

# U. S. Bureau of Reclamation

## Great Plains Region Water Conservation Field Services Program

### Part II - FY2004 Program Activity Highlights

#### Background

*'The Mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.'*

The Reclamation Program was created by the Reclamation Act of 1902 to reclaim the arid West and to provide economic stability in the 17 western states by developing irrigation projects. Over time, these single purpose projects gave way to the development and construction of multipurpose water resource projects with increasingly greater emphasis placed on the efficient use of developed water supplies, the protection of societal and environmental values, and the protection of the Federal investment and its infrastructure.

In 1996, Reclamation initiated the Water Conservation Field Service Program (WCFSP) to encourage water conservation and efficient use of water supplies on Federal Reclamation projects, as well as foster improved water management on a watershed basis throughout the western states.

The purpose of the WCFSP is to actively encourage water conservation, assist irrigation and other water districts in developing and implementing water conservation plans, and complement and support other state and local conservation efforts. In addition, it helps Reclamation fulfill other obligations under other Federal directives, i.e., Fish and Wildlife Coordination Act of 1958 and the Endangered

Species Act of 1973. It provides Reclamation the opportunity to broaden partnerships with other Federal and non-Federal agencies in fostering improved watershed management.

While the program emphasis under the Reclamation Reform Act of 1982 (RRA) is to work with Reclamation projects, the WCFSP is also designed to contribute to watershed management partnerships outside of Reclamation projects in order to improve fish and wildlife habitat associated with water systems or water supplies affected by Reclamation projects.

The Great Plains Region administers Reclamation projects in Montana, North and South Dakota, Colorado, Wyoming, Nebraska, Kansas, Oklahoma and Texas and has a great diversity of irrigation and non-irrigation related constituents. In addition to irrigation districts, Area Office WCFSP Coordinators work with tribal entities, rural water systems, non-profit organizations and municipalities on water management and conservation issues.

Area, Regional, and Denver offices provide technical and financial assistance in the four emphasis areas of the WCFSP:

- Conservation planning
- Conservation education
- Demonstration of innovative conservation technologies
- Implementation of conservation measures.

Following is a summarization of selected activities undertaken by program partners and Reclamation in FY 2004. The activities are organized by the four program emphasis areas.

### Conservation Planning

#### Dakotas Area Office (DKAO) - Conservation Plan Development

DKAO encouraged water districts to develop, update, and implement water conservation and management plans. Technical assistance and guidance was offered to all interested water users in preparing conservation plans. Seven conservation plans from irrigation entities and six from municipal and rural water entities have been

received and commented on by DKAO. Of the ten irrigation entities in the Dakotas receiving Reclamation water, only three are required to submit plans under RRA.

### **DKAO - Rural Water Systems**

DKAO is involved in the planning, design, construction, operations and maintenance of numerous rural water systems in North Dakota and South Dakota. Project sponsors of these systems are required or encouraged to develop a water conservation plan. DKAO staff provide assistance with development, review, and update of plans.



Installing water line on the Mini Wiconi Rural-Water System, SD

DKAO worked with the South Dakota Association of Rural Water Systems and North Dakota Rural Water Systems Association to provide training, technical assistance, and develop educational programs for the rural water distribution systems.

### **DKAO – Area Irrigation Specialist, North Dakota State University (NDSU) Extension Service**

DKAO participates in a Bridging-The-Headgate cooperative agreement with NDSU, and the Garrison Diversion Conservancy District to cost-share an Extension Irrigation Specialist. The objective of the agreement is to provide local, federal and state coordination and collaboration on planning, educational, and demonstration activities related to irrigation development and water conservation within the Garrison Diversion Project. NDSU has significant irrigation expertise and all parties have a vested

interest in efficiently utilizing water resources in the state. .

### **Eastern Colorado Area Office (ECAO) - Arkansas Valley Salinity Study - Colorado State University (CSU)**

This cost-sharing project educates irrigators and water managers in the Arkansas Valley about salinity and water logging problems and their solutions through field days and workshops. Project findings will be disseminated through appropriate venues and the interaction and feedback of decision-makers will be sought. Efforts will be made to gain direct input in the development of alternative solutions for consideration in CSU model development.



### **ECAO - South Platte Basin Salinity Study – Northern Colorado Water Conservancy District (NCWCD)**

This project entails a six-year data collection effort of salinity within NCWCD boundaries. NCWCD's Irrigation Management Service group will be collecting water and soil samples. They will also be using the dual EM-38 to determine levels of salinity within fields. Project findings will be disseminated through appropriate venues and the interaction and feedback of decision-makers will be sought.

### **Montana Area Office (MTAO) – Water Conservation Plans**

Through a cooperative agreement, the Montana Department of Natural Resources and Conservation assists irrigation districts in the Milk River Basin to develop, implement, and update quality water conservation plans.

### **Nebraska-Kansas Area Office (NKAO) - Conservation Plan Development**

NKAO's priority was to work with irrigation districts to update water conservation plans. NKAO continues to provide assistance in reviewing and updating water conservation plans for 12 Reclamation irrigation districts. NKAO has also provided planning assistance to private

irrigation districts.

### **NKAO - Water Supply Contract Renewals – Republican River Basin – Solomon River Basin**

Water conservation commitments were made by irrigation districts in the Republican and Solomon River basins in order to receive 40-year contracts. NKAO has provided technical and financial assistance to these districts in order to meet system and on-farm efficiency goals set by these commitments. NKAO and these Districts hold annual operations meetings to discuss current year operations, historic operations, completed and planned conservation measures, and future water supplies and system improvements.

