

S&T Highlights

Director's Office (Denver, Colorado)

Research Office cohosts the Lower Klamath Basin Science Conference.—The Research Office, along with the U.S. Geological Survey and Klamath River Basin Fisheries Task Force, cohosted the Lower Klamath Basin Science Conference at Humboldt State University in **Arcata, California**. The purpose of the conference was to initiate a dialogue between resource management and scientific communities, including tribal authorities, academia, and other stakeholders about present and future information needs and their priority in the basin. The physical connections and ecological linkages between upper and lower basins, including the **Trinity River**, were key themes. Conference goals focused on anadromous fishes and instream flow science needs. Science needs were identified, discussed, and synthesized. After the conference participants ranked the science needs on line, the results be will posted on the Research Web site and on the DOI Web site. (Siegie Potthoff, 303-445-2136)

Upcoming Events

- August 2: Proposal submission process will close and review phase will begin. (Siegie Potthoff, 303-445-2136)
- 3-4: Steering Team Meeting, **Fort Collins, CO**. (Siegie Potthoff, 303-445-236)
- October Early October: Funding awards made for FY05.

Improving Decision Support

Team meets to identify risk and uncertainty issues.—The Watershed and River Systems Management Program (WaRSMP) Risk and Uncertainty team met at the **Upper Colorado Regional Office in Salt Lake City**. The group identified key risk and uncertainty issues that are dealt with in participating offices. The group will be working to formulate an action plan for dealing with these issues over the coming months. (Don Frevert, 303-445-2473)

The Western Water Information Network Team visited the **Upper Colorado Regional Office in Salt Lake City, Utah** to discuss progress on the reports and geospatial data bases on the Gunnison and San Juan River Basins that the TSC is providing to the region. The TSC will issue a report summarizing over 500 media articles on water issues in the basins, and reports on the scholarly literature by the end of fiscal year 2004. Besides base data layers, such as topography, land cover, and roads, the data bases include information on predam and postdam ortho-rectified photography, Reclamation lands (as available), water rights, invasive plants, endangered species, water use, demographics, and Native American negotiations, among many other types of information. TSC personnel also prepared a tabulation of water conflict risk factors by county and presented these preliminary findings to demonstrate one way in which a geographic information system (GIS) can be used for decision support. Future research will focus on finding methods to use GIS data to solve particular problems in the Upper Colorado Region.



Dr. Aaron Wolf and Marcia Macomber from Oregon State University presented their recent research on global water conflict and conflict in Pacific Northwestern basins. Dr. Beth Murphy of the University of Utah presented her research on water conflicts on the **Upper Price River, Utah**. The meeting ended with discussions on ways to combine the research efforts of the Western Water Information Network with ongoing Oregon State University and University of Utah research. (Doug Clark, 303-445-2271)

Using remote sensing to facilitate detection of river system changes.—The TSC is performing an historical analysis of the **San Simon River in Arizona and New Mexico**, a heavily eroded drainage. The effort compares relatively recent (March 2001) orthophotography (orthos) and digital terrain data (DTM) to a 1935 topographic survey. Grade control structures have been built since then. Comparison of the two will provide a determination of effectiveness of the erosion control. Reclamation personnel are evaluating a 1935 plane table hardcopy map owned by the Bureau of Land Management. It is a continuous 80-foot plot, seamed together by glue joints, very brittle, and crumbling in sections. It is the only historic document of its kind for this area. Great care has to be taken on how to proceed with archiving. The map is first being digitally photographed. The line work will then be traced onto mylar overlays at the glue seams and cut into sections for scanning on a large format drum scanner. (Ron Miller, 303-445-2279)

Upcoming Events

- July 8: The Columbia Basin Research Team will hold their next conference call. (Don Frevert 303-445-2473)
- August 26: The Yakima Fisheries Research Team will hold their next conference call. (Don Frevert, 303-445-2473).

Improving Water Delivery Reliability

Spatial modeling (using a new video sensor) for the identification of invasive species.— This work involves testing newly acquired digital high definition camera equipment for the acquisition of video data to be used for invasive species identification. A portion of the middle **Rio Grande** was selected to represent the presence of the target invasive plants (salt cedar and Russian olive). The area was also selected, because a recent classification was performed there that could be used as ground truth for training and testing. The invasive plants must be discriminated from the naturally occurring cottonwood and, to a lesser degree, elm and willow in the final classification. Reclamation personnel installed the new equipment on a helicopter and flew the river reach. The video data acquired are now being evaluated. A subset of the data will be defined that contains a variety of the above-mentioned species for the pilot classification. Ground truth data are being prepared as two reference inputs. One set will be used for the classification and the other for accuracy assessment. (Ron Miller, 303-445-2279)

