August 2003

Research Highlights

Science & Technology

Science for today
Solutions for tomorrow

Director's Office (Washington, DC and Denver, Colorado)

This year the Research Office introduced the web-based, Proposal and Performance Contract Management System (PropC). PropC allows for the submission and review of research proposals online. For FY04, 186 proposals have been entered in the system in 18 technical output areas, for a total request of $15,357,842. After a proposal is submitted, it is subject to three distinct reviews. First, the Relevancy Review checks the relevancy of the proposal to Reclamation's mission and Science and Technology (S&T) Program goals. To date, 60 separate reviewers, representing Regional, Area, and other Program Offices, have completed 739 Relevancy Reviews. Out of a possible 40 points, 50 proposals scored 30 or greater for relevancy. The next Technical Review phase evaluates proposals for technical merit and involves technical experts inside and outside of Reclamation. The Technical Review should be completed by September 19. Program Review is the last step in the review process and involves the Research Director's Office as well as each Region's Research Coordinator. The Program Review checks to see if proposed research meets S&T Program goals, and checks past progress and performance of the investigators. The Program Review is scheduled to be completed October 15. (Dan Levish, 303-445-3175)

Upcoming Events

September 19	Technical Review of FY04 proposals due (Siegie Potthoff, 303-445-2136)
Mid-October	Desalination hearing on the Hill (Shannon Cunniff, 202-513-0682)
October 28-30	U.S. Geological Survey Regional Executives and Program Coordinators meeting, **Washington, DC** (Shannon Cunniff, 202-513-0682)
November 4	Water 2025 science meeting, Adams Mark Hotel, **Denver, Colorado** (Shannon Cunniff, 202-513-0682)
November 13-14	Satellite Imagery for Water Management: A NASA/Reclamation Planning Session and Workshop, **Albuquerque, New Mexico** (Doug Clark, 303-445-2271)

Improving Infrastructure Reliability

Possible tuning enhancements for multiple-input power system stabilizers were investigated. These enhancements may lead to larger power system stability margins, which help prevent blackouts. (J.C. Agee, 303-445-2309)

Discussions of Doubly Fed Machines with past researchers and design staff have taken place. Design staff is looking into the feasibility of the Doubly Fed Machine for **Mt. Elbert Pump-Generating Plant**, as well as possible efficiency gains and construction costs. This research is being conducted in conjunction with the Mt.

Elbert Powerplant rehabilitation project. The Doubly Fed Machine, if proven viable, would be an option for increasing efficiency at Mt. Elbert and other locations. (Gary Cawthorne, 303-445-2817)

The development, laboratory testing, and field testing of the Adwel DCR50 Ramp Test Set (shown below) are complete under our original Cooperative Research and Development Agreement (CRADA) with Adwel International, Ltd. The test set is now commercially available from Adwel (www.adwel.com/dcramp.html). The Hydroelectric Research and Technical Services Group has ordered a set. Other Reclamation offices have expressed interest in replacing their aging in-house-built ramp test sets, and at least one is in the process of ordering a new set. (Phil Atwater, 303-445-2304)

Improving Decision Support

Significant progress has been made using RiverWare in a Range of Variability Analysis for streamflows in the **Yakima Basin**. Priorities for the coming months include completion of the Range of Variability Analysis and evaluation of the impacts of changing reservoir management practices on the fishery population. (Don Frevert, 303-445-2473)

The **Columbia Basin Project** study group of the Watershed and River Systems Management Program (WaRSMP) reviewed work on the AWARDS ET Toolbox, Modular Modeling System, RiverWare and the cooperative effort with the National Aeronautics and Space Administration. (Don Frevert, 303-445-2473)

A study linking **Truckee River** water quality modeling with decision support systems continues. Reclamation team members met in **Reno, Nevada** with specialists from the city of Reno, concerning their existing water quality models. The newest water quality model developed by the city will become available later in the fall, when the model will be evaluated to identify if it will be suitable for linkage with the decision support system currently in development within the basin. The linkage would help ensure proper delivery of water to downstream reaches of the Truckee River that support threatened and endangered fish. (Jeff Rieker, 303-445-2484)

