

Annual Report and Plan of Work  
for the  
Nebraska State Water Planning and Review Process

Submitted to the Governor  
and Legislature by the  
Director of Natural Resources

September 13, 2002

## TABLE OF CONTENTS

I.	PLANNING AND REVIEW PROCESS ACTIVITIES .....	1
II.	INTRODUCTION.....	2
III.	STATUS REPORT ON COMPLETED AND ONGOING WORK.....	3
	A.    PROVIDE INFORMATION AND ALTERNATIVE METHODS OF ADDRESSING WATER POLICY ISSUES AND AREAWIDE OR STATEWIDE WATER RESOURCES PROBLEMS.....	3
	B.    DEVELOP AND MAINTAIN THE DATA, INFORMATION AND ANALYSIS CAPABILITIES TO PROVIDE A SUPPORT BASE FOR WATER PLANNING AND MANAGEMENT.....	11
	C.    PROJECT AND PROGRAM REVIEW ACTIVITY.....	18
	D.    PROVIDE THE STATE WITH THE CAPACITY TO PLAN AND DESIGN WATER PROJECTS.....	20
V.	BUDGETARY TABLES .....	19
	Table 1.    PLANNING AND REVIEW PROCESS EXPENDITURES - FY 02 AND BUDGET FYs 03-07 .....	22

## **I. PLANNING AND REVIEW PROCESS ACTIVITIES**

### **A. PROVIDE INFORMATION AND ALTERNATIVE METHODS OF ADDRESSING WATER POLICY ISSUES AND AREA-WIDE OR STATE-WIDE WATER RESOURCES PROBLEMS**

- 1) Platte River Cooperative Agreement Studies
- 2) Republican River Basin Activities
- 3) Platte River Cooperative Hydrology Study
- 4) Floodplain Planning
- 5) Water Decision Support System
- 6) Assistance to NRCS on Buck & Duck Watershed Planning
- 7) Lower Platte River and Tributaries Feasibility Study
- 8) Lower Platte River Corridor Alliance
- 9) Environmental Education Activities
- 10) Other Planning Activity

### **B. DEVELOP AND MAINTAIN THE DATA, INFORMATION AND ANALYSIS CAPABILITIES TO PROVIDE A SUPPORT BASE FOR WATER PLANNING AND MANAGEMENT**

- 1) Water Rights Mapping
- 2) Flood Prone Area Mapping
- 3) National Hydrography Dataset
- 4) Revision of Digital Elevation Models
- 5) Revision of Digital Orthophoto Quadrangles
- 6) Tagged Vector Cleanup
- 7) U.S.G.S. Water Use Report
- 8) Soil Survey Digitization
- 9) Watershed Boundary Delineation
- 10) Groundwater Level Web Data

### **C. PROJECT AND PROGRAM REVIEW ACTIVITY**

- 1) NRDF Reviews
- 2) Climate Assessment and Response Committee
- 3) Environmental Trust Committee
- 4) LB 1003 Water Policy Task Force
- 5) Other Activity

### **D. PROVIDE THE STATE WITH THE CAPACITY TO PLAN AND DESIGN WATER PROJECTS**

## **II. INTRODUCTION**

The Nebraska State Water Planning and Review Process was initiated in 1978 to redirect and accelerate Nebraska's water planning efforts. This Annual Report and Plan of Work summarizes work completed as part of that process in FY 2002 and presents a work program and budget for future fiscal years. This is a report of the Director of Natural Resources and is submitted in compliance with Nebraska Revised Statutes Sec. 2-15106. Section 2-1599 of the statutes directs that the process shall be designed to: 1) provide the Legislature and the citizens of Nebraska with information and alternative methods of addressing important water policy issues and area wide or statewide water resources problems; 2) provide coordinated interagency reviews of proposed local, state, and federal water resources programs and projects; 3) develop and maintain the data, information, and analysis capabilities necessary to provide state agencies and other water interests with a support base for water planning and management activities; 4) provide the state with the capacity to plan and design water resources projects; and 5) conduct any other planning activities necessary to protect and promote the interests of the state and its citizens in the water resources of Nebraska.

In recent years a major focus of the State Water Planning and Review Process has been on natural resources information management. Work has been closely coordinated with the work of the Data Bank Section to produce a variety of maps and other information useful in addressing the state's natural resources problems. Geographic information systems (GIS) and computer assisted data manipulation and modeling continue to be an integral part of the long range planning and management of the state's water and soil resources. The work items in this report continue to reflect that emphasis.

The State Water Planning and Review Process work items related to information management are found primarily in Section B. Many of the information management products and activities found in this report are co-products of the Department's Data Bank Section and the Planning and Assistance Division. This is a report of planning activities and includes no programmatic information about Data Bank Section initiatives. However, the Data Bank Section does have a major role in almost all of the information management/basic planning activities listed. Other divisions of the Department also participate in planning activities. For instance, the Floodplain Management and Dam Safety Division conducts floodplain planning activities and the agency's Legal Counsel is the agency lead in Platte River Cooperative Agreement activities.

Planning and review process activities are organized into the major statutory planning categories listed above. Within these categories, activities are listed roughly in the order of staff time and other non-financial support required.

