

# Nebraska Resources

## Newsletter

Published Quarterly by the Nebraska Department of Natural Resources  
301 Centennial Mall South / P.O. Box 94676 / Lincoln, NE 68509-4676

### Inside this Issue:

Issue 38, January 2011

- Renovation of Deteriorating Conduits/cover and pages 2 and 3
- Annual Evaluation Published/cover
- COHYST 2010/page 3
- Republican River Basin Forecast/page 4
- Water Year 2010/page 4
- Nebraska Soil and Water Conservation Update/page 5
- Historic Platte River Flows/page 5
- Revolving Fund Land Auction/page 5
- Basin Caucuses/page 6

### Agency Numbers to Remember

#### Agency address:

Nebraska  
Department of Natural Resources  
301 Centennial Mall South  
Fourth Floor  
P.O. Box 94676  
Lincoln, Nebraska 68509-4676

#### Agency phone number:

(402) 471-2363

#### Agency fax number:

(402) 471-2900

#### Agency homepage address:

<http://www.dnr.ne.gov>

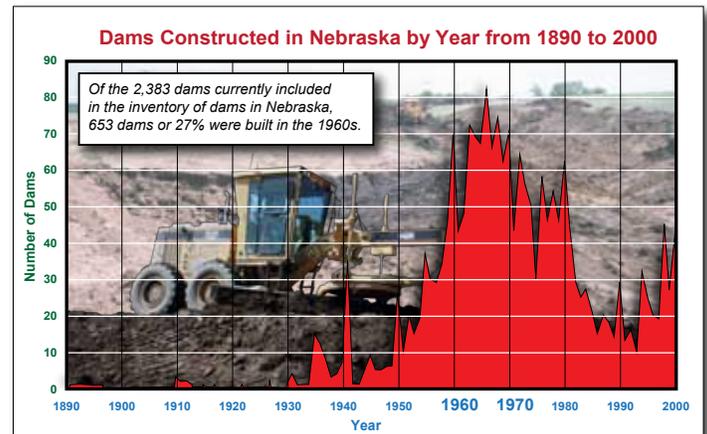
#### Editor's Note:

A full color electronic version of this newsletter can be found on the Department's web site along with back issues at <http://www.dnr.ne.gov/dnrnews/newsarchive2.html>.

## Renovation of Deteriorating Conduits Offers Alternative to Removal and Replacement

By Tim Gokie, P.E. and Pat Diederich, P.E.

If there was a "golden age" of dam building in Nebraska it was the 1960s. **Of the 2,383 dams currently included in the inventory of dams in Nebraska, 653 dams or 27% were built in the 1960s.** The vast majority of these dams have principal spillways constructed of corrugated metal pipe (CMP) risers and conduits.

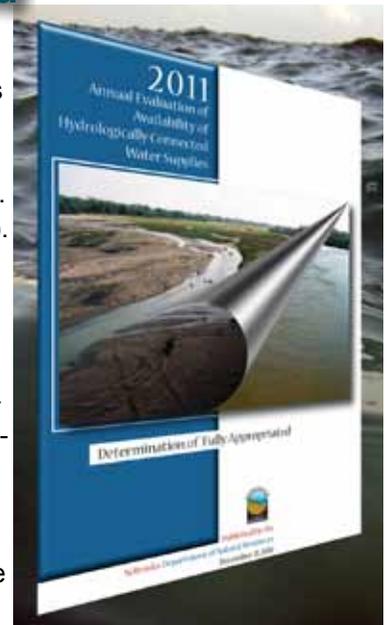


The commonly held average service life for a typical CMP is 50 years. One of the leading causes of failure of earthen dam embankments is problems associated with the principal spillway conduit. What this means is that in the next ten years there are going to be a lot of principal spillway conduits in Nebraska that are going to reach the end of their expected service life. If we are not vigilant, there could be a number of dam failures caused by leaky principal spillway pipes. *Continued on p. 2*

## Annual Evaluation Published

By Jesse Bradley, P.G.

