

Dave Heineman
Governor

STATE OF NEBRASKA

DEPARTMENT OF NATURAL RESOURCES
Roger K. Patterson
Director

September 15, 2005

IN REPLY TO:

Mr. Patrick J. O'Donnell
Clerk of the Legislature
State Capitol, Room 2018
P.O. Box 94604
Lincoln, Nebraska 68509-4604

Dear Mr. O'Donnell:

The enclosed copies of the Annual Report and Plan of Work for the Nebraska State Water Planning and Review Process are being submitted to you in accordance with Section 2-15,106 of the Nebraska Revised Statutes. The report describes the activity which occurred in fiscal year 2005 and work planned in fiscal years 2006 and 2007 in each work area of Nebraska's water planning process. A proposed budget through fiscal year 2010 is also included. I believe the information included in the report can be useful in evaluating what has been accomplished and what we hope to accomplish in the planning process.

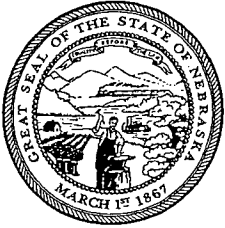
Sincerely,

A handwritten signature in cursive script that reads "Ann Bleed".

Ann Bleed
Acting Director

Enclosures

clrshare/bleed



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DEPARTMENT OF NATURAL RESOURCES
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Director

September 15, 2005

IN REPLY TO:

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State Capitol, 2nd Floor N.E.
P.O. Box 94848
Lincoln, Nebraska 68509-4848

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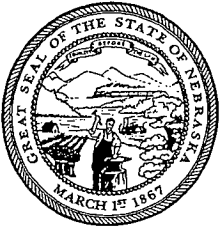
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Annual Report and Plan of Work
for the
Nebraska State Water Planning and Review Process

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

September 15, 2005

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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 2005 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.

The most important and high profile water planning activity that took place in FY 2005 was work towards implementation of LB 962, the major water legislation passed during the 2004 session of the Unicameral. Nebraska Department of Natural Resources (DNR) staff engaged in the State Water Planning and Review Process activity provided support, information and major work on implementation. Major NDNR staff support was also provided through the agency's Director, Assistant Director, and Legal Division. Implementation of LB 962 provisions will be a major activity for both NDNR staff and Natural Resources District (NRD) staff in future years. Two major aspects of that activity will be designation of fully appropriated basins and compilation of joint integrated management plans.

Another 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 Information Technology Division 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. Some of the information management products and activities found in this report are co-products of the Department's Information Technology Division and the Planning and Assistance Division. This is a report of planning activities and includes no programmatic information about Information Technology Division initiatives other than the revision of digital elevation models and revision of digital orthophoto quadrangles. However, the Information Technology Division does have a major role in most 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 Division 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) Implementation of LB 962

LB 962 as passed in the 2004 session of the Unicameral gave the Department of Natural Resources new responsibilities in several categories – water rights transfers, identification of overappropriated or fully appropriated basins, and joint plans for integrated management of surface water and groundwater. Both the joint plans and the appropriation determinations are planning oriented activities. The 2004 Unicameral also allocated \$2.5 million in FY 2005 funding to implement provisions of the bill and in the 2005 session it allocated \$7.5 million for implementation in FY 06. It also asked that NDNR develop and propose a system of fees and charges that could provide an ongoing source of funding for the program beginning in FY 07.

Overall implementation of the bill is likely to include a variety of studies, incentives and assistance for Natural Resources Districts developing and implementing joint plans. NDNR designated overappropriated basins in 2004 and is to consider the status of other basins by January 1 of each year from 2006 onwards. These designations will be made from a variety of hydrologic, water use and water rights information as well as other related data. Planning and Assistance Division staff are currently assembling and analyzing that information. Input is also being provided to and by a Negotiated Rules Making Committee. Information/input will then be evaluated by the agency and a report will be issued providing the results of that evaluation by January 1, 2006.

Joint plans for integrated management of surface water and groundwater are to be developed by the NDNR and natural resources districts with overappropriated and fully appropriated basins. As of July 2005 a total of nine natural resources districts have had fully appropriated and/or over appropriated areas declared in all or parts of their districts. Three of those districts have already had joint management plans completed. Two Planning and Assistance Division staff members are assigned primarily to assisting with those plans and major support is also provided through the Legal Division. The Legal Division has also been central in participating in a negotiated rules making committee which is helping develop criteria on which fully appropriated decisions are made.