### **III. STATUS REPORT ON COMPLETED AND ONGOING WORK**

#### **A. PROVIDE INFORMATION AND ALTERNATIVE METHODS OF ADDRESSING WATER POLICY ISSUES AND AREAWIDE OR STATEWIDE WATER RESOURCES PROBLEMS**

##### **1) Platte River Cooperative Agreement Studies**

On July 1, 1997 the governors of Nebraska, Colorado and Wyoming and the U.S. Secretary of Interior signed a cooperative agreement outlining a proposed basinwide recovery implementation program for endangered species in the Central Platte Basin. Roger Patterson, Director of Natural Resources, serves as the Nebraska state representative on the governing body for the agreement and Jim Cook, legal counsel for the department, serves as his alternate. The program proposes to reduce shortages to U.S. Fish and Wildlife Service "target flows" and provide additional land habitat for endangered species in the Lexington to Chapman reach of the river. The reduction in shortages to target flows is to be realized in part by: (1) operating Kingsley Dam and related facilities in Nebraska to store a portion of the inflows to Lake McConaughy as well as environmental water made available from upstream projects in an environmental account that is managed by the USFWS (this portion of the program is already in operation because of licensing requirements of the Federal Energy Regulatory Commission and releases have been made from that account starting in the summer of 2000), (2) modify Pathfinder Reservoir in Wyoming to store water in another environmental account to be similarly managed, and (3) construct and operate the Tamarack Project in Colorado; that project will utilize excess flows when available for groundwater recharge which will return to the river at times when flow shortages are more likely.

However, the three projects listed in the previous paragraph will only supply a portion of the needed average annual 130,000 to 150,000 acre feet of target flow shortage reduction. The remainder would need to be obtained through additional water conservation and water supply projects. A Water Action Plan that identifies potential projects in all three states to achieve the remaining water objective has been prepared. No projects will be implemented until additional assessments of their feasibility and impact have been completed. Those assessments will occur during the course of the program if it is, in fact, initiated.

On the land side, the proposed program would provide for 10,000 acres of suitable habitat by the end of the first thirteen year increment. Interests in land could be acquired through title, easements or leases but no eminent domain would be used. Taxes would continue to be paid on the land whether or not the record owner was tax exempt.

The primary agency work on the Cooperative Agreement has been handled through the Director of Natural Resources, the deputy director of the department, the agency legal counsel and a public information specialist headquartered in Kearney, none of which are part of the Planning and Assistance Division. However, Planning and Assistance Division staff have frequently worked with and are expected to continue to work with each of those other staff members and others on various activities relating to the agreement.

An additional responsibility under the agreement is for each state to mitigate, offset or

prevent any new depletions to the river's target flows as part of the proposed program. This requires each state to develop a mitigation plan that will allow new uses of both surface water and hydrologically connected groundwater to begin only as long as the impacts to the target flows are offset. Nebraska's new depletion plan has been in the development stage since 1998; that work is being performed by a group of Nebraskans, most of whom represent organizations that either would be responsible for implementing the plan or constituents that would be most affected by the plan. The group is led by the Department's legal counsel. A draft of the plan has now been submitted to the other members of the Governance Committee and is scheduled to undergo a review by the Water Management Committee and the Governance Committee in late 2002. However, further work on the details of the new depletion plan will continue in FY 2003 primarily because of its close relationship to the Cooperative Hydrology Study discussed elsewhere in this document.

The budget adopted by the Legislature for FY 2002 and FY 2003 included funds for two studies designed to help the Governor and the state in general better understand the significance of entering into a Platte River Program once formulation of that Program is complete. The first study is a survey of land use in the Platte River Basin for 2001 and that study is nearing completion. A similar survey also was conducted for 1997 through the Cooperative Hydrology Study. Comparison of land uses for those two years will be needed to determine the extent to which the number of irrigated acres is changing and how that is affecting flows in the Platte. A similar study will be needed for the year 2003. Those three studies will be critical to quantifying the amount of water needed to offset for depletions caused by new uses of hydrologically connected groundwater begun between July 1, 1997 and December 31, 2003. Those are the depletions for which, under the plan in its current form, the state alone will be responsible to offset. The cost of providing those offsets is not yet known but likely will be substantial. The cost of the 2001 survey, over the biennium, is estimated at \$175,000. A similar cost is anticipated for the 2003 land use inventory, but funds for that will not be needed until the next biennium.

The second study originally funded in the 2002-2003 biennium was a study of the economic impact of the proposed program in Nebraska, especially the impact of the new depletion plan discussed above. The funds for that study were lost when the department budget was reduced in the 2002 legislative session. However, funds are being sought from other sources. If they can be raised, that study will be conducted by an independent contractor and will be coordinated by a group of economists from DNR, UNL, the Nebraska Department of Economic Development and Nebraska Public Power District. The estimated cost of that study is \$150,000.

The Department is also serving as the agency through which the state's financial obligations for the term of the Cooperative Agreement are met. The appropriations to the Department's predecessor, the Natural Resources Commission, for FYS 1998, 1999, and 2000 for that purpose totaled \$700,000. Of the three year total, about \$265,000 was expended for Nebraska's share of the Water Conservation and Supply Study conducted by Boyle Engineering, Inc. of Denver. The contract for those services terminated at the end of calendar year 2000. Each of the other two states also had contracts with Boyle and expended the same amount.

Also funded by the three states on an equal basis was a study of the channel stability of

the Platte. That study, which was conducted by Parsons Engineering, Inc., had a total price tag to the states collectively of \$300,000 and was deemed necessary by the states because of concerns with preliminary federal conclusions that the channel of the Platte River on the Big Bend reach is still degrading (narrowing and deepening) and that some of the measures proposed for the Program might actually exacerbate that problem unless other new components were added to the Program. The results of that study were helpful to the states in redirecting portions of the proposed program to what the states believe is a more realistic pilot/adaptive management approach to assessing the relationship between flows, sediment and other factors on the width and depth of the Platte River channel.