The Nebraska Department of Natural Resources (DNR) has published its **2011 Annual Evaluation of Availability of Hydrologically Connected Water Supplies** (available at [http://www.dnr.ne.gov/IWM/docs/IWM\\_AnnualReports.html](http://www.dnr.ne.gov/IWM/docs/IWM_AnnualReports.html)). The evaluation was completed for all basins which are not currently designated as fully or overappropriated or for which a status change has not occurred in the past four years (Lower Platte River Basin). The basins that were evaluated include: **1)** the Niobrara River Basin downstream of the Spencer Hydropower facility; **2)** the Missouri Tributary Basins; and **3)** the Blue River Basins. DNR has reached a preliminary conclusion that no portions of these basins are fully appropriated at the current time.



available  
online at:

[http://www.dnr.ne.gov/IWM/docs/IWM\\_AnnualReports.html](http://www.dnr.ne.gov/IWM/docs/IWM_AnnualReports.html)

Renovation of Deteriorating Conduits continued from p. 1

The typical approach for dealing with a deteriorating spillway pipe has been to move in a ten ton piece of equipment, dig up the pipe, and replace it with a new one. The cost of replacing a principal spillway conduit can pose a significant financial burden to the dam owner. One hundred plus feet of 24-inch polymer coated (*polymer coating, which wasn't available fifty years ago, is supposed to double the service life*) corrugated metal pipe can cost several thousand dollars. In order to get proper compaction around the new conduit and get the backfilled soil to bond to the undisturbed portions of the embankment, a significant portion of the embankment has to be removed and replaced. In most cases, the cost to replace a 50-year-old principal spillway will **exceed the original cost** for constructing the dam. Fortunately, over the last 35 years there have been significant advances made in pipe materials and trenchless technologies resulting in alternatives to total replacement.

Nationwide, the most common alternative to total replacement is a renovation method known as sliplining. Sliplining is a method where a smaller diameter pipe is installed inside the original conduit and the space between the pipes is filled with grout. The smaller diameter pipe is pushed or pulled through the old conduit from the upstream or downstream end. Spacers are used at regular intervals to assure it is centered in the old pipe and to guarantee there will be a fairly uniform thickness of grout between the old and the new conduit. Experience has shown that smooth walled high-density polyethylene pipe, similar to what is used in water and gas distribution lines, is the material of choice when sliplining a conduit.

The other renovation method of choice is the installation of a plastic cured-in-place pipe (CIPP) lining. CIPP liners have been implemented on two dams in Nebraska. In 1993, CIPP was used to renovate an 18-inch diameter, 158-foot long conduit at the Plattsmouth 10-A Dam. The second installation was recently completed on a 21-inch, 130-foot long conduit at Big Indian Creek 5-A Dam located in Gage County.

CIPP was originally developed in the 1970s, but did not become widely used in dam applications until the 1990s. CIPP is made of polyester needle-felt or fiberglass felt that is preimpregnated with polyester resin. Prior to the curing process, the CIPP liner is a long elastic bag or tube. The liner can be pulled through a conduit or air can be used to invert the liner and push the liner along the conduit. Once the liner is in place, hot water or steam is used to pressurize the liner and initiate the curing process. After curing, what is

left is a jointless, tight-fitting, rigid plastic liner that is resistant to corrosion and biological attack.

Before making the choice to renovate rather than replace, several considerations must be made. First, the condition of the original conduit must be taken into account. The renovation methods presented here are not suited for badly corroded or seriously damaged conduits. For instance, if the conduit is corroded to the point that there are more than a few small, isolated holes or if the conduit has partially collapsed from structural failure, then the conduit will need to be removed and replaced. In addition, CIPP liners may not be suited to line CMP conduits that were originally protected with asphalt coatings. Chemicals in the asphalt may react with the resin in the CIPP. Other considerations include the impact on the hydraulic capacity of the spillway, the strength of the liner to withstand external and internal pressures, and whether the dam still meets current design standards.

