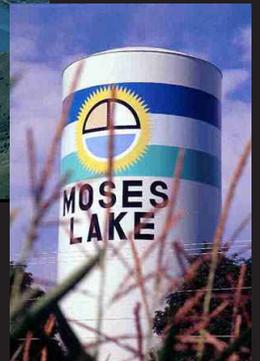
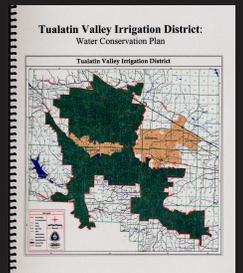




Water Conservation Field Services Program

1997 - 2002



Mission Statement

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.



A Century of Water for the West
1902 - 2002

Commissioner's Message



John W. Keys III

I am proud to be the 16th Commissioner of the Bureau of Reclamation, serving as part of the Department of the Interior team headed by Secretary Gale Norton. This is an historic year for Reclamation as we celebrate 100 proud years of service to the American people on June 17, 2002. Reclamation's history and that of water development and conservation in the West are tied closely together. From the beginning, Reclamation has served the values and needs of the American people. And when those values and needs changed, so did we. Over the past century, Reclamation's projects have enhanced the West's economic growth and quality of life and made major contributions to the Nation as a whole. What began with "single purpose" projects designed primarily for irrigation development, evolved over the years into a variety of multiple-purpose projects now delivering a host of additional benefits.

While we are celebrating our past accomplishments in bringing water to the West, we are also looking toward the future. As the West continues to grow, Reclamation has an important role to play in meeting the ever-increasing demand for our limited water resources. Though Reclamation started as a water development agency, our present and future is water

resources management. Secretary Norton's leadership is a guiding force in all of our efforts. Her principles, including her "4C's"--- *communication, cooperation, and consultation*, all to serve the cause of *conservation* --- set the direction in which I hope to lead the agency.

Today, Reclamation's focus includes a much greater emphasis on the efficient use of developed water supplies. Centered as it is on conservation partnerships, Reclamation's Water Conservation Field Services Program is a prime example of the Secretary's 4C's at work. Established in 1997, the Program continues to be an effective vehicle for encouraging water conservation and the efficient use of western water supplies. Over the last five years, the Program has given birth to a broad range of conservation partnerships at the Federal, State and local levels --- some of which are highlighted in this report.

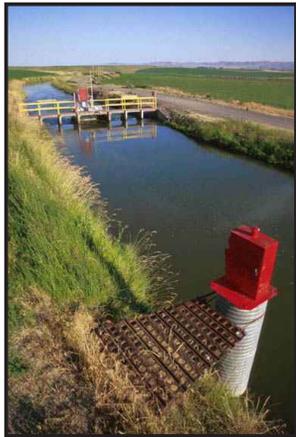
As some of the stories demonstrate, our Water Conservation Field Services Program is one way that Reclamation is encouraging and supporting new and innovative ways to manage the West's finite water resources. The economic viability --- and in some cases the very survivability --- of the citizens, ranchers, and farmers in the 17 Western States is at stake. Reclamation's commitment is unwavering. We are dedicated to finding solutions to the complex water issues facing us today. But Reclamation cannot do it alone. Cooperation is the key to success. By working together with the States, our contractors, our partners, and our stakeholders, we can reach long-term and fair solutions to the complex issues facing not only the West, but the entire Nation and the world.





A Century of Water for the West
1902 - 2002

Bureau of Reclamation



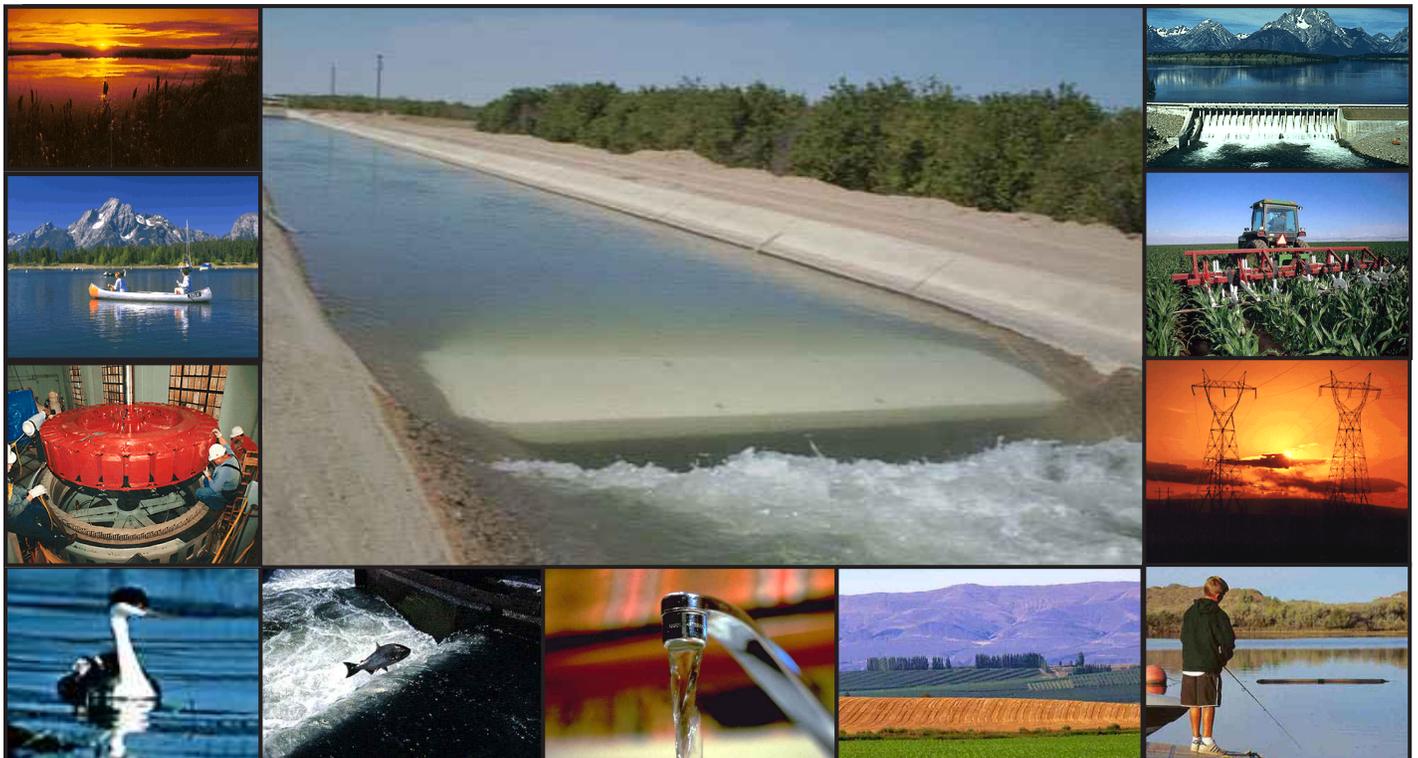
The Reclamation Act of 1902 was passed by Congress to stimulate settlement and economic development throughout the western United States. This was accomplished primarily through the development of western water projects that reclaimed the desert and turned arid western landscapes into some of the most productive farmland anywhere in the world. The Bureau of Reclamation, an agency of the Department of the Interior, became the lead Federal agency supplying irrigation water to agricultural producers throughout the seventeen western states. Over time, these single-purpose irrigation projects gave way to the development of multipurpose water resource projects designed to meet the many needs of a growing West.

Today, Reclamation balances its original mission of supplying agricultural water supply with a multitude of other water resource needs, including municipal and industrial water supply, hydropower production, flood control, recreation, and fish and wildlife protection and enhancement. The current challenge is to manage and maintain the quality of a finite water supply in a West that is experiencing dramatic population growth and associated impacts to aquatic ecosystems. As a result, Reclamation, originally charged with the task of developing, operating, and maintaining these water project infrastructures, has broadened its program focus to include a much greater emphasis on the efficient use of developed water supplies. In 1997, Reclamation established the Water Conservation Field Services Program to work with local water districts and others to help do just that.

Reclamation and the West

Reclamation, the largest water resources management agency in the West, administers or operates 348 reservoirs (with a total storage capacity of 245 million acre-feet), 58 hydroelectric powerplants, and more than 300 recreation sites. With these facilities, Reclamation:

- * delivers water to approximately 10 million acres of irrigated land or about one-third of the irrigated acreage in the West;
- * provides municipal and industrial water supply to urban areas serving over 31 million people;
- * generates more than 42 billion kilowatt hours of energy each year;
- * provides flood control benefits throughout western watersheds;
- * provides water-based recreation activities for about 90 million visitors each year; and,
- * provides water supplies to support habitat for wildlife refuges, migratory waterfowl, anadromous and resident fish, and threatened and endangered species.



Water Conservation Field Services Program

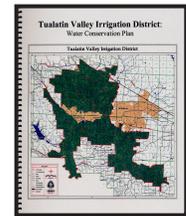
In 1997, the Bureau of Reclamation established the Water Conservation Field Services Program to encourage water conservation and efficient use of water supplies associated with Federal water projects throughout the western United States. The program provides technical and financial assistance to western water districts and other conservation partners in four key areas: 1) Water Management Planning; 2) Water Education and Training; 3) Demonstration of New Technologies; and, 4) Implementation of Efficiency Measures. The program seeks to promote improved water management on a regional, statewide and watershed basis throughout the western United States through numerous partnerships designed to complement and support other Federal, State and local conservation programs. The purpose of this report is to highlight some of these successful partnerships.



