



Nebraska Resources

Newsletter

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

Inside this Issue:

Issue 25, October 2007

- Baseflow vs. Runoff/Cover and page 2
- NDNR Streamgaging/Cover and page 5
- Platte River Conjunctive Management Study/page 2
- 2007 Maurice Kremer Award/page 3
- 2008 Annual Evaluation/page 4
- Modeling Group Meetings/page 5
- Length of Service Awards/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://dnr.ne.gov>

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.gov/dnrnews/newsarchive2.html>.

Baseflow vs. Runoff:

Two Sources of Water for Nebraska's Streams

By Jim Schneider and Jesse Bradley



Streamflow rates in Nebraska are dependent on many factors. Aside from the amount of recent rainfall, flow volumes are dependent on levels of groundwater pumping in the vicinity of the stream, upstream releases of storage water from reservoirs and/or diversions into canals, and land use changes affecting the ability for runoff to reach the stream. All of these factors have a simultaneous impact on the stream, making it difficult to parse out the relative effect of each on the total recorded streamflow.

In the simplest sense, after water falls on the ground as precipitation, it can become streamflow in one of two ways: 1) it flows over the land surface and to the stream as runoff, or 2) percolates through the ground and discharges to the stream as baseflow. In areas where groundwater is discharging to streams, increases in groundwater development (i.e. pumping) will reduce the amount of baseflow in a stream (or in the most extreme case, actually draw water from the stream). Changes in land use, including the implementation of conservation practices (e.g. farm ponds, terraces), can reduce the runoff, though recharge and consumptive use may be increased.

Continued on page 3

NDNR Streamgaging Efforts Support Variety of Needs

By Steve Gaul

The technology may be new – such as satellite data collection platforms or a data aggregation and analysis program with the colorful acronym WISKI. However, the basic goal remains the same – to provide Nebraska with streamflow data that is used for water rights administration, compliance with interstate compacts and decrees, flood forecasting / emergency management, determining supply availability and evaluating streamflow trends. The Department of Natural Resources (Department) streamgaging program provides data for all these uses. The program is operated and maintained by the agency's five field offices, with assistance, data aggregation, and display through the Lincoln office. **The Department is responsible for 84 full time streamgages and runs almost half of the state's approximately 170 streamgages, with the U.S. Geological Survey (USGS) responsible for the remainder. Department staff also operate 94 mostly part-time canal gages.**



Continued on page 5



Platte River Conjunctive Management Study

By Jesse Bradley

A new conjunctive management study is underway to create tools to assist water resource managers in the conjunctive management of groundwater and surface water in the Central Platte Valley. The **Platte River Conjunctive Management Study** is being developed through the cooperation of the Nebraska Department of Natural Resources (NDNR), Central Platte Natural Resources District (CPNRD), Twin Platte Natural Resource District (TPNRD) and Nebraska Public Power District (NPPD) (Sponsors).

The **Conjunctive Management Study** will proceed in three phases. **Phase one**, which has been completed, gathered substantial background information and funding requirements to proceed with phase two objectives. **Phase two**, which is currently underway, will create the tools necessary to evaluate conjunctive management strategies.

Phase three will identify those strategies to be implemented and evaluate methods of implementation.

