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Water Conference

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BOB PHARES

RON YODER - Head of Billing
Systems Eng

Water Conference
Thursday, August 17, 2006
North Platte, Nebraska

Dr. Eldon Cernoff -
UWL-Alumn - USDA/ARS

John C. Owens
NU Vice President and Harlan Vice Chancellor, IANR

We've all heard Mark Twain's old adage: "Whiskey is for drinking; water is for fighting over." Twain penned those words in 1884, and while I won't touch his commentary on whiskey, his comment on water remains on target today.

President John F. Kennedy put another way: "Anyone who can solve the problems of water will be worthy of two Nobel prizes - one for peace and one for science."

And one more quote I'd like to share: "I have little need to remind you that water has become one of our major national concerns," U.S. Secretary of Agriculture Ezra Taft Benson wrote in the opening sentence of a USDA Yearbook of Agriculture foreword dedicated entirely to water. If you can't quickly place Benson as the secretary of agriculture in your memory, there's a reason - that yearbook was 1955s. Over 50 years later, we remain concerned. And the concern is growing.

No one can live without water. States – and neighbors – go to court over it. In our agricultural powerhouse state, an adequate, sustainable supply of usable water is 'key' to our livelihoods and the State's economy. Listening sessions the Institute held across Nebraska the past few years demonstrate 'water' is a chief concern for 'both' rural and urban Nebraskans, whether we're in the north, south, east, or western-most part of our state. Both water quantity and quality are important to Nebraska, which is second only to California for irrigated acres in our nation.

We are fortunate that in Nebraska we sit over a majority of the largest underground aquifer in the Western Hemisphere, and perhaps the world. We rank 10th in the nation in numbers of streams and river miles in our state, and we have approximately 2,000 natural lakes, mainly in the Sandhills. We're 'stewards' of over 800 sandpits and barrowpits, primarily in the Platte Valley, and over 1,800 reservoirs. We rank 16th in the nation in total wetland acreage. With this wonderful water resource 'comes' a

tremendous responsibility to see that it is sustained and protected for those generations that follow us.

Irrigation has been a key part of "how" we grow things in Nebraska since the 1800s. The earliest record of surface irrigation in our state is in 1879, when an irrigation ditch company was formed right here, near North Platte. Irrigation from surface water developed first in major river valleys. The advent of center pivot irrigation and an abundant groundwater supply caused the next major irrigation-development in Nebraska after the 1960s. Today, about 1/4 of Nebraska's irrigated acres are surface irrigated, and 3/4 irrigated by center pivot.

During the 1950s, part of UNL extension's work in Nebraska was "educating" people to the new technologies of hybrid seed and fertilizer use, and discussing the "benefits" of irrigation. Irrigation management information was developed from University research, as it is today, and many field demonstrations around the state "showed" farmers the benefits of these new technologies.

Through the 1960s and '70s we saw steady growth of irrigation, but there was a "side-effect" we didn't want to see – groundwater nitrate levels were increasing in the central Platte Valley, which had been irrigated "extensively" for about 30 years. The Hall County Water Quality Special Project was initiated in 1979 in Nebraska's Central Platte Valley to deal with the nitrate problem through "voluntary participation" of area producers in programs "designed" to improve irrigation and nitrogen management. During that time, UNL extension initiated educational programs "stressing" the importance of improved nitrogen management, and improved irrigation techniques. Nitrogen management results showed the UNL-recommended nitrogen rate was 79 pounds per acre "less" over the four-year project than was the normal practice at that time. Irrigation management demonstrations showed many people were over-irrigating, as well. The latter habit was the harder one to change.

It is the research and education programs of the recent past that provide the solid foundation on which we build as we “seek” answers for today’s and tomorrow’s water-use and issues, as well.

I’ve been asked to talk today about your land-grant university’s commitment to water research-and-education for Nebraska. Of course I won’t just stop with one word and be done, but I can put that commitment very-succinctly: Strong. The University of Nebraska-Lincoln’s commitment to water research-and-education is strong. It is real. It does not waver. It is long-term, as illustrated by the few of many examples of past research-and-extension work which I just shared with you.