Water Management Planning



Reclamation provides technical and financial assistance to agricultural and urban water districts to develop effective water management and conservation plans. Since 1997, Reclamation has assisted 417 entities develop water management plans designed to improve water delivery, system operations and water use efficiency.



Water Education and Training



Reclamation develops education partnerships that promote efficient water use and conservation awareness. Many of these partnerships are aimed at students, teachers and the general public. Others focus on providing technical training for western water districts. Reclamation has supported 654 education and training partnerships with water districts and other organizations since the program was initiated in 1997.



Demonstration of New Technologies



Reclamation supports field demonstrations of new and innovative conservation technologies. Particular emphasis is being placed on finding ways to improve water measurement, modernize and automate facilities, minimize delivery system losses, and reduce overall consumptive use. Reclamation has supported 390 conservation demonstrations since 1997.



Implementation of Efficiency Measures



The implementation of efficiency measures by agricultural and urban water districts is the ultimate objective of the program. Local programs provide technical assistance and financial cost-sharing, generally on a 50-50 basis, through cooperative agreements or grants. Reclamation has assisted 542 western water districts implement a variety of efficiency measures since the program began.



Water Management Planning

Oregon Partnership Proven a Success

Reclamation's Lower Columbia Area Office, headquartered in Portland, Oregon, manages water projects for irrigation and municipal water districts throughout western and central Oregon. In Oregon, the Water Conservation Field Services Program has supported a unique statewide planning partnership among Reclamation, the Oregon Department of Water Resources, and the Oregon Water Resources Congress.

Early in 1997, Reclamation began working with the Oregon Department of Water Resources to ensure that State and Federal criteria for developing district water conservation plans were compatible. Reclamation and Oregon devised a review and approval process for developing one comprehensive plan meeting both State and Federal requirements.

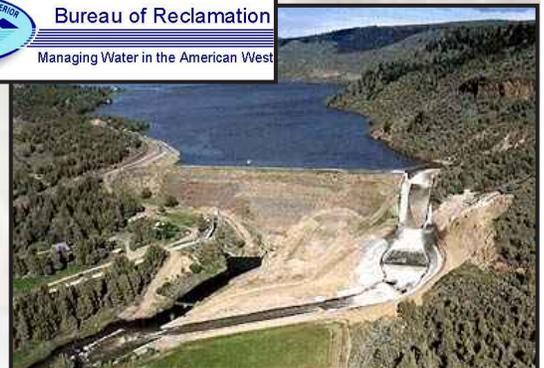
In Oregon, the Water Conservation Field Services Program has supported a unique statewide planning partnership...

The partnership was soon expanded to include the Oregon Water Resources Congress. As the statewide association representing agricultural water districts, the Congress entered into a cooperative agreement with Reclamation in 1997 to help member districts contract for technical assistance to develop their plans.

The North Unit Irrigation District, located within the Deschutes Project of central Oregon, was the first district to complete and receive approval for their water conservation plan through this Federal-State-local partnership in April 1998. Since then, eight other central Oregon districts have completed plans, and

two others are actively underway. The Lower Columbia Area's coordinated effort in central Oregon

has resulted in similar planning agreements between the Congress and Reclamation's Upper Columbia and Snake River Area Offices serving member districts in the Umatilla and Snake River basins in eastern Oregon.





Ute Mountain Ute Farm & Ranch Enterprise

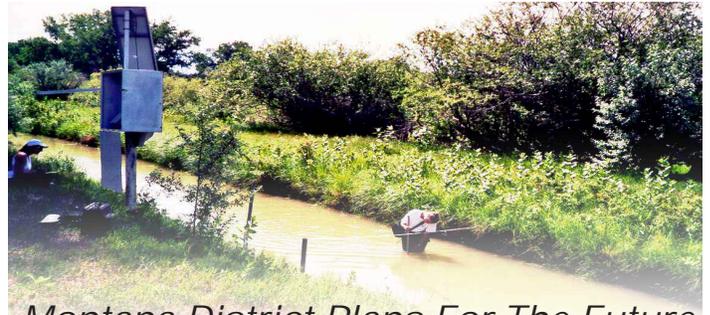
The Ute Mountain Ute Farm and Ranch Enterprise, located on the Ute Mountain Ute Indian Reservation in southwestern Colorado, is an irrigated agricultural project serving 7,634 acres as part of Reclamation's Dolores Project. Reclamation's Western Colorado Area Office began working with the Ute Mountain Ute Tribe in 1998 to develop a comprehensive water management plan for their agricultural operations.

With technical assistance from Reclamation and the Tribe's agricultural management consultant, the plan was primarily funded by the Tribe, and developed by tribal employees. Completed in December 1999, the plan addresses both on-farm and off-farm water management improvements, and serves not only as a schedule for implementing efficiency measures, but as the basis for the farm's annual operating plan, providing guidance on farm development, crop production, marketing, and personnel management.

Over the past two years, the Tribe has begun to actively implement the plan. They have used infra-red photography to identify soil and water management problems, reduced center pivot wheel erosion, implemented high-tech irrigation methods such as precision farming and computerized irrigation scheduling, and sponsored several technical training sessions and workshops for tribal staff, council members, and neighboring



water districts. A xeriscape demonstration project at the enterprise's headquarters is also now included in tours of the farm and ranch.



Montana District Plans For The Future

Over the past five years, Reclamation's Water Conservation Field Services Program has been a valuable resource for smaller western water districts looking to initiate water efficiency programs. The Paradise Valley Irrigation District, located within the Milk River Project in north-central Montana, delivers irrigation water to 63 small farms with a total of 8,300 acres of alfalfa, small grains and potatoes. In 1999, as the district began to develop a water management plan, they discovered the district lacked reliable data to formulate an accurate water budget. With technical and financial assistance from Reclamation's Montana Area Office in Billings, and the Montana Department of Natural Resources and Conservation in Helena, the district installed several key measurement sites that reduced operational spillage (from 4,993 acre-feet in 1999 to 225 acre-feet in 2001). In 2000, the district instituted their first comprehensive on-farm water measurement and accounting program, using portable flowmeters to begin recording all individual deliveries.

A GIS-based inventory of their conveyance system has allowed the district to become an active partner with Reclamation in a project-wide canal efficiency study. Early results have led to a demonstration project to reduce seepage in one of the district's canals. The district has also conducted a demonstration project on a major delivery lateral to promote the use of standardized turn-outs for efficient water measurement.



Among the district's longer-term goals are to increase the district's conveyance system efficiency from 40 to 60 percent (over the next 20 years), improve on-farm efficiency from 25 to 50 percent (over the next 13 years), decrease irrigation-induced salinity, and reduce streambank erosion along the Milk River.



Nebraska District Wins Awards For Planning Efforts

Mirage Flats is a small irrigation district serving 11,662 acres located along the Niobrara River in northwest Nebraska. The district has had a limited, and at times, inadequate, water supply since the project was completed in the late 1940's. With assistance from Reclamation's Nebraska-Kansas Area Office, headquartered in Grand Island, Nebraska, the district took a hard look at their overall water delivery system. They completed a water management plan and a long-range operational plan in 1997.

Many off-farm and on-farm improvements have already been implemented within the district as a result of this comprehensive planning effort. Reclamation assisted the district to install six portable corrugated metal pipe flumes with recorders to better quantify water operations and deliveries. Other improvements include the installation of canal lining, replacement of open-ditch laterals with buried pipe, additional water measurement structures, remote monitoring equipment and canal automation. Educational measures include a surge valve loaner program, several irrigation scheduling seminars, and district participation at Reclamation-sponsored water management courses. A web page allows irrigators to place water orders, review current water records, obtain weather and crop-related information, and review current district programs and policies. And, the district has provided cost-sharing for on-farm irrigation efficiency improvements.

In 1997, the district's efforts were recognized by the Commissioner of Reclamation's Water



Conservation Award. That same year, the district received the 29th Annual Progress Award from the Nebraska Water Conference Council and University of Nebraska Institute of Agriculture. This award is presented annually to a group or organization with outstanding accomplishments in water resources management.

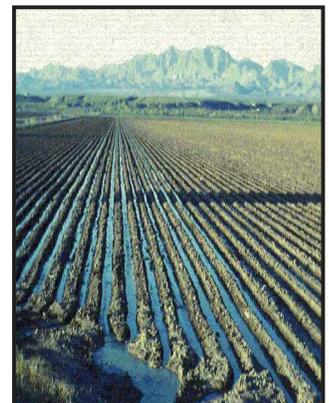


Wyoming State Planning Partnership

Since 1998, Reclamation's Wyoming Area Office has worked closely with the Wyoming State Engineer's Office and the Wyoming Water Development Commission to support effective water management planning by Wyoming agricultural water districts. Reclamation provides funding to help support a cooperative staff position administered by the Wyoming Water Development Commission. This "State Water Conservationist" works directly with Wyoming water districts to prepare water management and conservation plans. Assistance includes investigations of existing irrigation delivery systems, field evaluations, and analysis of water management improvement alternatives.

