

S&T Highlights

Improving Decision Support

Meeting held to plan research on evapotranspiration.—The International Center for Water Resources Management at Central State University, the Ohio View Consortium, and Colorado State University (the Alliance Universities), and the Bureau of Reclamation (Reclamation) held a workshop on the remotely sensed detection of evapotranspiration (ET) in **Ft. Collins, Colorado**. Evapotranspiration takes place when the water contained in plants evaporates. The consumption of water in this way affects irrigation management and water rights. The meeting, hosted by the U.S. Department of Agriculture, brought together ET experts from federal organizations, universities, and water districts.

Reclamation's Avra Morgan led off the meeting by indicating that ET remote sensing research is wholly in compliance with the principles and tools of Water 2025. Dennis Montgomery from Hill and Robbins, P.C. then talked about the legal consequences of evapotranspiration measurement for the equitable apportionment of waters of interstate rivers and for the prevention of injury in changes of water rights. Subsequent presentations dealt with current practices used for ET measurement and evolving technological developments.

The the meeting was held to assist the Alliance Universities in the preparation of their work plan for ET remote sensing research in the West. Subsequent meetings were held in **Blythe, California** and **Boulder City, Nevada** to iron out the details of the plan. The Alliance Universities are preparing meeting proceedings, which will be distributed along with a CD containing the workshop presentations. (Doug Clark, 303-445-2271)

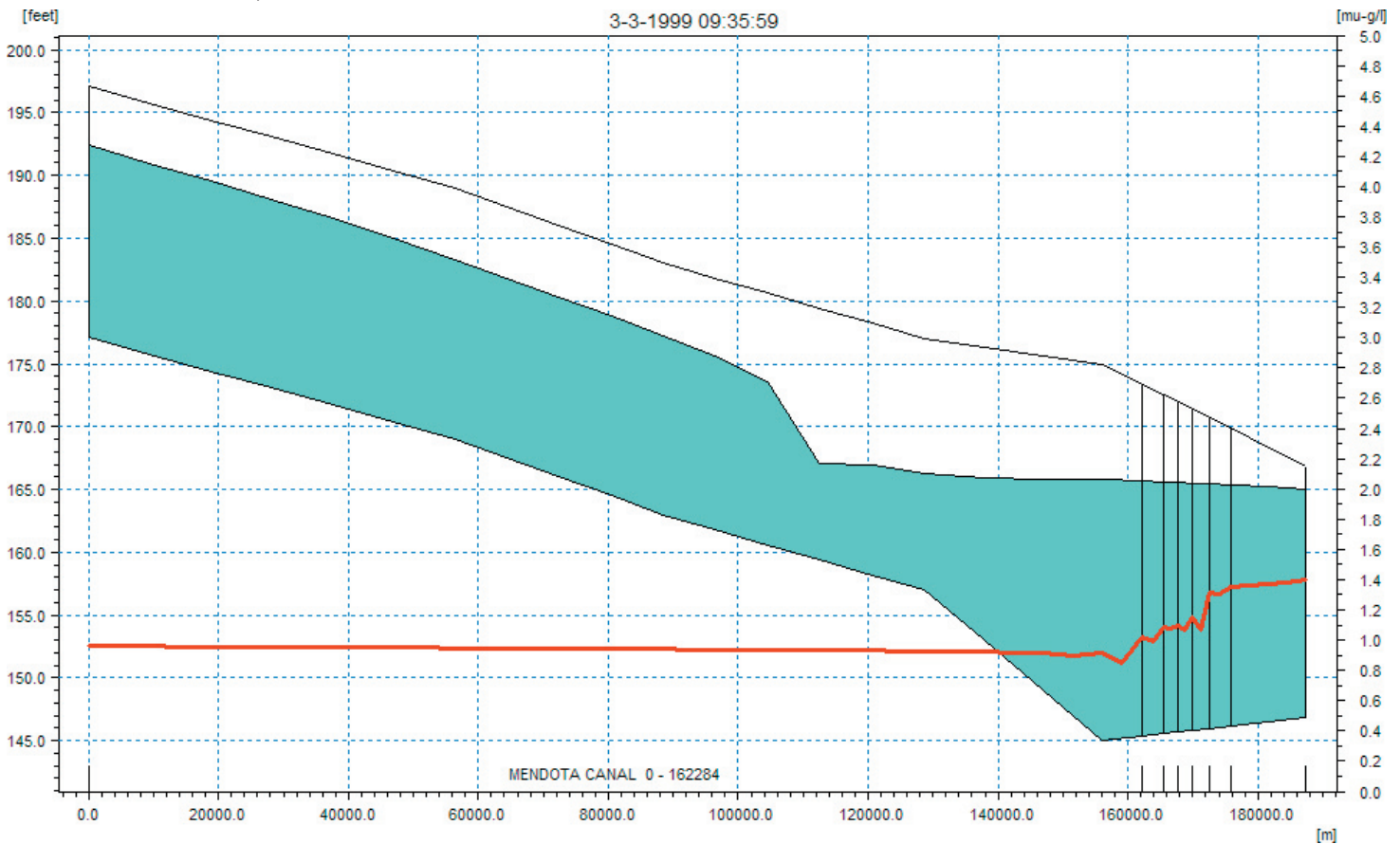
Agencies collaborate to share data.—The Western Water Information Network research group hosted an interagency workshop to develop interagency collaborative data sharing and information management mechanisms. Reclamation is identifying data and information that enable Western water managers to be more forward looking in identifying key trends and emerging issues that drive water availability to meet multiple demands. The U.S. Army Corps of Engineers, one of the participating agencies, is working on a major