The Nebraska Department of Natural Resources (DNR) Dam Safety Section can assist dam owners by inspecting existing principal spillway conduits and in making preliminary evaluations of various repair alternatives. When

the conduit is too small to make a visual inspection, the Department can use its remote operated camera to conduct a video inspection of the conduit.

In addition, DNR has an ultrasonic thickness gauge that can estimate the remaining thickness of a corroded metal conduit. If the dam is a significant or high hazard potential dam or what is considered a large low hazard potential dam, then the dam owner will have to hire a professional engineer to weigh the options and design the appropriate solution. In any case, the **dam owner must contact DNR prior to modifying any principal dam component, including the principal spillway.**



*The majority of dams in Nebraska have principal spillways constructed of corrugated metal pipe risers and conduits.*



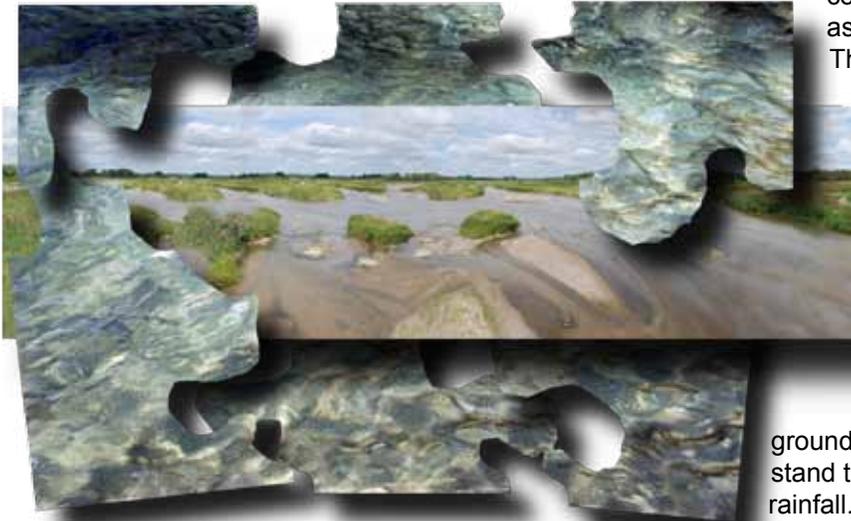
*The Department can use its remote operated camera to conduct a video inspection of the conduit if required.*

## COHYST 2010:

### A Total Water Budget Approach to Integrated Management

By Doug Hallum, P.G.

To support continued planning and water resources management in the Platte River Basin above Columbus, the Department of Natural Resources has rededicated its resources to a collaborative\* project that began in 1996. This was called the **Cooperative Hydrology Study (COHYST)** and is currently known as **COHYST 2010**. This study draws on 14 years of learning, data collection, water



budget analysis and management tool development to refine existing tools and add components to reflect a complete water budget. The water budget and corresponding tools that COHYST 2010 has developed: begin with precipitation, account for spatial and temporal variability, account for evapotranspiration, store and route water above and below ground, account for interactions between surface and groundwater, incorporate the input of a long

list of stakeholders, and accomplish the goals and objectives of state and local planning agencies associated with the region. These tools are capable of giving meaningful information to water managers in the Platte River Basin and can serve as a model in other basins.

It is fair to ask why this detailed effort is necessary when entities in Nebraska routinely collect information sufficient to construct estimated water budgets for the state, such as those we often see reported in the news media.

The challenge is that this data only provide one very small piece of a large puzzle. A water budget by itself is incapable of providing an understanding of the complex relationships of water traveling through Nebraska and its effects on the various users who rely on this resource at very specific times and at specific locations. In order to be successfully applied, the water balance concept itself assumes that the system it describes is in a state of dynamic equilibrium, which means that while water is moving through, it is moving at a constant rate. Every dryland producer and groundwater irrigator in the state can immediately understand that this does not happen in Nebraska with respect to rainfall. Every surface water irrigator in Nebraska will immediately understand that this does not happen with respect to streamflow. Since Nebraskans need to understand their water resources in time and space in addition to quantity, we need to continue creating sophisticated tools like those developed in COHYST 2010.