Developing reports on “fully appropriated” status and participating in development of joint implementation plans has required improved water information. Some of this information

is being developed cooperatively through an umbrella agreement with the University of Nebraska Water Center. One FY 05 University of Nebraska contract study examined legal approaches other states have used in closing basins. Another study currently underway is mapping hydraulic conductivity, specific yield, and transmissivity. Other efforts are being considered are a hydrologic model for Box Butte County, water conservation education, and land use mapping. Additional work involving the Bureau of Reclamation could involve a Blue River Basin study. Reclamation efforts mentioned in other parts of this report that are relevant to LB 962 implementation include the Frenchman Valley Study and the Platte River Water Decision Support System efforts.

An additional area of activity related to NDNR implementation of LB 962 is the improvement of NDNR record keeping and databases related to water rights administration. LB 962 requirements related to water transfers, as well as, administrative needs in fully appropriated basins have made this especially important. In response a portion of funding has been set aside to help scan, code, and electronically display surface water files and develop a system of database access.

In future years LB 962 planning monies are also expected to go to maintenance of the COHYST model, developing a groundwater model for the Lower Platte, and additional stream gages. The majority of the LB 962 budget is expected to be utilized for incentives/assistance for land and water management related to LB 962. Much of the early part of this effort is likely to be as matching activity to the Conservation Reserve Enhancement Program. A particular challenge for the LB 962 effort is likely to be development of potential fees and charges that can be used to fund LB 962 activities in future years.

It should be emphasized how central LB 962 implementation is to the current water planning efforts of NDNR. Much of the agency's current activity is at least related to these efforts.

2) 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 basin wide 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.

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 habitat 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 recorded 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 and the agency legal counsel, 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 responsibility, which must now be carefully coordinated with the LB962 planning activities described above, 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 Jim Cook; a Department legal counsel. Several drafts of the plan have been submitted to and reviewed by the other members of the Governance Committee. It should be approved early in FY2006.

Implementation of the new depletion plan depends on completion of the ground water/surface water models being developed through the Cooperative Hydrology Study (COHYST) discussed elsewhere in this document. When that COHYST work has been completed and peer reviewed, the plan will have to be implemented through adoption of regulations by the boards of several Natural Resource Districts.

The budget adopted by the Legislature for FY 2004 and FY 2005 included funds for a study 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. That study, a survey of land use in the Platte River Basin, was delayed until calendar year 2005 because of changes in program scheduling. Similar studies also were conducted for 1997 and 2001. When the 2005 study is completed, land uses for 1997, 2001, and 2005 will be compared to determine the extent to which the number of irrigated acres has changed since 1997. The COHST models and

other information will then be used to determine how that increase in irrigated acres is affecting and will later affect flows in the Platte. The amount, timing and location of water needed to offset for depletions caused by new uses of hydrologically connected groundwater begun between July 1, 1997 and December 31, 2005 can then be quantified. Those are the depletions for which, under the new depletion plan in its current form, the state is solely responsible for offsetting.. Those offsets are to be in place by the end of calendar year 2008. The cost of providing those offsets is not yet known but likely will be substantial.

Funds were also appropriated for FY2004 (\$200,000), FY2005 (\$400,000) and FY2006 (\$400,000) to assist the seven Natural Resources Districts involved in preparing for and implementing the Nebraska new depletion plan. Agreements that establish each NRD's portion of those funds and prescribing the tasks to be performed were executed in late FY2004 and early FY2005.

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 was left of the \$700,000 appropriated by the Legislature (approximately \$50,000 was lost to the budget reduction process in the 2002 session) and of an additional \$125,000 appropriated for FY 2004 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.

The original deadline for the Cooperative Agreement (July 1, 2000) has been extended until December 31, 2005 and, under current schedules, may need to be further extended to include a portion of 2006. At this time it appears that funds remaining from previous appropriations to DNR will be adequate to pay the Nebraska portion of those expenses through

calendar year 2005. Since no new appropriations were made for FY2006 specifically for this purpose, other DNR funds may need to be utilized if the Cooperative Agreement is extended into calendar year 2006.

In FY 2004 and FY 2005 the state reviewed the Draft 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 final development and implementation of the state new depletion 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 Governor and the Legislature.

One large issue still 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 approximately \$170 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.

