

STATE OF NEBRASKA



DEPARTMENT OF NATURAL RESOURCES
Roger K. Patterson
Director

March 27, 2003

IN REPLY REFER TO:

Mike Johanns
Governor

Fred Ore
Bureau of Reclamation
Great Plains Region
P.O. Box 1607
Grand Island, NE 68802-1607

Dear Fred,

As you requested, this letter presents an updated version of our 2002 grant request under Title II of the Reclamation States Emergency Drought Relief Act of 1991. These updates reflect changes in circumstances since we submitted the original grant package nearly a year ago. Some of the major changes since the package we presented at that time include:

- Addition of meter cost share to the "Republican River Basin Drought – Dry Year Proposal".
- Addition of "real-time" capability to three gages in the Cambridge area as part of the "Republican River Basin Drought – Dry Year Proposal".
- Deletion of three gaging stations and two gaging station upgrades from the "Republican River Basin Drought – Dry Year Proposal". (These have been purchased since the original proposal was submitted).
- Removal of the recurring maintenance budget from the "Automated Soil Moisture Monitoring Network for Nebraska" proposal because it would not qualify for Reclamation funding assistance.
- Decreasing the budget for the "Increased Stream flow Monitoring Capabilities to Better Predict and Distribute Surface Water in the Lower Platte Basin" proposal to reflect some purchases that have already been made.

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The proposals and their cost are listed in priority order on the following page. The Republican Basin Drought – Dry Year Proposal has a very high priority for us because of its relationship to the implementation of the settlement of the Republican River litigation. As you know, the settlement is vital to both the states and Reclamation and drought conditions have made that implementation even more challenging. Of the Republican Basin items, the money for meter cost share is perhaps most important. Management of groundwater well withdrawals in the basin is an essential component of maintaining Nebraska's compliance with the compact, which we believe will have benefits to Reclamation's reservoirs in the Basin.

The overall budget we are submitting is for \$662,200. The revised budget and proposals are enclosed. Please note that if additional funds should become available, we have a significant need for cost share funds for meters in the Republican Basin and could put any additional funds to very good use.

Sincerely,

A handwritten signature in cursive script, appearing to read "Roger K. Patterson".

Roger K. Patterson
Director

sg
Enclosures

2002 Nebraska Drought Assistance Proposals – Revised Summary List
(Revised March 21, 2003)

Priority

1)	\$401,200	Republican River Basin Drought - Dry Year Proposal
2)	\$ 16,000	Proposal: Increased Streamflow Monitoring Capabilities to Better Predict and Distribute Surface Water in the Lower Platte River Basin
3)	\$155,000	An Automated Soil Moisture Monitoring Network for Nebraska
4)	\$ 25,000	Drought Mitigation Planning
5)	\$ 65,000	Proposal: On-Site Computer Aided Capabilities for Distribution of Surface Water
	\$662,200	TOTAL

DRAFT
Republican Basin Drought-Dry Year Proposal
(Revised 3/27/03)

Background

The past three years have been very dry in the Republican River Basin and drought continued into early 2003. As water supplies diminish it is even more important to manage this resource with greater precision and equity. It will also be important that all water use, including groundwater use, be managed efficiently and be metered to help assure compliance with an interstate compact. This proposal provides for both equipment to better monitor surface water use and cost share for meters to monitor groundwater use that can affect surface water flows.

The cost share for meters would help address drought in a number of ways. First, they are a necessary part of a recent Republican River Compact settlement with Kansas and Colorado. In fact the \$200,000 would supply only a small portion of the meter cost share need anticipated as a result of the recent settlement. In order to implement that settlement it is necessary to model how groundwater use is affecting surface water and then meter and regulate groundwater use to make sure that that impacts to surface water are kept within acceptable limits. Grant funds provided by the Bureau would be used for cost share in areas where it has been determined that groundwater's long term impact on surface flows is relatively higher than some other areas. Even more importantly, the meters would result in better management, with less pumping by groundwater users. Finally, by leveraging other money, cost share would provide additional value. The conservation resulting from meters is most important in drought years; both in terms of value and in terms of fulfilling the provisions of the compact/agreement.