One of the priority goals written into our Institute of Agriculture and Natural Resources strategic-plan is this: “*Develop an integrated multi-disciplinary, multi-functional water resources program addressing Nebraska’s needs that provides statewide, national, and international leadership in water quality and quantity management in the next decade.*”

Certainly the need for that is apparent today, as our state faces this terrible sustained “dragon of a drought,” ripping its way through the seventh year in some parts of Nebraska, literally “fueling” burning trees, pastures, animals, and homes in the Harrison, Chadron, and Valentine areas, and figuratively burning crops, pastures, and people elsewhere, as reservoirs shrink and ponds go dry. We’re seeing interstate-agreements on the Platte River between Colorado, Wyoming, and Nebraska, and between Colorado, Kansas, and Nebraska on the Republican River. We have LB108, known as the conjunctive use bill, passed in 1996, that “recognizes” the connection between surface water and groundwater. And we’re seeing LB962, the integrated management bill with its “goal” of matching the available water supply with historical needs “statewide,” become part of our lives, with its requirements for development of integrated management plans in areas where water is deemed fully- or over-appropriated.

There is no doubt, whether ours is a legal, or ethical, mandate to do so, that all of us in Nebraska must wisely use water as efficiently and effectively as possible.

Of course, drought is not new to the Plains. Many of us here today no doubt grew up hearing our parents or grandparents recount vivid memories of the dirty thirties. Memories of those felled by dust pneumonia; of crops that withered and grasshoppers that flourished; of men who arose at night to pace the house, north, south, east, west, looking out the windows for a cloud, any cloud, from any direction. Clouds that did not come. Rain that was not there.

While we are experiencing drought today, and have our own, and our parents' and grandparents' memories of earlier droughts, drought in Nebraska goes centuries back. We know that from 1220 to 1957 at Ash Hollow, up near Lewellen, there were 21 drought periods that lasted five years or more. The longest of those was 38 years. Thirty-eight years also was the longest period between droughts at Ash Hollow in those 737 years. The shortest-period between droughts was three years.

No, drought certainly is not unknown to us. We can't prevent it, so we must do our best to manage our way through it as efficiently and effectively as we can. For that, we need research and we need education.

We conduct both to enable Nebraska agricultural water users to use water in ways that maximize water use efficiency and profitability, protect water quality, and meet regulatory requirements. We evaluate alternative crops that require less applied irrigation water or alternative crops that are adapted to dryland production that fit into Nebraska's cropping systems, and for which a market exists. We evaluate opportunities for shifting from irrigated to non-irrigated production or other enterprises that will maintain economic viability and sustainability for producers and communities. We work hard to help Nebraska and Nebraskans with the research and education needed to meet the water management issues facing agriculture and our entire state.

We do that and much, much more, as outlined in our strategic plan.

Water is a focus area throughout UNL. We have worked hard to accumulate significant expertise, breadth, and depth of knowledge in this area to help meet the needs of our state. We have faculty members with expertise in climatology, water resources engineering, crop water use measurement, irrigation design and management, agricultural production systems, natural resources economics, modeling at the field and watershed scales, and in groundwater hydrology and modeling.

We seek resources to add strength in an area critical to attaining maximum efficiency in agricultural water use, and that is a complete-understanding of "how" water moves from the top of the plant canopy through the soil surface to the bottom of the root zone, and back to the top of the plant canopy. We want to study that movement from a systems perspective, knowing that research knowledge would combine with current and ongoing research at the university to provide integrated strategies for managing water resources at the field scale, including development of crops with genetic traits that maintain a high level-of-production with a minimum-of-water-used consumptively.

Ultimately we think this would enhance our understanding of water infiltration, storage, and uptake by plants in Nebraska's agricultural production systems. We constantly are seeking ways to help our state manage our limited ~~water supplies~~ in the most efficient, profitable manner possible.

As I talk about the university's overall commitment, I want to provide a few specific examples of what has come from that commitment, as well. For instance, we know the EPA says non-point source agricultural inputs of nutrients into fresh water is the number one cause of water quality impairment in our nation. Excessive nutrients can lead to toxic blooms of algae. Nitrate contamination of groundwater is a significant problem in some parts of Nebraska, where levels exceed the 10 parts per million drinking water limit, and nitrate contamination is expensive to mitigate. Arsenic in rural ~~drinking water~~ is a rapidly-emerging issue, especially in western Nebraska. We've teamed water-scientists with faculty ^{Nut} and staff from ~~UNL~~'s Public Policy Center on this, because the project addresses both water and its societal dimensions.

Recently we invited 10 Nebraskans from across our state to serve on a Water Resources Advisory Panel with the charge, "To provide guidance to the University of Nebraska-Lincoln regarding water resources research, education, and outreach programs, including the Water Resources Research Initiative." We think this panel's input will help us further strengthen our work to address pressing state needs.

