NEBRASKA NATURAL
RESOURCES COMMISSION

STATE WATER PLAN
PUBLICATION NO. 301-1

Status Summary

Volume 1

Potential Projects

FIRST REVISION
APRIL, 1973

STATE OF NEBRASKA

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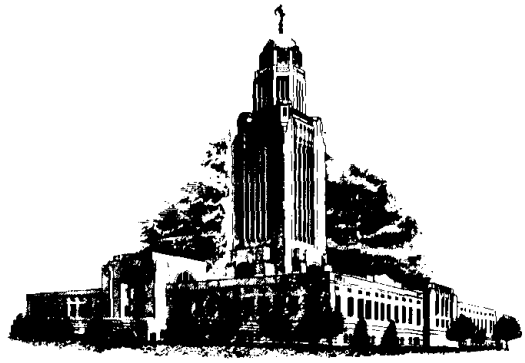
PROGRAMS:

SOIL & WATER CONSERVATION
WATERSHED PROTECTION
COMPREHENSIVE PLANNING
FLOOD PLAIN MANAGEMENT
DATA BANK
WATER QUALITY PLANNING



STATE OF NEBRASKA

NATURAL RESOURCES COMMISSION

P. O. Box 94725
State House Station
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Office Location: Room 358
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April 12, 1973

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 first revision of Volume I of the Status Summary section of the State Water Plan. Volume I summarizes potential water and related land resource development projects in Nebraska. It has been revised to present current data on these projects in response to Legislative Resolution 47 of the 1972 session, which directs that this publication be prepared and presented to the Legislature biennially.

This revised Volume I summarizes potential projects planned or being planned on January 1, 1973. 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 to give some indication of progress in water resource development in the past four years.

Decisions vital to Nebraska's future natural resource development will be required of the State's leaders in the coming years. This publication is intended to provide the Governor, the Legislature, and the citizens of the State the latest available information on which to base these far-reaching decisions.

Very truly yours,

Warren Patefield

Warren Patefield, Chairman

The Technical Advisory Committee and the Special Representatives Committee provided counsel and guidance in the preparation of the original report, and, in some cases, review and comments on this revision.

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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.

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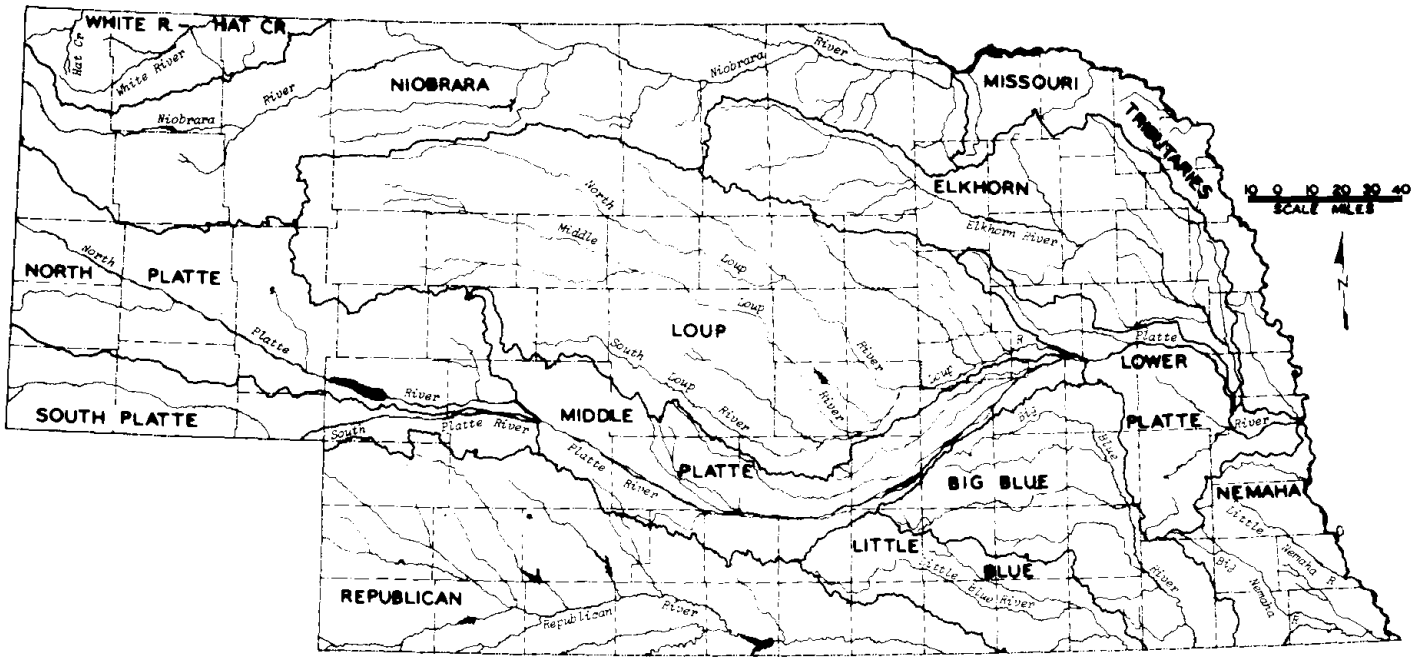


NEBRASKA'S STATE WATER PLAN

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 3 appendices to the report were published within the following four months.

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 for future development are described in the Status Summary, Volume 1, 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 federal projects which are presently proposed for construction. This publication is the first revision of Volume I, updating the original Volume I published March 1969.

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 requested by the Legislature, is continuously being developed and updated by the Commission to provide a guide to the wise and efficient use of our water and related land resources. A variety of federal agency 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. 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, 1973.

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 Missouri River Basin Commission reviewed and verified the data compiled from their reports.

PROJECT DEVELOPMENT BY AGENCY

This section summarizes the planning procedures for each of the three major federal agencies involved in water resource planning and development. It is included to provide the reader a basic explanation of the procedures followed in development and implementation of projects.

Development of a Bureau of Reclamation Project

The investigation and ultimate development of a Bureau of Reclamation project usually begins with a request from other federal agencies, state or local governments, public organizations, local interests, or by Congressional directive.

Based upon a determination that studies are needed and warranted, funds for an appraisal investigation, previously known as a reconnaissance investigation, are requested by the responsible Regional Director. Upon approval by the Commissioner of Reclamation, Secretary of the Interior, and the Office of Management and Budget, funds for this investigation are included in the Department of Interior budget request to the Congress. When funds have been appropriated by the Congress, an appraisal investigation is undertaken and an appraisal or concluding report prepared. This investigation is accomplished in collaboration with appropriate federal and state agencies with a minimum use of time and money. Information is compiled largely from available data and little field work is involved.

The appraisal investigation is intended to show whether further study, planning and expenditure of federal, state and/or local funds is warranted and to recommend future action regarding the project. Local interest and participation in project formulation are important in determining the desirability of further studies.

A concluding report is prepared whenever the findings of any type of investigation indicate that no further federal action is appropriate in the near future.

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 the Congress. This request is made through the appropriate committees and subcommittees of both the Senate and House of Representatives. If the study is authorized and money is made available by the Congress, the investigation is initiated.

The feasibility investigation develops a detailed, multiple-objective plan 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. Other agencies are involved to consider aspects of potential development related to their fields of expertise.

The feasibility report, after review within the Bureau and adoption by the Secretary of the Interior as his proposed report, is sent 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 Secretary of the Interior sends the report to the President through the Office of Management and Budget. If that office concurs with the report, it is forwarded to the Congress for authorization to construct the project. The feasibility report must proceed through the same Congressional committees which recommend authorization of the feasibility investigation. A separate environmental statement required by the National Environmental Policy Act of 1969 (P.L. 91-180), covering the environmental aspects of the proposed project, is also prepared and sent along with the main feasibility report for review, approval, and possible legislative action. Preparation and review of the environmental statement involves public hearings and widespread distribution of the statement to secure important participation and input from special interest groups and individuals. The final environmental statement is submitted to the Council of Environmental Quality.

Following Congressional hearings, project construction authorization, and preparation of a definite plan report which includes specific engineering and operation plans, the Bureau of Reclamation through the Office of Management and Budget, 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 statement and public hearings must be held before construction begins if any on the environmental aspects of the project have changed.

Final plans, specifications, and designs are then prepared and bids are invited for construction. With the acceptance of bids, construction of the various project facilities begins. Execution of repayment contracts is required prior to the start of construction.

The operation and maintenance of the system normally is turned over to a local sponsor as soon as possible after the project works have been tested. Annual or periodic joint inspections help assure adequate attention to the proper operation and maintenance of project works. Operation of major power facilities, dams, reservoirs, and supply canals usually remains with the Bureau of Reclamation.

A special report would be prepared in lieu of an appraisal or feasibility report if investigations were directed towards critical or unique situations not suitable for these types of studies, such as evaluations of total water management concepts or investigations involving broad environmental considerations. Procedures for implementing the recommendations of this type of report would parallel those for a feasibility report.

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 $10,000,000 with the Federal Government providing a loan and/or grant combination totaling no more than $6,500,000. 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 an 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 officals 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 the investigation. The Environmental Statement is forwarded 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 multipurpose 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 develop a Preliminary Investigation. If the Preliminary Investigation Report indicates a feasible project and, after public informational meetings are held, 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 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 is 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 costs, 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 - A strip of relatively low-lying land bordering a stream and usually built 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 rights-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 floodwater 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.

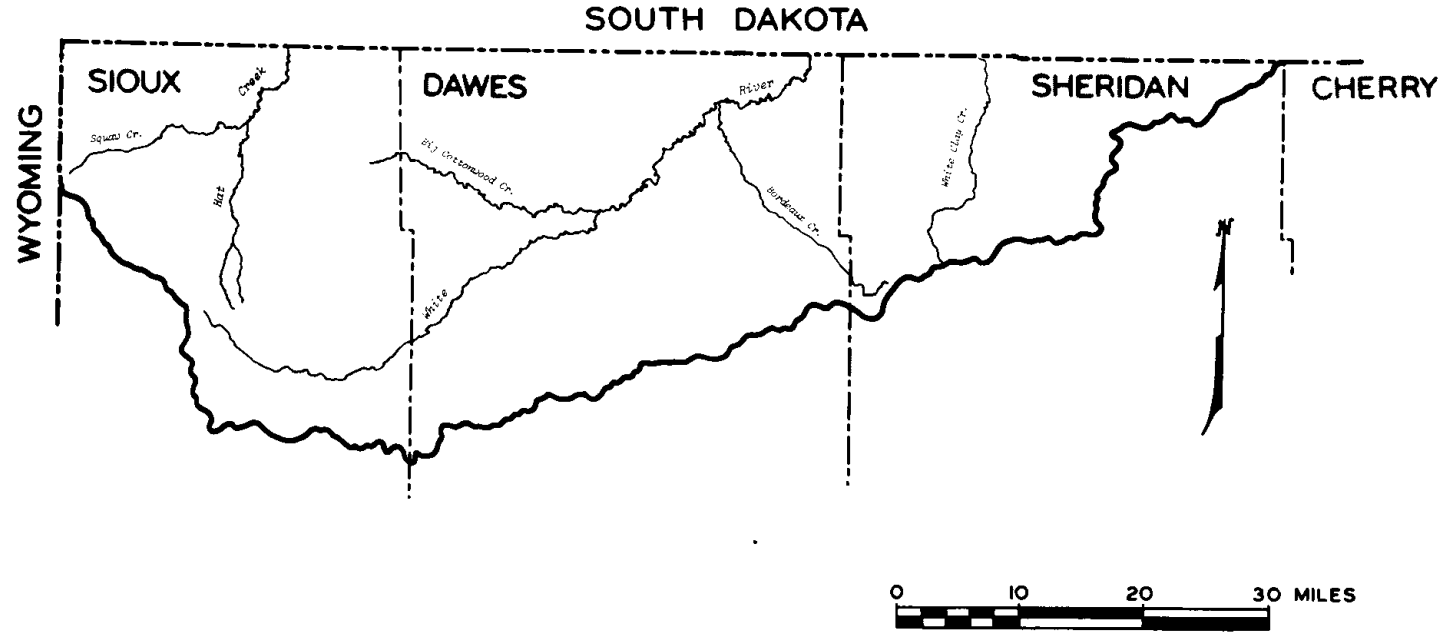
Storm Event - The runoff producing storm usually expressed as a frequency or percent chance of occurrence in any given year.

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.

WHITE RIVER-HAT CREEK BASIN



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 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

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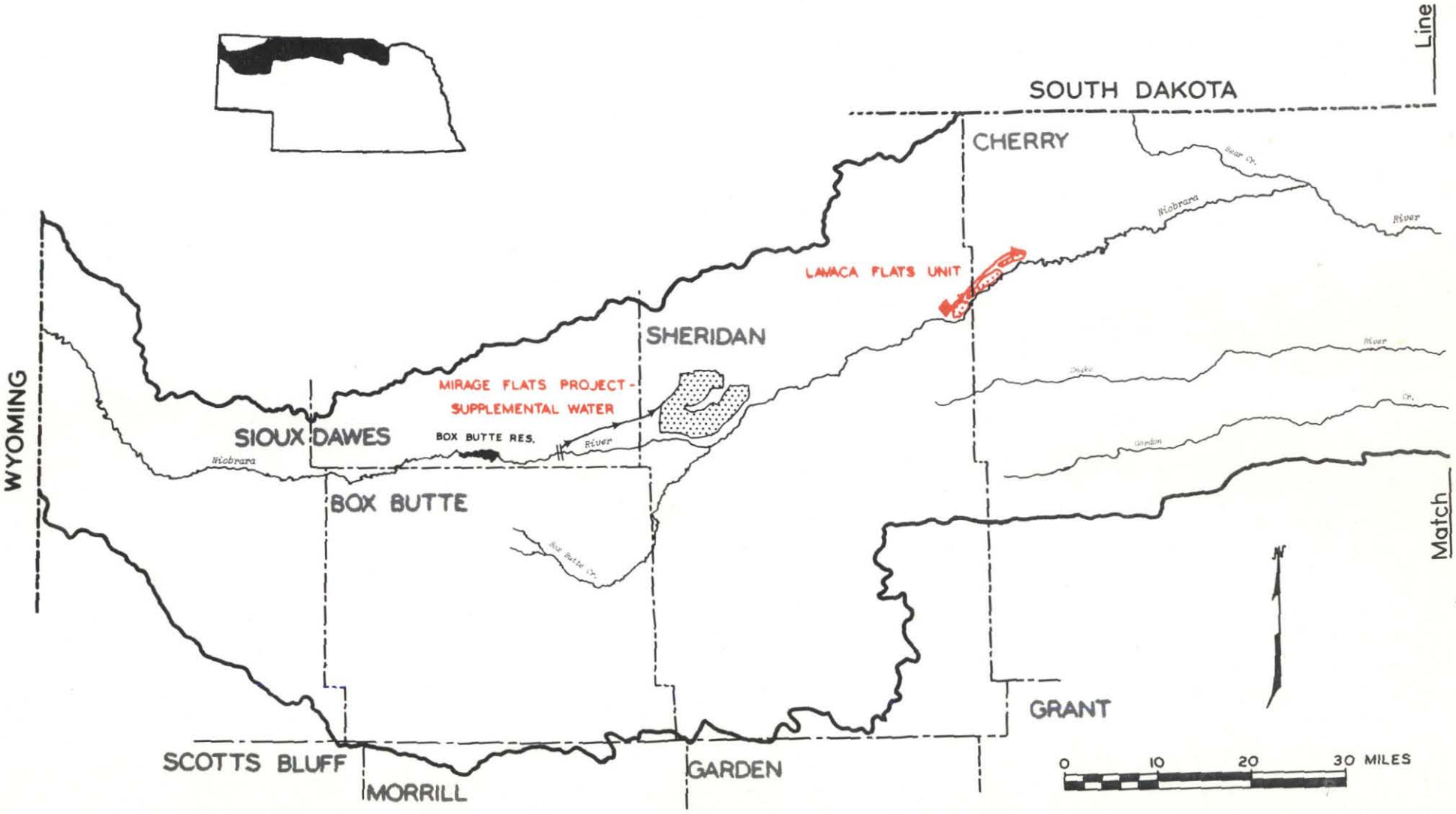
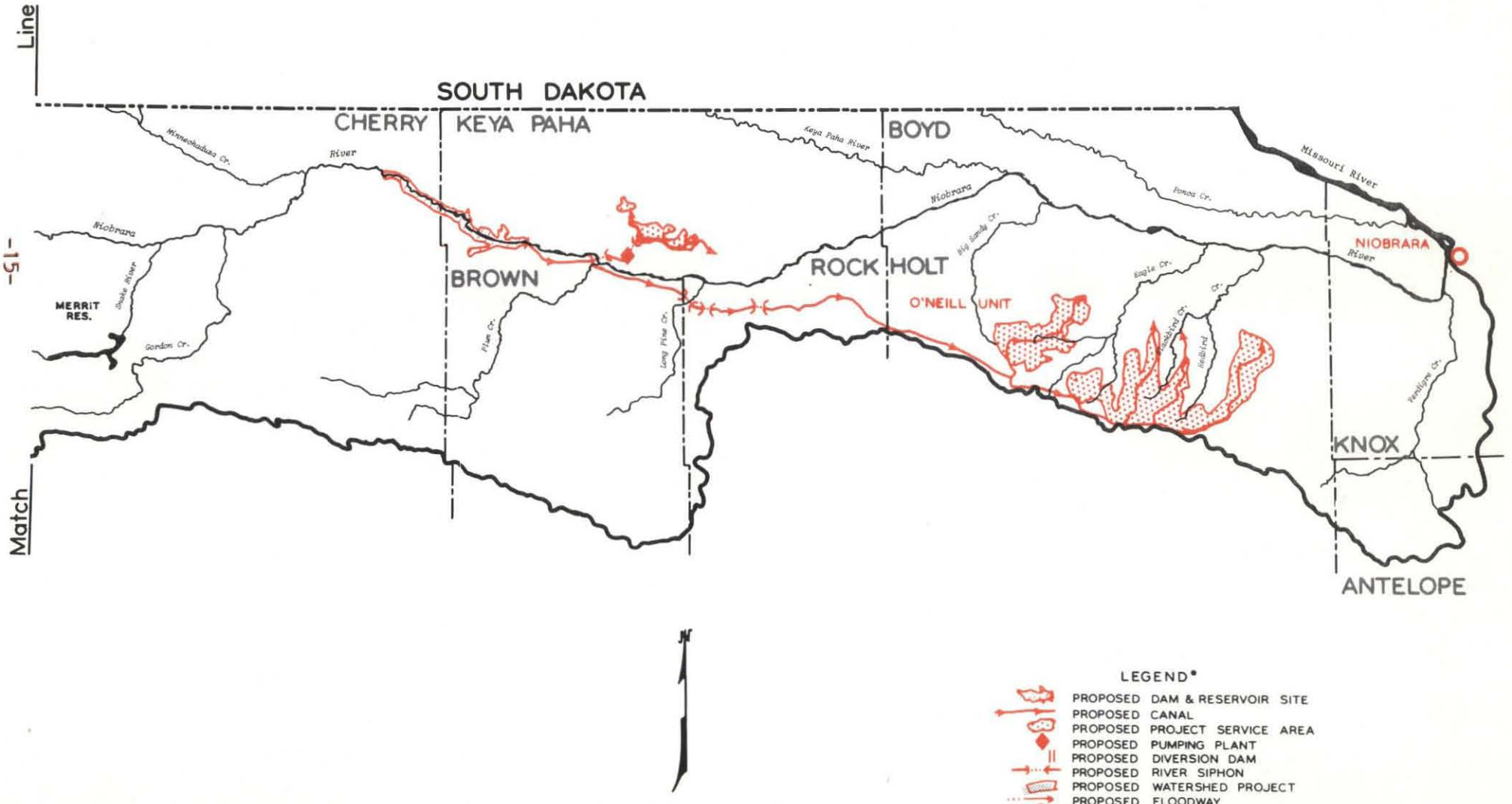


NIOBRARA RIVER BASIN

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
- EXISTING PROJECT SERVICE AREA
- EXISTING DAM & RESERVOIR

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

0 10 20 30 MILES

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.

Potential Projects

Lavaca Flats Unit

The Bureau of Reclamation is the agency primarily responsible for investigation of the Lavaca Flats Unit. Irrigation is the principal purpose of this proposed unit.

Current Status. A feasibility report on this potential project was completed by the Bureau of Reclamation in 1956. Local interest diminished however, and no authorization or construction funding was sought. Before further steps toward construction can be taken, firm indications of local interest and support must be evident.

Description of Project Area. The potential Lavaca Flats Unit is located in Sheridan and Cherry Counties in northwestern Nebraska, about ten miles southeast of Gordon. The topography is very suitable for irrigation development. Arable lands are crossed by pronounced drainageways which afford excellent drainage into the Niobrara River. The average annual precipitation is 17 inches, of which approximately 80 percent is received during the irrigation season from April to October.

The economy of the area is based primarily on agriculture with cattle, hay, and forage sorghum being the leading farm commodities. At present, small tracts of land near Gordon are irrigated with groundwater.

Project Description. The Lavaca Flats Unit would be a single-purpose irrigation project which would entail construction of a pumping plant, a main supply canal, distribution laterals, and a drainage system. These facilities would lift Niobrara River water a height of 110 feet and deliver it to 2,270 acres. The pumping plant would be located on the Niobrara River about ten miles southeast of Gordon. The Lavaca Flats canal would extend 11.5 miles from the pumping plant to the project lands and four small laterals totaling 3.4 miles in length would distribute the water throughout the irrigable area.

Remaining Problems and Needs. Erosion is a severe problem in this area and extensive land treatment is necessary. Sediment bedload is quite high in the Niobrara River.

This proposed project would have capacity to divert 40 c.f.s., which is in excess of that allowed by state law on a project of this size.

Diversion of water at the Lavaca Pump site would reduce the flow at the Valentine No. 3 and Spencer Power Plants by a small percentage. Further study would be required to resolve this problem.

Public Interest. There is little local support for this project and currently there are no known plans for formation of a local governmental entity, such as an irrigation district, to sponsor the project.

LAVACA FLATS UNIT

CONSTRUCTION PERIOD:	1 Year	ECONOMIC LIFE:	100 Years
AVERAGE ANNUAL COST:	$48,780	ANNUAL O.M.&R.:	$15,440
INTEREST RATE:	2 1/2 Percent	COSTS BASED ON:	1956 Prices
BENEFIT-COST RATIO:	2.74 to 1.00	LAND REQUIRED:	119 Acres
IRRIGATION SERVICE AREA:	2270 Acres		

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrigation	Fish & Wildlife	Total
Direct Benefits	53.3	0.23	53.53
Indirect Benefits	80.1	-0-	80.1
Total Benefits	133.4	0.23	133.63

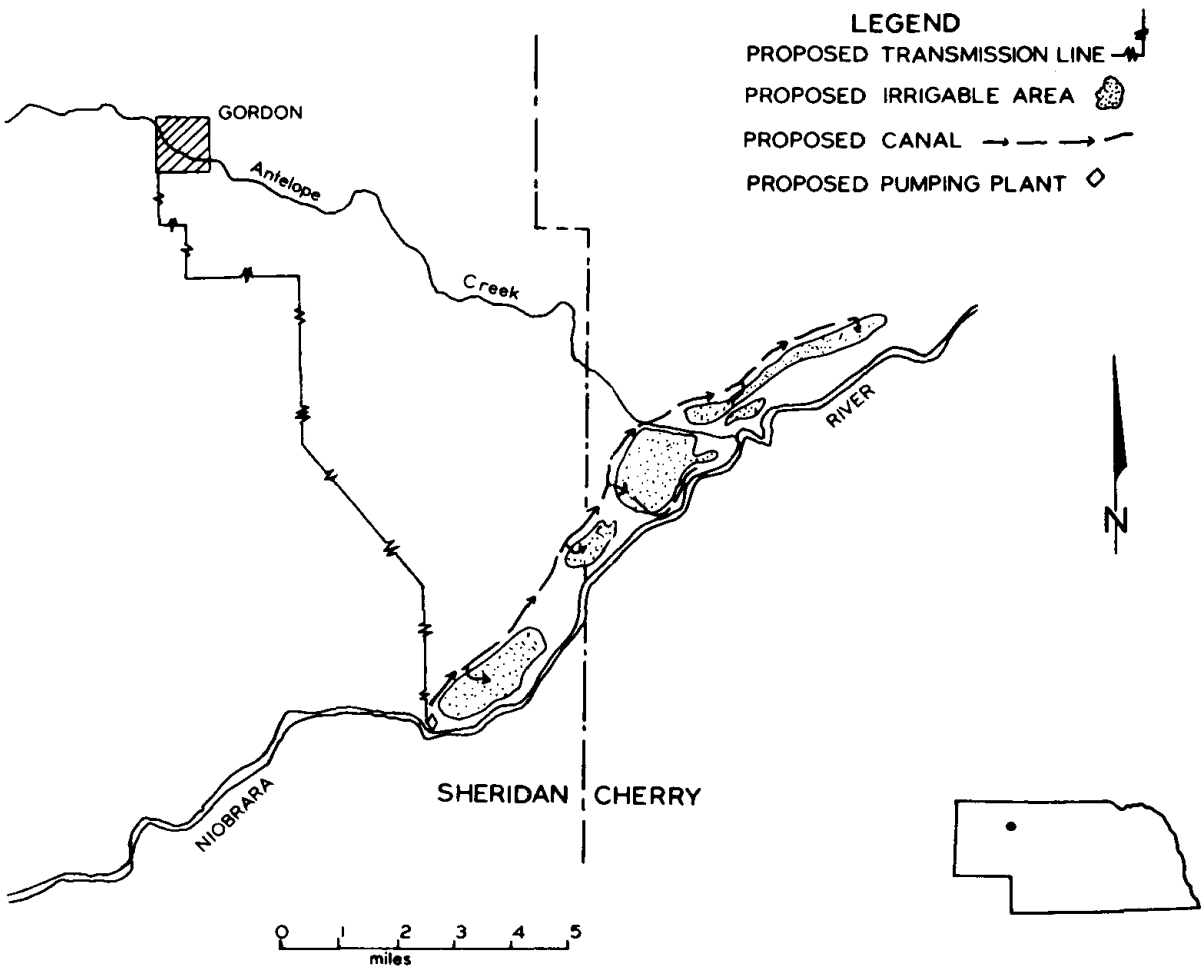
Table 2 - Project Costs and Repayment by Source
(Thousand Dollars)

	Irrigation	Fish & Wildlife	Total
Project Costs	1,250.7	-0-	1,250.7
Non-Reimbursable	-0-	-0-	-0-
Reimbursable	1,250.7	-0-	1,250.7
Mo. R. Basin Power	911.5	-0-	911.5
Non-Federal (Public)	-0-	-0-	-0-
Local	339.2	-0-	339.2

Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	1.20 ac.ft./ac.
Farm Delivery Requirement:	1.71 ac.ft./ac.
Diversion Requirement:	2.06 ac.ft./ac.
Total Diversion Requirement:	4,700 ac.ft.
Return Flow:	1,000 ac.ft.
Streamflow Depletion:	3,700 ac.ft.