The total meter program in the basin is expected to cost about \$7.5 million dollars. Of that amount \$3.75 million is expected to come from landowners and at least \$2 million will come from the state. Local natural resources districts are reading and calibrating the meters.

Fluctuating flows at the Superior/Courtland Diversion dam makes it difficult to manage supplies for both Kansas and Nebraska under the Republican River Compact. Improved measurements and real time data would help maximize the use of this limited resource.

The following equipment would assist the Nebraska Department of Natural Resources, The Nebraska Bostwick Irrigation District, Kansas Bostwick Irrigation District and the Bureau of Reclamation to better manage surface water supplies.

In addition, increased and more timely and accurate stream flow data will allow Nebraska Department of Natural Resources to more effectively administer surface water appropriations and protect storage releases while in transit to the diversion dams.

- (\$200,000) Meter cost share assistance for Republican Valley Water Users
- (\$ 18,000) Bring the three remaining Cambridge area stream gages not on a real time basis up to real time standards.
- (\$ 23,200) Upgrade all U.S.B.R. canal headgates with a Sutron satellite transmitter.
- (\$ 70,000) Install measuring devices, equipped with Sutron satellite transmitters on all major canal waster ways.

- (\$ 70,000) Radio transmitters installed on all pump diversion greater than 1 cfs located between Harlan County Dam and Guide Rock Diversion Dam.
- (\$ 20,000) In addition to these, Computer hardware, software, and a satellite downlink to process this information in a real time fashion would assist in future water administration.

Rough Estimated Overall Budget

\$401,200

Proposal: Increased Streamflow Monitoring Capabilities to Better Predict and Distribute Surface Water in the Lower Platte Basin

(Revised 3/19/03)

Background

To properly predict and distribute the drought affected flows on the Lower Platte River system; Nebraska needs to increase its stream flow monitoring and flow data retrieval capabilities. The purpose of this Nebraska Department of Natural Resources proposal is to improve that effort through acquisition of additional equipment.

Although eastern Nebraska itself is not experiencing a drought as western Nebraska is, the effects of the drought in the west are felt throughout the state. The Platte River flows across the entire state from west to east. A drought in the west shows up as reduced stream flows in eastern Nebraska. The demand for the water flowing in the Platte River exceeds its supply. Instream flow rights for fish and wildlife uses on the Platte as well as agricultural uses on the Platte and its tributaries require the best monitoring system we can provide. Inadequate monitoring capabilities hamper the making of good water distribution decisions. Bad decisions are costly to the adversely affected user, whether it be the endangered and threatened species that the instream flow rights were taken out to protect or the individual irrigators which depend on the rivers for much needed water for their thirsty crops. The lack of water at a crucial time cannot be made up once the damage is done. Timing is important to all the affected users.

A computer aided decision support system is being developed to help NDNR make better decisions. The system greatly increases our ability to track and predict stream flow. That system depends on specific, accurate and timely data.

Additional equipment is needed to provide the data needed for improved NDNR management. Two holes in Nebraska's data network have been identified. An improved remote access stream gage on the Loup River Power Canal return near Columbus Nebraska will help fill one of those holes. A gage at this site will greatly increase our tracking of flow capability and allow better predictions of flow down stream. To equip that gage NDNR is requesting \$5,800. The data from the gage will be retrieved either through a satellite downlink or through the telephone system.

Additional equipment is also needed to add real time capabilities to the gage on the Cedar River near Fullerton, Nebraska to fill the other hole. The Cedar River is a major tributary stream on the lower end of the Loup River both of which ultimately contribute significantly to the flows of the Platte River. The gage at the site currently provides a continuous record of the stage/flow of the Cedar River. The data is retrieved on site monthly from which the annual record is produced. Additional data logging and remote retrieval equipment would allow us to access that data as necessary and use the information in our decision process. Big changes in the flow of that stream are not known on a daily basis and therefore flow predictions and distribution decisions are not

as good as they could be. Nebraska needs additional equipment at this site to make good decisions. NDNR is requesting \$5,200 to equip this gage so its data can be retrieved through satellite downlink or through the telephone system. We are also requesting \$5,000 to backup the above mentioned gages.

