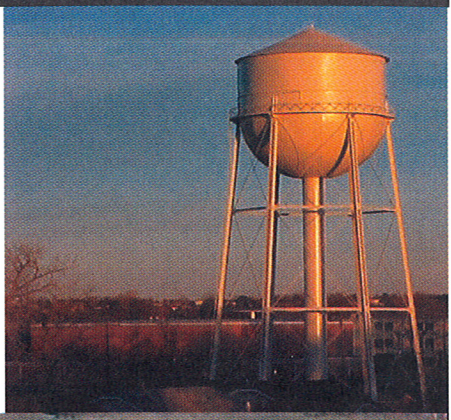
Groundwater and Surface Water in Nebraska



Cooperative Hydrology Study (COHYST)

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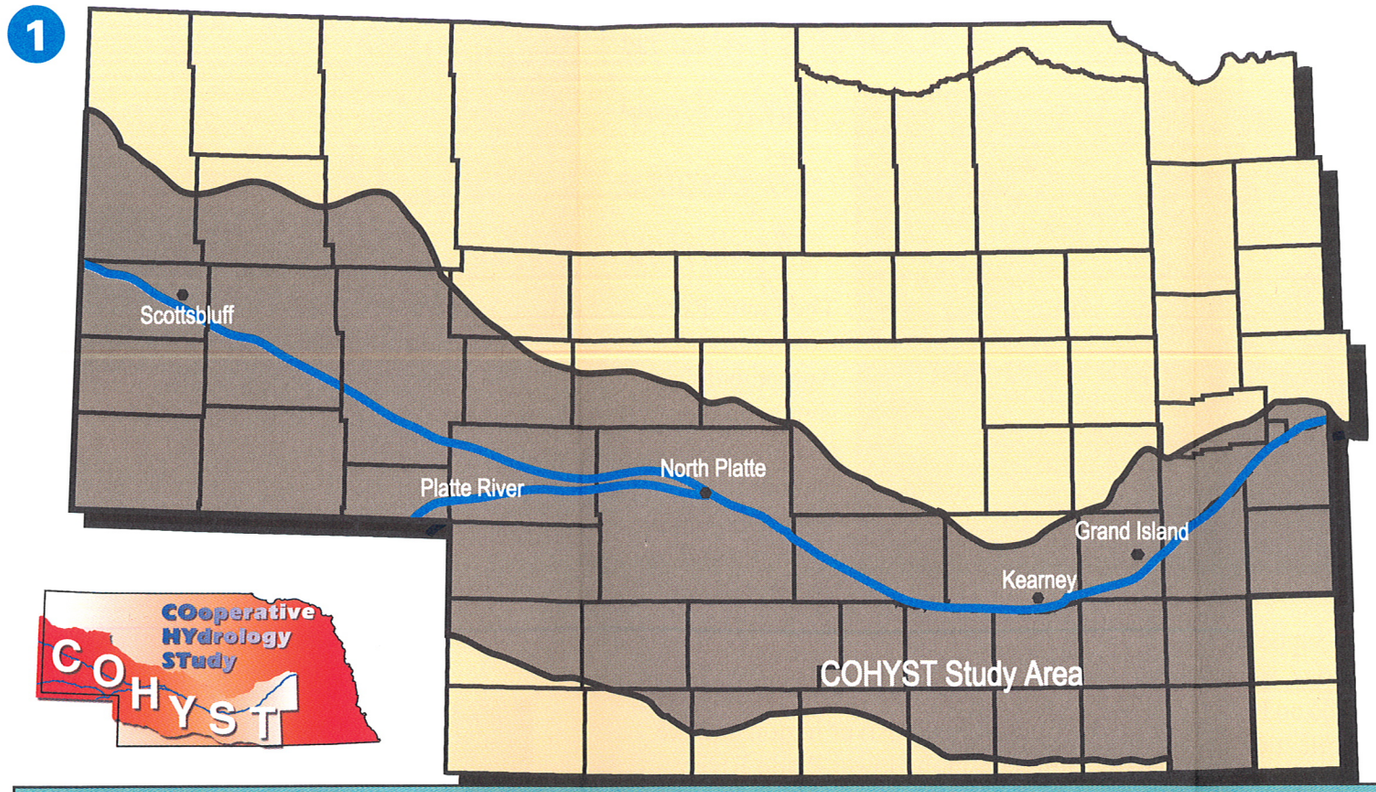
http://cohyst.nrc.state.ne.us/



Understanding Nebraska's Water Resources

Most of Nebraska was once called the "Great American Desert." Its scorching summers, harsh winters and seeming lack of water made this part of the Great Plains unfit in the eyes of many for settlement, not to mention agriculture.

However, one of Nebraska's greatest treasures **is** its water. Subsequent growth of agriculture and economic development in Nebraska can be traced to the ingenuity and tenacity of early Nebraskans who were able to develop ways to compensate for the semiarid climate. Nebraska's location in this "desert" was a fundamental factor in the development of the state's water resources.

Historian Walter Prescott Webb wrote of the importance of understanding the physical nature of the land. In *The Great Plains* (1931), Webb wrote: "If the Great Plains forced man to make radical changes, sweeping innovations in his ways of living, the cause lies almost wholly in the physical aspects of the land. A study of these physical aspects not only illuminates the later historical development, but in large measure serves to explain it."

One of Nebraska's foremost physical aspects is the Platte River, which is often labeled one of the most complex river systems in America. Understanding, managing and regulating the Platte are made difficult by the river's extreme variations in flows, changing characteristics and the many demands placed on it.