The State Water Conservationist also develops the conservation component of the State Water Plan. He works closely with the Wyoming Water Basin Planning Program to help analyze the differences in hydrology, available water supplies, and other basin factors and evaluate how those factors influence water conservation opportunities.

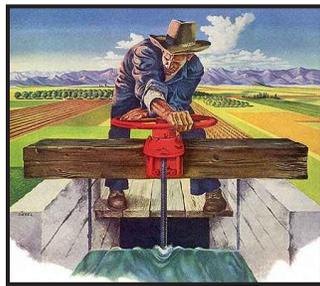
Through this collaborative effort, the State of Wyoming also maintains a Water Management and Conservation Assistance Programs Directory that identifies potential financial and technical assistance for implementing water conservation measures. Available in hard copy and online, it includes an overview of Federal, State and local programs available to water users.





Utah's "Bridging-the-Headgate" Alliance

In 1998, Reclamation initiated an agricultural conservation partnership called "Bridging-the-Headgate" to encourage Federal, State and local water resource and conservation agencies and organizations to work more closely together to ensure the sustainable and efficient use of western agricultural water supplies.



Throughout the 17 western states, local agricultural water districts manage the delivery of irrigation water from Reclamation reservoirs. The term "headgate"

typically refers to the structure that acts like an "agricultural faucet," delivering irrigation water to a farmer's field or ditch system from the water district's conveyance system. Reclamation maintains a close working relationship with state water resource agencies and local water districts, individually, and through such organizations as the Western States Water Council and the National Water Resources Association, respectively.

On the "on-farm" side of the headgate, USDA's Natural Resources Conservation Service, the National Association of State Conservation Agencies, and the National Association of Conservation Districts have traditionally worked closely together to support conservation programs and agricultural water resource management among private landowners, farmers and water users.

The "Bridging-the-Headgate" Partnership is a six-party alliance that includes Reclamation, the Western States Water Council, the National Water Resources Association, the Natural Resources Conservation Service, the National Association of State Conservation Agencies, and the National Association of Conservation Districts.

The purpose of the Partnership is to encourage and support collaboration between local irrigation districts and conservation districts, state water resource agencies and conservation agencies, and local Reclamation and Natural Resources Conservation Service field offices throughout the western United States. A primary objective is to

support the formation of active state-level "Bridging-the-Headgate" alliances that can serve to bring the partnership to life at the local level.

In Utah, for example, Reclamation's Provo Area Office has worked with the Utah Association of Conservation Districts, Utah Water Users Association, Utah Soil Conservation Commission, Utah Division of Water Resources, and the local Natural Resources Conservation Service office to do just that. Although these organizations have worked together informally for many years, they formally joined together 4 years ago to initiate the Utah "Bridging-the-Headgate" Alliance --- a working partnership that has charted new territory in terms of statewide collaboration on agricultural water resource issues.

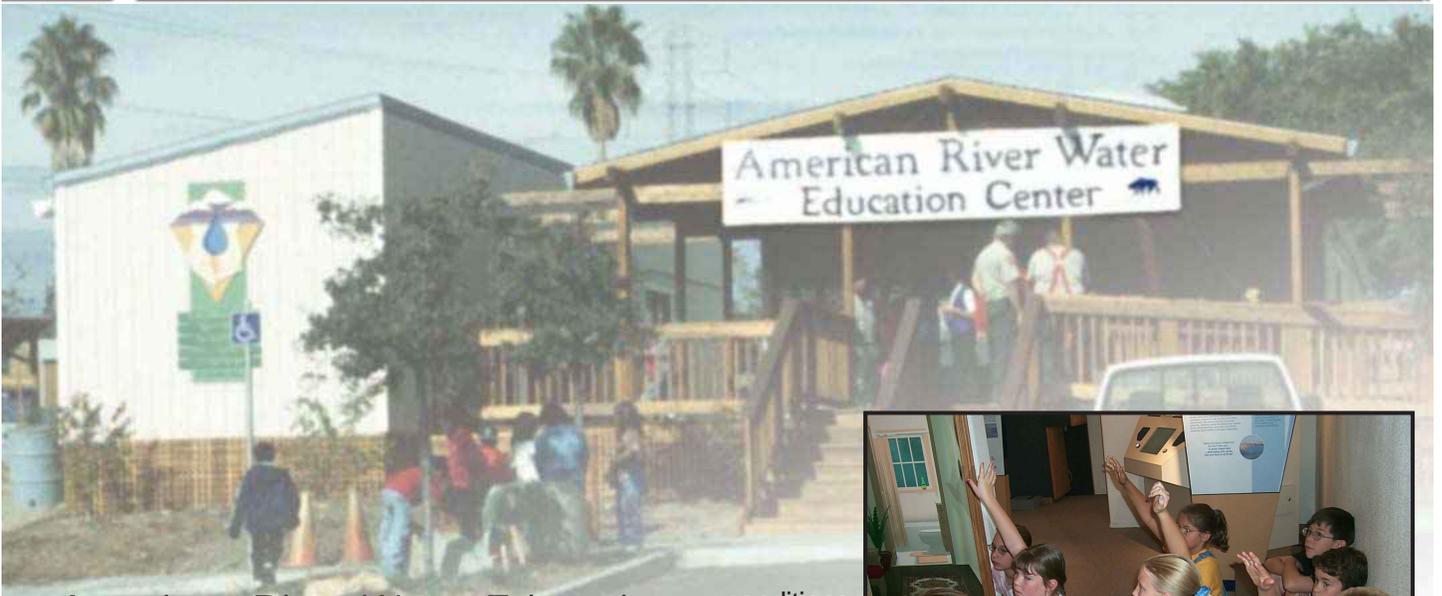


During the past 4 years, the Utah alliance has met regularly to discuss resource management issues and partnership opportunities. The group has hosted several meetings for western water groups, including a national Water Resources Committee meeting and tour for the National Association of Conservation Districts, and a "Disappearing Ditch" Workshop covering urban-ag encroachment issues.

In 2000, the Utah alliance hired a full-time planner to provide technical assistance in water management and conservation planning to water users and organizations throughout the state. The new planner, hired through the Utah Association of Conservation Districts, provides on-the-ground assistance to small irrigation companies in cooperation with the Utah Water Users Association. The partnership in Utah hopes to help provide field-level planning assistance to Reclamation water users and, potentially, to many of the small irrigation companies throughout Utah.

Presently, the Utah alliance is formulating a mission statement and strategic plan for the continuing partnership, and are in the process of investigating innovative methods to fund local water resource conservation projects. Working with local stakeholders and the public, the group also plans to collaborate and work cooperatively on a number of other local issues impacting water districts including continuing development, encroachment on right-of-ways, aging infra-structures, operation and maintenance challenges, new environmental and other regulations, liability and funding.

Water Education And Training



American River Water Education Center Offers Hands-on Learning

Located at Folsom Dam, the American River Water Education Center offers an exciting way to learn more about the American River watershed and the importance of water in California. Located on the American River, Folsom Dam provides water, flood protection, hydroelectric power and recreational opportunities for the Sacramento Valley in central California.

Developed in 1999, the Center operates under a cooperating partnership between Reclamation's Central California Area Office and California's State Parks. The Center was constructed using recycled materials by

Reclamation and a whole host of local water, utility and business partners.

A series of audio-visual and hands-on exhibits provide visitors with a unique opportunity to experience and learn

The American River Water Education Center has attracted nearly 20,000 school children and adult visitors per year...

about the many human and non-human uses of the river and its watershed. Exhibits feature the American River watershed, water uses, and water conservation methods and techniques. Demonstrations at a "sand table" illustrate the dynamics of watersheds, how rivers flow over the land, and the effects of drought and flood



conditions on wildlife and people. The Center also

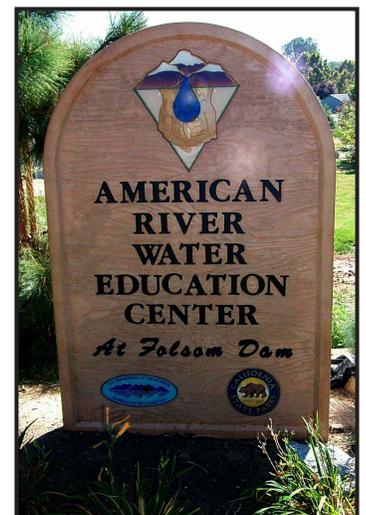


serves as an alternative classroom for local teachers, allowing them to conduct field trips and develop lessons covering the water cycle and a variety of water-related resource topics. A xeriscape (water efficient) garden featuring native and non-native plants and state-of-the art irrigation systems is showcased. The Center hosts or participates in water-related events to increase the public's awareness about water management issues. Future plans include an evening lecture series, new materials

for teachers, visits to local classrooms, and an outdoor classroom, including a pond and stream.

The Center's unique

location within the city limits of Folsom, directly adjacent to the popular American River Recreation Trail, puts it within easy walking and biking distance of nearly 60,000 people. As a very successful complement to the historic tours of Folsom Dam and its powerplant, the American River Water Education Center has attracted nearly 20,000 school children and adult visitors per year since opening in June 1999.