\***COHYST 2010 is sponsored by** Central Platte NRD, Twin Platte NRD, Tri-Basin NRD, Nebraska Public Power District, Central Nebraska Public Power and Irrigation District, Nebraska Game and Parks Commission, and Nebraska Department of Natural Resources.

#### *Renovation of Deteriorating Conduits continued from p. 2*

Renovation of a deteriorated conduit is not always an option, but when the conditions are right it can provide many benefits over removal and replacement. At Lower Big Blue Natural Resources District's (LBBNRD) Big Indian Creek 5-A, the reservoir is used for irrigation, so draining the reservoir for an entire season to replace the conduit would have likely meant lost crop revenues for the land owner. After the LBBNRD completed some initial prep work, the contractor moved in with the CIPP and within a few hours the rusted CMP was lined with a rigid, smooth plastic liner. The final cost to the LBBNRD for the renovation was about \$30,000, far less than the \$54,000 that was estimated for removal and replacement.

**Significant challenges lay ahead for many dam owners in Nebraska as their dams reach the end of their original design life and it is important to start planning now.**

Fortunately, new technologies have been developed over the past thirty years that will help in the inspection and repair of these dams. If the 1960s were the "golden age" of dam building, it appears the 2010s will need to be the "golden age" of dam renovation.



# Republican River Basin Forecast

By Jesse Bradley, P.G.



The Nebraska Department of Natural Resources (DNR) released its **Dry-Year Forecast of Water Supply and Depletions in the Republican River Basin**.

Pursuant to Nebraska Revised Statute 46-715(6), in consultation with the affected natural resources districts (NRDs), DNR is required to provide an annual short-term and long-term forecast of the maximum water supply available for use while **ensuring compliance with the Republican River Compact**. The DNR has determined that the short-term forecast should apply to the coming year, and that the long-term forecast should be for a decade later.

The forecast focuses on estimating the water supply in the basin assuming that dry conditions will exist next year. The forecast serves as a key tool in proactively identifying dry conditions so that Nebraska can ensure compliance with the Republican River Compact.

The DNR predicts that Nebraska's supply of Republican River streamflow during 2011 (if it is a dry year) will be approximately 315,900 acre-feet. The DNR is also predicting that Nebraska will be in compliance with the Republican River Compact under all likely weather conditions. Harlan County Lake is expected to provide a full irrigation supply in 2011, thus the two-year compliance standard above Guide Rock will not be in effect.

Due to the absence of a long-term trend in virgin water supply, the lowest water supply in the future is likely to be similar to the lowest available supply in the past. Thus, the water supply and allowable depletions (assuming several dry years) during 2021 is estimated to be approximately 200,000 acre-feet.

More information regarding this forecast is available by contacting DNR.



Reservoir Location Map

Reservoir Storage Comparison for  
(October 1, 2009 - September 30, 2010)

Reservoir		Capacity <i>Top of Irr. Pool in Acre-feet</i>	Maximum Storage <i>(for Water Year 2010)</i>		Carryover <i>September 30, 2010</i>	
			Acre-feet	% Average	Acre-feet	% Average
Pathfinder	a	1,016,510	1,016,357	113%	695,254	171%
Glendo	a	184,870	183,236	116%	175,936	138%
1. Lake McConaughy	a	1,948,000	1,592,892	104%	1,580,700	129%
2. Oliver <i>(no irr. water stored)</i>	b	1,680	1,121	49%	860	51%
3. Whitney	a	10,000	10,835	104%	5,732	132%
4. Box Butte	a	31,060	*13,660	73%	11,850*	222%
5. Enders	a	44,480	17,106	53%	16,236	100%
6. Harry Strunk Lake	a	37,140	39,813	98%	30,972	134%
7. Swanson Lake	a	120,160	83,147	83%	61,662	100%
8. Harlan County Lake	a	342,560	368,697	113%	303,665	125%
9. Hugh Butler Lake	c	37,780	24,214	74%	5,901	24%
10. Sherman	d	69,080	70,230	103%	52,240	114%
11. Merritt	e	74,490	67,900	92%	47,630	99%
12. Calamus	f	127,400	138,000	115%	60,150	84%
13. Davis Creek	g	32,459	29,350	100%	10,070	82%

This reservoir storage comparison table shows the capacity, maximum storage level reached during **Water Year 2010** (October 1, 2009-September 30, 2010), and the carryover at the end of September 2010 for the largest 15 reservoirs serving Nebraskans (13 of the 15 reservoirs are located in Nebraska, please see reservoir location map).

