

# RESEARCH AND NATURAL RESOURCES HIGHLIGHTS

## July 2002

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

Congratulations to our Research Office secretary, Shannon Thomas nee Smith, on her July 5 nuptials. Shannon's email address will soon be updated.

The Performance Institute invited the Science and Technology (S&T) Program to present its strategic plan logic model process as an example for R&D performance planning in its upcoming Environmental Performance Summit this fall. The logic model is our S&T Program Roadmap and can be viewed at [www.usbr.gov/research/r&doutput](http://www.usbr.gov/research/r&doutput).

The call for research project proposals for FY03 is out! Proposals are due August 31. See [www.usbr.gov/research](http://www.usbr.gov/research) for additional details. This site is the gateway to new information on the S&T Program's business practices, research needs, and submitting proposals--please visit it. Many thanks to Deena Larsen, Siegie Potthoff, and our summer intern, Debra Beasley, for their contributions to get this site up and running!

Met with UC region's **Albuquerque Area Office** to present information on the S&T program and to learn about their research activities and needs. Key topics included innovations in measuring and modeling water use and system losses, salt cedar removal and recovery, well bio-fouling, and use of remote sensing for archeological work. It was an impressive and informative visit. Many thanks to all who participated. (Shannon Cunniff, 202-513-0682; Chuck Hennig; Richard Lasson; Steve Hansen)

The Congressionally directed National Research Council review of Federal water resources research is now underway with the establishment of its Committee. Steve Parker, with the NRC staff, will brief water resource agencies at the August 9 meeting of the Water Resources Research Coordinating Committee on the likely schedule of events and expectations for Federal agencies' provision of information. The first NRC Committee meeting is September 19. (Shannon Cunniff, (202) 513-0682)

The first research/technology transfer workshop targeted to Bureau of Reclamation managers and staff was a great success. It focused on invasive species research issues and needs and featured presentations from the Secretary's Science Advisor, the Federal Invasive Species Council, several Federal agencies, and Reclamation's **Office of Policy**. Especially valuable were sessions focusing on research activities and needs presented by Technical Service Center (TSC) researchers and Area Offices. Approximately 70 people attended, with 35 participating in a field visit on salt cedar bio-control research. Future workshops on water management needs and fisheries are being planned. Suggestions and hosts for additional workshops are welcome! (Shannon Cunniff, 202-513-0682; Fred Nibling; Sarah Wynn; Denise Hosler; Ken Lair; Debra Eberts)

Coordinated compilation of existing data on water use and demand and other factors that can affect demands on water to develop initial projections of relative water stress in the West. This data is being presented in GIS format. This information will feed into the 25-year assessment on water use goals being coordinated by Operations (Jack Garner). This information can also help the S&T Program consider research and demonstration activities in areas of highest need. (Shannon Cunniff, 202-513-0682; Chuck Hennig; Doug Clark; and many others!)

S&T researcher at the TSC, Joe Kubitschek, has been accepted into the prestigious NATO-sponsored von Karman Institute for Fluid Dynamics in Belgium. As one of the 30 worldwide applications to be accepted to attend this 9-month program, he will be conducting research on scour and erosion due to high velocity flows from dams and hydraulic structures. He will also be able to engage other top minds to address these problems of significance to Reclamation. Therefore, the S&T program has chosen to fund his salary during this long-term training. (Joe Kubitschek, 303-445-2148; Cliff Pugh)

## Upcoming Events

### August

**7** Desalination Research Roadmap Meeting in Tampa in conjunction with the American Membrane Technology Association meeting. (Shannon Cunniff, 202-513-0682; Tom Jennings)

### September

Report to Congress on the Study of the Tularosa Basin Brackish Water Desalination Research Center. (Shannon Cunniff, 202-513-0682; Tom Jennings)

**11–13** River Systems Modeling Workshop, **Billings, MT** (Don Frevert, 303-445-2473; Shannon Cunniff)

**16-18** Performance Institute's R&D conference and workshops in Northern Virginia (Shannon Cunniff, 202-513-0682)

**17-18** AWRA Water Policy Workshop, **Washington, DC** (Shannon Cunniff, 202-513-0682)

**24:** Water Management Technologies Outreach Planning with **El Paso, TX**. (Shannon Cunniff 202-513-0682; Susan Martella)

**25-26** Cooperative Ecosystem Studies Units Executive Council strategic planning meeting. (Shannon Cunniff, 202-513-0682)

### October

**8-10** Bureau Of Reclamation Environmental Conference (Shannon Cunniff)

## Improving Decision Support

Members of the Watershed And River Systems Management Program (WaRSMP) team participated in the Second Federal Interagency Hydrologic Modeling Conference in Las Vegas. The group presented about a dozen oral, demonstration, and poster presentations showing WaRSMP products and a short course on the SAMS stochastic hydrology package. (Don Frevert, 303-445-2473)

