

Research Support for Bureau of Reclamation Mission

The Western Ecological Research Center (WERC) of the U.S. Geological Survey (USGS) has a strong and productive history of working with the Bureau of Reclamation (BOR). USGS biologists collaborate with other USGS disciplines (Water Resources, Mapping, and Geology) on many projects, thus strengthening their capability to conduct integrated natural resources research that meets the needs of the BOR. The BOR mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. WERC's 15 field stations are strategically located in California, Nevada, and Arizona, and two field stations have major research emphases on issues of interest to the BOR. Three research projects, totaling \$300,000, are underway and focus directly on management of riparian areas in the Mojave Desert. WERC also conducts research on natural resource issues of concern to other federal agencies such as the Bureau of Land Management, Fish and Wildlife Service, National Park Service, Minerals Management Service, and the Department of Defense. Many of these projects have crosscutting application to BOR research needs.

Highlighted Projects

Salton Sea

The Salton Sea is a large, hypersaline lake in arid southeastern California created in 1905 when flood waters from the Colorado River broke through a diversion dike and flooded a preexisting dry lake. The Sea, which is 376 square miles in size, is 25 percent saltier than ocean water and has become an important resource for millions of breeding, wintering, and migrating water birds. Having no outlet, the Sea concentrates whatever chemicals are brought into it in three rivers and several irrigation dikes. The Sea and its inlets have elevated levels of nitrogen, sodium sulfate, selenium, and various agrochemicals. As a consequence of this and high summer temperatures, millions of fish and thousands of birds die each summer. In 1992, 150,000 eared grebes died and in 1996, 1,400 endangered brown pelicans succumbed to botulism.



The Salton Sea is much saltier than sea water. Unless efforts are made to prevent salinities from increasing, an important recreational fishery is in jeopardy.

The Bureau of Reclamation, in cooperation with the Salton Sea Authority, is responsible for restoring the Sea to healthier conditions. Part of the solution being considered is to create large evaporation ponds and use specialized equipment to enhance evaporation rates by shooting water into the air. Some of the airborne saline water vapor may drift out of the evaporation ponds and deposit on the ground in the surrounding area. WERC scientists from the San Diego Field Station are studying the potential effect deposition of these airborne particulates has on the terrestrial ecosystem. They are monitoring vertebrate and invertebrate populations, including bats, birds, rodents, snakes, lizards, and beetles; measuring the spatial patterns of particulate deposition upwind and downwind from the pilot evaporation ponds; describing the dynamics of soil biogeochemistry; and tracking the flow of certain chemical compounds through the food web. The results of this project will help BOR evaluate impacts on the terrestrial ecosystem from the proposed broad scale use of evaporation ponds with the enhanced evaporation apparatus. Furthermore, the results will provide insights on how exposing large portions of sea floor to wind and air will impact surrounding areas.

Southwestern Willow Flycatcher Database

Researchers at the San Diego Field Station are creating and populating a statewide database centralizing information on the southwestern willow flycatcher (*Empidonax traillii extimus*), an endangered bird restricted to riparian habitat in the southwestern United States. Modeled after similar databases in other states, the California database will play a comparable role in providing standardized and centralized storage of information being generated by a wide array of efforts, and will be structured to allow query and information retrieval by agency personnel and others involved in management of the flycatcher. Project personnel are compiling existing data on the distribution, abundance, and breeding activities of willow flycatchers in California, developing a bibliography and compatible geographic information system in the process. The product of this effort will be an operable information management system that can be linked to other systems both within and outside of California, facilitating comprehensive analyses of flycatcher distribution, abundance, and productivity over a variety of geographical scales. In addition, it will provide historical and current presence/absence information for specific locations, and permit population trend analyses necessary for evaluating response to management and other activities.

Distribution and Status of Avifauna Utilizing Riparian Habitats in Clark County, Nevada

Scientists at the Las Vegas Field Station are conducting population studies on Neotropical migratory land bird species within the desert riparian ecosystem of the Virgin River in southern Nevada. This research is being conducted to assess the abundance and species composition of sensitive birds, and to monitor nest success, with particular emphasis on the effect of nest parasitism by brown-headed cowbirds. Unlimited-radius point counts and point count stations cover a six-kilometer stretch of the riparian floodplain. This area contains varying proportions of native willows and the exotic shrub tamarisk. Vegetation data are collected in conjunction with point count surveys to establish bird-habitat relationships. Variables derived from point count data such as relative abundance and species richness are being tested for associations with vegetation variables. Demographic data have been collected using systematic nest-searching and nest-monitoring for three Neotropical migrants: yellow warblers, Bell's



These least Bell's vireo nestlings are federally protected under the Endangered Species Act. These and other species depend on riparian habitat for their survival. The invasive exotic plant species saltcedar holding their nest replaces native species like willows.

vireos, and yellow-breasted chats. Nest site vegetation data have been collected to investigate potential correlations between nest success/productivity, and nest site. Vegetation data collection in conjunction with nest monitoring may identify habitat selection variables associated with nest success, predation, and brown-headed cowbird parasitism. In addition, monitoring is being conducted for the endangered southwestern willow flycatcher along the Virgin River in southern Nevada. The research is being done as a cooperative project with the Biological Science Section of the San Bernardino County Museum, Redlands, California.

Other Current Research Projects

WERC scientists are conducting research on other riparian, aquatic, and terrestrial issues of interest to BOR. Funded by agencies other than BOR, these projects received support of over \$1 million in Fiscal Year 2001. Selected projects are listed below.

Declining Amphibians

- Amphibian Research and Monitoring Initiative
- Distribution, populations status, and causes of decline for California amphibians
- The role of pesticides in declining amphibian populations in the Sierra Nevada
- Do endocrine disruptors play a role in amphibian population declines?

Aquatic Contaminants

- Contamination associated with abandoned mine lands, Bear River, South Fork Yuba and Trinity River watersheds: Mercury contamination of biota
- Cache Creek mercury study
- Potential impacts of contaminants on wildlife at Edwards Air Force Base
- Toxicity assessment of the mosquito larvicide Golden Bear Oil (GB-1111) on avian eggs, non-target prey, and duckling survival

Geomorphology and Erosion

- Inventory and monitoring of sediment sources and transport
- Evaluation of watershed response to land use changes
- Stream recovery following watershed restoration

Riparian Obligate Neotropical Migrants

- Population structure and demography of the least Bell's vireo and the southwestern willow flycatcher
- Bird use of restored riparian habitat
- Monitoring avian productivity and survival at Marine Corps Base Camp Pendleton, California

Wetland Restoration and Management

- Science support for wetland restoration in the Napa/Sonoma salt ponds, San Francisco Estuary
- Waterfowl migration, staging and wintering patterns in the Klamath Basin of California and Oregon

- Feeding ecology of dabbling ducks in Suisun Marsh and the Sacramento-San Joaquin Delta, California
- Waterfowl distribution, movements, and habitat use relative to recent habitat changes in the Central Valley
- Ecology of mallard molting on Klamath Basin National Wildlife Refuge
- Pintail habitat use and abundance during spring in the Klamath Basin and other southern Oregon-northwestern California basins

Central Valley Species at Risk

- An evaluation of restored wetlands as habitat for giant garter snakes at Colusa National Wildlife Refuge
- Distribution and habitat use of giant garter snakes in Natomas Basin Conservancy areas
- Distribution and population assessment of the yellow-billed cuckoo
- Declining species and grazing in the San Joaquin Valley, California

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