Estimated Overall Budget

\$16,000

**PROPOSAL: AN AUTOMATED SOIL MOISTURE
MONITORING NETWORK FOR NEBRASKA**
(Revised 3/19/03)

Background

Drought is a normal feature of Nebraska's climate, and the state is vulnerable to significant economic losses and environmental degradation resulting from its occurrence. In 2000 and 2002, severe drought affected many parts of the state, and agricultural losses were estimated at over \$1 billion in each year by Roy Frederick, a UNL agricultural economist. Monitoring the development and progression of the drought, so that a timely response by the state could be coordinated, involved a collaborative effort of the state's Climate Assessment and Response Committee (CARC), UNL extension, the High Plains Regional Climate Center (HPRCC), and the National Drought Mitigation Center (NDMC). However, in spite of these efforts, the early detection capability and the ability to monitor drought severity are both in need of further improvement.

Soil moisture is one of the most important variables in drought monitoring. Low soil moisture at critical times can cause water stress and reduce vegetative growth and yield and/or increase consumptive water use for irrigation. In the past, soil moisture data was collected through sporadic, costly and time-consuming field campaigns. In recent years, the soil moisture sensor technology has changed significantly and, as a result, automated soil moisture sensors are now available that are stable and accurate. Currently, Nebraska's Automated Weather Data Network (AWDN) monitors meteorological variables at 50 locations in Nebraska and soil moisture measurements are now available at 23 of these sites, providing daily soil moisture values at 10, 25, 50, 100 cm depths in the soil profile (<http://www.hprcc.unl.edu/soilm/>). This information has proven to be very helpful to CARC during the 2000 and 2002 drought.

Statement of Need

Although 14 soil moisture monitoring sites gives some indication of conditions around the state, it is clear that the state would benefit from additional soil moisture sensors. Adding soil moisture sensors to 25 existing stations within the AWDN would greatly expand Nebraska's soil moisture monitoring capability, and would improve the early warning and monitoring of drought across the state. In addition, to fill existing gaps within the AWDN, and provide a more uniform coverage across Nebraska, 10 new AWDN stations (along with soil moisture probes) are proposed. For example, two large counties, Cherry and Custer, do not currently have an AWDN site within the county. Adding an AWDN site in these counties would provide critical information to state officials as well as local producers.

Benefits to Nebraska

Development of a continuous soil moisture monitoring network throughout the state will allow

for timely assessments of available water in the soil root zone at critical times, before, after, and during the growing season, thereby providing the opportunity for the early detection of agricultural drought. This *ground-truth* soil moisture data set is essential for determining the *crop-specific* soil water needs. This information would be especially beneficial to producers, and could provide important guidance for irrigation scheduling.

The soil moisture information could also be provided as supplementary information as part of the applications to the Farm Service Agency (FSA) for the timely release of CRP land for haying and grazing during drought events. Soil water information was submitted to FSA as part of the CRP requests in 2000, but additional soil moisture sensors in important agricultural areas across the state would facilitate the availability of this information in the future.

Soil moisture information also proves beneficial during periods of surplus moisture, and could serve as an important early warning tool for flood events around the state. Such information would be helpful for the Nebraska Emergency Management Agency (NEMA). Currently, soil moisture data collected by a statewide network in Oklahoma is being used to monitor the potential for flash flooding events in that state.

All soil moisture information provided by a network would be available on the HPRCC web site, with a direct link to this information located on the CARC and NDMC web sites, providing this real-time information to decision makers (producers, lawmakers, municipalities, NRD, water and natural resource managers, etc.) across the state.

Budget

Twenty-five (25) AWDN sites updated to include soil moisture measurements	
1 each @ \$3,000	\$75,000
Ten (10) new AWDN sites located to increase coverage in gaps	
1 each @ \$8,000	\$80,000
<i>Recurring maintenance budget</i>	<i>(\$35,000)*</i>
	Total \$155,000 <i>(\$35,000)*</i>