WaRSMP fishery biologists and water resources engineers held a conference call to review preliminary Range of Variability analyses for endangered species on the **Yakima River basin** and formulate plans for future conjunctive modeling efforts. Good progress has been made this fiscal year, and the stakeholders are pleased with the effort to date. (Don Frevert, 303-445-2473; Mark Bowen)

Met with Dr. Paul Houser, Head, Hydrologic Sciences Branch, NASA/Goddard, and staff to discuss opportunities to partner with Reclamation's S&T program in support of application of advanced Land Surface Data Assimilation System technologies for surface energy and water budgets for Reclamation's Evapotranspiration (ET) toolbox, and water supply forecasts. NASA expressed interest in partnerships with Reclamation to demonstrate the practical utility of their products in the water resources community. (Dave Matthews, 303-445-2470)

Met with Dr. Vaughan Turekian, National Academy of Science, Program Officer, Board on Atmospheric Sciences and Climate, Steering Committee on Global Change to discuss the Academy's review and recommendations on climate change research, and their current review of the past decade's progress in the arena of weather modification research, to better understand the Academy's goals. We reiterated Reclamation's position that we are not in the weather modification business. (Dave Matthews, 303-445-2470)

Met with managers at the National Centers for Environmental Prediction to discuss needs from the Climate Prediction Center, Hydrologic Prediction Center, and the Environmental Prediction Center in the arena of short to medium and long-range forecasts of water supply and demand. (Dave Matthews, 303-445-2470)

Program managers from the Office of Science and Technology, NASA and NOAA representing the US Global Change Research Program/Climate Change Research Initiative (USGCRP/CCRI) met with Bennett Raley and his Staff; Commissioner Keys and his staff; and Dr. Charles Groat, Director, USGS regarding the need for weather and climate research in support of Reclamation's water resource management responsibilities. The briefing provided background and specific examples of ongoing and future opportunities for collaborative partnerships among our agencies. It emphasized the synergy of DOI's research applications in water resources management and the current research programs sponsored by the USGCRP/CCRI. (Dave Matthews, 303 445-2470)

## Upcoming Events

### August

- 7** The WaRSMP team will hold a conference call to discuss and resolve technical questions related to the Columbia Basin Project new start. The questions relate to crop distribution information and how to utilize it in interfaces, which are being developed between RiverWare and the AWARDS - ET Toolbox program. (Don Frevert, 303-445-2473)
- 22-23** The WaRSMP Independent Technical Review Panel will meet on August 22 and 23 to review progress on the program and recommend future priorities. The panel includes experts from Colorado State University, Utah State University, Louisiana State University, the Corps of Engineers and the US Geological Survey's Biological Resources Division. (Don Frevert, 303-445-2473)

## Improving Water Supply Technologies

Presented a paper at the USCID conference in San Luis Obispo entitled, "Relationship of Selenium in Drainage Water to the Selenium content of Irrigated Soils." The paper was published in the proceedings of that conference. The paper seemed to be well received, and a couple of interesting suggestions were made for future work and/ or different approaches that could be used to predict the selenium content of drainwater from soil data. (Joseph Brummer, 303-445-2457)

Advertised for weather modification R&D proposals. This research is being conducted in cooperation with the North American Interstate Weather Modification Council, which consists of 17 Western States and Hawaii water management agencies, in accordance with FY02 Appropriations language. Proposals are due in mid-October. (Dave Matthews, 303-445-2470; Curt Hartzell)

## Improving Infrastructure Reliability

Free swell and uplift pressure testing was conducted on foundation samples collected from the Burnham Lateral Reach 1 Canal, **Navajo Indian Irrigation Project**. This research will help determine a better method for treating soil and bedrock materials that are expansive. These expansive materials can and have caused extensive damage to canals and other structures. (Les Stone, 505-325-1794, Jeff Farrar)

A request for technical data from Bonneville Power Administration (BPA) relating to the ground resistance of the **Grand Coulee** 500-kV switchyard was answered with little difficulty because of Science and Technology funded field tests performed in 1993. Ground mat field tests were

conducted as part of a cooperative agreement with Montana State University. Results of this research effort were presented in a paper entitled “Grounding Evaluation of the Grand Coulee 500-kV Switchyard” and presented at the 1996 American Power Conference. Because of the information obtained by past research work, BPA and **Grand Coulee** were able to preclude performing these measurements at an estimated cost savings of about \$15,000. (Phil Atwater, 303-445-2304)

