RESEARCH HIGHLIGHTS
APRIL 2003

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

We are pleased to report that Chuck Hennig, Manager of the Science and Technology Program, was the recipient of the Denver Federal Executive Board (DFEB) Legacy Award in the category of Exceptional Process Improvement. The winners of the Legacy Awards were announced at the DFEB Awards Program luncheon at the Renaissance Hotel in **Denver**. The DFEB's membership includes over 160 Federal and State agencies in the Denver area, and the competition was stiff. Chuck was cited for "building effective and relevant coordinated research processes and agendas that help bring new and emerging technologies and tools to the doorsteps of the end users." Please join us in congratulating Chuck for receiving this prestigious honor. (Shannon Cunniff, 202-513-0682; Siegie Potthoff, 303-445-2136)

The Office of Management and Budget (OMB) announced that the Bureau of Reclamation's (Reclamation) Research Program (Science and Technology/ Desalination Programs) would be the subject of the 2003 Program Assessment Rating Tool (PART) Review. OMB indicated that the Bureau of Reclamaton draft input would be done May 19, 2003, with a final submission in early July. Research is the only Reclamation program starting a PART Review this year. (Shannon Cunniff, 202-513-0682)

Agencies participating in the Department of the Interior Invasive Species initiative for 2004 met to launch efforts to coordinate a strategic selection of projects. A call for proposals for Reclamation's portion of invasive species initiative funding was issued and closed during April. For projects other than $100,000 for invasive species removal along the **Pecos River**, decisions will be made by summer 2003 after dialogue with potential Federal, State, and Tribal partners. (Shannon Cunniff, 202-513-0682)

The National Research Council has been very active in a variety of water resources research areas. The Water Science Technology Board (WSTB) held its semiannual meeting. Several new research reviews are being pursued in the areas of groundwater, water quality, instream flows, modeling risk, and uncertainty. The WSTB and the American Water Works Association Research Foundation hosted a workshop on sustainable underground storage/conjunctive use, as a precursor to development of a proposal for a WSTB study. The WSTB's Committee on the Assessment of Water Resources Research met and was briefed by Federal Agencies on levels and areas of research investment pertinent to water resources. Their report is over a year away. (Shannon Cunniff, 202-513-0682)

A suite of potential projects for funding under the Enhanced Science and Technologies portion of the 2004 Western Water Initiative were forwarded for consideration. (Shannon Cunniff, 202-513-0682)

Shannon Thomas, secretary for the Research Director received the **Washington Office**'s Secretary of the Year Award! (Shannon Cunniff, 202-513-0682)

The President's Natural Science Technology Council Committee on Natural Resources has established a new subcommittee on Water Availability and Water Quality. The subcommittee is in its forming stages and looking at defining a few key topics to investigate. Focus is on the Science and Technology that is needed to carry forward

effective policy. The purpose of the subcommittee is to present advice to the President and the Administration on science and technology investments to best ensure that the nation has an adequate water supply in the future. (Shannon Cunniff, 202-513-0682)

IMPROVING INFRASTRUCTURE RELIABILITY

For power system stability enhancement, work continued on generator control system identification by applying methods developed to identify excitation system models from frequency response data to identify simple governor models using time domain data. The identification of governor models is currently of critical importance to power system security, and some of the background effort of this recent work was approved this month for publication in two technical papers for an Institute of Electrical and Electronics Engineers™ Transactions journal. (J.C. Agee, 303-445-2309)

The parts list for the **Green Mountain Powerplant** rotor turning gear was completed, and the parts will be ordered in May. The rotor turning gear provides a safe alternative to the potentially dangerous manual method of rotating a generator rotor used by most facilities, and brings us into compliance with hazardous energy-related safety regulations. (Roger Cline, 303-445-2293)

For operational and environmental constraints and their impact on ancillary services, basic concepts were developed for a 24-hour schedule package that will be used to schedule regulation services from a powerplant with a daily release requirement. Coordination work was performed with the Western Area Power Administration in **Phoenix**. Their staff expressed interest in a prototype being applied to **Davis Powerplant**. During May, the basic 24-hour schedule laboratory prototype will be completed. Work will be initiated to develop the hour-ahead schedule concepts. (Steve Stitt, 303-445-2316)

For optimization improvements to increase energy production and extend equipment life, additional manpower was committed to develop the performance monitoring scheme. Additional work was performed to coordinate with **Hoover Powerplant** staff on the prototype installation. During May, the prototype performance monitoring scheme will be laboratory tested and prepared for installation at Hoover Powerplant. A meeting will be held at Hoover to coordinate the installation. (Steve Stitt, 303-445-2316)

A working prototype stator fault detection system is complete (with minor software correction to be performed) and ready for field testing as the opportunity presents itself in the field. As available, generators or large motors with stator winding faults or scheduled rewinds will be targeted for field testing. The winding fault detector has already demonstrated the capability to pinpoint the location of electrical faults in the stator windings of large rotating machines. Reclamation currently 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)70)

IMPROVING DECISION SUPPORT

Very fine sediments can carry pollutants into reservoirs, which may cause water quality concerns. Many reservoirs are getting old, and sediment buildup behind dams can cost a great deal to remove, affect downstream fish, and

infiltrate water intake structures, causing water quality problems. Tracking sediment that flows in Reclamation facilities is now a primary concern, particularly as the Environmental Protection Agency is working on total maximum daily load criteria for sediment and the pollutants that may adsorb into sediment. Reclamation managers may need to calculate the sediment load for cohesive materials both upstream and downstream of their facilities. At present, most literature and research revolves around sand and coarse sediments, which do not absorb and carry the pollutants. Much more research needs to be done to provide the information Reclamation needs for efficient water operations and decision support.