LAVACA FLATS UNIT
BUREAU of RECLAMATION



Mirage Flats Project - Supplemental Water

The existing Mirage Flats Irrigation Project 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, and bills to authorize the additions to this project have been introduced but not acted on by Congress. The Congress must authorize and fund the additions before detailed planning and construction can proceed.

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 generally 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 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 its board requested that the Bureau of Reclamation study the feasibility of providing supplemental water. Local interest in this project addition developed because of the lack of an adequate water supply.

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		
IRRIGATION SERVICE AREA:	11,662 Acres	COSTS BASED ON:	1965 Prices
		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

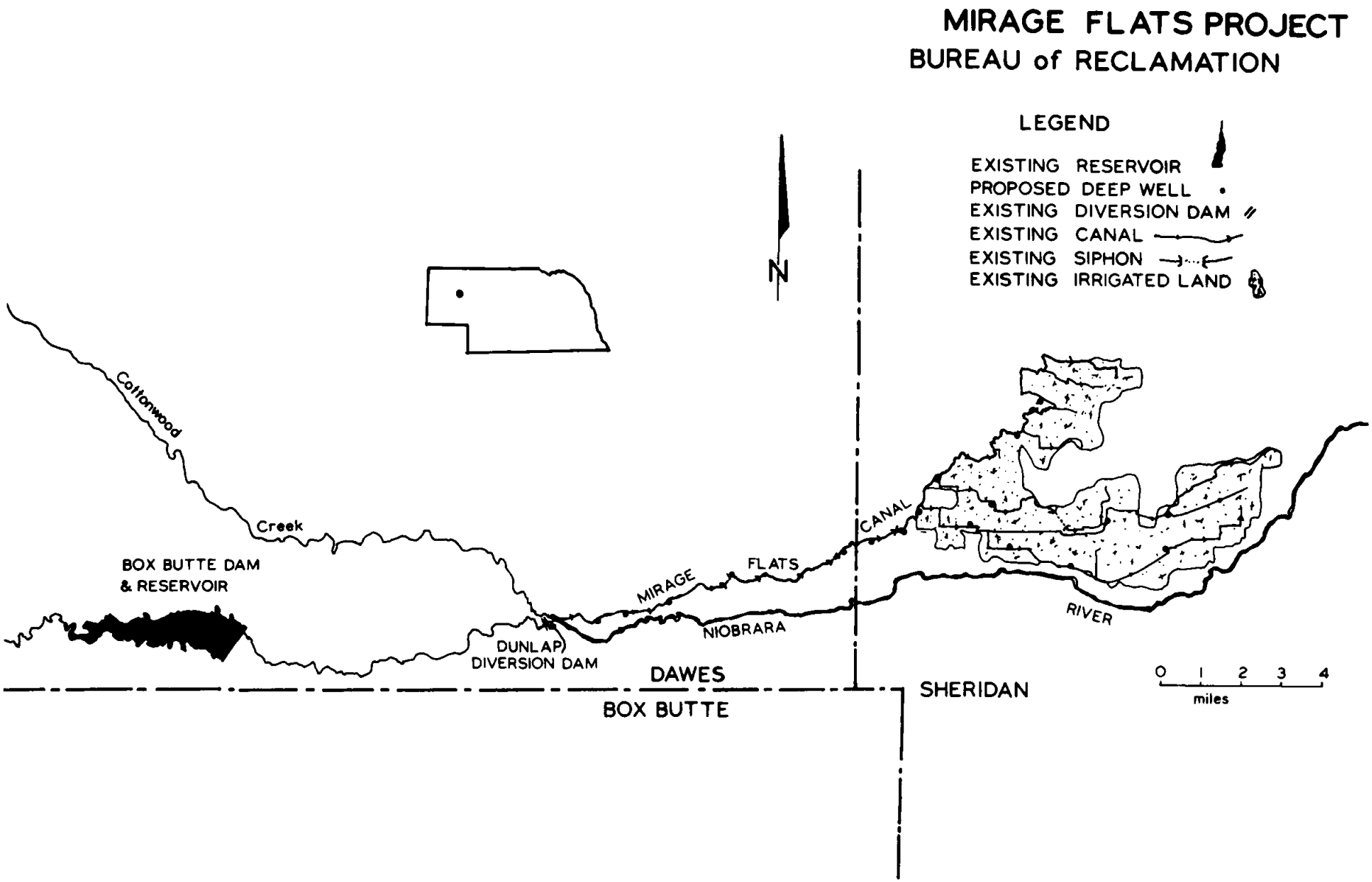
Table 2 - Project Costs and Repayment by Source
(Thousand Dollars)

	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
N
Cottonwood
Creek
BOX BUTTE DAM
& RESERVOIR
DUNLAP
DIVERSION DAM
MIRAGE
FLATS
CANAL
NIOBRARA
RIVER
DAWES
BOX BUTTE
SHERIDAN
0 1 2 3 4
miles

O'Neill Unit

The Bureau of Reclamation is the agency primarily responsible for investigation and design of the O'Neill Unit. This proposed project will be multipurpose, providing irrigation, recreation, fish and wildlife, and incidental flood control benefits.

Current Status. A feasibility report was completed in 1964 by the Bureau of Reclamation. The project has been endorsed by the Nebraska Natural Resources Commission as a part of Nebraska's State Water Plan. The project had previously been authorized as part of the Missouri River Basin Project in 1954. It was reauthorized by Congress in October, 1972.* Funds for final design and construction must be provided before construction can begin.

Description of Project Area. This project is located in north-central Nebraska just north of the Sandhills. The terrain of this area is characterized by benchlands and terraces ranging from 50 to 500 feet in elevation above the Niobrara River.

The economy is mainly agricultural. Feeder calves have been the major export commodity of the area in the past, but a trend toward more cattle feeding has developed as more irrigated corn is produced.

Intensive groundwater irrigation development has occurred in the area during the past 15 years, and since 1961, it has occurred at an increasing rate. Groundwater levels have declined as withdrawals have exceeded recharge and likely will continue to do so unless natural recharge is supplemented with surface water from other sources.

Annual precipitation in the area averages about 21 inches, of which 16 inches occur during the months of April through September.

Project Description. Major features of the O'Neill Unit would include the Norden Dam and Reservoir, O'Neill Canal, Springview Pumping Plant, and associated distribution systems. The primary function would be the irrigation of 77,000 acres of land in Keya Paha and Holt Counties.

Norden Dam would be a rolled earthfill structure on the Niobrara River about 3 miles below the mouth of Fairfield Creek. The reservoir would have an initial capacity of 411,000 acre-feet. The O'Neill Canal would deliver water to the Springview facilities as well as to the larger area in Holt County.

The Springview Forebay Dam and Reservoir, located five miles southwest of Springview on a tributary of Jewett Creek, would receive water from the O'Neill Canal through the Springview Sub-Canal. Springview pumping plant would lift water about 300 feet to serve 7,300 acres in Keya Paha County.

Approximately 4,697 acres, including 880 acres on Fairfield Creek, would be acquired and managed to provide fish and wildlife benefits.

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* P.L. 92-514

Recreation and fish and wildlife features of this project would provide 300,000 recreation days, 24,200 fisherman days, and 26,800 hunter days annually.

Public Interest. Local support for the project has been provided for many years by individual farmers and landowners, the Niobrara River Basin Development Association, and the O'Neill Chamber of Commerce. The North Central Nebraska Reclamation District, formed in 1963, has collected funds through taxation and voluntary contributions to sponsor the preliminary steps necessary for project authorization. The Niobrara Basin Irrigation District was formed in 1972 to sponsor the project and assume the repayment obligations.

Some opposition to the project has developed in recent years because of concern for the environmental effects. The Nebraska Game and Parks Commission has withdrawn its letter of intent to cost-share certain recreation and fish and wildlife costs of the project. The reclamation district has agreed to assume responsibility for non-federal costs associated with these functions.

Projects in Planning

Niobrara Relocation Project

This special project by the Corps of Engineers will provide for relocation of the village of Niobrara to alleviate the problems caused by high groundwater levels which have occurred since the filling of Lewis and Clark Lake.

Current Status. Construction funds have been made available by the Federal Government. Plans for a new townsite are being prepared by a private architect-engineer firm contracted by local interests. These plans are well advanced and are expected to be completed in time to permit construction to begin in late spring 1973.

O'NEILL UNIT

CONSTRUCTION PERIOD:	10 Years	ECONOMIC LIFE:	100 Years
AVERAGE ANNUAL COST:	$4,665,000	ANNUAL O.M.&R.:	$552,000
INTEREST RATE:	3 1/4 Percent	BY:	North Central Nebraska Reclamation District
BENEFIT-COST RATIO:	1.42 to 1.00		
IRRIGATION SERVICE AREA:	77,000 Acres	COSTS BASED ON:	1972 Prices
		LAND REQUIRED:	30,355 Acres

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrigation	Fish & Wildlife	Recreation	Flood Control	Total
Direct Benefits	4,760	71	381	16	5,228
Indirect Benefits	1,398	-0-	-0-	-0-	1,398
Total Benefits	6,158	71	381	16	6,626

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

	Irrigation	Fish & Wildlife	Recreation	Flood Control	Total
Project Costs	107,635 1/	1,605	5,877	351	115,468
Non-Reimbursable	-0-	1,238	4,505	351	6,094
Reimbursable	107,635 1/	367 2/	1,372 2/	-0-	109,374 2/
Mo. R. Basin Power	86,985	-0-	-0-	-0-	86,985
Non-Federal (Public)	-0-	367 2/	1,372 2/	-0-	1,739 2/
Local	20,650	-0-	-0-	-0-	20,650

1/ This figure includes $2,704,000 assigned pumping power costs.
2/ Does not include repayable interest during construction.

Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	1.12 ac.ft./ac.-O'Neill, 1.13 ac.ft./ac.-Springview
Farm Delivery Requirement:	1.87 ac.ft./ac.-O'Neill, 1.88 ac.ft./ac.-Springview
Diversion Requirement:	3.07 ac.ft./ac.-O'Neill, 2.39 ac.ft./ac.-Springview
Total Diversion Requirement:	231,100 acre-feet
Return Flow:	Not Available
Streamflow Depletion:	235,800 ac.ft. at Norden Dam

Table 4 - Dam and Reservoir Data

Norden Dam

Height:	245 feet
Length:	3,700 feet
Spillway Cap.:	8,800 c.f.s.
Drainage Area:	8,390 sq. miles 2400 contributing

Norden Reservoir

Capacity	Acre-Feet
Surcharge	131,500
Sediment	110,000/100 yr.
Conservation	125,000
Total	411,000*
Surface Area	**Acres**
Surcharge	7,500
Cons. Pool	6,300

Springview Forebay Dam

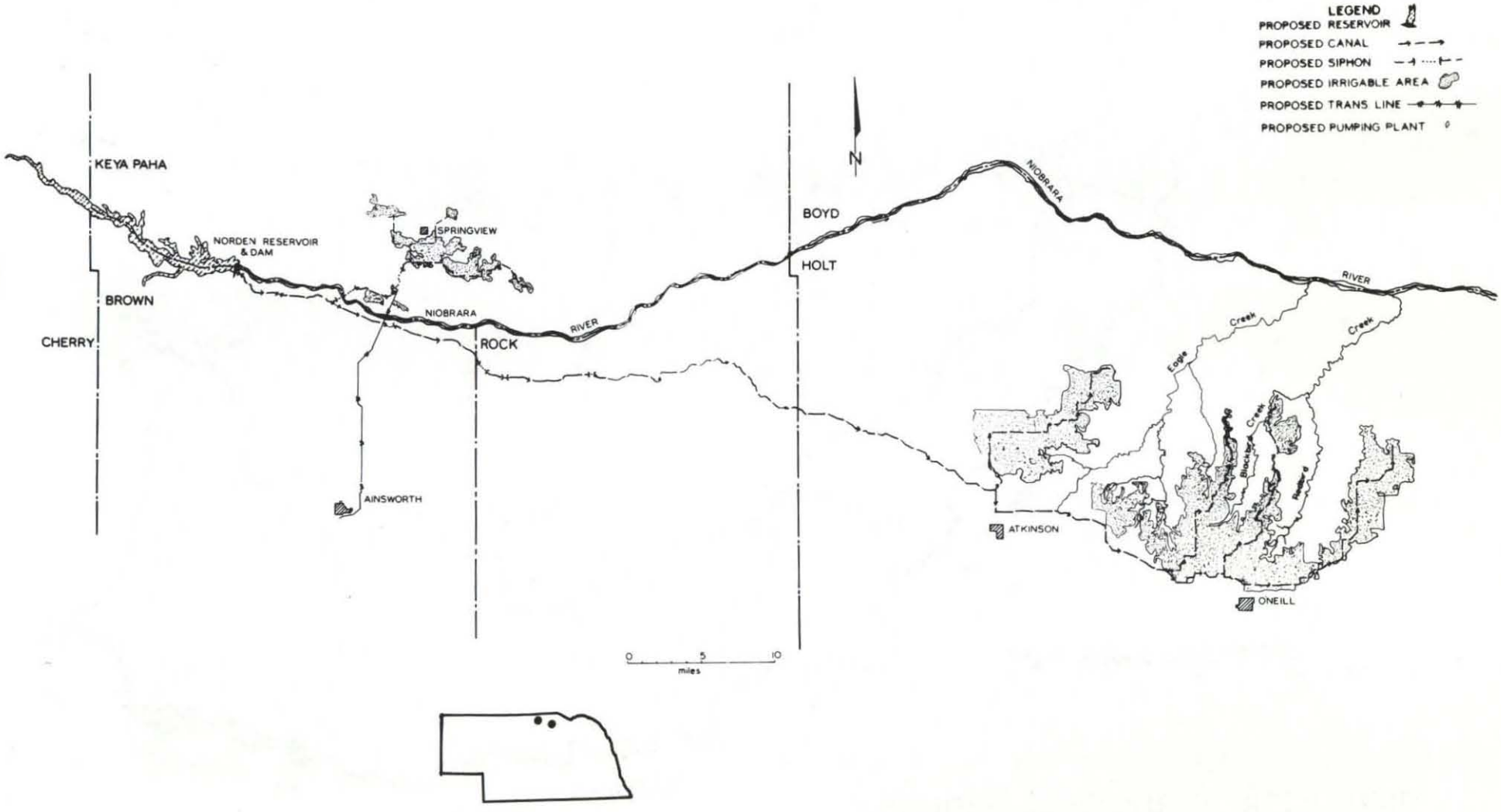
Height:	61 feet
Length:	375 feet
Spillway Cap.:	140 c.f.s.
Drainage Area:	0.4 sq. miles

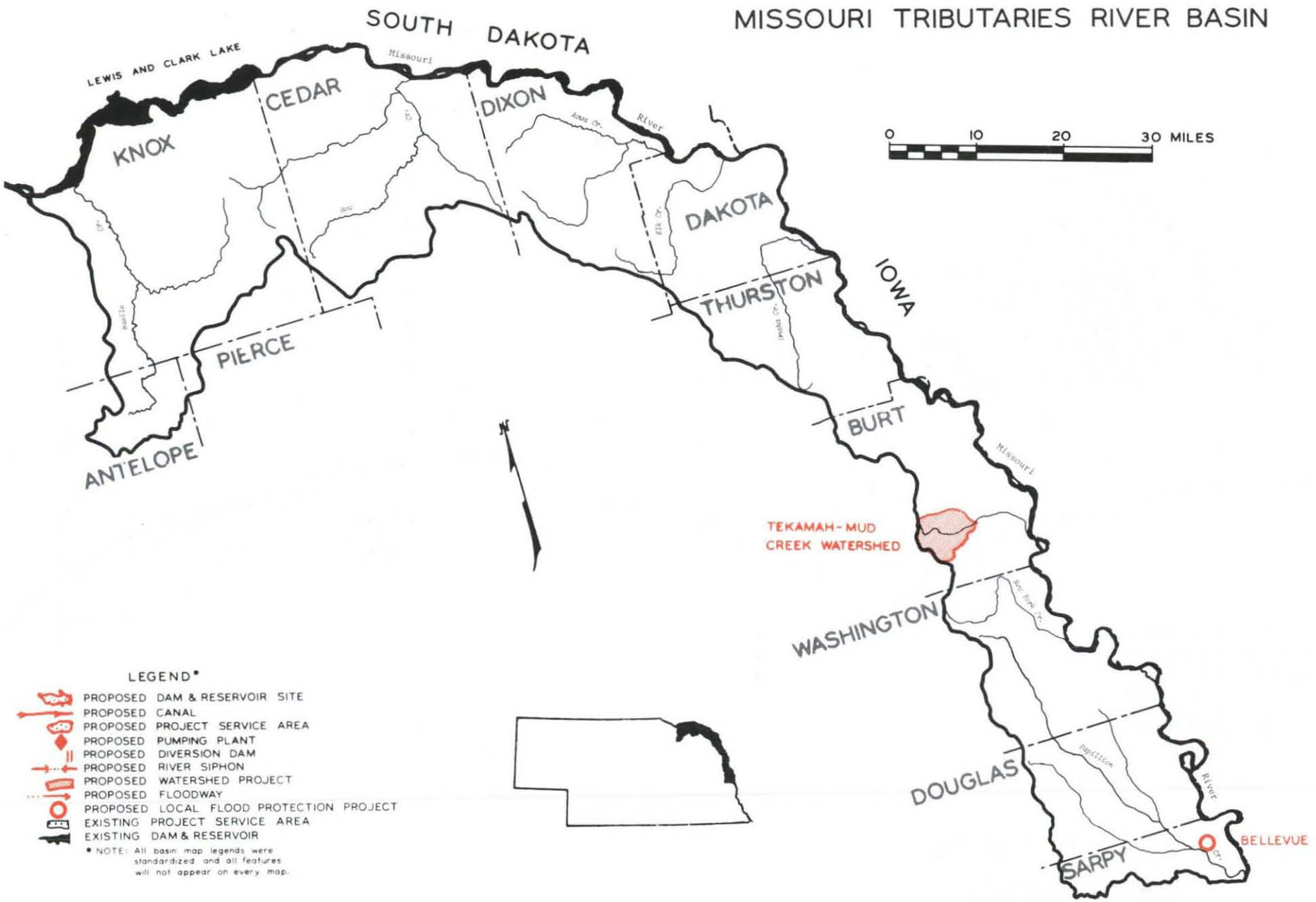
Springview Forebay Reservoir

Capacity	Acre-Feet
Surcharge	90
Sediment	80/100 yr.
Conservation	90
Total	170*
Surface Area	**Acres**
Surcharge Pool	14
Cons. Pool	8

* Excludes Surcharge

O'NEILL UNIT
BUREAU of RECLAMATION




MISSOURI TRIBUTARIES RIVER BASIN
SOUTH DAKOTA
LEWIS AND CLARK LAKE
Missouri
River
KNOX
CEDAR
DIXON
DAKOTA
THURSTON
IOWA
PIERCE
ANTELOPE
BURT
Missouri
River
TEKAMAH - MUD
CREEK WATERSHED
WASHINGTON
DOUGLAS
SARPY
BELLEVUE
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N
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
EXISTING PROJECT SERVICE AREA
EXISTING DAM & RESERVOIR
* NOTE: All basin map legends were standardized and all features will not appear on every map.

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 the original Volume I has changed as noted below.

Papillion Creek Watershed Project

This project is currently under construction.

Aowa Creek Watershed Project

This project is currently under construction.

Papillion Creek and Tributaries Project

This Corps of Engineers project is currently under construction.

Potential Projects

Tekamah-Mud Watershed

The Soil Conservation Service is the agency primarily responsible for investigation and design of the Tekamah-Mud Watershed project. It is a multipurpose project including recreation, flood control, and erosion control benefits.

Current Status. This project has undergone both preliminary and work plan investigations, completed all reviews, and is presently authorized for construction. It has been endorsed by the Nebraska Natural Resources Commission as part of Nebraska's State Water Plan.

Description of Project Area. This watershed is located along the Missouri River bluffs in Burt County and includes the city of Tekamah. The watershed is eight miles long with an average width of approximately five miles. Upland topography varies from moderately sloping to steep. Flood plain lands are nearly level to gently sloping. The average annual precipitation at Tekamah is 28.26 inches. The average length of the growing season is 166 days, and sixty-six percent of the precipitation occurs during that period.

The economy of the watershed is based on livestock and cash-grain farm enterprises. The distribution of the land use is approximately 67.5 percent cropland, 22.7 percent pasture and rangeland, and 9.8 percent devoted to other uses.

Almost the entire length of Tekamah and Mud Creeks are diked from where they cross US Highway 73 to the downstream end of the watershed and beyond to transport upland waters across the river bottoms to the Missouri River.

Project Description. This project would consist of installation of land treatment measures, one multipurpose floodwater retarding and recreation structure, four combination floodwater retarding and grade stabilization structures, and ten grade stabilization structures. Water-based recreational facilities would be installed in the vicinity of the multipurpose structure.

Economic benefits would be derived from flood control, erosion control, and recreation features. The proposed recreation development would provide an estimated 26,950 visitor days of recreation annually.

Remaining Problems and Needs. Flood plain management is needed in the city of Tekamah to prevent future flood plain encroachment. Additional land treatment is needed to further reduce soil erosion and sedimentation.

Public Interest. Local interests formed the Tekamah-Mud Watershed Conservancy District to sponsor the project. That responsibility was assumed by the Middle Missouri Tributaries Natural Resources District when it was created in July, 1972.