I mentioned LB962 earlier. Our faculty are continuing to assist with the Cooperative Hydrology Study modeling-effort along the Platte River, and this model is being used in part to develop water management plans as LB962 is implemented throughout the state. UNL has a cooperative-agreement in place with the Department of Natural Resources to speed-up transfer of the support necessary to assist their efforts to help establish these management plans based on more data.

Data and assistance from our Conservation and Survey Division experts helped make the Cooperative Hydrology Study possible. In fact, the work of Conservation and Survey since 1921 provides the foundation for Nebraska's understanding of the

"connection" between surface and groundwater, and what has become of Nebraska's groundwater resources as we've developed that resource in the last 50 years.

The University's Rural Initiative and our Water Center "together" have hired a new staff member to serve as facilitator between our water faculty, and the NRDs and state legislators - especially those on the Natural Resources Committee - to provide timely information to decision-makers across Nebraska who deal with water quality and quantity issues."

Our Sandhills Biocomplexity project addresses "how" water and vegetation interact" to stabilize the Sandhills over long-time periods. A recent article in *Science* magazine - and we are very happy to have this story in *Science*! - "featured" this research, shedding light on local climate, especially wind, and its effect on the stability of sand dunes during the "megadrought" 800 to 1,000 years ago.

We're in the process of "expanding" our water science major on campus, as-well-as our graduate-program in the water areas. We need people who can research, explain, and educate what we

all, as thinking human beings who make decisions in our own lives and whose decisions affect the lives of others, need to know about water.

Our researchers developed the Water Optimizer, a decision-support-computer-program that became available last year to help farmers make more informed choices that conserve water and producer profits. Nearly 700 producers "downloaded" or bought the tool in 2005. It lets users enter individualized information and calculate which crops will be most profitable with the given costs and available water. By running "what if" scenarios, growers can see the best options for farming with limited water, whether it be growing different crops, irrigating fewer acres, applying less water to existing crops, or transiting to dryland farming.

We all know irrigation-water is at a premium in Nebraska's Republican River Basin. University of Nebraska-Lincoln Extension "launched" the Republican River Basin Irrigation Management Project to show "how" timing-and-amount of irrigation applied affect crop yields. The demonstration project "focuses" on teaching

producers "how" to produce nearly full yields with less water. For example, the project showed that a water miser strategy used 31 percent less water while reducing corn yields only 3 percent.

"Savings in pumping-costs usually more than offset yield loss.

Participants estimated knowledge gained through the program is worth more than \$12 per acre, and two inches of water savings, *which is* 10 percent of the water normally pumped.

One of the "key roles" we see for "your" university is to ensure we have the best data possible for the data-driven decisions that must be made as to how we manage our surface and groundwater. These are not decisions that affect individuals only; they are decisions that matter to our entire state, no matter where we live. We need research to tell us what is the most efficient, effective use we can make of Nebraska's water. We need education, both in our classrooms and through extension education, to help Nebraskans "understand" water's "place" in their lives and in our state. Whether we're working with individual irrigators, municipal water suppliers, NRD board members, newly elected senators, or others, the "more" we all

^{the better off we all will be}
" understand the complexities, ~~as well as the nuts and bolts of~~
~~Nebraska's water situation.~~ We need to know exactly "where" we
all are within that water situation, and we need to know of the
"interdependence" we share in the ways each of us relies on this
life-giving resource. When that happens, we can work together
for the benefit of all. We have tremendous opportunities to
partner with local, state, and federal agencies on all aspects of
water resources in Nebraska, and we must grasp those
opportunities and we must make the most of them.

We are about – we must, *each* of us, be about – using water
more efficiently. The legacy of the 1930s drought was building
dams and developing irrigation. The legacy of today's drought
will be sustainability and quality of life.

We can't make more water, but we can take every
opportunity to learn all we can to make the most of what water
we have.

Now, before I end my remarks today, I want to thank Don
Adams, Director of the West Central Research and Extension
Center here in North Platte and Associate Dean of the Nebraska

College of Technical Agriculture, and all of his team who have worked so very hard to put on this conference and to provide us all the excellent information available from the speakers taking part today. I also want to especially thank Bob Klein and Jim Goeke for their assistance in providing me especially good information for this day. And as I end I want to share a Ben Franklin quote Bob Klein shared with me. Franklin said ,“When the well is dry, we know ‘the worth’ of water.”

We know water’s worth in our state, and we are working to preserve it. Thank you to everyone who attended today. We are your land-grant university. You’re the reason we’re here. Thank you.