agency | 67 |
| Definitions | 72 |

LIST OF MAPS

| <u>Title</u> | <u>Page</u> |
|----------------------------------|-------------|
| Nebraska River Basins | xiii |
| White River-Hat Creek Basin | 1 |
| Niobrara River Basin | 3 |
| Mirage Flats Project | 8 |
| Missouri Tributaries River Basin | 9 |
| North Platte River Basin | 13 |
| South Platte River Basin | 15 |
| Middle Platte River Basin | 19 |
| Loup River Basin | 23 |
| Cedar Rapids Division | 28 |
| Elkhorn River Basin | 29 |
| Lower Platte River Basin | 34 |
| Republican River Basin | 37 |
| Blackwood Creek Watershed | 41 |
| Little Blue River Basin | 43 |
| Little Blue Unit | 47 |
| Big Blue River Basin | 49 |
| Sunbeam Unit | 54 |
| Walnut Creek Watershed | 57 |
| Nemaha River Basin | 59 |

PROJECT INDEX

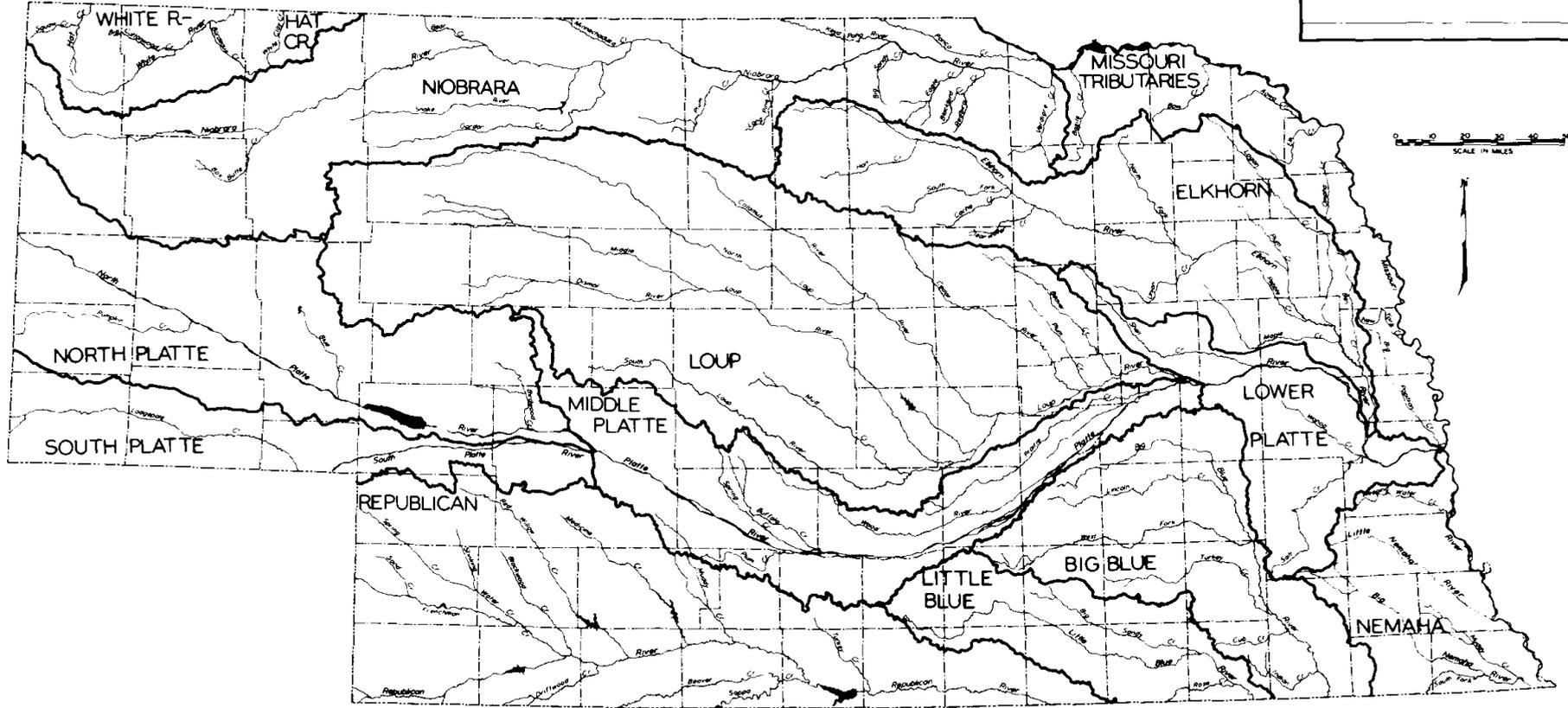
| <u>Name</u> | <u>Page</u> |
|---|-------------|
| Aowa Creek Watershed | 10 |
| Ash-Plum Creek Watershed | 12 |
| Battle Creek Local Flood Protection | 31 |
| Beatrice Local Flood Protection | 58 |
| Beaver Creek at St. Edward | 25 |
| Beck Plan | 62 |
| Big Muddy Creek Watershed | 65 |
| Blackwood Creek Watershed | 39 |
| Bone Creek Watershed | 35 |
| Boyd County Rural Water District #2 | 6 |
| Brule Watershed | 16 |
| Buffalo Creek Watershed | 18 |
| Cass County Rural Water District #2 | 36 |
| Cedar Rapids Division | 25 |
| Central Nebraska Public Power and Irrigation District E-65 Improvement | 18 |
| Clatonia Creek Watershed | 50 |
| Clear Creek Watershed | 35 |
| Corporation Gulch Watershed | 31 |
| Creighton Valley Watershed | 12 |
| Crofton Unit | 11 |
| Cuming County Rural Water District Phase 2 | 33 |
| Dodge Local Flood Protection | 32 |
| Frenchman-Cambridge Division Supplemental Water | 39 |
| Frenchman-Cambridge Irrigation District Rehabilitation and Betterment | 42 |
| Fort Kearny Unit | 18 |
| Gering-Fort Laramie Irrigation District Rehabilitation | 12 |
| Giles Creek Local Flood Protection | 31 |
| H&RW and Frenchman Valley, Rehabilitation and Betterment Program | 42 |
| Highland Unit | 31 |
| King Lake Local Flood Protection | 31 |
| Lavaca Flats Unit | 5 |
| Linwood Unit | 35 |
| Little Blue Unit | 44 |
| Little Blue Water Resources | 48 |
| Little Nemaha River Levee | 60 |
| Logan Unit | 31 |
| Long Branch Watershed | 60 |
| Lost Creek North of Columbus | 35 |
| Loup River at Columbus | 25 |
| Lower Big Nemaha Watershed | 65 |
| Lower Little Nemaha Watershed | 65 |

| | <u>Page</u> |
|---|-------------|
| Maple Creek Watershed | 31 |
| McCook Flood Control | 42 |
| Meadow Grove Local Flood Protection | 31 |
| Medicine Creek Watershed | 39 |
| Metropolitan Omaha, Nebraska-Council Bluffs, Iowa | 64 |
| Metropolitan Sioux City and Missouri River, Iowa Nebraska, and South Dakota Water and Related Land Resources Management Study | 65 |
| Middle Big Nemaha Watershed | 60 |
| Middle Missouri NRD Public Domestic Water Supply #1 | 11 |
| Mirage Flats Project Supplemental Water | 5 |
| Missouri River from Three Forks, Montana to Sioux City, Iowa | 64 |
| Mitchell Irrigation District Rehabilitation | 12 |
| Mud Creek at Broken Bow | 25 |
| Mud Creek near Bellevue | 10 |
| NAWAPA | 62 |
| Nance County Drainage | 21 |
| Nebraska Mid-State Division | 18 |
| Nemaha and Little Nemaha River Basin, Nebraska and Kansas | 64 |
| Niobrara Relocation Project | 5 |
| Niobrara River Basin, Nebraska, Wyoming, and South Dakota Review Study | 64 |
| Norfolk Unit | 31 |
| Northeast Cass Watershed | 65 |
| North Dry Creek Drainage | 21 |
| North Loup Division | 25 |
| North Platte Local Flood Protection | 17 |
| North Platte River Basin, Nebraska, Colorado, and Wyoming Review Study | 64 |
| Ogallala Tribs | 65 |
| Ogallala Tributary #6 | 16 |
| Oliver Dam Recreation | 16 |
| O'Neill Unit | 5 |
| Osmond Local Flood Protection | 32 |
| Papillion Creek and Tributaries | 10 |
| Papio NRD Improvement Project Area #1 | 10 |
| Papillion Creek Watershed | 10 |
| Pender Local Flood Protection | 31 |
| Peru-Brownville Watershed | 65 |
| Platte County Drainage | 21 |
| Platte River and Lost Creek near Schuyler | 35 |
| Platte River Waterfowl Habitat Preservation Study | 63 |
| Plum Creek Watershed | 58 |

| | <u>Page</u> |
|---|-------------|
| Rawhide Creek | 33 |
| Republican River Basin Study | 65 |
| Rock Creek Watershed | 65 |
| Scribner Local Flood Protection | 32 |
| Sedgwick-Sand Draws Watershed | 16 |
| Seward View Reservoir | 50 |
| Shell Creek and Tributaries | 35 |
| Shestak Reservoir | 50 |
| Silver Creek Watershed | 18 |
| South Branch Little Nemaha Watershed | 60 |
| South Platte River and Tributaries, Colorado, Wyoming, and Nebraska Review Study | 64 |
| Southern Sarpy Watershed | 65 |
| South Fork Watershed | 60 |
| Spring Creek Watershed | 18 |
| Squaw-Camp Creeks Watershed | 65 |
| Stevens-Callahan Watershed | 65 |
| Sunbeam Unit | 50 |
| Surprise Reservoir | 50 |
| Swan Creek Watershed | 58 |
| Tekamah-Mud Creek Watershed | 10 |
| Turkey Creek Watershed | 65 |
| Upper Little Nemaha Watershed | 61 |
| Upper Republican River Water Management Study | 63 |
| Wahoo Creek Watershed | 65 |
| Wakefield Local Flood Protection | 31 |
| Walnut Creek Watershed | 55 |
| Weeping Water Creek Watershed | 65 |
| Western States Water Augmentation Concept | 62 |
| Willow Creek Dam and Recreation Area | 32 |
| Winnebago-Bean Creek Watershed | 60 |
| Winters Creek Watershed | 12 |
| Wolf-Wildcat Creek Watershed | 58 |
| Wood River-Prairie Creek | 22 |

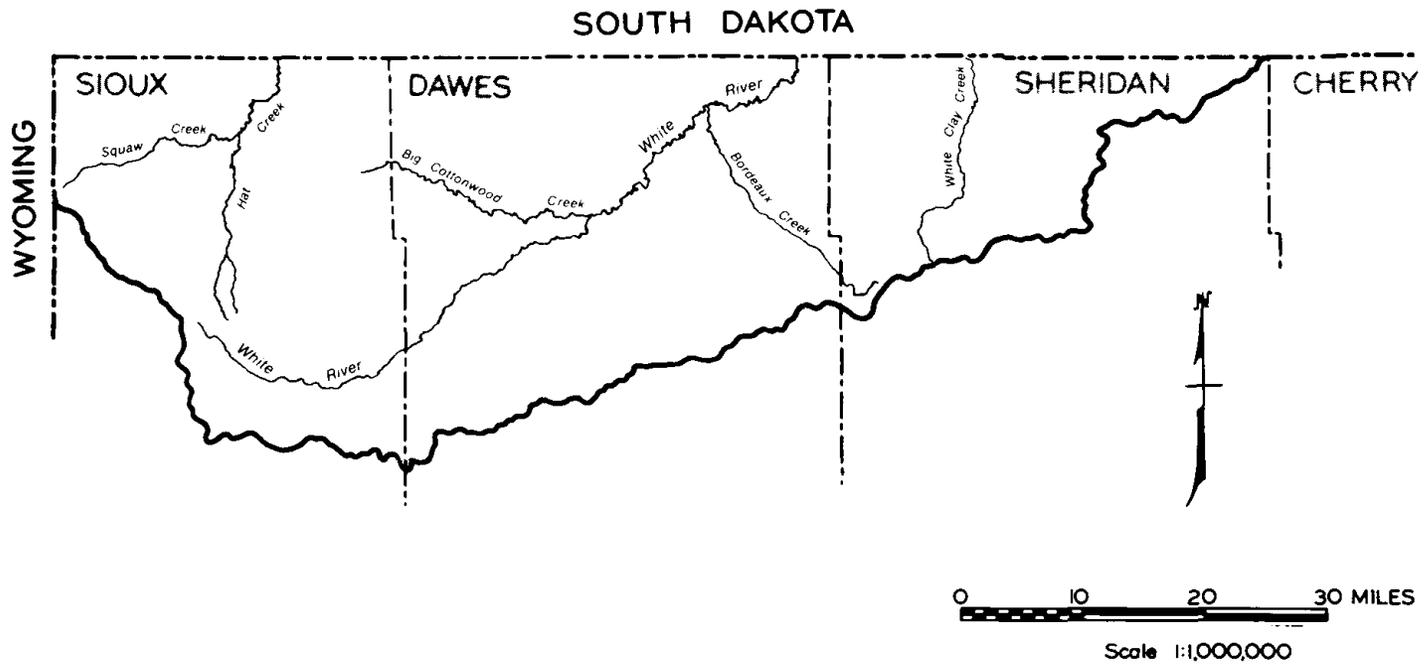
State of Nebraska
NATURAL RESOURCES COMMISSION
Planning Division

RIVER BASINS

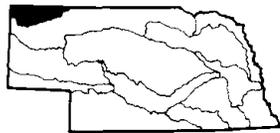


XIII

WHITE RIVER-HAT CREEK BASIN



- 1 -



LEGEND*

-  EXISTING PROJECT SERVICE AREA
-  EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.

CHAPTER 1. WHITE RIVER - HAT CREEK BASIN

This Basin is located in the extreme northwestern corner of the State. It includes only 2,130 square miles within Nebraska, making it the smallest Basin. The White River, with its many tributaries, drains the major portion of the Basin. Hat Creek, which drains the remainder of the Basin, rises in the northwestern part of Sioux County and flows northward into the Cheyenne River in South Dakota.

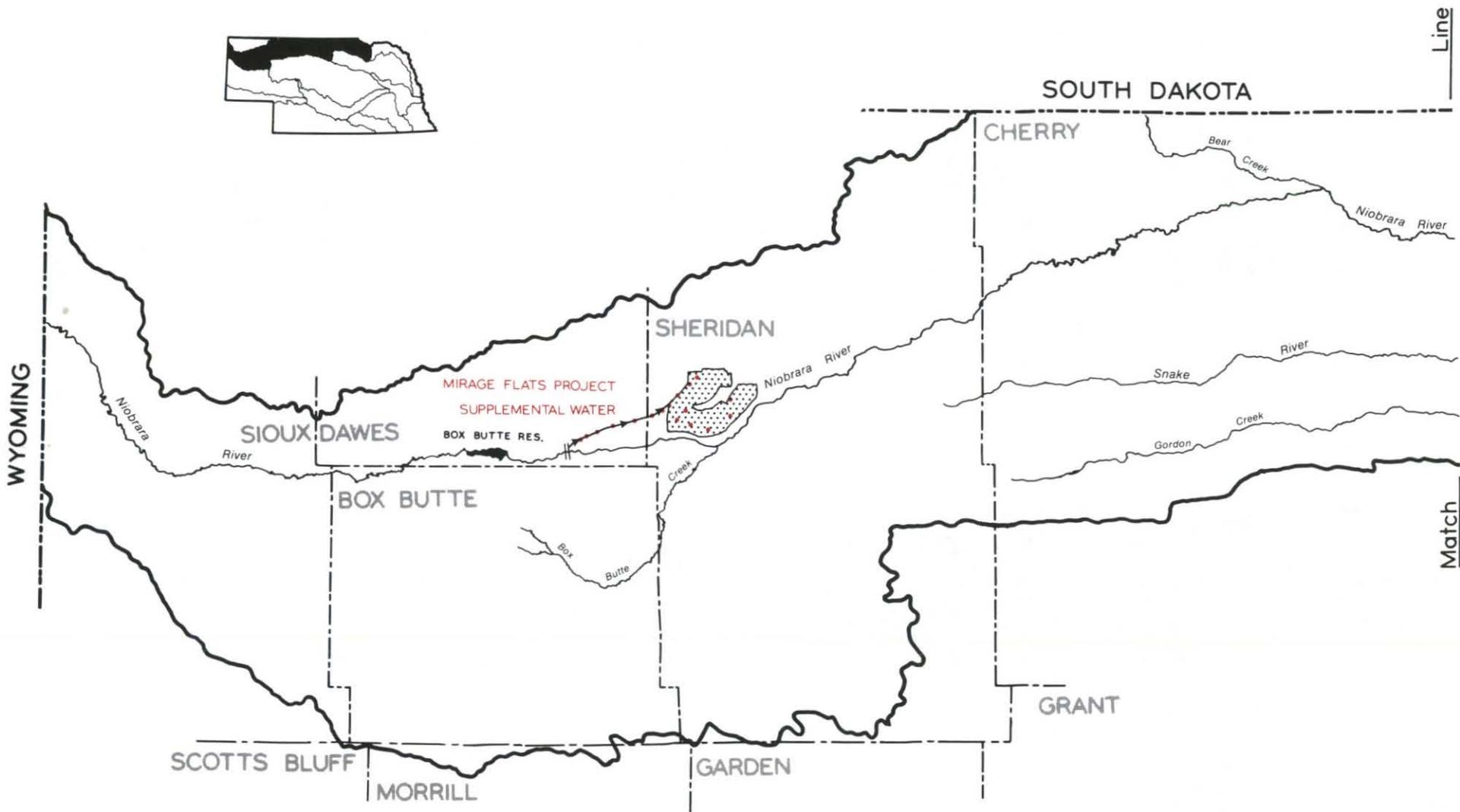
Potential Projects

There are no documented potential projects in this Basin of the type presented in this volume.

Volume 2 of the Status Summary will discuss the existing development in the Basin.

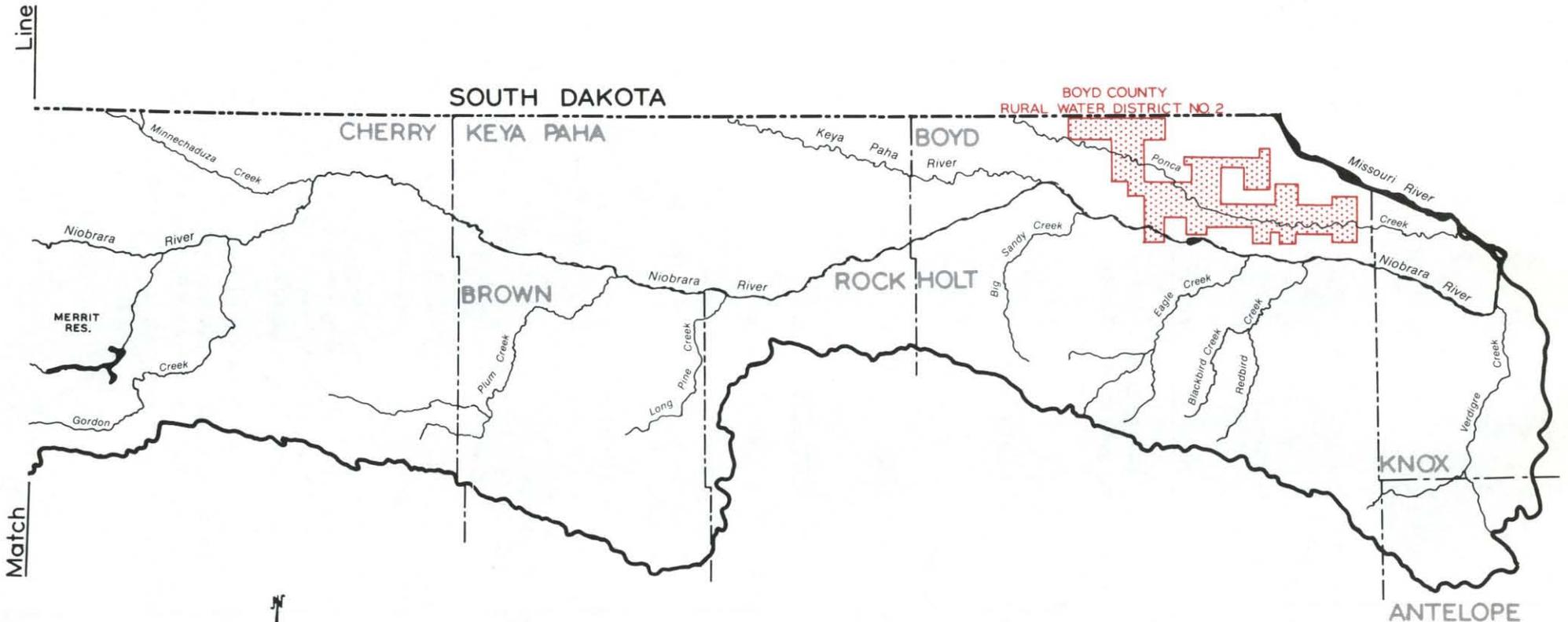
NIOBRARA RIVER BASIN

Sheet 1 of 2

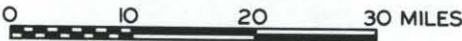


NIOBRARA RIVER BASIN

Sheet 2 of 2



Line
Match



Scale 1:1,000,000

LEGEND*

-  PROPOSED DAM & RESERVOIR SITE
-  PROPOSED CANAL
-  PROPOSED PROJECT SERVICE AREA
-  PROPOSED PUMPING PLANT
-  PROPOSED DIVERSION DAM
-  PROPOSED RIVER SIPHON
-  PROPOSED WATERSHED PROJECT
-  PROPOSED FLOODWAY
-  PROPOSED LOCAL FLOOD PROTECTION PROJECT
-  PROPOSED PROJECT WELL
-  EXISTING PROJECT SERVICE AREA
-  EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.

CHAPTER 2. NIOBRARA RIVER BASIN

The Niobrara River rises in eastern Wyoming and flows eastward across the northern part of Nebraska. The Basin covers 11,870 square miles in Nebraska, including the drainage area of Ponca Creek and several minor Missouri River tributaries.

Status of Former Potential Projects

The status of the following projects included in previous editions of this publication has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Niobrara Relocation Project (COE)
O'Neill Unit (BuRec)

INACTIVE OR TERMINATED

Lavaca Flats Unit (BuRec)

Potential Projects

MIRAGE FLATS PROJECT - SUPPLEMENTAL WATER

The existing Mirage Flats Irrigation District has an inadequate water supply, and the Bureau of Reclamation has developed a proposal to provide supplemental water and other benefits.

Current Status. A feasibility report was prepared in 1965. The project has not been reevaluated under the Water Resources Council's evaluation criteria, but would probably still be feasible. Congress must authorize and fund the additions before detailed planning and construction can proceed. Bills to authorize the additions to this project were introduced in 1976 but were not acted on by Congress.

This project has been endorsed by the Nebraska Natural Resources Commission as a part of the Nebraska State Water Plan.

Description of Project Area. This project is located in the northern half of Nebraska's panhandle. Box Butte Reservoir, which provides storage for the project, is located on the Niobrara River in Dawes County. The irrigated lands lie in Sheridan County north of the Niobrara River.

Geographically, this portion of the Niobrara River Basin is characterized by flat table lands which have been modified severely by erosion at many points. At these points the terrain varies from rolling to rough. Irrigated lands of this project lie on stream terraces in the Niobrara River valley.

