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SWP-002

Nebraska's State Water Plan

FRAMEWORK STUDY SUMMARY

SWP 2

STATE

OF

NEBRASKA



SOIL
AND
WATER
CONSERVATION
COMMISSION

SUMMARY

NEBRASKA NATURAL RESOURCES COMMISSION
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**NEBRASKA'S
STATE WATER PLAN**

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REPORT ON THE FRAMEWORK STUDY

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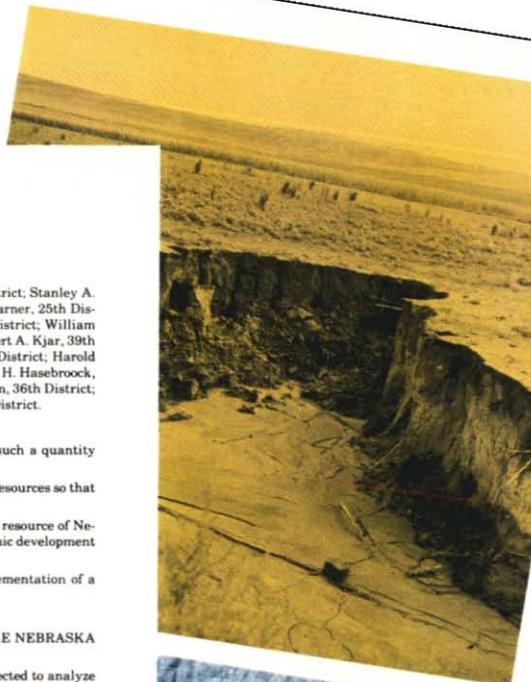
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Nebraska Soil and Water Conservation Commission
Dayle E. Williamson, Executive Secretary
Box 94725, Statehouse Station
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NEBR. SOIL AND WATER
CONSERVATION COMMISSION
STATE CAPITOL BUILDING
LINCOLN 9, NEBRASKA

October, 1971

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LEGISLATURE OF NEBRASKA
SEVENTY-SEVENTH SESSION

LEGISLATIVE RESOLUTION 5

Introduced by Maurice A. Kremer, 34th District; Arnold Ruhnke, 31st District; Stanley A. Matzke, 24th District; George Syas, 13th District; Jerome Warner, 25th District; Pat Moulton, 8th District; Ross H. Rasmussen, 15th District; William M. Wylie, 40th District; George C. Gerdes, 49th District; Albert A. Kjar, 39th District; Fred W. Carstens, 30th District; Herb Nore, 22nd District; Harold B. Stryker, 23rd District; Glenn Viehmeyer, 45th District; W. H. Hasebroock, 18th District; Rudolph C. Kokes, 41st District; Leslie Robinson, 36th District; S. H. Brauer, Sr., 21st District; Florence B. Reynolds, 14th District.

WHEREAS, the water supplies of Nebraska are not so located or of such a quantity to satisfy all present and future needs; and

WHEREAS, the state has a responsibility to guide the development of resources so that maximum benefits accrue to the citizens of the state; and

WHEREAS, the orderly development and utilization of water and land resource of Nebraska is essential to the fullest utilization of these resources and the economic development of the state; and

WHEREAS, such orderly development can only be realized by implementation of a comprehensive water and related land plan; and

WHEREAS, no such plan now exists.

NOW, THEREFORE, BE IT RESOLVED BY THE MEMBERS OF THE NEBRASKA LEGISLATURE IN SEVENTY-SEVENTH SESSION ASSEMBLED:

1. That the Nebraska Soil and Water Conservation Commission is directed to analyze the soil and water resources of the state and 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.

2. That this State Water Plan, in addition to an evaluation of the land and water resources, will also include an examination of legal, social and economic factors which are associated with resource development.

3. That a progress report on such plan be submitted to the Legislature during the regular session in 1969 and the final report be submitted to the Legislature promptly upon its completion.