The remainder of what is left of the \$700,000 appropriated by the Legislature (approximately \$50,000 was lost to the budget reduction process in the 2002 session) is being used for other expenses approved by the Governance Committee. Among those expenses are the costs of the services provided by the Executive Director, Dale Strickland, a consultant from Cheyenne, Wyoming. So that the negotiated "fair shares" for the costs of the Cooperative Agreement would be provided by each party, Mr. Strickland's services are now funded 65.79% by the federal government (Department of Interior), 15.79% by Colorado, 10.53% by Nebraska, and 7.89% by Wyoming. Nebraska's share of those and related expenses was approximately \$59,600 in FY 2001. The original deadline for the Cooperative Agreement (July 1, 2000) has now been extended until June 30, 2003 with another extension until December 31, 2003 possible without further approval by the Governors and the Secretary of Interior. During that extension, there will be ongoing expenses to be shared by the states and the federal government. However, at this time it appears that the remaining portion of the original appropriation of \$700,000 will be adequate to pay the Nebraska portion of those expenses in FY 2003. However, if the Cooperative Agreement is further extended, some or all of the \$50,000 lost in the budget reduction may need to be reappropriated for the 2004-05 biennium.

In FY 2004 the state will review and comment on the Programmatic Environmental Impact Statement being prepared by federal agencies in a separate process. In future fiscal years, Department staff also are expected to contribute to continued development and implementation of the state mitigation plan, contribute to advancement of projects for the water conservation and supply plan, assist in land use delineation, and help with land use and mapping. Land use analysis and planning and implementation of programs and projects for mitigation of future water uses could conceivably become a major activity for Department staff if a basinwide program is established. The extent of that work will depend upon direction from the the Governor and the Legislature. It remains to be seen what portion of that Department activity will be carried out by the planning staff.

One large issue unresolved when this report was finalized is how increases in Program costs are to be divided among the federal government and the three states. Since the original Cooperative Agreement was signed, the anticipated **cash** demand for the first thirteen year increment of the Proposed Program has risen from just under \$45 million to nearly \$105 million. When the cash demand was estimated at \$45 million, Nebraska's share of the total program cost was to be taken care of by (1) credits resulting from the Environmental Account in Lake McConaughy, (2) dedication to the Program of a large habitat area, Cottonwood Ranch, by NPPD, and (3) the \$700,000 previously appropriated and discussed above. While the three states believe that increases in cost should be assumed by the federal government, a decision to

that effect had not yet been made at the time this report was finalized.

## 2) **Republican River Basin Cooperative Activities**

The Department of Natural Resources has been assisting the Governor's Republican River Council and the Attorney General's office in a variety of Republican Basin related activities. Those activities are covered by attorney-client privilege and are not discussed in this report.

In addition, the Planning and Assistance Division continued to provide assistance in critical township mapping projects in the upper Republican Natural Resource District. This past year the process that had been used for about ten years was rewritten to utilize new GIS capabilities for displaying and analyzing the results. As a result, the process that used to take about one FTE week now takes just a few hours and is much more flexible in its use.

## 3) **The Platte River Cooperative Hydrology Study**

The Platte River Cooperative Hydrology Study (COHYST) was a three-year cooperative effort to develop an understanding of the hydrological and geological conditions in the Platte Basin in Nebraska upstream of Columbus, Nebraska and was completed June 30, 2001. COHYST II has taken over where the original COHYST left off and will continue for another three years until June 30, 2004. That study is discussed following this description of COHYST. The goals and objects of both studies are the same and are shown below:

To accomplish their goals, a group of Nebraska interests joined together to develop necessary data, analyses, modeling, and other information which when completed will;

1. Help Nebraska to meet its obligations under the Cooperative Agreement,
2. Enable NRDs and other entities along the Platte River to provide appropriate regulation and management,
3. Provide Nebraskans with a basis to develop policy and procedures related to ground water and surface water,
4. Enable Nebraskans to analyze proposed activities of the Cooperative Agreement and/or programs in Nebraska.

Study objectives include:

1. Collecting existing data and placing into a credible/appropriate database and fill in with new data as necessary.
2. Developing preliminary models to identify data gaps.
3. Collecting and adding supplemental data as necessary to provide a credible database.
4. Developing linked, sub-regional models to cover the Platte basin in NE.
5. Establishing credible models.
6. Using models.

The Department of Natural Resources is one of the 10 project sponsors of the study. The others are the Central Platte, Twin Platte, Tri-Basin, North Platte, and South Platte and

Upper Big Blue NRDs, Game and Parks Commission, Nebraska Public Power District, and Central Nebraska Public Power & Irrigation District. The cost was a total of \$2.7 million for COHYST I with \$1.6 million of that coming from a Nebraska Environmental Trust grant. The cost for COHYST II will be around \$3.7 million with \$1.4 million coming from NET funds and the remainder of about \$2.3 million paid for by in-kind services of the project sponsors. Two planning staff members are putting in significant time on this project. One is a member of the technical staff coordinator's committee. That Committee drafted the work plan and advises the sponsors on technical matters. They also direct the efforts of the ground water modelers hired for this study. That member is also the programmer for the study responsible for developing routines for projecting crop and irrigation distribution back in time and historical pumpage from that irrigation. This is all in-kind service. The other member's time has been committed to fulfill the GIS, database and web development needs of the study. COHYST II is paying for half of his salary and anything above that is in-kind service.

In FY 2002, Department planning staff continued to meet with other sponsors to help review and direct progress. A graphical user interface will be used to make the information available to any party. The database and Arc/Info coverages developed as part of the study will be housed on NDNR hardware and the NDNR web server will be used to deliver information to the public.

In FY 2001 and 2002, the agency provided extensive programming support to help develop the geologic layers for the ground water model. Programming support was also provided in developing the grid to be used to distribute the land use information developed by CALMIT for the study. Additional support was provided through participation on the Technical Committee to continue to organize and direct work efforts of the various contracts for the study.

The 1997 land use inventory developed by CALMIT has been completed. A new contract has been developed to also have CALMIT inventory the land use for 2001 and develop a historical inventory of 1982 lands. Programming support was also provided in FY 2002 to integrate these two sets of information into the pumpage, runoff, and recharge components of the models. Extensive time was also devoted to developing the geology layers and geohydrologic parameters to be used in the detailed ground water models. Once models have been completed they will be used to run management scenarios.