TEKAMAH-MUD WATERSHED

CONSTRUCTION PERIOD:	5 Years	INTEREST RATE:	5 1/8 Percent
PROJECT INSTALLATION COST:	$1,738,000	BENEFIT-COST RATIO:	1.3 to 1.0
FEDERAL:	$1,235,500	ECONOMIC LIFE:	100 Years
NON-FEDERAL:	$ 502,500	COSTS BASED ON:	1970 Prices
O. & M. BY:	Middle Missouri Tributaries Natural Resources District		

Table 1 - Average Annual Structural Benefits

Flood and Erosion Control	Recreation	Secondary	Total
$61,800	$40,400	$9,900	$112,100

Table 2 - Average Annual Structural Costs

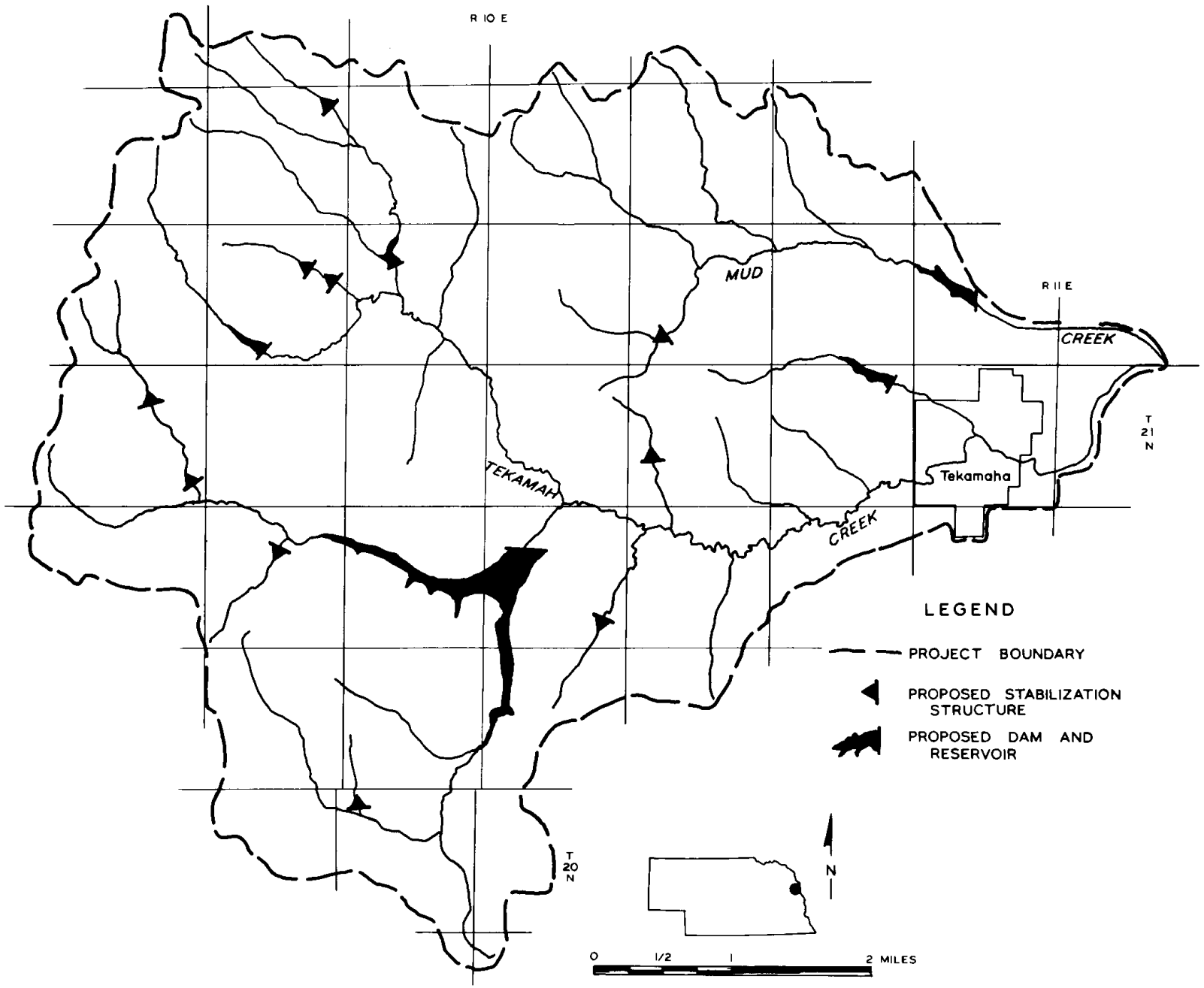
	Installation	O. & M.	Total
Structures	$67,300	$10,900	$78,200
Administration	8,410		8,410
Total	$75,710	$10,900	$86,610

Table 3 - Reservoir Data

Number of Structures	Total Controlled Drainage Area* (Acres)	Storage Capacity* (Acre-Feet)			
		Initial	Sediment	Recreation	Flood Control
15	12,150	7,667	3,298	1,255	3,114

* Floodwater storage structures only

TEKAMAH—MUD CREEK WATERSHED

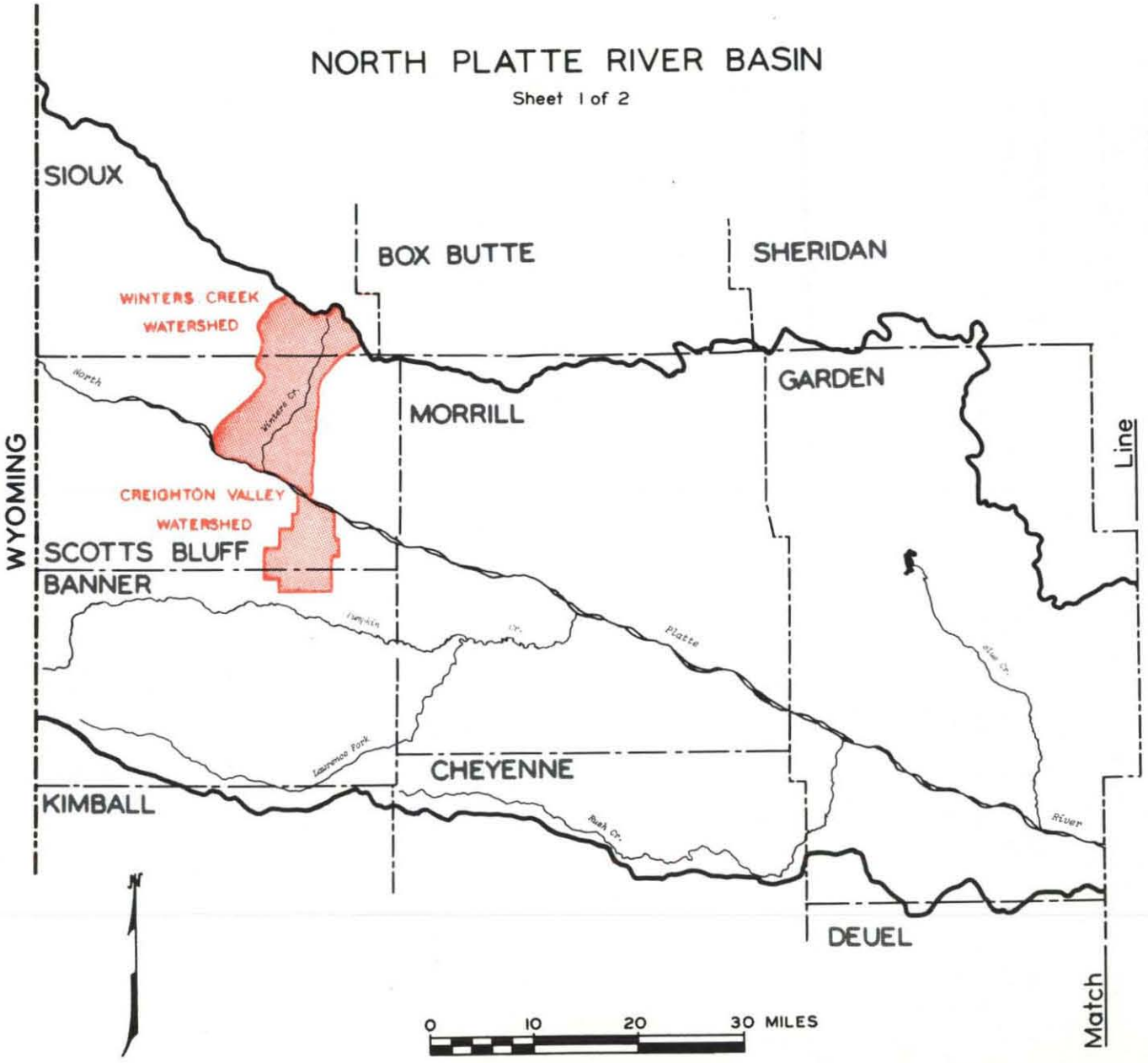


Projects in Planning

Mud Creek near Bellevue

A study was initiated by the U.S. Army Corps of Engineers, Omaha District, on November 9, 1971 at the request of the Sarpy County Board of Commissioners. The proposed project would provide protection from floods by improving the channel.

Current Status. The reconnaissance study, which indicates that a channel improvement project would be feasible under present conditions, has been completed. An official expression of local support is needed before the project can proceed further.


NORTH PLATTE RIVER BASIN
Sheet 1 of 2
SIOUX
BOX BUTTE
SHERIDAN
WINTERS CREEK
WATERSHED
GARDEN
MORRILL
WYOMING
Line
CREIGHTON VALLEY
WATERSHED
SCOTTS BLUFF
BANNER
CHEYENNE
KIMBALL
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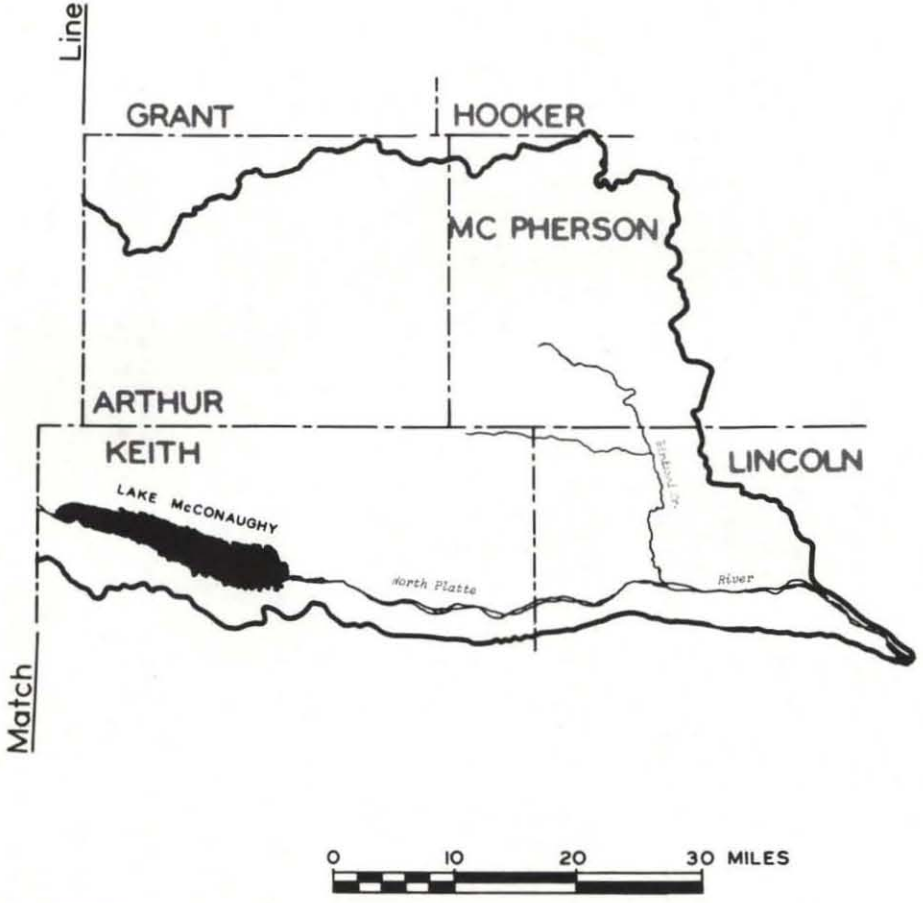
Match
0 10 20 30 MILES

NORTH PLATTE RIVER BASIN

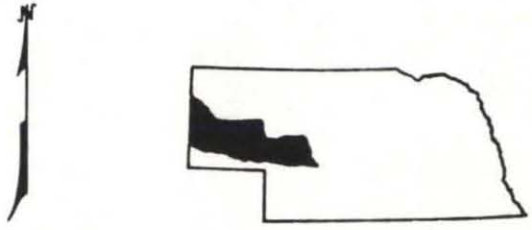
Sheet 2 of 2



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
- EXISTING PROJECT SERVICE AREA
- EXISTING DAM & RESERVOIR

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



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 project included in the original Volume I has changed as noted below.

Ash-Plum Creek Watershed

This project is inactive.

Potential Projects

Winters Creek Watershed

The Soil Conservation Service is primarily responsible for design of this watershed project. The principal purposes of the project are local flood protection and erosion control.

Current Status. The Watershed Work Plan and Environmental Statement have been formally approved by the Soil Conservation Service Administrator. The plan has been forwarded to the Office of Management and Budget for transmittal to the Public Works Committees of the House and Senate for authorization.

Description of Project Area. Winters Creek Watershed is located in extreme western Nebraska in Scotts Bluff and Sioux Counties. Winters Creek flows along the east side of the city of Scottsbluff before flowing into the North Platte River. The topography of the upper half of the watershed is gently rolling to rolling. The topography of the lower half ranges from nearly level to gently rolling. The average annual precipitation is 14.38 inches. The average growing season is 139 days, with 66 percent of the precipitation occurring during that period.

The economy of the watershed is based on the production of irrigated crops with the rangeland being used for summer grazing of cattle. The distribution of land use is approximately 36 percent cropland, 57 percent rangeland, 4 percent urban, and 3 percent devoted to other uses.

Extensive water resources developments have been constructed in this watershed. One of these, the Tri-State Canal, crosses Winters Creek immediately below the proposed floodwater retarding structure. The Winters Creek Canal crosses and diverts water from Winters Creek just east of Scottsbluff. A third development, the Scottsbluff Drain,

intercepts underground seepage and a very limited amount of overland flow from the area north and west of Scottsbluff.

Project Description. This project would consist of installation of land treatment measures, one floodwater retarding structure, and approximately 7.2 miles of channel improvement on Scottsbluff Drain and the lower reaches of Winters Creek.

The project measures would reduce erosion, prevent overtopping of the Tri-State Canal at the Winters Creek crossing, provide complete flood protection from a 100-year frequency storm in the area of Scottsbluff, and reduce flood damages to rural areas in the watershed.

Remaining Problems and Needs. Additional land treatment is needed to further reduce soil erosion and sedimentation. Flood plain management is needed in the city of Scottsbluff to prevent additional flood plain encroachment.

Public Interest. Scotts Bluff County and the Scotts Bluff County Soil and Water Conservation District agreed to sponsor this project originally. The responsibilities of the Soil and Water Conservation District were assumed by the North Platte Natural Resources District when it was created.

Projects in Planning

Mitchell Irrigation District Rehabilitation

The Mitchell Irrigation District lands are located in a strip along the south side of the North Platte River in Scotts Bluff County. The district applied for loan assistance through the Small Reclamation Projects Act of 1956, Public Law 984, for rehabilitation of its existing irrigation system.

The loan application has been separated into two parts, one part for rehabilitation of the lateral system and the other part for rehabilitation of the diversion dam, headgate structure, and initial reaches of the main canal. The loan for rehabilitation of the lateral system, totaling $1,204,000, has been approved and construction started in November 1971.

The loan for rehabilitation of the diversion works is still being negotiated with the Mitchell and Gering Irrigation Districts, which both use these facilities. The loan for this portion of the project is expected to total $447,750.

Creighton Valley Watershed

This project would be located south of the North Platte River in eastern Scotts Bluff County. A preliminary investigation found that a structural program under Public Law 566 would be feasible and planning authorization was granted. Further planning has been delayed, however, pending clarification of local support and sponsorship.

WINTERS CREEK WATERSHED

CONSTRUCTION PERIOD:	6 Years	INTEREST RATE:	5 3/8 Percent
PROJECT INSTALLATION COST:	$3,887,000	BENEFIT-COST RATIO:	1.1 to 1.0
FEDERAL:	$2,312,400	ECONOMIC LIFE:	100 Years
NON-FEDERAL:	$1,574,600	COSTS BASED ON:	1971 Prices
O. & M. BY:	North Platte Natural Resources District and Scotts Bluff County		

Table 1 - Average Annual Structural Benefits

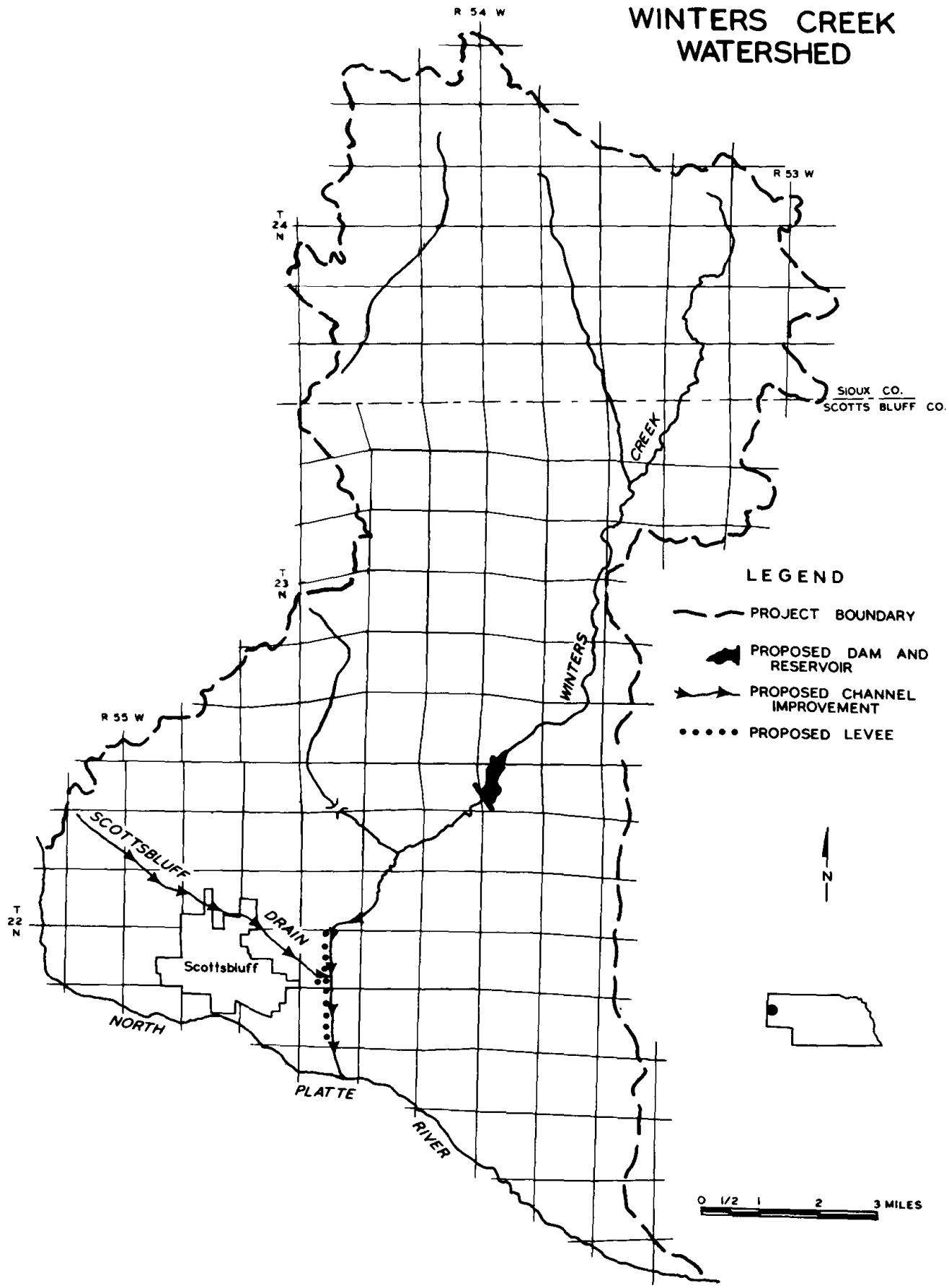
Flood and Erosion Control	Recreation	Secondary	Total
$177,100	-0-	$17,700	$194,800

Table 2 - Average Annual Structural Costs

	Installation	O. & M.	Total
Structures	$133,600	$23,100	$156,700
Administration	15,700		15,700
Total	$149,300	$23,100	$172,400

Table 3 - Reservoir Data

Number of Structures	Total Controlled Drainage Area (Acres)	Storage Capacity (Acre-Feet)		
		Initial	Sediment	Flood Control
1	24,320	5,020	1,397	3,623


WINTERS CREEK WATERSHED
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R 53 W
T 24 N
T 23 N
T 22 N
R 55 W
SIOUX CO.
SCOTTS BLUFF CO.
WINTERS CREEK
SCOTTSBLUFF DRAIN
Scottsbluff
NORTH PLATTE RIVER
LEGEND
PROJECT BOUNDARY
PROPOSED DAM AND RESERVOIR
PROPOSED CHANNEL IMPROVEMENT
PROPOSED LEVEE
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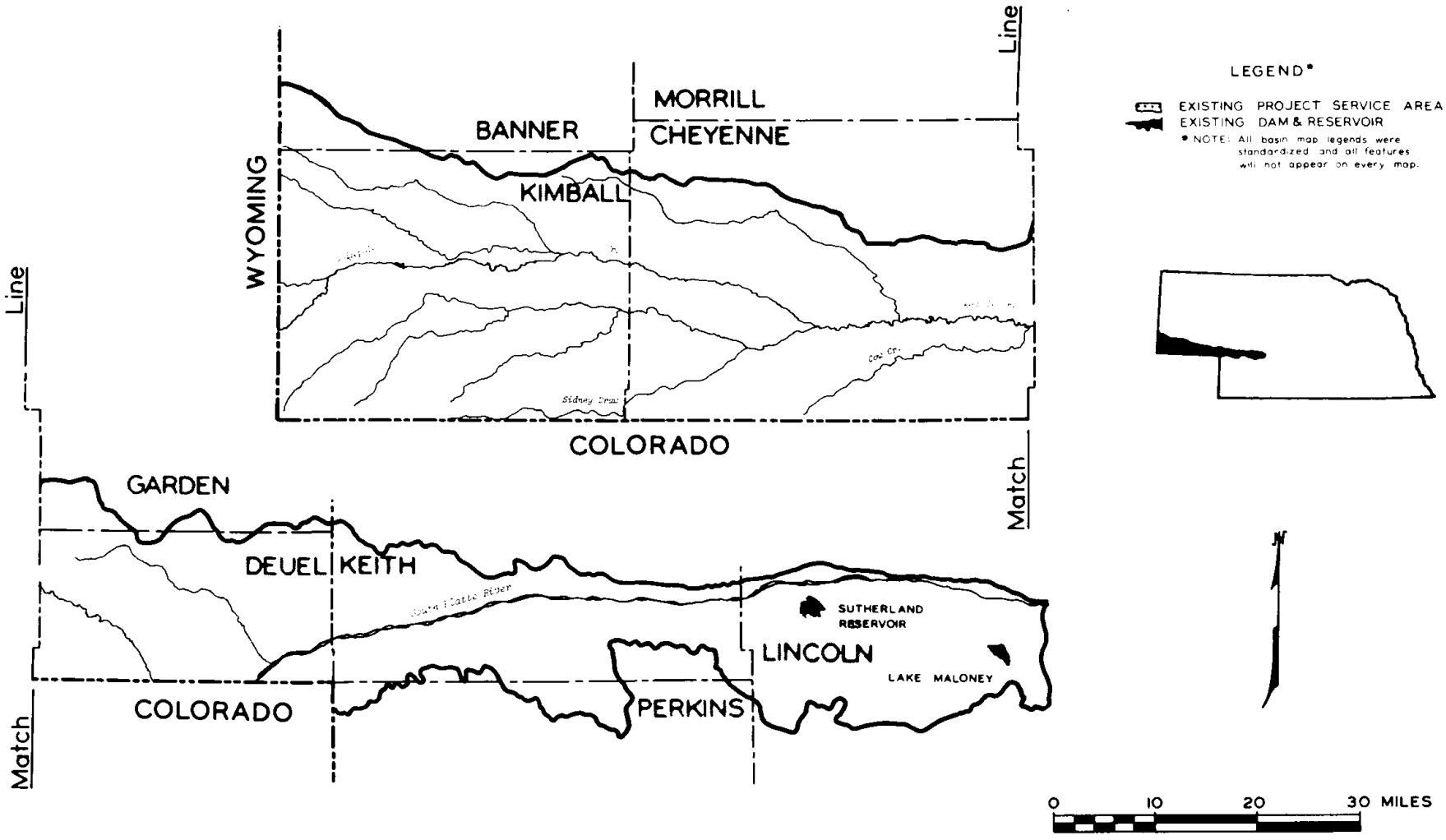
0 1/2 1 2 3 MILES

SOUTH PLATTE RIVER BASIN



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 project included in the original Volume I has changed as noted below.

Brule Watershed Project

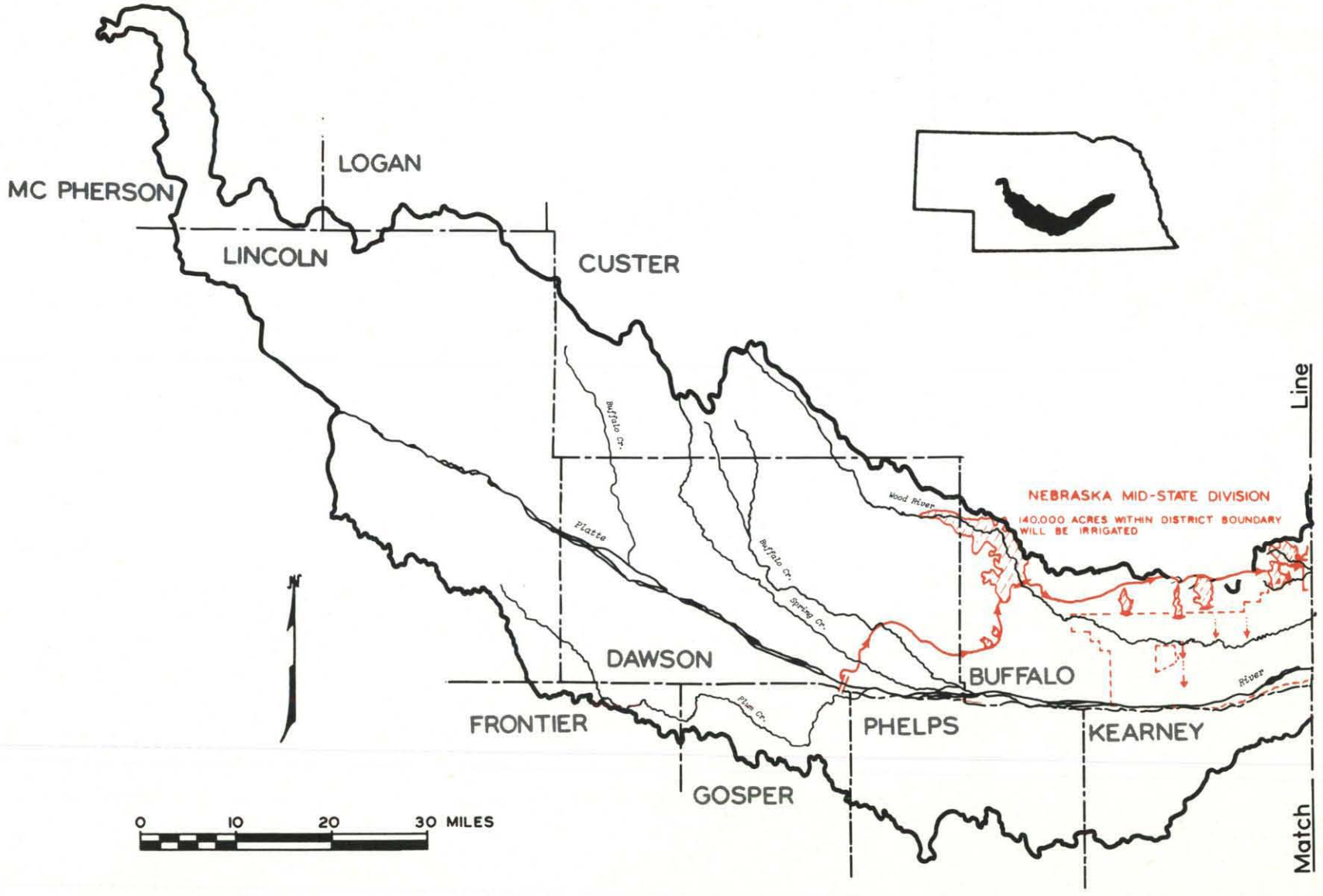
This project has been completed.