### **Oklahoma-Texas Area Office (OTAO) - Wholesale Water Provider Conservation Planning**

In 2004 Reclamation provided technical assistance to Arbutle Master Conservancy District and Canadian River Municipal Water Authority to revise their Water Conservation Plans (WCP). The WCP revisions will result in new conservation measures identified for implementation over the next 5 years.

### **OTAO – Municipal Water Conservation Planning**

In 2004 the City of Wichita was provided technical assistance by Area office and TSC staff in updating their WCP. The City is currently working to finalize the revised document.

### **OTAO – Agricultural Water Conservation Planning**

Lugert-Altus Irrigation District was provided technical assistance by Area Office and Denver TSC staff in updating the District’s WCP to identify new conservation measures planned for implementation. In addition, technical and financial assistance was also provided to Tom Green WCID#1 in updating their WCP.

### **OTAO - Lined Lateral Rehabilitation Study**

Tom Green WCID#1 was provided federal funding to conduct a study to evaluate options to rehabilitate sections of damaged concrete lined laterals in the District. Ponding tests conducted

by the District in conjunction with the study revealed that seepage losses are essentially the same in damaged and undamaged sections.



Typical damaged concrete lined section at Tom Green

### **Wyoming Area Office (WYAO) - State Water Conservationist Position - Wyoming Water Development Commission**

This is the eighth year of a cooperative effort between the State of Wyoming and Reclamation to improve water management and conservation within the state. Wyoming has an interest in the success of the WCFSP, and the Wyoming Water Development Commission (WWDC) has significant expertise in the area of water management improvements, evaluations, etc. This effort will reduce duplication of efforts and provide for a larger technical resource pool to draw from. Also, it is anticipated WWDC will be capable of working most efficiently with water users in providing assistance in developing and implementing water conservation plans.

### **Conservation Education**

#### **DKAO – Irrigation District Training and Education Opportunities**

Financial assistance was provided to water entities to participate in education and training activities related to water management and water operations. DKAO has agreements with North Dakota State University (NDSU) and South Dakota State University (SDSU) to provide educational information and activities to Reclamation water users. The activities included workshops and field-days as forums to discuss irrigation management, irrigation scheduling, estimating

crop water use, and improving irrigation efficiencies.



Teaching about Reclamation dams, water conservation, and letting kids build a dam

DKAO participates in Children's Water Festivals in North Dakota and South Dakota as an opportunity to educate elementary grade students in all facets of water.

### DKAO – Water Education Festivals & Displays

DKAO sponsors and participates in annual water conventions in North Dakota and South Dakota in cooperation with the South Dakota Association of Rural Water Systems and North Dakota Rural Water Systems Association.



Belle Fourche SD, Farm and Ranch Expo

### DKAO – Crop Water Use and Irrigation Scheduling Information

SDSU installed and renovated weather stations in Reclamation Irrigation Districts with funding provided by DKAO. The weather stations provide weather and crop water use information for Reclamation projects in South Dakota. The District plans to develop an internet web site to

provide soils, water, cropping information, and maps to producers.

### ECAO - Rain gauges in Northern Colorado - Colorado Climate Control

This program gives the community in Northern Colorado an opportunity to learn more about their local weather. This is accomplished by providing participants with ECAO sponsored rain gauges. They report to the Colorado Climate Control Center in Fort Collins, any precipitation that occurs throughout the year.

### ECAO - Water Festivals – Northern and Southeastern Colorado Water Conservancy Districts and Local Municipalities

A Children's Water Festival is an opportunity to educate 4<sup>th</sup> and 5<sup>th</sup> grade students in all facets of water. Reclamation has helped to financially sponsor about 7,000 students along the Front Slope of Colorado.



Water festival activity at Boulder, CO

### ECAO - WCFSP Resource Center



Display of tokens with Otto Otter

The center has water management information, videos, posters, books, publication, and water conservation tokens and prizes, and all is available to the public.

### **ECAO - Discovery Center Science Museum Water Exhibit - Fort Collins Water Utilities**

Through a cooperative agreement, a display of the water cycle was developed and installed in northern Colorado. A control panel with questions and answers is associated with the display to further enhance knowledge of the water cycle.

### **MTAO - Milk River Watershed News**

In cooperation with the Montana Department of Natural Resources and Conservation, MTAO sponsors a quarterly newsletter that is mailed to irrigators in the Milk River Project, along with local, state, and Federal officials, sportsman's groups, and other local citizens. The newsletter is designed to provide timely information to basin residents on issues that have the potential to impact them.

### **MTAO – Water Conservation Education**

With funding provided through a grant agreement, Montana Watercourse was able to provide information, tours and workshops for 2,657 educators and citizens in Montana on



Greenfield's Irrigation District Manager, Bob Hardin talks to school teachers about Gibson Dam

water conservation, watersheds and water resources. They also reached 1,304 students through festivals and direct outreach in addition to the students who will benefit from the information their teachers and parents gained through Montana Watercourse.

### **NKAO – Technical Workshop – Modernizing Agricultural Water Systems**

Through the Bridging-the-Headgate Program, NKAO assisted in hosting a workshop titled “Modernizing Agricultural Water Systems” held on January 13-14 in Fort Collins, CO. The workshop included technologies for stretching water supplies, system modernization developments, flow measurement, available assistance programs, and local case studies.

### **NKAO - Children’s Groundwater Festival**

NKAO is a major sponsor of the Children’s Groundwater Festival, which is held annually in Grand Island, NE. 2004 was the 16<sup>th</sup> year of the festival, which has been used as a model for other states and countries to develop other festivals. Over 3,000 grade school children attended the festival to learn about groundwater and associated water resources. Reclamation provided funding assistance through the Groundwater Foundation and hosted a presentation at the festival.