#### **4) Floodplain Planning**

FY 2002 was another active year for flood mitigation planning. Through the Flood Mitigation Assistance (FMA) Program, the NDNR completed flood mitigation plans for Fort Calhoun, Arlington, DeWitt, and for a portion of the Platte River in Sarpy County. Plans were started and are in the process of being completed in Ponca, Milford, Randolph, North Platte, and Omaha (Cole Creek). The Arlington plan was a pilot project and was completed entirely by the NDNR. The typical course of action is to contract with engineering firms for the completion of these plans. With Arlington, however, there were no engineering problems, so NDNR staff conducted public meetings, completed the necessary surveying of structures, and wrote the plan. With its success, the NDNR plans to continue to complete flood mitigation plans in-house and to contract out only for needed engineering assistance. The Cole Creek flood

mitigation plan has been particularly challenging because the watershed is almost completely developed. This presents problems for most structural flood control mitigation techniques such as detention basins or dams. In addition, there are residences that are situated very close to the creek, so channelization is not possible. Because of this, it is anticipated that there will be a large acquisition project as a result of the mitigation plan.

The FMA Program also funds projects for communities that have a completed flood mitigation plan. In the last year, the NDNR has helped fund a floodplain acquisition project in Arlington and is in contract negotiations to complete a bank stabilization project in Tekamah.

In the next two years, the NDNR will continue to assist with the funding of flood mitigation plans and projects. The NDNR receives annual planning and project grants from the Federal Emergency Management Agency (FEMA) which allows the agency to continue operating this program. This is the only pre-disaster flood planning program currently in existence. It has been popular because it allows the citizens to be the leaders in deciding how to reduce flood damages and eliminate flood problems in their community.

The second edition of the *State of Nebraska Community Flood Mitigation Planning Guidebook* was completed in September and is available online at the NDNR website. The *State of Nebraska Flood Mitigation Plan* was completed in November. This plan provides an overview of Nebraska flood problems and actions needed to address them. It also details the importance of flood mitigation planning, has a statewide assessment of flood mitigation needs, and contains an extensive record of known flood reports. The earliest information in the report dates back to 1823 and the report contains information from that time through flooding in the early 1980's. This state mitigation plan will be posted on the NDNR website upon its approval by FEMA. Anyone who has flooding data and records should contact Steve McMaster at (402) 471-3957 to help the NDNR develop as comprehensive a historic flood database as possible. Items sought include (if known): storm rainfall – how much in how much time, maximum stage and discharge, details of inundation area, deaths, damages, name of the watercourse, impacted communities, and anything else related to the flood event.

## 5) **Water Decision Support System**

A water decision support system is a product that allows managers to make better decisions by using the latest technology with the best information available to predict surface water conditions. In the past year the Department evaluated the feasibility of creating a Decision Support System for the Platte River and met with potentially interested parties. As scoped a system would likely include: 1) a long term simulation model, 2) a daily model, 3) improved data functions, and 4) a clearinghouse for current and predicted flow data. The Department has worked with the U.S. Bureau of Reclamation on potential funding. Other involved agencies have included: Nebraska Public Power District, Central Nebraska Public Power and Irrigation District, and the U.S. Fish and Wildlife Service.

It currently appears that funding constraints will limit NDNR work to a significant degree in the next few years. However, small-scale efforts will be made to improve predictive capability with existing staff. This will include: improved data collection on a more timely basis, consideration of gages needed, development and testing/use of simplified models in less

complex areas such as the Lower Platte, further evaluation of DSS needs/uses in the Platte and other basins, and continued exploration of potential avenues of funding. Continued work with the Bureau of Reclamation is expected.

**6) Assistance to NRCS on Buck and Duck Basins Watershed Project Planning**

In December 1999 an agreement was reached with the Natural Resources Conservation Service and the Nemaha NRD for NRC to provide assistance on the economic analysis portion of a study of the Buck and Duck watershed in southeast Nebraska. That work was completed in FY 2002.

**7) Lower Platte River and Tributaries Feasibility Study**

In January 1998, agreements were signed initiating work on the Lower Platte River and Tributaries Feasibility Study. The \$4.39 million study to investigate flood damage reduction and water resources problems and solutions in the Lower Platte Basin is being led by U.S. Army Corps of Engineers. In addition to the Department, cooperators include: the Lower Platte South NRD, the Papio-Missouri River NRD, the Lower Platte North NRD and the Lower Platte River Corridor Alliance. The Department has provided \$125,000 per year in pass through funding (for a total of \$500,000) and a total of over \$200,000 in in-kind services. The study is expected to be completed by September 2004. The feasibility study area includes the Platte River from Columbus to its mouth.

The study is a follow-up to an earlier reconnaissance level study and is to provide a variety of structural and non-structural options and recommendations. In addition to examining five specific structural options it has solicited public suggestions on natural resources management issues for the area and is addressing water quality, land use and public policy concerns in the watershed. Past Department work has included extensive cross-sections, surveys and mapping that were provided by what is now the Department's Floodplain/Dam Safety/Surveys Division. Past Planning assistance has included supervisory assistance for creating GIS products for the area, website assistance, and assistance to the Corps in compiling community flood mitigation plans. Along with the Corps and the Lower Platte South NRD, the Department acts as a co-sponsor and serves on the executive committee for the project. The Lower Platte South NRD acts as primary administrator of funds. Half of project costs are a Corps responsibility with the state and local sponsors providing 25% funding and 25% in-kind match.