Potential Projects

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

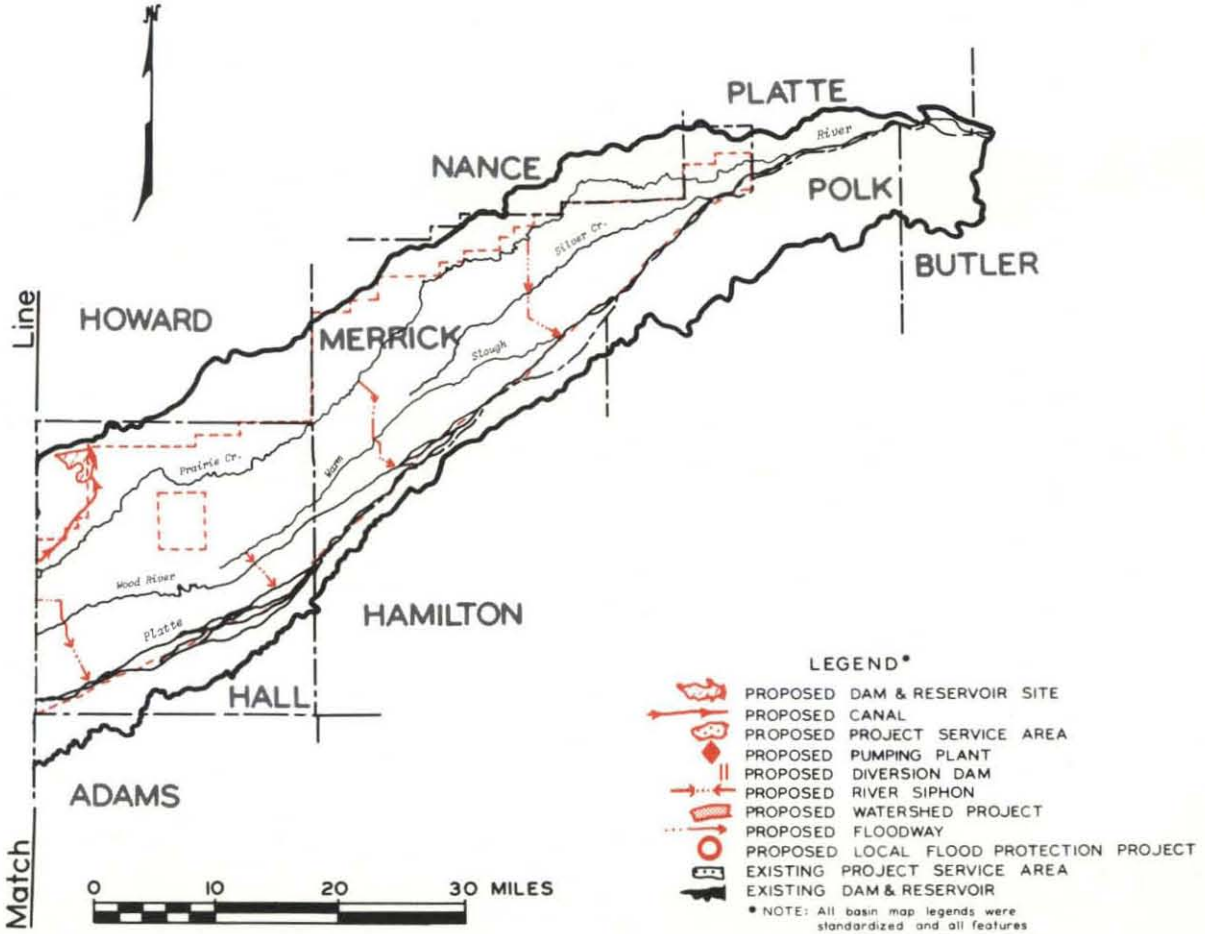
MIDDLE PLATTE RIVER BASIN

Sheet 1 of 2



MIDDLE PLATTE RIVER BASIN

Sheet 2 of 2



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 the original Volume I has changed as noted below.

Spring Creek Watershed

This project of the Soil Conservation Service is under construction.

Fort Kearny Unit

This study by the Bureau of Reclamation of the high groundwater problem in the Central Nebraska Public Power and Irrigation District was in progress when the first edition of Volume I was published. Since then a report on the study recommending local rather than federal action has been published.

Potential Projects

Nebraska Mid-State Division

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

Current Status. The Nebraska Mid-State Division was authorized in November, 1967 by the 90th Congress.* Both the Nebraska Mid-State Reclamation District and the Congress have provided funds for post-authorization studies. The Bureau of Reclamation plans an extensive study of the potential environmental impact. After completion of these studies, funds must be appropriated by Congress before construction can begin.

Description of Project Area. This project is located north of the Platte River in Dawson, Buffalo, Hall, and Merrick Counties. The Platte valley through the Mid-State area is characterized by three distinct terraces. Lands north of the valley are loess hills dissected by steep ravines, or sandhills.

The average annual precipitation is 22.62 inches. About 65 percent of this occurs during the growing season. In the early part of the summer,

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* P.L. 90-136

the rainfall is fairly well distributed, but later in July, August, and September, it is not uncommon to have long periods without adequate rainfall for crop growth.

The local economy is based largely on agriculture with corn, alfalfa, and cattle being the leading farm commodities. Principal industries operating in the Mid-State area are related to the processing and shipping of farm products.

Extensive private irrigation development has been accomplished in the proposed project service area by pumping from groundwater. A limited amount of irrigation water is being provided from surface water sources.

Project Description. This is a multipurpose project which would provide benefits from irrigation, groundwater stabilization, flood control, fish and wildlife, and recreation. Project facilities include a diversion dam on the Platte River, multipurpose reservoirs, an irrigation distribution system, and several floodways. Before construction is started, contracts for service to at least 140,000 acres must be signed.

Public Interest. The Nebraska Mid-State Reclamation District, formed in 1948, has levied taxes and obtained voluntary contributions to provide funds to aid project planning. As of February 1, 1973, agreements had been signed committing about 40 percent of the required 140,000 acres to the use of project water.

Local, state, and national groups have expressed concern over the possible detrimental environmental effects of the project and, in some cases, have indicated their opposition. The Nebraska Game and Parks Commission has withdrawn its letter of intent to cost-share certain recreation and fish and wildlife costs of the project. The reclamation district has agreed to assume responsibility for these non-federal costs.

NEBRASKA MID-STATE DIVISION

CONSTRUCTION PERIOD:	9 Years	ECONOMIC LIFE:	100 Years
AVERAGE ANNUAL COST:	$4,543,100	ANNUAL O.M.&R.:	$863,100
INTEREST RATE:	3 1/8 Percent	BY:	Nebraska Mid-State Reclamation District
BENEFIT-COST RATIO:	1.25 to 1.00		
IRRIGATION SERVICE AREA:	140,000 Acres	COSTS BASED ON:	1967 Prices

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrig.	Flood Control	Recreation	Fish & Wildlife	Total
Direct Benefits	4,339	518	175.5	425	5,457.5
Indirect Benefits	204	-0-	-0-	-0-	204
Total Benefits	4,543	518	175.5	425	5,661.5

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

	Irrig.	Flood Control	Recreation	Fish & Wildlife	Power (Deferred)	Total
Project Costs	76,831	12,831	3,780	11,151	1,542	106,135
Non-Reimbursable	-0-	12,831	3,665	10,744	-0-	27,240
Reimbursable	76,831	-0-	115*	407*	1,542*	78,895*
Mo. R. Basin Power	32,481	-0-	-0-	-0-	1,542	34,023
Non-Federal (Public)	-0-	-0-	115*	407*	-0-	522*
Local	44,350	-0-	-0-	-0-	-0-	44,350

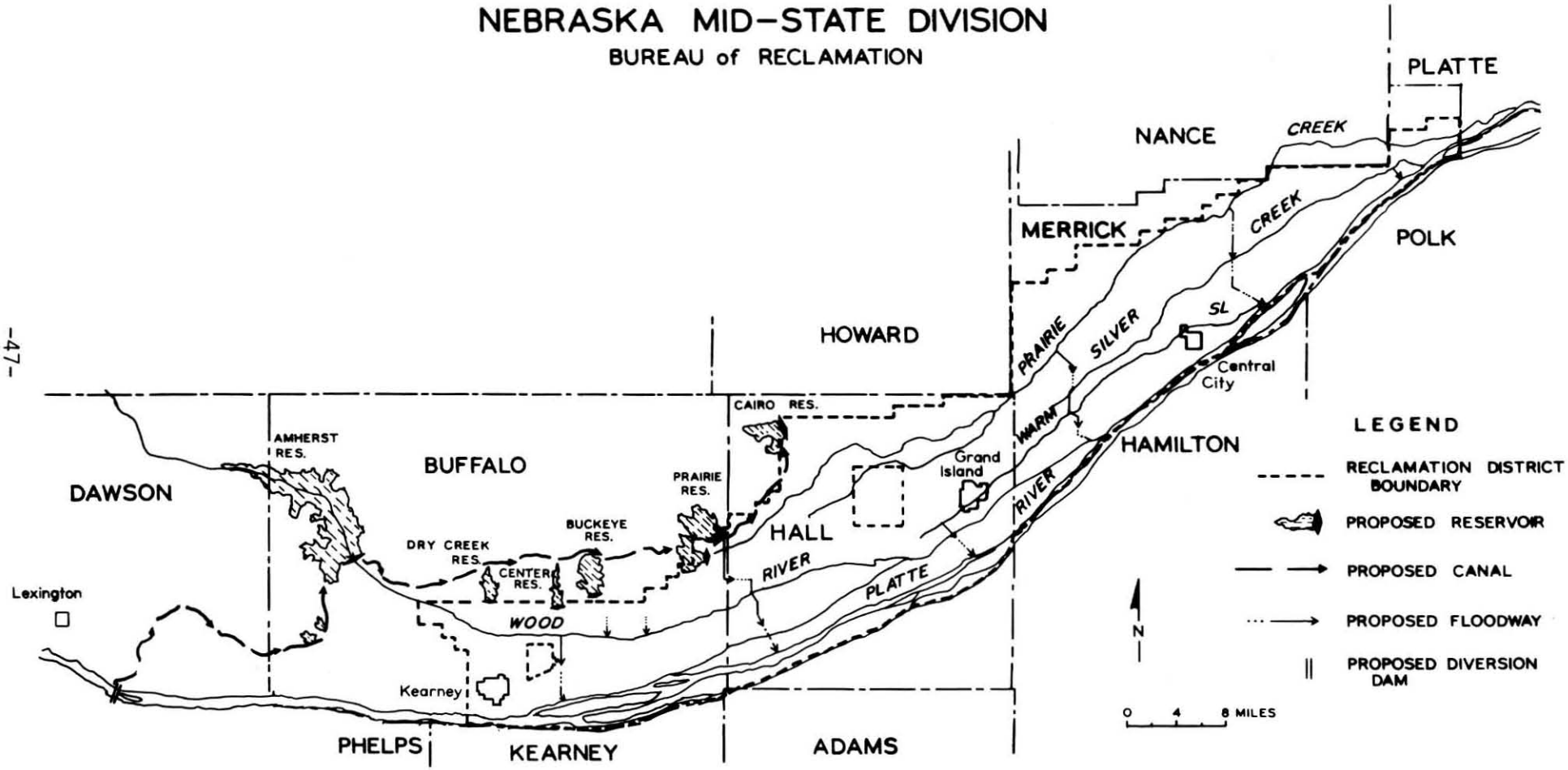
* Does not include repayable interest during construction

Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	1.08 ac.ft./ac.
Farm Delivery Requirement:	1.66 ac.ft./ac.
Diversion Requirement:	2.44 ac.ft./ac.
Total Diversion Requirement:	341,500 ac.ft.
Return Flow:	Not Available
Streamflow Depletion:	Not Available

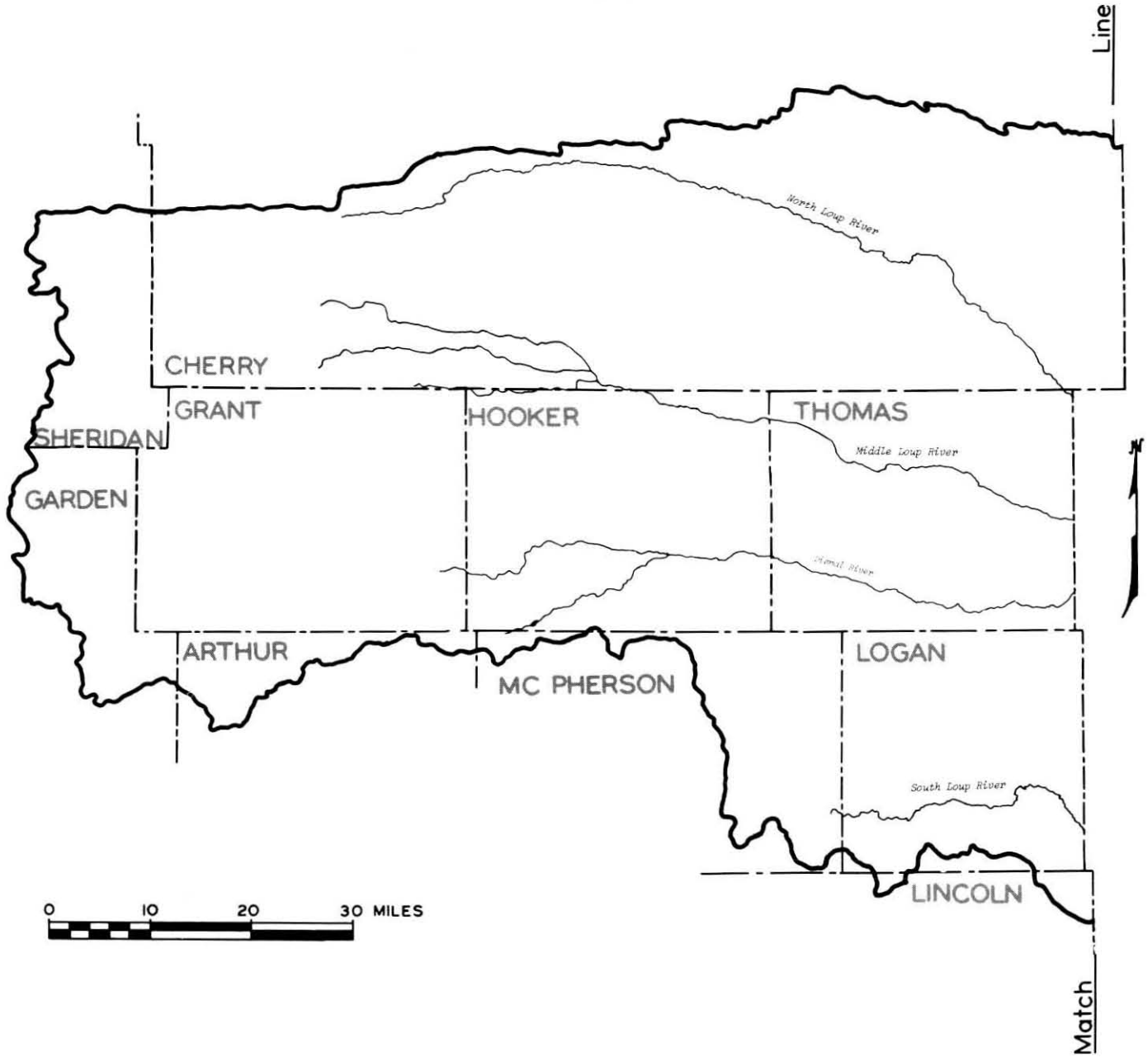
NEBRASKA MID-STATE DIVISION

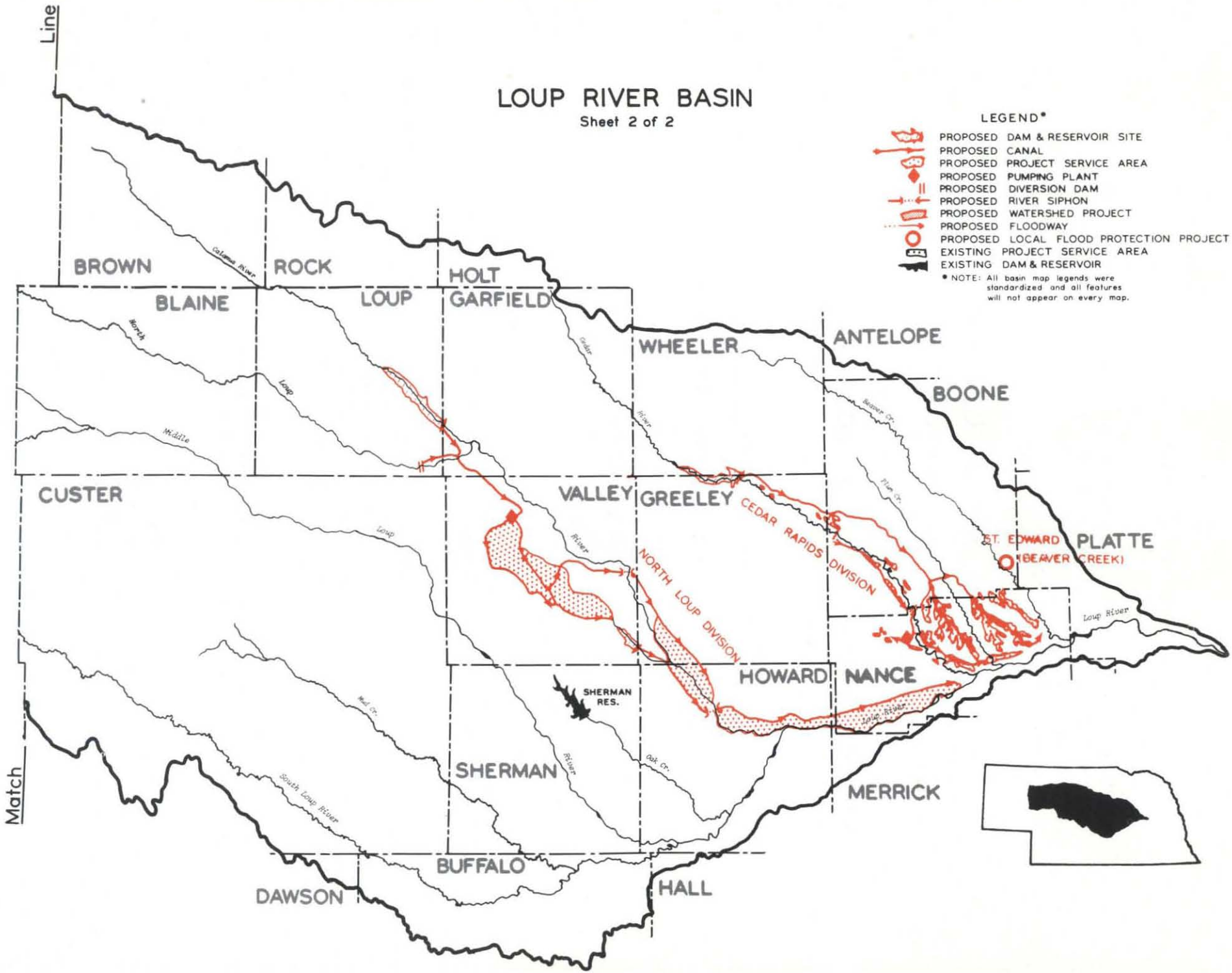
BUREAU of RECLAMATION



LOUP RIVER BASIN

Sheet 1 of 2




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
EXISTING PROJECT SERVICE AREA
EXISTING DAM & RESERVOIR
* NOTE: All basin map legends were standardized and all features will not appear on every map.
Line
Match
BROWN
ROCK
HOLT
BLAINE
LOUP
GARFIELD
WHEELER
ANTELOPE
BOONE
CUSTER
VALLEY
GREELEY
PLATTE
HOWARD
NANCE
SHERMAN
MERRICK
BUFFALO
DAWSON
HALL
CEDAR RAPIDS DIVISION
NORTH LOUP DIVISION
ST. EDWARD
(BEAVER CREEK)
SHERMAN RES.
Loup River
Cedar River
North Loup River
Middle Loup River
South Loup River
Mud Cr.
Oak Cr.
Beaver Cr.
Elm Cr.

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 the original Volume I has changed as noted below.

Loup River at Columbus Local Flood Protection

This Corps of Engineers project has been completed.

Mud Creek at Broken Bow Local Flood Protection

This Corps of Engineers project was under construction on January 1, 1973.

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 proposed report on the feasibility investigation found the project to be feasible in 1966, but it must now be re-evaluated using new planning procedures and current interest rates. This study is being delayed pending approval of new planning standards and procedures. If the project is still found to be feasible, authorization and funding by Congress will be required.

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 resulted in formulation of the feasibility 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.

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:	1.49 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

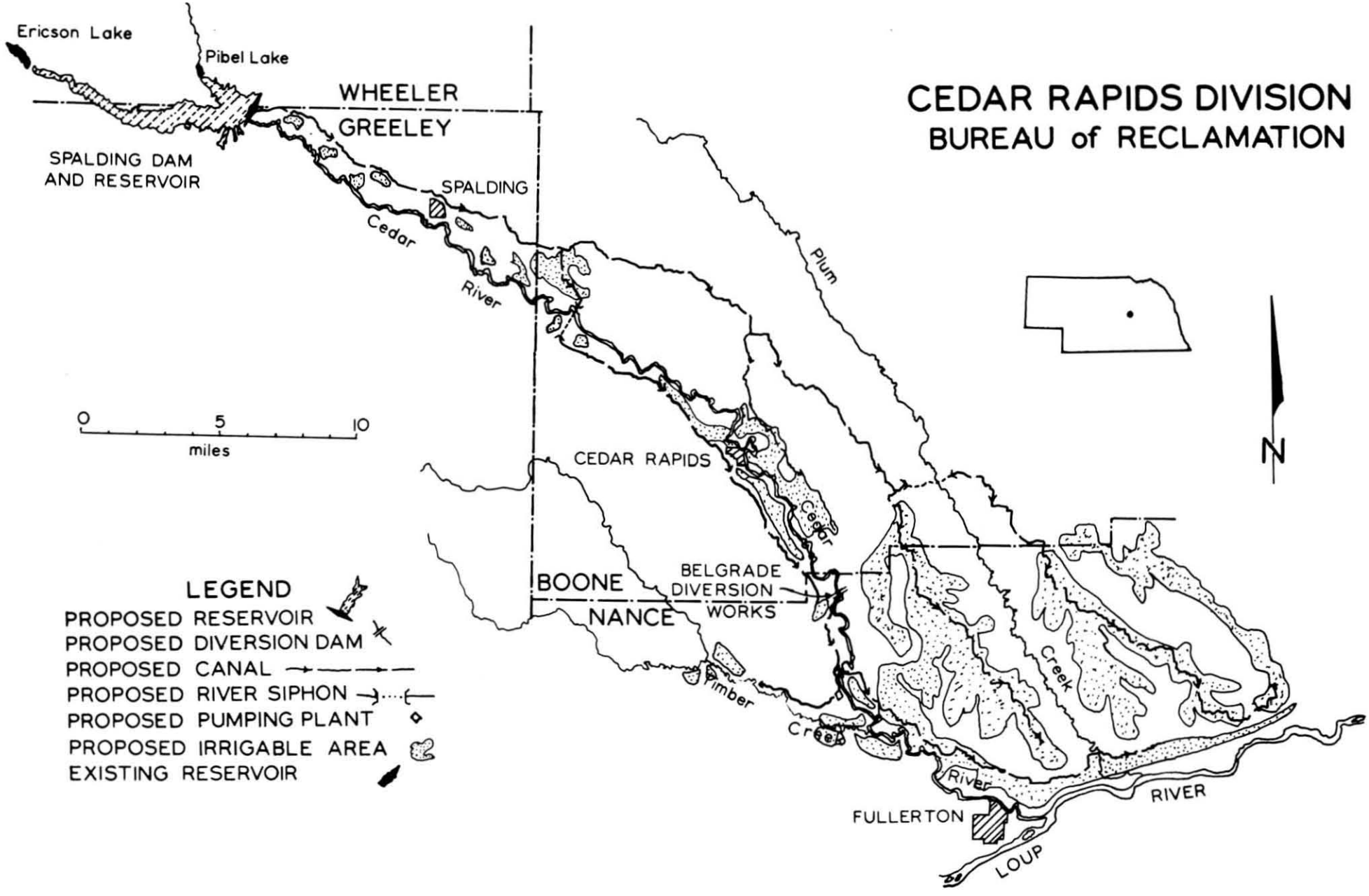
Table 4 - Dam & Reservoir Data

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
Ericson Lake
Pibel Lake
WHEELER
GREELEY
SPALDING DAM
AND RESERVOIR
SPALDING
Cedar
River
Plum
0
5
10
miles
CEDAR RAPIDS
Cedar
BOONE
NANCE
BELGRADE
DIVERSION
WORKS
Timber
Creek
Creek
River
RIVER
FULLERTON
LOUP
N
LEGEND
PROPOSED RESERVOIR
PROPOSED DIVERSION DAM
PROPOSED CANAL
PROPOSED RIVER SIPHON
PROPOSED PUMPING PLANT
PROPOSED IRRIGABLE AREA
EXISTING RESERVOIR

North Loup Division

The Bureau of Reclamation is the agency primarily responsible for investigation and design of the North Loup Division, a multipurpose project to provide recreation, irrigation, and fish and wildlife benefits.

Current Status. This project was authorized by Congress in October, 1972.* Funds must now be appropriated by Congress for final design and construction before further progress can be made. This project has been endorsed by the Nebraska Natural Resources Commission as a part of Nebraska's State Water Plan.

Description of Project Area. The potential North Loup Division of the Missouri River Basin Project is located in central Nebraska along the North Loup, Calamus, and Loup Rivers in portions of Loup, Garfield, Valley, Greeley, Howard, Merrick, and Nance Counties. The project area is made up of wide, flat river valleys and rolling hills. Surface drainage is well established.

The economy of the area is dependent upon agriculture and associated businesses. The area can reach its full potential for crop production only if adequate water is available.

The climate is suitable for the production of hay, grain, and livestock. Annual precipitation is nearly 21 inches with about 80 percent of this occurring during the growing season. A major part of the precipitation, however, falls in the early part of the growing season, leaving the later months relatively dry.

The major existing resource development in the area is the North Loup River Public Power and Irrigation District with 30,600 acres of irrigated land in the North Loup River valley.

Project Description. The project would include two storage reservoirs, a diversion dam, a pumping plant, canals, and a distribution system. Calamus Dam and Reservoir to be located 5-1/2 miles northwest of Burwell on the Calamus River would store flows of the Calamus River.

Davis Creek Dam and Reservoir would be located on a tributary to Davis Creek near the southeast corner of Valley County. Water would be diverted into Davis Creek Reservoir from Kent Diversion Dam on the North Loup River and Calamus Reservoir. It would provide some seasonal storage and re-regulate irrigation flows.

Six canals with a total length of 162 miles would be required to serve the 52,570 irrigable acres in the North Loup Division. A pumping plant would be required to lift water to an 8,700 acre area in the northern part of the district.