Reclamation Commissioner John Keys, Aurora 5<sup>th</sup> grader Jennifer Cervantes and Nebraska Governor Mike Johanns assist Reclamation’s Jeff Peterson at the 2004 Children’s Groundwater Festival. Jeff incorporates magic tricks while teaching students the importance of water conservation.

### **NKAO - Project WET (Water Education for Teachers)**

Project WET is an interdisciplinary water education program to advise and promote the awareness, appreciation, knowledge, and stewardship of water resources. Recently Project WET has expanded to supply education seminars to upper level college students who will soon be entering the educational field. NKAO provided assistance to the Nebraska 4-H Development Foundation for support of Project WET, along

with the University of Nebraska Cooperative Extension, the Nebraska Forest Service, and the Nebraska Game & Parks Commission.

#### **NKAO – Pipe Measurement Video**

NKAO and the Water Resources Research Lab worked with the NRCS and the University of Nebraska Extension Service to produce an instructional video titled “Irrigation Flow Measurement in Pipe Systems”. This video provides information on the importance of water measurement and the selection, installation, and operation and maintenance of water measurement devices in piped systems.

#### **NKAO – Flowmeter Testing and Field Operator Training Facility**

NKAO provided technical and funding assistance through agreement with the Kansas Division of Water Resources (KDWR) for the installation of a Flowmeter Testing and Field Operator Training Facility at the University of Kansas (KU). This facility will provide the KDWR and KU with a traceable, defensible, flow measurement standard, which the KDWR can use to facilitate the compliance monitoring of groundwater usage throughout the state of Kansas. Reclamation’s Water Resources Research Laboratory provided technical assistance for the design of the facility and the installation was completed in 2003. The facility was dedicated at a ceremony in February of 2004, attended by Kansas Division of Water Resources Chief Engineer David Pope and Stuart Bell, Dean of Kansas University’s School of Engineering.



Flowmeter testing and field operator training facility at Kansas University in Lawrence, Kansas.

#### **NKAO – Mid-High Plains Education Initiative**

NKAO provides assistance to the Groundwater Foundation for the Mid-High Plains Education Initiative. This project’s initial target was to continue water resource discussions between all interests involved in the contract renewal process, with the first area of focus being the Republican River Basin. Participating groups include irrigation districts, natural resource districts, groundwater guardian groups, public power agencies, university educators, private irrigators, and other local, state, and federal agencies. The goal of the project is to form a local group that will take over the leadership of this education project by 2005



Breakout groups discuss water issues at one of the MHPEI public information meetings.

#### **OTAO - 2004 Water Management Workshop**

The OTAO sponsored tuition for staff from Lugert-Altus Irrigation District to attend the 2004 Water Management Workshop hosted by Reclamation's Technical Service Center in Denver, Colorado.

#### **OTAO – Flow Measurement Improvements - Lugert-Altus Irrigation District**

The District was provided design assistance by Reclamation in 2003 for three new measurement structures. The District constructed two flumes in the spring of 2004. The third structure is planned for completion this winter. These structures will assist the District in better managing the water supply through improved water measurement.



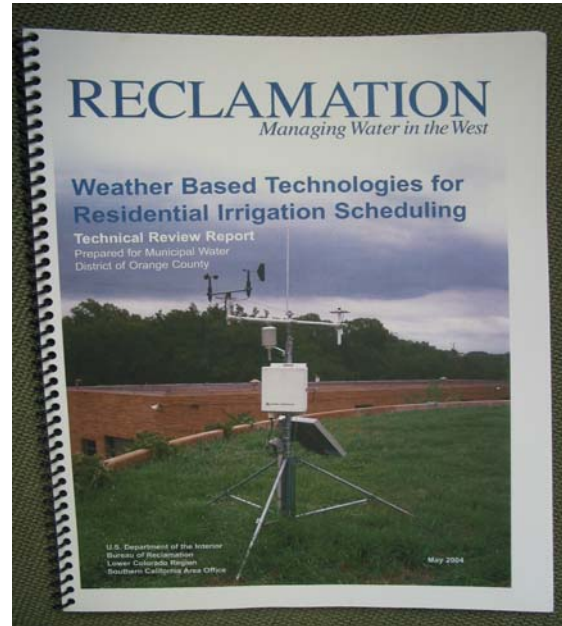
Altus Canal flume constructed by District in 2004

### **OTAO – Learning-to-be-Waterwise**

Funding was provided on a 50% cost-share basis to Foss Reservoir Master Conservancy District. For a number of years Foss has supported the “Learning to be Waterwise” program, developed for grades 4-8 by the nonprofit National Energy Foundation. The Learning to be Waterwise program is a “learn-by-doing” program that teaches 4th–8th graders and their parents about the water cycle and explores sources, uses and conservation of water. Students work with their parents to learn about their own home water use, while installing technologies from their resource action kits to save water, energy, and money on utility bills.

### **OTAO - Technical Report - Residential Weather Based Irrigation Controllers**

In 2004, OTAO staff worked with Reclamation's Southern California Area Office, staff from the TSC and Orange County Municipal Water District to develop a publication which summarizes the operation and features of available residential weather based irrigation controllers. This publication is valuable resource for cities and municipalities around the nation as this new technology in efficient irrigation control is being developed.