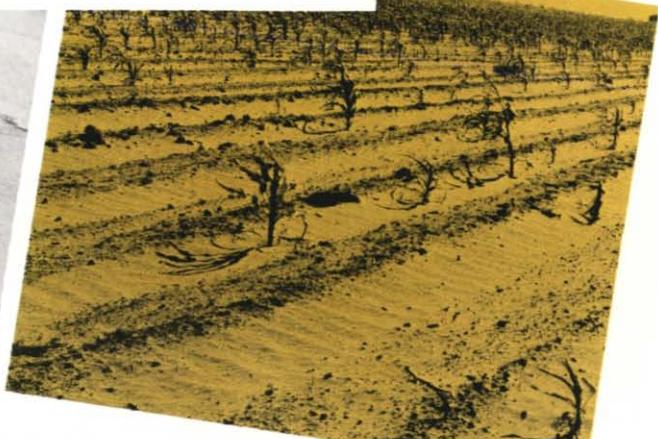
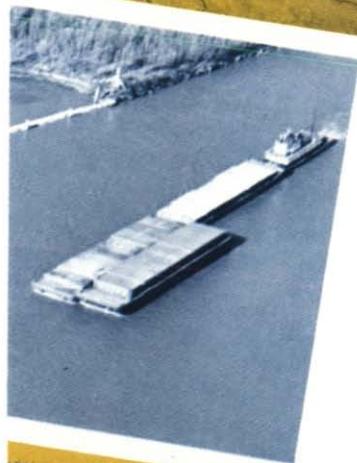
John E. Everroad

President of the Legislature

I, Hugo F. Srb, hereby certify that the foregoing is a true and correct copy of Legislative Resolution 5, which was passed by the Legislature of Nebraska in Seventy-seventh regular session on the eighteenth day of January, 1967.

Hugo F. Srb

Clerk of the Legislature



"It is apparent that the concern about the future of our country's water resources is entirely justified. Although Nebraska may be richer in water than many other states, our future development must be founded upon wise use of our water today and careful planning for its use tomorrow."

J. James Exon, Governor

The Framework Study of Nebraska's State Water Plan is concerned with the conservation and use of water today and in the future.

Fertile soil, water, timber, and mineral resources are nature's great gifts to man. In Nebraska, timber and minerals are woefully short, but the land and water resources are among the most extensive in the nation.

Fertile soils and abundant waters by themselves offer little to man. It is their productive union that multiplies the value of each. In the past, agricultural production has been the backbone of Nebraska's economy—the economy which has given us the quality of life we enjoy today.

Because water is so basic to our agriculture, our cities, and our very lives, a better appraisal and perspective of development, now and in the future, are needed to insure the wise use of the state's land and water resources. In 1967, the Nebraska Legislature recognized this need and directed the Soil and Water Conservation Commission to prepare a State Water Plan. The *Report on the Framework Study* presented to the Legislature in May, 1971, is the Commission's response to that directive.

Planning is necessary to guide the conservation and use of resources, and the Framework Study is the first step in a comprehensive planning program. Before detailed plans can be drawn, however, the citizens of the State must be informed and they must be heard. The decision to proceed beyond planning to implementation rests with the people of Nebraska.

NEBRASKA'S STATE WATER PLAN

The State Water Plan, when completed, will consist of four sections:

1. The Framework Study
2. Basin Studies
3. Status Summary
4. Special Recommendations

The Framework Study was initiated to assemble the building blocks of facts, estimates, and techniques required to lay the foundation for the State Water Plan. The Basic Framework presented in the *Report on the Framework Study* is the heart and the foundation of the Plan.

A broad, flexible framework was neces-

sary to guide the orderly, efficient development of the state's resources to best serve the general welfare of its people. It was necessary, therefore, that the study be statewide with equal consideration for all areas and that the only rigid planning constraints be those over which the State had no control, such as federal laws and interstate compacts. Existing state laws and legal rights were given full consideration and used as a basis for planning, but consideration was given to the possibility of change where it would permit better use of the resource to benefit more people. For planning purposes, the State was divided

into 13 river basins as shown on the map below.

The *Report on the Framework Study* includes an inventory of the land and water resources of the State and identifies the problems and needs associated with developing those resources. It presents a flexible plan of development, the Basic Framework, based on the use of water in its basin of origin and the satisfaction of all reasonable, foreseeable needs for in-basin development. The effects expected from this development are analyzed and some concepts for interbasin transfer of water to further utilize the state's resources are presented.

