

PROFILE OF THE NBS MIDCONTINENT ECOLOGICAL SCIENCE CENTER, FORT COLLINS, COLORADO

BY THE EDITOR

Editor's note: *This is the first of several science center profiles to be published in Park Science during the next couple of years. In preparation for the article, the editor visited the center during its second annual meeting with client agencies in February. Also fundamental was the center's prospectus of expertise and services.*

The Midcontinent Ecological Science Center (MESC), located in Fort Collins, Colorado, conducts ecological research and develops technologies to improve the understanding and management of biological systems (species, populations, communities, landscapes, and ecosystems) of the western interior United States. The center also develops and implements inventory and monitoring programs for the accurate assessment of biological status and trends, and provides information, technical services, and training related to the management of biological resources. Like most science centers, MESC generally concentrates on regional ecological research, although there is no requirement to work exclusively within the Midcontinent Region.

One of 15 NBS science centers, MESC is the second largest with 240 employees (42 from NPS) working in 16 locations. At \$15 million, the MESC budget is the largest among the science centers. To achieve its mission, the center is divided into 11 sections that are either organized by discipline or geography. The center also maintains 15 field stations that can conduct park research. These stations came to the NBS from various agencies, and several in the NBS Midcontinent Region are located within parks. Additionally, 13 regional cooperative research units (former CPSUs), although administered separately from science centers, are as-

sociated with universities throughout the region and conduct research that is often very applicable to parks.

Dr. Rey Stendell, a zoologist and research administrator, heads the science center with assistance from Dr. Tom O'Shea, a mammalogist and conservation biologist. Dr. Cliff Martinka has recently transferred from Glacier National Park to become the Mountain Ecosystems Section Leader. Along with O'Shea (acting in the role of Southwestern Ecosystems Sections Leader), they facilitate research and technical assistance needs among southwestern and northern Rocky Mountain national parks and find funding to accomplish the work.

Generally speaking, long-term (strategic) research priorities are set through an evolving process at the national level that places high value on the natural resource planning that we already do quite well. These projects trickle down to the appropriate regions, science centers, cooperative units, and field stations for implementation. A major area of unrest presently among client agencies is how the NBS addresses more immediate, unplanned requests for tactical research and technical assistance. The recently appointed NBS regional directors, including Midcontinent's Dave Garrett, acknowledge that their agency is not meeting client needs in this area and plan to address this issue as a high priority in the near future.



Figure 1. NBS researcher Susan Skagen of the MESC Vertebrate Ecology Section prepares to band a shorebird in her study on migration ecology. She hopes to determine species reliance on river corridors and desert oases as neotropical migrant stopover locations.

The work of the center is carried out under three major NBS programmatic areas: research, inventory and monitoring, and information and technology services. The *research* area of MESC (see figure 1) strives to improve the understanding and management of ecosystems, landscapes, communities, populations, and species. Ecosystem research is aimed at understanding the structure and function of montane, prairie, and arid lands and associated aquatic habitats while taking into consideration human impacts and global change on these systems. Current research projects that might have utility in parks include impacts of fire and revegetation in selected NPS areas, evaluating, restoring, and enhancing river corridor ecosystems, and restoring and creating wetland and riparian ecosystems.

Within this broad research function, the center also emphasizes *population ecology*. This area focuses on demography, population genetics, and the management and biology of small populations and metapopulations in relation to habitat change and land use patterns. A sample of ongoing investigations of likely interest to parks includes population genetics of the black-footed ferret, estimating and maintaining population sizes of endangered fish and amphibians, and developing census techniques and population models for other species of concern.

Species biology research determines the life history, systematics, and habitat requirements of selected species. The National Biological Service emphasizes endangered, declining, and non-game species and those species that may become candidates for listing. Ongoing investigations involve the grizzly bear, desert tortoise, bats, mountain plover, and other species of concern in NPS areas.

The *inventory and monitoring* activities of MESC track the status and trends of biological resources. The center carries out these activities at the national level as needed by providing expertise, developing technologies with wide applications, and developing spatial and tabular databases to support inventory and monitoring activities. The National Biological Service is conducting the following activities that may be of help to parks: determining the vertebrate faunas and faunal histories of federal lands including national park areas and managing herbaria and vertebrate repository collections at strategic locations within the region.

A fundamental intent of the National Biological Service is to make available information on biological resources to Department of the Interior managers (and the public, states, etc.), and MESC supports this objective through its *information and technology services*. The center provides information, technical services, and training related to the management of biological resources. They also provide expertise on a national scale for the development of new technologies and models critical to the management of these resources, and

training in the use of these tools. Their strengths include the ability to develop habitat models and provide technical assistance with social, economic, and institutional analyses. In this area the National Biological Service can develop species- and community-level habitat suitability models for habitat management planning, develop GIS to aid analysis of endangered species critical habitat, evaluate social perceptions of natural resource management alternatives, analyze economic impacts of endangered species critical habitat decisions, and develop computer technologies and expert systems for application to biological resource management.