3) **Republican River Basin Cooperative Activities**

DNR has worked diligently with the Republican River NRDs and the States of Colorado and Kansas to implement the requirements of the lawsuit settlement. In addition, the new provisions of the Nebraska Ground Water Management and Protection Act have combined with the activities related to the Republican River Compact to make for an active year.

The Middle, Upper and Lower Republican NRDs will have Integrated Management Plans in place by the end of June 2005. As part of the plans, those NRDs will be allocating ground water on a per-irrigated-acres basis. DNR staff have assisted the NRDs in design and implementation of databases for the tracking of ground water pumping and allocations.

The water meter installation is essentially done in all the NRDs. This program was significantly funded by the State. As part of this program, the Middle and Lower Republican NRDs have begun reading irrigation well water meters. DNR staff developed PDA-based data collection systems to aid the meter reporting efforts. DNR and the NRDs have several meetings each year to discuss technical issues and seek solutions.

The initial inventory of non-federal reservoirs was completed. This inventory was required by the settlement and becomes part of the annual computations for consumptive use via the evaporation of these small reservoirs.

The DNR and NRDs are in the final stages of negotiating inter-local agreements to help fund the NRDs efforts in support of the Integrated Management Plans and comply with provisions of the Compact. The DNR will continue to assist the NRDs as they continue to implement their water allocations and check for program compliance.

An additional important area of agency and Planning and Assistance Division activity has been work to provide information for compact compliance needs and to review the validity of input data for the model used in compact compliance. Two staff members have spent most of their time on this activity.

4) 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 was originally scheduled to be completed June 30, 2004 but has been extended into the 2005 calendar year. That study is discussed following this description of COHYST. The goals and objectives 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 Nebraska,
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, Nebraska 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 NDNR 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 that person's salary and anything above that is in-kind service.

During the 2005 FY, much of the effort for the project went towards calibration of the ground water models for the half-mile cell size. That has been completed for two of the three model areas and is nearly completed for the third. Other significant effort has gone into model documentation, hiring a consulting firm for peer review (Eagle Resources), and getting the appropriate documentation to Eagle Resources. Two of the three models have been documented and are in review with Eagle Resources while the third has been written and is in review "in-house" yet. Several additional programming utilities have also been written to aid in the modeling effort and GIS assistance has also been provided. Department staff have also spent significant time on review of the COHYST model and report and suggested revisions. Some of the initial use of the COHYST data has been to assist in determining the hydrologically connected area to the overappropriated basin in support of LB 962.

5) Floodplain Planning / Hazard Mitigation Planning

Hazard mitigation, including floodplain planning in Nebraska is occurring through "all hazards" mitigation plans, flood only mitigation plans (in special circumstances) and pre-disaster mitigation programs. Last year's report about flood mitigation planning is now somewhat out of date. This is because the regulations have been changed by the Federal Emergency Management Agency (FEMA) to require "all hazards" mitigation plans. The Disaster Mitigation Act of 2000 was passed by Congress with a November 1, 2004, deadline for having these plans in place. The penalty for communities which do not have a plan in place is that they are not automatically eligible for federal mitigation assistance and some forms of public assistance for federally-declared disasters.

The Nebraska Department of Natural Resources (NDNR) has been completing flood mitigation plans since 1997, the introductory year of the Flood Mitigation Assistance (FMA) Program. With the change in regulations to the all-hazards approach, it is still possible to fund and complete flood-only mitigation plans. However, these plans would not qualify for mitigation funds under FEMA's other – and much larger – mitigation programs such as the Hazard Mitigation Grant Program. Furthermore, there have been indications that other federal agencies

which have post-disaster funding programs may also look to the presence of all-hazards mitigation plans as a prerequisite for issuing funds.

NDNR is working on flood-only mitigation plans in special circumstances. For example, the City of North Platte plan began in 2001 and was finished in 2005. Also, it is anticipated a flood-only mitigation plan may be started for the unincorporated village of King Lake in Douglas County. Without an official elected body to adopt the plan and with the primary motive of getting residents of King Lake eligible for FMA project funding, a flood-only mitigation may be a solution.

There are few jurisdictions in Nebraska which have a FEMA-approved all-hazards mitigation plan. Lincoln County and Scottsbluff have approved plans, and Wahoo has an adopted plan which has not yet received approval. In-house, NDNR staff are currently working on all-hazards plans for Tekamah, Lexington, Valley, and Blair. In cooperation with private consultants, NDNR is also assisting with a plan for Alliance.