In addition to irrigation, the water stored in Calamus and Davis Creek Reservoirs would provide recreation and fish and wildlife benefits for people in the area as well as for those in other parts of the State. The recreation features of this project would provide 50,000 recreation days and 19,070 fisherman and hunter days annually.

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* P.L. 92-514

Remaining Problems and Needs. There was concern earlier by downstream interests as to the effects of reduction of Loup River flows. This issue has been resolved. The project cost estimate includes provisions to compensate for power interference.

Public Interest. Potential beneficiaries of this proposed project have actively supported the investigations and are pressing for construction. A reclamation district and an irrigation district have been formed. The reclamation district has obtained funds to promote the project through contributions and taxation.

Projects in Planning

Beaver Creek at St. Edward Local Flood Protection

This potential project of the Corps of Engineers would provide flood protection to the town of St. Edward from the waters of Beaver Creek and a north coulee. The project would include levees, channel straightening, and other channel improvements.

Current Status. The detailed project study was in progress on January 1, 1973.

NORTH LOUP DIVISION

CONSTRUCTION PERIOD:	8 Years	ECONOMIC LIFE:	100 Years
AVERAGE ANNUAL COST:	$3,144,000	ANNUAL O.M.&R.:	$324,000
INTEREST RATE:	3 1/4 Percent	BY:	Twin Loups Reclamation and Twin Loups Irrigation Districts
BENEFIT-COST RATIO:	1.23 to 1.00		
IRRIGATION SERVICE AREA:	52,570 Acres	COSTS BASED ON:	1972 Prices
		LAND REQUIRED:	19,674 Acres

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrigation	Recreation	Fish & Wildlife	Total
Direct Benefits	3,127	37.5	28.7	3,193.2
Indirect Benefits	677.8	-0-	-0-	677.8
Total Benefits	3,804.8	37.5	28.7	3,871

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

	Irrigation	Recreation	Fish & Wildlife	Total
Project Costs	78,347[1/]	362	754	79,463
Non-Reimbursable	-0-	181	754	935
Reimbursable	78,347[1/]	181[2/]	-0-	78,528[2/]
Mo. R. Basin Power	64,497	-0-	-0-	64,497
Non-Federal (Public)	-0-	181[2/]	-0-	181[2/]
Local	13,850	-0-	-0-	13,850

1/ Includes $1,207,000 assigned pumping power costs
2/ Does not include repayable interest during construction

Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	1.06 to 1.07 acre-feet/acre
Farm Delivery Requirement:	1.51 to 1.53 acre-feet/acre
Diversion Requirement:	2.64 acre-feet/acre
Total Diversion Requirement:	137,400 acre-feet

Table 4 - Dam and Reservoir Data

Calamus Dam

Height: 85 feet	Length: 6,400 feet
Spillway Capacity:	2,830 c.f.s.
Drainage Area:	110 square miles (contributing)

Calamus Reservoir

Capacity	Acre-Feet
Surcharge	26,400
Conservation	103,900
Sediment	6,500/100 yr.
Total	128,200*
Surface Area	**Acres**
Surcharge	5,777
Conservation	5,150

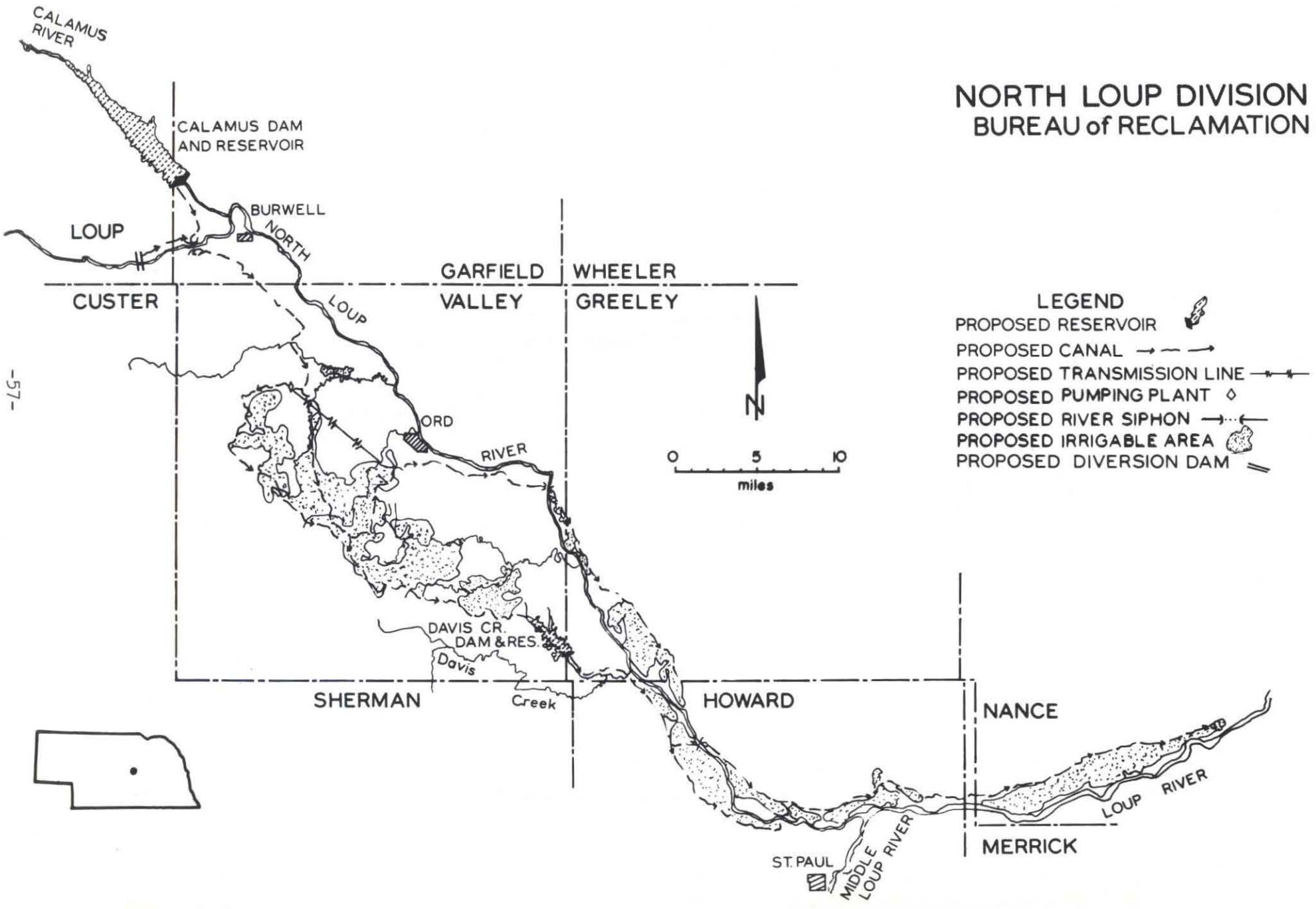
Davis Creek Dam

Height: 103 feet	Length: 2900 feet
Spillway Capacity:	430 c.f.s.
Drainage Area:	6.5 square miles

Davis Creek Reservoir

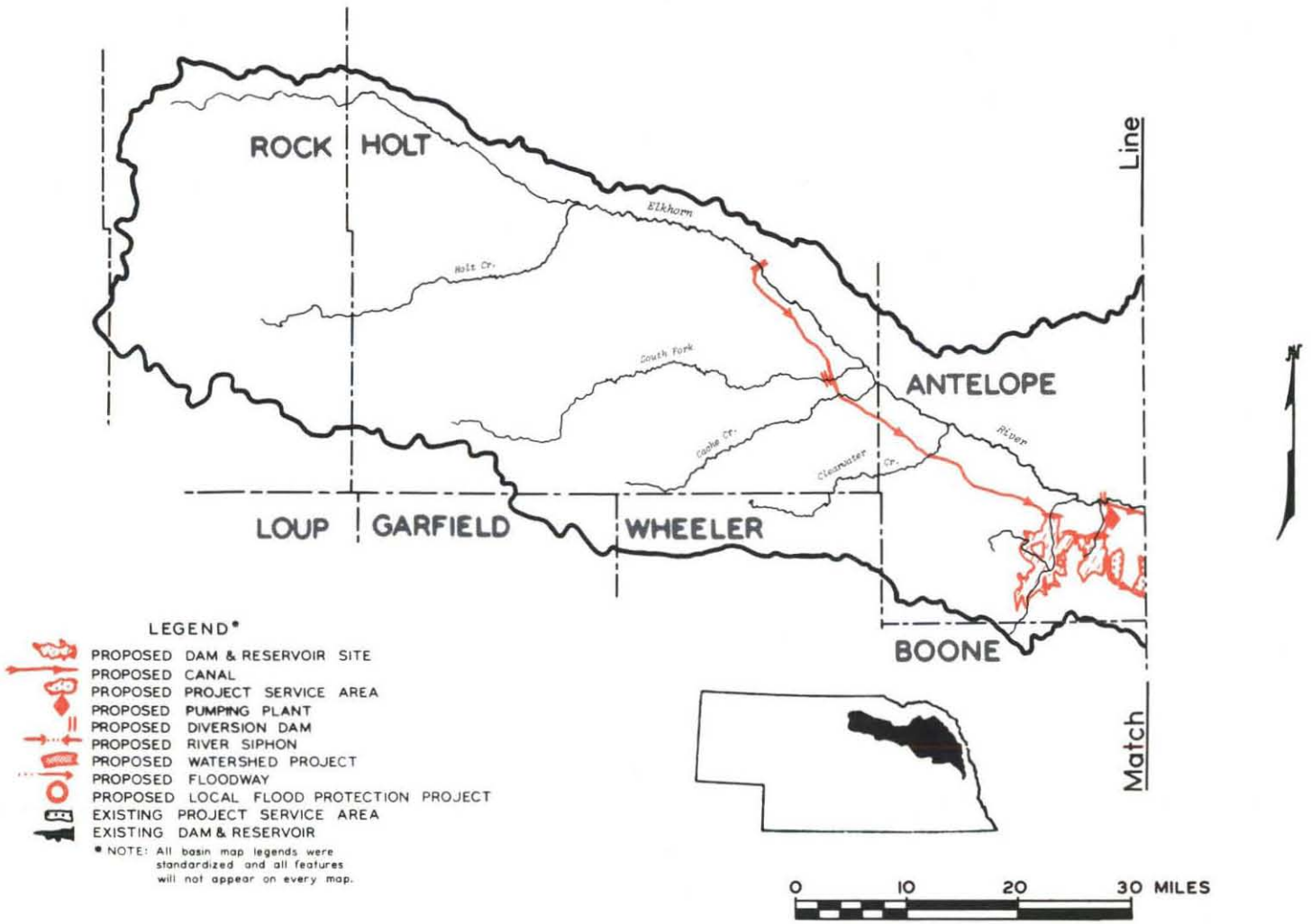
Capacity	Acre-Feet
Surcharge	7,900
Conservation	32,200
Sediment	1,200/100 yr.
Total	32,500*
Surface Area	**Acres**
Surcharge	1,312
Conservation	1,145

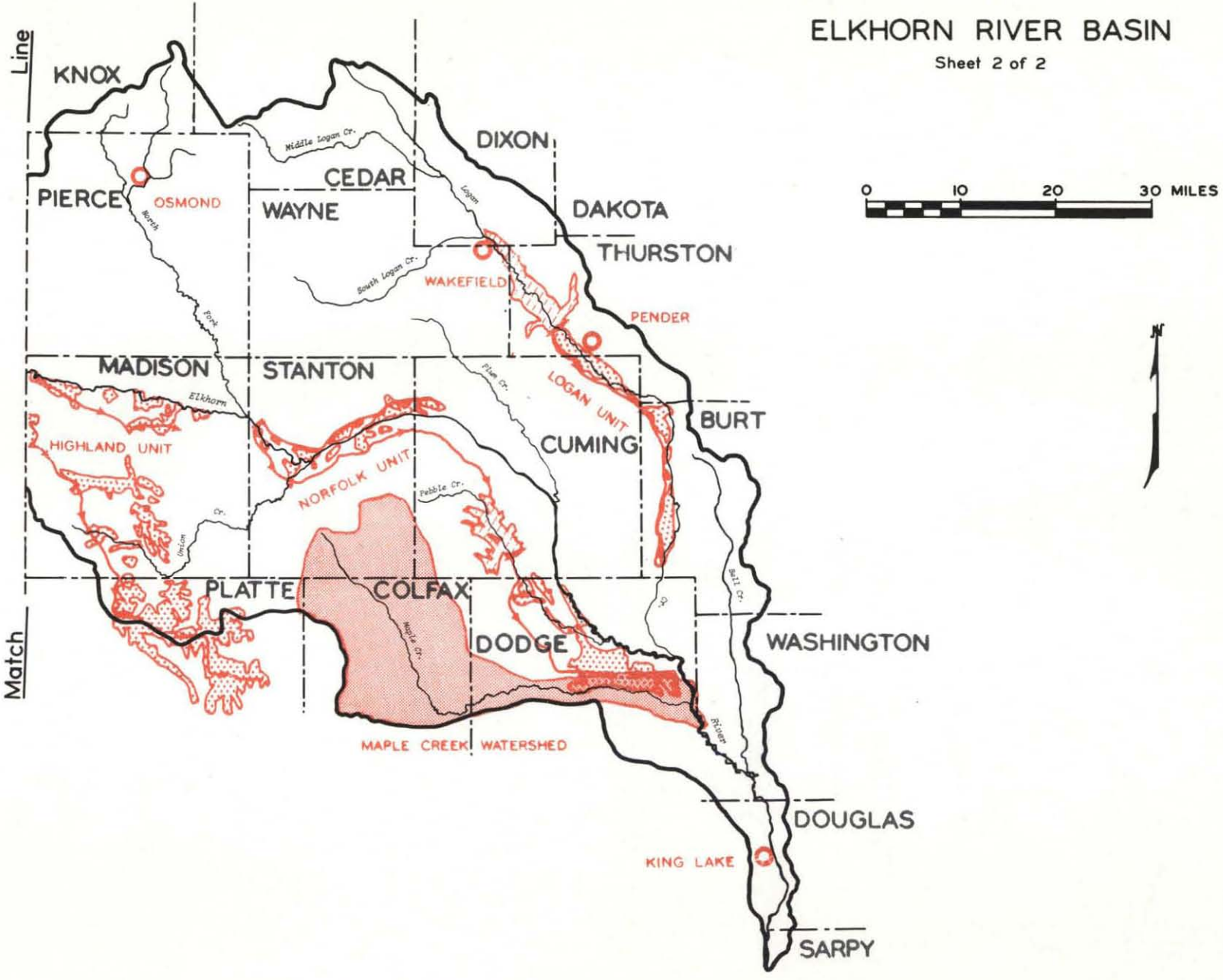
* Excludes Surcharge


NORTH LOUP DIVISION
BUREAU of RECLAMATION
CALAMUS RIVER
CALAMUS DAM AND RESERVOIR
BURWELL
LOUP
NORTH LOUP
GARFIELD
WHEELER
CUSTER
VALLEY
GREELEY
ORD
RIVER
DAVIS CR. DAM & RES.
Davis Creek
SHERMAN
HOWARD
NANCE
MERRICK
ST. PAUL
MIDDLE LOUP RIVER
LOUP RIVER
LEGEND
PROPOSED RESERVOIR
PROPOSED CANAL
PROPOSED TRANSMISSION LINE
PROPOSED PUMPING PLANT
PROPOSED RIVER SIPHON
PROPOSED IRRIGABLE AREA
PROPOSED DIVERSION DAM
N
0 5 10
miles

ELKHORN RIVER BASIN

Sheet 1 of 2




ELKHORN RIVER BASIN
Sheet 2 of 2
0 10 20 30 MILES
KNOX
Line
PIERCE
OSMOND
CEDAR
WAYNE
DIXON
DAKOTA
THURSTON
WAKEFIELD
PENDER
MADISON
STANTON
CUMING
BURT
HIGHLAND UNIT
NORFOLK UNIT
LOGAN UNIT
PLATTE
COLFAX
DODGE
WASHINGTON
Match
MAPLE CREEK WATERSHED
DOUGLAS
KING LAKE
SARPY
Middle Logan Cr.
South Logan Cr.
Logan
North
Fork
Elkhorn
Union
Cr.
Plum Cr.
Pebble Cr.
Maple Cr.
Bell Cr.
River

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 the original Volume I has changed as noted below.

Corporation Gulch Watershed

This project has been completed.

Battle Creek Local Flood Protection

This Corps of Engineers project is now inactive.

Giles Creek Local Flood Protection

This Corps of Engineers project is now inactive.

Meadow Grove Local Flood Protection

A detailed project study on this project was being conducted by the Corps of Engineers when the first edition of Volume I was published. Since that time a report has been prepared and the project has been completed.

Potential Projects

Highland Unit

The Bureau of Reclamation is the agency primarily responsible for planning the Highland Unit, a multipurpose project providing irrigation, recreation, flood control, and fish and wildlife benefits.

Current Status. The reconnaissance report on this project was favorable and feasibility studies were authorized and initiated in fiscal year 1973, but were terminated later that year because of a reassessment of national priorities. Completion of the feasibility study, authorization, and funding by Congress will be required before it can be constructed. A local organization with the requisite legal authority to sponsor the project must also be formed before construction can begin.

Description of Project Area. This project would be located in northeastern Nebraska in Holt, Antelope, Madison, and Platte Counties. It lies mostly within the loess hills on the edge of the Sandhills region.

Rainfall averages 26 inches annually with about 19 to 20 inches occurring during the period of April through September. However, it is not uncommon to have periods of little rainfall in late summer.

The economy of the area is based on agriculture, with considerable livestock feeding practiced. Most business activity stems from the processing and sale of farm products and associated retail trade. Manufacturing is a minor business activity in the area.

Project Description. Project plans include three diversion dams and feeder canals to an offstream dam and reservoir system, a pumping plant, and an irrigation distribution system. The two upper diversion dams would divert flows of the Elkhorn River and South Fork into Saint Clair Reservoir. A third diversion dam would divert part of the flows of the Elkhorn River to valley lands and part would be pumped into Saint Clair Reservoir for storage.

Saint Clair Reservoir would be created by a series of four dams on four small streams tributary to the Elkhorn River. The four impoundments would be interconnected by excavated channels and operate as a single reservoir.

The main canal would serve about 48,000 acres in Antelope, Madison, and Platte Counties. A second canal would supply water for 7,500 acres along the Elkhorn River valley in Antelope and Madison Counties.

Direct benefits would accrue from irrigation, recreation, flood control, and fish and wildlife enhancement. Irrigation would be the primary purpose, but recreation and fish and wildlife benefits would be significant. These features would provide 422,000 recreation days and 60,000 fisherman days annually. The project would provide only incidental flood control benefits.

Public Interest. In the 1950's, a group of individuals in the Elkhorn River Basin formed the Elkhorn Valley Water Resources Association and requested the studies which led to formulation of this proposed project. The Elkhorn Watershed Association, Inc. was organized recently to promote resource development, but there is no legal entity capable of sponsoring the non-federal obligations at the present time.

HIGHLAND UNIT

CONSTRUCTION PERIOD:	7 Years	ECONOMIC LIFE:	100 Years
AVERAGE ANNUAL COST:	$2,727,000	ANNUAL O.M.&R.:	$359,000
INTEREST RATE:	3 1/8 Percent	COSTS BASED ON:	1964 Prices
BENEFIT-COST RATIO:	1.28 to 1.00	LAND REQUIRED:	29,300 Acres
IRRIGATION SERVICE AREA:	55,500 Acres		

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrigation	Recreation	Flood Control	Fish & Wildlife	Total
Direct Benefits	2,804	319	7	60	3,190
Indirect Benefits	301	-0-	-0-	-0-	301
Total Benefits	3,105	319	7	60	3,491

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

	Irrigation	Recreation	Flood Control	Fish & Wildlife	Total
Project Costs	62,114	5,727	153	1,310	69,304
Non-Reimbursable	-0-	5,143	153	1,310	6,606
Reimbursable	62,114	584	-0-	-0-	62,698
Mo. R. Basin Power	Not Avail.	-0-	-0-	-0-	--
Non-Federal (Public)	-0-	595	-0-	-0-	595
Local	Not Avail.	-0-	-0-	-0-	--

Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	0.90 ac.ft./ac.
Farm Delivery Requirement:	1.29 ac.ft./ac.
Diversion Requirement:	2.43 ac.ft./ac.
Total Diversion Requirement:	126,000 ac.ft.

Table 4 - Dam and Reservoir Data

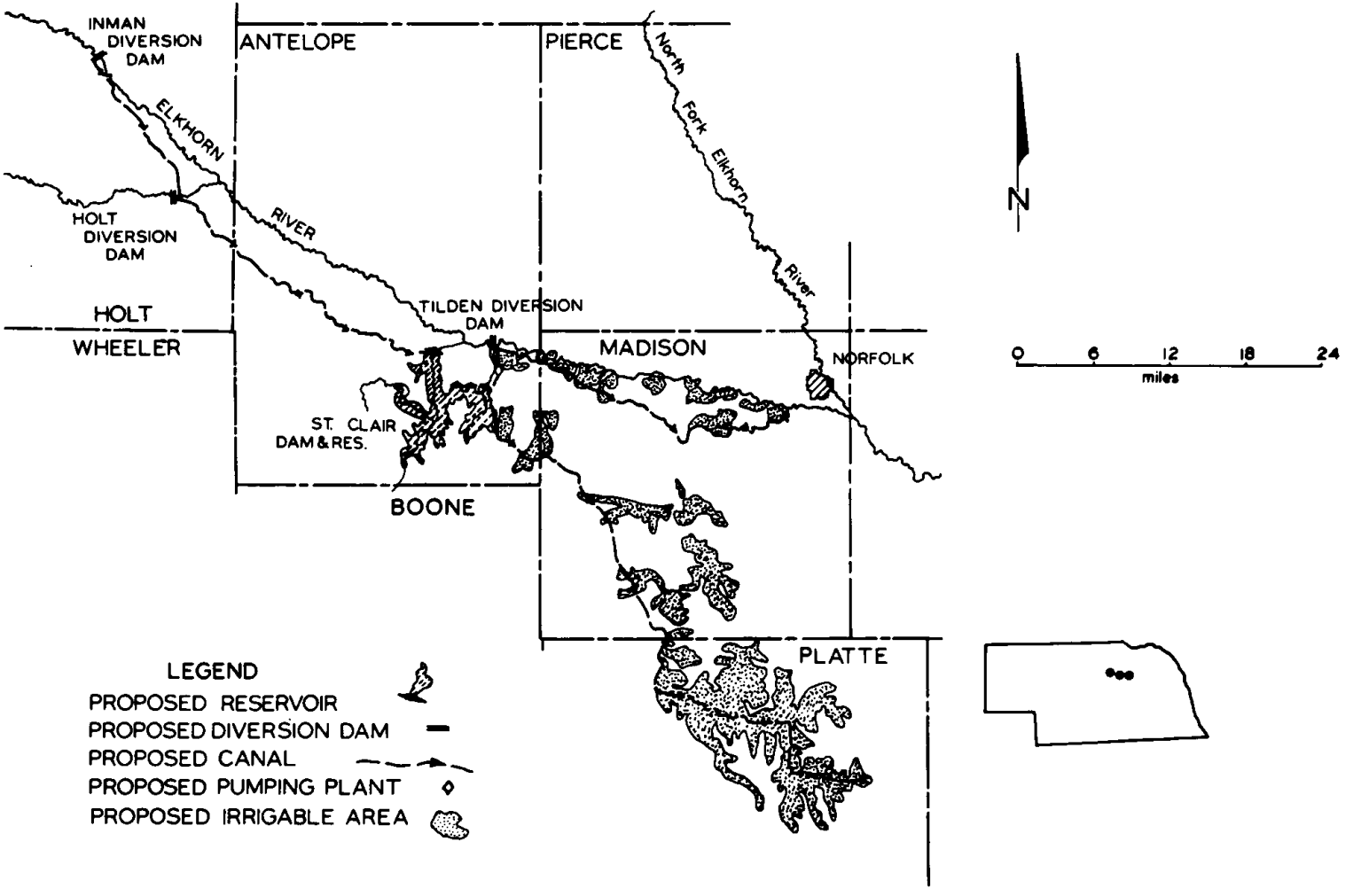
Saint Clair Dams (4)
Height: 64 to 100 feet Length: Not Avail.
Spillway Capacity: 1,760 c.f.s.
Drainage Area: 109 square miles

Saint Clair Reservoir

Capacity	Acre-Feet
Surcharge	60,000
Conservation	210,000
Total	310,000*
Surface Area	Acres
Surcharge	11,000
Conservation	9,600

* Excludes Surcharge

HIGHLAND UNIT
BUREAU of RECLAMATION



Logan Unit

The Bureau of Reclamation is the agency primarily responsible for planning the Logan Unit, a potential multipurpose project including flood control, fish and wildlife, recreation, and irrigation benefits.

Current Status. A reconnaissance report was published in April, 1966. Before any steps toward construction can be taken, a feasibility study must be authorized and completed.

Description of Project Area. The Logan Unit of the Elkhorn Division would be located in the Logan Creek valley of northeast Nebraska in Wayne, Dixon, Thurston, Cuming, and Burt Counties. Irrigable lands comprise suitable valley bottom lands, valley terraces, and uplands. The valleys vary in width up to a maximum of three miles. Poor drainage conditions exist in some parts of the valley. Rainfall averages 28 inches with approximately 21 inches falling during the months of April through September.

The economy of this area is basically agricultural. Most business activity stems from the processing and marketing of farm products.

A few flood protection facilities have been developed in this area for local protection, and consist mostly of channel straightening and some levee work around towns.

Project Description. Pender Dam and Reservoir would be located on Logan Creek in Dixon, Wayne, and Thurston Counties. The dam would be located approximately two miles north of the town of Pender.

The outlet works to the Bancroft Canal would be located near the right abutment of the dam and have a design capacity of 200 c.f.s. Bancroft Canal would have a length of 36 miles and would serve the total irrigable area of 11,700 acres.

Irrigation and recreation would be the major benefits of this project. The recreation and fish and wildlife features of this project would provide 750,000 recreation days and 42,500 fisherman days annually.