EXPERTISE AND RECENT MESC PROJECTS

The formation of the National Biological Service and subsequent restructuring of all land management client agencies has led to a firm beginning in human resources consolidation and ecosystem management. As agencies shrink and are forced to rely more on each other for cooperation and the NBS for biological research and technical assistance, it makes sense economically and organizationally to begin to approach resource management from a more holistic point of view. A few of the projects and services that the scientists at MESC have been working on recently, in addition to those already mentioned, are also beginning to show this orientation toward ecosystem management, perhaps especially at this science center. Table 1 (on page 14) shares a list of MESC sections, leaders, expertise, and selected research activities that are relevant to NPS needs (but by no means complete).

Other common services or products of MESC include scientific design assistance, statistical analysis, GIS, publications, bibliographies, species status and trends reports, global positioning system equipment, training (environmental negotiations, etc.), symposia, book chapters, ecological computer modelling tools, and technical assistance.

Table 1. Profile of MESC sections, leaders, and expertise.

Leader	Expertise	Recent or Ongoing NPS-relevant Study or Product
Social, Economic, and Institutional Analysis Section		
Lee Lamb; (970) 226-9256	Economics, environmental law, institutional analysis, land use policy, legislative process, policy analysis, political science, sociology, water law, and wildlife and habitat values.	Visitor values of Rocky Mountain National Park natural resources (published in Park Science 15(1):10 by Jonathan Taylor).
Southwestern Ecosystems Section		
Tom O'Shea (acting); (970) 226-9398; Field Stations at Los Alamos and Albuquerque, NM, Moab, UT, and Flagstaff, AZ	Arid & montane habitats; biodiversity; disturbance; endangered and declining species; fire ecology; habitat restoration; inventory and monitoring; landscape, plant, & soil ecology; taxonomy & systematics, & vertebrates.	Soil compaction impacts to desert lands (grazing, visitor trampling) and effects on biodiversity and plant recovery (Jane Belnap).
Mountain Ecosystems Section		
Cliff Martinka; (970) 226-9342; Field stations at West Glacier, MT, Yellowstone, WY, and Fort Collins, CO.	Animal behavior, aquatic systems, global change, landscape ecology, natural areas, plant ecology, threatened species, trend and analysis, and vertebrates of Glacier, Yellowstone, and Rocky Mountain National Parks.	Landscape scale gap analysis program to consolidate data for parks and forests in evaluating patterns of biodiversity (Leo Marnell).
Atmospheric and Watershed Ecosystems Programs Section		
Raymond Hermann; (970) 226-9342	Air pollution dispersion modeling, air quality, biodiversity, GIS, global change, inventory and monitoring, remote sensing, smoke management, water quality monitoring, and watershed science.	Atmospheric inputs and watershed outputs monitoring at Sequoia, Rocky Mountain, Olympic, and Isle Royale National Parks as a way to assess and model ecosystem dynamics (Robert Stottlemeyer).
Vertebrate Ecology Section		
Fritz Knopf; (970) 226-9325	Amphibians, biodiversity, birds, field biology, landscape ecology, mammals, and reptiles.	Restoration ecology of western rangelands using reintroduction of keystone species, such as beaver and prairie dogs (Bruce Baker).
Endangered Species Section		
John Oldemeyer; (970) 226-9491; Field stations at Bozeman, MT, Riverside and Palm Springs, CA, Las Vegas, NV, and Saint George, UT.	Animal behavior, arid habitats, botany, disturbance, endangered species, fire ecology, mammals, plant ecology, predator-prey relations, radiotelemetry, reptiles, threatened species, Great Plains, Mojave Desert, Rocky Mountains, Yellowstone National Park.	Fire effects on Yellowstone grizzly bears (Richard Knight).
Stream and Riparian Ecology Section		
Lee Ischinger; (970) 226-9331	Stream vegetation responses to changes in stream flow.	Contaminant impacts on western stream gravel bed aquatic habitats (Del Nimmo) and relationships between biotic indicators of ecosystem health and environmental variables (Terry Boyle).
River Systems Management Section		
Clair Stalnaker; (970) 226-9332	Ecotoxicological monitoring, geomorphology, habitat restoration, hydraulic and civil engineering, hydrology, impact assessment, invertebrate ecology, plant ecology, riparian and wetland ecology, sediment dynamics, stream ecology, systems modeling, and water quality.	Model development of in stream flow needs for multiple species in southeastern U.S. rivers (Ken Bovee) and multiagency Colorado River management model development using multiple criteria approach (Marshall Flug).
Landscape and Habitat Analysis Section		
Vacant; (970) 226-9305	Agricultural policy, bioenergetics, birds, forest management, GIS, global change, habitat analysis and modeling, impact assessment, landscape ecology, remote sensing, riparian ecology, statistics, stream ecology, systems modeling, and wetland ecology.	Techniques development for predicting responses of fish and wildlife to changes in habitat and Unix-Internet database of contaminants on federal lands.