

Research Support for FWS Mission

The Western Ecological Research Center (WERC) of the U.S. Geological Survey (USGS) has a strong and productive history of working with the U.S. Fish and Wildlife Service (FWS). That history started when many of our past and present Research Scientists were transferred from FWS into the National Biological Survey (Service) in 1993. In 1997, those scientists became part of the Biological Resources Division of the USGS, thus strengthening their capability to conduct integrated natural resources research that meets the needs of the FWS. The FWS mission is to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American public. WERC's 15 field stations are strategically located in California, Nevada, and Arizona, and four field stations conduct research largely in support of needs identified by FWS. Over 30 research projects are underway and focus primarily on endangered and at-risk species, migratory birds, wetlands, and ecosystem impacts of contaminants at a cost of over \$ 3.7 million. Indirect research benefits for FWS total another \$ 3.2 million. Several of the projects directly benefiting the FWS are highlighted below. WERC also conducts research on natural resource issues of concern to other federal agencies such as the Bureau of Land Management, National Park Service, Minerals Management Service, and the Department of Defense. Many of these projects have cross-cutting application to FWS research needs.



Highlighted Projects

Population Biology and Behavior of the California Sea Otter

New research is underway at WERC to discover causes for the declines in California sea otter populations by focusing on the behavior and population biology of sea otters. This is a broadly collaborative program involving additional scientists from the California Department of Fish and Game, the University of California at Santa Cruz, the University of California at Davis, the USGS National Wildlife Health Center, and the Monterey Bay Aquarium. The scientists are documenting patterns of growth or decline in sea otter populations. They hope to determine the demographic, behavioral, and physiological mechanisms responsible for the different rates of population change, and in particular to understand reasons for depressed growth for the threatened California sea otter. They are developing modeling approaches to predict trends, and using radio telemetry and visual observations of marked individuals to compare foraging, social behavior, physiological responses, and demographic distribution among various sea otter populations. Detailed health profiles are being developed for living animals, and beach-cast carcasses are being necropsied in an effort to determine cause of death. Analyses of these data will help indicate the status of sea otter populations.

Satellite Tracking of Northern Pintails: Spring Migration Routes, Staging Areas, Nesting Regions, and Postnesting Dispersal Relative to Prairie Habitat Conditions

Although northern pintails are very abundant in North America, their status has been steadily deteriorating over the last 30 years, even though the estimated number of prairie wetlands in May 2001 increased to record high levels in Canada and in the United States after the long drought of the 1980s and early 1990s. In contrast, all other species of prairie nesting dabbling ducks rebounded to average or above average as of May 1997, as wetland numbers increased. The minimal recovery of the North American pintail population is perplexing given the very large populations attained

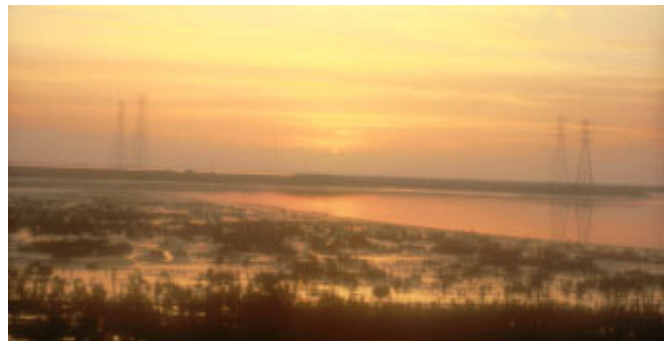


during previous periods of abundant May wetlands (1950s and 1970s), and the current high populations of other ducks. This research effort is designed to more fully understand pintail population dynamics and determine what is limiting pintail recovery so that useful remedies may be applied. Using satellite telemetry, this research effort is identifying spring migration routes and critical staging areas where pintails feed prior to arriving on breeding grounds in the prairies and in Alaska. Telemetry data are also identifying distribution patterns of pintails in relation to wetland abundance and distribution on the breeding grounds. By determining the postnesting distributions of pintails, scientists will be able to link molting locations with nest sites, measure exposure rates for pintail populations that use lakes where perennial botulism occurs, and assess whether current banding sites accurately represent pintail breeding distribution. Information gained from this study on winter and spring migration habitat quality and postnesting distribution will help direct management of key waterfowl areas on private, state, and federal lands. For more information on this study, visit <http://www.werc.usgs.gov/pinsat/>.