Remaining Problems and Needs. The decrease in stream flows due to project water depletions may reduce the stream's capacity to assimilate wastes and adversely affect the fishery. However, conditions during low flow periods would probably be improved by the regulated stream flow.

Public Interest. The drought of the middle 1950's adversely affected the local economy of this area and a group of individuals showed interest in irrigation and related resource development. This group was instrumental in securing the initiation of the reconnaissance investigations leading to this proposal and plan. However, no legal sponsoring district has been formed.

LOGAN UNIT

CONSTRUCTION PERIOD:	6 Years	PROJECT LIFE:	100 Years
AVERAGE ANNUAL COST:	$1,302,500	ANNUAL O.M.&R.:	$227,000
INTEREST RATE:	3 1/8 Percent	COSTS BASED ON:	1966 Prices
BENEFIT-COST RATIO:	1.06 to 1.00	LAND REQUIRED:	17,125 Acres
IRRIGATION SERVICE AREA:	11,700 Acres		

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrigation	Recreation	Fish & Wildlife	Flood Control	Total
Direct Benefits	591	560	42.5	170	1,363.5
Indirect Benefits	19	-0-	-0-	-0-	19
Total Benefits	610	560	42.5	170	1,382.5

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

	Irrigation	Recreation	Fish & Wildlife	Flood Control	Total
Project Costs	15,170	10,229	1,057	4,734	31,190
Non-Reimbursable	-0-	8,215	1,057	4,734	14,006
Reimbursable	15,170	2,014*	-0-	-0-	17,184*
Mo. R. Basin Power	Not Avail.	-0-	-0-	-0-	--
Non-Federal (Public)	-0-	2,014*	-0-	-0-	2,014*
Local	Not Avail.	-0-	-0-	-0-	--

* Does not include repayable interest during construction

Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	0.95 ac.ft./ac.
Farm Delivery Requirement:	1.38 ac.ft./ac.
Diversion Requirement:	2.32 ac.ft./ac.
Total Diversion Requirement:	25,500 ac.ft.

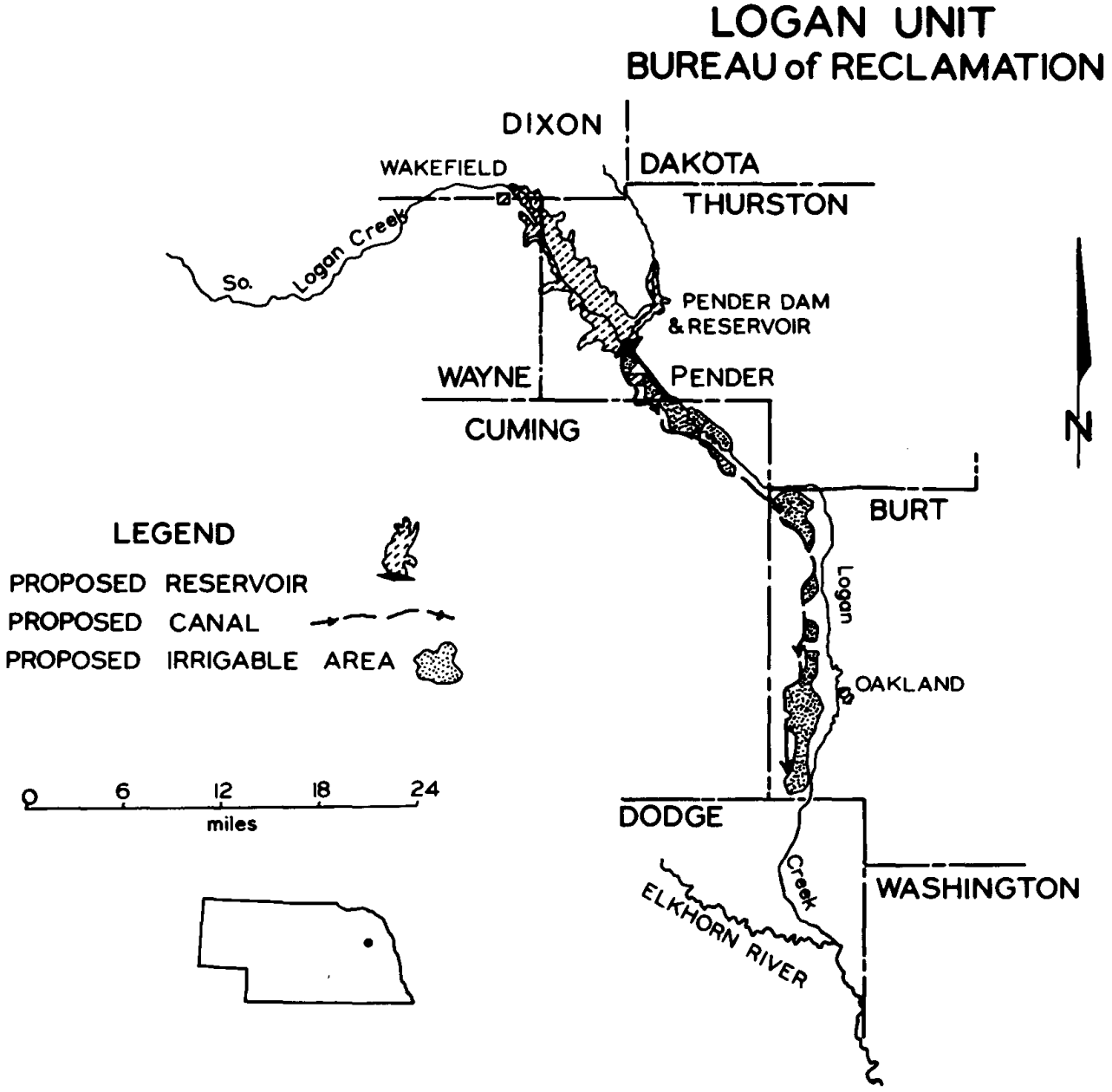
Table 4 - Dam and Reservoir Data

Pender Dam
Height: 65 feet Length: 10,000 feet
Spillway Capacity: 127,000 c.f.s.
Drainage Area: 745 square miles

Pender Reservoir

Capacity	Acre-Feet
Flood Control	136,000
Surcharge	42,700
Conservation	77,100
Sediment	15,000-100 yr.
Total	246,100*
Surface Area	**Acres**
Flood Control	12,400
Surcharge	13,665
Conservation	7,750

*Excludes Surcharge


LOGAN UNIT
BUREAU of RECLAMATION
DIXON
WAKEFIELD
DAKOTA
THURSTON
So. Logan Creek
PENDER DAM
& RESERVOIR
WAYNE
PENDER
CUMING
BURT
N
LEGEND
PROPOSED RESERVOIR
PROPOSED CANAL
PROPOSED IRRIGABLE AREA
Logan
OAKLAND
0 6 12 18 24
miles
DODGE
WASHINGTON
Creek
ELKHORN RIVER

Norfolk Unit

The Bureau of Reclamation is the agency primarily responsible for investigation of the Norfolk Unit. The proposed project would be multipurpose providing primary benefits from irrigation and recreation.

Current Status. A reconnaissance report has been prepared on this unit, but before further steps can be taken toward eventual construction, Congress must authorize and appropriate funds for a feasibility study.

Description of Project Area. The project area includes parts of Madison, Stanton, Cuming, and Dodge Counties. This area is made up of valley bottom lands, valley terraces, and uplands. The soil is primarily silty loess. Upland areas are generally sloping and dissected by small drains. Poor drainage conditions exist in parts of the valley lands. Rainfall averages 28 inches annually, with approximately 21 inches falling during the months April through September.

The economy of this area is basically agricultural. Most business activity stems from the processing and marketing of farm products.

Water resource development has been limited in the area. A few local flood protection works consisting mostly of channel straightening and some diking around towns have been developed.

Project Description. Major features of the Norfolk Unit would be the Monterey Dam and Reservoir and the Warnerville Diversion Works. Monterey Dam would be located on Pebble Creek, a tributary of the Elkhorn River, approximately seven miles southwest of West Point in Cuming County. A canal originating at outlet works located near the right end of the dam embankment would serve 25,000 acres, mostly upland between Pebble and Maple Creeks, by gravity.

The Warnerville Diversion Dam, to be located on the Elkhorn River approximately four miles southeast of Norfolk, would consist primarily of an uncontrolled overflow spillway and two canal headworks. The Monterey Feeder Canal on the right end of the spillway would divert river flows to both deliver water to the Monterey Reservoir and serve 2900 acres with irrigation water enroute. The Norfolk Canal on the left end of the spillway would serve about 5100 acres of land on the north side of the river.

Direct benefits would be derived from irrigation, recreation, fish and wildlife enhancement, and flood control. The recreation and fish and wildlife features of this project would provide 924,000 recreation days and 43,700 fisherman days annually. Flood control benefits would be incidental to the operation of the reservoir and would reduce annual damages on Pebble Creek about 30 percent.

Public Interest. The local people are concerned mainly about flood prevention and control. Interest in other project purposes has not been sufficient to lead to the organization of a district capable of sponsoring the project.

NORFOLK UNIT

CONSTRUCTION PERIOD:	8 Years	ECONOMIC LIFE:	100 Years
AVERAGE ANNUAL COST:	$2,214,400	ANNUAL O.M.&R.:	$351,700
INTEREST RATE:	3 1/8 Percent	COSTS BASED ON:	1966 Prices
BENEFIT-COST RATIO:	1.16 to 1.00	LAND REQUIRED:	21,515 Acres
IRRIGATION SERVICE AREA:	33,000 Acres		

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrigation	Recreation	Fish & Wildlife	Flood Control	Total
Direct Benefits	1,668	693	43.7	11	2,415.7
Indirect Benefits	163	-0-	-0-	-0-	163
Total Benefits	1,831	693	43.7	11	2,578.7

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

	Irrigation	Recreation	Fish & Wildlife	Flood Control	Total
Project Costs	41,910	11,861	956	243	54,970
Non-Reimbursable	-0-	9,231	956	243	10,430
Reimbursable	41,910	2,630*	-0-	-0-	44,540*
Mo. R. Basin Power	Not Avail.	-0-	-0-	-0-	--
Non-Federal (Public)	-0-	2,630*	-0-	-0-	2,630*
Local	Not Avail.	-0-	-0-	-0-	--

* Does not include repayable interest during construction

Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	0.95 ac.ft./ac.
Farm Delivery Requirement:	1.38 ac.ft./ac.
Diversion Requirement:	2.41 ac.ft./ac.
Total Diversion Requirement:	74,600 ac.ft.

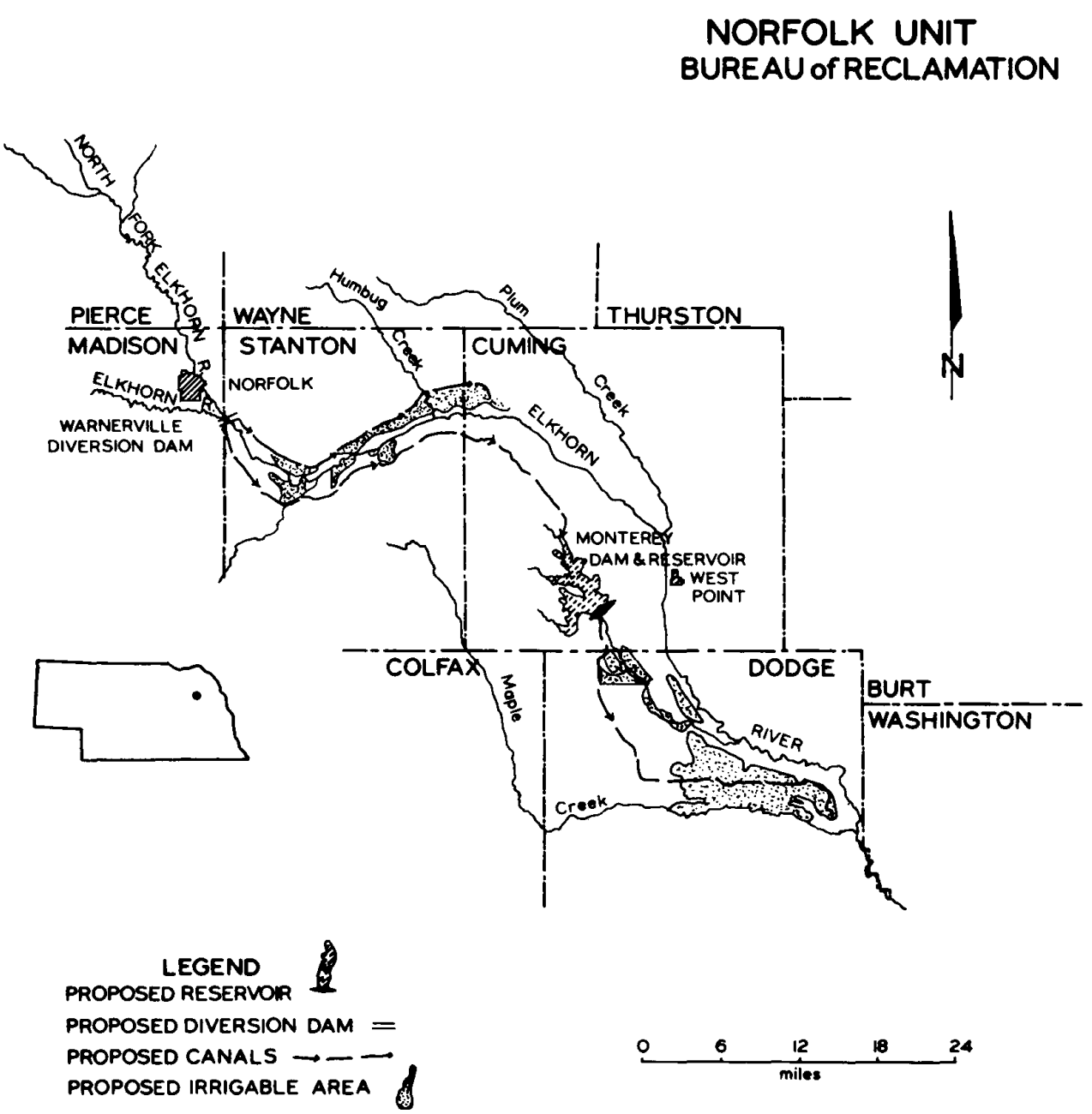
Table 4 - Dam and Reservoir Data

Monterey Dam
Height: 102 feet Length: 10,100 feet
Spillway Capacity: 3,500 c.f.s.
Drainage Area: 79 square miles

Monterey Reservoir

Capacity	Acre-Feet
Flood Control	0
Surcharge	38,700
Conservation	113,500
Sediment	10,000/100 yr.
Total	211,100*
Surface Area	**Acres**
Surcharge	8,000
Conservation	7,300

*Excludes Surcharge


NORFOLK UNIT
BUREAU of RECLAMATION
NORTH FORK ELKHORN R.
PIERCE
MADISON
WAYNE
STANTON
Humbug Creek
Plum Creek
THURSTON
CUMING
N
ELKHORN R.
NORFOLK
WARNERVILLE DIVERSION DAM
ELKHORN
MONTEREY DAM & RESERVOIR
WEST POINT
COLFAX
Maple Creek
DODGE
BURT
WASHINGTON
RIVER
LEGEND
PROPOSED RESERVOIR
PROPOSED DIVERSION DAM
PROPOSED CANALS
PROPOSED IRRIGABLE AREA
0 6 12 18 24
miles

Projects in Planning

Maple Creek Watershed

This watershed project is located in Colfax, Dodge, and Stanton Counties. Preliminary investigations indicate a project involving 28 floodwater retarding structures, including three multipurpose structures with recreation water storage, would be feasible. Work plan investigations have been recently authorized.

King Lake Local Flood Protection

This Corps of Engineers project would provide flood protection for the community of King Lake. It would include a ring levee approximately 14,250 feet long and a diversion channel about 3,000 feet long at an estimated cost of $495,000.

Current Status. The detailed project report is essentially complete. Assurance of cooperation from a qualified local sponsor is now required.

Pender Local Flood Protection

This Corps of Engineers project would provide protection for the village of Pender from the floodwaters of Logan Creek. It would include a levee around three sides of the village at an estimated cost of about $520,000.

Current Status. The reconnaissance report was completed in October, 1971. Detailed project studies will be initiated upon allocation of funds by the Chief of Engineers.

Wakefield Local Flood Protection

This Corps of Engineers project would include flood protection for the city of Wakefield from the waters of Logan Creek. Protection could be provided by a levee at a cost of approximately $370,000.

Current Status. The city of Wakefield has provided a resolution of support for the project. Detailed project studies will be initiated upon allocation of funds by the Chief of Engineers.

Osmond Local Flood Protection

This Corps of Engineers project would provide flood protection for the town of Osmond through channel improvement. It is estimated the project would cost approximately $425,000.

Current Status. The reconnaissance report was completed in September, 1971. Further study has been deferred pending completion of Missouri River Basin Commission's study of the Platte River Basin in Nebraska.

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 the original Volume I has changed as noted below.

Platte River and Lost Creek, Schuyler Local Flood Protection

This Corps of Engineers project has been completed.

Shell Creek and Tributaries

This Corps of Engineers project is now inactive.

Clear Creek Watershed Project

This project has been authorized and is awaiting construction.

Potential Projects

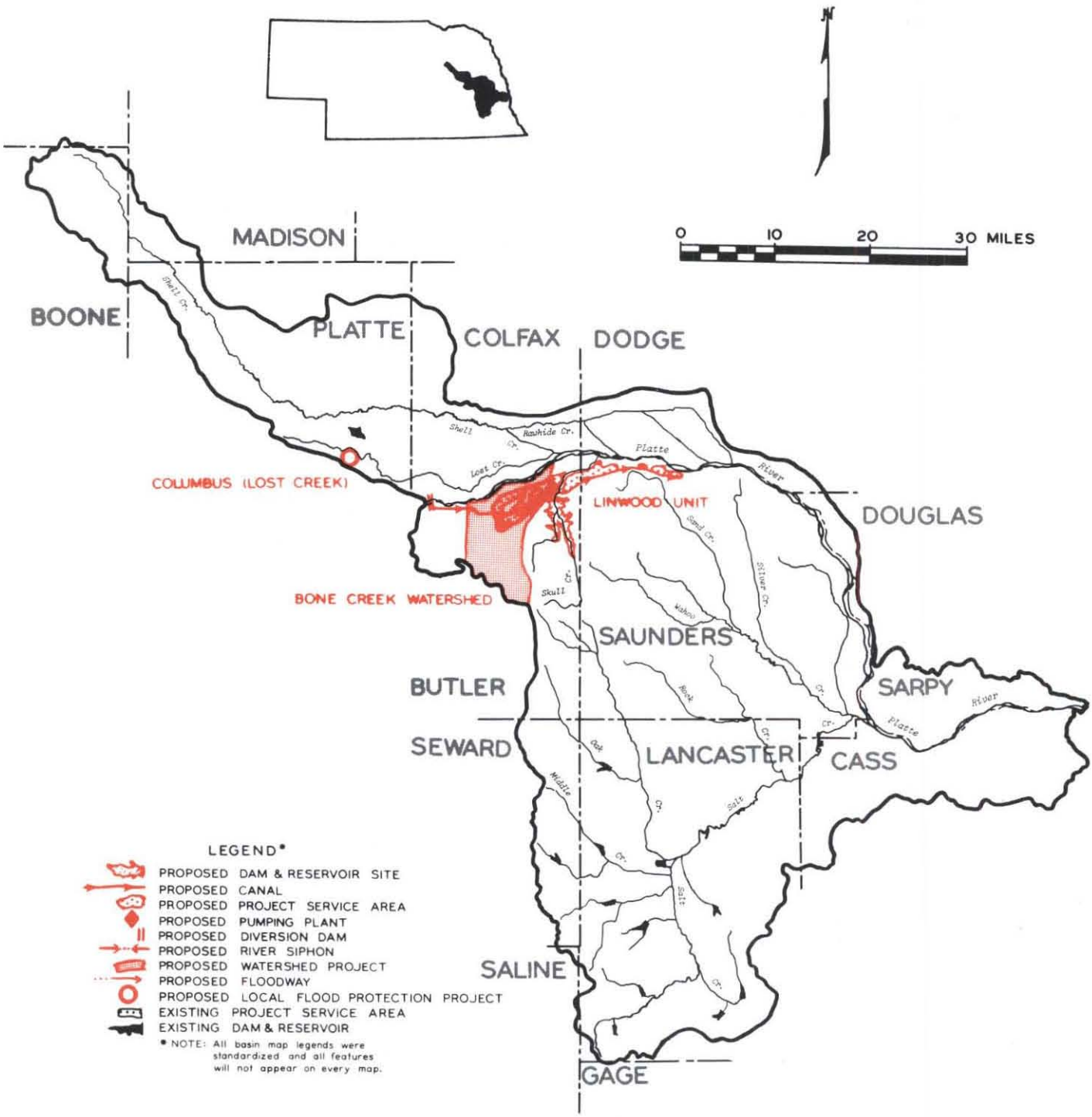
Linwood Unit

The Bureau of Reclamation is the agency responsible for investigation of the irrigation functions of this project. The proposed project would be multipurpose with irrigation as the primary function.

Current Status. A favorable reconnaissance report was released in August, 1966. Before further steps toward construction can be taken, the Congress must authorize and provide funds for a feasibility study. A local district with authority to sponsor the project must also be formed prior to any construction.

The irrigation potential of this area was explored briefly during the late 1940's and early 1950's by the Bureau of Reclamation. The Corps of Engineers later investigated the possibility of a flood control reservoir on Skull Creek above the village of Linwood and requested the Bureau of Reclamation to evaluate the desirability of including irrigation storage in this potential reservoir. Eventually this led to the reconnaissance investigation.

LOWER PLATTE RIVER BASIN



Description of Project Area. The project would be located along the south side of the Platte River in Butler and Saunders Counties. The topography of the area is characterized by valley lands walled by bluffs or rough loess hills to the south. Bottomlands are only slightly higher than the river and much of this area has a high water table. The surface of the proposed service area ranges from smooth to slightly undulating.

Periods of two or three weeks with little or no moisture often occur in the critical part of the growing season. Rainfall averages about 27 inches annually with about 75 percent of this falling during the months of April through September.

Water resource development is limited in the area. Present irrigation development is confined to pumping from wells.

The economy of the area is basically agricultural. Most business activity stems from the processing and sale of farm products and associated retail trades.

Project Description. The irrigation features of this project would consist of a diversion dam, two canals, and a pumping plant for the irrigation of a total of 10,600 acres of land. The construction and operation of these features would be integrated with a storage reservoir on Skull Creek proposed by the Corps of Engineers.

Water would be diverted into the Linwood Canal from the Columbus Diversion Dam on the Platte River to serve 7,700 acres of land south of the Platte River. A pumping plant near the proposed Skull Creek Dam two miles southwest of Linwood would lift water 92 feet to the Octavia Canal and also into the Skull Creek Reservoir for later release. The Octavia Canal would serve 2,900 acres lying above the Linwood Canal.

Direct benefits which would be derived from this project include irrigation, recreation, and fish and wildlife. The recreation and fish and wildlife features of this project would provide 12,000 recreation days and 5,400 fisherman days annually.

Public Interest. Local people in the Skull Creek area are interested in securing adequate flood control, but no organization with legal authority to sponsor the project has been formed.

LINWOOD UNIT

CONSTRUCTION PERIOD:	4 Years	ECONOMIC LIFE:	100 Years
AVERAGE ANNUAL COST:	$564,500	ANNUAL O.M.&R.:	$62,300
INTEREST RATE:	3 1/8 Percent	COSTS BASED ON:	1966 Prices
BENEFIT-COST RATIO:	1.09 to 1.00	LAND REQUIRED:	2,066 Acres
IRRIGATION SERVICE AREA:	10,600 Acres		

Table 1 - Average Annual Project Benefits
(Thousand Dollars)

	Irrigation	Recreation	Fish & Wildlife	Total
Direct Benefits	529.5	12	5.4	546.9
Indirect Benefits	66.2	-0-	-0-	66.2
Total Benefits	595.7	12	5.4	613.1

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

	Irrigation	Recreation	Fish & Wildlife	Total
Project Costs	14,347	193	141	14,681
Non-Reimbursable	-0-	140.5	141	281.5
Reimbursable	14,347	52.5*	-0-	14,399.5*
Mo. R. Basin Power	Not Avail.	-0-	-0-	--
Non-Federal (Public)	-0-	52.5*	-0-	52.5*
Local	Not Avail.	-0-	-0-	--

* Does not include repayable interest during construction

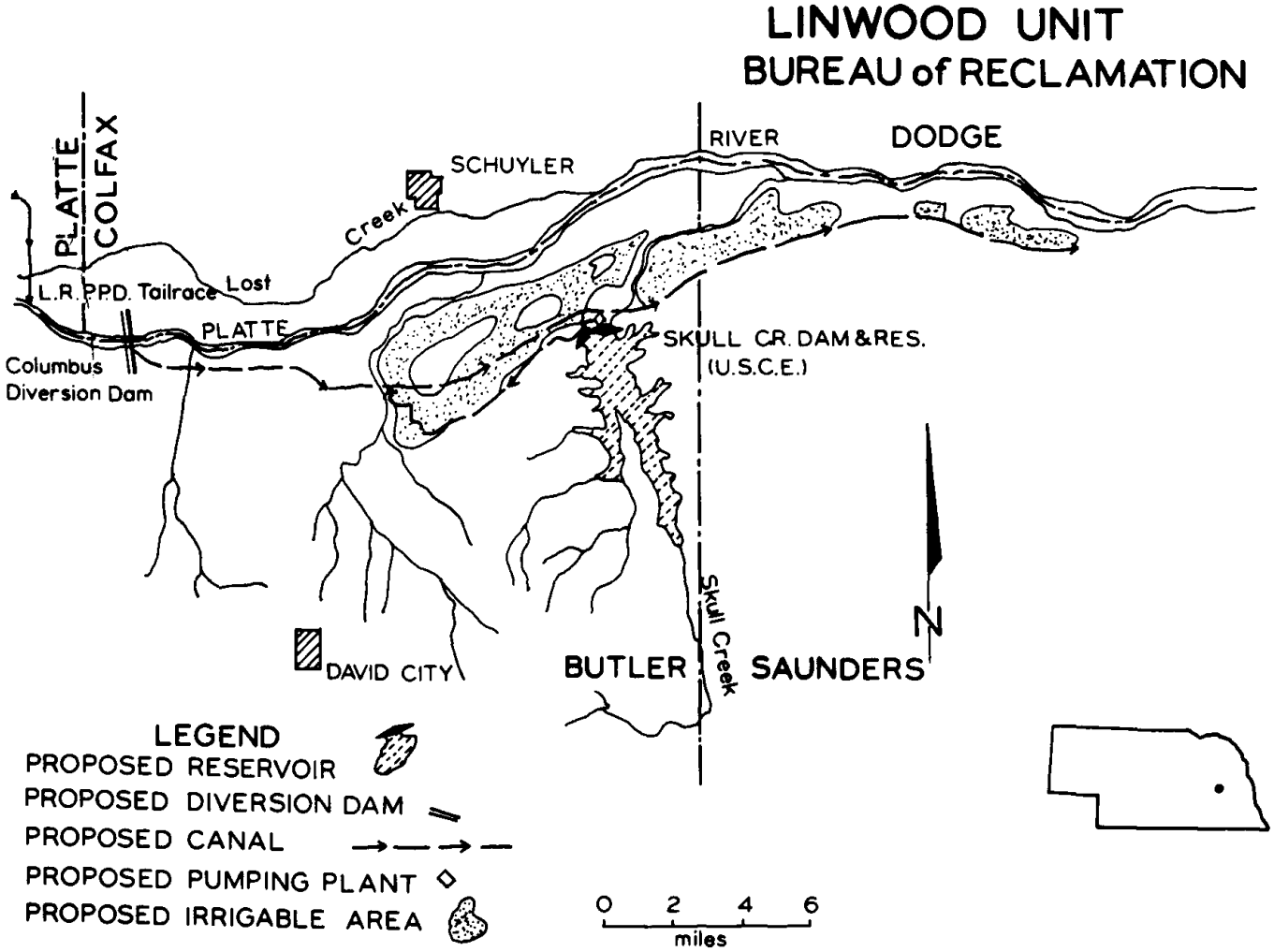
Table 3 - Average Annual Water Requirements

Crop Irrigation Requirement:	0.85 ac.ft./ac.
Farm Delivery Requirement:	1.21 ac.ft./ac.
Diversion Requirement:	2.05 ac.ft./ac.
Total Diversion Requirement:	20,700 ac.ft.