*Records used for averages  
a 1960-2010, b 1981-2010, c 1962-2010, d 1963-2010, e 1964-2010, f 1985-2010, g 1994-2010*

\* The Box Butte Reservoir capacity was modified.



The **Nebraska Soil and Water Conservation Fund** is a state fund established in 1977 to provide financial assistance to Nebraska landowners installing approved soil and water conservation measures. **Since 1977 the State of Nebraska has provided over \$87 million in state cost-share assistance to Nebraska landowners.** The fund is administered at the state level by the Nebraska Department of Natural Resources and is coordinated by the state's 23 natural resources districts at the local level with technical assistance provided by the Natural Resources Conservation Service. For additional information on the Nebraska Soil and Water Conservation Fund, contact the Nebraska Department of Natural Resources or your local natural resources district.

## Nebraska Soil and Water Conservation Program Update

Approved Soil and Water Conservation Practices	Program Accomplishments in 2010	Total Program Accomplishments 1977-2010
Terraces.....	101 miles	12,283 miles
Terrace Underground Outlets.....	145,429 feet	6,099,040 feet
Water Impoundment Dams.....	4	1,358
Grade Stabilization Structures.....	4	735
Irrigation Tailwater Recovery Pits.....	1	872
Diversions.....	22,802 cubic yards	1,756,304 cu.yds.
Grassed Waterways.....	32 acres	14,173 acres
Water and Sediment Control Basins.....	33	746
Dugouts for Livestock Water.....	4	700
Pasture or Range Seeding.....	1,225 acres	69,606 acres
Critical Area Plantings-Grass.....	92 acres	1,738 acres
Windbreaks.....	3,584 acres	50,739 acres
Windbreak Renovations.....	12 acres	3,883 acres
Irrigation Return Pipe.....	1,560 feet	559,056 feet
Planned Grazing Systems.....	63,596 acres	3,881,170 acres
*Irrigation Surge Valves.....	0	632
Irrigation Water Management.....	23,693 acres	477,156 acres
Repair of Practices.....	15	259
Brush Management.....	0 acres	39 acres
Stream Bank Stabilization.....	0	3
**Republican Basin GW Meter Program.....	0 meters	1,713 meters
**Republican Basin SW Meter Program.....	0 meters	82 meters
***Republican Basin Water Meter Program.....	0 meters	5,451 meters
****Water Mgt. Area Water Meter Program.....	0 meters	504 meters
<b>Totals</b>	<b>\$2,314,935.00</b>	<b>\$87,352,256.00</b>

\* Rescinded as separate practice effective 7/1/94  
 \*\* These practices not used after 7/1/2001  
 \*\*\* This practice not used after 12/31/05  
 \*\*\*\* This practice not used after 3/31/05

January 2011  
 Figures are rounded to the full unit

## Historic Platte River Streamflow

By Jennifer Schellpeper, M.S.

The Department of Natural Resources (DNR) has released a new report titled "Evaluation of Historic Platte River Streamflow in Excess of State Protected Flows and Target Flows."