### **OTAO - Arbuckle Master Conservancy District Tour -**

In February of 2004, Reclamation arranged for staff from the Central Oklahoma Master Conservancy District to visit the Arbuckle Master Conservancy District to tour the facilities and see recently implemented updates to the District's Telemetry System. Following the tour, Central Oklahoma MCD is working with Reclamation to pursue implementation of similar modernization efforts.

### **WYAO - Children’s Water Festival - Wyoming Children’s Water Festival Foundation**

A cooperative agreement between Reclamation and the Wyoming Children’s Water Festival Foundation provided funds to assist in the 2004 Wyoming State Children’s Water Festival. The Festival provided a unique opportunity to inform large numbers of school children distributed over a large geographic area, of the importance of protecting water resources, responsible water use, and pro-active pollution prevention. This year’s festival attracted over 1,500 4<sup>th</sup> and 5<sup>th</sup> grade students from all over the state. Students were able to participate in a simple hands-on demonstration of how reservoir storage water is delivered to various water users. The demonstration illustrated the basic concepts associated with reservoir storage, water rights, and water delivery.



Reclamation's Jay Dallman demonstrates reservoir storage deliveries at the Children's Water Festival

**WYAO - Water Education Calendar Website - Utah State University, International Office for Water Education**

WYAO was part sponsor in the development of a water education calendar website. The calendar website contains water-related artwork created by elementary students and includes questions and facts about water. The calendar website assist teachers and students in gaining a better understanding of the role water plays in our lives and how we can help deal with future problems.

**WYAO – Using the Landscape as a Classroom, Introduction to Rangeland Perspectives - Wyoming Agriculture in the Classroom**

Reclamation provided funding to Wyoming Agriculture in the classroom. Wyoming Agriculture in the Classroom is working to increase K-12 teachers and students knowledge



Wyoming Agriculture in the Classroom activity

of the benefit, function, and management of watersheds and riparian zones through a consensus-based decision-making workshop for educators.

**WYAO – Irrigation Conservation Workshops for North Platte Valley Water Users - University of Nebraska - Panhandle Extension and Research Center**

Reclamation provided funding to the University of Nebraska to host workshops and operational meetings to highlight new and existing water conservation technologies to assist North Platte Valley water users with making informed water resource management decisions.

**WYAO – Water Management Workshop**

WYAO sponsored the attendance of various irrigation district personnel at Reclamation's 2004 Water Management Workshop. The Workshop is a seminar for supervisors, managers, water masters, and others responsible for or associated with the operation and maintenance of water systems.

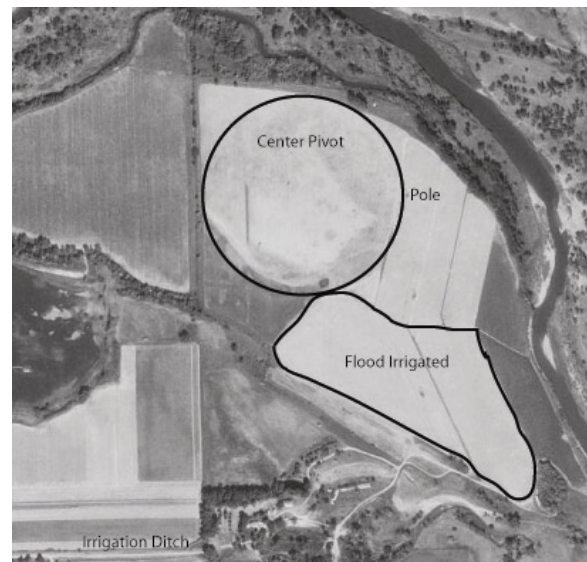
**Conservation Technology Demonstration**

**DKAO – Demonstration Activities**

DKAO has agreements with SDSU and NDSU to demonstrate and evaluate innovative conservation technologies to water users. Surge valves, mini-center pivots, and alternative crops with lower water requirements are some of the technologies being demonstrated in South Dakota.

**DKAO – Mini-pivot Demonstration**

Mini center pivot systems were designed and installed on the Angostura and Belle Fourche



Irrigation Districts on previously flood irrigated fields that have soils types that were difficult to flood irrigate; and topography limiting flood irrigation efficiency. The Belle Fourche site indicated substantial water savings, with the mini pivot applying 75 percent less water than the adjacent flood irrigation system.

Considerable interest in this technology has been generated in the two project areas as evident by over 30 new center pivot irrigation systems being installed since the demonstrations were initiated. This demonstration showed people the ability of center pivots to increase production and decrease labor in a cost effective manner.



SDSU innovative suction filter for center pivot pump near Oral, SD. Flood irrigation to center pivot conversion.

SDSU delivered web-based crop water use (ET) for common crops to the farmers and water managers; maintained and managed automatic weather stations on the Angostura project, Belle Fourche project, Rapid Valley project area to estimate crop water use; demonstrated water-conserving technologies including surge irrigation, sprinkler systems, and discussed Subsurface Drip Irrigation (SDI); continue to provide assistance with the micro center pivot demonstration; develop and mail a newsletter to water users in the project areas.

NDSU demonstrated more efficient management of surface irrigation methods using surge valves; evaluated seepage problems on district facilities; continued to improve and develop effective intake structures that don't plug while pumping irrigation water from a shallow river; designed and investigated a river intake infiltration gallery to supply water free of sediment and floating debris for center pivots; explored alternative intake designs; conducted irrigation pumping plant performance tests; located pump sites in

the Heart Butte Unit using GPS and imported into GIS; continued to develop user-friendly computer based irrigation scheduling tools.



Submersible low water intake designed, constructed and demonstrated by NDSU for the Heart River Irrigators.