To assist in Phase two activities,

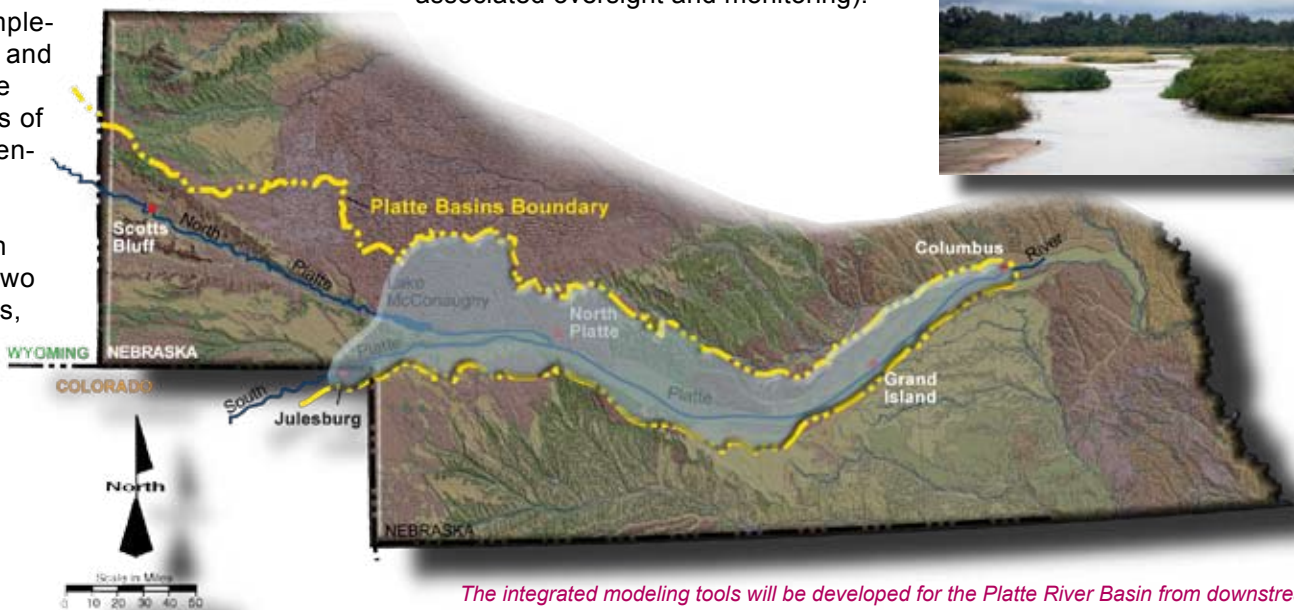
the Sponsors have hired a consulting firm to assist in creating the tools necessary to evaluate various conjunctive management scenarios. These tools include: 1) a **ground-water model** to assess baseflow impacts; 2) a **surface water model** to assess runoff impacts; 3) a **farm model** to assess crop water budgets; 4) an **operations model** to maximize the limited water resources; 5) a **water quality model** to evaluate the impacts of management decisions on water quality; and 6) **economic analysis tools** to evaluate cost effective solutions that will not harm existing users.

The integrated modeling tools will be developed for the Platte River Basin from downstream of Lake McConaughy on the North Platte River, downstream of Julesburg, Colorado on the South Platte River, and the Platte River to the confluence with the Loup River near Columbus, Nebraska (see map below for approximate area). The study will seek to accomplish two basic changes in current water use practices (along with associated oversight and monitoring):

- **Reduce** water use and associated depletions. Reductions could be sought on a temporary (dry period) or permanent basis. Reductions could result from fewer acres, changes in crops, or more efficient irrigation practices. Reductions in water use will result in higher ground water levels and/or higher streamflows.

- **Integrate** the management and use of surface and groundwater to maximize the sustainable supply from the resource. This means management that recognizes the ways in which surface and groundwater are interconnected, and the comparative benefits of each. Typically, streamflow is valued for being a sustainable resource and one with great environmental benefits; groundwater is valued for ease of use and reliability.

Other changes may be considered if they benefit the overall objectives. For example, one potential change would be to import water to increase streamflows. The water source could be upstream surface water, or groundwater that is not hydrologically connected. Note that practices to benefit water quality are not part of this strategic discussion, but will be included in the study.



The integrated modeling tools will be developed for the Platte River Basin from downstream of Lake McConaughy on the North Platte River, downstream of Julesburg, Colorado on the South Platte River and the Platte River to the confluence with the Loup River near Columbus, Nebraska.

Jim Cook to Receive 2007 Maurice Kremer Groundwater Achievement Award



Past Legal Counsel for the Department of Natural Resources, **Jim Cook**, has been selected to receive **The Groundwater Foundation's 2007 Maurice Kremer Groundwater Achievement Award**. Jim retired from NDNR this year after 36 years of service. The Kremer Award was established in

1985 to recognize Nebraskans who have made a substantive contribution to the conservation and protection of Nebraska's groundwater. Selection Committee member and past Kremer honoree, Jim Goeke said, "Jim Cook is a very deserving recipient of the Kremer Award. Jim's accessibility and responsiveness to Nebraska's citizens are qualities exemplified by Maurice Kremer himself, one of Jim's mentors." Committee members also cited Cook's involvement in writing Nebraska's water laws and drafting important groundwater legislation over the past 25 years and his key role in the development and implementation of the Platte River Cooperative Agreement. Groundwater Foundation President Susan Seacrest

described the selection of Jim Cook as the 2007 Kremer honoree as "A natural choice given all that Jim has given to our understanding and protection of Nebraska's groundwater. Jim worked on controversial issues without ever becoming part of the controversy himself. This is a testimonial to his ability to respect and value stakeholder interests while maintaining his integrity and professional manner."

The Kremer Award is chosen by a selection committee appointed by The Groundwater Foundation Board of Directors. Cook will be presented with the Kremer Award at the Foundation's National Conference to be held November 28-30, 2007, at the Sheraton Denver West Hotel in Denver, Colorado.