The average annual precipitation in this area is only about 16 inches. About three-fourths of this precipitation occurs during the growing season.

The economy of the region is agriculturally oriented.

Project Description. The proposed plan would supply supplemental water through the existing distribution system by pumping from 17 deep wells located near project canals. Additional lands around Box Butte Reservoir would be acquired to enhance recreation and fish and wildlife functions of the project, and to alleviate existing and future operation and maintenance problems.

Benefits from the proposed additions would be derived from the components of irrigation, fish and wildlife, and recreation. They would include an additional 5,000 recreation days and an additional 4,940 hunting, fishing, and nature study days annually.

Public Interest. The Mirage Flats Irrigation District is currently operating and maintaining the project, and the board of directors requested that the Bureau of Reclamation study the feasibility of providing supplemental water to the irrigation district. Local interest in this project addition developed because of the lack of an adequate water supply.

Projects In Planning

BOYD COUNTY RURAL WATER DISTRICT #2

Description. This proposed project is located in the central part of Boyd County along Ponca Creek. The purpose of the project is to provide domestic and livestock water service to 140 rural units and the villages of Spencer and Lynch. The project features include two wells, two water storage reservoirs, and 147 miles of distribution mains. The estimated total cost of constructing the project is \$1,900,000.

Current Status. The preliminary report was completed in October 1975. The District is presently negotiating agreements with potential users and obtaining easements. The potential for enlarging the service area to include parts of Holt and Knox Counties is being investigated. This must be determined before final design of the system can be completed.

MIRAGE FLATS PROJECT

| | | | |
|--------------------------|---------------|-----------------|----------------------------------|
| CONSTRUCTION PERIOD: | 2 Years | ECONOMIC LIFE: | 100 Years |
| AVERAGE ANNUAL COST: | \$54,000 | ANNUAL O.M.&R.: | \$33,100 |
| INTEREST RATE: | 3 1/8 Percent | BY: | Mirage Flats Irrigation District |
| BENEFIT-COST RATIO: | 2.00 to 1.00 | COSTS BASED ON: | 1965 Prices |
| IRRIGATION SERVICE AREA: | 11,662 Acres | LAND REQUIRED: | 926 Acres |

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

| | Irrigation | Fish & Wildlife | Recreation | Total |
|-------------------|------------|-----------------|------------|-------|
| Direct Benefits | 77.6 | 8.5 | 3.7 | 89.8 |
| Indirect Benefits | 18 | -0- | -0- | 18 |
| Total Benefits | 95.6 | 8.5 | 3.7 | 107.8 |

Table 2 - Project Costs and Repayment by Source
(Thousand Dollars)

| | Irrigation | Fish & Wildlife | Recreation | Total |
|----------------------|------------|-----------------|------------|--------|
| Project Costs | 560 | 110 | 38 | 708 |
| Non-Reimbursable | -0- | 78.5 | 23 | 101.5 |
| Reimbursable | 560 | 31.5* | 15 | 606.5* |
| Mo. R. Basin Power | -0- | -0- | -0- | -0- |
| Non-Federal (public) | -0- | 31.5* | 15 | 46.5* |
| Local | 560 | -0- | -0- | 560 |

* Does not include repayable interest during construction

Table 3 - Average Annual Water Requirements

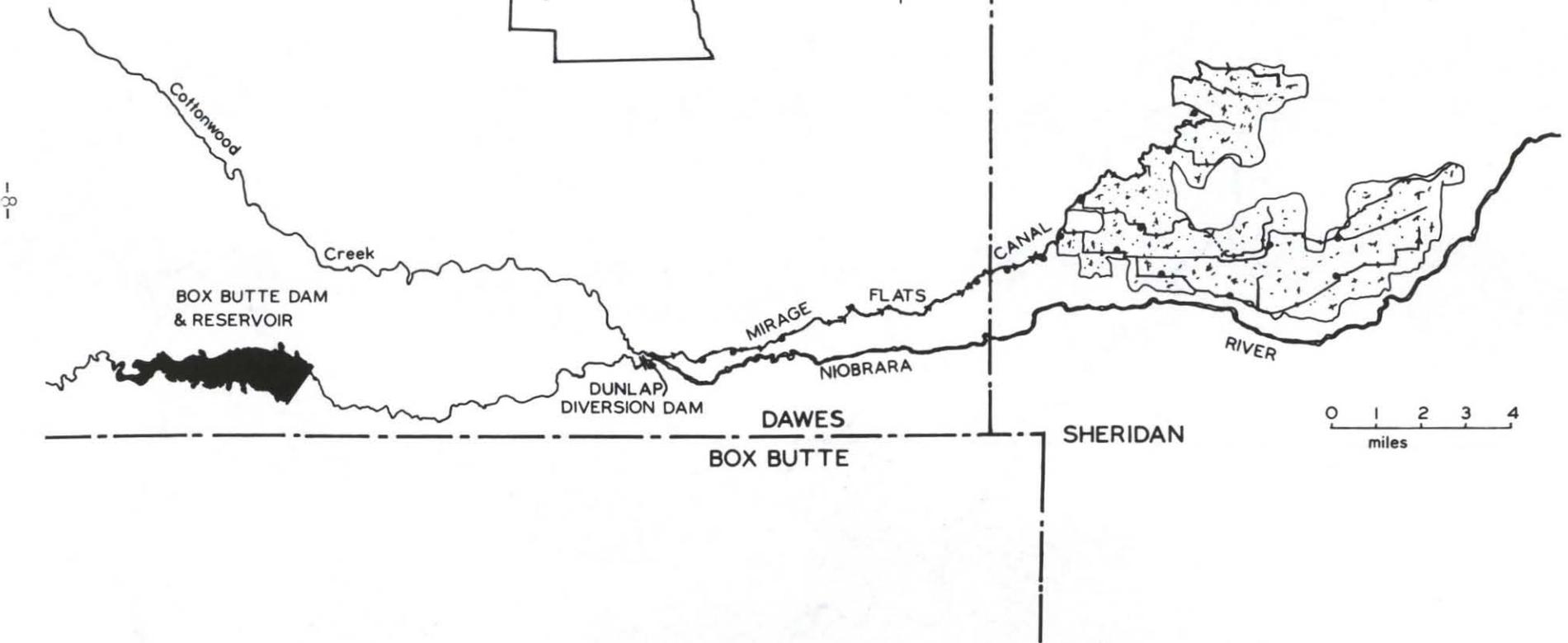
| | |
|------------------------------|-----------------|
| Crop Irrigation Requirement: | 1.09 ac.ft./ac. |
| Farm Delivery Requirement: | 1.56 ac.ft./ac. |
| Diversion Requirement: | 2.32 ac.ft./ac. |
| Total Diversion Requirement: | 26,200 ac.ft. |

MIRAGE FLATS PROJECT

BUREAU of RECLAMATION

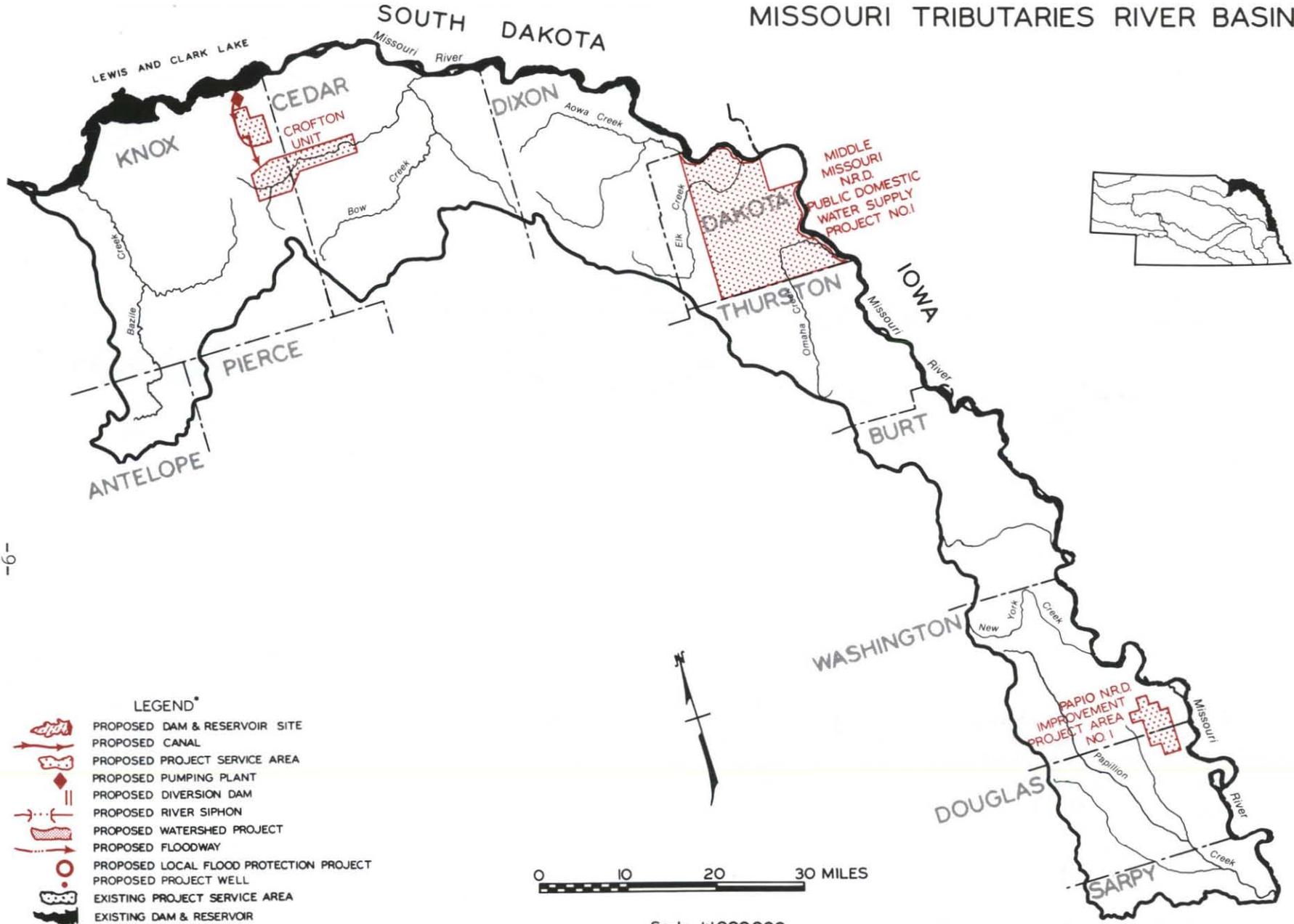
LEGEND

- EXISTING RESERVOIR 
- PROPOSED DEEP WELL 
- EXISTING DIVERSION DAM 
- EXISTING CANAL 
- EXISTING SIPHON 
- EXISTING IRRIGATED LAND 



10

MISSOURI TRIBUTARIES RIVER BASIN



LEGEND*

- PROPOSED DAM & RESERVOIR SITE
- PROPOSED CANAL
- PROPOSED PROJECT SERVICE AREA
- PROPOSED PUMPING PLANT
- PROPOSED DIVERSION DAM
- PROPOSED RIVER SIPHON
- PROPOSED WATERSHED PROJECT
- PROPOSED FLOODWAY
- PROPOSED LOCAL FLOOD PROTECTION PROJECT
- PROPOSED PROJECT WELL
- EXISTING PROJECT SERVICE AREA
- EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.



Scale 1:1,000,000

CHAPTER 3. MISSOURI TRIBUTARIES RIVER BASIN

This Basin occupies a narrow strip of land along the eastern and northeastern borders of the State between the mouths of the Niobrara and Platte Rivers. The Basin, totaling 2,950 square miles, is composed of the drainage areas of a number of small streams directly tributary to the Missouri River and the portions of the Missouri River flood plain which connect these drainage areas.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Papillion Creek Watershed (SCS)
Aowa Creek Watershed (SCS)
Papillion Creek and Tributaries (COE)
Tekamah-Mud Watershed (SCS)

INACTIVE OR TERMINATED

Mud Creek near Bellevue (COE)

Potential Projects

There are no more documented potential projects in this Basin of the type presented in this volume.

Projects In Planning

PAPIO NATURAL RESOURCES DISTRICT IMPROVEMENT PROJECT AREA #1

Description. This project is located in northeastern Douglas and southeastern Washington Counties, Nebraska. It will provide water service to rural users and the village of Fort Calhoun. Project features include a supply system designed to distribute water through 22 miles of pipe ranging in size from 2 to 14 inches in diameter. The proposed source of supply will be the Metropolitan Utilities District. The total estimated cost of constructing the project is \$1,200,000.

Current Status. An engineering study and report were completed in November 1974 and a supplemental study and report in September 1975. Project funds have been approved by Farmers Home Administration for both the Papio Natural Resources District and the city of Fort Calhoun. Final plans and specifications will be prepared to enable construction to start as soon as possible.

MIDDLE MISSOURI NATURAL RESOURCES DISTRICT
PUBLIC DOMESTIC WATER SUPPLY PROJECT #1

Description. This proposed project, encompassing about forty percent of central Dakota County, will provide domestic and livestock water service to approximately 275 rural users and possibly four villages. Project features include approximately 105 miles of pipe ranging in size from 2 to 12 inches in diameter and two elevated storage tanks with an estimated combined capacity of 625,000 gallons. The water supply will probably be obtained from South Sioux City. The total estimated cost of constructing the project is \$2,100,000.

Current Status. Preliminary planning has been completed. The feasibility and practicability of servicing the municipalities of Dakota City, Homer, Hubbard, and Jackson must still be determined.

CROFTON UNIT

Description. This proposed Bureau of Reclamation project is located in northwestern Knox and northern Cedar Counties. A subreconnaissance study analyzed pumping water from Lewis and Clark Lake about 250 feet in elevation to irrigate approximately 10,000 upland acres. Project features would include a pumping plant and service canals.

Current Status. This project was first investigated on a subreconnaissance basis in 1957. An appraisal study has been funded and initiated in fiscal year 1977.

CHAPTER 4. NORTH PLATTE RIVER BASIN

This Basin is located in the western portion of the State near the central part of the Panhandle. It extends from the Wyoming-Nebraska state line to the confluence of the North and South Platte Rivers, encompassing an area of 7,140 square miles.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Winters Creek Watershed (SCS)
Mitchell Irrigation District Rehabilitation and Betterment (BuRec)

INACTIVE OR TERMINATED

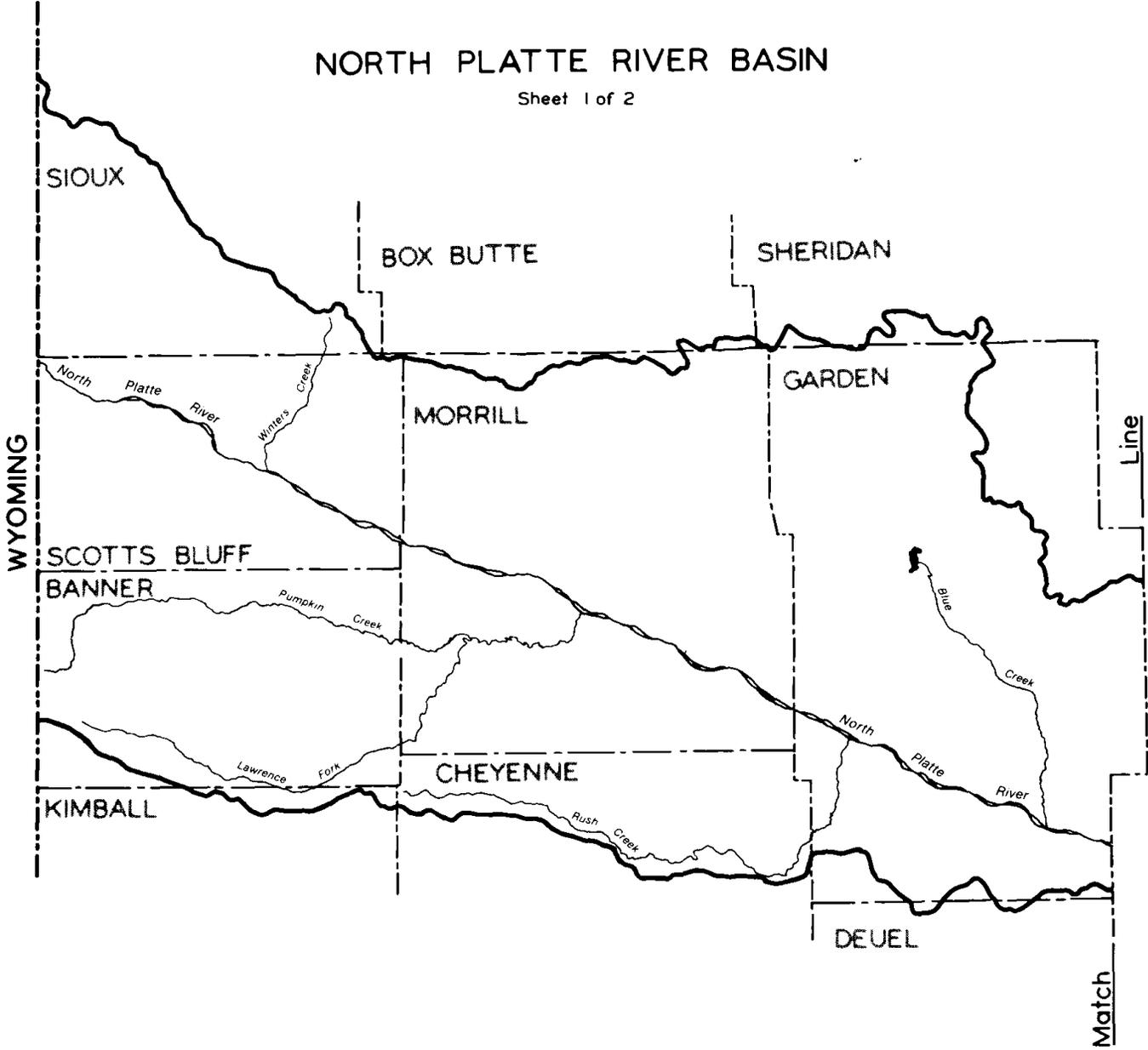
Creighton Valley Watershed (SCS)
Ash-Plum Creek Watershed (SCS)
Gering-Fort Laramie Irrigation District Rehabilitation and
Betterment (BuRec)

Potential Projects

There are no more documented potential projects in this Basin of the type presented in this volume.

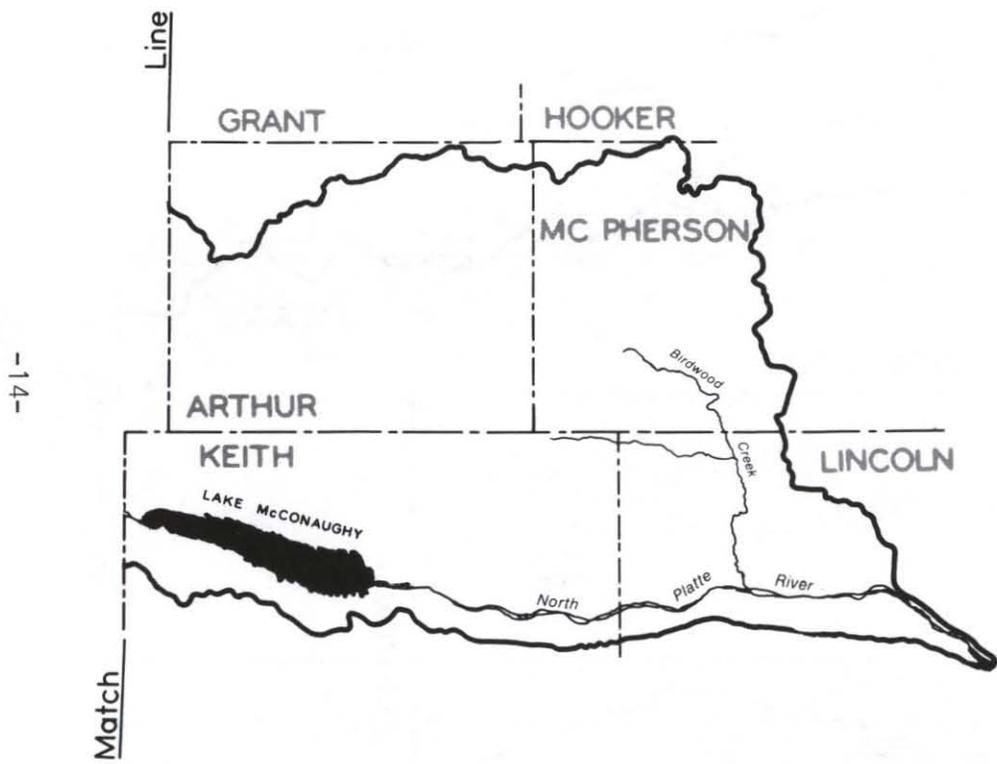
NORTH PLATTE RIVER BASIN

Sheet 1 of 2



NORTH PLATTE RIVER BASIN

Sheet 2 of 2

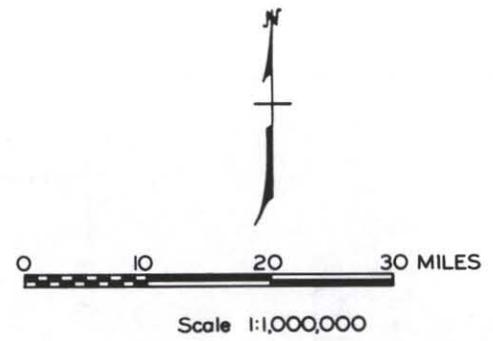


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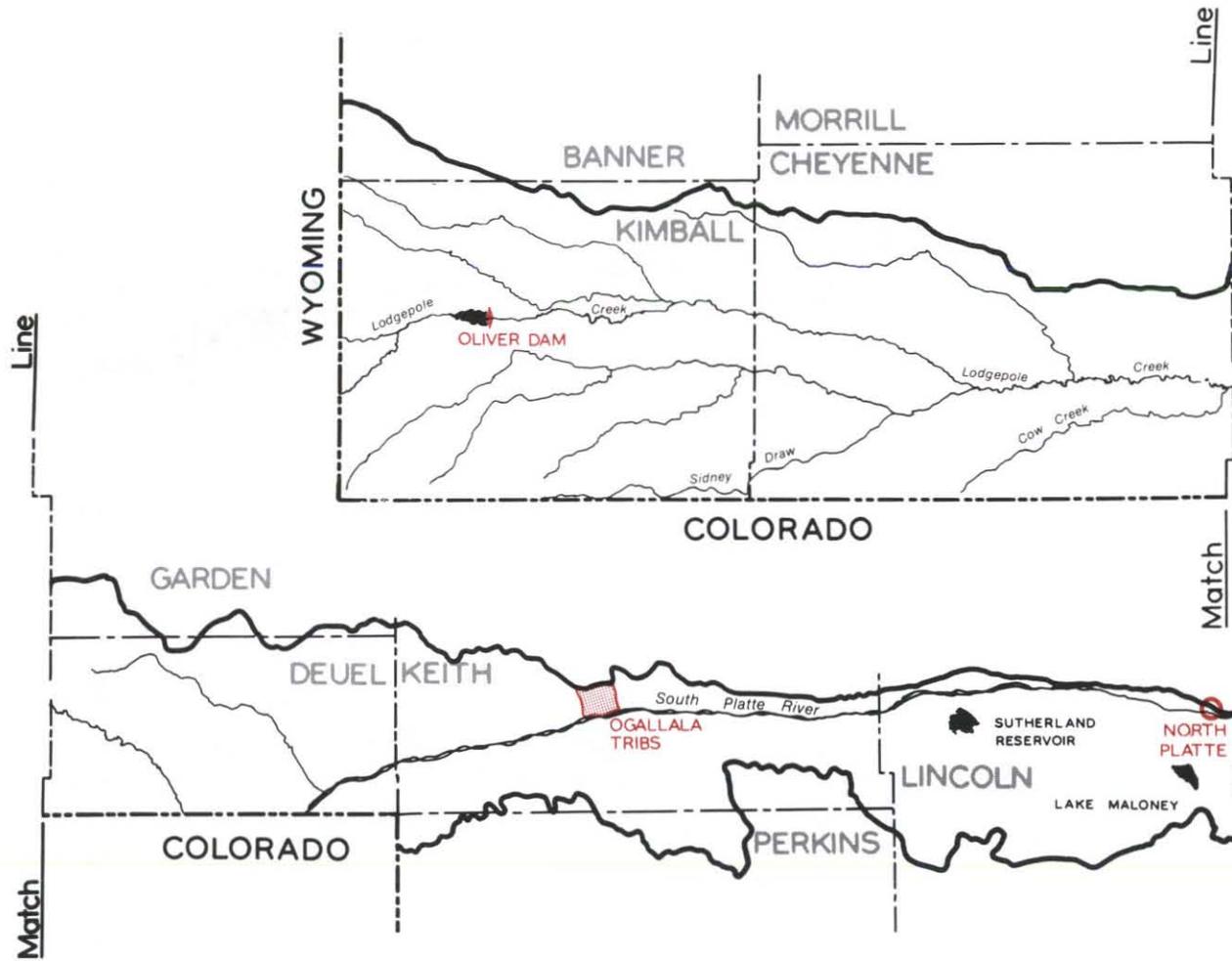
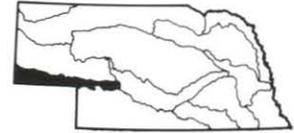
LEGEND*

-  EXISTING PROJECT SERVICE AREA
-  EXISTING DAM & RESERVOIR

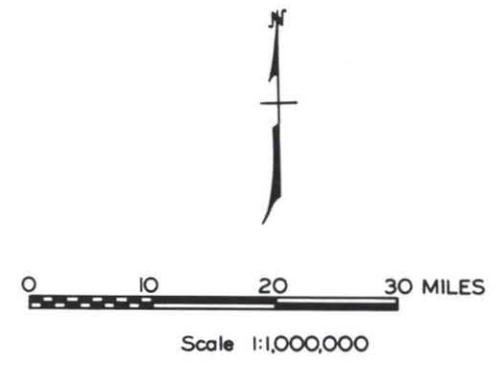
*NOTE: All basin map legends were standardized and all features will not appear on every map.