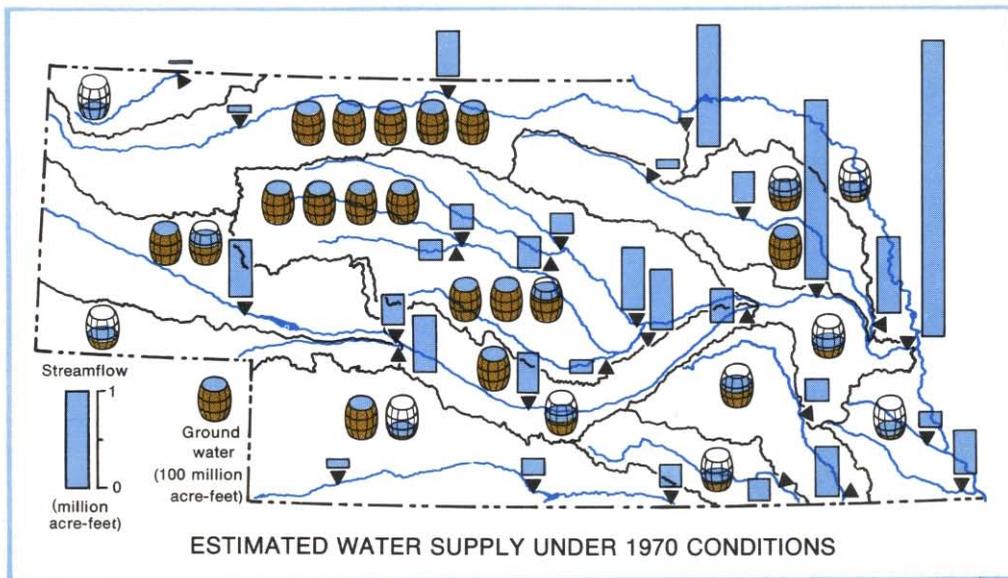
The Basic Framework is a general guide for the conservation and development of Nebraska's water resources, not a rigid plan or timetable for construction of specific projects. It is flexible enough to meet changing needs and future conditions while providing guidelines for coordinated development to produce the most efficient

use of the water resource.

Development along the lines of the Basic Framework will help avoid conflicts between projects and insure maximum benefit to all the people of the State, whether it is more water for irrigation, a reduction of flooding, or space for recreation.

The remaining sections of the State Water Plan are in various stages of completion and parts will take more than ten years to complete. The Basin Studies are a series of comprehensive, more detailed studies of the state's 13 river basins required to refine the Framework Study. The Status Summary is a summary of existing developments and potential projects for future development. The last section is a series of specialized studies of current issues important in water resources and related fields. These studies examine the physical, legal, economic, and social aspects of immediate problems and present the results as Special Recommendations.





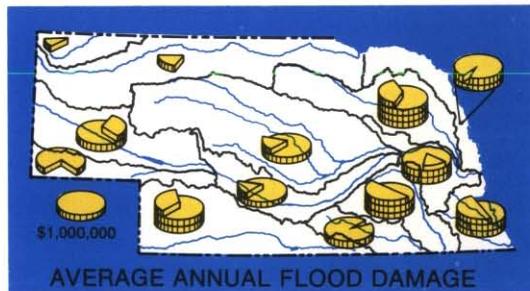
EXISTING WATER RESOURCES AND PROBLEMS

Nebraska has vast supplies of both ground and surface water. It is estimated there are nearly two billion acre-feet in storage at reasonable pumping depths below the ground surface. On the surface, about one million acre-feet of water flow into the State and 7 million flow out in an average year. The average supply in each basin under 1970 levels of development is shown in the map above.

Problems arise because the water is not always in the right place at the right time. Too much at one time produces floods—no basin is safe from them—which cause damage averaging over 20 million dollars a year. The opposite side of the same coin, severe drought, is no stranger to Nebraska either. Prolonged droughts lasting 4 to 10 years have destroyed crops

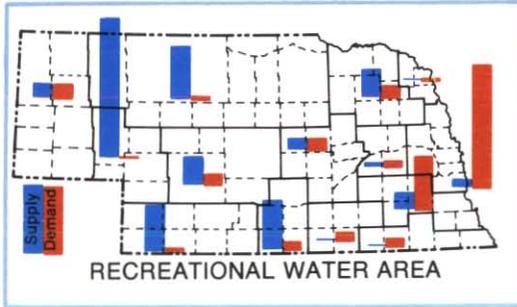
four times in the past 80 years, and shorter droughts have dried up the fields many more times.

Other problems arise because the water supply is spread unevenly across the State. There are 19 million acres of land scattered across the State which are suitable for irrigation, but only about 3½ million are de-

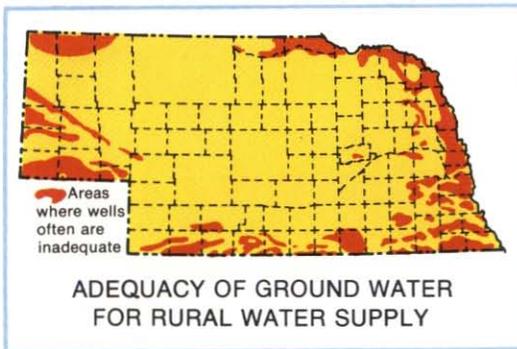


veloped for such use, partly because irrigation water is not available in some areas.