The Groundwater Foundation is a nonprofit organization based in Lincoln, Nebraska that works to educate the public about the nature and value of groundwater. Since its inception in 1985, the Foundation has offered educational programs and opportunities for youth and adults. For information about **The Groundwater Foundation** and its programs, please visit www.groundwater.org, call 402-434-2740, or e-mail info@groundwater.org.

2008 Modeling Group

As presented in the last newsletter, the Department of Natural Resources is presenting a series of workshops developed for groundwater modeling and technical groups. The schedule, topics, and location for workshops in 2007 were printed in the last newsletter. Additional workshops, topics, and dates have been scheduled and January 2008-April 2008 are shown here. The times and locations will be announced at a later date and will be on DNR's website along with additional information at <http://dnr.ne.gov/docs/currentmeetingschedule.html> or you can contact Doug Hallum at 402-471-1114 or dhallum@dnr.ne.gov. One hour of Engineering Continuing Education Credit is available for each presentation.

- January 31st, 2008: The PWAP Surface Water Accounting Model**
Thursday, January 31st, 2008
From 3:00 pm to 4:00 pm
at the State Office Building
301 Centennial Mall South
Lincoln, Nebraska
- February 28th, 2008: Conservation Practices in Nebraska: An Assessment**
Thursday, February 28th, 2008, Time and Location: TBD
- March 27th, 2008: Developing the Eastern Nebraska Water Resources Assessment**
Thursday, March 27th, 2008, Time and Location: TBD
- April 24th, 2008: Optimization Modeling**
Thursday, April 24th, 2008, Time and Location: TBD

Baseflow vs. Runoff continued from page 1

The NDNR is currently working to evaluate the relative impacts of groundwater development and land use changes on total flow in Nebraska's streams. An important first step in this assessment is to gain an understanding of how streamflow, and more importantly it's two components of streamflow, (baseflow and runoff) have changed through time. Several methods are available to differentiate the baseflow component from the runoff component. NDNR has begun evaluating the

effectiveness and applicability of the varying techniques across the state and plans to prepare a report detailing the methodologies used and any potential limitations.

Once a clearer understanding of applicable methodologies has been developed, NDNR plans to begin individual basin studies beginning with the Republican River and Platte River basins, with other major river basins to follow in the future.



As required by state law, the Department of Natural Resources (Department) has issued the **2008 Annual Evaluation of Availability of Hydrologically Connected Water Supplies** annual report that evaluates each of the state's river basins that have not already been determined to be fully or overappropriated and makes a preliminary determination of which river basins, subbasins or river reaches are preliminarily considered to be fully appropriated.

This year the report has preliminarily determined that the Niobrara River Basin between the Mirage Flats diversion dam in Dawes County and NPPD's Spencer Hydropower facility near Spencer in Boyd County are fully appropriated. This portion of the Niobrara River Basin was determined to be fully appropriated because there would not be sufficient water available to supply any new water uses without injuring existing water users. No other additional areas were preliminarily considered to be fully appropriated in 2007. The report was released October 16, 2007.

The preliminary determination triggers an immediate temporary stay on the issuance of permits for new surface and groundwater uses and ten days after publication of a notice to the public, a stay on the expansion of new irrigated acres takes effect. Within ninety days of the issuance of the report, the Department will have a hearing on the report and its preliminary determination.

The report itself describes the existing water supplies and water uses in each basin in the state that is not already fully or overappropriated and what could be expected to be used in the future if there were no further restrictions on new development. For the portion of the Niobrara River Basin that was preliminarily determined to be fully appropriated, the report includes maps showing the boundaries of the