Improving Water Supply Technologies

Testing of an automatic fish identifier.—The first quantitative test of the automatic fish identifier showed that it successfully classified 87.5 percent of fish images to species like the ferreirinha below (pronounced fa-HEY-in-ya). Reclamation personnel and personnel from the Computer Science Department, Federal University of Minas Gerais, Brazil, collected 55 fish images at Igarapava Dam fish ladder (near Uberaba, Minas Gerais, Brazil) for the test. The automatic identifier performed even better than expected on these images. The next step is to protect this intellectual property and make Reclamation the exclusive recipient, for the time being, of the

technology. Then the research may be continued to develop the preprocessor (cleans up the image significantly) and the tracker (cuts out the images automatically and counts them). When all the components are linked in the next couple of years, the integrated Fish Imaging Project software will take a tape obtained in a fish ladder window (or anywhere) and identify and count the fish passing by. In the United States, Reclamation will adapt this technology for steelhead (listed as threatened), chinook salmon, and other fish in the Pacific Northwest. Then river managers will know when steelhead are not present in the vicinity of a Reclamation facility. With such knowledge, much more latitude in operations will allow these same managers to save water. This saved water can be allocated for the benefit of agricultural water delivery, power production, and environmental needs. (Mark Bowen, 303-445-2222)



A ferreirinha detected by the automatic fish identifier.

Workshops on urban encroachment on canals.—The Technical Service Center (TSC), in collaboration with Colorado State University, is conducting workshops throughout the West on urban encroachment issues facing irrigation districts in the West. In addition, an overview of research findings was presented in June 2004 at Reclamation's Lands Conference in **Salt Lake City, Utah**. In recent years, urban encroachment on canals has become a major liability issue for districts. A report on this research is due late this year, and we hope the report will help people understand the seriousness of this issue for irrigation districts throughout the West. Recommendations will be included in the report on ways that districts can address this issue more effectively. (John Wilkins-Wells, 970-491-5635)

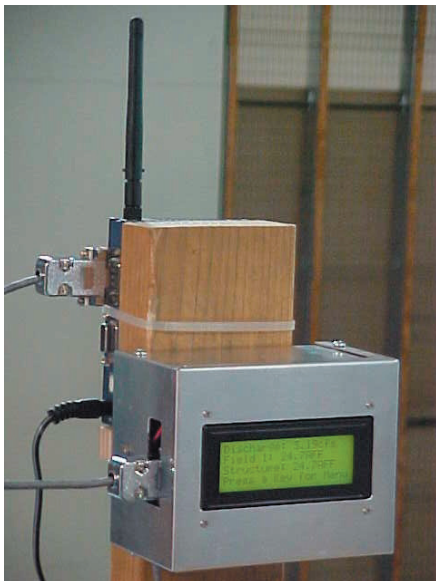
Development and deployment of affordable technologies for flow measurement and delivery control.—The Water Resources Research Laboratory (WRRL) has reconfigured its continuous flow measurement (CFM) system. The original unit featured Netmedia Inc.'s Basic X Programmable Logic Controller (PLC) to receive an input signal from a level sensor, process this signal into a flow depth, then calculate discharge from that depth. Outputs included flow rate and total volume flow delivered. Using a two-button input, simple programming tasks could be performed, such as indicating the beginning of a new season, (i.e., zeroing out the volume total). The upgrade utilizes Netmedia's recently available [LCDX PLC](#), which comes with an integral 4- by 20-character liquid crystal diode (LCD) display that is replacing the hardware for the CFM units. The new controller is set up to be readily connected with a 4- by 4-key matrix keypad. The upgraded CFM units use keypad input to provide simplified user input tasks for setup and sensor calibration. The CFM was developed as a low-cost, stand-alone automation system for computing and totalizing flow at flow measurement structures. The upgraded system provides improved operational features at a slightly lower

cost for system hardware. The upgraded systems will be deployed at demonstration sites in **Arizona** and possibly elsewhere during the current crop season. (Tom Gill, 303-445-2201)



Upgraded CFM unit installed on the WRRL canal model

Development testing and demonstration of components of a canal modernization system.— This project was proposed to investigate the applicability of emerging technologies to canal modernization systems. In an effort to identify low cost, wireless telemetry capability, a low cost, limited-range spread spectrum radio ([Serialan from Data Hunter](#)) was successfully linked with the recently reconfigured CFM unit installed on the canal model at Reclamation’s Water Resources Research Laboratory. The radio communicates with an identical remote radio mounted on the canal model control platform. Information received by the remote unit is fed into a programmable logic controller (PLC) with an integral LCD display—the same PLC system used for the CFM upgrade. The same output information is displayed on both the CFM and remote PLC. This limited-range communications setup may have applications including relay of information from a flume at an inconvenient-to-access site to the ditch rider’s pickup at a nearby control gate, or possibly “drive-by” data acquisition for the ditch rider. Demonstration unit installation(s) are planned for one or both outlets at **Belle Fourche Reservoir in South Dakota**. (Tom Gill, 303-445-2201)



Remote radio and display on the control platform of the WRRL canal model