Nebraska Children's Groundwater Festival

When first held in Grand Island, Nebraska in 1989, the Nebraska Children's Groundwater Festival was the first of its kind created through the Groundwater Foundation, a non-profit organization whose mission is to educate and motivate people to care for groundwater. Reclamation's Nebraska-Kansas Area Office has been a major sponsor of the event since 1995, and now helps host over 3,000 students and visitors each spring.



The Festival has become an international model of innovative, hands-on water education for elementary students. The 1998 Festival included the Children's International Groundwater Summit and hosted 27 students from across the United States, Australia, England, Russia, Canada, Panama, and Zimbabwe. The first water festivals were held in the United Kingdom and Panama in 1999. The Festival's third anniversary hosted more than 39,000 children and countless guests.

During the 1999 festival, Reclamation was presented with the Don Nelson Festival Service Award. This award is presented annually to



an individual, agency, or organization that has contributed "above and beyond the call of duty" to the Children's Groundwater Festival.

Reclamation provides funding assistance through the Groundwater Foundation and also hosts a presentation each year. In past festivals, Reclamation has hosted the game show, "Who Wants to be Water Rich?" patterned after the popular "millionaire" game show. Reclamation has also hosted presentations on groundwater contamination, the importance of wetlands, and a "Water Wizard" presentation that taught children about water resources by incorporating magic tricks.



New Mexico Rolling Rivers Study Program

"Have river, will travel" is the new water education slogan in New Mexico and several other western states participating with Reclamation in a "rolling rivers" trailer program designed to train and educate the public and others about watersheds, water resource management, and conservation. The programs, now up and running in New Mexico, Colorado, Arizona, and Montana, are centered around the use of mobile trailers designed and equipped with running water to simulate a working watershed and river system.

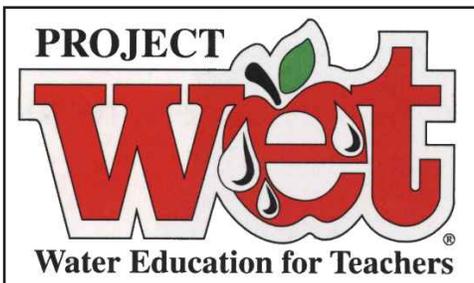
Reclamation's Albuquerque Area Office has provided funding and technical assistance through its Water Conservation Field Services Program and "Bridging the Headgate" Partnership initiative to help establish the Rolling Rivers Study Program in New Mexico. Started in 1998, the statewide program now consists of fourteen river trailers stationed at local soil and water conservation district offices throughout New Mexico. It is administered by the New Mexico Association of Conservation Districts (NMACD) in





partnership with Reclamation, the New Mexico Department of Agriculture, the Natural Resources Conservation Service, and the New Mexico Office of the State Engineer. NMACD works through 47 local soil and water conservation districts in the State to coordinate the use and maintenance of the trailers and provide statewide training for their operation. NMACD schedules use of the trailers on their website and has produced an operation and maintenance training guide that has helped other states start up similar programs. NMACD has also worked with New Mexico State University in an effort called “Ag in the Classroom” to recruit teachers to develop curriculum and lessons for elementary teachers to use with the trailers.

The river trailers have been used extensively at schools, reaching an estimated 38,000 students through the “rolling rivers” program over the past 3 years. The trailers have also been used to reach the general public and others at the New Mexico State Fair, numerous water festivals, and water-related meetings of conservation districts and other organizations around the state. They have proven to be an excellent hands-on way to demonstrate the dynamics of a river and its watershed and promote water resource education throughout New Mexico.



Project WET - Water Education for Teachers

Project WET, or “Water Education for Teachers,” is a nonprofit water education program for educators and young people, grades Kindergarten-12. The original WET program was established in 1984 by

the North Dakota State Water Commission. In 1989, Reclamation partnered with Montana State University to duplicate the original North Dakota program in Montana, Idaho, and later, Arizona. The success of this pilot multi-state initiative led to the development of a national Project WET program. Today Project WET operates in all 50 states, as well as the U.S. territorial islands, Mexico and Canada. The program is administered nationally and internationally through “The Watercourse”, a non-profit water science and education program based at Montana State University in Bozeman, Montana.



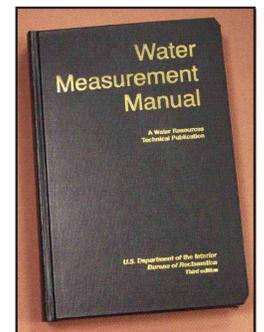
Project WET’s goal is to facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources through State and internationally sponsored Project WET programs. Statewide programs focus on developing specialized water education materials for classroom use, as well as sponsoring local workshops for teachers. Many workshops provide basic water education for teachers, while others offer advanced thematic and investigative sessions exploring wetlands, ground water, water conservation, watersheds, water monitoring, issue resolution, water history, and other water resource topics.

Reclamation continues to support Project WET, particularly at the State level throughout the western states through the Water Conservation Field Services Program.

For more information on Project WET, check out their website at www.ProjectWET.org, e-mail them at ProjectWET@montana.edu, or write them at 201 Culbertson Hall, Montana State University, PO Box 170570, Bozeman, Montana 59717-0570.

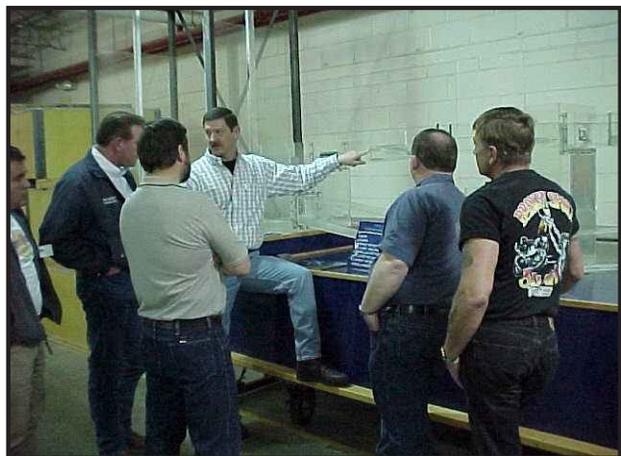
Technical Training in Water Resources Management

Another primary emphasis of Reclamation’s Water Conservation Field Services Program is the development of technical training materials and workshops for western water districts.



The *Water Measurement Manual* is one of the most recognized and used of all Reclamation technical publications. Since 1913, this manual has gone through more than a dozen printings. The most recent edition was produced in 1997, in cooperation with the Agricultural Research Service and the Natural Resources Conservation Service. This manual is available at www.usbr.gov/wrrl/fmt/wmm.

In 1997, Reclamation began working cooperatively with the Agriculture Research Service's Water Conservation Laboratory in Phoenix, Arizona to develop a new Windows-based computer program called WinFlume to design and calibrate water measurement devices. The software facilitates the design of new flumes and weirs to meet specific site conditions and measurement objectives, as well as allowing easy and quick calibration of existing flumes. The WinFlume software was completed in 1999 and is available for free download at www.usbr.gov/wrrt/winflume.

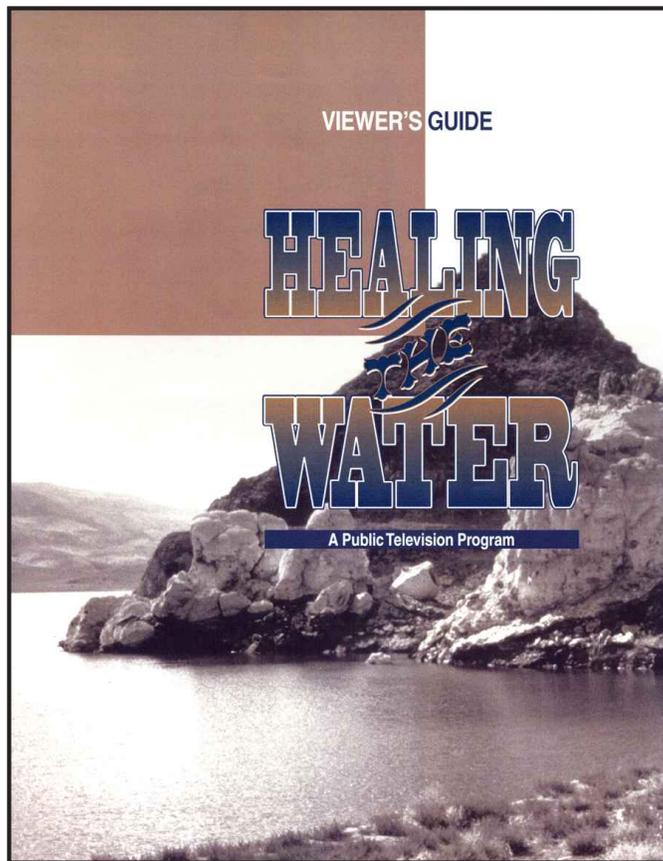


Reclamation's Technical Services Center in Denver, Colorado is also offering a new series of training workshops called "Modern Methods in Canal Operations and Control" and "Basic Principles and Developments in Flow Measurement." Both classes use a model canal system in Reclamation's research laboratory to illustrate the basic principles of hydraulics, flow measurement and canal control. These week-long workshops are offered 2 to 3 times a year, typically during the winter season. Participants include canal operators, water district managers, ditchriders, technicians and engineers from water districts throughout the western states and beyond.