Developed and are in the process of demonstrating an electronic circuit to equalize/balance the cell voltages of large, multi-cell batteries, such as those used in Reclamation facilities, as well as in many other industries, including telecommunications. This equalization process keeps the cells at peak performance, extends the useful life of the battery, and also indicates when a cell voltage is out of tolerance, signaling that the cell is beginning to fail. The cost to monitor a 60-cell battery is estimated to be about \$3,000. Rival systems, presently available, cost over \$10,000. The equalizer circuit has been tested in the laboratory, and circuit boards have been prepared for demonstration later this summer at **Mt. Elbert** switchyard, and possibly a second location. Michael Messaros, Technology Transfer Facilitator, has been contacted to explore patent issues in anticipation that this technology will be transferred to the private sector. (Jim DeHaan, 303-445-2305, Malin Jacobs, Nathan Myers)

The Tunnel Radio system, developed by Malin Jacobs, Jim DeHaan, and Phil Atwater in the Hydroelectric Research and Technical Services Group, is undergoing a patentability assessment with one of our contracted intellectual property law firms, Lathrop & Gage. This radio was developed to address a Reclamation need for safe, reliable communications in de-watered tunnels during maintenance activities. In anticipation of preparing and filing a patent application, a marketing assessment was completed this month by Foresight Science & Technology, Inc., of New Bedford, Massachusetts. Foresight followed through with our recommended inquiry into possible military application. As a result of a contact made by Foresight, the Department of Defense expressed interest in witnessing an actual field test. Discussions are underway to conduct a possible field test some time in September or October. (Michael Messaros, 303-445-2135)

The draft Cooperative Research and Development Agreement (CRADA) for completing the prototype development of our winding fault detector was submitted in April to the Colorado School of Mines for their review. Nathan Myers (a newly hired graduate from the School of Mines) and Carmela Salas (a School of Mines Intern) have taken over this project and expect to have a prototype completed in the next 6 weeks. The winding fault detector has demonstrated the capability of pinpointing the location of electrical faults in the stator windings of large rotating machines. Reclamation experiences approximately five insulation failures a year. This device can save upwards of \$50,000 per failure. Technology transfer of the prototype will be sought as part of this study. (Phil Atwater, 303-445-2304)

Plans have been made to demonstrate a rotor turning gear at **Green Mountain Powerplant**. Nathan Nakamoto traveled to Green Mountain Powerplant in July to take measurements required to complete the design. A preliminary design of the turning gear should be completed in August. The rotor turning gear safety device was developed using S&T funding to improve safety when performing the hazardous task of slowly turning large hydroelectric generator and motor rotors.

The prototype was successfully tested at **Glen Canyon** last year; however, because **Green Mountain Powerplant** is significantly smaller, it requires a modified design. (Roger Cline, 303-445-2293)

We developed a draft proposal for a Life Extension assessment at **Mt. Elbert Powerplant** which would be a pilot of the methodology developed under this research project. It is possible that the actual assessment will be funded in part by the Western States Power Corporation. Also, additional work was done on the equipment condition assessment tools to be used as a baseline for current equipment condition which affects Life Extension risk assessment. Through the remainder of the fiscal year, we will continue to refine these proposals and tools. (Gary Osburn, 303-445-2297)

We continue to support the development of standard modular SCADA products for use by the **Lower Colorado** and **Mid-Pacific** Regions. Investigations were performed during July into a new product that will be used to improve configuration schemes for the Remote Terminal Unit module.

**Note:** During the fall of 2002, development of an optimization module for **Yellowtail Powerplant** will be completed. The optimization module will provide Reclamation operators and Western Area Power Administration with an improved method to control total powerplant requirements for generation and reserves by distributing requirements to individual units in such a way as to minimize water usage for power generation and minimize damage resulting from operation of units within their rough zones. The optimization module will be based on the Resource Optimization Module developed using past S&T funding and is now operational at Hoover Powerplant. (Steve Stitt, 303-445-2316)

During August, the report on valuation of ancillary services will be modified based on peer review comments. Review of data which shows the level of ancillary service production at powerplants in the Lower Colorado and Mid-Pacific Regions will be performed. (Steve Stitt, 303-445-2316)

During August evaluation of methods used by Tennessee Valley Authority to develop on-line flow models will be initiated. Development will be initiated as part of the optimization module at **Yellowtail** that will provide on-line flow monitoring that may be used to create new performance data for future analysis of turbine efficiency degradation. (Steve Stitt, 303-445-2316)

## **Regional Reports**

### **Mid Pacific Region**

In the Kit Fox Artificial Den Study, to date, 31 dens artificial dens have been established in complexes of 2-3 dens at 11 locations in **Bakersfield**. Ongoing research continues to indicate these artificial dens are successful in establishing useable habitat by Kit Foxes. Kit Fox migration patterns have potentially been affected by Reclamation water delivery infrastructure.