The "Pre-Disaster Mitigation" program (PDM) was first started in FY2003. PDM is different from all other FEMA mitigation programs in that the funds for plans and projects are offered annually on a nationwide competitive basis. Since there was a short notice of availability for this money for this first round of funding, the State did not have enough time to submit any applications. However, every state's mitigation coordinating agency did receive a lump sum of funds to be used for mitigation planning. In Nebraska, we are using these funds to start a pilot planning project to complete a mitigation plan for a Natural Resources District. NDNR will be assisting in the development of a plan for the Papio-Missouri River Natural Resources District in conjunction with the Corps of Engineers. The Corps will complete all aspects of the flood portion of the plan, and NDNR will complete the other hazard components and write the plan. All communities in the NRD will be asked if they would like to participate in this planning process. NRD mitigation plans are used because the Districts are the most frequent match fund providers for federally-funded mitigation projects. Also, NRDs have the local-level working experience with disasters, and they have an elected board which can oversee the adoption and future plan review responsibilities. If all goes well with this pilot plan, we hope to complete plans for other NRDs in the State. If we can complete a mitigation plan for the Papio-Missouri River and Lower Platte South NRDs, we would be able to "cover" more than half the State's population with a mitigation plan.

The application phase for the second year of PDM has passed, and NDNR hopes to have applications accepted to complete plans for Hall County, South Bend, and Elmwood. The South Bend and Elmwood plans will be completely in-house, but the Hall County plan will once again be split with the Corps of Engineers taking the flood portion. A mitigation plan for Hall County may prove to be a great asset if the heavy rain and hail from the severe storms of May 11 and 12, 2005 end up producing enough damage to qualify the County for a federal disaster declaration.

6) Water Decision Support System

In late FY 05 work restarted on examination of state options in formulation of a water

decision support system model. The purpose of the model would be to assist managers in optimizing water storage releases by projecting short-term future water availability, gains, and losses with sufficient accuracy so that environmental, irrigation, power, and other releases provide the legally required or requested flows at those times needed, and releases in excess of those requirements can be minimized. The U.S. Bureau of Reclamation has acted as a partner in those efforts. Initial scoping meetings were also attended by Central Nebraska Public Power and Irrigation District, Nebraska Public Power District, the Nebraska Game and Parks Commission, and the U.S. Fish and Wildlife Service.

The primary objectives of water quantity modeling of the Platte River can be outlined through questions the model will be used to answer:

- How should Lake McConaughy and any other storage facilities be operated on a daily basis in an effort to optimize operations, i.e. minimize unnecessary releases, while releasing enough water for environmental, irrigation, and power requirements, as well as any other legally required releases or requested flows?
- How much water should be released at North Platte on an hourly basis to achieve a given flow at Grand Island (or at any other locations?) during a specific time period?
- What streamflow conditions are anticipated at Grand Island or any other downstream location given the current releases from Lake McConaughy and baseflow conditions?
- How much “environmental” water is available under wet, dry or normal target flows, and if conditions change?

The choice of a model and decisions on scope of effort had not yet been made as of the end of FY 05.

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 approximately \$5 million study to investigate flood damage reduction and water resources problems and solutions in the Lower Platte Basin has been led by U.S. Army Corps of Engineers. Although the original study has been mostly completed for some time, work on flood mitigation planning remains, and some peripheral studies that are solely the responsibility of involved natural resources districts and the Corps of Engineers have been added.

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. Between 1998 and 2002 the Department provided \$500,000 in pass-through funding and a total of over \$200,000 in in-kind services. Several significant water projects have spun off from the study, including the Western Sarpy County Levee, the Sand Creek Project, and the Schilling Chute restoration. The feasibility study area includes the Platte River from Columbus to its mouth. This study is now mostly complete and NDNR efforts on the study in FY 06 are likely to be nominal.

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.

There has been limited financial support of the Alliance by the Department and other state agencies. Departmental support is being continued in FY 2005 and 2006. 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) Lower Platte Cumulative Impacts Study

The Lower Platte Cumulative Impacts Study is a joint effort to determine the cumulative impacts of development in and adjacent to the floodplain of the lower Platte River. Partners in the effort include the Lower Platte North NRD, the Lower Platte South NRD, the Pappio-Missouri River NRD, the Nebraska Game and Parks Commission, the Nebraska Department of Roads, and the Nebraska Department of Natural Resources. The study has been conducted through the U.S. Army Corps of Engineers. The Department of Natural Resources has had a very limited role, but agreed to provide \$1,000 worth of in-kind services for the study. Initial efforts are now complete and a second phase for the effort is being considered.