SOUTH PLATTE RIVER BASIN



-15-



- LEGEND***
- PROPOSED DAM & RESERVOIR SITE
 - PROPOSED CANAL
 - PROPOSED PROJECT SERVICE AREA
 - PROPOSED PUMPING PLANT
 - PROPOSED DIVERSION DAM
 - PROPOSED RIVER SIPHON
 - PROPOSED WATERSHED PROJECT
 - PROPOSED FLOODWAY
 - PROPOSED LOCAL FLOOD PROTECTION PROJECT
 - PROPOSED PROJECT WELL
 - EXISTING PROJECT SERVICE AREA
 - EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.

CHAPTER 5. SOUTH PLATTE RIVER BASIN

The South Platte River Basin covers 3,150 square miles in a narrow strip along the southern Panhandle extending from the Wyoming-Nebraska state line to the confluence of the North and South Platte Rivers. Lodgepole Creek is the principal Nebraska tributary to the South Platte River, which originates in Colorado.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Brule Watershed Project (SCS)
Sedgwick-Sand Draws Watershed (SCS)

Potential Projects

There are no documented potential projects in this Basin of the type presented in this volume.

Projects In Planning

OLIVER DAM RECREATION PROJECT

Description. This project proposed by the South Platte Natural Resources District is located near U.S. Highway 30 approximately eight miles west of the town of Kimball in Kimball County. The primary purpose of this project is to provide outdoor recreation. It will include the rehabilitation of the existing on-stream irrigation dam, the acquisition of adjacent land, and the construction of recreation facilities. The estimated construction and right-of-way costs total \$715,000.

Current Status. A project proposal submitted to the Nebraska Resources Development Fund has been approved by the Advisory Board. An engineering firm has evaluated the existing structure and a formal application to the Resources Development Fund is being prepared.

OGALLALA TRIBUTARY #6

Description. This proposed Twin Platte Natural Resources District project would be located on the north edge of the city of Ogallala. The primary purpose of the project is to reduce floodwater and sediment damage to agricultural property, roads, railroads, and property in Ogallala. The drainage area is 483 acres, consisting primarily of range and pasture land. The project will consist of one dry structure estimated to cost \$45,000.

Current Status. A project proposal was submitted to the Nebraska Resources Development Fund in December 1976.

NORTH PLATTE LOCAL FLOOD PROTECTION PROJECT

Description. This proposed Corps of Engineers project is located on the North and South Platte Rivers near the city of North Platte. The purpose of the project is to provide flood protection to 4,000 acres of urban land. The project features include a levee 11.5 miles long and a diversion channel. The total estimated cost of constructing the project is \$8,737,000.

Current Status. The Platte River Basin, Nebraska Level B Study showed a favorable benefit-cost ratio, so this project is currently being evaluated as part of the ongoing Platte River and Tributaries, Level C Study.

CHAPTER 6. MIDDLE PLATTE RIVER BASIN

This Basin encompasses 5,130 square miles in the south-central part of the State. It includes the drainage areas of the streams tributary to the Platte River between the confluence of the North and South Platte Rivers and the mouth of the Loup River.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Spring Creek Watershed (SCS)
Central Nebraska Public Power and Irrigation District E-65
Improvement (BuRec)

INACTIVE OR TERMINATED

Fort Kearny Unit (BuRec)
Nebraska Mid-State Division (BuRec)

Potential Projects

There are no more documented potential projects in this Basin of the type presented in this volume.

Projects in Planning

BUFFALO CREEK WATERSHED

Description. This watershed occupies approximately 190,000 acres in Custer, Dawson, and Buffalo Counties. The Central Platte Natural Resources District is responsible for investigation of this project, which will control the runoff from approximately 75,000 acres with floodwater retarding structures. It is estimated that this should reduce the flood damage in the watershed by 50 percent or more. The total estimated cost of constructing the project is \$1,708,840.

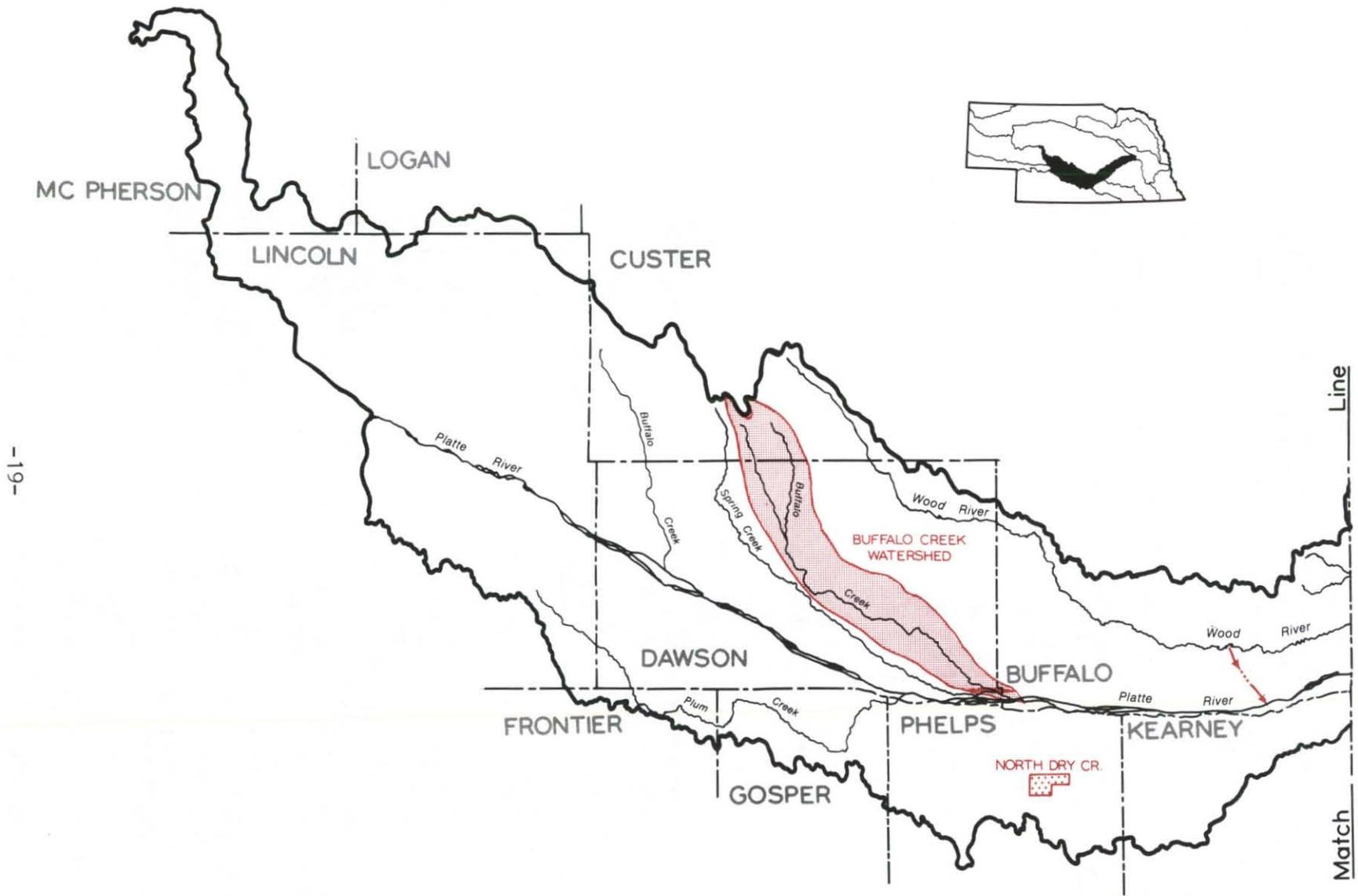
Current Status. A project proposal to the Nebraska Resources Development Fund has been approved by the Natural Resources Commission's Advisory Board. The Central Platte Natural Resources District has hired a consulting firm and is preparing a formal application to the Resources Development Fund.

SILVER CREEK WATERSHED

Description. This watershed is comprised of approximately 85,000 acres

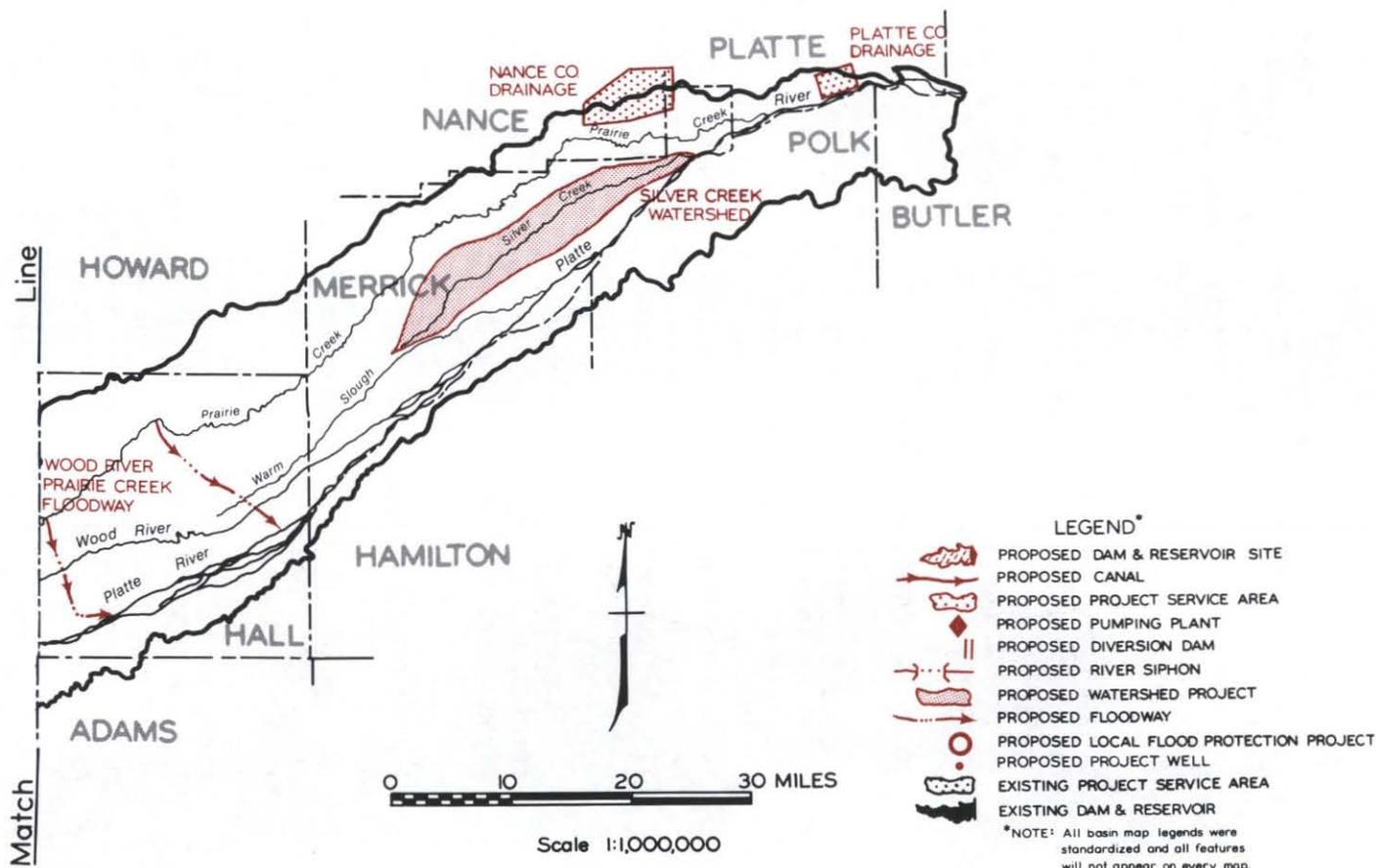
MIDDLE PLATTE RIVER BASIN

Sheet 1 of 2



MIDDLE PLATTE RIVER BASIN

Sheet 2 of 2



in Merrick County. Although the primary purpose of the proposed project will be flood control, the Central Platte Natural Resources District will investigate the feasibility of a multipurpose project including water conservation, pollution and siltation control, drainage, and wildlife habitat enhancement. The total estimated cost of constructing the project is \$2,680,000.

Current Status. A project proposal to the Nebraska Resources Development Fund has been approved by the Natural Resources Commission's Advisory Board. A consulting firm has been hired and a formal application to the Resources Development Fund is being prepared.

NORTH DRY CREEK DRAINAGE

Description. This proposed project is located approximately seven miles north and two miles east of the city of Holdrege in Phelps County. The Tri-Basin Natural Resources District is responsible for investigation of this project. The purpose of the project is to provide low flow drainage to improve cropland along the existing channels. The total drainage area is approximately 5,500 acres. Project features include about 25,890 lineal feet of channel improvement. The total estimated cost of constructing the project is \$101,460.

Current Status. The preliminary planning for the project has been completed. Currently, the project repayment assessment system is being planned and land acquisition and construction will follow.

PLATTE COUNTY DRAINAGE

Description. This proposed Central Platte Natural Resources District project is located in Platte County between the Platte and Merrick County line and the town of Duncan. The purpose of the project is to improve drainage on 1,300 acres of agricultural land and provide a limited amount of flood control. The drainage area involved is approximately 2,000 acres including the 1,300 acres which would be improved. The project plan includes improvement of the existing channel and construction of approximately one mile of new channel outlet to the Platte River. Estimated construction and right-of-way costs total \$80,000.

Current Status. The final plan for the project is completed and the easements and right-of-way are being acquired. Construction will begin in the spring of 1977 and will be completed by the end of fiscal year 1978.

NANCE COUNTY DRAINAGE

Description. This proposed project is located principally in the southeastern corner of Nance County with small portions extending into Merrick and Platte Counties. The Central Platte Natural Resources District is planning a project to improve drainage on about 3,000 acres of agricultural land and provide a limited amount of flood control. The drainage area consists

of approximately 5,000 acres including the 3,000 acres to be improved. The total estimated cost of constructing the project is \$450,000.

Current Status. The Soil Conservation Service will develop the final plan. Easement and right of way acquisition should be completed in fiscal 1977 and construction should start in fiscal 1978.

WOOD RIVER-PRAIRIE CREEK

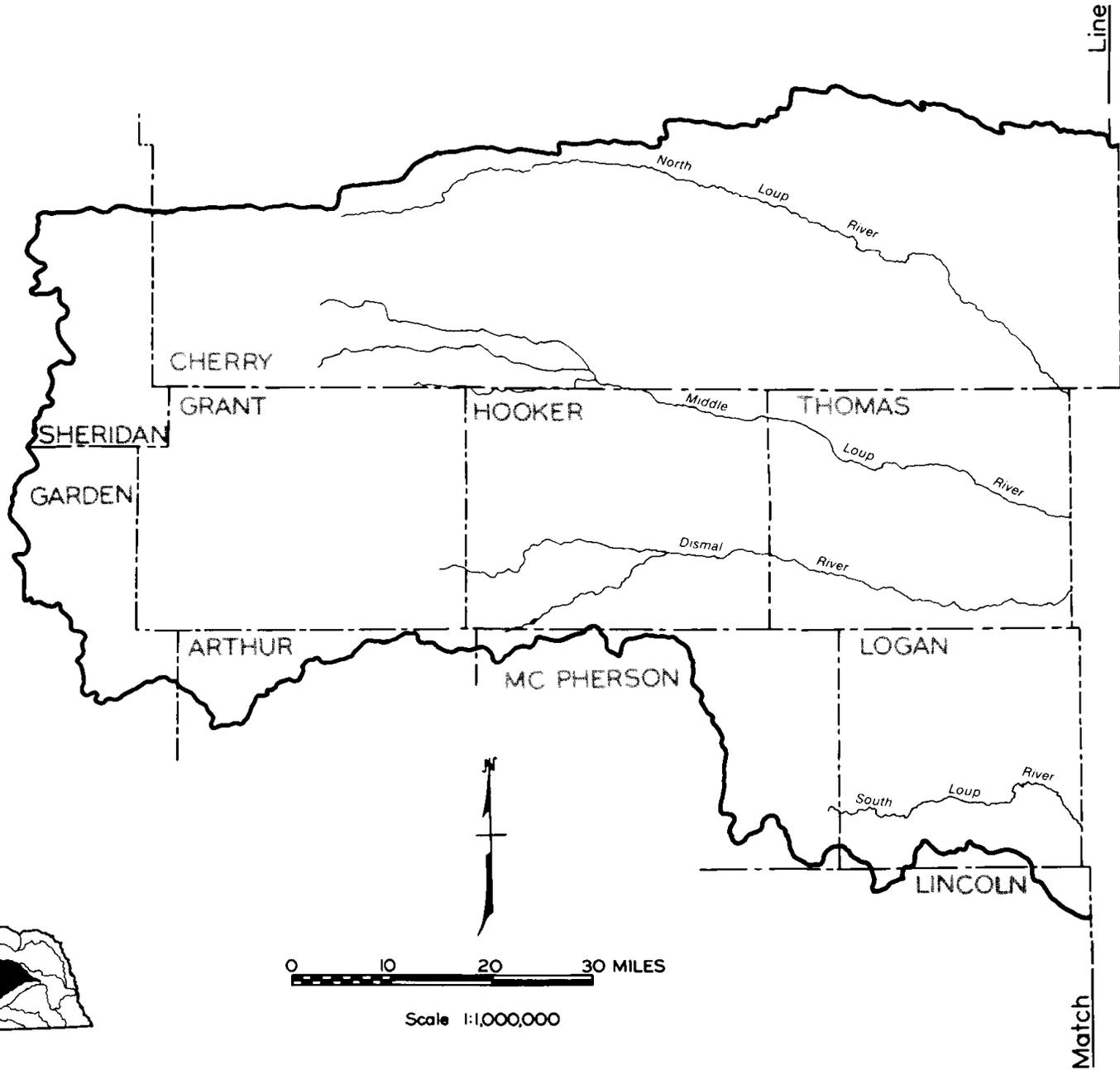
Description. This potential Corps of Engineers project would be located in Buffalo and Hall Counties. The primary purpose is to provide flood protection for Grand Island by diverting flood flows from the Wood River-Prairie Creek basins into the Platte River. Project features include three potential floodways ranging from four to six miles in length.

Current Status. This project was found to have a favorable benefit-cost ratio in the Platte River Basin Level B Study, so it has been included in the ongoing Platte River and Tributaries, Nebraska Level C Study.

LOUP RIVER BASIN

Sheet 1 of 2

-23-



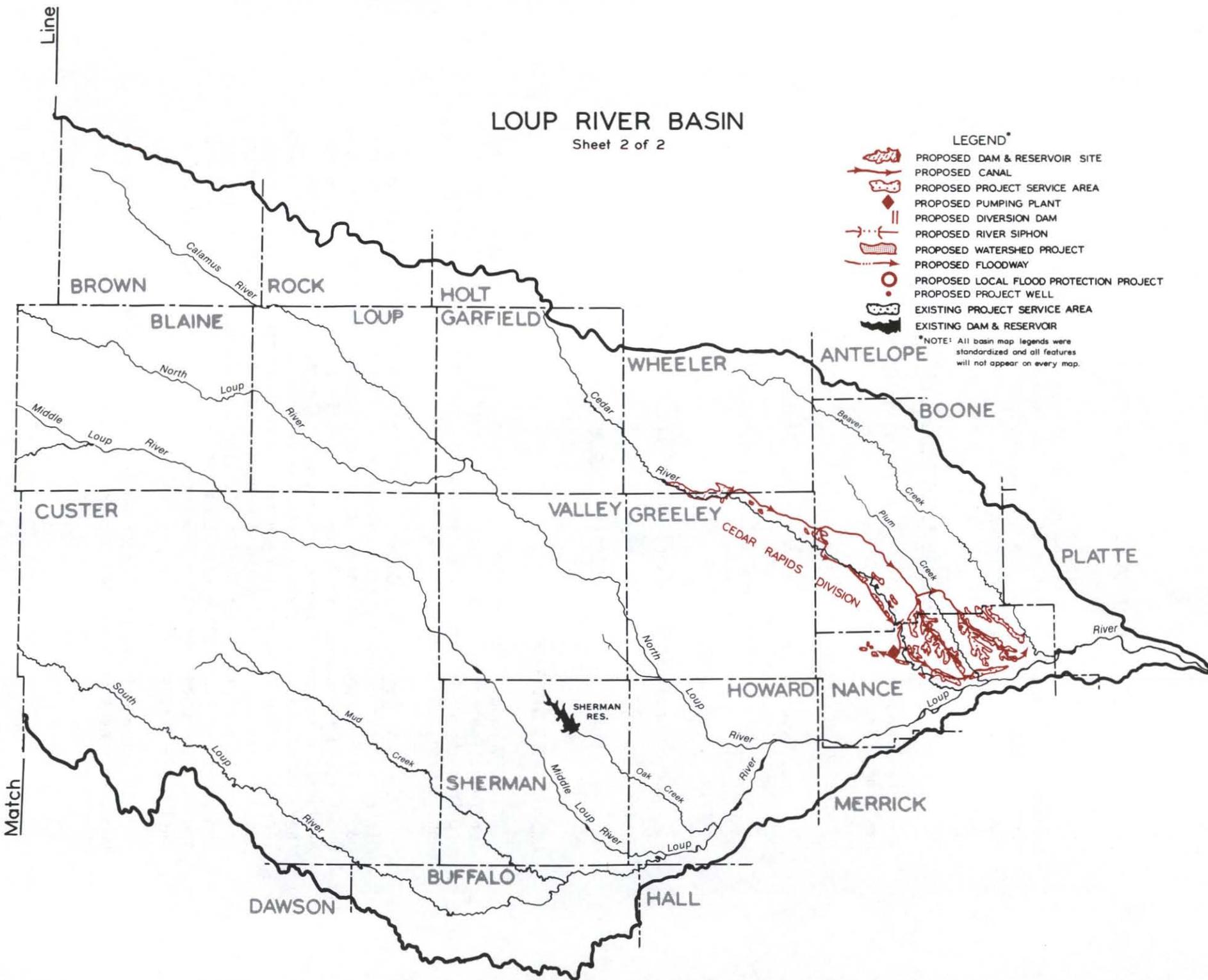
LOUP RIVER BASIN

Sheet 2 of 2

LEGEND*

-  PROPOSED DAM & RESERVOIR SITE
-  PROPOSED CANAL
-  PROPOSED PROJECT SERVICE AREA
-  PROPOSED PUMPING PLANT
-  PROPOSED DIVERSION DAM
-  PROPOSED RIVER SIPHON
-  PROPOSED WATERSHED PROJECT
-  PROPOSED FLOODWAY
-  PROPOSED LOCAL FLOOD PROTECTION PROJECT
-  PROPOSED PROJECT WELL
-  EXISTING PROJECT SERVICE AREA
-  EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.



