

Desert Trends

A Quarterly Newsletter for the Pima County Ecological Monitoring Program

Issue No. 2 April 2008

“Quantify changes to ecosystem components to inform adaptive management and to determine if the biological goal of the SDCP is being achieved.”

Welcome to the second newsletter of the Pima County Ecological Monitoring Program (EMP). This newsletter provides an opportunity to describe the program’s activities, tools, and products. This issue provides (1) updates on the program’s latest design developments, (2) an overview of how monitoring data can link to management activities, (3) an introduction to three members of our design team, and (4) brief updates on two reports related to monitoring.

What to Monitor? A New Approach for Identifying Promising Indicators

The approach being advocated for monitoring ecological resources in Pima County recognizes that single-species monitoring can be expensive and can be of limited value to management (see Newsletter No. 1). Consequently, a major focus of the planning effort for the Pima County Ecological Monitoring Program (EMP) involves identifying a broad suite of biotic and abiotic characteristics (indicators) thought to represent the range of ecological features that support the region’s biodiversity (Figure 1). In short, by monitoring these resources we will be in a position to gauge the “health” of the ecosystem in Pima County.

A key question in developing the Pima County EMP is how to identify those indicators that are more closely associated with biodiversity in Pima County. The Pima County/University of Arizona design team has sought to adopt a science-based approach similar to that used in development of the Sonoran Desert Conservation Plan (SDCP). Because the SDCP is focused on the species scale, the design for Phase II will begin on the same scale. Therefore, the first step in identifying what to monitor is to use species’ habitat as a way to identify environmental features that reflect patterns of species presence across the landscape. Examples of important environmental features would be the presence of permanent water for frogs and fish and vegetation resources for birds and mammals.

To accomplish this work we compiled a list of native vertebrate species for Pima County that occur at elevations below the Sky Island’s oak woodland belt. We are now choosing a subset of species that represents a range of physical body sizes, trophic levels (i.e., carnivore, herbivore, or omnivore), and vegetation communities. Many of the Priority Vulnerable Species, which played an im-

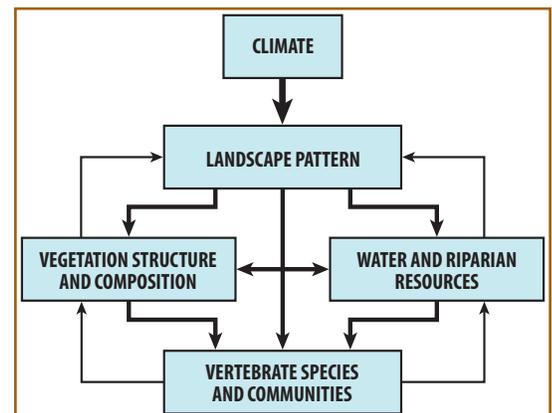


Figure 1. The influence of “leading” ecological indicators such as climate, landscape pattern, vegetation, and water on vertebrate species warrants the inclusion of these features in the Pima County Ecological Monitoring Program.

portant role in the development of the SDCP and MSCP, will likely be included in this list of species. Once we choose the species set we will develop models for each species that predicts the distribution of potential habitat across Pima County. After completing these tasks, we will link these features to threats (stressors) to the species and their habitats. Examples of threats include development-related activities, non-native species, and climate change.

An ad hoc subcommittee, made up of some members of the Monitoring Subcommittee, recently met to comment on this approach. The Pima County/UA design team will present this process to the full Monitoring Subcommittee with additional questions and initial results.

Monitoring to Improve Management Practices

Once indicators are chosen we will start on-the-ground monitoring and time we will accumulate a large volume of data to identify ecologically significant change (i.e., trends). But looking for change is only one part of our work—of equal importance is what managers can do when change is detected. This is the essential nexus between monitoring and management. During this design phase of the Pima County EMP we are exploring ways to make the results from the monitoring program both relevant and timely for land managers.

It has been a guiding principle throughout the SDCP process that sound stewardship of natural resources requires man-

agers to base decisions on the best available information. Adaptive management (AM) is a relatively new tool in natural resource management and it involves feedbacks between information gained through monitoring and management actions. In essence, AM is an iterative learning process that identifies gaps in understanding, facilitates action, and modifies management based on the new information. Adaptive management typically takes one of two forms: passive and active. Passive AM uses observational data to infer causation based on observed patterns: we learn by watching. Active AM is more powerful and involves applying management treatments as experiments to establish cause-and-effect, thereby leading to refinement of management responses: we learn best by doing.

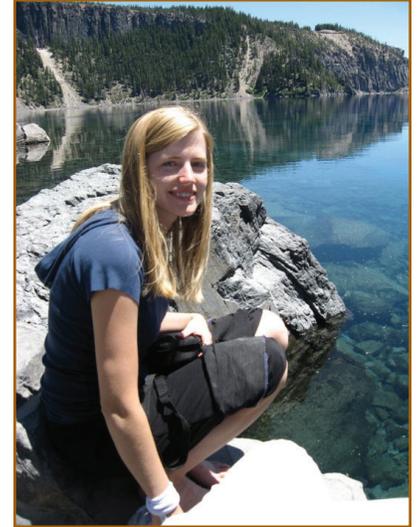
Active AM may be the ideal form of adaptive management, but it is rarely employed because of budgetary and environmental constraints to manipulating resources. Therefore, the use of active AM in the Pima County EMP might be limited but may be employed if monitoring results indicate that an indicator has exceeded a critical “threshold”, thereby necessitating activities to restore the system to desired conditions. Examples of active AM include using fire to restore native grasslands (Figure 2) or removal of non-native species using a variety of methods. Though less informative than active AM, passive AM can still provide an extraordinary opportunity for learning. Taken together, data from monitoring efforts and AM management tools will provide managers with opportunities to improve conditions for the full spectrum of plants and animals in Pima County.