Upcoming Events

September 9-11	Sediment Monitoring Instrumentation and Analysis Workshop at the U.S. Geological Survey **Flagstaff** Field Center
October 15-16	WaRSMP's Independent Technical Review Panel will meet in **Boulder and Denver, Colorado,** to evaluate progress on the program and provide recommendations for how to improve technology. The panel includes experts from Colorado State University, Utah State University, Louisiana State University, and the U.S. Army Corps of Engineers. (Don Frevert, 303-445-2473)
October 21-22	WaRSMP team members from Reclamation, USGS, and other collaborating organizations will hold their fall meetings in **Sagehen, California**, to evaluate progress on the program and set technical priorities for the coming months. (Don Frevert, 303-445-2473)
October 23-24	The Reclamation Hydrologic Data Base and RiverWare technical teams will meet at the University of Nevada's Desert Research Institute in **Reno**. (Don Frevert, 303-445-2473)

Improving Water Supply Technologies

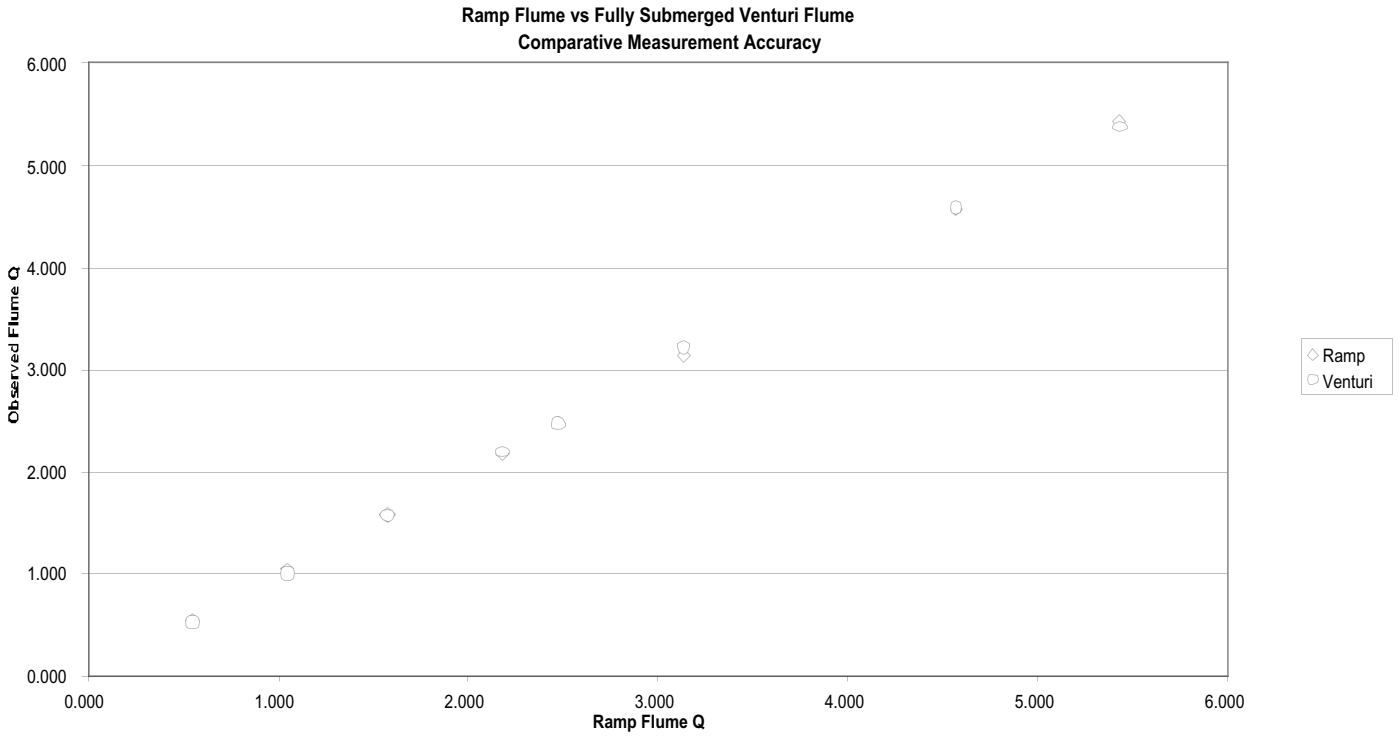
TSC personnel made field visits to the Pioneer Irrigation District near **Haigler, Nebraska** in cooperation with the **Nebraska-Kansas Area Office**, and to the Belle Fourche and Angostura Districts in **South Dakota** in cooperation with the **Dakota Area Office**. Automation of selected gates on the Townsite Lateral of the Belle Fourche District is planned in an effort to address discharge fluctuations experienced along reaches of the lateral. Candidate demonstration sites in the Pioneer District for Automated Farm Turnout/Continuous Flow Measurement were viewed during the visits. Selection of sites for FY04 installation will be done during a followup visit planned for September. (Tom Gill, 303-445-2201)