Table 4 - Dam and Reservoir Data

Columbus Diversion Dam

Height:	20 feet	Length:	14,700 feet
Spillway Capacity:	90,000 c.f.s.		
Drainage Area:	Not Available		


LINWOOD UNIT
BUREAU of RECLAMATION
PLATTE
COLFAX
SCHUYLER
RIVER
DODGE
Creek
L.R. P.P.D. Tailrace
Lost
PLATTE
Columbus
Diversion Dam
SKULL CR. DAM & RES.
(U.S.C.E.)
DAVID CITY
BUTLER
SAUNDERS
Skull Creek
N
LEGEND
PROPOSED RESERVOIR
PROPOSED DIVERSION DAM
PROPOSED CANAL
PROPOSED PUMPING PLANT
PROPOSED IRRIGABLE AREA
0 2 4 6
miles

Projects in Planning

Bone Creek Watershed

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 indicates a structural program including 6 floodwater retarding structures may prove feasible.

Lost Creek North of Columbus Local Flood Protection

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 greenbelt area.

Current Status. The detailed project study was in progress on January 1, 1973 and the report is scheduled for completion in June, 1974.

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 the original Volume I has changed as noted below.

Medicine Creek (Upper and Lower) Watershed

This project was under construction on January 1, 1973.

Republican River and Tributaries

This Corps of Engineers flood protection project is inactive.

Potential Projects

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

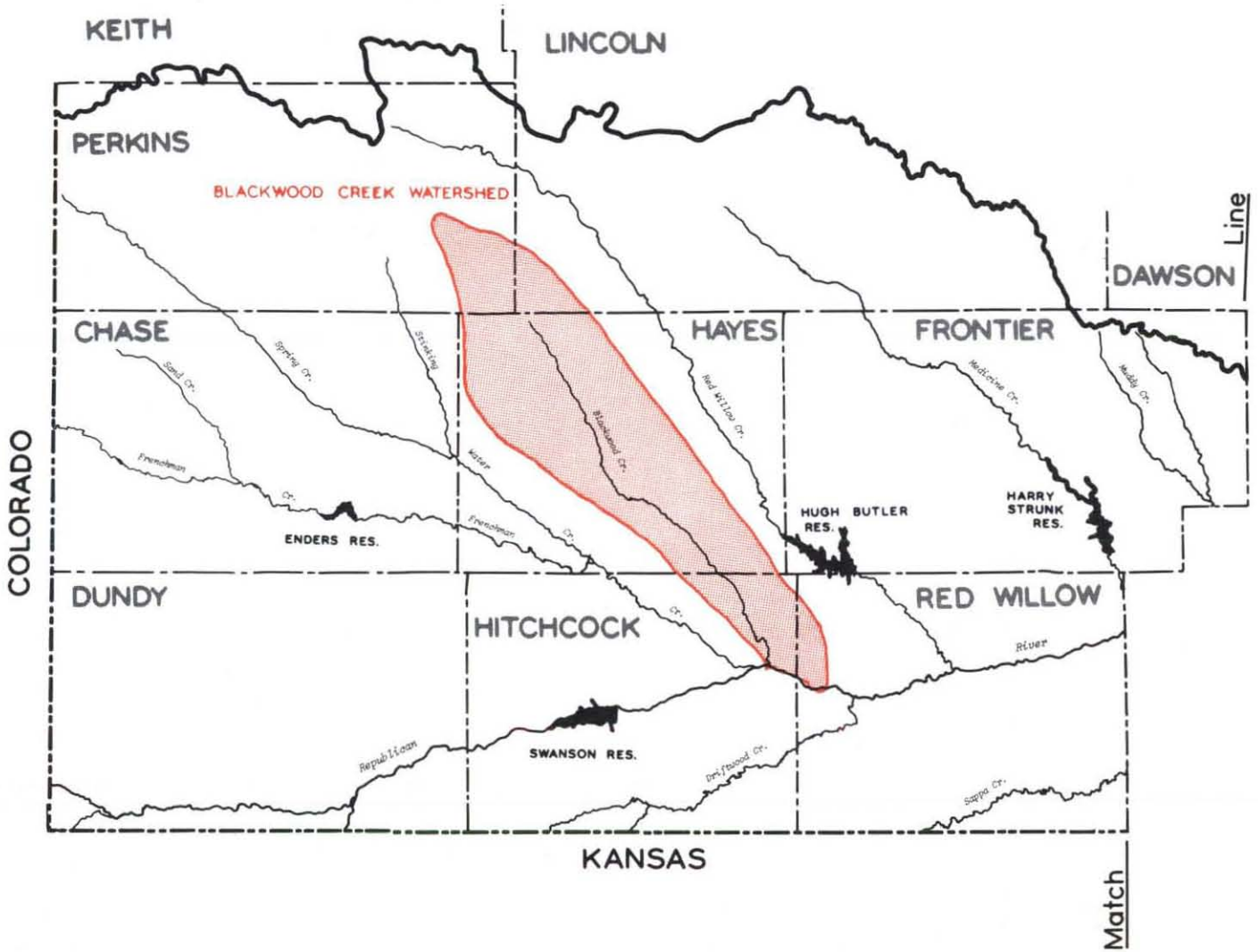
Projects in Planning

Blackwood Creek Watershed

This proposed project is located in the Middle Republican Natural Resources District in Red Willow, Hayes, Hitchcock, Lincoln, and Perkins Counties. Major watershed problems include floodwater, sediment, and scour damage, and opportunities exist to provide fish and wildlife benefits. Work plan investigations have recently been completed and a plan involving 13 floodwater retarding structures has been formulated. The plan is presently undergoing reviews.

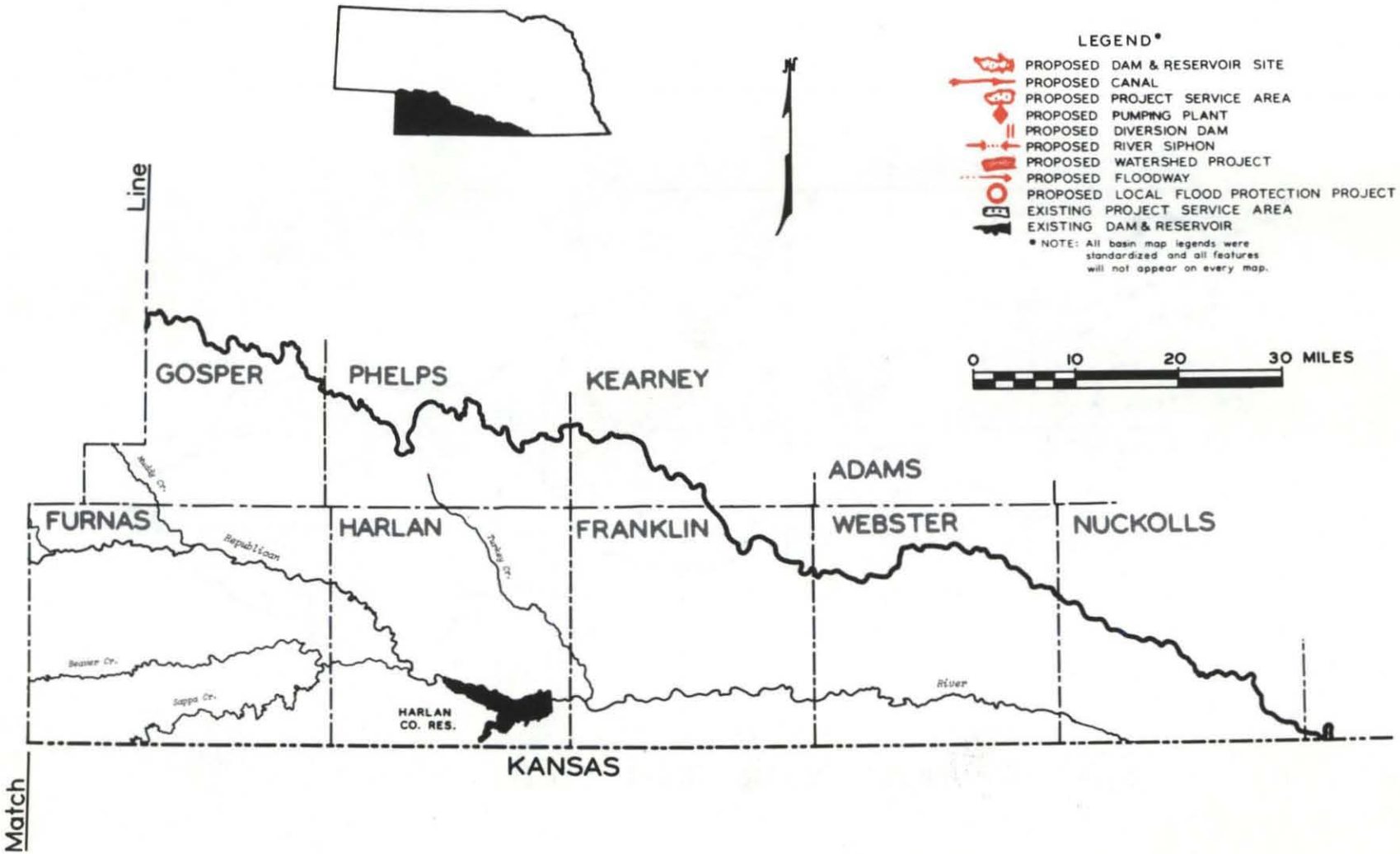
REPUBLICAN RIVER BASIN

Sheet 1 of 2

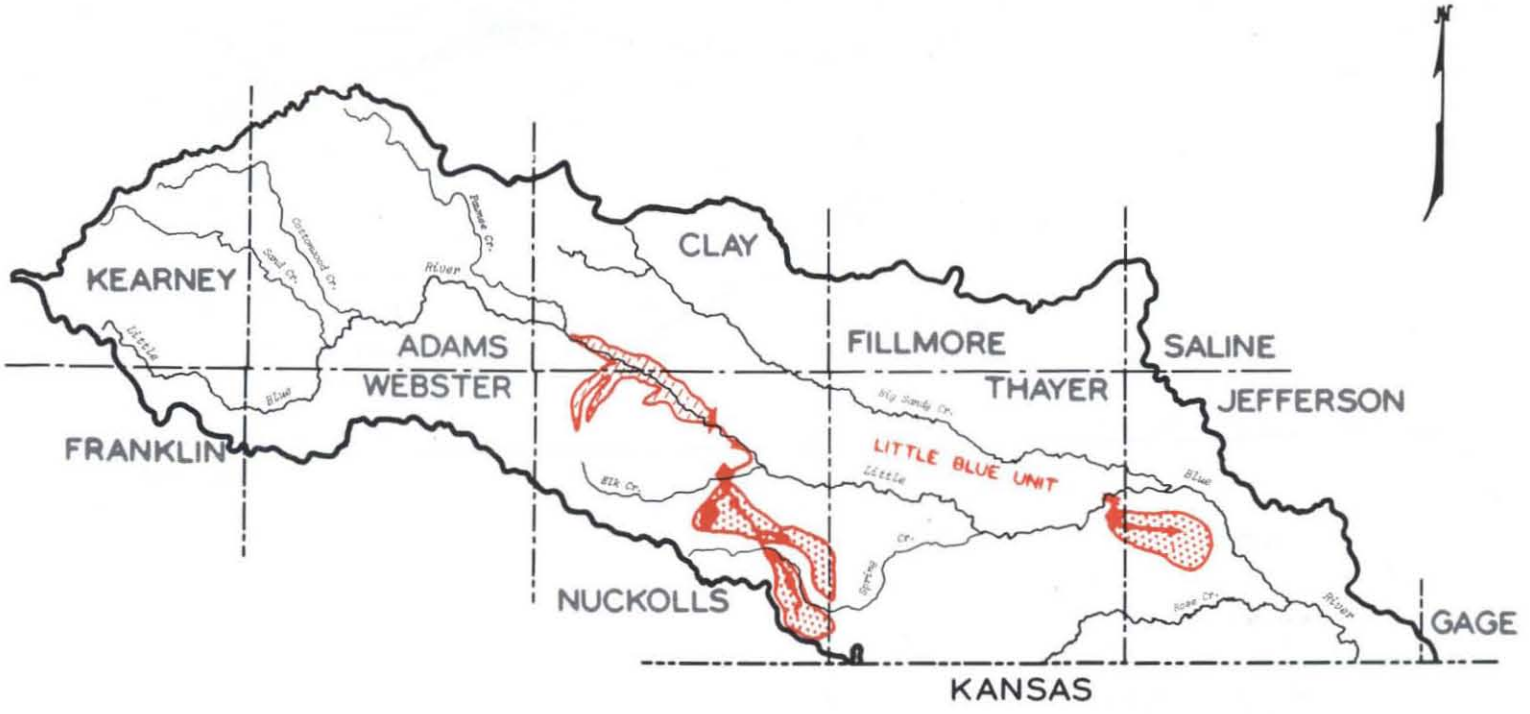


REPUBLICAN RIVER BASIN

Sheet 2 of 2



LITTLE 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
- EXISTING PROJECT SERVICE AREA
- EXISTING DAM & RESERVOIR

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

0 10 20 30 MILES

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. If it is found the project is still feasible, authorization and funds for construction must be provided by the Congress.

Description of Project Area. The potential Little Blue Unit is located on the Little Blue River in Clay, Nuckolls, Thayer and Jefferson Counties in south-central Nebraska. 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. Nuckolls, Thayer, and Jefferson Counties have assessed special tax levies to financially assist the sponsors in promoting the unit.

The Little Blue River Irrigation and Flood Control Committee was organized in 1956 and has actively supported the proposed project. The Little Blue Irrigation District was formed in 1961 to demonstrate the local interest in irrigation.

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		
IRRIGATION SERVICE AREA:	20,000 Acres	COSTS BASED ON:	1965 Prices
		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	63,699 1/
Non-Reimbursable	22,106	2,882.5	1,728	-0-	26,866.5
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/ Includes $150,000 for non-reimbursable road relocation, but excludes investigations of $419,000
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

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

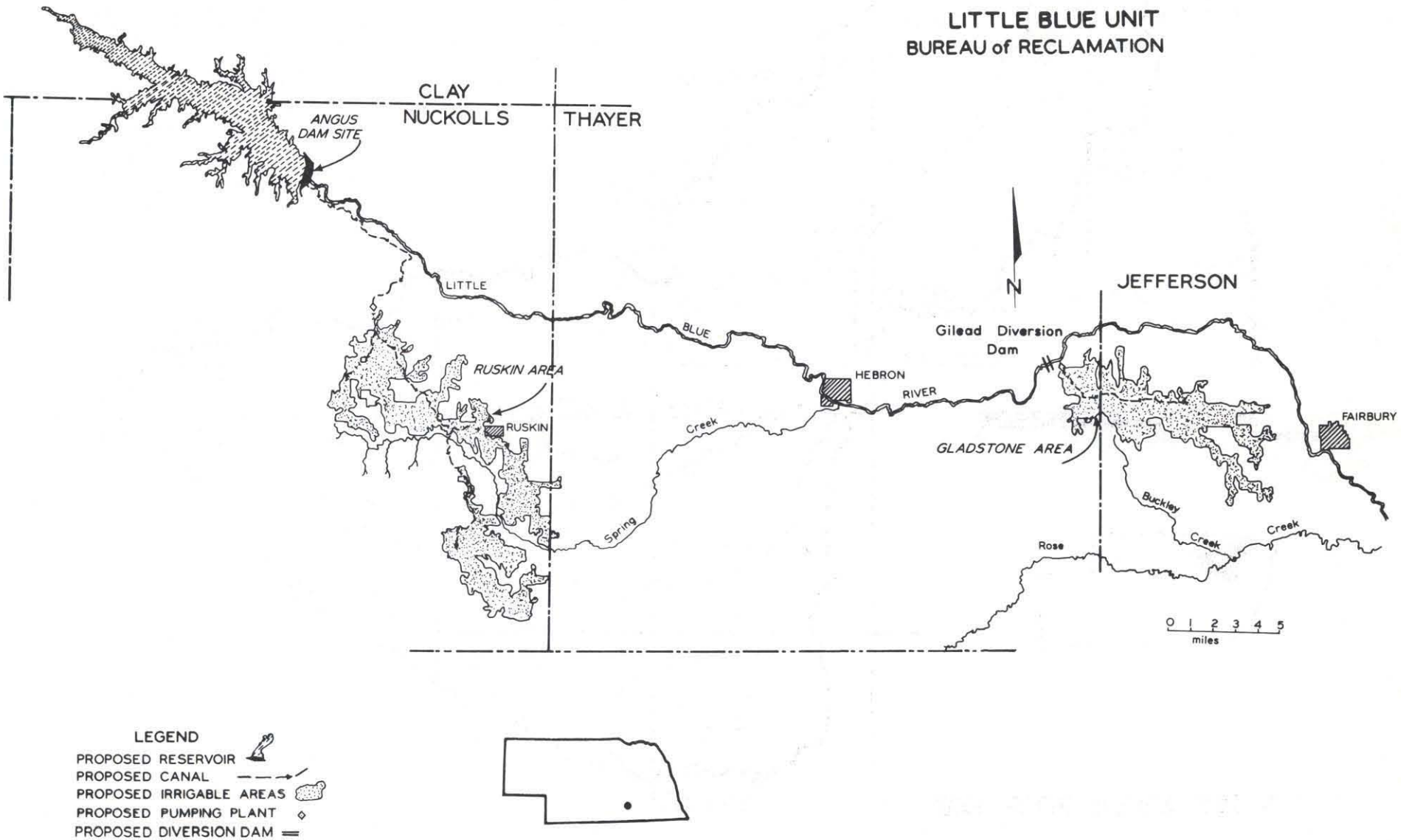
Angus Dam

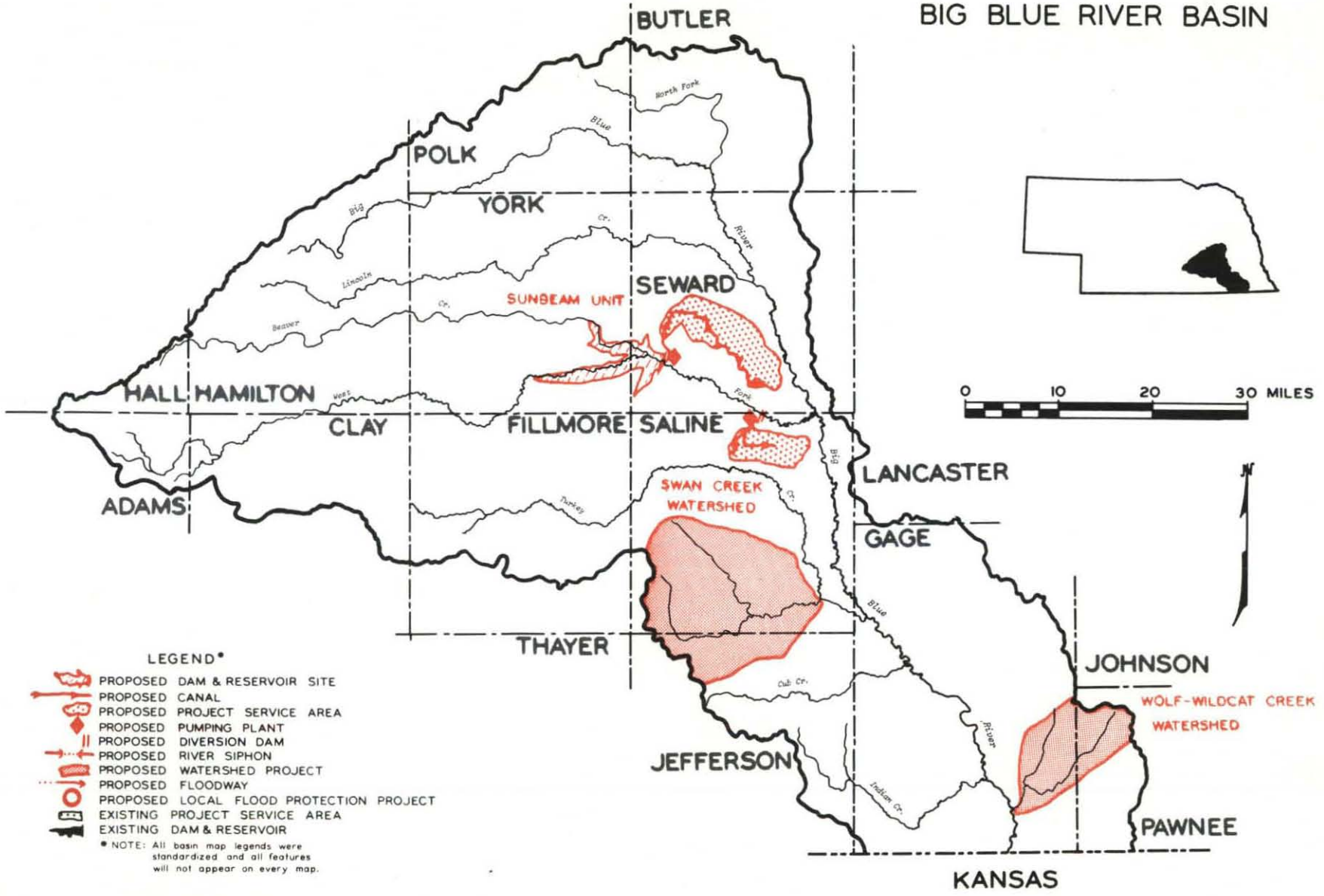
Height: 120 feet Length: 11,160 feet

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
CLAY
NUCKOLLS
THAYER
JEFFERSON
ANGUS DAM SITE
LITTLE BLUE
RUSKIN AREA
RUSKIN
HEBRON
RIVER
Gilead Diversion Dam
GLADSTONE AREA
FAIRBURY
Spring Creek
Buckley Creek
Rose Creek
N
0 1 2 3 4 5
miles
LEGEND
PROPOSED RESERVOIR
PROPOSED CANAL
PROPOSED IRRIGABLE AREAS
PROPOSED PUMPING PLANT
PROPOSED DIVERSION DAM


BIG BLUE RIVER BASIN
BUTLER
POLK
YORK
SEWARD
SUNBEAM UNIT
HALL
HAMILTON
CLAY
FILLMORE
SALINE
ADAMS
LANCASTER
SWAN CREEK
WATERSHED
GAGE
THAYER
JOHNSON
WOLF-WILDCAT CREEK
WATERSHED
JEFFERSON
PAWNEE
KANSAS
North Fork
Blue
Big
Lincoln
Beaver
West
Turkey
Cr.
River
Fork
Sub Cr.
Indian Cr.
0 10 20 30 MILES
N
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
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 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 the original Volume I has changed as noted below.

Clatonia Creek Watershed

This project was under construction on January 1, 1973.

Beatrice Local Flood Protection

This Corps of Engineers project is inactive.

Surprise Dam and Reservoir

This Corps of Engineers project has been found to be infeasible.

Seward View Dam and Reservoir

This Corps of Engineers project has been found to be infeasible.

Shestak Dam and Reservoir

This Corps of Engineers project has been found to be infeasible.

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 recent changes in interest rates and 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. Funds for future studies are required before further progress can be made.

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 to 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 AREA:	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	22,225	2,843	2,820	81,335
Non-Reimbursable	-0-	22,225	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.
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.