The major Department staff input to this project has already occurred and the Department provided the final \$125,000 of its financial obligation in late FY 2002. Much of the Corps work on the project in both FY 2001 and FY 2002 centered on the Western Sarpy County Levee and Sand Creek Projects. Future Corps work is planned on a number of components, including non-structural flood mitigation planning, and the Union Dike. Some initial work on the Union Dike project began in FY 2002. Initial work was completed on the South Fremont structural component and a decision was made to break that effort off into a separate study under the Corps Section 205 authority. Two new structural projects are being in the process of added to the Lower Platte Feasibility Study. A scope of studies for a drinking water

and wastewater study for the corridor in Saunders and Cass counties between Louisville and Lincoln has been completed. In addition the Papio-Missouri River NRD Board of Directors requested the inclusion of \$250,000 in Section 503 of the Water Resources Development Act for a drinking water and wastewater study in the southern third of Sarpy county that drains into the Platte and Elkhorn rivers.

**8) Lower Platte River Corridor Alliance**

The Lower Platte River Corridor Alliance is an umbrella organization of state and local agencies working to foster the development and implementation of locally drawn strategies, actions, and practices to protect, enhance or restore the vitality of the river's resources between Columbus and Plattsmouth. The major project supported by the Alliance to date has been the Lower Platte River and Tributaries Feasibility Study. However, the organization has a separate purpose from the feasibility study and has been meeting on a quarterly basis. In FY 2002, there was limited financial support of the Alliance by the Department and other state agencies. Although Departmental support was continued for FY 2002, there is an expectation that in future years that funding may be discontinued and more local support encouraged. This activity has taken only a very limited amount of NDNR staff time.

Alliance activities have included local water quality and flood mitigation planning activities.

**9) Environmental Education Activities**

Agency environmental education activities include: 1) participation in planning and staging the Nebraska Envirothon, 2) participation in the Children's Groundwater Festival, held annually in Grand Island by the Groundwater Foundation, 3) participation in the Earth Wellness Festival, annually held at Southeast Community College in Lincoln, and 4) continued very limited distribution of Stop, Look and Learn About Our Natural World: A Nebraska Natural Resources Elementary Education Guide. (a very limited number of copies remain and mention of the Guide will be dropped from next year's annual report). Environmental education activity takes only a very small portion of staff time.

**10) Other Planning Activity**

Not all NDNR planning activity is water related or part of the State Water Planning and Review process. In FY 2001 and FY 2002, Department staff coordinated efforts on Carbon Sequestration related reports compiled in response to LB957 (2000). Those reports were completed in December 2001 and March 2002.

**B. DEVELOP AND MAINTAIN THE DATA, INFORMATION AND ANALYSIS CAPABILITIES TO PROVIDE A SUPPORT BASE FOR WATER PLANNING AND MANAGEMENT**

Basic Planning Activities provide the data base and management information necessary to plan natural resource related activities. This activity is a major function within the Department of Natural Resources. In addition to providing information to other agencies and interests, work in this activity is used to support general planning activities, administer the planning process and review projects and plans. Although future fiscal years may see an increasing emphasis on other types of planning activity, data base management and mapping activities are expected to remain a vital part of the Department's planning program.

#### Planning Information Base - General

The long-term goal of the information base is to develop the capability to analyze the relationships of a wide variety of information in a GIS environment. This includes data on soil characteristics, land use, surface and ground water data, geologic characteristics, climate, socio-economic characteristics, forestry characteristics, hydrology and water use. The development of statewide databases for use by state, federal, NRD and local units of government has a high priority.

The databases developed through the State Water Planning and Review process will be those with special application to water or watershed planning and activities.

Natural resources needs can be better met by increased efficiency and effective use of natural resources data. Better techniques of information acquisition, processing, storage and use are required to accomplish that task. GIS processing offers a tool for decision makers that combines multiple layers of information with the interactive capability of a relational database.

The products that will be and in some cases are being produced are as varied as the agencies that will use them. These include land use maps, soils maps, aerial photography with interpretations, multi-spectral satellite imagery, enhanced high altitude color aerial imagery, floodplain management information, water rights, well registrations, hydrologic information, and resources planning and environmental protection data. Applications of this information base can enhance state, federal and NRD management as well as city and county services and tax assessment.

NDNR's GIS efforts will continue to support the priorities of the GIS Steering Committee. The production of digital orthophoto quadrangles (DOQs) and digital elevation models (DEMs) on a statewide basis was a major agency priority completed in FY 99 and a second updated version of those DEMs was initiated in FY 2001. Among other uses, these DOQs and DEMs are being used by Department staff to help digitize soil survey maps recompiled by the Natural Resources Conservation Service and bring them up to SSURGO (Soil Survey Geographic Data Base) national standards. The work on updating DEMs-DOQs that was started in FY 2001 should help to expand the future use of these products and assist in future floodprone area mapping. In addition, NDNR work on a National Hydrographic data set is helping address the priorities of the committee.

The NDNR actively supports the development and use of statewide databases freely

available for the use of a host of government agencies. To that end, the NDNR has aggressively populated its world wide web server accessible through the Internet with easily available up-to-date information in both graphic and tabular forms.

## **Planning Information Base – Work Completed and Planned**

### **1) Water Rights Mapping**

The Department has maintained a visual record of irrigated land under various types of water rights for over 100 years. Early cartographers relied on a combination of physical description and surveys to delineate boundaries of permitted lands. Eventually, surveys endorsed by a Professional Engineer were required to establish the boundaries of irrigated land under water right. Currently we allow anyone to file a water right map using tracing paper over aerial photographs. The information is transferred by hand to compiled water rights maps of all irrigated land in the area. The compiled maps are tiled by township or USGS 7 ½ minute quadrangle map.

The hand drafting method of creating and editing water rights maps is being replaced by digital cartography. Current paper based maps are being scanned and digitized. In the last year, new computer software tools have been developed to speed the process of digitizing. In addition, tools have been developed to populate an interim database with the legal description of lands under permit and the number of acres that can be irrigated. Current expectations are for all water rights maps to be digitized by November 2004.

The Department has acquired a new, fast large-format scanner. In conjunction with small desktop scanners, this has increased the accuracy of the digitizing process. The scanned paper maps will provide an archive to anyone needing to look at the historical documents that were used to develop the digital water management system. Most of the large maps in the Department should be scanned by December 2002.