-24-

Match

Line

CHAPTER 7. LOUP RIVER BASIN

This Basin, located in the center of Nebraska, contains 15,230 square miles, about one-fifth of the State's total area. It extends from the Sandhills of southern Cherry and Sheridan Counties to the Platte River valley near Columbus.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Loup River at Columbus Local Flood Protection (COE)
North Loup Division (BuRec)
Mud Creek at Broken Bow Local Flood Protection (COE)

INACTIVE OR TERMINATED

Beaver Creek at St. Edward Local Flood Protection (COE)

Potential Projects

CEDAR RAPIDS DIVISION

The Bureau of Reclamation is the agency primarily responsible for investigation of this project. It would be a multipurpose project providing benefits from irrigation, flood control, fish and wildlife enhancement, and recreation.

Current Status. The Cedar Valley Public Power and Irrigation District first conducted reconnaissance studies of this project in the early 1940's. The Bureau of Reclamation conducted further investigations which found the project to be feasible in 1966, but it must now be re-evaluated using new planning procedures and current interest rates. There is also a need to study probable effects of further groundwater irrigation development on stream flow from which the project's water supply is taken. A bill was introduced on March 4, 1975, to authorize construction of the Cedar Rapids Division but was not acted on by Congress. The Bureau of Reclamation will consider requesting funds to reevaluate the division under the Water Resources Council's Principles and Standards during fiscal year 1978.

This project has been endorsed by the Nebraska Natural Resources Commission as a part of the Nebraska State Water Plan.

Description of Project Area. This project would be located along the Cedar and Loup Rivers in Wheeler, Greeley, Boone, and Nance Counties. Surface soils in this area are generally silt and loess except north and west of the project lands in the upper Cedar River basin, where the mantle is dune sand.

Annual precipitation during the period of record has ranged from 13 to 38 inches, averaging about 24 inches. Precipitation from April through September averages about 19 inches, or 80 percent of the annual total. However, in the critical crop production months of July, August, and September, and occasionally June, there are extended periods of little or no moisture.

Significant surface water irrigation has not developed in the area because of several problems. Much of the land immediately adjacent to the river is not suitable for tilling or irrigation. Consequently, high pump lifts are required to irrigate the more suitable lands. Groundwater irrigation has developed rapidly in recent years in parts of the area where an adequate aquifer is present.

Project Description. Project features include a multipurpose dam and reservoir, a diversion dam, a pumping plant, canals, and an irrigation distribution system. The principal feature of the plan is the Spalding Dam and Reservoir, which would be located in Wheeler and Greeley Counties on the southeastern edge of the Sandhills. During normal operation, the river outlet works would release water as needed for the Belgrade Diversion Dam and for bypasses as required. The canal outlet works in the left abutment of the Spalding Dam would deliver irrigation water to the Spalding Canal, which would deliver the water to 51 laterals serving 21,300 acres of land. Headworks located at the Belgrade Diversion Dam would divert flows to serve a total of about 5,500 acres of irrigable land. The Timber Creek Canal Pumping Plant would receive water from Belgrade Canal and serve 1,085 irrigable acres in the Timber Creek valley.

Planned fish and wildlife features include purchase of 255 acres at Spalding Reservoir for upland game management, and 210 acres of land adjacent to Spalding Canal for construction of three fish and wildlife impoundments. Four waterfowl habitat ponds are planned for construction. The recreation and fish and wildlife features of this project would provide 50,000 recreation days, 16,850 fisherman days, and 450 hunter days annually.

Public Interest. Development of this proposed project has received strong support from its prospective beneficiaries. At the May 1968 election, Cedar Valley Reclamation District voters approved an ad valorem tax on tangible property. Some tax has been collected each year since that time. The Nebraska Game and Parks Commission furnished a letter of intent to share in fish, wildlife, and recreation costs but later withdrew it because of anticipated budgetary constraints.

CEDAR RAPIDS DIVISION

| | | | |
|--------------------------|--|-----------------|--------------------------------|
| CONSTRUCTION PERIOD: | 7 Years (Partial Water Delivery after 4 years) | ECONOMIC LIFE: | 100 Years |
| AVERAGE ANNUAL COST: | \$1,254,300 | ANNUAL O.M.&R.: | \$133,800 |
| INTEREST RATE: | 3 1/8 Percent | BY: | Cedar Valley Reclamation Dist. |
| BENEFIT-COST RATIO: | 1.40 to 1.00 | COSTS BASED ON: | 1964 Prices |
| IRRIGATION SERVICE AREA: | 26,800 Acres | LAND REQUIRED: | 12,252 Acres |

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

| | Irrigation | Fish & Wildlife | Recreation | Flood Control | Total |
|-------------------|------------|-----------------|------------|---------------|---------|
| Direct Benefits | 1,207.6 | 58.9 | 37 | 14 | 1,317.5 |
| Indirect Benefits | 439.3 | -0- | -0- | -0- | 439.3 |
| Total Benefits | 1,646.9 | 58.9 | 37 | 14 | 1,756.8 |

Table 2 - Project Costs and Repayment by Source
(Thousand Dollars)

| | Irrigation | Fish & Wildlife | Recreation | Flood Control | Total |
|----------------------|------------|-----------------|------------|---------------|---------|
| Project Costs | 31,599 | 1,414 | 576 | 351 | 33,940 |
| Non-Reimbursable | -0- | 1,342 | 457 | 351 | 2,150 |
| Reimbursable | 31,599 | 72* | 119* | -0- | 31,790* |
| Mo. R. Basin Power | 24,714 | -0- | -0- | -0- | 24,714 |
| Non-Federal (Public) | -0- | 72* | 119* | -0- | 191* |
| Local | 6,885 | -0- | -0- | -0- | 6,885 |

* Does not include repayable interest during construction

Table 3 - Average Annual Water Requirements

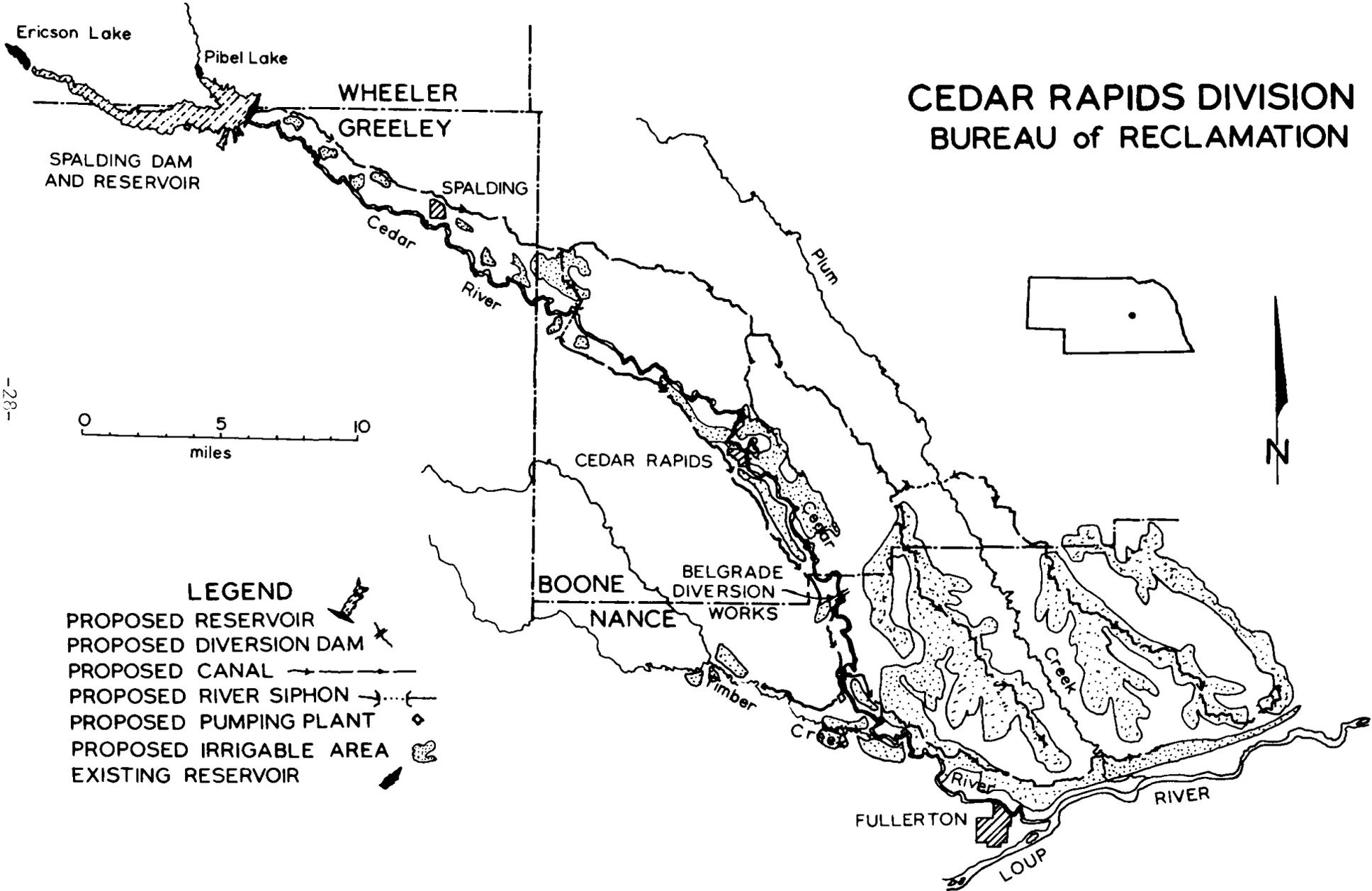
| | |
|------------------------------|--|
| Crop Irrigation Requirement: | 1.03 ac.ft./ac. |
| Farm Delivery Requirement: | 1.47 ac.ft./ac. |
| Diversion Requirement: | 2.94 ac.ft./ac.-Spalding 3.45 ac.ft./ac.-Belgrade |
| Total Diversion Requirement: | 76,800 ac.ft. |
| Streamflow Depletion: | 61,400 ac.ft.-Spalding 17,400 ac.ft.-Belgrade |

Table 4 - Dam & Reservoir Data

| | |
|--------------------|------------------|
| Spalding Dam | |
| Height: | 86 feet |
| Length: | 4,860 feet |
| Spillway Capacity: | 2,680 c.f.s. |
| Drainage Area: | 794 square miles |
| Spalding Reservoir | |
| Capacity | Acre-Feet |
| Surcharge | 26,820 |
| Sediment | 3,200/100 yr. |
| Conservation | 46,000 |
| Total | 81,430* |
| Surface Area | Acres |
| Surcharge Pool | 4,370 |
| Conservation Pool | 3,570 |

* Excludes Surcharge

CEDAR RAPIDS DIVISION BUREAU of RECLAMATION

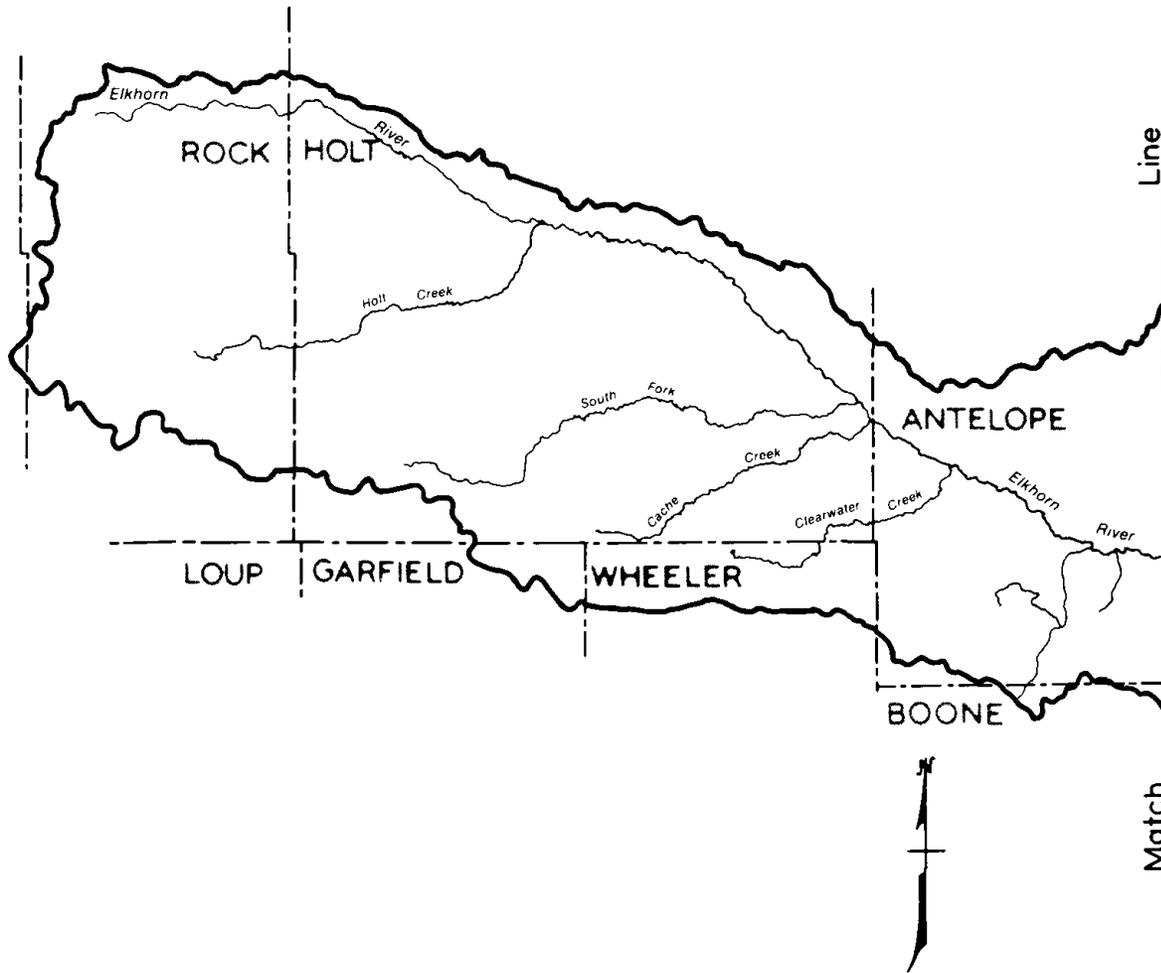


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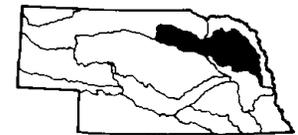
- LEGEND**
- PROPOSED RESERVOIR 
 - PROPOSED DIVERSION DAM 
 - PROPOSED CANAL 
 - PROPOSED RIVER SIPHON 
 - PROPOSED PUMPING PLANT 
 - PROPOSED IRRIGABLE AREA 
 - EXISTING RESERVOIR 

ELKHORN RIVER BASIN

Sheet 1 of 2

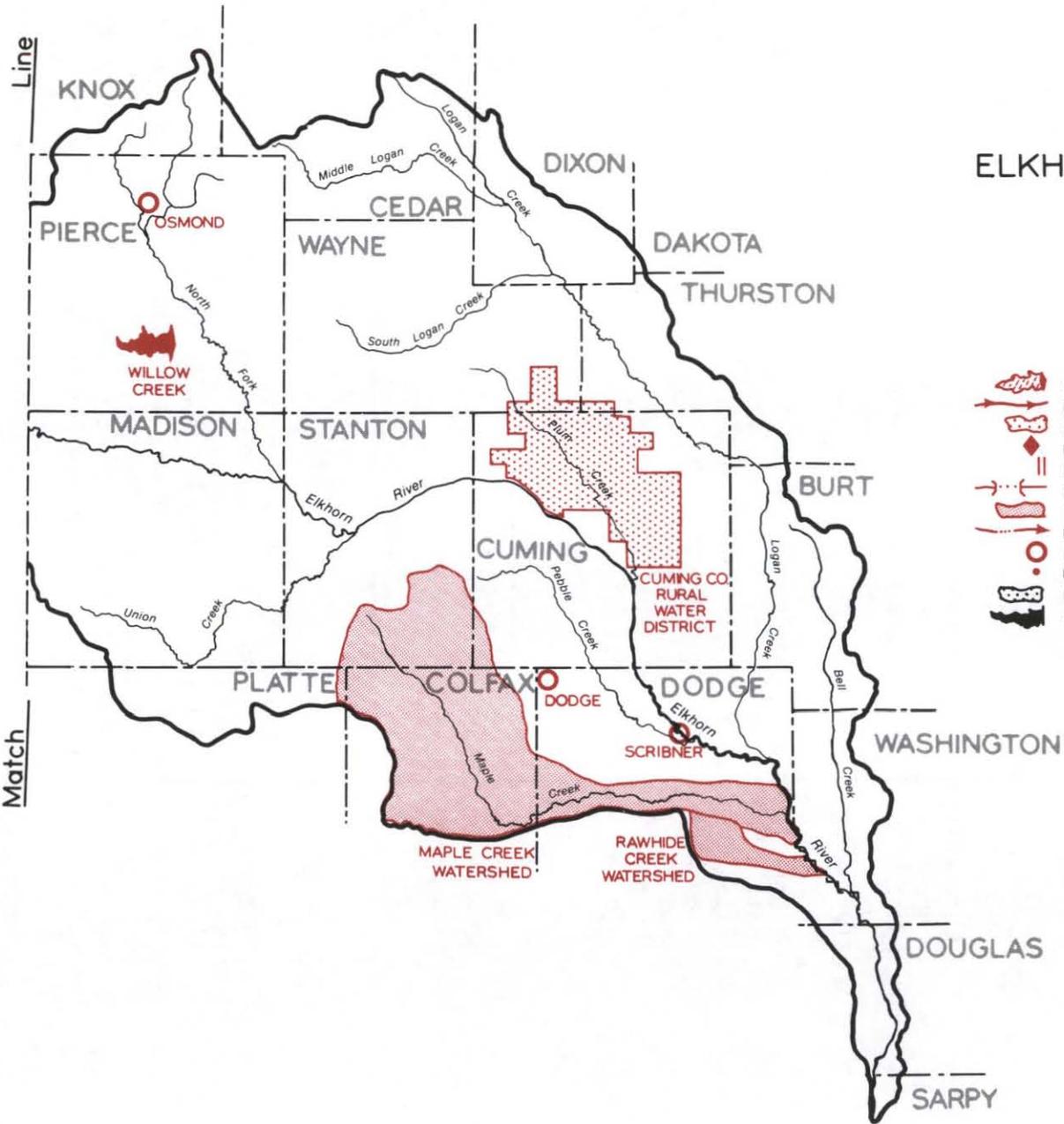


Scale 1:1,000,000



ELKHORN RIVER BASIN

Sheet 2 of 2



- LEGEND***
- PROPOSED DAM & RESERVOIR SITE
 - PROPOSED CANAL
 - PROPOSED PROJECT SERVICE AREA
 - PROPOSED PUMPING PLANT
 - PROPOSED DIVERSION DAM
 - PROPOSED RIVER SIPHON
 - PROPOSED WATERSHED PROJECT
 - PROPOSED FLOODWAY
 - PROPOSED LOCAL FLOOD PROTECTION PROJECT
 - PROPOSED PROJECT WELL
 - EXISTING PROJECT SERVICE AREA
 - EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.

-30-

CHAPTER 8. ELKHORN RIVER BASIN

The Elkhorn River rises in the eastern part of the Sandhills in north-central Nebraska and flows southeastward to join the Platte River about 30 miles upstream from its confluence with the Missouri River. The area of the Elkhorn River Basin is about 7,000 square miles, nearly 10 percent of the State's total area.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Corporation Gulch Watershed (SCS)
Pender Local Flood Protection (COE)
Meadow Grove Local Flood Protection (COE)

INACTIVE OR TERMINATED

Wakefield Local Flood Protection (COE)
Battle Creek Local Flood Protection (COE)
Giles Creek Local Flood Protection (COE)
King Lake Local Flood Protection (COE)
Logan Unit (BuRec)
Norfolk Unit (BuRec)
Highland Unit (BuRec)

Potential Projects

There are no more documented potential projects in this Basin of the type presented in this volume.

Projects In Planning

MAPLE CREEK WATERSHED

Description. This Soil Conservation Service watershed project is located in Colfax, Dodge, and Stanton Counties. The purpose of the project is to reduce flood damage in the Maple Creek valley and to provide some recreational benefits to the area. Preliminary investigations indicate a project involving 28 floodwater retarding structures, including three multipurpose structures with recreation water storage, would be feasible. The total estimated cost of constructing the project is \$4,229,500.

Current Status. A report on the preliminary investigation was completed in September 1972. Work plan investigations are scheduled for completion in 1978.

OSMOND LOCAL FLOOD PROTECTION

Description. This Corps of Engineers project would be located on the East Branch of North Fork Elkhorn River in the city of Osmond. The purpose of the project is to reduce flood damages to Osmond through channel improvement. In 1971 it was estimated the project would cost approximately \$425,000.

Current Status. The reconnaissance report was completed in September 1971. The project is currently being evaluated as part of the ongoing Platte River and Tributaries, Nebraska Level C Study.

DODGE LOCAL FLOOD PROTECTION

Description. This Corps of Engineers project would be located on an unnamed stream in the town of Dodge, Dodge County. It would provide flood protection through channel improvements, levees, and a drainage ditch. Estimated cost of the project in 1967 was \$246,000.

Current Status. The reconnaissance report was completed in March 1967. The project is currently being evaluated as part of the ongoing Platte River and Tributaries, Nebraska Level C Study.