Reclamation also participates with other training institutions to provide water districts with technical training in water resources management. In March, 2000, Reclamation's Klamath Basin Area



Office worked with the California Polytechnic State University's Irrigation Training and Research Center to provide training in water measurement and canal operations for irrigation district personnel in the Klamath Basin of southwestern Oregon. The 2-day class and field day was attended by 30 district technicians, including several U.S. Fish and Wildlife Service personnel who manage the Klamath Basin National Wildlife Refuge.

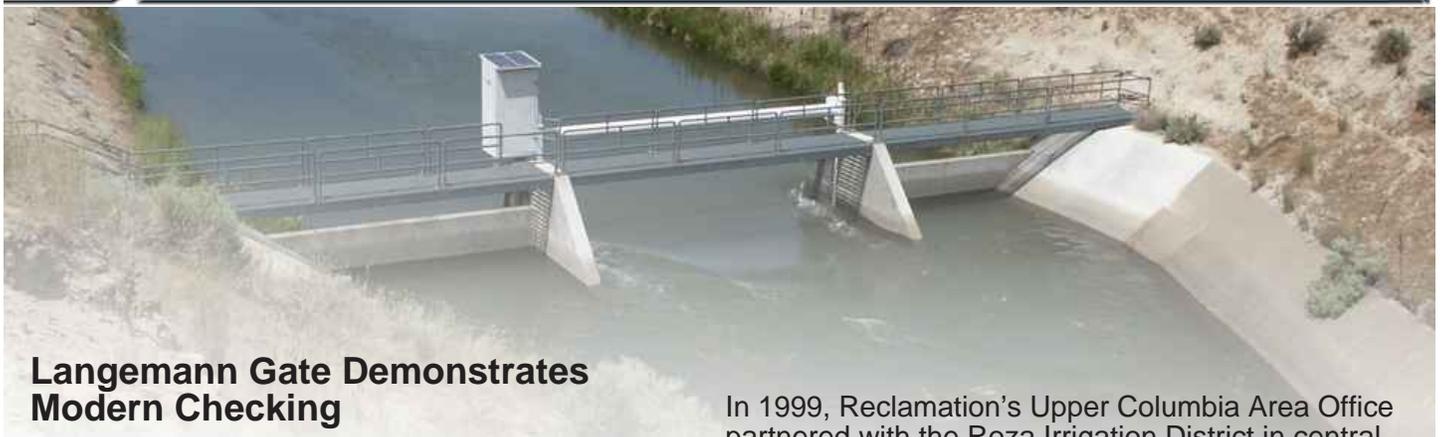


“Healing the Water” Video Featured on PBS

In cooperation with the Water Education Foundation, Reclamation's Lahontan Basin Area Office in Carson City, Nevada, helped produce a documentary video called "Healing the Water." The video addresses local water issues in northwestern Nevada, highlighting some of the complicated water resource management issues associated with the Truckee River and Pyramid Lake area. The story presents a case study about the dynamics of a western water struggle involving numerous stakeholders with diverse cultural, economic and fisheries issues.

The video documentary has been featured on PBS and recently received an Emmy nomination. Reclamation has also helped develop a viewers' guide for the video --- complete with class exercises --- that serves as a powerful teaching tool for children grades K through 12.

Demonstration Of New Technologies



Langemann Gate Demonstrates Modern Checking

Water flows downhill, and western water managers make careers out of controlling that phenomenon in irrigation delivery systems. A "check structure" is essentially a small, controllable "dam" that raises the water level in a canal or lateral allowing the operation of a diversion, pump, headgate, turnout or other water control facility. Check structures help conserve water by reducing the minimum flow required for canal operations.

"Flashboard checks" are a traditional type of check structure that allow a water manager to manually add or remove wooden boards to control the height of the "dam." However, these checks are labor intensive and do not allow the operator to respond to changes in flow regimes, reducing operational efficiency.

As a result, water managers have sought to improve the efficiency

of these open agricultural water delivery systems by automating these check structures with newer gate technologies to maximize water control.

For a number of years, replacing traditional checks with something called an "overshot leaf gate" has worked well; however, they typically require extensive, expensive structural modification to install the new gate. The Langemann gate is a relatively new style of gate, first developed by Peter Langemann in Lethbridge, Alberta, Canada, whose unique, simple and versatile design is easily adapted to existing flashboard check structures. Mechanically, the Langemann gate consists of two leaves that are comparable to a horizontal "bi-fold" door. It operates in a vertical plane in contrast to the 60-degree horizontal plane of a leaf gate. Because of this, it requires very little structural modification to most existing check structures. In terms of operation, the Langemann gate allows for problem-free water level and flow control.

The Langemann gate is a relatively new style of gate ... whose unique, simple and versatile design could be easily adapted...

In 1999, Reclamation's Upper Columbia Area Office partnered with the Roza Irrigation District in central Washington's Yakima Valley to demonstrate how the Langemann gate could improve water delivery operations. The technical and financial assistance provided through Reclamation's Water Conservation Field Services Program has allowed the district to retrofit nine of their major check structures with Langemann gates. The gates help manage water deliveries much more effectively throughout the system.

A conservation demonstration project will test new technologies, as well as show other water districts the potential pros and cons of those technologies. In the true spirit of a successful "demonstration", Roza's Langemann project has been successful and has led to widespread adoption of the improved technology by others. Field tours highlighting Roza's

pioneering work have led to Langemann installations by the East Columbia, South

Columbia, Naches-Selah, the Chelan PUD and Sunnyside Valley Irrigation Districts in Washington, and the West Extension Irrigation District in north-central Oregon. A number of other districts throughout the western states are considering use of the gates.





Xeriscaping in Southern Nevada Conserves Water

Nevada is the driest state in the nation, receiving an average of only 4 inches of rainfall per year. Southern Nevada is also one of the fastest growing urban areas in the nation, with an average of 4,000 people per month relocating to the area. Low precipitation and growing populations are raising concerns about water availability. To complicate matters, Nevada has reached its Colorado River allocation of 300,000 acre-feet per year. In the desert climate of southern Nevada, as well as other parts of the arid Southwest, landscape irrigation for burgeoning suburbs is a serious issue. Sixty-five percent of southern Nevada's water use is residential, and 70 percent of that is for outdoor irrigation.

During the past 6 years, the Southern Nevada Water Authority and Reclamation's Lower Colorado Regional Office Area in Boulder City, Nevada, have co-sponsored the nation's largest study to evaluate the potential for water savings by converting urban landscapes to xeriscaping. The study monitors the results of landscape conversions from traditional turfgrass to xeriscape (low water use) at private residences located throughout the Las Vegas valley.

To date, the demonstration has completed 499 landscape conversions. Preliminary results suggest residential water savings of 33 percent are average for typical conversions at single-family residences, with savings of well over 50 gallons per square foot. Average water savings in summer months is even higher at nearly 40 percent.



Through Reclamation's urban partnership with the Authority, this study provides "real-world" proof of the significant potential for water savings from landscape conversion. The study is in its last year of data collection, with a final report and public workshop expected soon. Meanwhile, the effort's success has convinced the Authority to transition from a xeriscape study to a full-scale implementation program.



Irrigating with Surge Valves and PAM in Eastern Colorado

In the Arkansas River Valley of southeastern Colorado, Reclamation has teamed up with USDA's Natural Resources Conservation Service and Colorado State University's Extension to demonstrate two new weapons in the war against agricultural irrigation runoff and erosion.

The first, polyacrylamide, or "PAM," is a polymer that increases the infiltration of agricultural soils. It is available in liquid or dry formulations and can be applied to an agricultural field in the irrigation water. Only about 1 pound per acre is needed, at a cost of about \$5 to \$6 per acre. Field demonstrations have shown that PAM can improve infiltration by 15 to 80 percent, depending on the soil. It can also reduce erosion as much as 90 to 95 percent.

A second weapon is the surge valve, a valve that can be programmed to release specified amounts of water at specific times. This allows a farmer to customize water releases on a furrow or flood irrigated field. The valve can be programmed to deliver an initial "surge" of water to help seal the bottom of the furrow, followed by a reduced flow that provides a more uniform application and reduces water use.

In 1998, Reclamation's Eastern Colorado Area Office, headquartered in Loveland, Colorado, began working with Colorado State University's Extension to initiate a program to loan surge valves to local farmers. These



valves can be moved from field to field, crop to crop, and have a useful life of about 15 years with battery replacement every five years. Demonstration studies conducted by Extension and the Natural Resources Conservation Service in Colorado indicate that, when compared to conventional irrigation, surge irrigation maintains or increases yields on corn, pinto beans and grain sorghum. This technique also reduces the amount of irrigation water applied, runoff from the field, and soil loss caused by erosion. Using a combination of surge irrigation and PAM in flood-irrigated situations has proven particularly effective at preventing erosion and optimizing the use of irrigation water.



Variable Speeds Improve Pump Efficiency

Reclamation's South-Central California Area Office, headquartered in Fresno, California, encompasses more than 2.5 million acres of irrigated farmland served by the Central Valley Project and several coastal areas, including the Monterey, Ventura River, and Cachuma projects. These urban projects are facing inadequate water supplies, saltwater intrusion, water quality degradation, and expanding urbanization. The vast agricultural area of the Central Valley is also faced with reduced water supplies, high water tables, salinity and drainage disposal problems, and a host of new environmental obligations.