**(The \$35,000 recurring maintenance budget is not part of the final proposal to the Bureau as it is ineligible)*

PROPOSAL: DROUGHT MITIGATION PLANNING

The State of Nebraska first adopted a drought plan in 1986. This plan, Nebraska's Drought Assessment and Response System (DARS), was developed through cooperation between state and federal agencies and the University of Nebraska. This plan has been revised on several occasions and was formalized in 1991 with passage by the Nebraska Legislature of Legislative Bill 274. This bill established the Climate Assessment and Response Committee (CARC) under the leadership of the office of the Governor. CARC broadened the range of authority of the previous drought plan to include other potential climate-related natural hazards. In spring 1998, at the suggestion of the National Drought Mitigation Center (NDMC) at the University of Nebraska, CARC agreed to revise the state's drought plan. This revision process has had the full support of the Governor's office. The goal of this revision process was to derive a plan that would place greater emphasis on mitigation measures to lessen the risk (i.e., impacts) associated with the occurrence of drought and to incorporate new technologies for monitoring drought and water supply conditions that were now available to the committee. Nebraska's Drought Mitigation and Response Plan was approved by CARC at their meeting in June 2000.

Nebraska recognizes that its drought plan must address both the emergency or response element of drought and longer-term issues associated with the reduction of vulnerability and, therefore, risk. The intent of Nebraska's drought plan is to provide government with an organizational structure to systematically address the impacts of drought in a more effective, timely, and coordinated manner. Thus, drought mitigation planning is considered to be an ongoing process that the state will need to continue to address in the long term. CARC understands that its role is to provide leadership and coordination in the pursuit of the goal to reduce the impacts of drought in Nebraska while preserving our natural and agricultural resource base for future generations.

A Risk Assessment Committee (RAC) has been organized under the drought plan to identify those sectors, population groups, or regions most at risk from drought and the most probable impacts. The RAC has conducted a preliminary drought risk assessment for Nebraska and assembled a list of mitigation and response actions that will reduce these impacts in the long term. To implement these actions, the Risk Assessment Committee, through the actions of its subcommittees and in close collaboration with CARC and the Monitoring Committee, must further develop these mitigation programs through collaboration with appropriate state and federal agencies, develop appropriate triggers for the implementation of mitigation and response programs, and identify appropriate drought management areas for the state that reflects regions and sectors most at risk. Support is requested to complete this portion of the state's drought mitigation planning activity.

Budget

Staff support for development of triggers, drought management areas \$25,000

PROPOSAL: ON-SITE COMPUTER AIDED CAPABILITIES FOR DISTRIBUTION OF SURFACE WATER

The drought brings with it diminished stream flows throughout the state. Recently approved instream flow rights for fish and wildlife establish varying yet specific target flows and various sites on the Platte River. Other users upstream from these instream flow target sites must be regulated and/or closed to assure the targets are being met. This includes some 2100 irrigation permits that rely on the streams in the Platte, Loup, Elkhorn Rivers and their tributaries for their water supply. The drought stricken Republican River Basin although not subject to the instream flow demands on the Platte River is closely monitored for proper distribution of water among some 600 surface water irrigation users. Surface water use in the Republican is monitored to comply with terms of an interstate compact. The staff of the Department of Natural Resources Field Offices monitors use of irrigation permits closely. The tighter the water supplies are, the more important it is for them to be effective and efficient in their water distribution duties. Currently in order to accomplish this, the field staff must carry with them a large collection of maps, water right listings and measuring equipment. They set rates and operation times "by hand". The maps and listings they must carry with them is often unmanageable. A computer-integrated system would eliminate their map burden and eliminate regulating calculation errors and automate the writing of regulation orders. Record keeping of water administration activities will also be enhanced by such a system, allowing for more efficient use of the field staff.

A system to integrate water right information and computer aided issuance of regulating orders has been developed. This system adds effectiveness and efficiency to the water distribution activity.

Additional equipment is needed to implement the newly developed system. Laptop computers, portable printers and specialized software are needed. Four systems are needed for water administration in the Lower Platte Basin, two in the Elkhorn Basin, five in the Central Platte and Loup Basins, four in the upper Platte Basin, and three on the Republican Basin are needed. We are requesting funding to purchase these systems. The cost for each of these 18 systems, which would include a laptop computer, a portable printer and the specialized software, is \$3500. Adding a power inverter would add about \$2,000 to the combined total for the systems.

Total cost for the 18 systems is \$65,000.