WILLOW CREEK DAM AND RECREATION AREA

Description. This proposed project, which includes a multipurpose dam and recreation facilities, is located near the town of Pierce in Pierce County. The Lower Elkhorn Natural Resources District is responsible for investigation of this project. The primary purpose of the project is to provide recreation benefits for the surrounding area, but it will also provide some incidental flood control benefits. The total estimated cost of constructing the project is \$6,237,000.

Current Status. A preliminary feasibility study was completed in 1974. A project proposal has been submitted to the Natural Resources Commission to determine the possibility of obtaining funding assistance from the Resources Development Fund. A computer model study to be completed by December 1, 1976 will determine the base flow of Willow Creek and indicate the size of the recreation pool for the site.

SCRIBNER LOCAL FLOOD PROTECTION

Description. This proposed Corps of Engineers project is located along Pebble Creek near the city of Scribner. The purpose of the project is to provide flood protection to 130 acres in the city of Scribner with a levee 4.7 miles long. The total estimated cost of constructing the project is \$509,000.

Current Status. This project is currently being evaluated as part of the ongoing Platte River and Tributaries, Level C Study.

CUMING COUNTY RURAL WATER DISTRICT PHASE 2

Description. This proposed rural water district is located in an area encompassing about 30 percent of Cuming County and small portions of Wayne and Thurston Counties. The purpose of the project is to provide domestic and livestock water service to approximately 150 rural users. Project features in preliminary plans include approximately 120 miles of pipe, one elevated storage reservoir, and two wells. The total estimated cost of constructing the project is \$760,000.

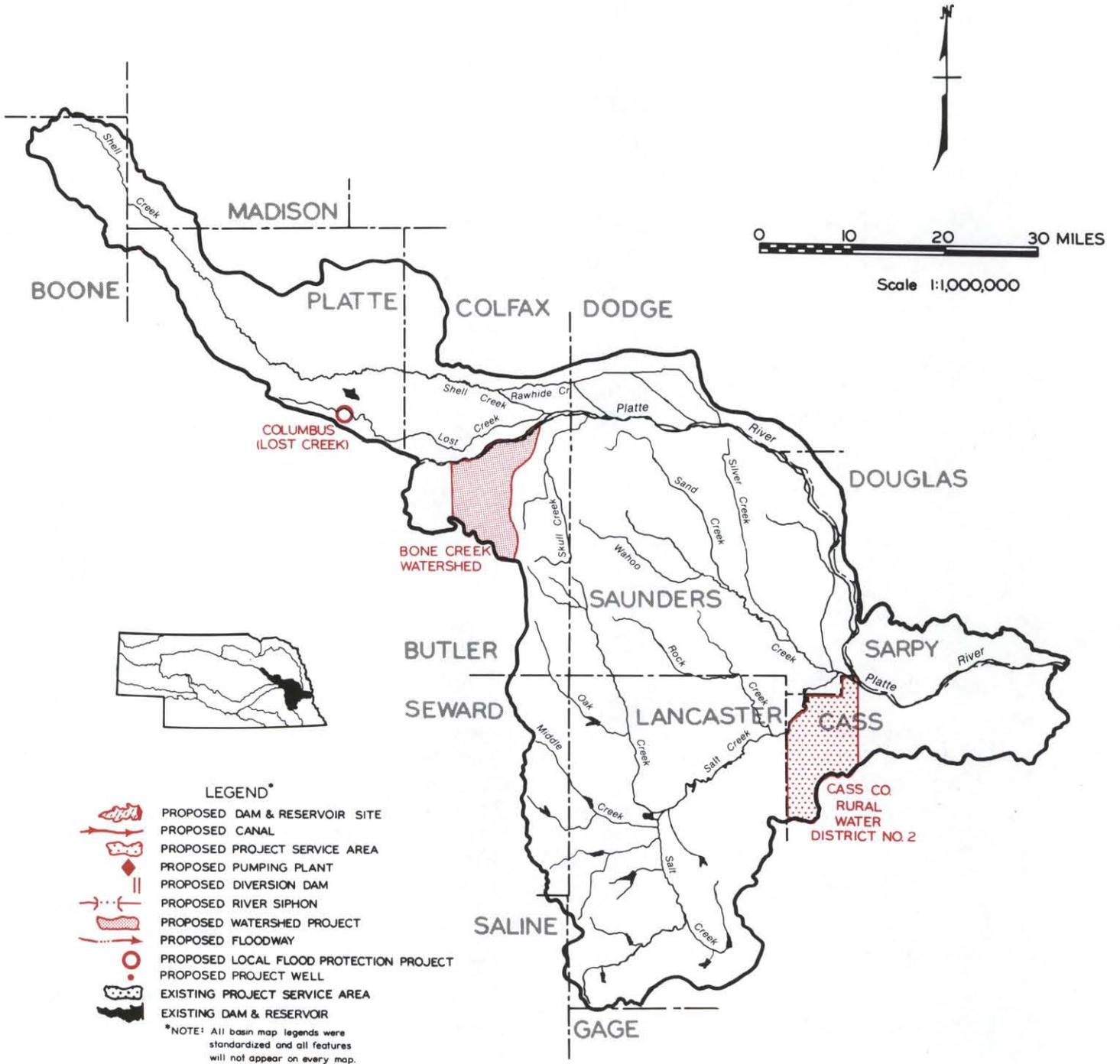
Current Status. Organizational meetings have been held and easements are presently being negotiated. A detailed project report is scheduled for completion in the spring of 1977.

RAWHIDE CREEK WATERSHED

Description. This proposed project is located northwest of the city of Fremont. The Lower Platte North Natural Resources District is responsible for investigation of the project. The primary purpose is to provide flood protection for the city of Fremont. Project features include a flood-water retarding structure, channel improvements, and levees. The total estimated cost of constructing the project is \$790,000.

Current Status. A project proposal submitted to the Nebraska Resources Development Fund has been approved by the Natural Resources Commission's Advisory Board and a formal project application is being prepared.

LOWER PLATTE RIVER BASIN



CHAPTER 9. LOWER PLATTE RIVER BASIN

The Lower Platte River Basin is that part of the Platte River drainage area, exclusive of the Elkhorn River drainage, extending from the mouth of the Loup River to the Missouri River. The 3,110 square miles in the Basin includes the valley of the Platte River, the drainage areas of Shell, Salt, and Wahoo Creeks, and a number of other smaller tributary streams.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Platte River and Lost Creek, Schuyler Local Flood Protection (COE)
Clear Creek Watershed (SCS)

INACTIVE OR TERMINATED

Shell Creek and Tributaries (COE)
Linwood Unit (BuRec)

Potential Projects

There are no more documented potential projects in this Basin of the type presented in this volume.

Projects In Planning

BONE CREEK WATERSHED

Description. The Bone Creek watershed located south of the Platte River in Butler County suffers flood and sediment damage on the Platte River valley lands in the lower reaches of the watershed. The preliminary investigation by the Soil Conservation Service indicates a structural program including three floodwater retarding structures may prove feasible. The total drainage area of the project covers approximately 46,000 acres. The total estimated cost of constructing the project is \$1,658,000.

Current Status. A preliminary investigation report has been completed and work plan investigations are scheduled for completion in 1978.

LOST CREEK NORTH OF COLUMBUS LOCAL FLOOD PROTECTION

Description. This Corps of Engineers project would provide flood protection to Columbus and the area north of the city. The reconnaissance report recommends channel improvement for Lost Creek and an adjoining green-

belt area. The total estimated cost of constructing the project is \$3,766,000.

Current Status. The project is being further evaluated as part of the Platte River and Tributaries, Nebraska Level C Study. The city of Columbus has indicated a willingness to provide the local cooperation.

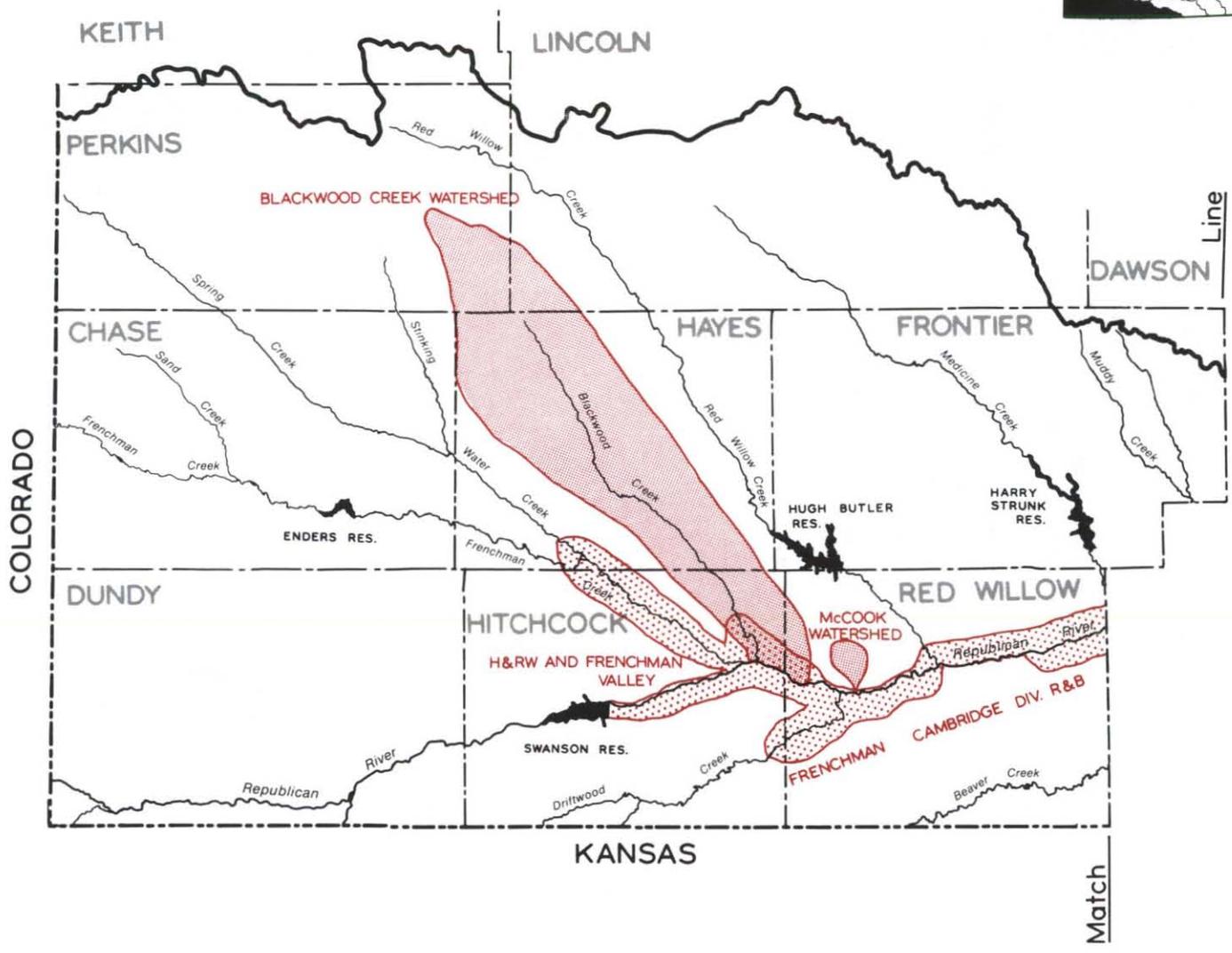
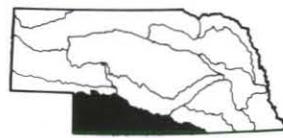
CASS COUNTY RURAL WATER DISTRICT #2

Description. This proposed rural water district includes an area generally about eight miles wide along the west side of Cass County. The purpose of the project is to provide domestic and livestock water service to approximately 500 rural users and the villages of Eagle and Elmwood. Project features include approximately 230 miles of pipe and two elevated storage tanks with an estimated combined capacity of 450,000 gallons. The source of supply will be two district wells or the city of Lincoln. The total estimated cost of constructing the project is \$2,900,000.

Current Status. Organizational meetings were held in the summer of 1976. The detailed project report is scheduled for completion in the spring of 1977. A source of potable water must be selected before more detailed planning can be undertaken.

REPUBLICAN RIVER BASIN

Sheet 1 of 2



-37-

REPUBLICAN RIVER BASIN

Sheet 2 of 2



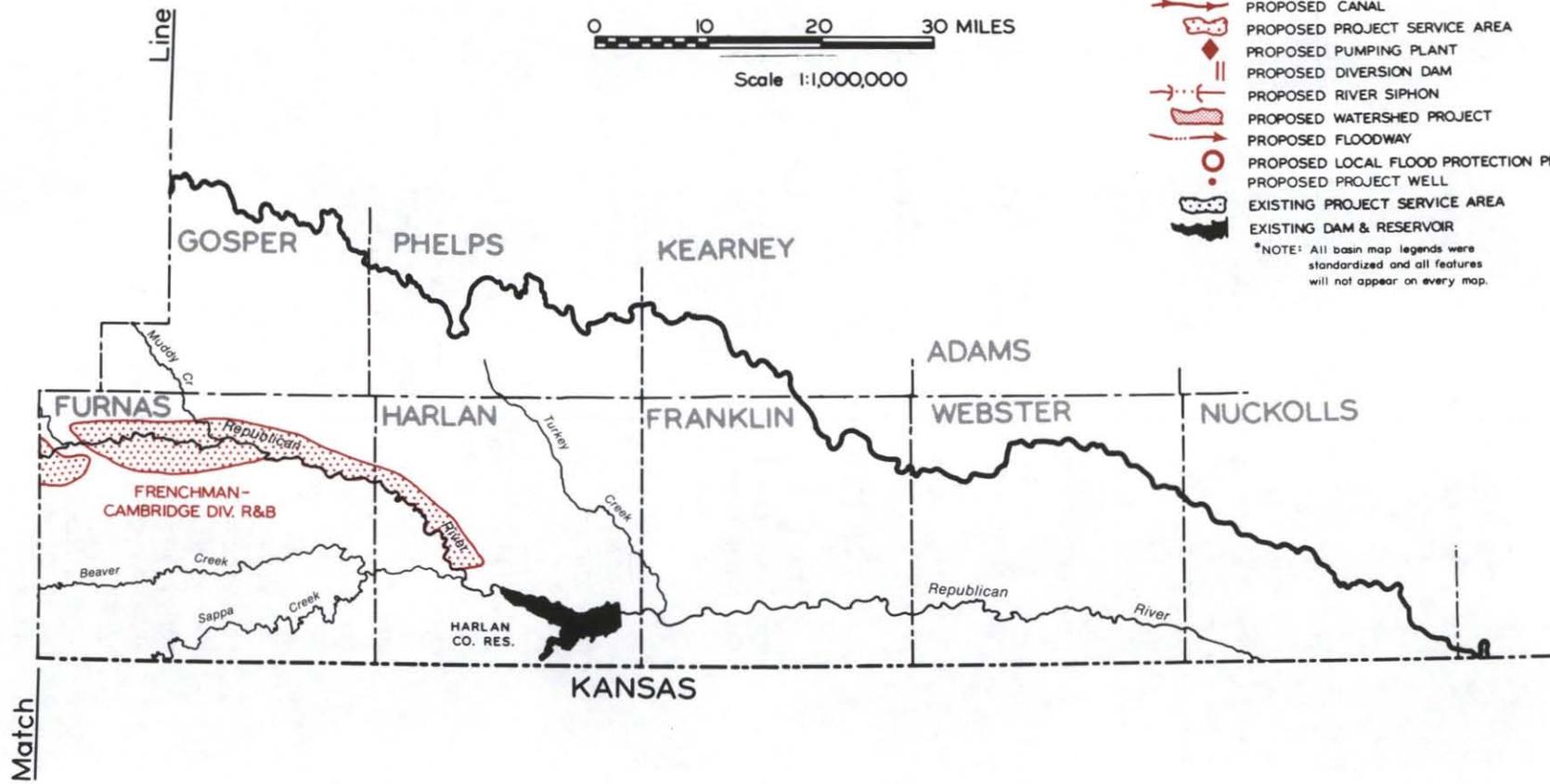
0 10 20 30 MILES

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LEGEND*

-  PROPOSED DAM & RESERVOIR SITE
-  PROPOSED CANAL
-  PROPOSED PROJECT SERVICE AREA
-  PROPOSED PUMPING PLANT
-  PROPOSED DIVERSION DAM
-  PROPOSED RIVER SIPHON
-  PROPOSED WATERSHED PROJECT
-  PROPOSED FLOODWAY
-  PROPOSED LOCAL FLOOD PROTECTION PROJECT
-  PROPOSED PROJECT WELL
-  EXISTING PROJECT SERVICE AREA
-  EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.



CHAPTER 10. REPUBLICAN RIVER BASIN

The Republican River Basin lies in the southwest corner of the State and occupies 9,650 square miles, about one-eighth of the State's total area.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Medicine Creek (Upper and Lower) Watershed (SCS)

INACTIVE OR TERMINATED

Frenchman-Cambridge Division Supplemental Water Supply Study (BuRec)

Potential Projects

BLACKWOOD CREEK WATERSHED

The Soil Conservation Service is the agency primarily responsible for investigation and design of the Blackwood Creek Watershed project. The principal purposes of the project are to prevent floodwater, erosion, and sediment damages.

Current Status. The Blackwood Creek Watershed Work Plan has been completed and is now in committees of Congress awaiting authorization for construction.

Description of Project Area. Blackwood Creek is a tributary of the Republican River. The watershed, located in Red Willow, Hayes, Hitchcock, Lincoln, and Perkins Counties, consists of two hydrologic and economic units, the Blackwood Creek Unit and the Perry Drain Unit. The watershed area consists of a series of narrow flat-topped divides separated by steep-walled drainageways of considerable relief. The average annual precipitation for Blackwood Watershed is 20 inches. The average growing season is 147 days and 65 percent of the rainfall occurs during that period.

The economy of the area is agriculturally based with grain and livestock farms as the major units. The distribution of land use in the watershed is approximately 41 percent cropland, 56 percent rangeland, and 3 percent devoted to other uses. The principal crops grown include wheat, corn, alfalfa, and grain sorghum.

Project Description. The project will consist of land treatment measures and 13 floodwater retarding structures, nine in the Blackwood Creek Unit and four in the Perry Drain Unit.

Structural and land treatment measures will reduce the floodwater damages by about 57 percent and erosion and sediment damages by about 70 percent.

Public Interest. The Middle Republican Natural Resources District is the local organization sponsoring this project.

BLACKWOOD CREEK WATERSHED

| | | | |
|----------------------------|--|---------------------|---------------|
| CONSTRUCTION PERIOD: | 5 Years | INTEREST RATE: | 6 7/8 Percent |
| PROJECT INSTALLATION COST: | \$4,276,700 | BENEFIT-COST RATIO: | 2.2 to 1.0 |
| FEDERAL: | \$1,367,500 | ECONOMIC LIFE: | 50 Years |
| NON-FEDERAL: | \$2,909,200 | COST BASED ON: | 1973 Prices |
| O. & M. BY: | Middle Republican Natural Resources District | | |

Table 1 - Average Annual Structural Benefits

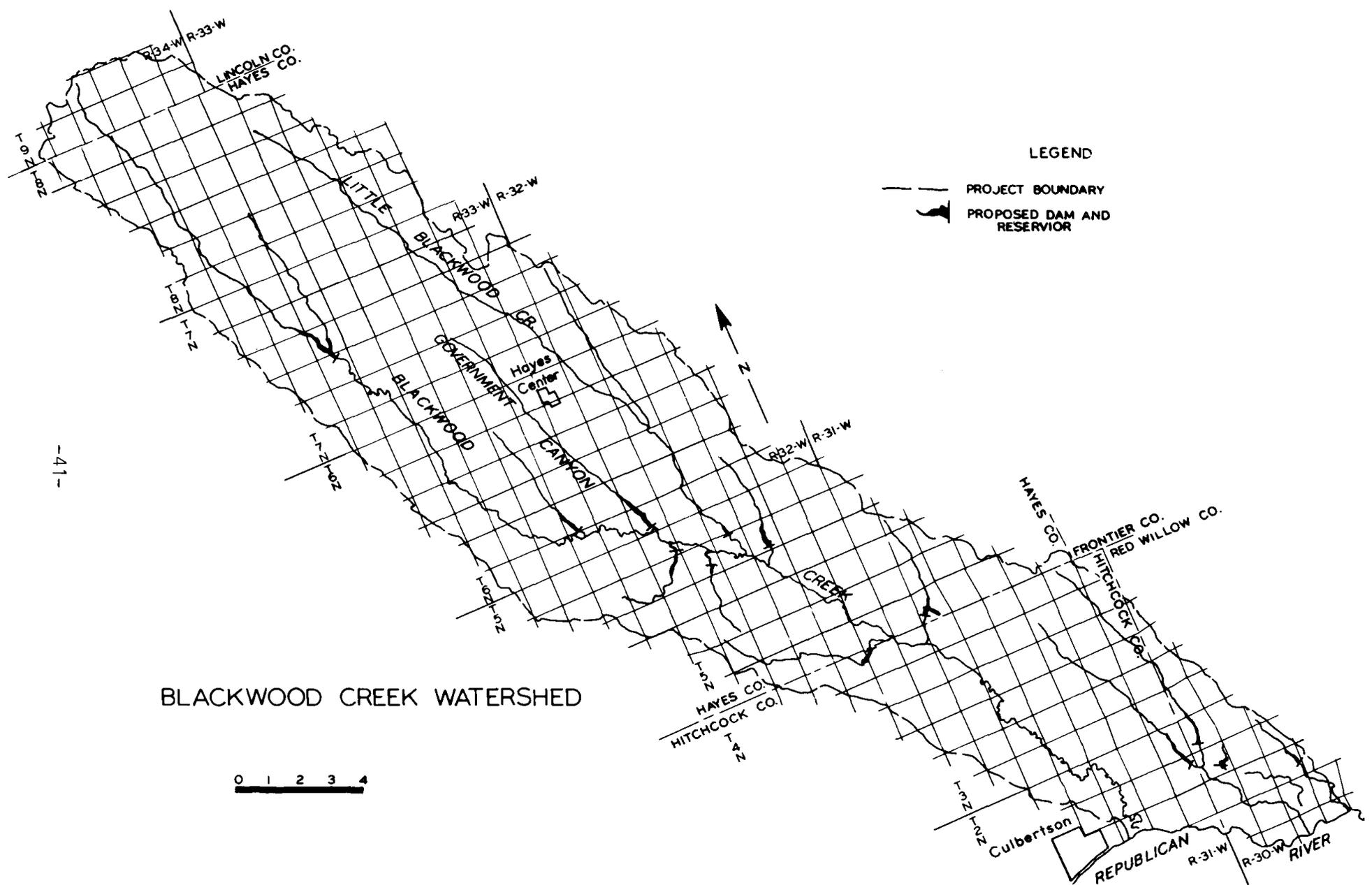
| Flood and Erosion Control | More Intensive Land Use | Incidental Ground-water Recharge | Secondary | Total |
|---------------------------|-------------------------|----------------------------------|-----------|-----------|
| \$66,600 | \$21,400 | \$3,200 | \$91,300 | \$182,500 |

Table 2 - Average Annual Structural Costs

| | Installation | O. & M. | Total |
|----------------|--------------|---------|----------|
| Structures | \$70,770 | \$3,750 | \$74,520 |
| Administration | 10,280 | | 10,280 |
| Total | 81,050 | \$3,750 | \$84,800 |

Table 3 - Reservoir Data

| Number of Structures | Total Controlled Drainage Area (Acres) | Storage Capacity (Acre-Feet) | | |
|----------------------|--|------------------------------|----------|---------------|
| | | Initial | Sediment | Flood Control |
| 13 | 97,500 | 21,215 | 2,692 | 18,523 |



LEGEND

- PROJECT BOUNDARY
- PROPOSED DAM AND RESERVIOR

BLACKWOOD CREEK WATERSHED



Projects In Planning

FRENCHMAN-CAMBRIDGE IRRIGATION DISTRICT REHABILITATION AND BETTERMENT

Description. This Bureau of Reclamation project would be located in Hitchcock, Red Willow, Furnas, and Harlan Counties. The results of a survey indicated the need and justification for converting approximately one-half of the present open ditch laterals to pipe.