10) Environmental Education Activities

Limited agency environmental education activities included: 1) participation in planning and staging the Nebraska Envirothon, and 2) participation in the Earth Wellness Festival, annually held at Southeast Community College in Lincoln.

11) Frenchman Valley Study

The Frenchman Valley Study is expected to be a cooperative effort with the U.S. Bureau of Reclamation that will examine opportunities for more efficient management of water supplies in the Frenchman River Valley. The study will focus on problems and opportunities in an area that has experienced dramatically reduced ground and surface water supplies, including reduced reservoir inflow. The goal of the effort will be to evaluate alternative program activities, structural measures, or incentives that can assist in optimizing existing facilities, providing lake level benefits, and providing recharge facilities for Enders Reservoir and the irrigated area it serves. Initial scoping meetings on the study occurred in the spring of 2005 and the study is expected to begin in September 2005.

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

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

The NDNR actively supports the development and use of statewide databases freely available for the use of a host of government agencies. NDNR's GIS efforts will continue to support the priorities of the GIS Steering Committee. 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

Water Rights Digitizing is now under the direction of the NDNR Water Administration Division and is no longer included as a planning activity in this report.

2) Flood Prone Area Mapping

Planning staff members provided about 2 FTEs to further improve the automatic mapping processes, to carry out hydrology and hydraulic computations, and to publish flood-prone area maps. During FY 2005 NDNR expects to greatly increase the number of counties mapped. Counties mapped will be located in the Republican River basin and the Sandhills region.

3) National Hydrography Dataset

The Department of Natural Resources is currently compiling tagged vector hydros for a National Hydrographic Dataset (NHD) for the state and at the present rate of progress is likely to finish the process by the end of 2007. 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 Datasets. 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. Under the current process NDNR will supervise the completion of “tagged vector hydros” for targeted watersheds. Under a work share 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 funding being supplied through the Nebraska Department of Environmental Quality. Smaller past amounts were 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. To date sufficient funding has been secured to complete only a portion of the state. However, it appears likely that sufficient funds will become available to complete the balance of the state.

Extensive progress has been made on the project, which is divided into map catalog units. Thirty three units, covering most of the Republican, South Platte, Blue River, Missouri Tribes, and Lewis and Clark basins, have been completed. Digitizing is underway in 17 units in the North Platte, Niobrara, Elkhorn and Nemaha basins. Fourteen units remain to be done in the Lower Platte and Loup basins. Fourteen units with minor area in Nebraska around the perimeter of the state remain to be done but are someone else’s responsibility.

4) Revision of Digital Elevation Models

The Department of Natural Resources, in 2004, developed a statewide 3.75-minute, 10-Meter interval Digital Elevation Models (DEMs), mapped to 1:12,000 scale. The 10-Meter DEM database, processed in both 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. This activity is now complete and will not be included in future annual reports.

5) Digital Orthophoto Quadrangles

The Department of Natural Resources, in 2004, developed Digital Orthophoto Quadrangles (DOQ) coverage for the state. These DOQs (1-Meter resolution, 1:12,000, grayscale) are produced using 10-Meter DEMs and 1999 NAPP photography. The compressed DOQs, processed in both UTM and State Plane coordinate systems, 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 other geospatial layers, like SSURGO soils, transportation network, political boundaries, and 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. This activity is now complete and will not be included in future annual reports.

6) Creation of Nebraska Geospatial Data Center and the Metadata clearinghouse

In FY 2005, the Data Bank created a Nebraska Geospatial Data Center that provides internet access to a wide variety of geospatial databases developed and/or maintained by various state, federal and local government agencies, academic institutions, and private entities. It is a one-stop enterprise portal for on-line searching, accessing, displaying and mapping available geo-data relating to the geographic area of Nebraska.

As part of the Geospatial Data Center, the Data Bank also created a unified enterprise-wide Metadata Clearinghouse that provides a web-based metadata submission site for the State. The online entry of metadata facilitates ongoing publication of metadata into the clearinghouse. The metadata entry contains descriptive information about the specific geo-data and is structured in a standardized FGDC format. The site is designed to receive new metadata, edit existing metadata, and review available metadata resources at any time. This facilitates direct access to metadata information, and as well provides links to geo-databases across multiple participating sites. Such hypertext links are embedded in the metadata text.

