



RESEARCH HIGHLIGHTS



DIRECTOR'S OFFICE (WASHINGTON, DC AND DENVER, COLORADO)

Attended a Capitol Hill briefing by the Department of the Navy on mobile desalination technology to support field units. The Bureau of Reclamation (Reclamation) is providing technical support to this effort. Demonstration of the unit will occur at the planned Bureau of Reclamation Tularosa Desalination Research Facility. Reclamation received high praise from the Navy for its participation in this effort. (Shannon Cunniff, 202-513-0680; Michelle Chapman, 303-445-2264; Tom Jennings, 303-445-2130; Karen Pearce, 202-513-0569)

Completed a draft Desalination and Water Research Enhancement Act to reauthorize extramural desalination research and increase Reclamation's flexibility to enter into cooperative agreements for research. This was done as a drafting service for Energy and Natural Resources Committee staff.(Shannon Cunniff, 202-513-0680)

Attended the Office of Science, Technology and Policy's Committee on Environment and Natural Resources Subcommittee meeting on Sustainable Water and Quality. This subcommittee serves to share information among the Federal entities interested in water issues and will be preparing a report addressing future issues. (Shannon Cunniff, 202-513-0680)

Refining draft of the Department of the Interior manual addressing peer review of science and technology products. The draft of the manual will be distributed to bureau staff for review in mid-August. (Shannon Cunniff, 202-513-0680)

Released the draft Administrative Guide for working with Cooperative Ecosystem Studies Units. Comments are due August 10, 2003. (Shannon Cunniff, 202-513-0680)

Prepared Jim Tate for and attended the House Hearing on a bill directing the Department to gather information on tamarisk distribution, water use, and impacts and to demonstrate tamarisk control, removal, and habitat restoration. Broad support of the bill was offered by all panelists. Senate Bill 1516, introduced on July 31 by Senator Domenici and co-sponsored by Senator Campbell, complements the House bill. (Shannon Cunniff, 202-513-0680)

UPCOMING EVENTS

- August 10 Comments on draft Cooperative Ecosystem Studies Units administrative guide are due.
- August 13 FY 04 desalination planning review meeting, **Denver**
- August 18-September 15 Research proposal technical merit review
- August 27 Comments due on the draft U.S. Geologic Survey (USGS) River Science Strategy, which has been distributed to the Science and Technology (S&T) steering team, the S&T Regional coordinators, and experts in **Technical Service Center (TSC)** for review and comment. The Reclamation Leadership Team has also been copied. Comments should be sent to Shannon Cunniff by August 27 for compilation.
- November 13-14 Satellite Imagery for Water Management: A NASA/Reclamation Planning Session and Workshop, **Albuquerque, NM** (Doug Clark, 303-445-2271)

IMPROVING INFRASTRUCTURE RELIABILITY

A patent application entitled *Method and Device for Equalizing the Float Voltage of a Battery Cell* was filed with the Patent Office. The patent covers an electronic circuit that equalizes/balances the cell voltages of large, multicell batteries, such as those used at Reclamation facilities. Powerplant batteries are the most critical system in a powerplant and are the sole source of power and control in emergency situations. (Jim DeHaan, 303-445-2305)

In a cooperative effort, the Hydroelectric Research and Technical Services Group and the **Eastern Colorado Area Office** submitted a requisition to deploy a demonstration fuel cell at **Pole Hill Powerplant**. The fuel cell will be used to provide extended emergency power to the Pole Hill communications equipment. It is planned to have the fuel cell installed by the end of the fiscal year. This is the first fuel cell system to be installed at a Reclamation facility. Through the Science and Technology Program, an extensive literature search was undertaken to identify available fuel cell systems, specifications for the fuel cell system were developed, and installation and safety issues were addressed. The **Eastern Colorado Area Office** is handling the procurement, purchase, and installation of the fuel cell. (Jim DeHaan, 303-445-2305)

The laboratory prototype developed last month as part of study efforts to create tools for predicting powerplant energy-related ancillary service production was modified to shape the 24-hour day-ahead limits, according to an estimated market price for regulation up and down. Also, concepts for a moving hourly limit were implemented. A basic display tool was developed to be used for demonstrating schedule features. The prototype will be enhanced to simulate actual unit operations,

and display features will be completed. The prototype will be ready for initial demonstration in September. (Steve Stitt, 303-445-2316)

Basic concepts for an online energy generation performance monitoring scheme were developed. A module that will create new models under program control was developed, and a method to filter new performance data to provide a “learning” feature was created. The learning feature will allow new models to be developed as new data become available at different powerplant head conditions and will allow for new efficiency curves to be developed for peak unit performance, thereby correcting for wear. Additional laboratory testing of the **Hoover** performance monitoring system was completed. The new online performance features developed will be integrated into the existing performance monitoring system, and testing will be initiated. (Steve Stitt, 303-445-2316)