Reclamation has helped establish a demonstration program in the Central Valley to encourage water districts to install variable-speed drive units to existing irrigation pumps, thereby improving management, saving water and energy, and reducing maintenance costs. While a fixed-speed pump can only operate at maximum efficiency for a specific water flow, the variable-speed drives allow pumps to adjust speeds and operate optimally at many different flow volumes. The program has resulted in improved pump efficiencies with energy savings of 15 percent and water use reductions reaching as high as 20 percent.

One participant, Broadview Water District, is located on the west side of the San Joaquin Valley, an area with drainage problems. Return flows in the San Joaquin River do not meet water quality standards for selenium and total dissolved salts. The district's goal is to improve efficiency by recycling water at the district boundary thereby reducing discharges into the river. By automating the system and continuously monitoring water quality, the pumps can be custom-operated at speeds specifically designed to meet the water quality standard.

Reclamation's Upper Columbia Area Office has also worked with water districts in the Yakima Valley of central Washington to demonstrate new ways to improve pump efficiency.

The Roza Irrigation District has been implementing a program to pipe their delivery laterals, and farmers usually give 24 hours advance notice before turning off water deliveries; however, during



emergencies (e.g., when a farm pipe breaks or a line filter clogs) the farmer may turn off his delivery causing a flow fluctuation and damaging the pump. The solution is to have automatic flow control at the pumping plant. Traditionally, this is accomplished with a variable-speed drive that slows down the motor and reduces the pump's rpm. Roza chose to demonstrate a new alternative using magnetic induction technology. Unlike the variable-speed drive, this "MagnaDrive" coupler allows the motor to operate at its optimal design speed while producing a range of flows that can compensate for demand changes within the piped laterals.



Salinity Control through Precision Farming

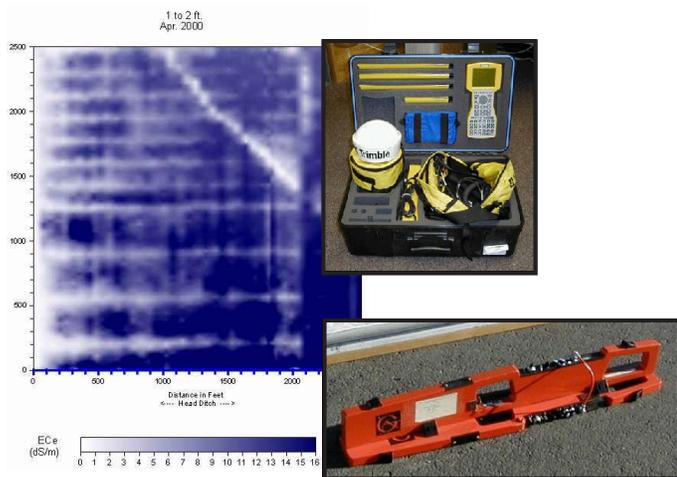
Salinity --- the buildup of salts, toxic chemicals, and pesticides in the soil and associated waters --- is a significant irrigation issue along the lower reaches of the Colorado River in southern Arizona and California.

The area surrounding Yuma, Arizona is a productive agricultural area, with about 1 million acres of irrigated cropland growing almost year-round. In the extreme Southwest, salinity can accumulate, robbing the soil and water of its productive capacity. In fact, more than half of the economic damages caused by salinity in the Colorado River basin occurs in the Yuma area: these damages total more than municipal economic damages in all cities served by the Colorado.

Long-term control of soil salinity can be achieved only by adopting optimal irrigation water management practices, coupled with appropriate cultural, cropping and drainage strategies.

However, it is difficult to manage soil salinity for two reasons. First, agricultural effects are difficult to see --- a crop is just smaller and less productive than it could otherwise be. Second, salinity levels are extremely variable across an individual field and during growing seasons. Traditional soil sampling or testing does not tell the story. Designing an effective on-farm irrigation management strategy requires detailed knowledge of the field's spatial salinity pattern, as well as adequate information about changing salinity conditions over time.

A new technology in the battle against soil salinity is a form of "precision farming" that combines the



use of soil salinity sensors with a Geographic Positioning System (GPS). Referred to as "Mobilized Soil Conductivity Assessment" systems, these units consist of four basic components: 1) one or more soil conductivity sensors; 2) A GPS receiver; 3) hardware interfacing; and, 4) some type of transport vehicle or physical platform. The system can be used to produce comprehensive, accurate and timely maps of a field's soil salinity patterns. The Farmer can use these maps to customize his irrigation management.

Reclamation's Yuma Area Office has been working with the U.S. Department of Agriculture and other partners to sponsor the Lower Colorado Region

Salinity Assessment Network, an organization dedicated to the monitoring, control and abatement of soil salinity within the irrigated agricultural areas of the Lower Colorado region. The program is jointly sponsored by the U.S. Department of Agriculture's Agriculture Research Service; George E. Brown, Jr. Salinity Laboratory; and Reclamation's Lower Colorado Region. The primary purpose is to help equip each agency charged with performing local salinity assessments with tools and training to perform rapid salinity inventory and monitoring; also, to demonstrate the proper use of various salinity assessment technologies. See more about the program at www.usssl.ars.usda.gov/lcrsan/lcrhome.



Polymer Tested to Seal Canals in North Dakota

The Buford-Trenton Irrigation District near Trenton, North Dakota, provides water for approximately 10,400 irrigated acres of sugar beets, barley, wheat and alfalfa. The distribution system includes almost 12 miles of main canal and about 34 miles of laterals and sub-laterals. Most are unlined, resulting in up to 45 percent of water lost through seepage.

In 1999, Reclamation's Dakotas Area Office, located in Bismark, North Dakota, began working with the district to demonstrate a new, cost-effective spray-on canal sealant to reduce seepage. The product's manufacturer claims that up to 90 percent of seepage can be eliminated by using the proprietary polymer referred to as "Seal-It."

It can be applied dry directly into the water stream or mixed with water and applied to the canal prior to release. Trials conducted by the district in 2000 were encouraging, and the district constructed a large volume sprayer to expand their application program in 2001 to cover portions of the canal system with excessive losses. The treatment costs about \$38 per mile for a 10-foot-wide canal. Reclamation and the district are presently evaluating the results of this demonstration.



Implementation Of Efficiency Measures

SCADA Modernizes Sacramento River Water Management

In the world of government programs, it is hard to avoid acronyms. And, in the world of water system technology, it is hard these days to avoid the acronym SCADA. SCADA stands for "Supervisory Control And Data Automation." During the past five years, Reclamation's Northern California Area Office, located in Willows, California, has worked with Sacramento River water users to install SCADA systems to modernize operations and better manage water diversions.

Twelve water districts account for approximately 85 percent of the nearly 2.5 million acre-feet diverted from the Sacramento River north of Sacramento. Total diversions can reach nearly 8,000 cubic feet per second (cfs) which, in low water years can, at times, represent nearly the total available flow of the river. Except for periodic mechanical improvements in pumping technology and canal control, most districts have not changed operations significantly since the Central Valley Project was originally established in California. And, river diversions have historically been measured by mechanical propeller flow meters which tend to be less accurate, labor intensive, and notoriously prone to operation and maintenance problems.

SCADA systems... allow river managers to remotely... monitor and operate key river, pump, canal, and return flow control facilities...

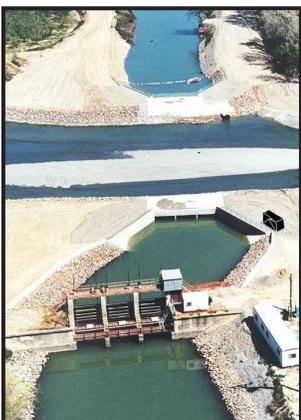
systems throughout the Central Valley Project. With Cal Poly's assistance, Reclamation began working with the Sacramento River districts in 1996 to modernize their diversion and delivery systems with SCADA technology.

SCADA systems, using automated electronic sensors, allow river managers to remotely monitor and operate key river, pump, canal, and return-flow control facilities by computer and radio telemetry. SCADA sites use different types of meters to monitor flows, but older metering technology is giving way to new acoustic technologies. The SCADA equipment receives, accumulates, records and provides data on a "real-time" basis. Individual stations can be "called" to monitor river levels or diversion flow rates at any time. In addition, Reclamation and district operations managers can respond to daily water management needs and emergencies in a timely fashion by controlling pump and canal facilities remotely.

Although automated electronic data collection and control is not new to the water industry, the associated systems have become more standardized and user-friendly.

Through the cooperative partnership among Reclamation, Cal Poly and the water districts, such systems are now providing real-time monitoring and control for more than 80 percent of the Sacramento River diversions and river levels between Redding and Sacramento.