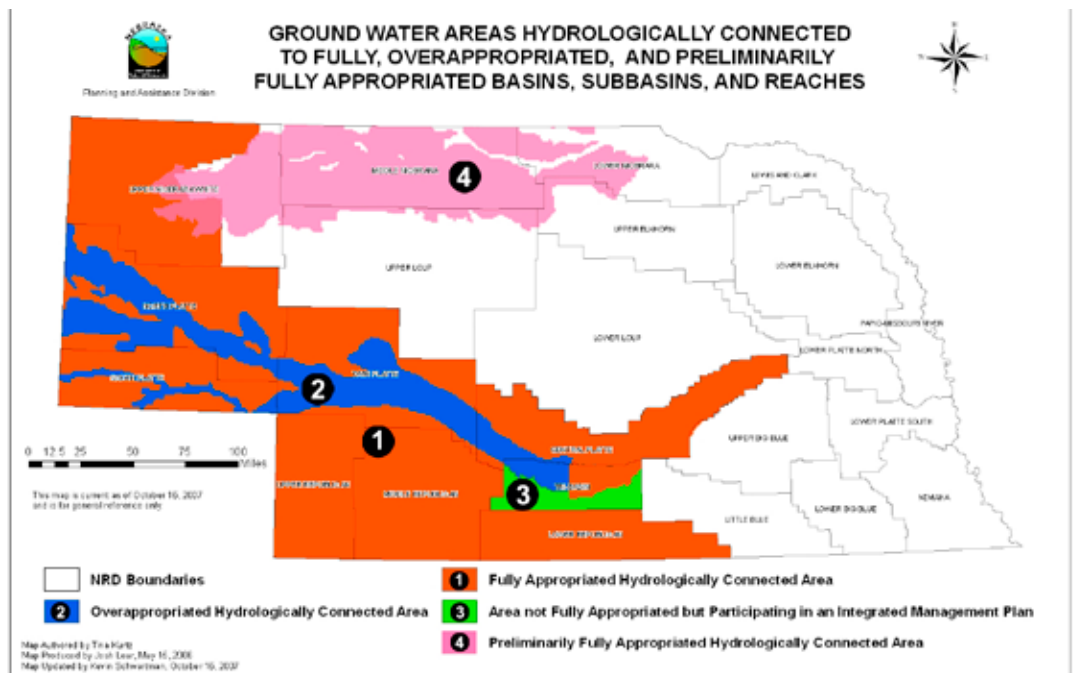
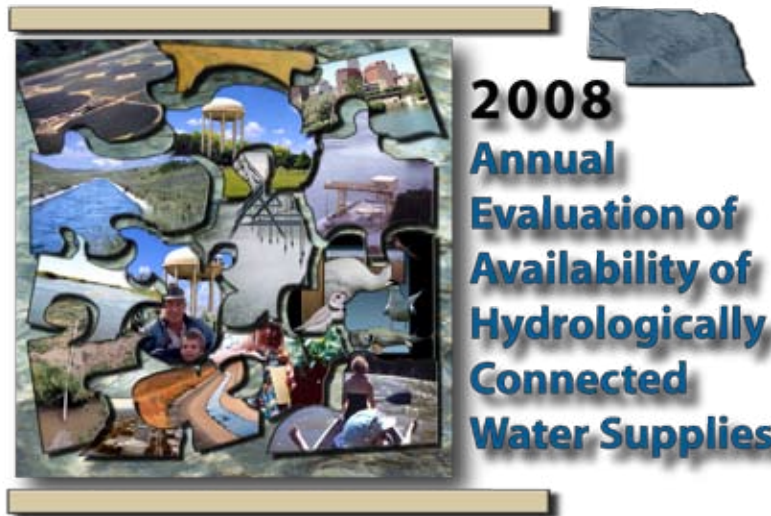
surface watersheds and groundwater reservoirs that are considered to be hydrologically connected to the surface water in the basin.

If, following the hearing held by the Department on its preliminary determination, a basin is finally determined to be fully appropriated, the Department and each affected natural resources district must, within three to five years, jointly develop an integrated management plan for the fully appropriated areas of the basin. In developing the plan, the Department and the NRD must consult with stakeholders in the basin.

If the portion of the Niobrara River Basin described in this article is finally determined to be fully appropriated, plans will be developed for portions of the Upper Niobrara-White NRD, the Middle Niobrara NRD, the Lower Niobrara NRD, the Upper Elkhorn NRD, and the Upper Loup NRD.

Additional information can be found on the Department's website at <http://www.dnr.ne.gov>. The report can be found at http://dnr.ne.gov/LB962/AnnualReport_2008/FAB_Report_Final_2008.pdf, and a map with the newly preliminarily

determined area for 2007 and previously determined areas can be found at <http://www.dnr.ne.gov/LB962/Maps/HydrologicallyConnectedBasins0707.pdf>.



NDNR Streamgaging continued from page 1

When the Department is asked to administer water rights or analyze either depletions to flow or flood risk, it is the stream gaging record that is often one of the first places to turn. How the staff makes accurate readings, the nature of the equipment, and how the records are worked into a useful permanent record will be dealt with in a future issue. However, both the extent of the program and how the electronic technology is used to aggregate data are changing.

Early gage records in Nebraska date to the 1890s when USGS operated a number of gages in cooperation with the State Board of Irrigation. By 1940 there were more than 40 USGS gages in Nebraska.