Generator control system identification work continued by applying developed methods to identify nonlinear components of complex systems. The results were encouraging and will be incorporated into the identification of generator control systems. The ability to identify nonlinear as well as linear elements of the systems is essential to achieving adequate models of generator governor and excitation control systems. Work for the next month will focus on integrating all results obtained so far and applying them to complete, complex generator models. (Shawn Patterson, 303-445-2311)

The Materials Engineering Research Laboratory (MERL) kicked off the first round of testing in its new Thin Concrete Repair Materials Testing Laboratory, with assistance from personnel from the University of Laval, **Quebec, Canada**, and from ConProCo. The lab is currently set up to test six materials concurrently, and will be expanded to handle eight materials in the near future. ConProCo provided the first eight materials for testing. Several other vendors have expressed interest in having MERL evaluate their products. This program is a direct result of S&T's support of Reclamation's participation in the American Concrete Institute's Strategic Development Council "Concrete Repair Engineering Experimental Program" consortium. The consortium is a partnership of public and private interests with the goal of improving the performance of thin repairs to concrete. (Kurt vonFay, 303-445-2399)



Attaching instrumentation to test specimens.



Preparing specimens for testing.



MERL's Thin Concrete Repair Materials Testing Laboratory is fully functional. Results from the first round of testing should be available in about 3 months.

IMPROVING DECISION SUPPORT

A study is under way in the **Truckee Basin in California and Nevada** to link water quality modeling to a decision support system (DSS). The research focus recently shifted to the use of existing water quality models that have been developed by **Washoe County** and the city of **Reno**. The effort includes the use of artificial neural networks to replicate the existing models. Artificial neural networks (ANN) are a form of artificial intelligence in computing, and are based on research of the learning methods of the human brain. The ANN water quality models will eventually be used in conjunction with the RiverWare DSS that is being developed for the basin. The model linkage will optimize the use of water for delivery to downstream reaches of the Truckee River, which support threatened and endangered fish. (Jeff Rieker, 303-445-2484)

New technologies have been developed on the **Truckee Project**, to be shared with other Reclamation users: (1) a computer program has just been completed that will take near-real-time data and input it into a RiverWare model that summarizes each storage account in the basin reservoirs daily; (2) a series of three RiverWare models is nearing completion that will produce basin forecasts from the current date for the remainder of the calendar year; (3) computer programs have been completed for each of the three models in the forecasting process that have the ability to “re-initialize” the models with the proper data from a data base in the event that the data in the models is lost or overwritten; and (4) computer programs have been created to place the output from the RiverWare forecasting process into the spreadsheet format that stakeholders in the basin have been using in recent years; this will help smooth the transition from previous forecasting methods to the new RiverWare forecasting method for basin stakeholders. RiverWare helps

Reclamation managers and technical experts in **Upper and Lower Colorado Regions and Upper Columbia, Albuquerque, and Lahonton Basins Area Offices** make better and more informed reservoir management decisions. (Jeff Rieker, 303-445-2484; Don Frevert, 303-445-2473)

Members of the Watershed and River Systems Management Program (WaRSMP) **Columbia Basin Project** team held a conference call. Matching funds from the National Aeronautics and Space Administration (NASA) in the amount of \$85,000 have been committed for calendar year 2003. Progress on RiverWare, Evapotranspiration (ET) Toolbox, and Modular Modeling System development and deployment in the basin was reviewed and found to be on schedule. Data Management Interfaces are being developed to facilitate the joint operation of the modeling systems. (Don Frevert, 303-445-2473)

Reclamation personnel attended the annual Global Energy and Water Cycles Experiment (GEWEX) Americas Prediction Project (GAPP) Principal Investigators (PIs) meeting in **Seattle, Washington**. Over 100 PIs from across the country discussed progress in research related to the water cycle and global climate variability and change. Reclamation presented a poster on collaborative work with NASA in the **Middle Rio Grande Basin** entitled *Improved Demand Forecasting for Water Resource Managers*. This work highlighted a research effort between the National Oceanic and Atmospheric Administration (NOAA) Office of Global Programs and Reclamation’s S&T Program to integrate emerging NASA/NOAA technologies with Reclamation’s ET Toolbox to improve operations on the **Middle Rio Grande** during the current extreme drought (see www.usbr.gov/pmts/rivers/awards/Nm/riogrande.html). (Dave Matthews, 303-445-2470)



GAPP PIs, consisting of scientists from a variety of agencies and universities, meeting in **Seattle, WA.**



A USGS speaker provides MMS streamflow forecast capabilities to GAPP PIs.