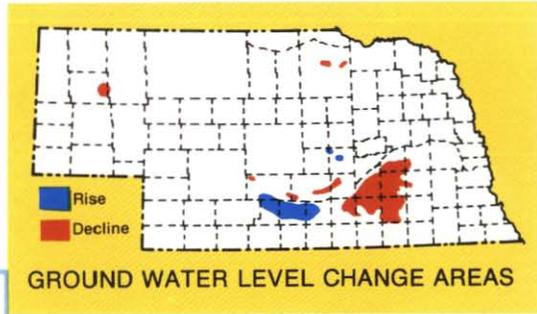
Most of the lakes and reservoirs are in western Nebraska, too far away to be enjoyed by the greatest majority of the people who live and work in the eastern part of the State.



The uneven distribution of ground water presents some problems too. Some areas have difficulty finding wells which will provide enough water for household use and livestock. There are even more areas where supplies are inadequate for irrigation.



In some places where wells are now producing enough to irrigate, withdrawal is greater than recharge and the water table has lowered as much as 40 feet. If this continues, pumping could become too expensive to continue irrigation.



On the other hand, surface water irrigation is providing too much water to the ground water reservoir in some places, and the water table is rising so that low ground is becoming too marshy to farm.

Not all problems are caused by nature. Resource developments, some built to solve the problems above, have caused other problems. Pollution has come with progress, and interference with the environment has accompanied some projects. Nebraska has many unique and valuable environmental resources, among them some unspoiled, free-flowing streams which could be lost forever by ill-considered development.



THE BASIC FRAMEWORK

The Basic Framework is a flexible plan for the future development of water resources. It is based on the use of water within the basin of origin to satisfy needs within the basin. All in-basin development which appears reasonable and necessary in the foreseeable future is included. Use of all the water and all of the land in the State is not planned, so more complete use of these resources is possible if the need arises.

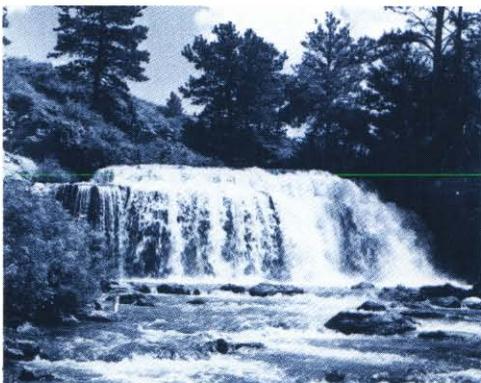
Projected development included in the Basic Framework is of two types. The first, "independent local development," is the type undertaken by individuals or local governments. It includes all types of water supply systems, both rural and urban, and waste water treatment facilities. It also includes levees and other measures for reduction of flooding in local areas, development of irrigation water supplies from wells or streams, and treatment of land to prevent soil erosion.

Independent local development is not susceptible to explicit planning because it

is the sum of many small-scale plans and decisions by many persons. However, the total effects of these many developments must be taken into account in any water resources planning. The combined efforts of many farmers and ranchers drilling wells and irrigating crops, for example, will have a significant effect on the available water resources, both surface and ground water. It will also have considerable impact on the state's economy because irrigation increases the farmers' yield and production, which in turn generates more business for industries that supply and process agricultural products. This type of chain reaction will help continue the growth of the state's economy.

The second type of development is "public project development." These developments are generally large-scale projects requiring the cooperation of several levels of government to plan and finance.

Non-structural measures of this type include flood plain management to reduce flood damages and the establishment of a



system of protected rivers to preserve areas with special environmental or recreational values.

Structural developments include large irrigation projects, watershed protection projects, flood control projects, and multipurpose projects serving combinations of several purposes. A major multipurpose project can produce economic benefits to local residents through irrigation and con-

trol of floods and benefits to the rest of the State through fishing, boating, and other forms of recreation.

Public projects are generally long range developments and lend themselves to mapping, while independent local development does not. Therefore, only public project development is shown on the map on the following pages.