### **DKAO - Canal Sealant and Seepage Reduction Demonstration Project**

A cooperative agreement for conservation demonstration and implementation with Buford-Trenton Irrigation District has allowed the demonstration of a sealant to reduce canal seepage. Irrigation districts cannot afford the expense of lining large canals, or replacing canals with pipelines, without substantial financial assistance. The use of a canal sealant to reduce seepage is a cost effective alternative for districts to consider. The district modified their applicator to more efficiently apply the product after discussing the project with other Reclamation districts.

### **DKAO - Xeriscape Landscape Demonstration – Fargo, ND**

DKAO has a cooperative agreement with the City of Fargo, ND to conduct a landscape water



Home of a Fargo Xeriscape study participant

conservation demonstration. Data is being compiled and analyzed comparing conventional lawn water use to Xeriscape landscapes.

**DKAO - Xeriscape Gardens**

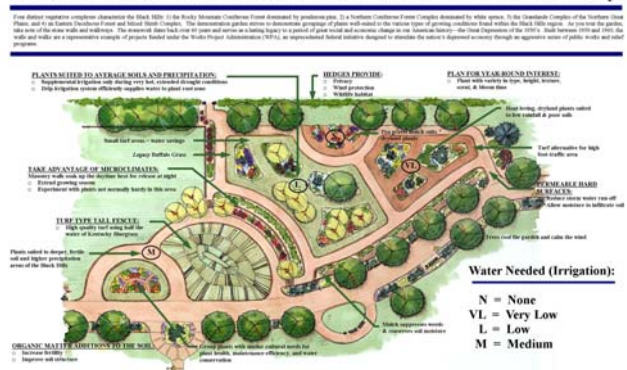
DKAO continued to participate in the Xeriscape demonstration and educational garden developed in cooperation with the city of Fargo, ND. The garden illustrates plantings of very low, low, and moderate water use; alternative turf grasses; a native prairie demonstration; and a riparian plant demonstration. To obtain more information or receive a copy of their free booklet "Discover the Beauty of Xeriscape", visit [www.cityoffargo.com/publications](http://www.cityoffargo.com/publications).



Fargo Xeriscape Demonstration

A cooperative agreement with Rapid City, SD to construct and demonstrate a Xeriscape garden has been successful and the agreement was closed out.

**Welcome to Roosevelt Park Demonstration Gardens Water-Wise Landscape**



Rapid City Xeriscape Demonstration

**ECAO - Xeriscape Demonstration - Metro Water Conservation, Inc.**

In cooperation with Reclamation's Washington and Denver Offices, continued participation in one of five Water Conservation Challenge Grants. This six year cost-sharing agreement with the MWCI is to conduct a landscape water conservation demonstration. Data will be collected, compiled, and formatted for use in a broader framed analysis. Participants include the cities of: Fort Collins, Boulder, Colorado Springs, Arvada and Denver. The study will end in 2004.

**ECAO - Xeriscape Garden – Southeastern Colorado Water Conservancy District (SECWCD)**

The xeriscape garden is the first of its kind in the Pueblo area. This garden educates local users about the type of plants and hardscape to incorporate in their own lawns. The garden is located at the SECWCD headquarters. A variety of local entities contributed time and funds to the garden.

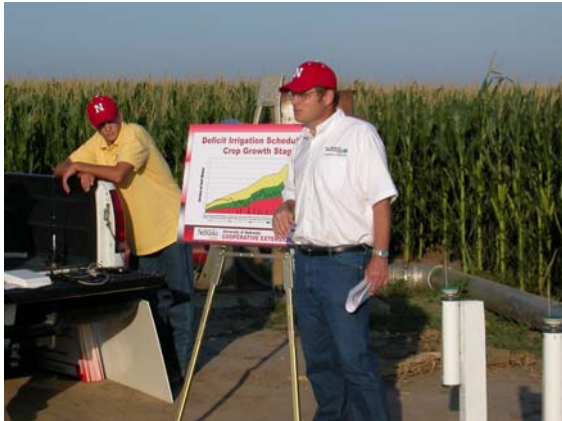
**ECAO - Evapotranspiration rates for Xeriscape plants – Northern Colorado Water Conservancy District**

This project monitors the growth and water usage of 45 typical landscape plants (15 species with three replications of each). Weekly measurements are taken of the amount of water used, with daily observation of two species at a time, rotated throughout the growing season to obtain daily data. The plants are established in drainage lysimeters and the measured area covered by the plants is related to an equivalent coverage area of turfgrass. Based on the size of the plant, estimates of the amount of water being used are compared to turfgrass. The project is to be completed after the 2003-growing season.

**NKAO – Limited Irrigation Management Strategies – UNL Extension Service**

Reclamation continues to provide financial assistance to the University of Nebraska for a Limited Irrigation Management Strategies study in the Republican River Basin. The project demonstrates implications of alternative irrigation management strategies on water use and profitability, specifically for deficit irrigation. Interest in this study has been high due to groundwater pumping restrictions, metering

requirements, groundwater well moratoriums implemented in the four Natural Resource Districts in the Republican Basin, and the recently settled lawsuit between Colorado, Nebraska, and Kansas involving the Republican River Basin.



Steve Melvin, Extension Educator from the University of Nebraska discusses soil moisture holding capacities at Limited Irrigation Management Strategies Field Day held August 3, 2004 at site near Moorfield, Nebraska.