TSC personnel met with **Yakima Project Office** personnel to review **Yakima Project** operations and tour the project. This tour provided valuable insights and a comprehensive PowerPoint presentation that summarized the project needs and provided photos of various components from the key Sunnyside Diversion Dam at **Parker** and USGS stream gauge, Rim Rock Lake, Cle Elum Reservoir, and Tieton and Rosa diversion structures. A second tour covered the fish screens at the Parker and Rosa diversion structures. The NASA/USBR

research project entitled *Use of NASA Land Data Assimilated products to improve flood and drought risk analysis and forecasting for water resources management in the Columbia Basin* will focus on the **Yakima Basin** water supply and demand predictions. (Dave Matthews, 303-445-2470)



Tieton Diversion Canal with 235-cfs flow.



Sunnyside canal diversion with traditional tribal fishing posts restored on the Yakima River for salmon fishing. The NASA/Reclamation research study will improve streamflow predictions on the Yakima and Columbia Rivers.



The Rosa Diversion Dam fish screens on the Yakima River north of **Yakima, WA**.

UPCOMING EVENTS

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| August
20-22 | RiverWare training: Introduction to Simulation Modeling at the University of Colorado at Boulder . More information is available at http://cadswe.colorado.edu/riverware/training . |
| September
9-11 | Sediment Monitoring Instrumentation and Analysis Workshop at the U.S. Geological Survey Flagstaff Field Center |
| October
15-16 | WaRSMP Technical Review Panel Meeting in Boulder and Denver, CO (Don Frevert, 303-445-2473) |
| October
21-22 | Interagency WaRSMP Meetings with USGS and other partners in Sagehen, CA (Don Frevert, 303-445-2473) |

IMPROVING WATER SUPPLY TECHNOLOGIES

An American Society of Civil Engineers Task Committee closely aligned with the objectives of Reclamation's research project on flow measurement at canal gates met in **Denver** to exchange information from several different field, laboratory, and analytical projects, aimed at developing more accurate and more useful methods of measuring flow rates at radial gates, slide gates, and other typical canal gates. Members of the committee represent Reclamation, the Agricultural Research Service, the **Salt River Project**, the **Central Arizona Project**, and several equipment manufacturers. The committee discussed potential laboratory studies that may be conducted in the near future in the Water Resources Research Laboratory. (Tony Wahl, 303-445-2155)

The Water Resources Research Laboratory has completed publication of Reclamation Research Report R-03-03, *Design Guidance for Coanda-Effect Screens*. Coanda-effect screens are hydraulically self-cleaning with no moving parts, to provide efficient, low-maintenance screening of fine debris and fish. The report is a source of both design information and application experience. It includes an appendix with case study information from 2 dozen screen installations varying in size from a few to more than 200 cfs. The oldest have operated successfully for more than 20 years. For more information, visit http://www.usbr.gov/pmts/hydraulics_lab/twahl/coanda/. (Tony Wahl, 303-445-2155)

IMPROVING WATER DELIVERY TECHNOLOGIES

For contributions to delisting the Rio Grande silvery minnow—egg habitat identification—Michael Porter presented preliminary study results on the retention of Rio Grande silvery minnow eggs in created microhabitat inlets to U.S. Fish and Wildlife Service biologists, the **New Mexico** Interstate Stream Commission, the **City of Albuquerque**, and other stakeholders. Questions focused on designing effective nursery habitat. This study will provide Reclamation with essential information that minimizes impacts to stakeholders for areas to create nursery habitat. (Michael Porter, 505-462-3596; Tamara Massong, 505-462-3613)

A field study was completed in cooperation with scientists from the USGS Biological Resources Division (BRD) and the Indian Health Service at **Pinon, Arizona**, to determine the effectiveness

of using a constructed wetland to improve water quality and useability of wastewater on Navajo land. If it can be demonstrated that this water source can be sufficiently treated by this passive technology and reused, it could be a valuable addition to the local water supply and used for agriculture. (Richard Roline, 303-445-2213)

An evaluation of flow measurement instrumentation for operating the **City of Henderson, Nevada**, constructed wetland was done in cooperation with the city, Southern Nevada Water Authority, USGS BRD, and the **Lower Colorado (LC) Region**. This was done, so that the effectiveness of wastewater treatment can be demonstrated and evaluated for potential expansion of this technology within the Las Vegas Wash watershed and improving inflows into Lake Mead. In addition, this research site has become an excellent addition to the local wetland park system and supports numerous waterfowl species throughout the year. (Richard Roline, 303-445-2213)