POTENTIAL EFFECTS OF BASIC FRAMEWORK DEVELOPMENT

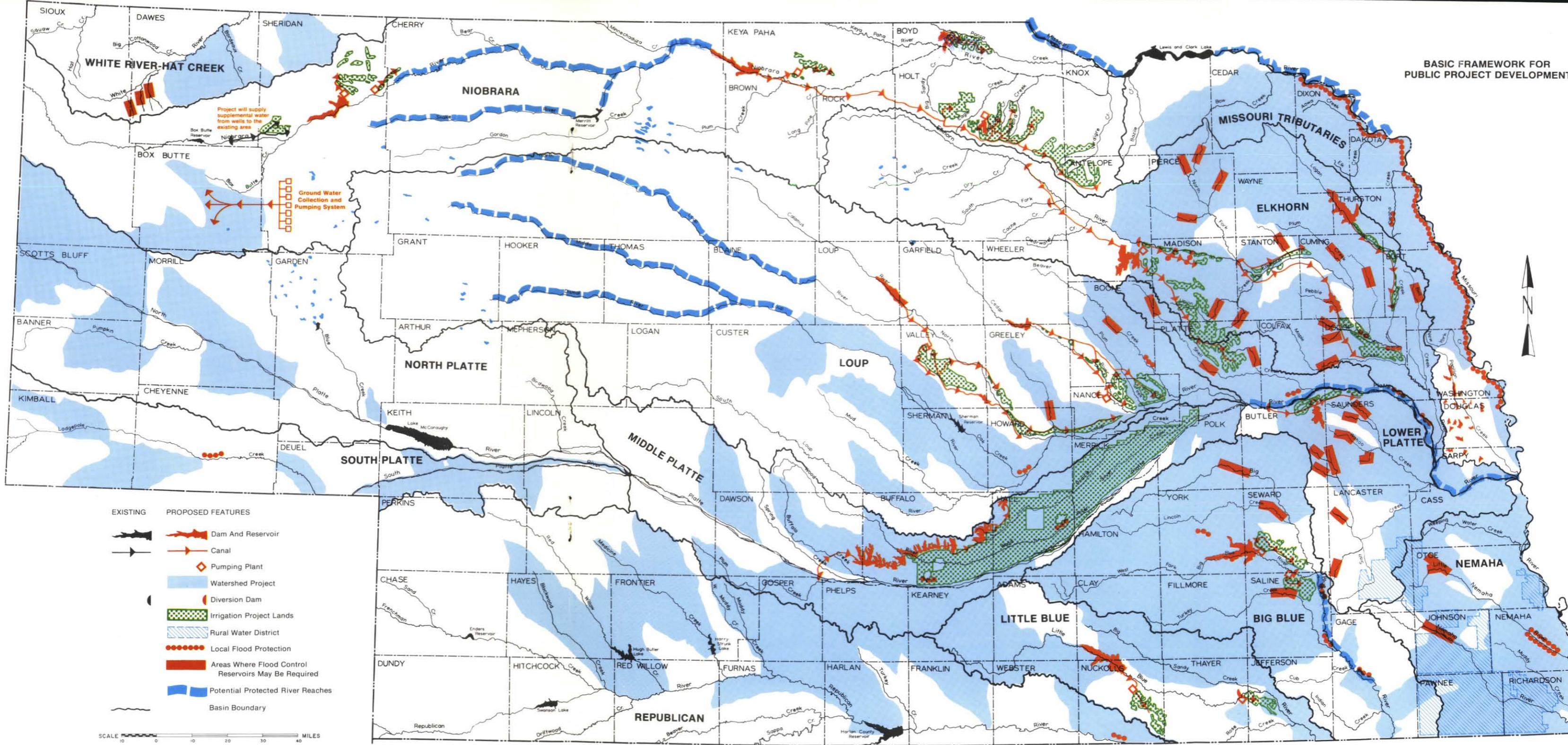
In-basin development of water resources will produce both immediate and long range effects on the local area and the whole State. Economic benefits will first come from the construction contracts for projects and the purchase of supplies for independent developments like sprinkler irrigation. More lasting benefits will come from increased production due to irrigation, new businesses to meet the demands of recreationists, and the reduction of flood damages and disruption to farms,

industries, and transportation. With the improvement in the economy will come more leisure time and the opportunity to enjoy the recreation afforded by the proposed projects.

The physical accomplishments of the projected development which can be determined and quantified are presented in the table below. Measurement or prediction of the multiplied effects of the development are beyond the scope of the Framework Study.