In the mid-1990's, Reclamation initiated an agreement with the California State Polytechnic University's Irrigation Training and Research Center at San Luis Obispo. This working partnership has helped identify opportunities to apply advanced technology such as SCADA to



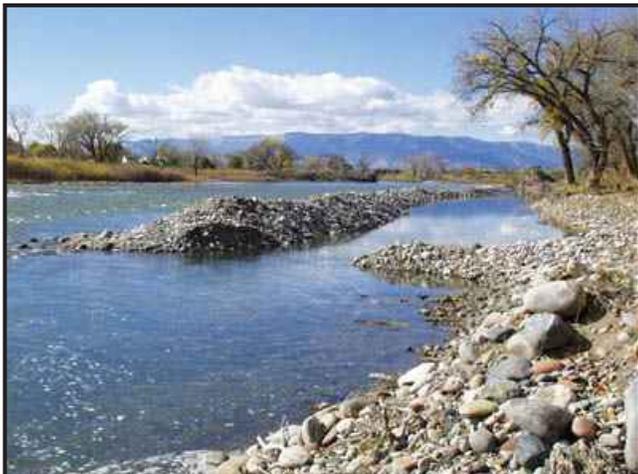


Silt Water Conservancy District Improves Diversion

The Silt Water Conservancy District is located north of the Colorado River in west-central Colorado near the towns of Rifle and Silt. The district stores water from Rifle Creek and pumps water from the Colorado River to increase available irrigation water for 6,591 acres of farmland. Reclamation's Western Colorado Area Office began working with the district in 1996 to develop a comprehensive water management plan.

During the plan's development, it became evident that the district needed to install an improved diversion facility for the Silt pumping plant on the Colorado River, which provides irrigation water to the lower reaches of Silt Mesa. The original canal was constructed in the mid-1960's. Water had been diverted from the Colorado River to the pumping plant using a "rock-and-brush" diversion structure located approximately 1 mile east of the plant. Since the project was constructed, the Colorado River channel had scoured down 3 to 4 feet. No grade control for the river channel was included in the project plan, and it became necessary to periodically move the point of diversion farther upstream to divert water. Also, high spring flows routinely washed away parts of the temporary diversion.

A coordinated effort among the district, Reclamation, the Natural Resources Conservation



Service, the Colorado State Soil Conservation Board, and local conservation districts provided cost sharing and technical assistance to install a permanent, environmentally-friendly diversion structure.

Designed by the Natural Resources Conservation Service in consultation with Reclamation during the fall/winter of 1999, the diversion cost approximately \$162,000. It extends 67 feet across the river channel and rises about 12" above the channel bottom, allowing fish and recreationists to use the channel with little or no obstruction. The diverted water then flows 900 feet through a 42-inch pipeline and empties into the existing canal leading to the pumping plant inlet.

The system has operated well for the district, greatly reducing the need for environmentally-intrusive instream maintenance activities.



Southern California Urban Retrofit Programs

The infrastructure of many of the nation's urban centers is somewhat antiquated, at least in terms of improved technologies for water efficiency. Reclamation has taken a proactive approach towards helping urban water agencies and utilities provide incentives to replace inefficient plumbing fixtures with more water-efficient devices.

Reclamation's Southern California Area Office, headquartered in Temecula, California, has worked with water agencies such as the Metropolitan Water District of Southern California, the West and Central Basin Municipal Water Districts, and the San Diego County Water Authority to develop targeted marketing strategies for the distribution and installation of high-quality, low-flow showerheads (2.5 gallons per minute), ultra-low flow toilets (1.6 gallons per flush), improved toilet flappers, and new faucet aerators. For a typical single-family home that uses an average of about 70 gallons of water per person per day indoors installing these fixtures and appliances has reduced the average usage to an estimated 45 gallons --- a 35 percent reduction.

Typically, these urban efficiency programs involve a direct partnership between Reclamation and the local water agency who, in turn, offers rebates, fixture giveaways, or other incentives to boost customer participation. Historically, however, these programs have been less successful in low-income communities. In these areas, Reclamation and urban water agencies have teamed up with community-based organizations such as the Mothers of East LA, ExPert, ADVANCE, and the Old



Timers Foundation to market and distribute improved fixture such as ultra-low flow toilets. Reclamation and the sponsoring agency subsidize the toilet purchase and provide an incentive to the community-based organization for each replaced toilet. The local organization markets the program, distributes the toilets, provides technical troubleshooting for installation problems, and collects the old toilets for recycling. Proceeds from the toilet programs have been used to support graffiti removal, child care, scholarship funds, and job training.

Reclamation has also worked with Metropolitan Water District, the San Diego County Water Authority, and local energy utilities to provide a coordinated rebate program that encourages the purchase of high-efficiency washing machines throughout the Los Angeles and San Diego areas. This program was recently awarded the California Environmental Protection Agency's prestigious 2001 Governor's Environmental and Economic Leadership Award for significant contributions reducing energy and water consumption in southern California.



Foss Reservoir Master Conservancy District

Reclamation's Oklahoma-Texas Area Office, located in Austin, Texas, manages water projects serving irrigation and municipal water districts in Texas, Oklahoma, and southern Kansas. The Foss Reservoir Master Conservancy District, a municipal water supplier in southwestern Oklahoma, contracts for water as part of Reclamation's Washita Basin Project. Facilities include Foss Reservoir, the Foss Water Treatment Plant, three pumping plants, and 50.8 miles of delivery pipeline.

The Foss District delivers municipal and industrial water to six water companies serving approximately 15,000 people. The water treatment plant produces 1.1 million gallons of



treated water each day. When the project was first constructed, it became apparent that desalinating the reservoir water was necessary to meet the District's municipal and industrial customers' water quality standards. In 1974, an electrodiagnosis desalination facility was completed; however, flow meter problems limited the district's ability to account for water deliveries and losses.

With assistance from Reclamation's Water Conservation Field Services Program, the district

was able to install a new 30" magnetic flow meter to measure water usage in 1999. Meters were also installed to measure water used for chemical mixing within the plant and at Foss Dam to measure releases to the Washita River.

During 2001, Reclamation helped the district complete a comprehensive water conservation plan. Reclamation also provided financial assistance for implementing a new SCADA system with associated flow meters, software, and computer equipment, giving the district automated water measurement capabilities throughout their distribution system.

The district has budgeted \$6.1 million and is currently reviewing bids for rehabilitating the aging water treatment facility. Once the rehabilitation is completed, the district will be able to remotely monitor and account for all water delivered and used throughout the system and, based on this information, develop a comprehensive, accurate water budget to guide future operations.



Automated Water Control in Southern Idaho

Reclamation's Snake River Area Office in Boise, Idaho has worked with irrigation water providers in southern Idaho to better monitor and automatically control irrigation distribution facilities. Participating irrigation districts range from the Twin Falls Canal Company --- the largest irrigation provider in the state, irrigating 202,000 acres in south-central Idaho --- to the Bilbrey Ditch Company, irrigating 1,100 acres in the Payette Valley of southwestern Idaho.

This cost-effective automation concept uses readily available, low-cost solar-powered electronic components that can be installed by irrigation district staff. The primary objective is

to provide water district staff with the ability to remotely measure and regulate diversions, deliveries and spillage into and out of the irrigation distribution system.



Many of the sites are equipped with cell phone or radio telemetry for remote control and monitoring, as well as alarm notification, to alert district staff of unusual or emergency conditions. Radio telemetry enables operators to frequently monitor key locations within their systems from district offices, greatly increasing operational efficiencies and improving the response to emergencies



The automation and telemetry tools have allowed the irrigation companies along the lower reaches of the Payette River and the middle Snake River to better manage their irrigation return flows. Both of these stream segments have water quality problems, including high water temperatures, sediment and nutrient loading, particularly during low-flow periods.

With Reclamation's assistance, the Twin Falls Canal Company and the Minidoka Irrigation District have installed 19 automated control structures and 28 telemetered water measurement sites in south-central Idaho. In the Payette Valley, nine irrigation districts and canal companies within Water District 65 have automated 29 control structures and installed four remote water monitoring sites. The water districts believe that the investment in automated structures and remote monitoring capabilities was a major reason they were able to weather the extreme drought conditions in 2001.



Water Conservation Alliance of Southern Arizona (Water CASA)

The Water Conservation Alliance of Southern Arizona, is proving that "nine organizations are better than one" when it comes to partnering on conservation in Tucson, Arizona. In 1997, six water suppliers in the metropolitan Tucson area, joined with the Pima County Wastewater Department, Reclamation's Phoenix Area Office and the University of Arizona's Water Resources Research Center to create the Water Conservation Alliance of Southern Arizona, or "Water CASA," as it is locally known.

This partnership allows these local water providers to pool resources, benefit from group purchasing power and share water systems expertise and staff in a coordinated effort to conserve limited water supplies in the desert southwest. Because Water CASA members provide municipal and industrial water supplies to a diverse service area, the group identified public education and information dissemination among its highest priorities. Water CASA provides welcome packets for new customers and distributes conservation devices to its members.

Water CASA has also provided local leadership on several water efficiency studies. The first evaluated potential health risks associated with the use of "graywater" systems --- systems that recycle household water for other uses such as landscaping. A second study will help determine total outdoor residential use. Data will be collected from three subdivisions with newly installed dual meters to assess water use from aging indoor appliances and fixtures, as well as track water use for maturing landscaping. These studies will help Arizona update databases used to establish per capita usage regulations.

The alliance also allows member organizations to speak as a unified voice on regional water conservation issues. In 1999, Water CASA hosted an interactive conference entitled "Conserve This" to identify improved water



conservation techniques. Members of Water CASA have developed ten potential water conservation ordinances, which are currently being reviewed by Pima County and local municipalities. Additionally, Water CASA members provide input to the Tucson Active Management Area's Safe Yield Task Force and the Governor's Water

Management Commission. As Water CASA enters its sixth year, the alliance has established itself as a proactive, regional leader in conservation efforts. As a testament to this leadership effort, Water CASA was recently presented with the first-ever Governor's Pride in Arizona Award for its water conservation efforts.