Starting in FY99, the S&T Program began a partnered study with the Environmental Protection Agency to develop a Generalized Sediment Transport Model for Alluvial River Simulation (GSTARS 1-D). This model will be able to track the fine sediment as it is carried through canal and river systems. Researchers are testing the model on the **San Luis Canal near Coalinga, California**. The ephemeral stream, Arroyo Pasajero, drains directly into the **California Aqueduct**. The stream contains extremely high concentrations of suspended sediment and water quality constituents like total dissolved solids. The model is assessing the value of a new gated structure downstream of Arroyo Passajero to help remove polluted waters when flood waters enter the aqueduct from the arroyo.

In FY2002, the S&T Program started 5-year partnered study with the Environmental Protection Agency to develop the computer program GSTARS4. GSTARS4 will be able to estimate the delivery of sediment from the watershed to river systems. With this model, Reclamation managers will have the ability to make better estimates of the amount of sediment that is expected to enter our reservoirs and other hydraulic facilities. (Ted Yang, 303-445-2550)

Members of the interagency Watershed and River Systems Management Program (WaRSMP) Technical Team met in **Ephrata, Washington** to evaluate progress on the **Truckee, Columbia Basin Project, and Yakima** deployment. Representatives from the **Truckee, Upper Rio Grande, Upper Colorado, and Yakima Basin** water operations management teams reviewed progress and discussed common water management decision support challenges, including total maximum daily load regulations for species in fisheries listed under the Endangered Species Act, water accounting modeling, relational data base optimization for decision support systems, water supply and demand forecasting, and distributive hydrologic runoff modeling for snowpack and rainfall events and longer term seasonal predictions. In addition team members from Reclamation and the U.S. Geological Survey (USGS), Kristi Arsenault, principal investigator from the National Aeronautics and Space Administration (NASA), also attended to discuss current and future opportunities for cooperative efforts. Global Energy and Water Cycles Experiment, Americas Prediction Project plans and progress were reviewed for a recently project funded by the National Oceanic and Atmospheric Administration Office of Global Programs, titled "Improved Water Demand Forecasting for Water Resources Managers," Matthews and Arsenault, Principal Investigators. Technical priorities and plans for FY2004 were also reviewed. Meeting notes are available at http://www.usbr.gov/rsmg/forums/warsmp. (Don Frevert, 303-445-2473)

Kristi Arsenault, NASA briefs WaRSMP technical teams from Reclamation's Upper Columbia Area Office, Columbia Basin Project Office, USGS: Tacoma District Office, Water Resources Division-Denver, and Reston HQ; and TSC scientists.

Kristi Arsenault, NASA Goddard Space Flight Center co-Principal Investigator with Dave Matthews of the Technical

Service Center (TSC), on the NASA-funded research project titled "The Use of NASA Land Data Assimilated Products to Improve Flood and Drought Risk Analysis and Forecasting for Water Resources Management in the **Columbia River Basin**," toured project facilities with TSC staff and met with 25 members of the WaRSMP technical team to review plans for the NASA research. John Moody, Columbia Basin Project Office provided a tour of the project, including **Grand Coulee Dam** (see below). (Dave Matthews, 303 445-2470)

Craig Sprankle, Public Affairs Officer, Grand Coulee Power Office, briefs WaRSMP S&T scientists at Grand Coulee Dam.

John Moody, Manager, Irrigation Operations and Technical Services, Columbia Basin Project, discusses irrigation operations with TSC researchers Frevert, Stodt, and Meyer at CBP Central Canal. The flow in the canal was about 3,700 cfs.

The group also met with the Pacific Northwest National Lab (PNNL) scientists in **Richland, Washington** to discuss areas of mutual interest in applying emerging remote sensing and land surface-atmospheric modeling technology for water management decision making. The team drafted a joint, NASA, Department of Energy, and Reclamation proposal that addresses forecasting and decision support needs of the **Upper Columbia Basin Area Office**. This work may fit into existing PNNL research application responsibilities under a NASA-funded Pacific Northwest Regional "Collaboratory". (Dave Matthews, 303 445-2470

WaRSMP team members will make presentations at the RiverWare users group meeting to be held at the University of Colorado. (Don Frevert 303-445-2473)

IMPROVING WATER DELIVERY TECHNOLOGIES

Technical specialists involved in S&T research on wetland construction and ecology from the Technical Service Center and the USGS Biological Resources Division met with the **Lower Colorado Region** and representatives of the Colorado River Indian Tribes and their Fish and Game Department to evaluate a wetland construction and restoration site on tribal land near **Parker, Arizona**. This restoration effort involves approximately 40 acres and will provide valuable local waterfowl and wildlife habitat as well as water treatment for irrigation return flows. This wetland site is being developed with extensive tribal and Federal interagency cooperation and should provide an excellent demonstration of the value of wetlands for low cost water management. (Richard Roline, 303-445 2213)

Peer-reviewed journal articles were published in *Hydrobiologia*, on the relationship of flow to aquatic invertebrates in the **Sacramento River**, and in wetlands on litter processing responses to flood flows in the **Yampa River**. These studies will help in understanding biotic responses to flow regulation and provide needed biological information for mitigation purposes. (S. Mark Nelson, 303-445-2225)