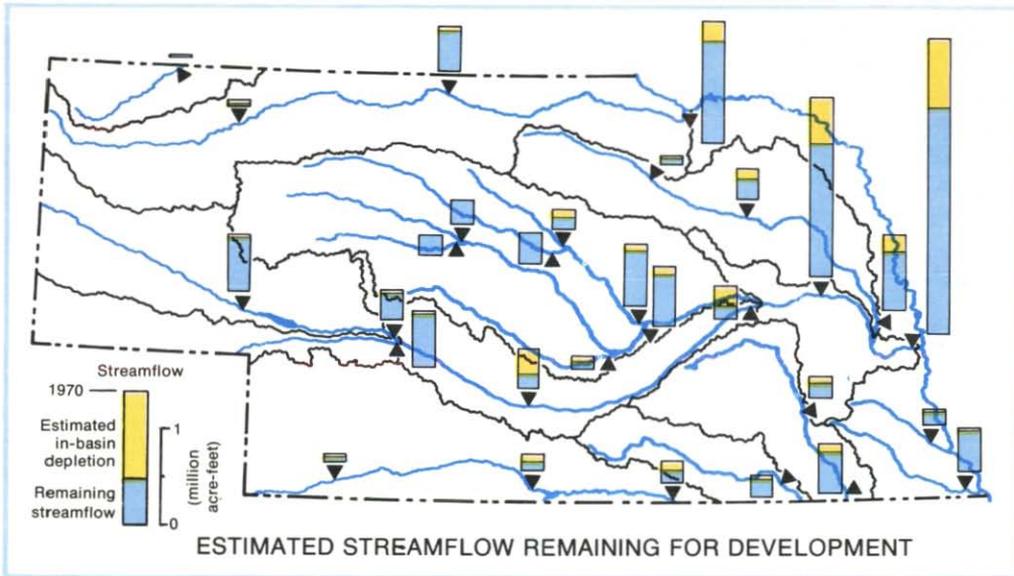
SUMMARY OF BASIC FRAMEWORK DEVELOPMENT POTENTIAL			
Item	Present Development	Basic Framework Development Potential	Total Development
Independent Local Development			
Municipal and Industrial Water (afa)	270,000	430,000	700,000
Rural Domestic and Livestock Water (afa)	130,000	190,000	320,000
Ground Water Irrigation (Acres)	2,600,000	2,100,000	4,700,000
Public Project Development			
Surface Water Irrigation (Acres)	1,100,000	520,000	1,620,000
Flood Water Storage (AF)	1,000,000	2,270,000	3,270,000
Water Surface Area for Recreation and Fishery (Acres)	90,000	160,000	250,000
Land Treatment (associated with projects) (Acres)	400,000	2,000,000	2,400,000

BASIC FRAMEWORK FOR PUBLIC PROJECT DEVELOPMENT



- | EXISTING | PROPOSED FEATURES |
|----------|--|
| | Dam And Reservoir |
| | Canal |
| | Pumping Plant |
| | Watershed Project |
| | Diversion Dam |
| | Irrigation Project Lands |
| | Rural Water District |
| | Local Flood Protection |
| | Areas Where Flood Control Reservoirs May Be Required |
| | Potential Protected River Reaches |
| | Basin Boundary |

SCALE 0 10 20 30 40 MILES



REMAINING RESOURCES AND NEEDS

The nature and amount of Basic Framework development will differ between basins and areas within basins. The use of available water resources and the consequent reduction in streamflow and ground water in storage will vary accordingly. The map above shows the probable reduction in the average streamflow shown on page 5 and the water which would remain after the completion of in-basin development.

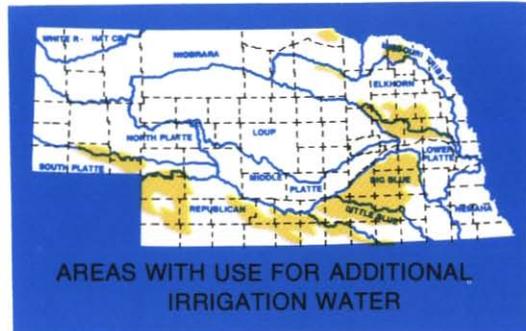
In-basin development will alleviate many of the state's water resource problems, but it cannot be expected to solve every problem or fulfill every opportunity which arises.

Remaining statewide needs will include additional flood control measures and more land conservation treatment. Remaining local and regional needs will include better rural domestic and livestock

water supplies in some areas and additional water area for fishing, boating, and all other forms of water-based recreation around Lincoln and Omaha.



The most outstanding need for large amounts of additional water—for irrigation—shows up in many areas scattered across the State. Some areas are experiencing shortages already, particularly in dry years. Other areas are not now short of water, but the ground water level is consistently lowering. Supplemental supplies may be needed in these areas to maintain the existing level of development and to stabilize the ground water level. In addition, there are areas containing large blocks of land highly suitable for irrigation which have not been considered for such development because of the lack of any kind of water supply.



The map above shows the general areas with need for additional irrigation water or with the opportunity for further development if water was available.

CONCEPTS FOR INTERBASIN WATER TRANSFER

In-basin development alone cannot utilize Nebraska's water and related land resources to the best advantage. There will be basins which will still have land not utilized to the fullest extent, and there will be other basins with a surplus of water. To more fully utilize this land and water, it would be possible to move the surplus water to the dry lands.

The *Report on the Framework Study* presents three conceptual schemes that generally illustrate the practical range of possibilities. These concepts are not proposals for development. They are presented only to stimulate thinking about planning for further use of the water resource in the future.