Figure 2. Prescribed fire can be an important management tool in restoration of semi-desert grasslands and forests of Pima County. Use of fire in an adaptive management framework would entail data collection before and after fires and experimentation with different treatments, such as comparison of spring versus summer burns. Photo credits: Andrea Litt.

Profile of EMP Design Team Members

During the next few issues we will introduce members of the Pima County EMP design team, starting with Andrea Litt, Sherry Mann, and Ginny Newsom. All three work out of our University of Arizona office.



Andrea Litt is working on the Pima County EMP as a Postdoctoral Fellow at Colorado State University. She received her Ph.D. from the School of Natural Resources at the University of Arizona in 2007. Andrea is taking the lead on applying quantitative tools to identify the most appropriate indicators to include in the Pima County EMP. Andrea recently accepted an Assistant Professor position at Texas A & M University - Kingsville, to start in January 2009. We are thrilled that Andrea will be working with us until she leaves for her new adventure.

Sherry Mann recently joined the team as an employee of the University of Arizona. Sherry received her M.S. in Wildlife and Fisheries Science from the University of Arizona in 1999 and worked most recently as a biologist at Coronado National Memorial. Sherry has a great knowledge of natural history and conservation and has broad practical management experience. She is applying her skills to this project by taking the lead in developing species habitat models and identifying appropriate monitoring methods and protocols.

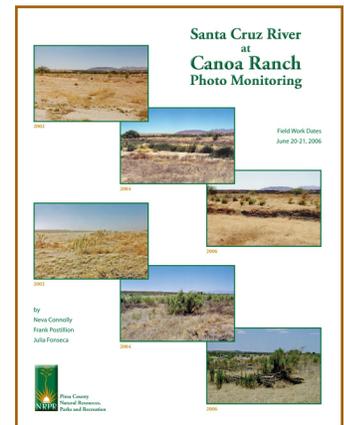
Ginny Newsom graduated from the University of Arizona in 2005 with her B.S. in Ecology and Evolutionary Biology (EEB). She is working on the Pima County EMP as a research technician assisting Sherry Mann with determining environmental factors that influence native species. Ginny will be starting work as a graduate student in the Ph.D. program in EEB in the fall of 2008. The aim of her research will be to investigate the use of mutualism (relationship among species from which both species benefit; e.g., flowering plants and their pollinators) as indicators of the ecological effects of climate change.

Report: Groundwater Monitoring in Pima County

Shallow groundwater systems in Pima County play a critical ecological role in eastern Pima County. A new report by Julia Fonseca provides a brief primer on groundwater-dependent ecosystems, and describes methods used to measure change in shallow aquifers that are linked to the condition and extent of riparian and aquatic ecosystems. The report reviews existing groundwater monitoring efforts to communicate needs and partnership opportunities with agencies and citizen groups. The report also identifies a subset of shallow groundwater systems that would be of highest priority if groundwater monitoring is deemed appropriate for inclusion into the program. Pima County and the SDCP Science Team's Monitoring Subcommittee will use this information to weigh the significance of expanding current groundwater monitoring versus employing other measures of ecosystem health such as vegetation. These decisions and tradeoffs will be the subject of future meetings and reports. Julia's report will be posted by April 30 to: <http://www.pima.gov/cmo/sdcp>.

Report: Canoa Ranch Riparian Vegetation and Stream-channel Change

A new report by Neva Connolly provides a review of four years of change in the riparian landscape of Canoa Ranch near Green Valley. In 2002, the Pima County Regional Flood Control District, through partnership with an environmental consulting firm, established photographic monitoring points to document changes in vegetation and river channel characteristics (i.e., morphology) along the 5-mile stretch of the Santa Cruz River at the ranch. Repeat photographs were taken at two-year intervals since 2002. Results from the work indicate that some long-lived perennial trees and shrubs away from the stream channel have died or show loss of vigor, most likely a result of drought conditions. At the same time, cottonwood and Goodding willow saplings closer to the main channel have persisted, despite reductions in flood-related recharge. Neva's report can be found at: <http://www.pima.gov/cmo/sdcp>.



Pima County Joins the Desert Southwest Cooperative Ecosystem Studies Unit

Pima County and the Pima County Regional Flood Control District were recently accepted as the newest partners in the Desert Southwest Cooperative Ecosystem Studies Unit (DSCESU). The DSCESU is a cooperative network of federal, academic, and nongovernmental agencies studying and managing natural and cultural resources across California, Nevada, Arizona, New Mexico, and Texas. Members benefit from a collaborative partnership in research, education, and technical assistance and membership will benefit the Pima County EMP by providing an easy and cost-effective means to gain the technical expertise of a wide range of local cooperators such as the UA, Arizona-Sonora Desert Museum, and The Nature Conservancy of Arizona. Pima County is the first local government that the DSCESU has admitted.

For additional information on the Pima County Ecological Monitoring Program, please visit our website: <http://www.pima.gov/cmo/sdcp/Monitoring/index.html> or contact Brian Powell, Program Manager, at brian.powell@pima.gov; 877-6112.