### **NKAO – Surge Valve Loaner Program**

Reclamation works with the Natural Resources Conservation Service (NRCS), the local Natural Resource Districts, the University of Nebraska Extension Service, and various Irrigation Districts to educate and assist the irrigators with field setup, operation, and programming of surge valves. District irrigators can use a Reclamation provided surge valve free of charge for one year. At the end of the year, the irrigator can purchase the valve from the District or return it to the District. The District uses these funds to purchase additional valves that will be used the next irrigation season.

### **NKAO – Canal Trash Screening Devices**

NKAO provides financial and technical assistance to the Twin Platte NRD for the demonstration of various canal trash screening devices. Irrigators in the Twin Platte NRD have been reluctant to install water meters or to utilize more efficient methods of irrigation (such as surge, gated pipe, and sprinkler) because they

feel that surface water cannot be sufficiently screened. This project provides assistance for various types of canal screening devices used by other canal systems that will be displayed throughout the Twin Platte NRD.

### **NKAO – Water Measurement and Improved Delivery Service Demonstration – Pioneer Irrigation District**

Reclamation entered an agreement with the Pioneer Irrigation District (located in eastern Colorado and southwest Nebraska) to demonstrate various water measurement devices and improved farm delivery service installations. Reclamation's NKAO and Technical Service Center provide technical and financial assistance for various installations. Prior to the agreement the District estimated farm deliveries.



Flume installed on Pioneer Irrigation District farm turnout in southwest Nebraska as part of water measurement demonstration

### **NKAO and WYAO – Elbow Meter Technology**

The NRCS, Reclamation's Water Resource Research Lab, the Wyoming Area Office, and the NKAO are working together on a research and demonstration project that will develop and demonstrate an inexpensive elbow meter that will be used to measure pipe flow in the Nebraska panhandle. The WRRL is completing the lab testing of these elbow meters and the field demonstration began in 2002. The NRCS will complete a report of this demonstration following the 2004 irrigation season.



Field demonstration of inexpensive elbow meter at Mirage Flats Irrigation District

**NKAO – Improved Irrigation Efficiency Demonstration Project – KSU**

The NKAO provided financial assistance to Kansas State University (KSU) for an improved irrigation efficiency demonstration project in the Kansas Bostwick Irrigation District No. 2. The



demonstration will compare water use efficiency between subsurface drip, sprinkler, and furrow irrigation systems. A linear move sprinkler was installed prior to the 2002 irrigation season and a sub-surface drip irrigation systems will be in operation for the 2005 irrigation season.

**NKAO - Subsurface Drip Irrigation - University of Nebraska, West Central Research and Extension Center – North Platte**

This project will demonstrate the potential for using subsurface drip irrigation (SDI) to

improve water management and conserve the limited water supplies in southwest Nebraska. Information from this demonstration will be presented in technical papers, conferences and seminars, and field demonstration days. Half of the SDI system was installed in the spring of 2004 and the other half will be installed in the spring of 2005.



University of Nebraska Irrigation Specialist Jose Payero presents information on the SDI system at a field day held on September 17, 2004 at the West Central Research and Extension Center in North Platte, Nebraska.

**WYAO - Subsurface Drip Irrigation - University of Nebraska, Panhandle Research and Extension Center**

This project will demonstrate the potential for using subsurface drip irrigation (SDI) to improve water management and conserve surface water supplies in the North Platte River Valley. In 2004, an 8-acre SDI system was used to irrigate dry beans and corn. The project is investigating the impact on irrigation frequency for corn and dry beans yields using SDI. It will aid the public in developing knowledge on the installation, use, and maintenance of a SDI system in the local area, and provide irrigators an opportunity to observe the SDI in a field setting.

**WYAO - Surge-Valve Demonstration Program - University of Nebraska, Panhandle Research and Extension Center**

Through a cooperative agreement, Reclamation provided funds to the University for providing demonstrations to water user entities of surface-irrigation water conservation techniques, including surge irrigation water management. These demonstrations will help water users identify

conservation measures to include and implement in their water conservation plans.

### **OTAO –Weather Based Irrigation Scheduling - Tom Green WCID#1**

Reclamation provided financial and technical assistance to help implement an Agrimet weather station located at the Tom Green Water



Agrimet Station at Tom Green WCID#1

Control and Improvement District #1. This station is the GP Region's first Agrimet station to be installed outside of Montana. The station will be used to collect local weather data to calculate a daily evapo-transpiration. The data will also be made available on Reclamation's GP Region Agrimet website to assist farmers in efficiently scheduling their irrigations.

### **OTAO – Subsurface Drip Irrigation Demonstration Field Day - Tom Green WCID#1**

2004 was the first year of a cooperative 3-year demonstration program to show that subsurface drip irrigation (SDI) technology is feasible utilizing treated effluent as a source of water. Partners in the effort include Reclamation, Tom Green County Water Control and Improvement District #1, Natural Resources Conservation Service, Tom Green County Soil and Water Conservation Board, Texas State Soil and Water Conservation Board, Texas Cooperative Extension Service. Local irrigators have been slow to adopt micro-irrigation technology in the water district due to concerns about system plugging when using treated wastewater. This project demonstrates design, operation & maintenance, and proper management of a state of the art, high efficiency, subsurface drip irrigation system. The design incorporates water

supply chemical treatment and filtration. This



Cotton irrigated with SDI at Tom Green WCID#1

demonstration will help to encourage local farmers to adopt water more efficient irrigation technologies which save water and further stretch short water supplies in a competitive area. To help highlight the demonstration on June 20, 2004, the partners hosted a field day for approximately 50 local farmers.