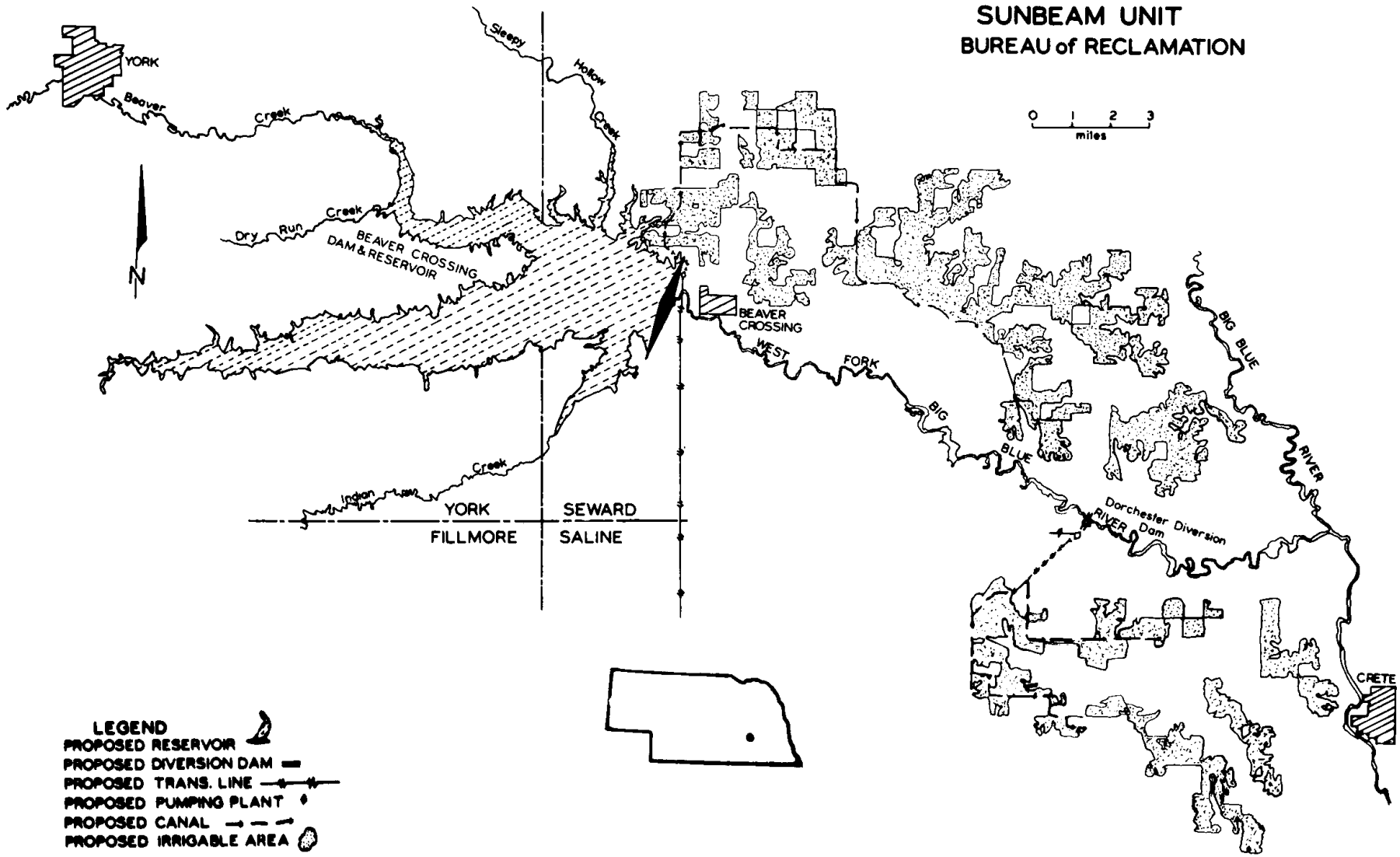
Table 4 - Dam and Reservoir Data

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:	1,154 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
0 1 2 3
miles
YORK
Beaver Creek
Sleepy Hollow Creek
Dry Run Creek
BEAVER CROSSING DAM & RESERVOIR
BEAVER CROSSING
WEST FORK BIG BLUE
BIG BLUE RIVER
Dorchester Diversion Dam
CRETE
Indian Creek
YORK
FILLMORE
SEWARD
SALINE
N
LEGEND
PROPOSED RESERVOIR
PROPOSED DIVERSION DAM
PROPOSED TRANS. LINE
PROPOSED PUMPING PLANT
PROPOSED CANAL
PROPOSED IRRIGABLE AREA

Projects in Planning

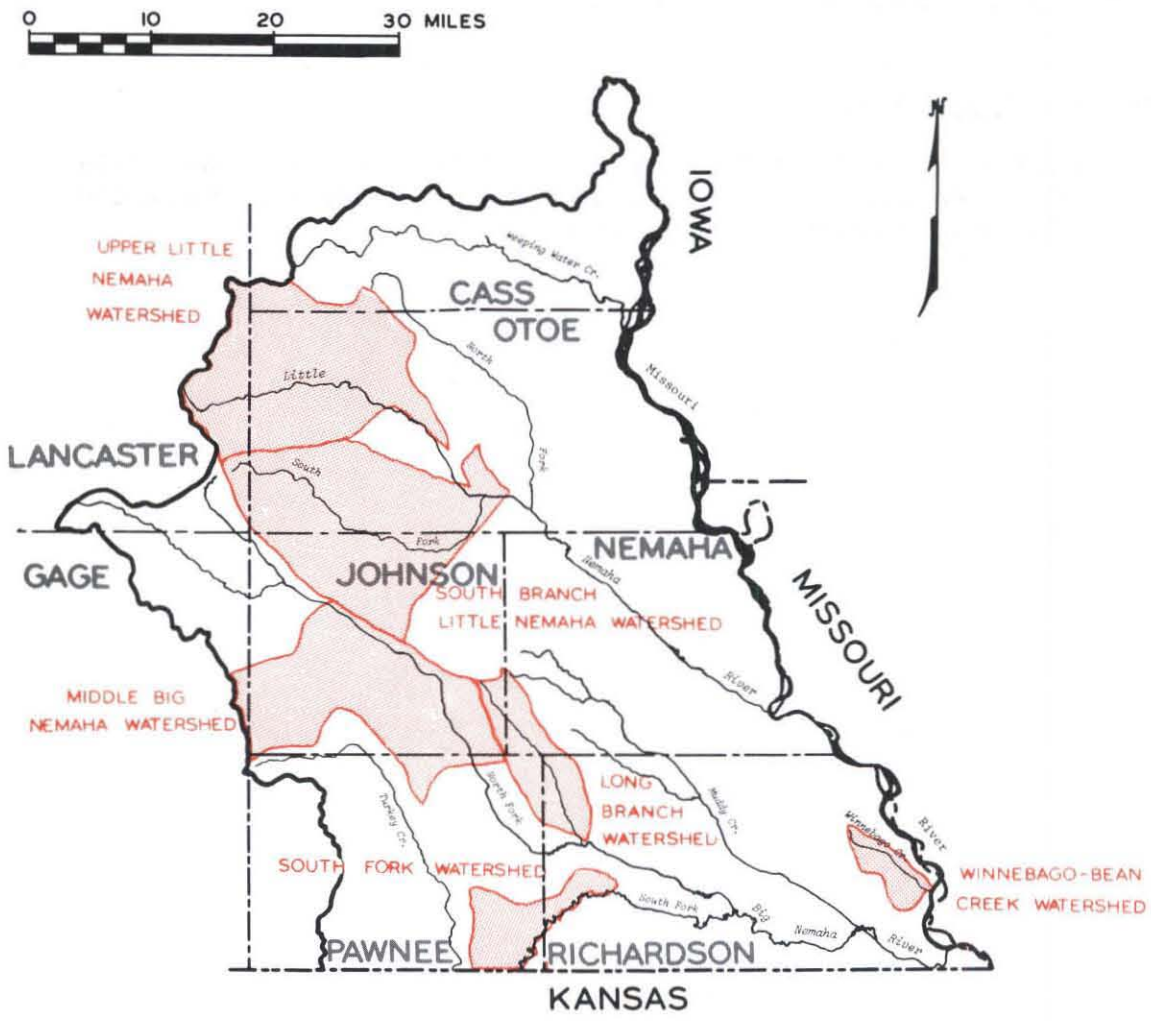
Swan Creek Watershed

This proposed project is located in Jefferson and Saline Counties. Preliminary investigations indicate a project including structural measures for flood control may be feasible. Construction of two structures identified in the preliminary investigation has been started to take advantage of a highway project by the Department of Roads. Other structures will be included in the normal work plan investigations, which have been authorized for this project.

Wolf-Wildcat Creek Watershed

This watershed is located in the southeastern portion of the Basin in Gage and Pawnee Counties. Preliminary investigations were favorable and work plan authorization has been granted.

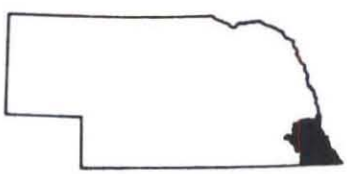
NEMAHA RIVER BASIN



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
- EXISTING PROJECT SERVICE AREA
- EXISTING DAM & RESERVOIR

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



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 project included in the original Volume I has changed as noted below.

Little Nemaha River Levee Project

This Corps of Engineers project is inactive.

Potential Projects

Winnebago-Bean Creek Watershed

The Soil Conservation Service is the agency primarily responsible for investigation and design of the Winnebago-Bean Creek Watershed project. The primary purpose of this proposed project is erosion control.

Current Status. The Winnebago-Bean Watershed project was authorized for construction in July, 1972. Final design and construction will begin as funds become available.

Description of Project Area. Winnebago-Bean Creek Watershed is located in Richardson County in the southeast corner of Nebraska. Winnebago Creek is a direct tributary of the Missouri River. Topography in the upland varies from moderately sloping to steep. Bottomlands on the major drains are nearly level to gently sloping. The average annual precipitation at Falls City, ten miles southwest of the watershed, is 35.01 inches. Seventy percent of the precipitation occurs during the growing season from April to October.

The Corps of Engineers has constructed a levee along the east bank of Winnebago and Bean Creeks where they enter the Missouri River bottom.

Project Description. This project would consist of installation of land treatment measures and 16 grade stabilization structures. The design life for all structures is 50 years, and they will initially store water to the level of the riser crests of their principal spillways. Five of the structures will be designed for full-flow. They will pass the peak runoff from the design storm event through the principal spillway without use of the emergency spillway.

Sediment production will be reduced 13 percent as a result of additional land treatment. The structural system will reduce gully growth damage to approximately 180 acres of cropland and endangered roads and bridges at five locations.

Public Interest. Local interests created the Winnebago-Bean Conservancy District to sponsor this project, but this responsibility was transferred to the Nemaha Natural Resources District upon its formation in July, 1972.

WINNEBAGO-BEAN CREEK WATERSHED

CONSTRUCTION PERIOD:	5 Years	INTEREST RATE:	5 1/8 Percent
PROJECT INSTALLATION COST:	$751,025	BENEFIT-COST RATIO:	1.1 to 1.0
FEDERAL:	$469,500	ECONOMIC LIFE:	50 Years
NON-FEDERAL:	$281,525	COST BASED ON:	1970 Prices
O. & M. BY:	Nemaha Natural	Resources District	

Table 1 - Average Annual Structural Benefits

Flood and Erosion Control	Recreation	Secondary	Total
$28,400	-0-	$2,350	$30,750

Table 2 - Average Annual Structural Costs

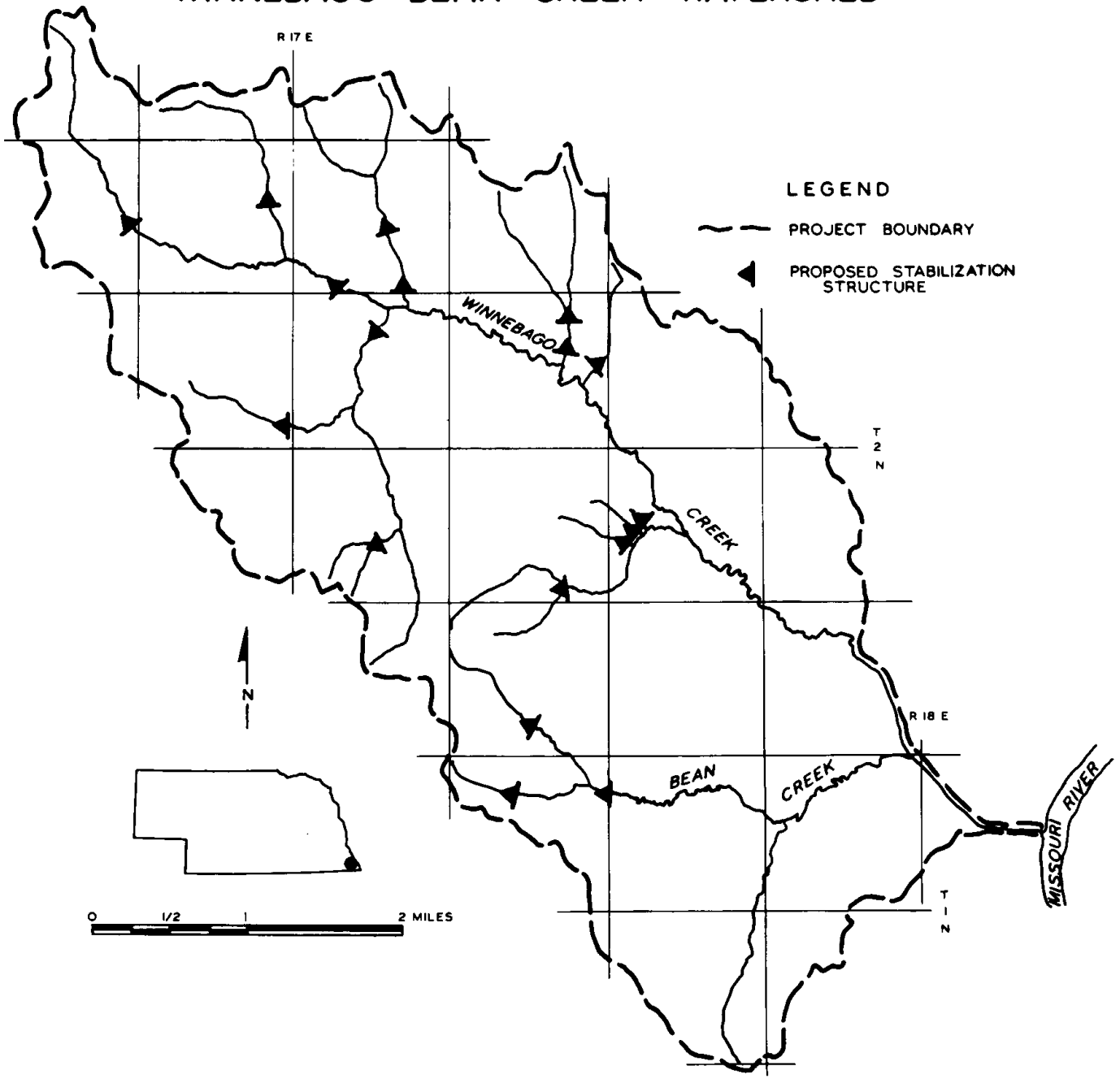
	Installation	O. & M.	Total
Structures	$22,680	$1,280	$23,960
Administration	3,340		3,340
Total	$26,020	$1,280	$27,300

Table 3 - Reservoir Data

Number of Structures	Total Controlled Drainage Area* (Acres)	Storage Capacity* (Acre-Feet) Initial	Sediment	Flood Control
16	2,870	810.5	371.9	438.6

* Structures 5-5, 41-5, 42-5, and 43-2 only

WINNEBAGO-BEAN CREEK WATERSHED



South Fork Watershed

The Soil Conservation Service is the agency responsible for investigation and design of the South Fork Watershed project. This proposed multipurpose project is designed to produce recreation, flood control, and erosion control benefits.

Current Status. The South Fork Watershed Work Plan has been completed and is now undergoing formal review. Before the project can proceed further, it must be authorized by the Congress.

Description of Project Area. The South Fork Watershed is located in Pawnee and Richardson Counties in southeastern Nebraska. It consists of the Lores and Negro Branches and several small unnamed tributaries that flow directly into the Big Nemaha River. The watershed area consists generally of rolling hills with rounded ridgetops and well-defined, generally entrenched drainageways. The average annual precipitation is 31.6 inches. The average growing season is 170 days and 70 percent of the rainfall occurs during that period.

The economy of the watershed is largely based on livestock and cash-grain farming. The distribution of land use in the watershed is approximately 44 percent cropland, 36 percent rangeland, 17 percent woodland, and 3 percent devoted to other uses.

Project Description. The project will consist of land treatment measures, 14 grade stabilization structures, 2 floodwater retarding structures, and one multipurpose structure. The multipurpose structure, to be located about 2 miles west of the town of DuBois on Lores Branch, will provide flood control and recreation benefits.

Structural and land treatment measures will reduce the estimated average annual floodwater, sediment, and erosion damages within the watershed from $37,170 to $1,870. Planned recreation facilities will provide an estimated 22,500 visitor days annually.

Public Interest. The South Fork Watershed Conservancy District was created by local interests to sponsor this project, but their responsibilities were transferred to the Nemaha Natural Resources District when it was created in July, 1972.

SOUTH FORK WATERSHED

CONSTRUCTION PERIOD:	8 Years	INTEREST RATE:	5 3/8 Percent
PROJECT INSTALLATION COST:	$1,076,240	BENEFIT-COST RATIO:	1.4 to 1.0
FEDERAL:	$ 649,850	ECONOMIC LIFE:	50 Years
NON-FEDERAL:	$ 426,390	COST BASED ON:	1972 Prices
O. & M. BY:	Nemaha Natural Resources District		

Table 1 - Average Annual Structural Benefits

Flood and Erosion Control	Recreation	Redevelopment	Secondary	Total
$34,290	$33,750	$3,240	$3,050	$74,330

Table 2 - Average Annual Structural Costs

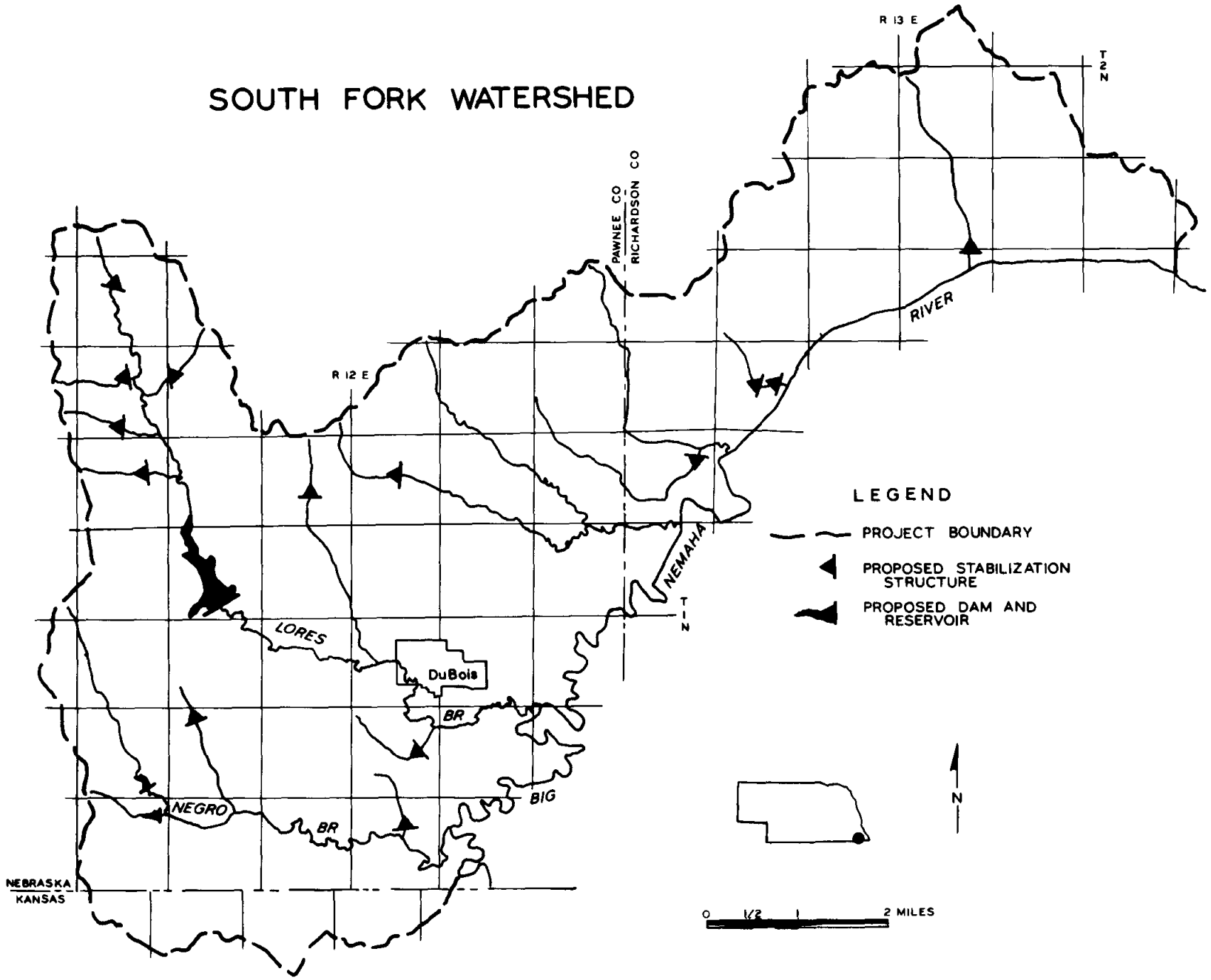
	Installation	O. & M.	Total
Structures	$37,370	$10,840	$48,210
Administration	4,880		4,880
Total	$42,250	$10,840	$53,090

Table 3 - Reservoir Data

Number of Structures	Total Controlled Drainage Area 1/ (Acres)	Storage Capacity 1/ (Acre-Feet)			
		Initial	Sediment	Recreation	Flood Control
17	7,350	3,504 2/	809	361	2,293

1/ Includes floodwater storage structures and grade stabilization structure 4-2

2/ Includes an additional 41 acre-feet of storage for non-beneficial use


SOUTH FORK WATERSHED
R 13 E
T 2 N
PAWNEE CO
RICHARDSON CO
R 12 E
RIVER
NEMAHA
T 1 N
LORES
DuBois
BR
BIG
NEGRO
BR
NEBRASKA
KANSAS
LEGEND
PROJECT BOUNDARY
PROPOSED STABILIZATION STRUCTURE
PROPOSED DAM AND RESERVOIR
N
0 1/2 1 2 MILES

Projects in Planning

Middle Big Nemaha Watershed

This proposed project is located mostly in southwestern Johnson County. The preliminary investigation of the project was favorable and work plan investigations have been authorized.

South Branch Little Nemaha Watershed

This proposed project located in Otoe and Johnson Counties includes the drainage area of the South Fork Little Nemaha River and Muddy Creek. Preliminary investigations have been authorized.

Upper Little Nemaha Watershed

This proposed project is located in Otoe, Lancaster, and Cass Counties. The preliminary investigation of the project was favorable and work plan investigations have been authorized.

Long Branch Watershed

This watershed is drained by Long Branch, a tributary of the North Fork Big Nemaha River. It is located in the corners of Richardson, Pawnee, Johnson, and Nemaha Counties. The preliminary investigation of this project was 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.

The Beck Plan

The Beck Plan involves the diversion of water from the Missouri River just below Fort Randall Dam and the transporting 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 dollars.

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.

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.

Missouri River Basin Commission

Platte River Basin Study - Nebraska. This is a joint state-federal study under the Commission's direction which will provide a comprehensive plan for management of the water and related land resources in the Platte River Basin of Nebraska. Many state and federal agencies are participating in funding and developing the plan, and local citizen participation has been included in the planning process. Potential projects which may be feasible within the next 30 years as well as long range needs will be identified. The study is scheduled for completion by July 1, 1975.

Bureau of Reclamation

Nebraska State Water Plan Studies. These are studies to provide information used in the preparation of Nebraska's State Water Plan.

Niobrara River Basin Reappraisal Study. This revision of a previous report is deferred pending development of new Water Resources Council planning guidelines. The study investigated resource development potential in the Gordon, Page, Keya Paha, and Ponca areas.

Frenchman-Cambridge Division Supplemental Water Supply Study. This study was started in December, 1972.

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. No definite completion date is scheduled.

Big Blue River Basin, Nebraska and Kansas. A draft survey report on this investigation of potential irrigation, flood control, water supply, recreation, and fish and wildlife developments has been prepared.

The report finds that structural improvements cannot be economically justified at this time and recommends local implementation of non-structural measures.

Nemaha and Little Nemaha River Basin, Nebraska and Kansas. The survey investigation of this area is scheduled for completion before July 1, 1973.

Republican River - Harlan County Lake Review Study. A draft report on the review of Harlan County Lake operations and other aspects has been prepared. The report finds that neither modification of reservoir operations nor additional storage projects are warranted at this time.

Platte River and Tributaries, Nebraska. A number of studies in the Platte River Basin have been combined to coordinate with the Missouri River Basin Commission's study of the Platte River Basin in Nebraska. Those included are:

Platte River, Nebraska
Elkhorn River, Nebraska
Lost, Dry, and Twin Creeks, Nebraska
Loup River, Nebraska
Salt Creek and Tributaries, Nebraska
Wood River and Prairie Creek, Nebraska

Missouri River, Yankton to Sioux City, Bank Stabilization. An informal study produced a plan for a potential project, but formal studies have not yet been scheduled.

Missouri River, Gavins Point Reservoir and Niobrara River, Nebraska and South Dakota Review Study. A draft of the review report has been prepared. A report will be completed and released after comments are incorporated.

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 June, 1975.

North Platte River Basin, Nebraska, Colorado and Wyoming Review Study. This study is presently underway.

Metropolitan Omaha, Nebraska - Council Bluffs, Iowa. This study of the seven-county metropolitan area is scheduled for completion by July 1, 1975.

Soil Conservation Service

Niobrara Basin Study. A draft of the report has been reviewed. Completion is scheduled prior to July 1, 1973.

Little Blue Basin Study. This report has recently been completed.

Nemaha Basin Study. The first draft of this report is scheduled to be completed before July 1, 1973.

Loup Basin Study. This study was initiated in August, 1968 and has been integrated into the Level B Study of the Platte River Basin.

Republican Basin Study. This study is scheduled for completion before July 1, 1975.

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

Watershed	River Basin
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