Currently, both the Nebraska Geospatial Data Center and the Metadata Clearinghouse are operated and hosted by the Nebraska Department of Natural Resources (Data Bank), with oversight from the Nebraska GIS Steering Committee.

7) 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 coverages 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 had technically been completed, there were a number of details in the data that needed to be corrected. They were very small changes (usually around

quad boundaries) and did not affect the DOQ production so were disregarded earlier. With current ARCINFO coverage, the errors were more noticeable and so needed to be corrected. This work was completed in FY 05. 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. Because this effort is now complete, it will not be included in future annual reports.

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 county Soil Surveys. That process was completed in June 2004.

The overall goal of the project was 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 were stationed at the NDNR offices to work on the project. As older surveys are re-mapped or updated digitizing will continue for these counties as well. With completion of the dataset State Level work began on correcting county joins and some other map line work as well as maintenance issues.

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. A recent federal initiative requires that each state have watershed boundary delineations that meet national mapping standards. While the Watershed Boundary Delineations do not meet the national mapping standards, they are close and will be used as the basis for updating to the new standards. NDNR is involved in the process of bringing this dataset up to standards as this project develops.

The update of the Watershed Boundary Delineation project is a three-year effort and efforts are on schedule to finish the delineation portion of the project near the end of calendar 2005. During this past year, all of the southwestern, southern, eastern, and northern boundaries of Nebraska have been delineated and matched up in a coordinated effort with the surrounding states. The remaining boundary with Wyoming is in the latter stages of the review process and delineations have already begun on the penultimate phase of the project (completing the interior part of Nebraska). Attributing the GIS coverage will be started early next calendar year and the entire project should be completed by the end of Fiscal Year 2006.

10) Nebraska Rain Assessment and Information Network

A new program was initiated by the Nebraska Department of Natural Resources in cooperation with the Nebraska Natural Resources Districts (NRDs) in early 2004. It was patterned after the Community Collaborative Rain and Hail Study (CoCoRaHS) developed through Colorado State University. It was funded for the first year through a grant from the Nebraska Environmental Trust with the Little Blue NRD acting as the project sponsor for the grant but there is no additional funding from NET for this current year. However, the participating NRDs have added it to their budget so it will be maintained into the future.

Through the NRDs, volunteers have been organized and trained to read "official" rain gauges (purchased using the NET grant money) and to enter this precipitation and other weather related information into a website developed by the NDNR. This information is available through the NDNR website to the public and specifically for use by the National Weather Service to supplement their existing network. During the past year, NDNR has worked with NWS to develop a system to allow them to download and incorporate NeRAIN data into their network. This should help them better understand rainfall patterns in Nebraska and develop better predictive models for the future.

The initial goal was to develop a network of volunteers to be entering information into the database on a daily basis and covering an area that encompasses the Big and Little Blue, Republican, and Platte (above Columbus including the Loup) river basins. That was a one-year grant with plans to apply for an additional grant to cover the remainder of the state. Unfortunately, the second year grant was not approved so plans to expand to the remainder of the state have been put on hold for the time being.

Over 800 applications were received in the first year with more still coming in daily. Of those 800+ applications, nearly 750 volunteers are still participating and with the record of nearly 550 reports on a single day across the study area.

NDNR has most of the presentation website in place but additional development will be ongoing this year as improvements are made to the site.

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:

- Water Policy Task Force Activity
- Nebraska Resources Development Fund Reviews
- Climate Assessment and Response Committee
- Environmental Trust Advisory Committees
- Geographic Information System Steering Committee and Subcommittees

- Other Reviews

1) Water Policy Task Force

In 2002 the Nebraska Legislature created a Water Policy Task Force to evaluate the effectiveness of and make recommendations on any needed changes to the law governing the integrated management of surface water and hydrologically connected ground water. The legislature also asked the Task Force to make recommendations on water transfers, leasing and banking and on how to address inequities between surface water and groundwater users. The Director of the Department of Natural Resources serves on the Water Policy Task Force and NDNR staff also administer a cash fund created for that effort.

In December 2003 the Task Force issued a report titled; “Report of the Nebraska Water Policy Task Force to the 2003 Nebraska Legislature”. The report helped result in the introduction of LB 962 which made provision for implementing many of the recommendations of the Task Force. The bill was subsequently passed and enacted into law. The bill included provisions related to both water transfers and to integrated planning and management of surface and ground water.