The digital maps will be linked to a new surface water right database. The development of the surface water database entered the design phase in May of 2002 and is being conducted by Databank staff. Synchronizing the spatial data produced by the digitizing process with the new surface water tabular database will provide the benefits of access to anyone on the network; increased analytical capability using spatial query techniques; and improved accuracy.

Analysis of water management and permit decisions will be improved due to the layering ability of the geographic software. New maps will be immediately incorporated into existing digital maps, so that discrepancies such as “overlapping” can be quickly recognized and corrected. The accuracy will be enhanced using existing digital aerial photography for proper field boundaries. These new capabilities will be accomplished by programming an administrative user interface that utilizes both the tabular and spatial databases. Several Divisions within DNR will share the design, programming and implementation of this phase of the water administration

modernization process.

Interim tools to exploit the spatial data will be developed. The first set of tools is expected to be in use by February 2003 and additional development will continue through 2004. Improvement of these software tools will most likely continue on an ongoing basis.

## **2) Flood Prone Area Mapping**

In FY 1999 Natural Resources Commission staff developed a relatively automated process to delineate floodprone areas using recently completed digital elevation models and digital orthophoto quadrangles. This method is now being used by NDNR to develop detailed floodplain maps for the nearly half of the counties in the state that have no countywide floodplain mapping.

In FY 2002 NDNR delineated and mapped floodprone areas for Fillmore, Thayer, Nance and Kearney counties and was approaching completion of work on Thurston, Keith and Garden counties. In FY 2003 work is scheduled to begin and be completed on Cass, Custer, Deuel, Franklin, Johnson, Pawnee, Perkins, and Scotts Bluff Counties. This work is a joint effort of the Floodplain/Dam Safety Division and the Planning and Assistance Division and is paid for in part through a continuing contract with the Federal Emergency Management Agency.

## **3) National Hydrography Dataset**

The National Hydrographic Dataset (NHD) is a dataset model developed jointly by the USGS and EPA with a goal of providing a common reference digital hydrographic dataset for a wide cross-section of applications using data related to surface water features. At 1:24,000 scale it would present water features at the same scale as other state digital mapping packages. It would also better enable spatial comparison with a wide range of other data. More importantly it would provide the basis for, or enhance the efficiency of, a wide range of potential water analysis activities

The Department of Natural Resources is coordinating development of the NHD in Nebraska. To date sufficient funding has been secured to complete only a portion of the state, although a long term goal is to complete statewide coverage. Under the current process NDNR will supervise the completion of "tagged vector hydros" for targeted watersheds. Under a workshare agreement the U.S. Geological Survey will then undertake the processing to convert those tagged vector hydros into the finished NHD product. The project is a joint effort, with \$150,000 being supplied through the Nebraska Department of Environmental Quality, and smaller amounts being supplied through the Nebraska Information Technology Commission, the Nebraska Department of Roads, and NRD sources. Funding is utilized primarily to hire student digitizing personnel through the University of Nebraska Conservation and Survey Division. The students are then officed and supervised at NDNR.

The schedule for NDNR delivery of tagged vector hydros on past and upcoming watersheds includes:

May 15, 2002	Salt Creek
August 16, 2002	Lower Elkhorn
September 6, 2002	Lower Platte
October 18, 2002	Lower Platte – Shell
November 15, 2002	Big Papillion – Mosquito
January 10, 2003	Blackbird – Soldier

#### 4) **Revision of Digital Elevation Models**

In FY 2002, the Department of Natural Resources continued to develop second generation of digital elevation model (DEM) coverage for the state. As scheduled, the agency recently completed developing statewide 3.75-minute, 10-Meter interval Digital Elevation Models (DEMs), mapped to 1:12,000 scale and those products are undergoing USGS review and awaiting approval. The Planning Division staff assisted the Data Bank in their generation. The 10-Meter DEM database, both in UTM and State Plane coordinate system, is available on-line and interactively retrievable over the Internet through the Data Bank. The Department uses digital elevations for production of digital orthophoto quadrangles (DOQs), flood prone area mapping, and planning purposes. The Elevation data provides information about the terrain. This is one of the framework databases that provide basic data infrastructure for a wide variety of GIS applications and geo-spatial data users.

#### 5) **Revision of Digital Orthophoto Quadrangles**

In FY 2002, the Department of Natural Resources is also generating a second generation Digital Orthophoto Quadrangle (DOQ) coverage for the state. These DOQs (1-Meter resolution, 1:12,000, grayscale) are produced using 10-Meter DEMs and 1999 NAPP photography. Currently, one-third of the state is completed. The statewide coverage is targeted for completion by FY 2004. The compressed DOQs, both in UTM and State Plane coordinate system, are available on-line and interactively retrievable over the Internet through the Data Bank. These DOQs support a wide variety of applications, including development of various natural and cultural resources coverages. The Nebraska GIS Steering Committee has indicated that statewide coverage of 5 layers consisting of DOQs, soils, transportation, hydrography and land parcels is needed for Nebraska. The DOQs are important as a base map that will support the development of the other four layers. This includes use as a base map to bring soil mapping up to SSURGO national standards and to develop a National Hydrographic database (NHD) for the state. Also, the DOQs are used extensively by all levels of government for watershed planning, stream networking, and other hydrologic applications.

In FY 2004, the DNR will continue with an update of DEMs and DOQs that will use newer photography (or satellite imagery) and provide a more up-to-date database for future uses. The newer imagery is actually required for various uses, such as Federal Emergency Management Agency floodplain mapping applications.