State-of-the-Art Canal Lining in Tulelake, Oregon

In parts of Oregon, the unique volcanic geology causes high rates of water loss in many agricultural canals and laterals. Improving the delivery efficiency of these fractured basalt waterways is a top priority for local water districts in this area.

In the early 1990's, Reclamation helped sponsor a comprehensive canal lining demonstration project throughout central Oregon to identify cost-effective lining materials to address these unique problem areas. Local irrigation districts, contractors and material suppliers teamed up with Reclamation to install several dozen new lining membranes and to monitor the project for 10 years, evaluating its effectiveness and maintenance costs. Techniques and lessons learned from this demonstration are being used by other water districts throughout the western states, many supported by the Water Conservation Field Service Program.

For example, Reclamation's Klamath Basin Area Office, headquartered in Klamath Falls, Oregon, teamed up with the Tulelake Irrigation District to install lining using a new material called EPDM (Ethylene Propylene Diene Terpolymer). The material is manufactured by Firestone and is similar to a large rubber tubing. The lining is 45 mil. thick with 8 oz. of geotextile backing material designed for use in especially rocky areas. The manufacturer provided materials, Reclamation purchased 400,000 square-feet of the lining, and the district installed it. The project has eliminated seepage on approximately 2.3 miles of open canal that was losing an estimated 1,000 acre-feet per year.





AgriMet: “ET” Phones Home

In 1982, Steven Spielberg tickled the imagination of the world with his Hollywood saga of a wide-eyed extraterrestrial named “ET.” One of the movie’s most memorable lines, “ET! Phone home!”, came to symbolize the universal need for communication, even among extraterrestrials. In the terrestrial world of agriculture, “ET” refers to evapotranspiration, the amount of water used by a particular agricultural crop on any given day during the growing season. In the mid-1980’s, Reclamation took a page out of Mr. Spielberg’s screenplay by developing a satellite-based network of automatic agricultural weather stations which virtually “phones home” ET, or crop water use information, on a daily basis for agricultural crops throughout the Pacific Northwest.

AgriMet, as this Northwest Cooperative Agricultural Weather Network is called, provides timely weather and agricultural crop water use information to a variety of customers, including Federal and State agencies, irrigation districts, agricultural consultants, county extension agents, university researchers, and individual farmers and irrigators throughout Washington, Oregon, Idaho, Montana, and parts of California, Wyoming and Nevada.

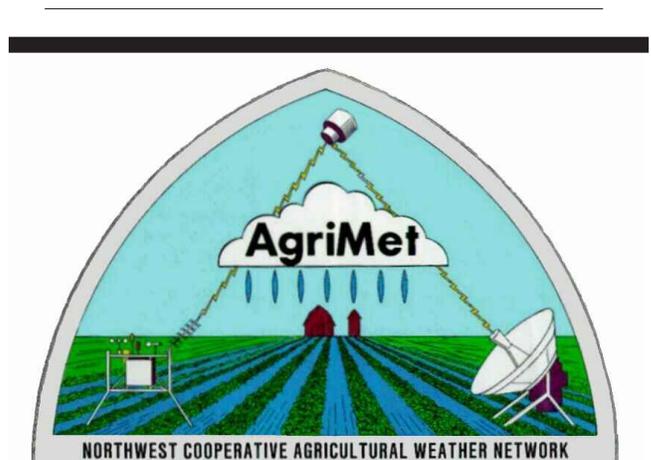
AgriMet began as a conservation partnership between Reclamation and the Bonneville Power Administration in the mid-1980’s. The network now consists of 86 automated weather stations that collect information to model agricultural crop water use and calculate daily evapotranspiration, or “ET,” in the vicinity of each station. This information, transmitted by satellite, is generated daily during the growing season (March through mid-October) for nearly 50 crops grown in the region. The data is made available to growers and others on-line through AgriMet’s websites at either: www.pn.usbr.gov/agrimet (west of the Continental Divide); or, www.gp.usbr.gov/agrimet (Montana east of the Continental Divide).

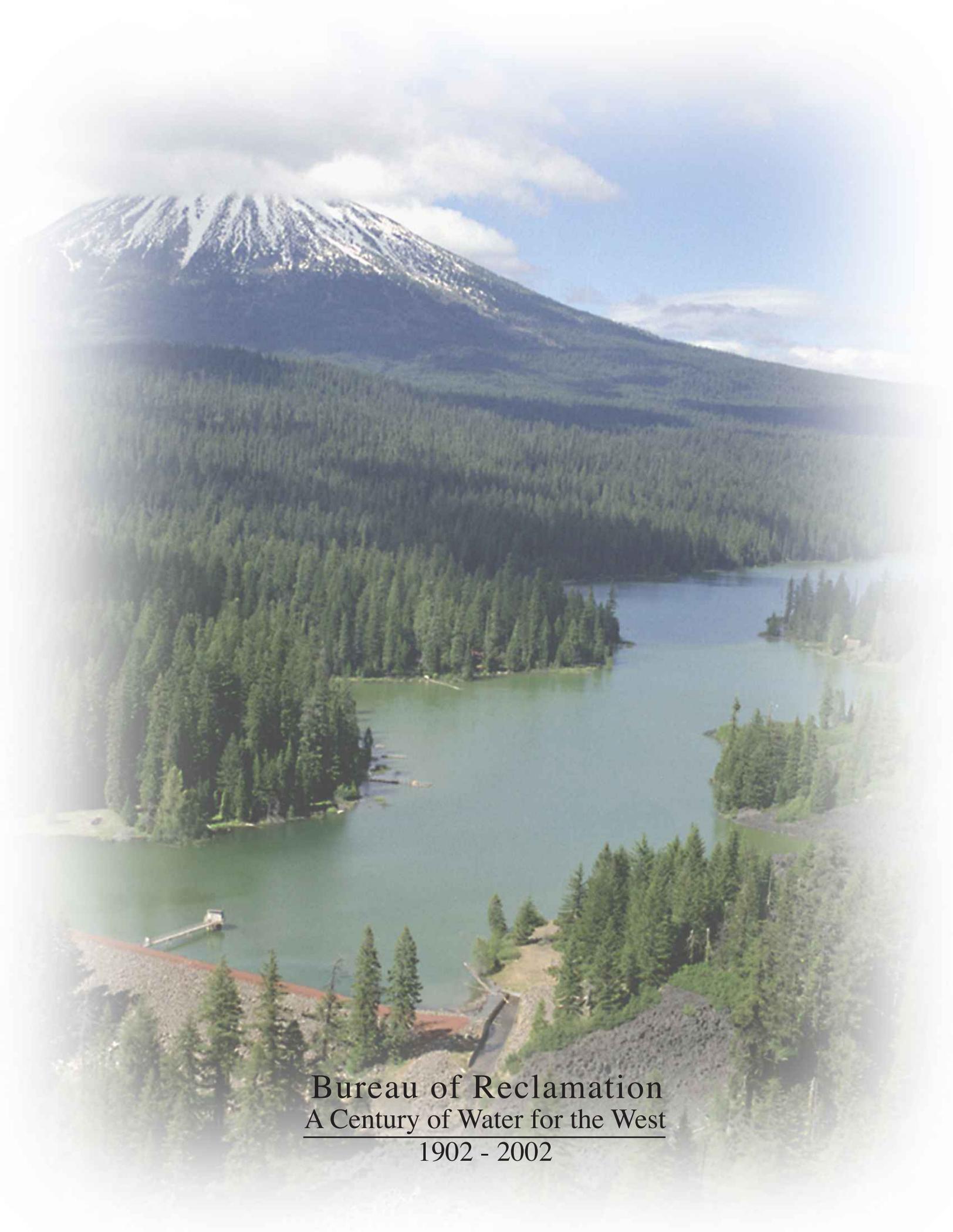
The data supports scientific irrigation scheduling --- helping irrigators to apply the right amount of water to crops at the right time --- throughout the region. Program benefits include conservation

of water and power resources, improved agricultural production, reduced irrigation operating costs, and improvements in surface and ground water quality.

Reclamation has developed numerous partnerships to help support operation and maintenance of the AgriMet network. Participating sponsors include the Northwest Energy Efficiency Alliance, local irrigation districts and conservation districts, State land grant universities, Natural Resources Conservation Service and Agricultural Research Service, Extension, and other State and local agricultural and water resource organizations.

Operation and maintenance of the network is cost-shared through sponsorship agreements with participating entities. In the spring of 2002, seven new AgriMet stations were installed in Washington and Idaho to help model water temperatures and dissolved gases in major reservoirs on the Snake and Columbia rivers. The collected data will help regulate power and reservoir operations, improving downstream water temperatures for salmon migration. Reclamation is assisting the U.S. Army Corps of Engineers, Bonneville Power Administration, and the National Marine Fisheries Service in this effort. These new stations are located at the Bonneville, Chief Joseph, Grand Coulee, Little Goose, and Dworshak dams.





Bureau of Reclamation
A Century of Water for the West

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