Current Status. A reevaluation of the project has been made under revised guidelines and includes revised cost estimates, evaluation of payment capacity, a repayment schedule, and an environmental assessment. A construction appropriation was written in by Congress for fiscal year 1977. The Frenchman-Cambridge Irrigation District continues to support the program.

H&RW AND FRENCHMAN VALLEY REHABILITATION AND BETTERMENT

Description. The H&RW and Frenchman Valley Irrigation Districts located in Hayes, Hitchcock and Red Willow Counties comprise the Frenchman Unit within the Frenchman-Cambridge Division. This unit has experienced a declining water supply due to groundwater development upstream of Enders Reservoir. The program was initiated in May 1976 to determine the effectiveness of installing wells to recover project water being lost to deep percolation.

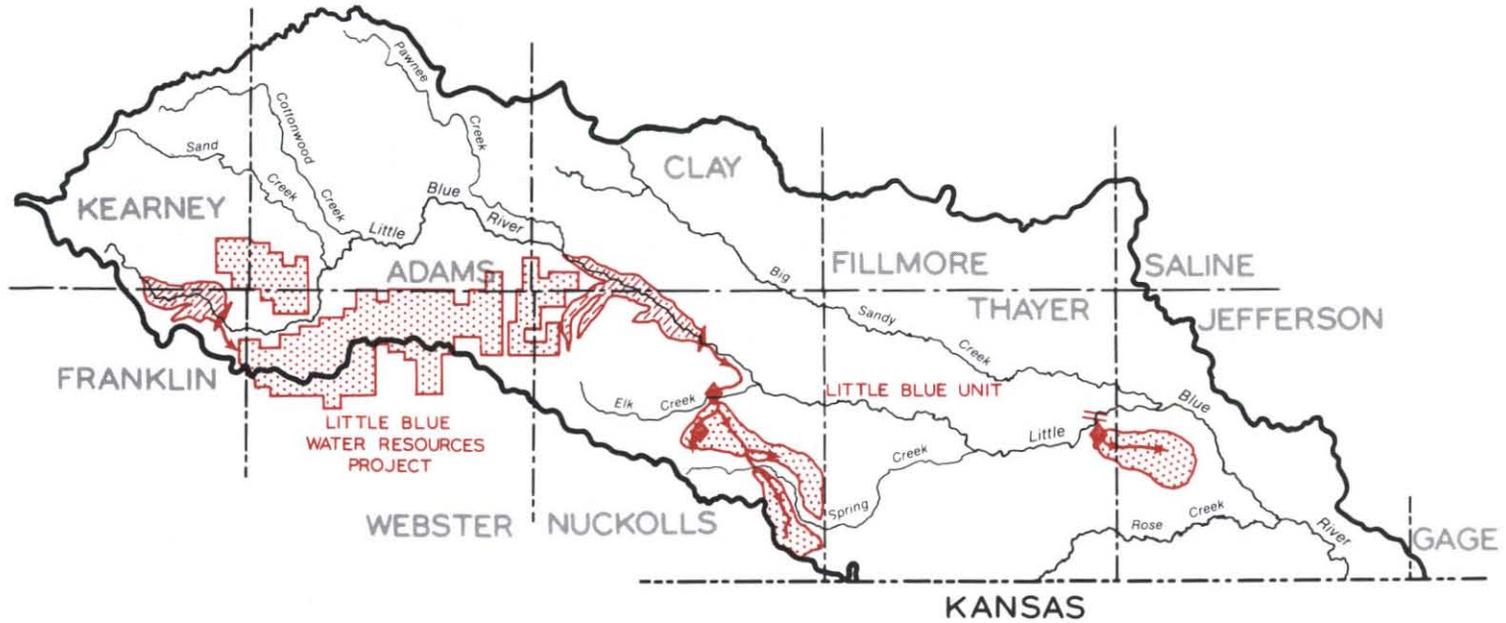
Current Status. The Geological Survey is currently studying the groundwater resources in the area under a cooperative agreement with the Bureau of Reclamation to determine the amount of groundwater which can be attributed to surface water irrigation in the H&RW and Frenchman Valley Irrigation Districts. Groundwater development will be recommended if an adequate water supply can be identified and it can be demonstrated that the irrigation districts will have sufficient payment capacity to repay the costs within the anticipated life of the facilities. The studies are scheduled for completion during fiscal year 1977.

McCook FLOOD CONTROL

Description. This proposed project is located near the north edge of the city of McCook. The Middle Republican Natural Resources District is responsible for investigation of the project. The primary purpose is to provide protection from floodwater and sediment damage to the city of McCook. Project features include two floodwater retarding and sediment detention dams and channel improvements. The total estimated cost of constructing the project is \$653,032.

Current Status. A project proposal submitted to the Nebraska Resources Development Fund has been approved by the Natural Resources Commission's Advisory Board. A consulting firm has been hired and a formal application is being prepared.

LITTLE BLUE RIVER BASIN

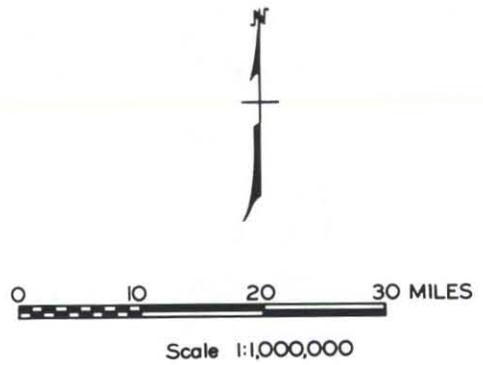
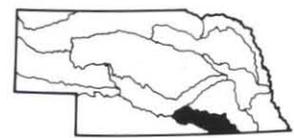


-43-

LEGEND*

-  PROPOSED DAM & RESERVOIR SITE
-  PROPOSED CANAL
-  PROPOSED PROJECT SERVICE AREA
-  PROPOSED PUMPING PLANT
-  PROPOSED DIVERSION DAM
-  PROPOSED RIVER SIPHON
-  PROPOSED WATERSHED PROJECT
-  PROPOSED FLOODWAY
-  PROPOSED LOCAL FLOOD PROTECTION PROJECT
-  PROPOSED PROJECT WELL
-  EXISTING PROJECT SERVICE AREA
-  EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.



CHAPTER 11. LITTLE BLUE RIVER BASIN

This Basin is located in south-central and southeastern Nebraska between the Republican, Middle Platte, and Big Blue River Basins. It occupies an area of 2,650 square miles, second smallest in the State.

Potential Projects

LITTLE BLUE UNIT

The Bureau of Reclamation is the agency primarily responsible for investigation of the Little Blue Unit, a proposed multipurpose project to provide flood control, recreation, fish and wildlife, and irrigation benefits.

Current Status. A favorable feasibility report completed in 1966 must be reevaluated to be responsive to new multiple-objective planning guidelines. As a result of extremely strong local support from both the existing irrigation district and the Little Blue Natural Resources District, the Bureau of Reclamation has given this study a high priority for initiation during fiscal year 1978.

Description of Project Area. The potential Little Blue Unit is located on the Little Blue River in Clay, Nuckolls, Thayer and Jefferson Counties. The area encompassing the Little Blue Unit is comprised of loess mantled uplands with a well-developed drainage pattern, narrow terraces, and narrow flood plains. The average annual precipitation is 27 inches of which about 83 percent occurs during the six-month growing season from April through September.

The economy is agriculturally based with livestock, wheat, and corn being the chief exports of the area. Most of the industrial firms in the area are engaged in processing local agricultural products.

Project Description. Project features include a multipurpose dam and reservoir, three pumping plants, six small relift pumps, a diversion dam, canals, and distribution systems. Angus Dam and Reservoir, located about three miles northwest of the town of Angus, would provide storage for project purposes.

A canal heading in the right abutment would deliver water to two pumping plants required to lift the water into the distribution systems serving irrigable lands in southeastern Nuckolls County.

Gilead Diversion Dam and Pumping Plant, to be located on the Little Blue River approximately 35 miles southeast of Angus Dam, would divert water to irrigable lands in Thayer and Jefferson Counties.

Angus Dam and Reservoir would significantly reduce downstream flood

damages to valley lands, several cities and towns, a number of roads and highways, and utilities and railroad lines. The recreation and fish and wildlife features of this project would provide 225,000 recreation days, 55,500 fisherman days, and 1,500 hunter days annually.

Public Interest. The Little Blue River Irrigation and Flood Control Committee was organized in 1956 and has actively supported the proposed project. Nuckolls, Thayer, and Jefferson Counties have assessed special tax levies to financially assist the sponsors in promoting the unit. The Little Blue Natural Resources District supports the reevaluation of the Little Blue Unit.

LITTLE BLUE UNIT

| | | | |
|--------------------------|---------------|-----------------|------------------------------|
| CONSTRUCTION PERIOD: | 6 Years | ECONOMIC LIFE: | 100 Years |
| AVERAGE ANNUAL COST: | \$3,731,700 | ANNUAL O.M.&R.: | \$259,500 |
| INTEREST RATE: | 5 1/8 Percent | BY: | Little Blue Irrigation Dist. |
| BENEFIT-COST RATIO: | 1.25 to 1.00 | COSTS BASED ON: | 1969 Prices |
| IRRIGATION SERVICE AREA: | 20,000 Acres | LAND REQUIRED: | 22,260 Acres |

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

| | Flood Control | Recreation | Fish & Wildlife | Irrigation | Total |
|-------------------|---------------|------------|-----------------|------------|---------|
| Direct Benefits | 1,778 | 341.9 | 170.2 | 1,899.5 | 4,189.6 |
| Indirect Benefits | -0- | Not Avail. | -0- | 461.2 | 461.2 |
| Total Benefits | 1,778 | 341.9 | 170.2 | 2,360.7 | 4,650.8 |

Table 2 - Project Costs and Payment by Source
(Thousand Dollars)

| | Flood Control | Recreation | Fish & Wildlife | Irrigation | Total |
|----------------------|---------------|---------------------|-------------------|----------------------|----------------------|
| Project Costs | 22,106 | 3,789 | 1,918 | 35,736 | 63,549 ^{1/} |
| Non-Reimbursable | 22,106 | 2,882.5 | 1,728 | -0- | 26,716.5 |
| Reimbursable | -0- | 906.5 ^{2/} | 190 ^{2/} | 35,736 ^{3/} | 36,832.5 |
| Mo. R. Basin Power | -0- | -0- | -0- | -- | -- |
| Non-Federal (Public) | -0- | 906.5 | 190 | -0- | 1,096.5 |
| Local | -0- | -0- | -0- | -- | -- |

^{1/} Does not include \$150,000 for non-reimbursable road relocations, or \$419,000 for investigations

^{2/} Does not include repayable interest during construction

^{3/} The district will repay within its ability; the balance will be paid by Pick-Sloan Missouri Basin Program power revenues

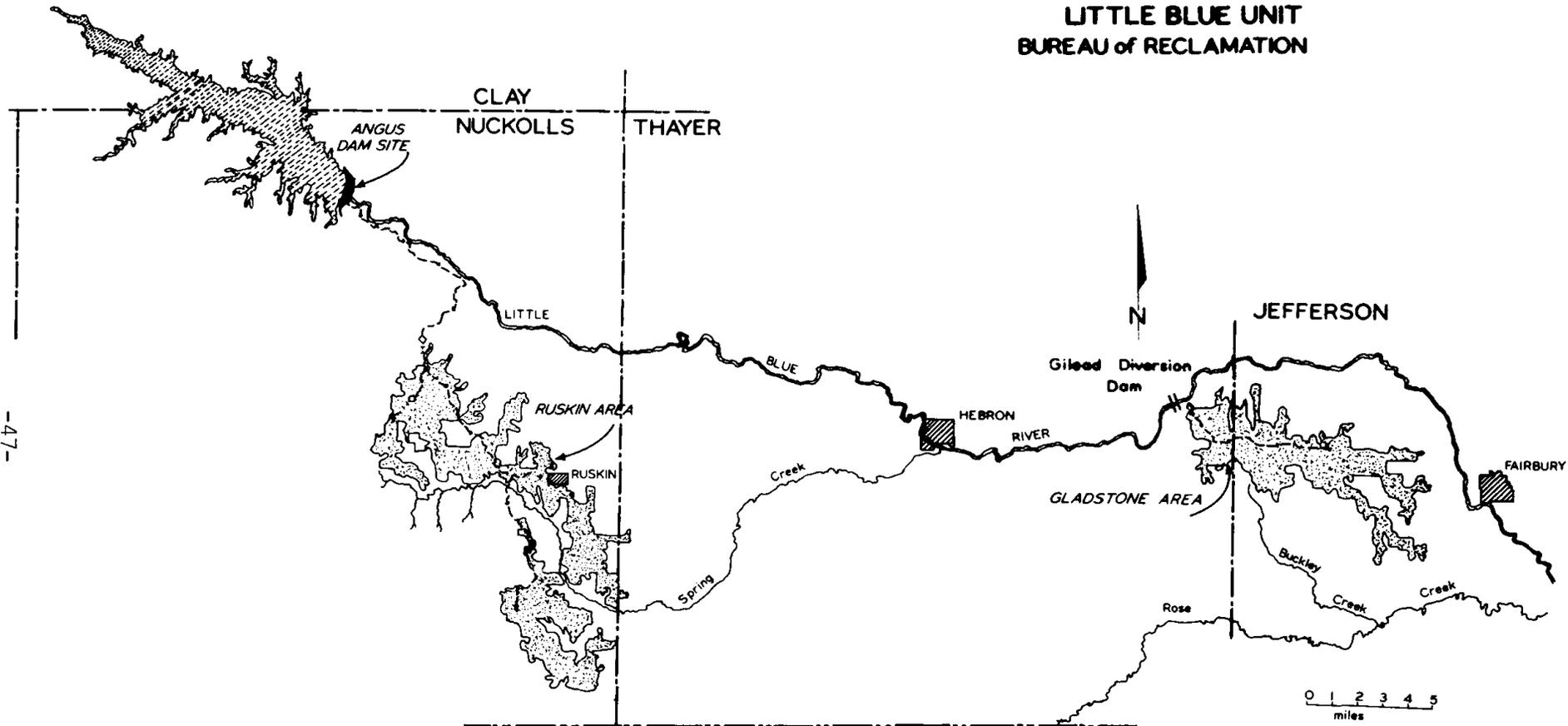
Table 3 - Average Annual Water Requirements

| | |
|-----------------------|---|
| Crop Irrig. Req.: | Ruskin 0.80 ac.ft./ac.; Gladstone 0.71 ac.ft./ac. |
| Farm Del. Req.: | Ruskin 1.23 ac.ft./ac.; Gladstone 1.09 ac.ft./ac. |
| Diversion Req.: | Ruskin 1.82 ac.ft./ac.; Gladstone 1.49 ac.ft./ac. |
| Total Div. Req.: | 31,600 acre feet |
| Return Flow: | 11,300 acre feet |
| Streamflow Depletion: | 26,400 acre feet |

Table 4 - Dam and Reservoir Data

| | |
|-----------------------------------|---------------------------------|
| Angus Dam | |
| Height: 120 feet | Length: 11,160 feet |
| Spillway Capacity: 158,800 c.f.s. | Drainage Area: 1,098 square mi. |
| Angus Reservoir | |
| Capacity | Acre Feet |
| Flood Control | 337,000 |
| Surcharge | 56,000 |
| Conservation | 94,800 |
| Sediment | 26,000/100 years |
| Total | 440,000 |
| Surface Area | Acres |
| Flood Control Pool | 12,964 |
| Surcharge Pool | 14,006 |
| Conservation Pool | 5,080 |

**LITTLE BLUE UNIT
BUREAU of RECLAMATION**



- LEGEND**
- PROPOSED RESERVOIR 
 - PROPOSED CANAL 
 - PROPOSED IRRIGABLE AREAS 
 - PROPOSED PUMPING PLANT 
 - PROPOSED DIVERSION DAM 



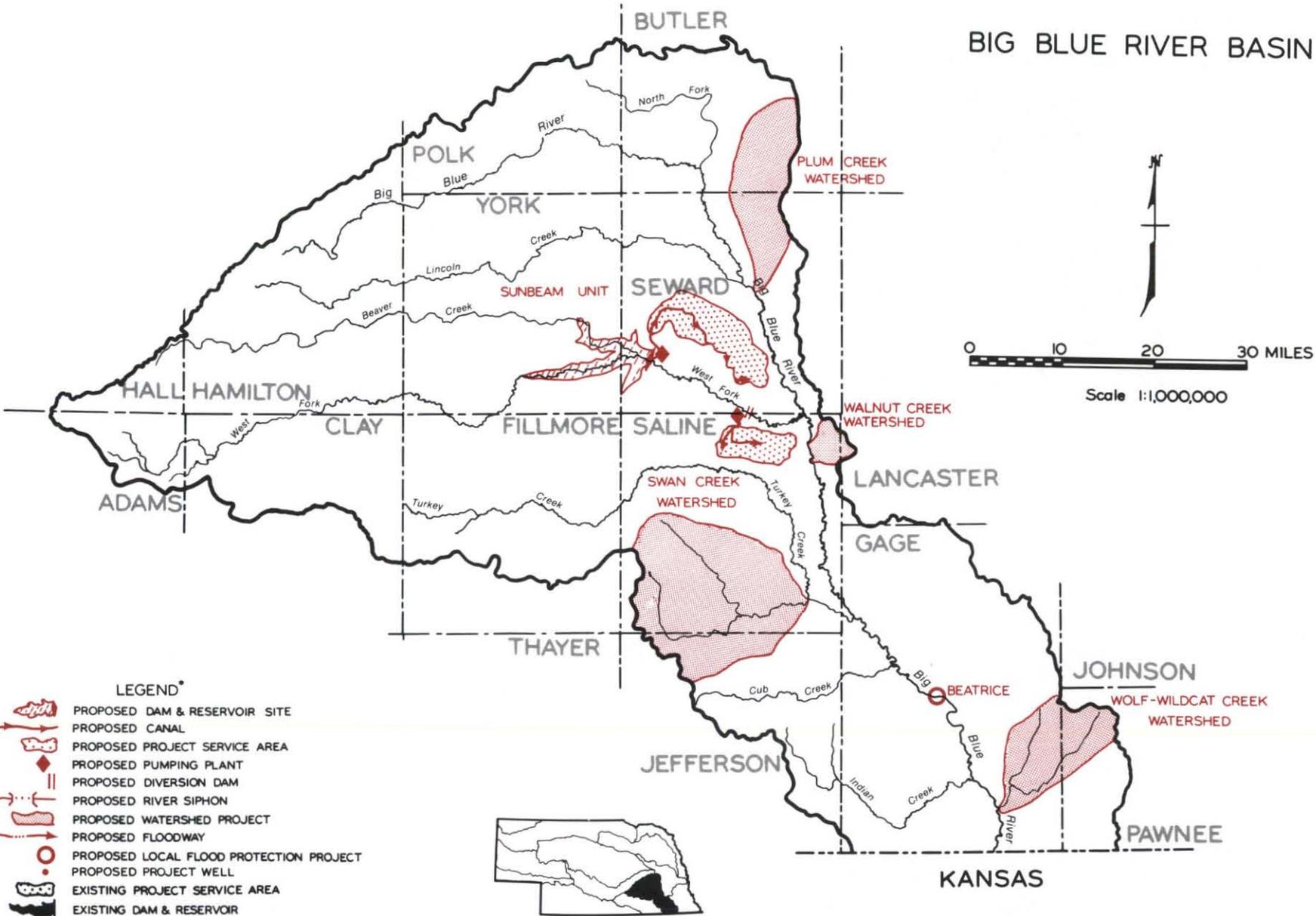
Projects In Planning

LITTLE BLUE WATER RESOURCES PROJECT

Description. This proposed irrigation project is located in Kearney, Franklin, Adams, Nuckolls, Clay, and Webster Counties. The Little Blue Natural Resources District is primarily responsible for investigation of this project. Preliminary plans include a 24-mile long supply canal that would divert from the Phelps County Canal Central Nebraska Public Power and Irrigation District power return flows normally returned to the Platte River during the off season from September through January. Up to 115,000 acre-feet could be diverted for storage in a reservoir on the Little Blue River. The total estimated project costs range from \$56,200,000 for a project that would irrigate 40,000 acres to \$81,800,000 for a project that would irrigate 66,500 acres.

Current Status. A pre-feasibility report completed in October, 1976 indicates the project may be feasible.

BIG BLUE RIVER BASIN



LEGEND*

-  PROPOSED DAM & RESERVOIR SITE
-  PROPOSED CANAL
-  PROPOSED PROJECT SERVICE AREA
-  PROPOSED PUMPING PLANT
-  PROPOSED DIVERSION DAM
-  PROPOSED RIVER SIPHON
-  PROPOSED WATERSHED PROJECT
-  PROPOSED FLOODWAY
-  PROPOSED LOCAL FLOOD PROTECTION PROJECT
-  PROPOSED PROJECT WELL
-  EXISTING PROJECT SERVICE AREA
-  EXISTING DAM & RESERVOIR

*NOTE: All basin map legends were standardized and all features will not appear on every map.

CHAPTER 12. BIG BLUE RIVER BASIN

This Basin is located in southeastern Nebraska between the Little Blue, Platte, and Nemaha River Basins. It occupies an area of 4,570 square miles.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Clatonia Creek Watershed (SCS)

INACTIVE OR TERMINATED

Shestak Reservoir (COE, BuRec)
Seward View Reservoir (COE, BuRec)
Surprise Reservoir (COE, BuRec)

Potential Projects

SUNBEAM UNIT

The Bureau of Reclamation is the agency primarily responsible for planning this multipurpose project.

Current Status. A feasibility report prepared in 1968 recommended authorization for construction of the Beaver Crossing Dam and Reservoir with irrigation deferred to a future date, but changes in interest rates and current planning requirements made reevaluation necessary. A status report published in April 1972 indicated the project would be feasible with initial inclusion of the irrigation function. Further studies of the unit, which would include reevaluation in accordance with the Water Resources Council's Principles and Standards, are contingent upon the development of local and State support for the study.

Description of Project Area. The proposed Sunbeam Unit is located in southeastern Nebraska in York, Seward, and Saline Counties.

The region is characterized by extensive areas of rolling loess tablelands dissected by well entrenched drainageways. These drainageways are spaced approximately one-half to one mile apart leaving relatively large areas of level to gently sloping land suitable for irrigation.

Precipitation during the April through September period averages 21 inches, which is about 75 percent of the annual total.

Wheat, corn, and livestock have been the primary sources of farm

income with livestock producing an increasingly larger share of total farm income in recent years. The urban communities serve principally as trade and service centers for the surrounding agricultural area.

Water resource development in the area has been mostly limited to private groundwater irrigation. A small watershed project has been constructed near Dorchester and several others are under construction downstream from the project area.