#### 6) **Tagged Vector Cleanup**

The Tagged Vector Coverage was a by-product of the DEM-DOQ development process. The files that were used for that process were converted into ArcInfo coverage to be able to show USGS 7 ½ minute quadrangle contour lines. These can be used to make finer custom grids than what is currently available. This could be characterized as producing more accurate and precise digital elevation data. This project was completed in FY 2000. The results have been used for a variety of additional projects ranging from calculating depth to water (and locating wetlands) in a joint project between the Natural Resources Commission and the Rainwater Basin Joint Venture to helping NRDs developing farm terraces. Other uses have included help in the delineation of the watershed boundaries.

Although Tagged Vector Coverage has technically been completed, there are a number of improvements in the data that should be corrected. They are very small (usually around quad boundaries) and did not affect the DOQ production so were disregarded earlier. With this ARCINFO coverage, the errors are more noticeable now and so are being corrected. This is an ongoing project that is worked on when time is available. Output uses are the same as the Tagged Vector Coverages except these coverages have improved accuracy and are subsequently more valuable and reliable. An additional use of this product is the Flood Prone Area Mapping initiative. This was an activity that this division was actively involved in during FY 2001. A recent use involved developing new watershed boundaries to check the manual process that had been used in the past. This checking process helped confirm a decision by NDEQ to reject an application for modifying a permit to expanding a dairy farming operation in a Class A Stream drainage basin.

## **7) Water Use Data Report**

In 1992, the Natural Resources Commission entered into an agreement with the U.S. Geological Survey to cooperate with USGS's nationwide program of data collection and estimation of water use. The Commission issued reports on 1990 and 1995 estimated Nebraska water use in connection with that effort. Although the NDNR continued to participate in the 2000 USGS water use estimate effort, the level of effort was scaled back, with primary NDNR responsibility being for water use by public water systems and industries. Surveys of municipal and industrial water use were completed in late FY 2001 and compiled, analyzed and delivered to USGS in early FY 2002. NDNR staff also provided limited assistance to USGS personnel responsible for the irrigation portion of the study. The USGS regional director is currently reviewing water use data for quality assurance. The final USGS data is expected to be made public in September of 2002.

## **8) Digitizing of Soil Surveys to SSURGO National Standards**

In April 1997, the Nebraska Natural Resources Commission, the Natural Resources Conservation Service, and the University of Nebraska Conservation and Survey Division entered into an agreement to digitize Nebraska's published Soil Surveys. The overall goal of the project is to develop a digital soils base of all 93 Nebraska counties and incorporate

updated surveys as they become available. Once digitized, the file can be adjusted in scale, making it easier to integrate the soils data with other geographic data. The process utilizes the DEMs and DOQs produced by the Department. Both the NDNR Planning and Assistance Division and its Data Bank participate in the process. Personnel from both the Natural Resources Conservation Service and the University of Nebraska Conservation and Survey Division are stationed at the NDNR offices to work on the project.

As of June 1, 2002, about 73 counties had been completed and certified, another three counties had been digitized and were awaiting certification, and compilation was underway in five counties. In the past, NDNR has cost shared on the salary of the NRCS staff member stationed at NDNR. In FY 2003 that cost share is expected to end, but cooperative work on the project is expected to continue. Previous plans to complete the project by September 30, 2002 had been scaled back to March 31, 2003. However, plans are now to accelerate the SSURGO process because of the recent passage of the farm bill and the project may be completed significantly sooner than the March date.

#### **9) Watershed Boundary Delineation**

This project has been completed for several years but has been improved several times recently as more detailed maps and information became available. Now new discussions are underway with the Natural Resources Conservation Service to possibly upgrade the product significantly. NDNR is currently reviewing the work of the surrounding states to see how much time and effort this new update will take. Once that is completed, the results will be discussed with NRCS to see how or if this project will proceed. When this project was developed several years ago, there were no national standards and now there are. Any new efforts would bring this very useful dataset up to the national standards.

This product has been used in the Flood Prone Area Mapping initiative as well as being a valuable layer for base maps. Most surface water maps developed by the Data Bank Section staff will probably use this layer to show boundaries and flow directions by watershed. This layer can also be used to display NDNR basic units or division boundaries, DEQ water quality stream reaches, NRCS and USGS hydrologic units, Game and Parks Commission stream fishery resource classifications and drainage areas of streamflow gage information. One of the most recent uses of the dataset has been to support the decisions of the State in a decision by NDEQ regarding the development of additional dairy operations.

#### **10) Groundwater Level Web Data**

The Department and U.S. Geological Survey have an annual agreement by which USGS produces an annual groundwater levels report and the NDNR provides limited financial support and places the material on the world wide web in an easily searchable format. Most of the agency work on the project has been provided through the Data Bank Section. However, financial support has been provided through planning funds. The effort was funded in FY2002 but beginning in FY 2003 NDNR intends to provide funding on only a biennial basis (provided adequate funds are available), with the recognition that the project itself may become biennial unless the USGS acquires additional funding sources. Therefore no NDNR funding for this effort will be provided in FY 2003. To prevent the loss of this valuable data, discussions have

been undertaken with the NDEQ to have them help provide funding for part of this service.

## **C. PROJECT AND PROGRAM REVIEW ACTIVITY**

This activity includes both individual reviews and service on a wide variety of review and program planning committees. It includes both smaller one time reviews of some projects and programs as well as larger longer-term types of review activity. Some of the major longer-term work activities in this category are:

- Nebraska Resources Development Fund Reviews
- Environmental Trust Advisory Committees
- Geographic Information System Steering Committee and Subcommittees
- Western Governor's Association Geographic Information System Council
- Climate Assessment and Response Committee
- Other Reviews

### **1) Nebraska Resources Development Fund Reviews**

In FY 2002 four project proposals and four project applications/feasibility reports were reviewed. The project proposals were (1) Skull Creek Sites 30 and 31, (2) Blue Creek Irrigation District Rehab, (3) Winslow Levee and (4) Leigh Dam/Reservoir. The project applications/feasibility reports were (1) Lake Ericson, (2) Antelope Creek, (3) Little Sandy Creek Watershed and (4) Western Sarpy/Clear Creek. DNR staff also provided some assistance to project sponsors during their preparation of these documents for Nebraska Resources Development Fund assistance.