LB 962 called for continuation of the task force through December 2004 and its duties will continue. The task force is charged with examining issues related to Nebraska laws governing the management surface water and groundwater. It is also charged with identifying options for resolution of the issues and making recommendations to the Governor and Legislature. Issues examined included:

- 1) A review of the laws of 1996, LB 108, to determine what, if any, changes are needed to adequately address Nebraska’s conjunctive use management issues;
- 2) An evaluation of the utility of allowing temporary water transfers and, if deemed useful, development of draft legislation and procedures for authorizing and implementing a temporary water transfer law;
- 3) An evaluation of the utility of authorizing additional types of permanent water transfers and, if deemed useful, development of draft legislation and procedures for authorizing and implementing additional types of permanent water transfers;
- 4) A determination as to the usefulness of water leasing or transfers and development of a potential water banking system that would facilitate the temporary or permanent transfer of water uses; and
- 5) A determination as to what other ways, if any, inequities between surface water users and ground water users need to be addressed and potential actions the state could take to address such inequities.

In FY 2005 NDNR staff scheduled and coordinated meetings, developed a variety of briefing materials, maintained a task force website, and provided overall administrative support and guidance to the task force. In FYs 2006 and 2007 areas of special task force emphasis are expected to include municipal water needs, transfers, and funding. There will also likely be task force review and comment concerning LB 962 implementation.

2) Nebraska Resources Development Fund Reviews

In FY 2005 two project applications/feasibility reports, Upper Prairie/Silver/Moores Creek and Leigh Dam, were reviewed. Two project proposals, Kezan Creek and Pigeon/Jones Creek Site 15, were also reviewed. DNR staff provided assistance to project sponsors during their preparation of these documents for Nebraska Resources Development Fund financial assistance and re-analyzed the economic feasibility of one project due to cost increases. DNR staff also took part in the preparation of a NASIS survey regarding outdoor recreation in Nebraska. The results of the survey will be considered during revision of the Nebraska Resources Development Fund Guidelines.

3) Climate Assessment and Response Committee

The Climate Assessment and Response Committee (CARC) was active again in FY 2004/05 as drought conditions continued throughout much of the state for the sixth 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 CARC member and the committee 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, wind storms, and tornadoes.

One Planning and Assistance Division staff member also serves as a Co-Chair of two subcommittees of CARC; the Agricultural, Natural Resources, and Wildlife Subcommittee and the Risk Assessment Committee. A second 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.

4) Environmental Trust Technical Advisory Committee

The Environmental Trust Board, of which the Director of Natural Resources is a member, has a technical advisory committee to help review grant applications. Department of Natural Resources staff 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. During the past year, staff reviewed fewer than 5 applications.

5) 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 a high-resolution National Hydrographic database (NHD), Nebraska Geospatial Data Center, and National Map Initiative have been identified as top areas of interest for Nebraska.

6) 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. Through the Platte River Hydrology Study the NDNR also acquired a set of Landsat MSS data from the early 1980s; this was also acquired through COHYST. This provides a historical reference for land use analysis.

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.

**PLANNING & REVIEW PROCESS EXPENDITURES FY 03
AND BUDGET FYs 2005-2009**

	FY2005*	FY2006	FY2007	FY 2008	FY 2009	FY 2010
Lower Platte River Alliance	5,417	5,417	5,417	5,417	--	--
Platte River Cooperative Agreement	\$766,000	\$486,000	Unknown	Unknown	Unknown	Unknown
National Hydrography Dataset Expenses						
Other than DNR Staff (funded via grant or anticipated to be funded via grant)	\$74,668	\$75,000	\$65,000	-	--	--
Contract LB 962 Studies With UNL	\$46,361	\$275,000	\$275,637	\$275,000	\$275,000	\$275,000
Contract LB 962 Studies with Other Entities	--	\$370,000	\$370,000	\$370,000	\$370,000	\$370,000
LB 962 Equipment, Computer Equipment, Supplies, Travel	\$120,000	\$100,000	\$100,000	Unknown	Unknown	Unknown
Staff/Other	\$793,000	\$814,000	\$820,000	\$820,000	\$820,000	\$820,000
TOTAL	\$1,805,446	\$2,125,417	\$1,636,054	\$1,470,417	\$1,465,000	\$1,465,000
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* 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 2005 this included about 11.5 full time equivalent positions for part of the NDNR Planning and Assistance Division and about 4 full time equivalent positions from other divisions of NDNR. Beginning with FY05 normal computer and office expenditures for planning activities are included in the budgetary figures and extra computer expenses made for LB 962 activities are noted separately. These preliminary estimates include only the NDNR planning related budget. Also included is a separate category for 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 through the Nebraska Department of Environmental Quality. For that project, computer software, hardware and budget expense are included in this budget. The budget for the Platte River Cooperative Agreement includes pass through and contract funds. This includes monies to be passed through to Natural Resources Districts for their new depletions implementation efforts as well as contract monies for a land use inventory and