Science Support for Wetland Restoration in the Napa/Sonoma Salt Ponds, San Francisco Bay Estuary

Only about 10 percent of historic intertidal wetlands remain around San Francisco Bay. These tidal wetland remnants support the only remaining populations of several endangered species. Recovery plans for these listed species recommend restoration of vast acreages of salt ponds to tidal wetlands. This research study examines the ecological function of the Napa-Sonoma salt ponds and their importance for waterbirds, including integrated studies on primary productivity, macro-invertebrates, plants, and fishes. The objectives of the

study are to document the trophic structure in salt ponds along a salinity gradient, determine how biological processes vary with differing physical regimes, and predict outcomes and consequences of wetland restoration efforts on species that rely on salt ponds. Results from this study will explain how salt pond communities function and will help to identify those ponds with wildlife values that are difficult to replace or mitigate, compared with those that may be successfully restored to functioning intertidal wetlands. Results of this study will help resource managers with FWS and the California Department of Fish and Game better design and manage rehabilitation of intertidal wetlands, so that the greatest diversity of species can be supported in the San Francisco Bay estuary.



Foraging Ecology and Environmental Contaminants in Migratory Birds in the San Francisco Bay Estuary

Few studies have been conducted on the San Francisco Bay estuary to examine the effects of environmental contaminants on the large migratory bird populations that are dependent on the estuary. Introductions of exotic species, such as the Asian clam, have changed available food resources for migratory birds. Recent studies indicate that the Asian clam population is increasing exponentially in the North Bay area, and it bioaccumulates higher levels of contaminants than other food resources, possibly tripling the concentrations of selenium available in prey consumed by waterbirds. This research project is examining the winter distribution of diving ducks and their prey, examining their contaminant concentrations, and determining their rate of bioaccumulation through a foraging-energetics contaminants model. This study will provide information on foraging and movements of diving ducks in the San Francisco Bay estuary and their contaminant levels with respect to pollution in the ecosystem. It will provide much needed information for regulators about environmental pollutants and their potential effects in the estuary.



Habitat Conservation Planning Science Support

Southern California is a region characterized by both unparalleled natural biodiversity and an enormous human population whose continued growth and expansion threaten many native species and habitats. As a result, this region has more endangered and threatened species than any other area in the continental United States, and once extensive natural communities have been reduced to mere remnants. It is thus essential to manage biodiversity in remaining habitats while providing opportunities for other appropriate uses of the land. Our San Diego and Las Vegas field stations are actively involved in providing data and technical assistance to several Habitat Conservation Planning efforts administered by FWS. Historically, wildlife protection has taken the form of single-species management as provided for under the Endangered Species Act (ESA). Growing



recognition that the single-species approach is not justifiable on either ecological or socioeconomic grounds has promoted a shift towards multi-species and habitat-based planning in the form of Habitat Conservation Plans (HCP's); legal agreements that afford protection under the ESA to multiple species and/or habitats. A significant HCP process emerged with the incorporation into California law of the Natural Communities Conservation Planning (NCCP) program in 1991. The pilot project of this ambitious program focuses on

protection of coastal sage scrub communities within a 6,000-square-mile planning area spanning five southern California counties. It is this planning effort that is the subject of our investigations in southern California. Similar technical assistance is being provided within the framework of the West Mojave Coordinated Management Plan of BLM. BLM is working with 28 federal, state, and local governments to develop the plan for managing lands in the western Mojave Desert. To incorporate rigorous, objective science into the development of a strong regional management plan, BLM requested WERC scientist participation on the planning team to provide expertise in desert tortoise biology and management. Activities include analyzing the threats to desert tortoise populations, coordinating the compilation of technical information for 98 plant and animal species of concern found within the planning area, and providing input into development of alternative planning strategies.