enterprise geographic information system application for the Missouri River Basin. Representatives from the **Upper Colorado** regional office and the **Technical Service Center** spoke about conflict and cooperation in water resource management, and the Western Water Information Network, respectively. Since the workshop, interagency work groups have been established to identify and collaborate on mutually beneficial projects to support water supply in the West. These projects will involve extensive data sharing and technology transfer. (Doug Clark, 303-445-2271)

Improving Water Delivery Reliability

Improving operation of the Delto-Mendota Canal.—The picture below is from an entertaining animation that shows the depth of water (in blue) along the length of the Delta Mendota Canal, using daily mean data. The red line is the estimated concentration of selenium in the water based on less frequent samples. The six vertical lines near the right represent six sumps from which seleniferous groundwater is pumped into the canal. The animation is part of a model that Reclamation will use to predict how operation of the canal and the addition of the groundwater will alter water for downstream farms and refuges. The goal is real time operation of the sumps using supervisory control and data acquisition (SCADA) to run them according to the dilution capacity of the canal water. This model can probably be adapted to many other canals. (Chris Eacock, 559-487-5133)



Klamath River Thermal Refugia Study.—In 2002, the National Marine Fisheries Service (NMFS) (currently National Oceanic and Atmospheric Administration Fisheries) issued its Biological Opinion (BiOP) for Klamath Project Operations. In the BiOP, NMFS indicated that incremental decreases in flows from Iron Gate Dam to the Klamath River posed an increasing threat to the continued existence of coho salmon. However, NMFS could not determine how different summer Iron Gate Dam flows improved or diminished any survival benefits to coho salmon associated with thermal refugia because no studies had been conducted. Thermal refugia are pockets of cooler water, typically at the mouths of small tributaries, where salmon begin to gather when the main-stem river exceeds 23 °C. As part of a set of reasonable and prudent alternatives outlined in the BiOP, Reclamation was requested to engage in a multiyear study to investigate the effects of various summer Iron Gate Dam flow regimes on thermal refugia in the main-stem Klamath River.

In the summer of 2004, Reclamation monitored two refugia, Beaver Creek and Red Cap Creek, two tributaries representing the upper and lower reaches, respectively, of the Klamath River between Iron Gate Dam and the Pacific Ocean. Under various hydrological and meteorological conditions at the two refugia, higher flows from Iron Gate Dam showed some ability to affect the refugia. However, none of the flows dramatically enhanced or degraded thermal refugia, and fish behavior tended to be consistent. This study may have implications on operations of the Klamath Project for summer flow releases from Iron Gate Dam. (Ron Sutton, 303-445-2495)



Beaver Creek thermal refugium.

Tamarisk Food-Web Study.—The objective of this work was to determine the arthropod (insect and spider) food web supported by branches on tamarisk, or saltcedar (*Tamarix ramosissima*). Tamarisk is a salt-tolerant tree native to Asia that has become established alongside rivers in the western U.S. The study will be published in *Environmental Entomology* this June. Two species of plant-feeding insects comprised 98 percent of total arthropod biomass, measured as dry weight. Biomass of plant-feeding insects occurred mostly (85%) in trees next to surface water where groundwater was high (3 m deep). Biomass of plant-feeding insects also differed greatly between 2002 and 2003. Tamarisk branches supported seven species of predatory insects or spiders. Tamarisk branches provide vertebrate animals with insect and spider prey that is narrowly distributed, low in diversity, and erratic through time. Birds, such as the endangered southwestern willow flycatcher, that repeatedly nest and forage in tamarisk may depend on an unpredictable food base. The results of this study suggest that Reclamation activities to improve riparian wildlife habitat should strive to reestablish native trees and shrubs rather than preserve tamarisk. (Bill Wiesenborn, 702-293-8699)