for other process contractual assistance. Special planning studies anticipated to use LB 962 budgeted money are included in their own categories. For some future years on the NHD budget amounts are based upon anticipated grants needed to complete the project rather than actual money pledged.

Related items not included in the Planning and Review Process budget include LB 962 monies to be used for upgrading the water administration database, Information Technology Division Expenses, and LB 962 Incentive and Implementation monies provided to outside entities.

VI. GLOSSARY

Digital Elevation Models – This dataset provides electronic information about terrain elevation. It serves as a framework dataset useful in production of many other types of analyses and mapping efforts.

Digital Orthophoto Quadrangles – Digital Orthophoto Quadrangles (DOQs) are aerial photographs that have the properties of a map. These properties support the measurement of distances and areas and the identification of a location.

Fully Appropriated – Defined in Nebraska Revised Statutes Section 46-713 “(3) A river basin, subbasin, or reach shall be deemed fully appropriated if the department determines that then-current uses of hydrologically connected surface water and ground water in the river basin, subbasin, or reach cause or will in the reasonably foreseeable future cause (a) the surface water supply to be insufficient to sustain over the long term the beneficial or useful purposes for which existing natural flow or storage appropriations were granted and the beneficial or useful purposes for which, at the time of approval, any existing instream appropriation was granted, (b) the streamflow to be insufficient to sustain over the long term the beneficial uses from wells constructed in aquifers dependent on recharge from the river or stream involved, or (c) reduction in the flow of a river or stream sufficient to cause noncompliance by Nebraska with an interstate compact or decree, other formal state contract or agreement, or applicable state or federal laws”

Geographic Information System – Simply put, a GIS combines layers of information about a place to give you a better understanding of that place. What layers of information you combine depends on your purpose—finding the best location for a new store, analyzing environmental damage, viewing similar crimes in a city to detect a pattern, and so on.

National Hydrography Dataset – The National Hydrography Dataset (NHD) is a comprehensive set of digital spatial data that contains information about surface water features such as lakes, ponds, streams, rivers, springs and wells. Within the NHD, surface water features are combined to form "reaches," which provide the framework for linking water-related data to the NHD surface water drainage network. These linkages enable the analysis and display of these water-related data in upstream and downstream order

Overappropriated – Defined in Nebraska Revised Statutes Section 46-713 “(4)(a) A river basin, subbasin, or reach shall be deemed overappropriated if, on the operative date of this section, the river basin, subbasin, or reach is subject to an interstate cooperative agreement among three or more states and if, prior to such date, the department has declared a moratorium on the issuance of new surface water appropriations in such river basin, subbasin, or reach and has requested each natural resources district with jurisdiction in the affected area in such river basin, subbasin, or reach either (i) to close or to continue in effect a previously adopted closure of all or part of such river basin, subbasin, or reach to the issuance of additional water well permits in accordance with subdivision (1)(k) of section 46-656.25 as such section existed prior to the operative date of this section or (ii) to temporarily suspend or to continue in effect a temporary suspension, previously adopted pursuant to section 46-656.28 as such section existed prior to the operative

date of this section, on the drilling of new water wells in all or part of such river basin, subbasin, or reach.”

SSURGO Soil Surveys - The Soil Survey Geographic Database (SSURGO) is a national dataset that will put all county soil surveys into an electronic format. This will allow soils information to be layered in conjunction with other electronic datasets as well as allow electronic access to county soil map information. The national SSURGO compilation process is being coordinated through the USDA Natural Resources Conservation Service.

Tagged Vector Contours – Tagged Vector Contours are elevation contours represented, in electronic format, as lines that have been attributed with elevations.

Tagged Vector Hydros – Tagged Vector Hydros are surface water features represented, in electronic format, as lines that have been attributed with hydrographic descriptions.