## **Implementation of Conservation Measures**

### **DKAO – Implementation of Measures**

DKAO has cooperative agreements with four districts to cost-share the implementation of approved conservation measures on approximately 82,000 acres of irrigated farmland. The measures are: implementing water measurement and accounting systems; installing and rehabilitating water measurement structures; calibrating water control structures; purchasing flow measurement equipment; testing pumping plant efficiency and pump performance; replacing open laterals with pipelines; purchasing surge valves and gated pipe; converting from flood irrigation to sprinkler systems; converting sprinkler systems to drop nozzles and lower pressure; rebuilding pumps to provide optimum pressure and field uniformity; utilizing a spray-on canal sealant; providing training to district personnel on water measurement, water district operation and maintenance, and canal operation and automation.

### **DKAO – Canal Replacement Program**

DKAO has provided technical and financial assistance to Belle Fourche and Angostura Irrigation Districts to assess and replace high loss, high maintenance sections of open ditch



Belle Fourche ID, Angostura Unit, SD - Replacing open lateral with buried pipeline

lateral with buried pipe. These projects reduce system water losses, improve water accounting and scheduling, and reduce seepage impacts to adjacent landowners

### **DKAO – Canal Structure Automation**

Technical and financial assistance was provided to the Belle Fourche Irrigation District to automate the Townsite Lateral gate. Automating this gate will reduce canal fluctuations, relieving problems for irrigators getting too much or too little water, and reduce operational wastes.

### **DKAO - Bridging-the-Headgate Programs**

DKAO entered into a "Bridging-the-Headgate" (B-T-H) cooperative agreement with Belle Fourche Irrigation District and Butte County Conservation District (working through the District Conservationist for the Natural Resources Conservation Service). Agreement is to input project and local utility facilities into a Geographical Information System database; provide technical assistance to the District and local irrigators, and to collect water quality data within the project.

### **ECAO - South Platte Watershed Forum – Northern Colorado Water Conservancy District and other entities in the South Platte Basin**

An adult based educational opportunity for interested people. The forum focuses on issues in the South Platte Basin.

### **ECAO - Arkansas River Basin Watershed Forum -Southeastern Colorado Water Conservancy District**

An adult based educational opportunity for interested people. The forum focuses on issues in the Arkansas Basin.

### **ECAO - Update and Integrate Irrigation Scheduling Program into Web Page - Northern Colorado Water Conservancy District**

This project will increase irrigation efficiency, improve water quality through reduced run-off and deep percolation, and assist farmers implementing Best Management Practices. By developing a precise soil moisture reference standard for tensiometers; updating in field monitoring and reading of tensiometers; and writing software for farmer's accessibility to web-page to run irrigation scheduling program. The project will be completed in 2005.

### **ECAO - Best Management Practices (BMPs) within the Purgatorie River Water Conservancy District's Boundaries - Natural Resource Conservation Service (NRCS)/Spanish Peaks and Purgatorie Soil Conservation District**

Through a cooperative agreement, water conservation and management practices are being developed and implemented on individual farms throughout the PRWCD. Types of BMPs are land leveling, gated pipe, and surge valves. The program is administered through the local NRCS. While in 1996 three farmers participated, the program now has reached 55 of the 172 farmers within the district. The farmer provides 40% of cost for improvements.

### **ECAO - Cooperative Program of Water Resources Data Collection - Southeastern Colorado Water Conservancy District**

This program is in cooperation with the USGS. The USGS monitors three water measurement sites along the Arkansas River. This information helps to manage the movement of water throughout the Fryingpan-Arkansas Project. This program is in its third year. Reclamation provides

financial assistance to SECWCD on a yearly basis depending on the request.

#### **ECAO - Acreage Verification System (AVS) – PRWCD**

Through a cooperative agreement with the PRWCD, development and installation of an AVS database is occurring. The AVS will allow the PRWCD to manage the use of water in the district. The database will allow queries and reports to be produced. The database was completed in Fiscal Year 2004.

#### **MTAO -Computer Based Daily Water Data**

MTAO provided 50% cost-shared funds to Greenfields Irrigation District for the purchase of laptop computers to replace hand written water logs and daily hydrologic data. Benefits include increased tracking of water use which will improve the district accounting

#### **MTAO – Canal Headworks Automation**

Funds were provided to automate the headworks of Paradise Valley Canal. The activity was identified under an engineering assessment conducted last year.

#### **MTAO – Headgate Automation and Measurement**

Funds were provided to Glasgow Irrigation District to repair headgate automation equipment and improve water measurement on the district's main canal.

#### **MTAO – Water Measurement**

MTAO has been work cooperatively with the Milk River Joint Board of Control to install sonar water measurement equipment on the main irrigation canals. MTAO has provided funding to purchase the equipment while the irrigation districts have provided the labor and hardware required to mount the equipment in the irrigation canals.

#### **NKAO – Buried Pipe Program**

The NKAO has provided technical and financial assistance to various districts for the replacement of high loss, high maintenance sections of open ditch lateral with buried pipe. These projects reduce system water losses, improve water accounting and scheduling, and provide on-farm efficiency improvements. Irrigation Districts participating in this program

in 2004 include Frenchman Cambridge, Bostwick in Nebraska, Almena, Kansas Bostwick, Kirwin, and Webster.

#### **NKAO – Nebraska Soil Moisture Monitoring Program – High Plains Regional Climate Center**

The NKAO has provided financial assistance to the High Plains Regional Climate Center (HPRCC) for soil moisture monitoring equipment that will be added to the HPRCC's Automated Weather Data Network throughout Nebraska. This equipment will provide real time data that will assist in accessing soil water conditions, crop growth, irrigation scheduling, and monitoring drought conditions.