Project Description. Project plans as presented in the 1968 feasibility report included Beaver Crossing Dam and Reservoir with deferred facilities for two pumping plants, a diversion dam, and distribution systems to serve 30,000 acres. Beaver Crossing Reservoir would store and regulate the flows of the West Fork of the Big Blue River.

The Goehner Pumping Plant which would be located near the left abutment of the dam would lift water to irrigable lands in Seward County between the Big Blue River and the West Fork. The Dorchester Diversion Dam and Pumping Plant would be located on the West Fork about 20 miles below the Beaver Crossing Dam. This pumping plant would lift water to irrigable lands in Saline County.

Reformulation studies using the new multiobjective guidelines would emphasize the conjunctive use of surface and groundwater to stabilize the declining groundwater table in the area, and the recreational needs near the two most populated urban areas in Nebraska.

Approximately 480 acres would be purchased specifically to provide for wildlife purposes along with 120 acres for recreational purposes. The recreation and fish and wildlife features would provide 141,300 fisherman days, 325,000 recreation visitor days, and 6,150 hunter days annually.

Public Interest. No entity with the required legal powers has been formed to sponsor development of this project. There is widespread interest in this project throughout the Basin, but concerted opposition has developed by those who would be displaced by the proposed reservoir.

SUNBEAM UNIT

| | | | |
|-------------------------|---------------|-----------------|--------------|
| CONSTRUCTION PERIOD: | 5 to 6 Years | ECONOMIC LIFE: | 100 Years |
| AVERAGE ANNUAL COST: | \$5,068,000 | ANNUAL O.M.&R.: | \$232,000 |
| INTEREST RATE: | 5 3/8 Percent | COSTS BASED ON: | 1971 Prices |
| BENEFIT-COST RATIO: | 1.37 to 1.00 | LAND REQUIRED: | 24,570 Acres |
| IRRIGATION SERVICE ARE: | 30,000 Acres | | |

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

| | Irrigation | Flood Control | Recreation | Fish & Wildlife | Total |
|-------------------|------------|---------------|------------|-----------------|-------|
| Direct Benefits | 3,451 | 1,969 | 325 | 304 | 6,049 |
| Indirect Benefits | 930 | -0- | -0- | -0- | 930 |
| Total Benefits | 4,381 | 1,969 | 325 | 304 | 6,979 |

Table 2 - Project Costs and Repayment By Source
(Thousand Dollars)

| | Irrigation | Flood Control | Recreation | Fish & Wildlife | Total |
|----------------------|----------------------|---------------|-------------------|-------------------|--------|
| Project Costs | 53,417 | 22,255 | 2,843 | 2,820 | 81,335 |
| Non-Reimbursable | -0- | 22,255 | 2,467 | 2,683 | 27,405 |
| Reimbursable | 53,417 ^{1/} | -0- | 376 ^{2/} | 137 ^{2/} | 53,930 |
| Mo. R. Basin Power | -- | -0- | -0- | -0- | -- |
| Non-Federal (Public) | -0- | -0- | 376 | 137 | 513 |
| Local | -- | -0- | -0- | -0- | -- |

^{1/} The district will repay within its ability; the balance will be paid by the Pick-Sloan Missouri Basin Program power revenues.

^{2/} Does not include repayable interest during construction.

Table 3 - Average Annual Water Requirements

| | |
|------------------------------|------------------------------|
| Crop Irrigation Requirement: | 0.86 ac.ft./ac. - Goehner |
| | 0.86 ac.ft./ac. - Dorchester |
| Farm Delivery Requirement: | 1.32 ac.ft./ac. - Goehner |
| | 1.32 ac.ft./ac. - Dorchester |
| Diversion Requirement: | 1.55 ac.ft./ac. - Goehner |
| | 1.50 ac.ft./ac. - Dorchester |
| Total Diversion Requirement: | 43,400 ac.ft. |
| Return Flow: | 4,800 ac.ft. |
| Streamflow Depletion: | 44,200 ac.ft. |

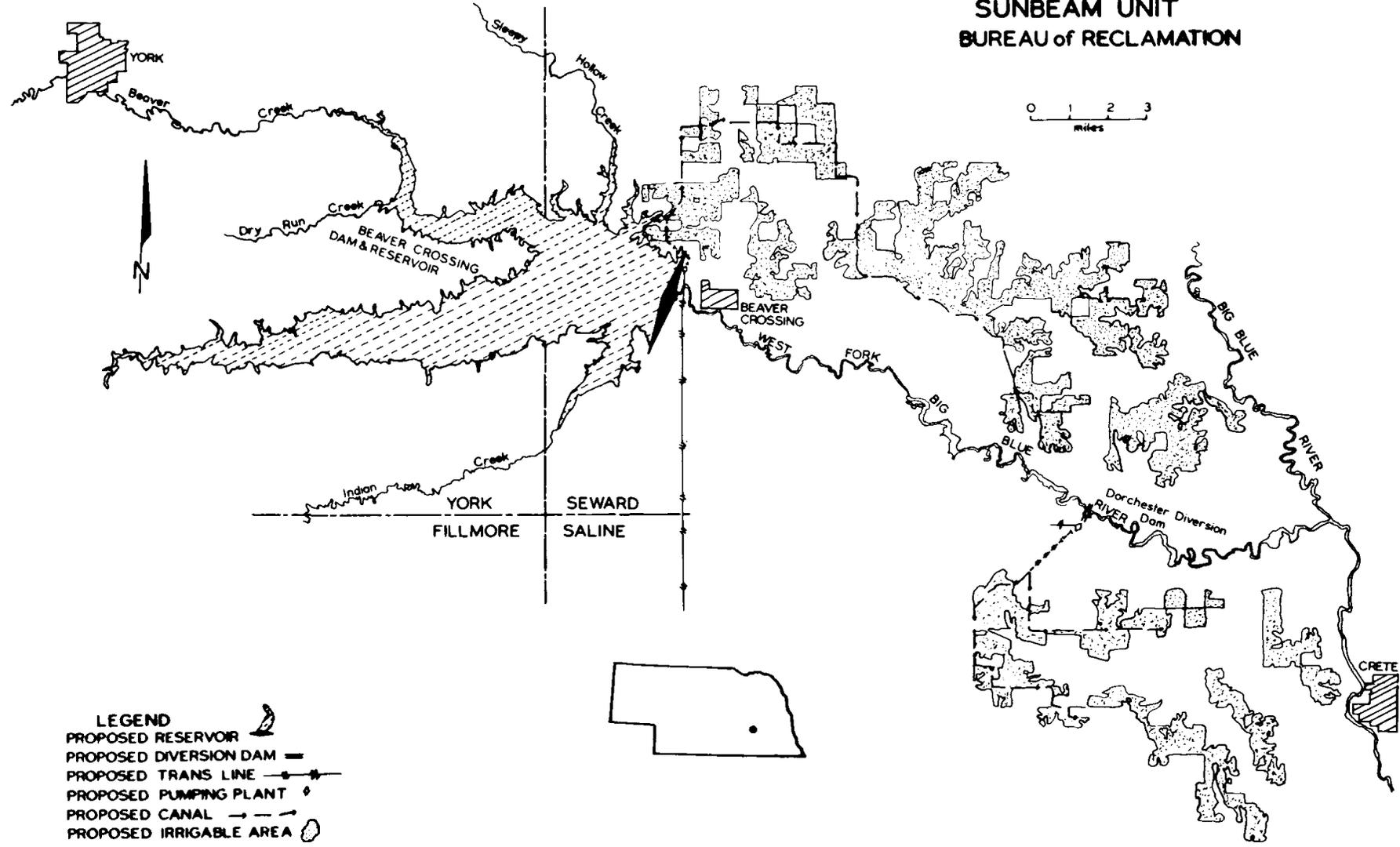
Table 4 - Dam and Reservoir Data

| Beaver Crossing Dam | |
|--------------------------------|--------------------|
| Height: | 112 feet |
| Length: | 15,650 feet |
| Spillway Capacity: | 20,130 c.f.s. |
| Flood Control Outlet Capacity: | 25,800 c.f.s. |
| Drainage Area: | 1,040 square miles |
| Beaver Crossing Reservoir | |
| Capacity | Acre-Feet |
| Flood Control | 413,200 |
| Surcharge | 340,339 |
| Conservation | 119,200 |
| Sediment | 46,000/100 yr. |
| Total | 538,300 |
| Surface Area | Acres |
| Flood Control | 17,686 |
| Surcharge | 24,708 |
| Conservation | 7,813 |

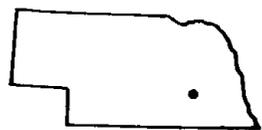
SUNBEAM UNIT BUREAU of RECLAMATION



-54-



- LEGEND**
- PROPOSED RESERVOIR
 - PROPOSED DIVERSION DAM
 - PROPOSED TRANS LINE
 - PROPOSED PUMPING PLANT
 - PROPOSED CANAL
 - PROPOSED IRRIGABLE AREA



WALNUT CREEK WATERSHED

The Lower Big Blue Natural Resources District is responsible for the planning and investigation of the Walnut Creek project. This proposed multipurpose project is designed to produce recreation, flood control, and erosion control benefits.

Current Status. A consulting engineer has investigated the feasibility and practicability of the project and prepared a planning report. An application has been submitted to the Natural Resources Commission for funding assistance from the Resources Development Fund.

Description of Project Area. The Walnut Creek Watershed is located in northeastern Saline County. The watershed is approximately four miles long and four miles wide and contains 6,700 acres. Walnut Creek, which flows northeast to southwest, is a direct tributary of the Big Blue River. The topography of the watershed varies from flat to steeply rolling, with the surface elevation ranging from 1,500 feet above sea level at the highest point to 1,340 feet at the mouth of Walnut Creek. The average annual precipitation for the watershed is approximately 28 inches. The average annual temperature of the watershed area is approximately 50 degrees Fahrenheit.

The economy of the area is agriculturally based with relatively small family farms engaged in generalized farming. There are 71 farms or portions of farms in the watershed with an average size of 160 acres each. The principal crops grown are corn, alfalfa, grain sorghum, soybeans, and wheat.

Project Description. The project will consist of five floodwater retarding structures with a combined total storage capacity of 1,390 acre-feet at the levels of the emergency spillways. Criteria to be used for the design of the five structures will be determined by the Soil Conservation Service with approval of the Lower Big Blue Natural Resources District.

Public Interest. The Lower Big Blue Natural Resources District is the project sponsor and Saline County and the city of Crete support the project.

WALNUT CREEK WATERSHED

CONSTRUCTION PERIOD: 2 Years
 PROJECT INSTALLATION COST: \$307,757
 STATE FUNDS (Requested): \$230,817
 LOCAL FUNDS: \$ 76,940
 O. & M. BY: Lower Big Blue NRD

ECONOMIC Life: 50 Years
 COST BASED ON: 1976 Prices

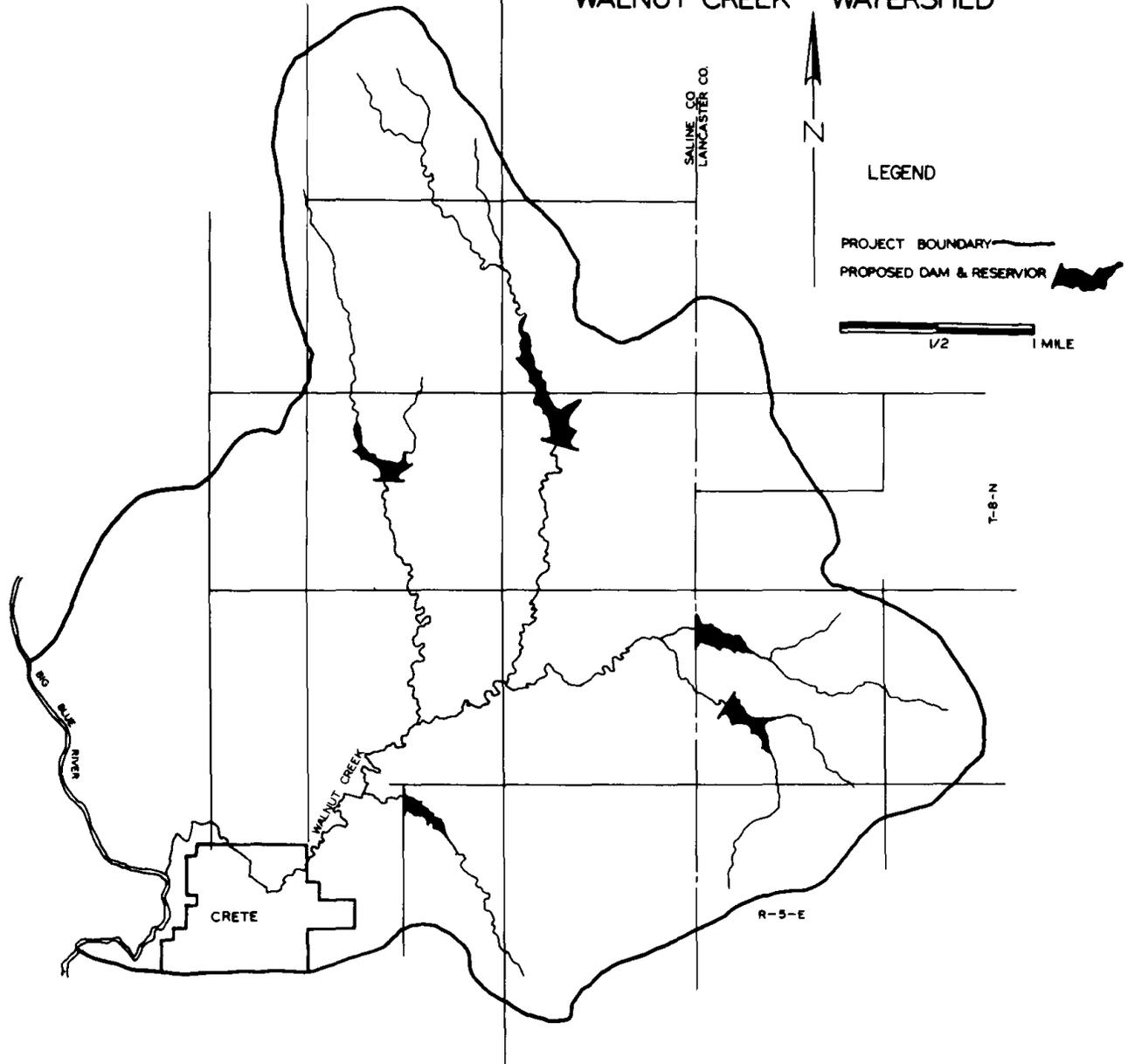
Table 1 - Cash Flow Stream

| Year | Feasibility, Study, Engineering & Inspection | Project Costs | | Gross Costs | Total Value of Project (Gross Benefits) | Incremental Benefit (Cash Flow) |
|-------|--|---------------|--|-------------|---|---------------------------------|
| | | Capital Items | Operation, Maintenance & Replacement Costs | | | |
| 0 | 4,061 | | | | | |
| 1 | 11,861 | 31,948 | | 31,948 | -0- | - 31,948 |
| 2 | 8,536 | 166,767 | | 166,767 | 30,000 | -136,767 |
| 3 | | 85,355 | 700 | 85,955 | 10,806 | - 75,149 |
| 4-50 | | | 68,300 | 68,300 | 839,283 | +770,983 |
| Total | 24,458 | 284,070 | 69,000 | 352,970 | 880,089 | +527,119 |

Table 2 - Reservoir Data

| Number of Structures | Total Controlled Drainage Area (Acres) | Storage Capacity (Acre-Feet) | |
|----------------------|--|------------------------------|---------------|
| | | Sediment | Flood Control |
| 5 | 3,328 | 416 | 974 |

WALNUT CREEK WATERSHED



Projects In Planning

SWAN CREEK WATERSHED

Description. This watershed, covering 162,317 acres in Jefferson and Saline Counties has received preliminary investigations by the Soil Conservation Service. The purpose of the proposed project is to reduce flood damages in the area. Project features include a structural system of 16 to 18 flood water reservoirs. The total estimated cost of the project in 1970 was \$2,567,800.

Current Status. Construction of two road structures by the Department of Roads has been completed. Normal work plan investigations have been authorized for this project.

WOLF-WILDCAT CREEK WATERSHED

Description. This watershed is located in the southeastern portion of the Basin in Gage and Pawnee Counties. The total drainage area of the project covers approximately 55,900 acres. Preliminary investigations by the Soil Conservation Service indicate a flood prevention system of approximately nine floodwater retarding structures may prove feasible. The total estimated cost of constructing the project is \$1,500,000.

Current Status. Preliminary investigations were favorable and work plan investigations have been authorized.

BEATRICE LOCAL FLOOD PROTECTION

Description. This Corps of Engineers project would be located on the Big Blue River in the city of Beatrice. A flood protection project was authorized in 1954, and a plan for a feasible levee project was developed in a 1964 reevaluation study. This plan did not receive local support, so it was included in a 1972 basinwide review study, which found the structural system no longer economically feasible.

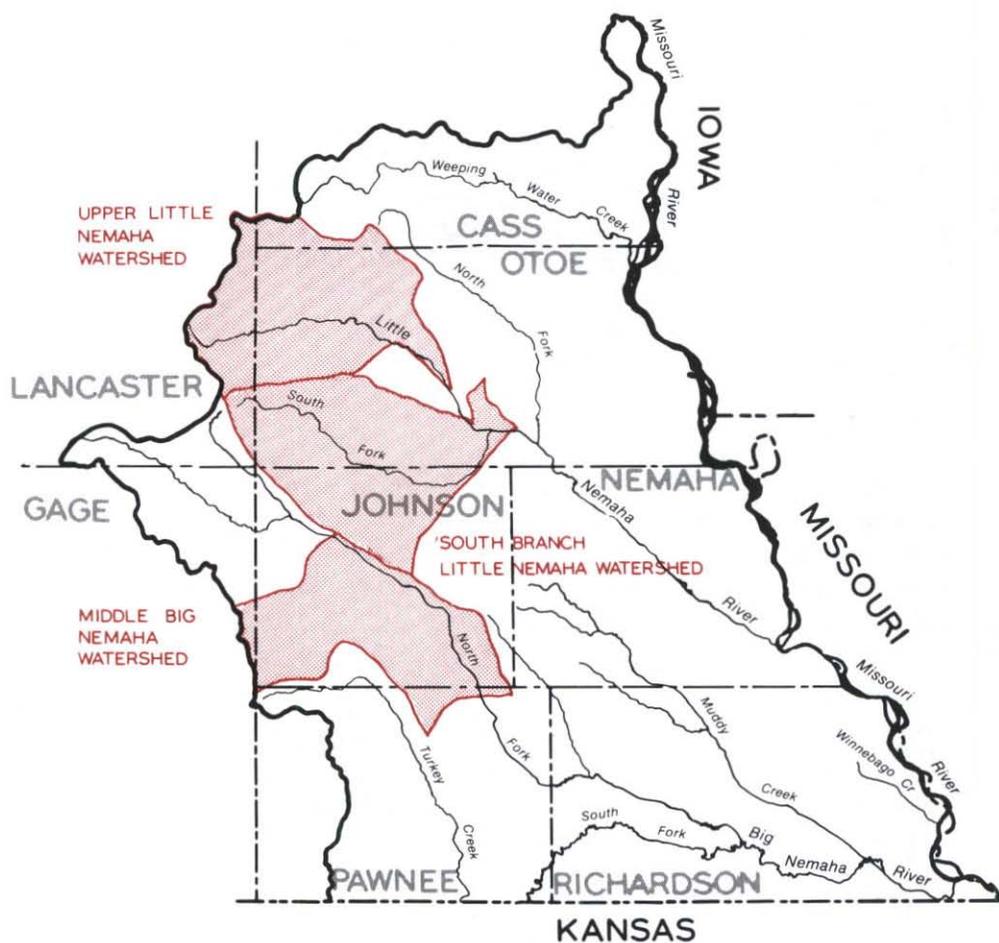
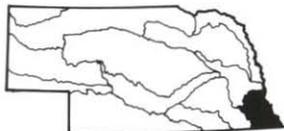
Current Status. The city of Beatrice has requested that the Corps of Engineers resume advanced planning studies for the authorized local protection project to determine the feasibility of a structural system and/or non-structural flood control through acquisition of flood plain lands and relocation. This study is under way.

PLUM CREEK WATERSHED

Description. This proposed project is located in Butler and Seward Counties. The Upper Big Blue Natural Resources District is responsible for investigation of the project. The purpose of the project is to provide flood control and irrigation benefits to the Plum Creek area. A total of 58,000 acres are drained by Plum Creek and its tributaries. Project features include three major flood detention dams to be constructed on Plum Creek, Coon Creek, and Big Weedy Creek. The total estimated cost of constructing the project is \$1,324,500.

Current Status. A reconnaissance report has been prepared for the project indicating it to be economically feasible to construct.

NEMAHA RIVER BASIN



LEGEND*

-  PROPOSED DAM & RESERVOIR SITE
-  PROPOSED CANAL
-  PROPOSED PROJECT SERVICE AREA
-  PROPOSED PUMPING PLANT
-  PROPOSED DIVERSION DAM
-  PROPOSED RIVER SIPHON
-  PROPOSED WATERSHED PROJECT
-  PROPOSED FLOODWAY
-  PROPOSED LOCAL FLOOD PROTECTION PROJECT
-  PROPOSED PROJECT WELL
-  EXISTING PROJECT SERVICE AREA

0 10 20 30 MILES

CHAPTER 13. NEMAHA RIVER BASIN

This Basin, which encompasses 2,760 square miles in the southeastern corner of the State, includes the drainage area of all streams entering the Missouri River between the mouth of the Platte River and the Kansas-Nebraska state line, with the exception of the portion of the Big Nemaha River drainage lying in Kansas.

Status of Former Potential Projects

The status of the following projects included in previous editions has changed as noted below.

AUTHORIZED OR CONSTRUCTED

Winnebago-Bean Creek Watershed (SCS)
South Fork Watershed (SCS)
Long Branch Watershed (SCS)

INACTIVE OR TERMINATED

Little Nemaha River Levee (COE)

Potential Projects

There are no documented potential projects in this Basin of the type presented in this volume.

Projects in Planning

MIDDLE BIG NEMAHA WATERSHED

Description. This watershed covers approximately 131,000 acres, mostly in southwestern Johnson County. Preliminary investigations by the Soil Conservation Service indicate a flood prevention system of approximately 13 floodwater retarding structures and 30 grade stabilization structures may prove feasible. The total estimated cost of constructing the project is \$5,500,000.

Current Status. Preliminary investigations were favorable and work plan investigations have been authorized.

SOUTH BRANCH LITTLE NEMAHA WATERSHED

Description. This proposed Soil Conservation Service project located in Otoe and Johnson Counties includes the drainage area of the South Fork Little Nemaha River and Muddy Creek. The structural system consists of 14

floodwater retarding structures and 46 grade stabilization structures to be installed over a period of eight years. The total estimated cost of constructing the project is \$7,500,000.

Current Status. The work plan and environmental impact statement have been submitted to local, state, and federal agencies, the sponsors, and outside organizations for informal review. Submission of the plan to Congressional Committees for construction approval is anticipated in 1977.

UPPER LITTLE NEMAHA WATERSHED

Description. This proposed project covers approximately 123,500 acres in Otoe, Lancaster, and Cass Counties. Preliminary investigations by the Soil Conservation Service indicate a flood prevention system of approximately 18 floodwater retarding structures and 35 grade stabilization structures may prove feasible. The total estimated cost of constructing the project is \$8,000,000.

Current Status. Preliminary investigations were favorable and work plan investigations have been authorized.