### **2) Climate Assessment and Response Committee**

The Climate Assessment and Response Committee (CARC) was active again in FY 2002 as drought conditions continued throughout much of the state for the third year. The western part of the state has been hit harder by drought conditions and many of the efforts of the CARC committee have been directed at that problem area. The Director of the Department of Natural Resources is a member of this committee that meets periodically and reports to the Governor. Reports are made as warranted by climatic conditions; including but not limited to problems caused by the lack of moisture; drought conditions; problems caused by excess moisture or flooding conditions; and other related activity like hail and wind storms.

One Planning and Assistance Division staff member also serves as a Co-Chair of a subcommittee of CARC; the Agricultural, Natural Resources, and Wildlife Subcommittee.

One Division staff member also serves on another subcommittee of CARC; the Moisture Availability and Outlook Committee. That subcommittee meets throughout the summer to assess conditions across the state and provide a summary of this information to the Chairman of the Climate Assessment and Response Committee.

### **3) Environmental Trust Committee**

The Environmental Trust Board, of which the Director of Natural Resources is a member, has formed a technical advisory committee to help review grant applications. Department staff, including planning staff members, assist in project application reviews. Activity levels are expected to remain limited in upcoming fiscal years. Time commitments range from no involvement some years to several days effort other years, depending on the projects submitted to the Trust.

## **2) Geographic Information System Steering Committee and Subcommittees**

The Geographic Information System Steering Committee has adopted a number of priority initiatives for GIS application in the State of Nebraska. The Department's GIS coordinators serve on the Committee. The development of digital orthophoto quadrangles (DOQs), vectorized soils databases and a high-resolution National Hydrographic database (NHD) have been identified as top areas of interest for Nebraska. The NRC developed DOQs to the U.S. Geological Survey standards and the NDNR is updating the DOQs with newer photography. NDNR is continuing the development of the digital soils database. NDNR has also committed to producing tagged vector hydros for a number of eastern Nebraska Watersheds, and has a workshare agreement with the U.S. Geological Survey for turning those into the final National Hydrography Dataset product for those watersheds. The goal is to ultimately find funding for and complete the process throughout the state's watersheds and thus fulfilling GIS Steering Committee objectives.

## **3) LB 1003 Water Policy Task Force**

The Director of the Department of Natural Resources serves on the Water Policy Task Force created by LB 1003 (2002). The Department also administers a cash fund created for that effort. Significant agency activity in support of that activity is also expected.

## **4) Other Activity**

Other Planning and Assistance Division work in basic planning activity has included the acquisition, cataloging, and maintenance of Landsat TM terrain corrected data for landuse/landcover planning activities. This data is acquired from the EROS Data Center. The NDNR has Landsat data that includes complete statewide coverage for 1991-1993 and partial coverage of the state for 1997. Recently an extensive collection of Landsat TM data for 2000 has been acquired through the COHYST program that has greatly added to satellite data we currently have archived. The DNR has examples of this information available on its web site and has made this data available to other federal, state, and local agencies.

We also acquired a set of Landsat MSS data from the early 1980s; this was also acquired through COHYST. This provides a historical reference from land use analysis. We are currently in the process of acquiring some high resolution (5m pancromatic / 20m multi-spectral) satellite imagery from the Fish and Wildlife Service that will cover 17 counties in the rainwater basin.

**D. PROVIDE THE STATE WITH THE CAPACITY TO PLAN AND DESIGN WATER PROJECTS**

Although the activity has not been fully implemented, the State has participated in project planning activities through the Natural Resources Development Fund and recently through financial support for the Lower Platte River and Tributaries Feasibility study.

Table 1

PLANNING & REVIEW PROCESS EXPENDITURES FY 01  
AND BUDGET FYs 2002-2006

	FY2002*	FY2003	FY2004	FY 2005	FY 2006	FY 2007
Lower Platte River Alliance	\$5,417	--	--	--	--	--
Lower Platte Feasibility Study	\$125,000	--	--	--	--	--
Intergovernmental Contract with NRCS	\$36,042	--	--	--	--	--
Platte River Cooperative Agreement***	\$302,089	\$76,000	\$56,000			
National Hydrography Dataset Expenses Other than DNR Staff (funded via grant or anticipated to be funded via grant)	\$3,886	\$77,214	\$80,000**	\$80,000**	\$80,000**	
USGS Ground Water Levels	\$8,400	--				
Staff/Other	\$745,169	\$746,000	\$746,000	\$746,000	\$746,000	
<b>TOTAL</b>	<b>\$1,226,003</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	<b>\$</b>	

\* Beginning in FY 2002, budgetary figures are based upon a roughly estimated combination of costs from a variety of NDNR divisions that work on state water planning and review process activities. In FY 2002 this included about 10.5 full time equivalent positions for part of the NDNR Planning and Assistance Division and about 2.25 full time equivalent positions from other portions of NDNR. Also beginning in FY 2002, computer and office expenditures are no longer included in the budgetary figures. These rough estimates include only the NDNR planning related budget. Also included in the Staff/Other category is estimated expense for digitizing personnel for the National Hydrography Dataset Project. Those personnel are hired by the UNL Conservation and Survey Division, officed at NDNR, and paid with grant money NDNR receives from a variety of sources, especially through the Nebraska Department of Environmental Quality. Some earlier work was funded through the Lower Platte North NRD and that work has not been included in this budget. For some out-years on the NHD budget amounts are based upon anticipated grants needed to complete the project rather than actual money pledged. \*\* Based upon grant funds needed to complete project and anticipated but not yet obtained. \*\*\*Platte Cooperative Agreement Budget does not include \$150,000 being sought for Economic Study. Should those funds be secured, they will be noted in a future annual report.