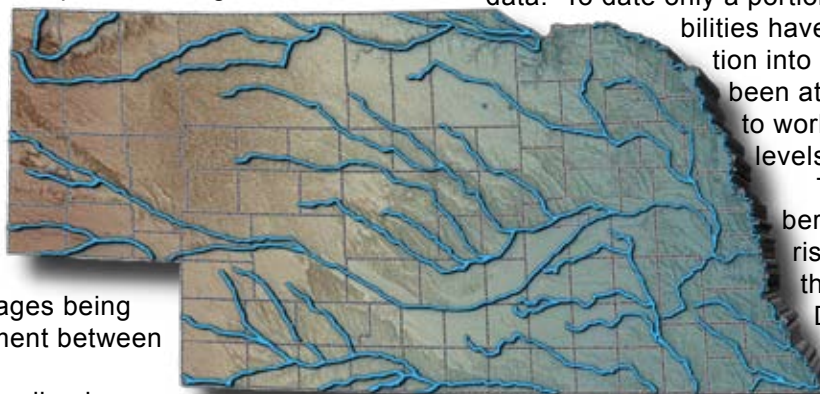
The combined USGS and NDNR gage numbers approached their current levels by the late 1950s. This means that there is a solid record in a number of locations throughout the state which are highly useful for trend analysis. However the total number of gages operated by the Department remained under 20 until the mid 1990s. At that time changes made to require cash funding for the Department's share of the Cooperative Program with USGS resulted in the Department dropping most of its commitment to the program and assuming operation of approximately 50 of the gages. Nonetheless, the Department and the USGS continue to cooperate closely with some gages being operated under an agreement between the agencies.

Maintaining a stable funding base for streamgaging efforts has been a continuing concern as federal funding has fluctuated over time. Some gages are funded through a combination of federal, state and local funds with other state agencies and natural resources districts providing financial assistance. Of all the full time Nebraska stream gages that have ever been in the combined USGS-NDNR system, only about 47 percent are still operating. However, some of those systems were only intended to be short-term at the time they were installed.



In recent years the Department's streamgaging program has benefited from an influx of drought assistance monies from the U.S. Bureau of Reclamation and from legislative appropriations to help implement new inter-related water management provisions of Nebraska's Ground Water Management and Protection Act. The legislative funds have recently been used to help install four new gages in the system. The Reclamation monies were used to purchase satellite data collection platforms to transmit streamflow data, replacing telephone transmission on a portion of the system. In the long term this should help enable streamgaging information distribution to move closer to real-time transmission and posting of data.

The other benefit of the Reclamation drought assistance funds has been the acquisition and partial implementation of a powerful new water information aggregation and analysis software program **WISKI** (**Water Information System – Kisters International**). In the long term WISKI has capabilities to help aggregate data, create graphs and tables, place data on the Web, conduct complex analyses, and facilitate a change to a close to real time approach to posting of stream gaging data. To date only a portion of the program's capabilities have been tapped and integration into agency operations has been at a deliberate pace in order to work within available staffing levels.



Total streamgaging numbers in Nebraska have risen only modestly since the 1950s. However, the Department's role and the sophistication of the collection, display, distribution, and analysis of the data have greatly increased. As Nebraska enters an era where management of interrelated surface water and groundwater is taking center stage, the importance of gage data may be higher than ever. Continuing to accurately collect and display that data is likely to remain a vital Departmental function. Additional information on both NDNR and USGS streamgaging stations can be found at:

<http://dnrdata.dnr.ne.gov/shifts/stream.asp>
and

<http://dnr.ne.gov/WaterReport/StateMap.html>.

Nebraska Resources

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

Return Service Requested

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



Printed on Recycled Paper

Nebraska Resources page 6



State of Nebraska

Dave Heineman, Governor

Nebraska

Department of Natural Resources

Ann Bleed, Director

The *Nebraska Resources* is a quarterly publication of the Nebraska Department of Natural Resources. Your comments and or suggestions are welcomed.

Since 1985, state government, on behalf of the Governor's Office, has sponsored a recognition program honoring both exceptional employees and career service employees. Governor Heineman has proclaimed the month of October 2007, as State of Nebraska Employee Recognition Month and ceremonies honoring both Employees/Managers of the Year and Length of Service were held across Nebraska during the month of October. DNR employees recognized for their length of service were:

- 10 years:** Pat Golti
- 15 years:** Mark Noble
- 20 years:** Mike Thompson
- 25 years:** Ann Bleed
- 30 years:** Susan France
Jim Marburger
Keith Paulsen
Steve Rathje
Jim Retchless
- 45 years:** Tom Hayden

Printed on Recycled Paper with Soy Ink

Nebraska Department of Natural Resources....

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