In northern California, our Dixon Field Station is providing technical assistance to the Natomas Basin Conservancy, the agency charged with managing conservation areas within the Natomas Basin Habitat Conservation Plan. WERC scientists have been conducting population and habitat use studies for the giant garter snake, a key species in this HCP. Current studies are monitoring giant garter snake use of conservation lands purchased by the Natomas Basin Conservancy.

Current Research Projects

Endangered or At-risk Species Research

- Hydrocarbons and prey, and potential effects on Steller's eiders wintering at the eastern Aleutian Islands
- At-sea distribution of seabirds and marine mammals in the Southern California Bight
- Distribution and population assessment of the yellow-billed cuckoo
- Monitoring of giant garter snake use of newly restored wetlands at Colusa National Wildlife Refuge
- Status and distribution of giant garter snakes within the Natomas Habitat Conservation Plan boundaries
- Disturbance of wintering snowy plovers at Coal Oil Point and other Pacific Coast populations
- Interactions between sea otters and nearshore communities

- Population biology and behavior of the California sea otter
- Population biology and behavior of sea otters in Washington State
- Ecological research to support the Natural Communities Conservation Planning program in coastal sage scrub in southern California
- Autecology and reserve design parameters for reptiles and amphibians of coastal southern California
- Population status and conservation of the rosy boa
- Population structure and demography of the least Bell's vireo
- Population structure and demography of the southwestern willow flycatcher
- Desert tortoise research – see WERC fact sheet “Research Support for BLM Mission”

Migratory Bird Research

- Development of reliable population indices for band-tailed pigeons
- Waterfowl distribution, movements and habitat use relative to recent habitat changes in the Central Valley of California
- Movements and distribution of green-winged teal during winter in the San Joaquin Valley
- Changing landscape of wetlands in Oregon and California and its effect on the vulnerable Tule white-fronted geese
- 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
- Mourning dove nest density and productivity in California
- Satellite tracking of northern pintails: spring migration routes, staging areas, nesting regions, and post-nesting dispersal relative to prairie habitat conditions
- Epizootiology of avian cholera and its control in migratory birds
- Bird use of restored riparian habitat
- Monitoring avian productivity and survival at Camp Pendleton Marine Corps Base

Wetland Research

- Tidal wetland restoration of salt ponds in South San Francisco Bay, San Francisco Bay National Wildlife Refuge
- Science support for wetland restoration in the Napa/Sonoma salt ponds, San Francisco Bay Estuary

- Restoration of severely disturbed lands to viable wetlands at Concord Naval Weapons Station
- Restoration of severely disturbed lands to viable wetlands at Skaggs Island
- Distribution and impact of perennial pepperweed on wildlife refuges in California
- Wetland restoration at San Pablo Bay National Wildlife Refuge
- Parasites as estuarine indicators

Ecosystem Impacts of Contaminants Research

- Contaminants in the Aleutian Islands marine ecosystem
- Potential impacts of contaminants on wildlife at Edwards Air Force Base
- Assessment of the food web consequences of a potentially contaminated retention pond, Moffett Federal Airfield
- Distribution pattern of mercury burdens in the Chinese mitten crab in South San Francisco Bay
- Foraging ecology and environmental contaminants in migratory birds in the San Francisco Bay estuary
- Monitoring program for environmental contaminants in the nearshore marine ecosystem at Adak Island, Alaska

Other Research

- Comprehensive monitoring, assessment, and research program for the CALFED Bay-Delta program

For more information, contact:

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