CHAPTER 14. OTHER STUDIES OF POTENTIAL PROJECTS

Inter-State and Regional Studies

There are a number of inter-state and inter-basin projects which have been proposed. These include the R. W. Beck Plan, "A New Water Resource Plan for the Great Plains", the Parsons Company's "North American Water and Power Alliance" known as NAWAPA, and a plan proposed by Lewis G. Smith, "Western States Water Augmentation Concept."

Water needs continue to mount and unless shifts are made between competing uses, inter-state and inter-basin project proposals will become more numerous and more important in the future.

BECK PLAN

The Beck Plan involves the diversion of water from the Missouri River just below Fort Randall Dam and the movement of this water through a series of dams and/or canals 200 miles up the Niobrara River to a point just north of Alliance, Nebraska. From this point, the water would flow by gravity in a major canal through western Nebraska, across the Platte River and south through Colorado, Kansas, Oklahoma, and Texas to a point near Hobbs, New Mexico. The canal would have an estimated capacity of 17,000 c.f.s. and would be approximately 148 feet wide, 22 feet deep, and about 940 miles long.

The total estimated cost of this undertaking, based on 1967 price levels, would be nearly \$3.5 billion.

NAWAPA

The North American Water and Power Alliance Plan involves the collection and distribution of water from rivers in Alaska, the Yukon, and British Columbia to water-deficient areas of Canada, the United States, and northern Mexico. In addition to serving water supply functions, provisions would be included to stabilize the level of the Great Lakes and provide other navigation benefits. Thirty-three states, including Nebraska, would benefit directly from the project.

The proponents of NAWAPA say it would annually deliver 78 million acre-feet of water to the United States, make 30 million kilowatts of power available for sale, and could increase national income from agriculture, mining and manufacturing by \$30 billion.

The total cost of this development, based on 1964 or earlier price levels, is estimated to be as much as \$100 billion.

WESTERN STATES WATER AUGMENTATION CONCEPT

The Western States Water Augmentation Concept is similar to NAWAPA, but includes distribution to only the 17 states west of the Iowa-Nebraska boundary.

Water would be collected in the Liard-Mackenzie Basin in Northern Canada and conveyed south within the Rocky Mountain Trench. Distribution of the water would be handled through natural channels, canals and tunnels.

The total cost of this system is estimated to be around \$75 billion based on 1967 price levels.

PLATTE RIVER WATERFOWL HABITAT PRESERVATION STUDY

The North Platte and Platte Rivers in central Nebraska provide critical river and adjacent wetland habitat with international, national, state, and local significance because it is used by thousands of waterfowl as a staging area during their spring and fall migrations. Mounting concern for the effects of existing development and the impact of projected water depletions on this riverine habitat resulted in a proposal to establish a wildlife refuge in the area. Need for a broader, multi-objective investigation of the problem caused representatives of the Department of the Interior, the states of Colorado, Wyoming, and Nebraska, and the Missouri River Basin Commission to meet in December 1976 to consider ways of conducting a coordinated investigation by the Department, the three states, and the Commission. This study would provide some essential data, analyze all available information, and consider alternative water management objectives and procedures that would allow habitat maintenance as a part of the overall management of the water and related land resources affecting the Platte Basin.

Information gained in the formative stage of planning indicates that a three-year study could possibly be initiated in fiscal year 1977, possibly under general leadership of the Missouri River Basin Commission.

Studies in Nebraska

The studies listed by agency below could produce potential projects in this State. They are only listed briefly because formal project reports are not available at this time.

BUREAU OF RECLAMATION

Upper Republican River Water Management Study. The determination of a dependable water supply in the Upper Republican River Basin is complicated by several factors including past and future depletions of surface water flows by groundwater use, possible changes in the rainfall patterns, and fulfillment of the Republican River Compact conditions. These factors have given this study a high priority for fiscal year 1978. The States of Colorado, Nebraska, and Kansas support the study.

The study would first assess the surface and groundwater supplies in the basin. The interrelationship between ground and surface water supplies would be determined, which would include an assessment of how groundwater development has affected surface water supplies. Then problems in the upper part of the basin would be identified. Alternative plans would then be developed to maximize the near- and far-term utilization of the existing water resources in the basin.

CORPS OF ENGINEERS

Niobrara River Basin, Nebraska, Wyoming, and South Dakota Review Study. The investigation of this area is directed primarily toward developing multipurpose storage reservoirs to provide silt detention, erosion control, flood control, recreation, municipal and industrial water supply, and review of other related water resources problems. The study has been deferred.

Nemaha and Little Nemaha River Basin, Nebraska and Kansas. An investigation and a report of flood and erosion control measures in the basin were completed in November 1973. The report states that additional structural improvements in the basin cannot be economically justified at this time and recommends local implementation of nonstructural measures. The report has been forwarded to the Secretary of the Army for transmission to the Congress.

Missouri River from Three Forks, Montana, to Sioux City, Iowa. A study concerning main stem reservoir operations, navigation, bank erosion, flood control, recreation, fish, and wildlife and the feasibility of additional hydroelectric power is underway. Completion of this investigation is scheduled for February 1977. Special studies have been initiated in accordance with Section 32 of Public Law 93-251, 93rd Congress, of a potential bank stabilization project in the reach from Yankton, South Dakota, to Sioux City, Iowa and in the reach between Garrison Dam and Oahe Reservoir.

South Platte River and Tributaries, Colorado, Wyoming, and Nebraska Review Study. All flood control studies initiated prior to July 1, 1972 have been integrated into one regional planning study. Studies are being continued on the remaining problems in the basin. The scheduled completion date is September 1977.

North Platte River Basin, Nebraska, Colorado and Wyoming Review Study. Work on this study has been suspended due to the unfavorable outlook for developing economically feasible water resource projects in the basin.

Metropolitan Omaha, Nebraska-Council Bluffs, Iowa. This study of the seven-county metropolitan area is completed. The study developed comprehensive water resources management plans for four alternative futures.

Metropolitan Sioux City and Missouri River, Iowa, Nebraska and South Dakota Water and Related Land Resources Management Study. This study is scheduled to be initiated in fiscal year 1977. The study includes water quality and wastewater management studies in the Sioux City area to address the goals of P.L. 92-500; analyses of alternative flood control and flood plain management plans in the Sioux City area; 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 the Missouri River.

SOIL CONSERVATION SERVICE

Republican Basin Study. This study is scheduled for completion by September 1978.

Preliminary Watershed Studies. Applications for preliminary planning in the following watersheds have been approved.

| <u>Watershed</u> | <u>River Basin</u> |
|---------------------|--------------------|
| Squaw-Camp Creeks | Nemaha |
| Peru-Brownville | Nemaha |
| Turkey Creek | Nemaha |
| Big Muddy | Nemaha |
| Lower Big Nemaha | Nemaha |
| Lower Little Nemaha | Nemaha |
| Wahoo Creek | Lower Platte |
| Southern Sarpy | Lower Platte |
| Stevens-Callahan | Lower Platte |
| Northeast Cass | Lower Platte |
| Rock Creek | Lower Platte |
| Weeping Water | Nemaha |
| Ogallala Tribs | South Platte |

Appendix

developing them as a solution are investigated, and a report is prepared. This is carried out with a minimum of funds and field work, using available data and considerable judgment. The appraisal study is conducted to determine promising alternatives and to assess the engineering and economic feasibility, environmental aspects, and local interest in such alternatives, but only to the extent that a determination can be made as to whether expenditure of the funds necessary to accomplish a feasibility investigation and report are warranted. Appraisal studies which indicate favorable results, and for which feasibility investigations are recommended, may require the preparation of an environmental impact statement.

Where an appraisal investigation has shown that a potential project warrants further study and state and local interests have endorsed the potential plan, a request for authorization to make a feasibility investigation is made to Congress. This request is made through the appropriate committees and subcommittees of both the Senate and House of Representatives. If the investigation is authorized and money is made available by Congress, studies are undertaken in cooperation with interested and affected government agencies, local area representatives, and the public. Public involvement programs will be initiated as required to provide liaison between the general public and the planning and technical personnel. Depending on the complexity of the investigations, planning teams and technical task forces may be organized to collect and assess resource data and to formulate and evaluate alternative plans.

The feasibility investigation develops a detailed, multiple-objective plan following procedures established by the Water Resources Council that includes appraisal evaluations of alternate plans as well as an examination of possible environmental impacts and the financial feasibility and economic justification for the project.

The feasibility report, after receiving departmental approval, is submitted to other federal agencies and to the governors of affected states for formal review and comment. A report for any unit of the Pick-Sloan Missouri Basin Program is also sent to all of the states in the Basin for review and comment. Following this formal review, the report is then transmitted to the Office of Management and Budget (OMB) for review. After clearance by the OMB, the Secretary of the Interior transmits the report to Congress for consideration of the proposed project for authorization. The feasibility report must proceed through the same Congressional committees which recommend authorization of the feasibility investigation.

Environmental impact statements are prepared for all project feasibility reports. A final environmental impact statement must be filed with the Council on Environmental Quality 30 days prior to any major Federal action. After a project is authorized, any significant changes in the project plan or purposes are reported through supplements to the final environmental impact statement.

Following Congressional hearings and enactment of project construction authorization, a definite plan report which includes specific engineering and operation plans is prepared. The Bureau of Reclamation through the OMB then requests that Congress appropriate funds to permit the start of construction. At this time, or even in the earlier feasibility review process, additional planning may be necessary to update the plan and estimates if considerable time has elapsed between the project construction authorization and the request for appropriation of funds. Any changes in the updated plan must also be reflected in a final updated environmental impact statement and public hearings must be held before construction begins if any of the environmental aspects of the project have changed.

After execution of suitable repayment contracts, certification of the irrigability of lands, filing final environmental impact statements, and Congressional appropriation of necessary funds, project construction can proceed. Designs and specifications are prepared by the Bureau of Reclamation. Practically all construction is accomplished by private contractors chosen on the basis of competitive bids. However, inspection and control of construction to assure conformance with specifications is accomplished by the Bureau.

As soon as practicable after completion of construction, the operation, maintenance, and general management of a project's distribution system is turned over to the local sponsor. Annual or periodic joint inspections help assure adequate attention to proper operation and maintenance. Normally, multipurpose reservoirs with power facilities, dedicated flood control capacity, or municipal and industrial water supply will remain under the operating control of the government.

The Small Reclamation Projects Act of 1956, and amendments thereto, and the Rehabilitation and Betterment Act make it possible for certain types of organizations to obtain interest-free loans for small reclamation projects. Grants are also made, along with the loans, for those portions of the projects that are non-reimbursable. The project may be a completely new undertaking, or it may be a rehabilitation of an existing project. The maximum cost of projects under the Small Reclamation Projects Act can be no more than \$24,200,000 with the Federal Government providing a loan and/or grant combination totaling no more than \$16,100,000. There is no limit on the total cost of programs under the Rehabilitation and Betterment Act, but it must be within the ability of the water users to repay within a reasonable period of time.

Development of a Corps of Engineers Project

Corps of Engineers projects in Nebraska are mainly of two types, major flood control or multipurpose projects and small local flood protection projects.

Major project studies of survey scope originate with a request from individuals or organizations to their Senator or Congressman for assistance with a flood threat, water supply problem, recreation need, or some other type of water problem. The member of Congress may request that the Public Works Committee authorize a survey study of the situation, usually through adoption of a resolution but sometimes by inclusion in a river and harbor and flood control act.

After the study has been authorized, it is assigned by the Chief of Engineers through the Division Engineer to the proper District Office. Then funds must be requested in the Department budget and provided by Congress before the study can be started.

When funds become available, the District Office makes a study, initiated by a public hearing, to determine the extent of the problem and possible solutions. An engineering survey is made to develop the general plan, and estimate is made of the cost and the expected public and private benefits from the project. If the proposed project is for local protection, or it is a multipurpose project including local water supply, general agreement of the responsible local officials with the requirements for local cooperation must be obtained.

Upon completion of the District Engineer's survey report and development of an Environmental Statement, they are submitted for review by state and federal agencies at several different levels. After all comments are received, the survey report is forwarded to the Office of Management and Budget by the Secretary of the Army. After approval by this office, it is transmitted to the Public Works Committee to fulfill the original directive which started to the Council on Environmental Quality.

Ordinarily if the proposed project is feasible the report is then printed as a public document, and may be included in a flood control bill for consideration by the Congress. If the bill is passed by Congress

and signed by the President, the project becomes authorized for construction. On receipt of authorization, the District Office secures assurance of local cooperation, and funds for construction are requested in the Department's budget, which is reviewed by the Office of Management and Budget before it is transmitted to Congress.

Under special authority given to the Chief of Engineers, the Corps, without specific Congressional approval, can undertake small localized projects if they meet certain limitations. These projects include small flood control projects, bank protection works, clearing of channels, small boat harbors, flood plain delineations, and the repair of existing flood control works which were not constructed by the Federal Government.

A study of a potential local project may be initiated by the District Engineer at the request of local citizens. If a reconnaissance study indicates a project could provide sufficient benefits, funds for a detailed project study are requested from the Chief of Engineers. The detailed project report, containing the results of engineering and economic analyses of the project, must be reviewed by state and federal agencies and approved by the Chief of Engineers. Then, if assurances of local cooperation are provided and other statutory limitations are met, funds for construction may be allocated by the Chief of Engineers without specific Congressional action.

After appropriation of construction funds by Congress or the Chief of Engineers, the District Engineer prepares plans, specifications, cost estimates, and secures evidence of local willingness to accept right-of-way and maintenance provisions. Awarding of the construction contracts is made through bidding.

Upon completion of construction, local protection projects are turned over to the local sponsor for operation and maintenance. Major multi-purpose projects are maintained by the Corps or other cooperating federal agencies.

Development of a Small Watershed Project Under the Administration of the Soil Conservation Service

Public Law 566 provides for federal assistance in solving flood, drainage, erosion, sediment and irrigation problems which are beyond the scope of an individual effort, and in development of facilities for recreation, fish and wildlife, and municipal or rural water supplies.

The Natural Resources Districts created by the Legislature in July, 1972 can initiate and sponsor small watershed projects. Formal application must be made to the Nebraska Natural Resources Commission to obtain planning assistance from the Soil Conservation Service.

After an application is submitted, a field review is held with representatives of the Soil Conservation Service, Natural Resources Commission, Fish and Wildlife Service, Nebraska Game and Parks Commission, other interested state and federal agency personnel, and the Natural Resources District board to examine the watershed problems and determine

if the proposed project is potentially feasible. Following the field review the application and recommendations are forwarded to the Natural Resources Commission. If a need for watershed development is apparent and a project appears potentially feasible, the Commission approves the application and forwards it to the Soil Conservation Service.

After the application is approved by the Soil Conservation Service, priorities will be issued by the Natural Resources Commission for planning assistance. As technical assistance and planning funds become available, the Soil Conservation Service will conduct a Preliminary Investigation. If the Preliminary Investigation Report indicates a feasible project and, after public informational meetings are held to determine the most socially acceptable alternative and the proposed plan is accepted by the sponsoring board, the State Conservationist will request planning authorization from the Administrator of the Soil Conservation Service.

After receipt of this authorization and allocation of funds by the Administrator, a detailed watershed plan is formulated and an environmental assessment is conducted by the local sponsors with technical assistance from the Soil Conservation Service and the Natural Resources Commission. The sponsors then initiate a public informational meeting and invite local residents and interested state and federal agencies. After this meeting, the local sponsors determine if the plan is acceptable. If acceptable, preliminary drafts of a Watershed Work Plan and Environmental Statement are prepared for technical review by USDA specialists. These documents are forwarded to interested federal and state agencies for review and comment. After review, another public meeting similar to the other two will be held. If the watershed plan is still acceptable to the local sponsors after this meeting, they sign the Work Plan Agreement.

After these reviews, the work plan and environmental impact statements are submitted by the State Conservationist to the Administrator of the Soil Conservation Service for review by federal agencies at the Washington level and for formal review by the Governor. Projects in which the federal share of construction is less than \$250,000 may be approved by the State Conservationist. For projects in which the federal share exceeds \$250,000, the work plan is transmitted through the Office of Management and Budget to the appropriate House and Senate Committees for authorization.

Federal funds for watershed construction are budgeted annually by Congress and allocated by the Administrator to the State Conservationist. Before construction can begin on any structure, the local sponsoring organization must obtain needed land rights, water rights, a construction permit, and enter into the construction contract, except that the Federal Government may, upon request of the local sponsor, enter into contracts for construction of structures.

Operation and maintenance of the completed structural works is the responsibility of the local sponsor.

DEFINITIONS

The following definitions are provided to reduce repetition and to define many of the terms used in this summary. Included in this glossary are explanations covering such subjects as direct benefits, indirect benefits, state and federal cost, and Missouri River basin power revenues.

Definitions and terms used in this publication and all State Water Plan publications conform, where possible, to those adopted by the Missouri Basin Interagency Committee in April, 1968.

Acre-Foot - (abbr. ac. ft.) A unit for measuring volume of water equal to the quantity required to cover one acre to a depth of one foot and is equal to 325,851 gallons or 43,560 cubic feet.

Activity Day - Participation by an individual in a specific outdoor recreation activity during any part of a day.

Ad Valorem Tax - A tax authorized by the state for use by small subdivisions of government. A tax on all tangible property within the subdivision boundary.

Aquifer - A rock formation, bed, or zone containing water that is available to wells. May be referred to as a water-bearing formation or bed.

Arable Lands - Lands which are capable of being cultivated using presently accepted practices.

Average Annual Damages - Estimated flood and related damages computed as a uniform annual series. Average annual flood damages are computed on the basis of expectancy in any one year of the various amounts of flood damages that would result from floods throughout the full range of potential magnitude.

Conservation Storage - Storage of water for useful purposes such as irrigation, municipal water supply, power, recreation, water quality, or fish and wildlife.

Consumptive Use Requirement - The annual quantity of water in acre-feet per acre absorbed by the crop and transpired or used directly in the building of plant tissue, together with that evaporated from the cropped area.

Crop Irrigation Requirement - The amount of irrigation water in acre-feet per acre required by the crop; it is the difference between crop consumptive use requirement and effective precipitation.

Cubic Feet Per Second - (abbr. c.f.s.) A term used in measuring the rate of flow of water past a given point. One c.f.s. flowing for 24 hours equals 1.98 acre-feet.

Cutoff - Channel straightening procedure whereby a stream loop or meander is eliminated.

Direct Benefits - Those estimated benefits which are derived as a direct result of the project features such as providing irrigation water for increased crop production.

Diversion Requirement - The amount of water in acre-feet per acre that is diverted from a stream to irrigate a given area of land, including an allowance for evaporation, seepage and farm waste.

Drainage Area - The land area above a given point on a stream which contributes surface water drainage.

Economic Life - The number of years used for economic analysis.

Farm Delivery Requirement - The amount of water in acre-feet per acre required to serve an area from a canal turnout. It is the crop irrigation requirement plus farm waste and deep percolation losses.

Fisherman Day - Any part of a day spent fishing by an individual.

Flood Frequency - The probability of occurrence of a flood expressed as a percent or as a recurrence interval based on its ratio to the mean annual flood. Thus, a two percent chance flood would be essentially a 50-year flood when expressed on a recurrence interval.

Flood Plain - The portion of a river valley covered with water when the river overflows its banks at flood stage, usually built up of sediment deposited by the stream.

Flood Storage - The volume of water in acre-feet which can be stored in a reservoir to reduce the flow of flood waters downstream from the reservoir. It is usually an increment of storage above the conservation pool.

Headworks - The initial canal section and diversion control features which permit or control passage of water.

Hunter Day - Any part of a day spent hunting by an individual.

Indirect Benefits - Indirect benefits are those estimated benefits which are not derived directly from operation of project features but are realized from increased profits by local businesses, increased settlement opportunity, and increased economic growth by reason of the direct production.

Initial Storage - The amount of water in acre-feet that a newly constructed reservoir is capable of storing, including an allowance for sediment.

Interest Rate - The rate of interest used in plan formulation and evaluation for discounting future benefits and computing costs, or otherwise converting benefits and costs to a common time basis.

Intermittent Stream - A stream that flows only part of the time or through only part of its course.

Irrigation Depletion - The amount of diverted water consumptively used in serving an area, including wasted water not returning to the stream system. It is the gross diversion minus the return flow.

Irrigable Lands - Lands that are capable of being irrigated and are in an area where water can be made available at costs presently conducive to private or public development.

Land Treatment - The application of conservation practices to the land, such as terracing, contour farming, planting of grass, etc. It includes all types of management, vegetation, and mechanical practices.

Lateral - A small waterway or canal which usually branches from a larger canal and brings irrigation water to the fields which are to be irrigated.

Local Cost - Costs which are borne by a local unit or entity. On Bureau of Reclamation projects it generally is that portion of the project cost allocated to irrigation which is reimbursable and will be paid by a local body such as an irrigation district.

Maximum Water Surface - The highest water surface elevation for which the dam is designed.

Missouri River Basin Power Revenues - (abbr. Mo. R. Basin Power) - Money which is derived from the generation and sale of power from federally-owned hydroelectric power plants located within the Missouri Basin over and above that needed to cover the costs of repayment, operation and maintenance of the power facilities.

Multiple-Purpose Reservoir - A reservoir planned to be used for more than one purpose.

Non-Federal Costs - Project costs borne by a state or local body. May include recreation; irrigation; fish and wildlife; operation, maintenance, and replacement; and land and right-of-way. For this report, it includes all non-federal costs except those associated with an irrigation project.

Operation, Maintenance, and Replacement - (abbr. O.M.&R.) - Average Annual costs of project operation and normal maintenance, with allowance for replacement of worn-out parts of facilities.

Pick-Sloan Missouri Basin Program - The multiple-purpose plan of development consolidated from plans of the Corps of Engineers and Bureau of Reclamation and approved by the second session of the 78th Congress in the Flood Control Act of December 22, 1944.

Project Installation Cost - The total cost of Soil Conservation Service projects; includes the cost of land treatment, land rights, structural measures, and engineering and administrative costs.

Recreation Day - A visit by an individual to a recreation area for a significant portion of a 24-hour day. A recreation day is assumed to consist of 2.5 activity days.

Return Flow - That part of irrigation water not consumed by evaporation, stored in the soil, or used by plants, which returns to either its source or another body of water.

Revetment - A river channel control structure usually built of stone and either extending out into the river to deflect the flow or extending along the bank to protect the bank.

Sediment Capacity - The amount of reservoir capacity allowed for the deposition of sediment.

Separable Cost - The cost associated with a function of a multipurpose project computed as the difference between the project cost with and without the function.

Side Channel Basin - Low depression areas along a river channel which can be used to store flood water to reduce the flow in the river channel.

Spillway Capacity - The rate of flow in cubic feet per second that a spillway can discharge under maximum water surface conditions.

Spoil Bank Levees - A levee constructed from material excavated at the site from the channel for the purpose of preventing floodwater encroachment beyond this levee.

State Costs - Costs assigned to the State, which usually include, but are not limited to, one half of the separable cost of providing land and facilities for the enhancement of recreation, fish and wildlife, and associated functions during construction.

Storm Event - The runoff producing storm usually expressed as a frequency or percent chance of occurrence in any given year.

Streamflow Depletion - Decrease in the amount of water within a certain stream reach. It is the inflow minus the outflow.

Surcharge Storage - Temporary reservoir storage from the maximum water surface elevation down to the highest of the following elevations:

- a. Top of exclusive flood control capacity,
- b. Top of joint use capacity, or
- c. Top of active conservation capacity.