The first scheme is based on the concept of collecting and transporting surplus water as far west as possible. It would require exchange of imported water for that presently stored in Lake McConaughy, but it would interfere least with present or proposed developments and water rights,

and make re-use possible as the water moves across the State. However, it would require large, complex facilities which would be expensive and difficult to stage over a period of years. These facilities would also interfere with the scenic Sandhills streams and might affect the ecological balance of the entire region.

The second scheme provides a concept for transferring large amounts of water the shortest possible distance. It has great potential for staged development with a minimum of interference with important fishing and scenic streams and the Sandhills region. However, it would interfere with present hydro-electric developments and a number of water exchanges would be required.

The third scheme interferes least with existing power and irrigation developments, but it would provide only relatively small quantities of water for western and central Nebraska. It would interfere least with the Sandhills and its unique streams.

RECOMMENDATIONS

Plans are not an end in themselves. Turning plans into projects or programs can be achieved only through positive action—by the people of Nebraska through their Legislature and Governor. The *Report on the Framework Study* contains 26 recommendations for such action in the fields

of flood damage reduction, erosion control, greater state participation in development, future planning, environmental values and fish, wildlife and recreation resources, and interbasin water transfer considerations.

The State of Nebraska should...

FLOOD DAMAGE REDUCTION

Nearly 3,000,000 acres, including agricultural, residential and commercial development, are subject to recurrent floods that cause damages averaging over \$20,000,000 annually. In addition to structural

control of floodwaters included as part of the Basic Framework, a total program including nonstructural measures is needed to minimize flood damage and the threat to life and health.

...strengthen the present program for regulation of flood plains and initiate a program for emergency flood warning and disaster relief.

EROSION CONTROL

Nebraska's economy is based largely on its soil. Careless use or misuse results in its loss by wind and water. Protection

from erosion is fundamental to the continued growth of agriculture in the State.

...emphasize programs of wind and water erosion control, agricultural pollution abatement, and water management.



GREATER STATE ACTIVITY

No crop can be harvested without first sowing the seed. Greater investments will be needed in the future to reap the benefits of resource development. Since federal assistance is limited, the state's role

in planning, financing, and constructing developments must be expanded. New policies, new legislation, and increased funding are needed if growth is to continue.

...begin studies of policies and laws to provide state authority to construct, finance, and operate water projects.

...establish a Water Development Fund for use in financing various aspects of water resources development.

...continue the program that provides matching funds for municipal waste treatment plants.

Many federal projects have been included in the Basic Framework. Some are feasible and ready for construction, others need further investigation. A concerted effort by local interests and state govern-

ment is needed to gain authorization and funding for these projects which provide flood control, irrigation, recreation and other associated benefits.

...urge the appropriate federal authorities to fund and expedite planning and construction of the following projects of these agencies:

Soil Conservation Service

Aowa Creek
Corporation Gulch
Medicine Creek
Upper Little Nemaha
Blackwood Creek
South Fork
Swan Dry Creek
Maple Creek

Tekamah-Mud
Winters Creek
Creighton Valley
South Branch Lt. Nemaha
Twin Creek
Bone Creek
Long Branch

Ash-Plum
Oak-Middle (Supp)
Clear Creek
Winnebago-Bean Cr.
Middle Big Nemaha
Box Elder
Wahoo Creek
Big Muddy Creek

Bureau of Reclamation

Mid-State Reclamation Project
O'Neill Unit
Little Blue Unit
Logan Unit
Norfolk Unit

North Loup Division
Mirage Flats Project (Supp)
Cedar Rapids Division
Highland Unit
Sunbeam Unit

Army Corps of Engineers

Missouri River Levee System
Little Nemaha River Levees Proj.
Lost-Dry Creek & Twin Creek Basin Study
Nemaha and Little Nemaha River Study
Elkhorn River Basin Study
Wood River-Prairie Creek Study

Papillion Creek & Tribs Project
Big Blue River Study
Niobrara River Study
Upper Republican River Study
Loup River Study
Salt Creek & Tribs Study

Federal agencies look to the State for guidance in setting priorities for programs. Support from the local level is required,

but establishment of priorities at the state level eliminates competition for funds and insures greater statewide benefits.

...establish and maintain a priority list for planning, authorizing, and funding of federal projects in Nebraska.