#### **NKAO – Water Measurement Improvements**

The NKAO has provided assistance to various districts to improve the accuracy of water measurement. This includes the construction of



Broad crested weir constructed in spring of 2003 on Courtland Canal below Lovewell Dam in north-central Kansas

ramp flumes at the head of canals, providing equipment for remote monitoring, portable pipe flumes for new lateral measurement sites, and purchased ultrasonic meters that Districts can use to check existing propeller meters.

#### **NKAO – Canal Automation – Mirage Flats Irrigation District**

Technical and financial assistance was provided to the Mirage Flats Irrigation District for canal automation. The District has currently has three automated canal sites, and numerous remote monitoring sites. Advances in automation equipment, along with increases in the number of

manufacturers of this equipment, have lowered the costs of implementing these projects.

### **NKAO – Remote Monitoring Installations – State of Nebraska**

NKAO has provided technical, financial, and installation assistance for the installation of remote monitoring equipment on existing and new stream gage sites along the Republican River and its tributaries to assist the Nebraska Department of Natural Resources in administering surface water rights in the basin. Upgrades were made to existing sites in 2004 and additional sites are scheduled for installation prior to the 2005 irrigation season.

### **NKAO – Remote Monitoring Installations – Irrigation Districts**

NKAO has provided technical, financial, and installation assistance for remote monitoring equipment on wasteways and other key canal



Remote monitoring site installed in the spring of 2003 on Bostwick Irrigation District in Nebraska's Franklin Canal west of Red Cloud, Nebraska

measurement sites to improve water management, accounting, and scheduling in the Almena Irrigation District in northwest Kansas, the Frenchman-Cambridge Irrigation District in southwest Nebraska, and the Bostwick Irrigation District in south-central Nebraska.

### **OTAO –SCADA System and Computerized Water Accounting System - Lugert-Altus I.D.**

Under a cooperative agreement in 2004 Reclamation provided 50% cost-share funding to begin a multi-year effort to install remote monitoring and automation capability at key locations within Lugert-Altus Irrigation District,

as well as implement a new computerized water accounting program. Initially, remote monitoring is being implemented in eight locations, and monitoring combined with automation is planned for four sites. Once the project is completed, District staff will also have the ability monitor and control canal flows from the District office as well as from two mobile units installed in District



Mobile interface for monitoring and controlling canal conditions

vehicles.

### **WYAO -Gate Automation - Pathfinder Irrigation District**

Funds were provided for the automation of four large lateral discharge gates in the Pathfinder Irrigation District's canal system. The gate automation allows the District to remotely control the discharge into these laterals, improving the responsiveness of the canal system.

### **WYAO – Farm Delivery Flumes – Farmers Irrigation District**

Funds were provided to the Farmers Irrigation District to purchase a number of flumes for the measurement of on-farm deliveries between two and six cubic feet per second. The flumes enable the District to measure on-farm deliveries not previously measured to improve water use accounting.

### **WYAO – Portable Ultrasonic Flow Meter - Goshen Irrigation District**

Funds were provided to Goshen Irrigation District for the purchase of a portable ultrasonic flow meter for measuring discharge of landowner pumps. Accurate measurement of pump discharge

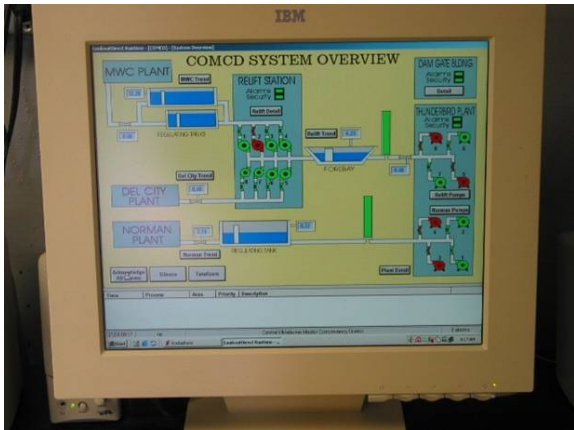
enables the District to improve water distribution and usage accounting within their system.

**WYAO - Frannie Canal Ramp Flume –  
Deaver Irrigation District**

Funds were provided to the Deaver Irrigation District to install a ramp flume at the head of their Frannie Canal. The ramp flume provides improved measurement of canal diversions.

**OTAO – Flow Measurement and Accounting  
– SCADA -Central Oklahoma Master  
Conservancy District**

Funds were provided on a 50% cost-share basis to update the District’s telemetry system. District staff is providing all labor associated with installation of the flow meters and development of the SCADA system.



Central Oklahoma MCD telemetry system interface

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*Vision for the Great Plains Regional Water Conservation Program*

**VISION**

In cooperation with water users, states, federal agencies, local entities and others, we in the Great Plains Region should direct our water management and conservation efforts towards helping water users identify and implement water efficiency improvements that will improve the overall beneficial uses of water and related resources.

Through proactive but judicious use of technical and financial assistance, technology transfer, and education programs, we will work in the interest of the public good by:

- Helping to remedy current problems by providing tools (education, training, outreach) to help resolve, and prevent, similar problems in the future,
- Find ways to provide water for beneficial uses which are presently not being met,
- Reducing negative impacts resulting from inefficient water operations, and
- Improving, enhancing or enlarging current benefits for present beneficiaries.

Through successful implementation of the WCFSP, we in the Great Plains Region will demonstrate to the water user community, the public, states, other partners, and staff, our capability and sincere commitment to managing and protecting the water and related resources to which we are entrusted in an environmentally and economically sound manner.