The Townsite Lateral headgate in North Canal.

The TSC is building a microscale model to demonstrate its Development of Automated Delivery Systems Compatible with Improved Efficiency Application of Irrigation Water. The model is near completion. By early FY04, the model should be available to present at water meetings/conferences. (Tom Gill, 303-445-2201)

The TSC laboratories completed an initial set of tests to examine the flow measurement capability of a submerged Venturi flume. The labs compared the discharge measurement from the Venturi flume against values obtained from a ramp flume installed downstream. In the photo below, the Venturi flume is near the Mead Reach of the model channel, and the ramp flume is at the end of the channel in the foreground. The flat-bottomed Venturi flume is being studied, because it presents no physical barriers to fish, even under low flow conditions. In the chart below, observed Venturi flume discharge values are plotted against observed discharge for the ramp flume (using ramp flume discharge for the x-axis). The degree of agreement shown suggests the submerged Venturi flume offers promising flow measurement capability. In upcoming tests, vertical velocity profiles will be measured at critical points under a range of flow conditions. (Tom Gill, 303-445-2201)

A TSC engineer measures flow depth above the sensor of an acoustic profiler instrument.



A patent was awarded for a modified clamshell gate concept, the Modified Isbester (MI) valve. The concept was identified during physical model studies for the **Arrowrock Dam** Outlet Works Rehabilitation Project that uses clamshell gates for replacement of the old Ensign valve technology. The hydraulic performance of the MI valve is similar to that of the clamshell gate, but has the advantage of being less costly to being less costly to fabricate and is expected to achieve improved sealing capability. The concept is intended to provide a cost effective alternative for future replacement of aging outlet works flow control components at Reclamation facilities and elsewhere. (Joe Kubitschek, 303-445-2148; Warren Frizell, 303-445-2145)

Tony Wahl will receive the 2003 WatSave Young Professionals Award. The International Commission on Irrigation and Drainage (ICID) presents the award to recognize work that facilitates water savings, conservation, and cost-effective, efficient use of water. The U.S. Committee on Irrigation and Drainage (USCID) nominated Tony for the award, who will be the first ever U.S. recipient. Tony was recognized specifically for his work on water measurement (WinFlume software), water conservation education (canal operations and water measurement workshops offered by the Water Resources Research Laboratory), and innovative debris and fish screening concepts. The award will be presented to Tony's colleague in the development of WinFlume, Dr. Marinus Bos, at September's ICID meeting in Montpellier, France, and will then be presented to Tony at an upcoming USCID meeting in February 2004 in **Phoenix, Arizona**.

Improving Water Delivery Technologies

The TSC hosted a documentary film crew from the U.S. Department of Agriculture Agricultural Research Service (USDA/ARS) in **Pueblo, Colorado**. Reclamation is cooperating with the USDA/ARS to produce a documentary about saltcedar biocontrol using a leaf beetle that will damage only saltcedar (*Tamarisk spp*). Saltcedar is a small, nonnative tree that now covers approximately 1.6 million acres of riparian lands within the Western States, causing an annual water loss estimated to be as great as 2.4 million acre-feet per year. Estimates place the value of waters lost and other damages attributable to tamarisk in the Western States at between $133 million and $265 million annually. Pueblo was chosen for some of the documentary's footage because of the extensive defoliation seen at the research site this year. Research has been ongoing at the site since 1997, with insects first released into the field in May 2001. The USDA, Reclamation, and other members of the Consortium for Biological Control of Saltcedar wish to use this video to promote use of biocontrol for saltcedar. (Debra Eberts, 303-445-2217)