Overall, this report describes the historic amount of stream flow that is in excess of existing surface water appropriations and the Platte River Recovery Implementation Program flows for threatened and endangered species. Excess water could be used to provide a more reliable supply of water at times when water needs for appropriations and species flows are not met. More specifically, this report is to assist in implementing the integrated management plans of the five Platte River Basin natural resources districts (NRDs) with lands in the overappropriated area of the Platte Basin (Central Platte, North Platte, Twin Platte, South Platte and Tri-Basin NRDs). For this purpose, part of the report is a set of tools that will allow water managers to generate surface water flow and demand scenarios. These scenarios will be directed toward evaluating the potential benefits of multiple water projects. Additionally, this tool will assist DNR in evaluating proposed surface water appropriations in the Platte Basin. A copy of the report can be found on DNR's website: [http://www.dnr.ne.gov/IWM/Reports/PlatteRiverStreamflow\\_1210.pdf](http://www.dnr.ne.gov/IWM/Reports/PlatteRiverStreamflow_1210.pdf).



## Revolving Fund Land Auction

By Kent Zimmerman

Little Blue NRD held a public auction to dispose of the S1/2 of Section 2, Township 4 North, Range 1 West in Thayer County, Nebraska on January 18, 2011. Bill Rut conducted the auction and Anita Meyer, Home & Country LLC provided the brokerage services.

**This land was purchased with funding provided from the Small Watersheds Flood Control Fund.** At its January 26, 2011, meeting, the Nebraska Natural Resources Commission voted to approve the high bid of **\$418,301**.

**Net proceeds of the sale will be returned to the Small Watersheds Flood Control Fund for use in acquiring land rights for other eligible projects across the state.** Requests for such assistance have been submitted by the Nemaha NRD for land rights on their Buck Creek dam site, and by the Lower Platte North NRD for land rights related to seven sediment control dam sites located upstream of their newly constructed Sand Creek Environmental Restoration project.



# Nebraska Resources

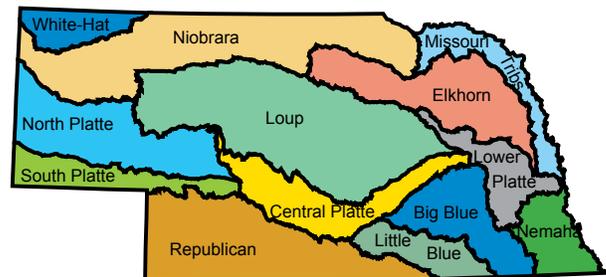
Nebraska Department of Natural Resources  
301 Centennial Mall South, 4th Floor  
P.O. Box 94676  
Lincoln, Nebraska 68509-4676

Return Service Requested

PRSRST STD  
U.S. POSTAGE  
PAID  
LINCOLN NE  
PERMIT 212

## Nebraska Resources page 6

Nebraska's Major River Basins



## Basin Caucuses & NRC Organizational Meeting

Basin caucuses to select Natural Resources Commission members for six river basins were held between January 7 and 16, 2011. Caucuses resulted in four incumbents being selected to continue their service as basin representatives, including Beverly Donaldson (Missouri River Tributaries Basin), Keith Rexroth (North Platte River Basin), Dan Watermeier (Nemaha River Basin), and Richard Hadenfeldt (Loup River Basin). The two new members joining the Commission ranks are Kenneth Brockman (Big Blue River Basin) and Jeff Steffen (Missouri River Tributaries Basin). In addition, Governor Heineman's appointment of Thomas Knutson to serve on the Commission as representative for surface water irrigators was confirmed by the Legislature.

New Commission members joined continuing members to take on their duties at the January 25, 2011, organizational meeting. Officers elected to serve one-year terms were Dan Watermeier (Nemaha River Basin) - Chairman, and Dick Mercer (Groundwater Irrigators) - Vice Chairman.

Additional information on the Nebraska Natural Resources Commission can be found at:  
<http://www.dnr.ne.gov/commembers/commemb2.html>



### State of Nebraska

Dave Heineman, Governor

### Nebraska

### Department of Natural Resources

Brian P. Dunnigan, P.E., Director

The *Nebraska Resources* is a quarterly publication of the Nebraska Department of Natural Resources. We welcome your comments and suggestions.

Printed with Soy Ink

Nebraska Department of Natural Resources....

....dedicated to the sustainable use and proper management of the State's natural resources.