FUTURE PLANNING

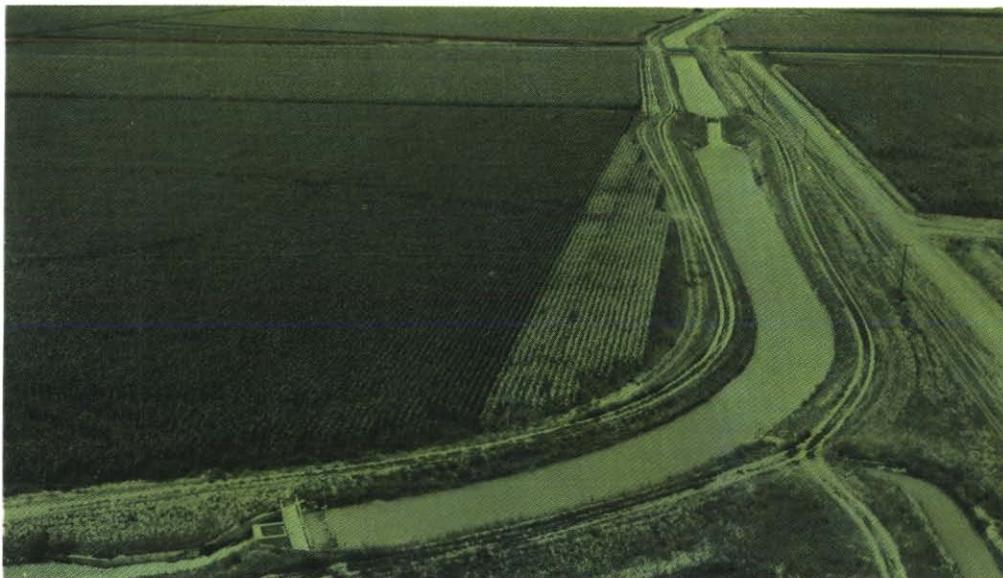
The Basic Framework provides a flexible guide for future planning and development of water resources. In the past, the solution to water related problems has sometimes been hampered and delayed

by the absence of a comprehensive plan and coordinated action. Proper utilization of the present plan will do much to assure the efficient use of available resources to provide maximum benefits.

...recognize the Basic Framework, through Legislative and Gubernatorial action, as the guide for orderly control, protection, development, and in-basin utilization and management of Nebraska's waters.

...complete the three remaining sections of the State Water Plan as early as possible.

...establish procedures for coordinated planning of water developments to include quality and environmental as well as quantity aspects.



The majority of planning for water resource development in Nebraska is done by the federal agencies. It is imperative that the State be a full partner in any fed-

eral or regional planning or development. This will assure the proper use of Nebraska's resources and that Nebraska's needs and opportunities are fully considered.

...take an active role in regional or river basin planning activities to be accomplished under the general guidance of the Federal Water Resources Council.

...give the Platte River Basin Study a high priority.

Basic data on the availability and use of water resources is needed to provide a firm basis for future planning. Collection of data, investigations of present situations

and problems, and research into possible problems and solutions are needed to guide intelligent decisions on resource management.

...investigate the geologic and hydrologic relationship of ground and surface water and study their conjunctive use.

...accelerate development of the Soil and Water Resources Data Bank.

...expand resource data collection programs.

...promote and coordinate research on water problems through joint judgments of all water agencies.

ENVIRONMENTAL VALUES AND FISH, WILDLIFE AND RECREATION RESOURCES

A satisfactory physical and natural environment must be maintained if the high quality of life available in Nebraska is to be maintained. Certain areas in the State

possess sufficient historical, scenic, or cultural value to be protected and enhanced for posterity.

...designate and appropriately protect aesthetically attractive river reaches and water related areas of historic, scientific, and cultural significance.

...evaluate possible environmental and ecological effects of potential water development with the objective of minimizing adverse impacts.

...encourage public study and comment as part of development procedures.

Fish and wildlife resources are valuable not only for their intrinsic value as part of our environment, but also for the recreational opportunities they afford. Water re-

source developments have the potential to either disrupt or improve conditions for fish and wildlife.

...protect and enhance fish and wildlife resources, especially by maintenance of proper water quality and minimum stream flows and adequate habitat.



Outdoor recreation, especially water based recreation, is important to the qual-

ity of life in Nebraska, and is a growing factor in the state's economy.

...determine means of providing greater public access to water for recreation.

...consider the potential for recreation in all projects and provide public access when public funds are expended.

INTERBASIN WATER TRANSFER CONSIDERATIONS

In-basin water resources are not adequate to sustain irrigation of all high quality lands in some river basins. On the other hand, there will be surplus water after in-basin development in other river basins.

Efficient use of the state's resources requires some means of balancing the water supply between water surplus and water short areas.

...examine the public policy issues involved in interbasin transfer of water for possible legislative action.

...investigate alternative interbasin water transfer schemes on the basis of sound economic, engineering, and environmental criteria.

NEBRASKA SOIL AND WATER CONSERVATION COMMISSION

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