A study has begun to look at the use of a newly approved Environmental Protection Agency aquatic herbicide (Renovate from SePRO) in the Palo Verde Irrigation Drain (PVID) located near **Blythe, California** for controlling *Salvinia molesta* and parrot feather. Renovate was applied at 1 and 2 quarts per acre (2 applications) to a lagoon containing a very heavy infestation of *Salvinia* adjacent to the PVID with very little effect. In other sections of the PVID system, parrot feather was sprayed with Renovate at rates of 3 and 2 quarts per acre with excellent efficacy. Renovate herbicide by itself does show promise for the control of parrot feather with two applications; in addition Renovate herbicide, combined with copper complexes, may be a very useful cocktail for controlling both *Salvinia* and parrotfeather when they occur together. (Dave Sisneros, 303-445-2228)

Parrot feather in a section of the PVID before the application of Renovate.

After the application of Renovate.

Renovate affected the *Salvinia* infestation in this lagoon very little.

Analysis of aerial photography of the Winchester Wasteway (**Pacific Northwest Region, central Washington State**) from 1995 to 2000 shows that the area of the invasive weed purple loosestrife that has been severely damaged by biocontrol insects has increased exponentially by a factor of 3.53 per year. Similarly, the area occupied by the cane Phragmites increased exponentially, unopposed, by a factor of 0.27 per year. Both species harm wetlands and divert or restrict water supply and transport. (Ed Holroyd, 303-445-2276; Debra Eberts, 303-445-2217)

Purple loosestrife in 1995 on the Winchester Wasteway in central **Washington**.

The same area in 1998, with purple loosestrife severely damaged by biocontrol insects.

Preliminary results of the study on egg habitat identification of the Rio Grande silvery minnow were presented at the American Fisheries Society Annual meeting. The presentation emphasized the interactions of life history with fluvial geomorphology, suggesting that nursery habitat occurs where semi-buoyant silvery minnow eggs and larvae exit the current. Geographic information systems were used to show how eggs and yellow beads were distributed in the drift zone of the microhabitat. Discussion following the presentation focused on the role of habitat restoration in managing endangered fish species. (Michael Porter, 505-462-3596)

The Southwestern Willow Flycatcher breeding season has again come to an end within the **Middle Rio Grande Basin**. In spite of the continuing drought, the localized flycatcher populations have continued to expand, with a 25 percent increase in the overall number of territories since 2002. However, nesting success has decreased from previous years and may signal a leveling off or possible decline in the population sometime in the future. Over 80 percent of the territories in 2003 were established within native willow-dominated communities, and only 5 percent within exotic saltcedar communities; indicating a strong preference for the native habitats. Nest site quantification—now that the birds have headed back to their wintering areas—has been initiated to clearly identify the critical nest site habitat parameters and to establish criteria from which to evaluate ongoing and future restoration efforts. In addition, nest data analysis from 1999-2003 has been initiated to determine whether a relationship exists between nesting success and hydrology. There appears to be a strong correlation with surface hydrology and territory establishment; however the relationship between surface hydrology and nesting success is less evident. These data will help resource

managers address critical concerns and make informed decisions regarding the management of the limited water supplies within the **Middle Rio Grande Basin**. (Darrell Ahlers, 303-445-2233)

Regional Report

The **South-Central California Area Office** is studying artificial dens to mitigate the effects of Reclamation canals on the endangered kit fox. This study will help answer questions about design and materials for the dens. Kit foxes have visited 7 of the 12 artificial den complexes. Family groups of kit foxes now are using three of the complexes; it doesn't appear that litters of pups were born in the artificial dens. Radio-collared kit foxes have been located in artificial dens at two complexes; locating foxes in dens during daytime telemetry checks confirms use of the dens for daytime resting and avoiding temperature extremes. Use of dens by kit foxes has been photodocumented at three of the complexes; automated camera stations were used to capture images of foxes using the dens. Appropriate equipment for montoring temperature and relative humidity within artificial dens has been identified; the equipment will be ordered, and measurements will begin later in September. (Rosalie Faubion, 559-487-5138)