Cooperative Hydrology Study

The Cooperative Hydrology Study (COHYST: pronounced "co-heist") is an effort to improve understanding of the hydrological and geological conditions in the Platte Basin. The study's goal is to provide scientifically supportable databases, analyses, and detailed computer groundwater models to more accurately identify and quantify the relationship between Platte River flows and the groundwater within the Platte and adjacent river basins.

Several entities—public power districts, natural resources districts, state agencies, water-user organizations, environmental groups and agricultural interests in Nebraska—have joined together as sponsors and partners to conduct the study, which:

- Provides Nebraskans with a basis to develop policy and procedures related to groundwater and surface water;
- Assists Nebraska in meeting its obligations under a three-state/U.S. Department of the Interior Platte River Cooperative Agreement;
- Helps Nebraskans analyze proposed water management activities of the Cooperative Agreement and/or other programs in the state; and
- Assists natural resources districts along the Platte River in providing appropriate regulation and management.

Sponsors

The Central Nebraska Public Power and Irrigation District
Central Platte Natural Resources District
Little Blue Natural Resources District
Nebraska Department of Natural Resources
Nebraska Game and Parks Commission
Nebraska Public Power District
North Platte Natural Resources District
South Platte Natural Resources District
Tri-Basin Natural Resources District
Twin Platte Natural Resources District
Upper Big Blue Natural Resources District

Partners

City of Grand Island
City of North Platte
City of Scottsbluff
Nebraska Audubon Society
Nebraska Farm Bureau
Nebraska Water Resources Association
Nebraska Water Users, Inc.
Platte River Whooping Crane Trust

with additional funding from the Nebraska Environmental Trust

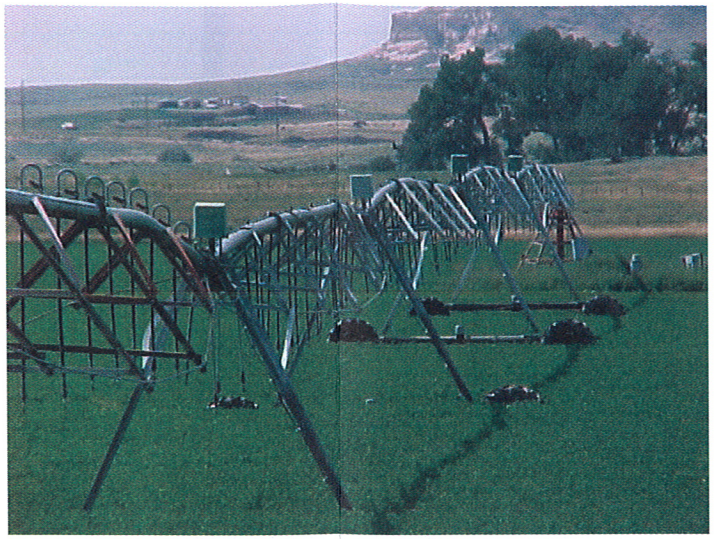
2 Databases and Computer Models

COHYST develops computer databases, which are collections of information organized in such a way that a computer program can quickly select desired pieces of data. The databases quantify existing water use and flow data in the Platte River Basin. This includes groundwater as well as surface water flowing in streams and rivers.

The databases are used to develop regional computer models to provide a better understanding of the groundwater flow system, the interrelationships between groundwater and surface water, the geology of the region, and other characteristics of the groundwater aquifer. Computer models enable researchers to represent real-world features—rivers, streams, groundwater aquifers, floods or droughts—as a set of mathematical equations which reproduce observed water levels and stream flows.

The models can be used as tools to predict how changes to or "stresses" on the groundwater system may impact flows in the Platte River. Stresses are additions and subtractions of water from the groundwater system, including pumping from wells, evapotranspiration by vegetation, aquifer storage and recovery, flow to drains, groundwater recharge from precipitation, deep percolation from irrigation, enhanced recharge due to certain land uses, recharge from canal and lateral leakage, and recharge from lakes and reservoirs.

The models can be used to predict, for example, what might happen to groundwater levels and flows in the river if irrigation development increases, declines, or continues at its present level. The models can also help predict how water supply or conservation projects proposed as part of the Platte River Cooperative Agreement would affect groundwater levels and river flows.



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COHYST flow models may be use
of regulatory and management de
they must be defensible in both sci
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will help technicians define comp
systems as accurately as possible

In addition to providing valuable
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COHYST is an important tool as Natural Resources Districts revise groundwater management plans, analyze groundwater quality problems and undertake other projects that may affect groundwater use or recharge. The databases and models are also be useful for other individuals and agencies throughout the state.

Products and data produced by the study are available on the COHYST web site at **http://cohyst.nrc.state.ne.us/**

3 COHYST and the Platte River Cooperative Agreement

The Platte River Cooperative Agreement was signed by the governors of Nebraska, Wyoming and Colorado and by the Secretary of
to address the needs of three
nd endangered species (whoop-
east tern and piping plover) that
tral Platte River region and the
eon in the lower Platte River.
the Cooperative Agreement is to
asinwide, long-term program to
bitat for these species.

nship between COHYST and the Cooperative Agreement is indirect. Information developed by the COHYST study is available to the Governance Committee that oversees the Cooperative Agreement. Many of the same people and entities are involved in both efforts.

COHYST will provide valuable information necessary to develop a plan to address "new depletions" to flows in the central stretch of the Platte River. Protecting target flows is one goal of the Cooperative Agreement.

April 2002