

Tucson's Wildlife Heritage—Saguaro National Monument

By Suzanne McCormick

Tucson's Saguaro National monument is the focus of local and national efforts to study the effects of nearby urban development on Sonoran desert plants and animals.

"As human populations have expanded, the natural ecosystem around many national parks has been reduced and the parks have become increasingly isolated as 'islands' of nature in a human-manipulated environment," says William W. Shaw, a professor of wildlife and fisheries science in the School of Renewable Natural Resources.

"This issue is especially relevant for Saguaro National Monument because Tucson's rapid expansion is leading to dramatic land use changes along the monument borders," he says.

Since 1986 Shaw has been coordinating a variety of studies on urbanization's effects on the monument's wildlife, including mule deer, javelina, native bird species and coyotes. The studies were funded by the National Park Service, Pima County, the City of Tucson, and the Southwest Parks and Monuments Association. UA scientists studying the Monument report that it is home to 74 species of mammals, 58 species of reptiles and amphibians and nearly 190 species of birds.

When the monument was established in 1933, Tucson's population was only 35,000 and the monument only was accessible by traveling 15 miles east of town on dirt roads. By 1986 Pima County's population had reached nearly 625,000, with growth expected to continue at about three percent per year and reach 940,000 by the year 2000.

Shaw says the studies of wildlife-related boundary issues — including the attitudes and behavior of people who live near the monument — help to develop an understanding of the relationship between urbanization and protected areas. With this kind of information, park managers and city planners can evaluate the implications of



L.G. Kachun

Researchers mark a deer they captured from a helicopter flying over the Saguaro National Monument.

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alternative land uses for the wildlife and humans that reside in and near the park.

Last year Congress authorized expanding the 63,000-unit east of Tucson by more than 3,500 acres. A spokesman for the National Park Service testified at an April Senate hearing that the monument's saguaros are vanishing at an increasing rate. The spokesman said scientists blame pollution, Tucson's urban growth and poaching for the loss of cactus.

While the federal lawmakers approved expansion, funding has yet to be appropriated. Shaw says the impetus for the

expansion is locally based. He believes that the monument's increased size would enhance the value of the park because it would capture the healthiest saguaro area and the best of the wildlife habitat, and it will preserve the natural beauty valued by many Tucsonans.

"We are very attuned to the natural environment we live with here," Shaw says. "Tucson is a national leader in integrating conservation into its metropolitan planning."

This close relationship between Tucsonans and the natural resources of the area is reiterated in Shaw's study of 500 households within a mile of the park. He discovered that these residents have extensive interaction with wildlife and substantial use and enjoyment of the park resources.

Sixty percent of the residents say they attract wildlife to their homes by providing food. The majority also report that the proximity of the monument was a factor in selecting the location for their home and most of the neighbors believe that the park increases the monetary value of their homes.

This group of residents also expressed considerable agreement concerning the kinds of land uses that are appropriate nearby the monument. When presented with seven alternatives ranging from "low density housing (one acre or more per house)" to "light industry," only "low density housing" was considered appropriate by a majority of those who responded. As a group, the monument's neighbors favored land management and zoning that will maintain the interchange between the monument and adjacent lands.

At the current levels of development, many species of wildlife move freely between the park and adjacent private land. Indeed, some species, especially coyotes and javelina, seem to thrive on the interaction between the protected land and the very low density housing found along much of the monument's boundary.

"One consequence of feeding large mammals may be an exceptionally large population of urban-adapted coyotes," Shaw says. "About 90 percent of the monument's neighbors reported that they see coyotes on their property and over 40 percent believe they have lost

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cats to coyote predation."

However, feeding large wild mammals is discouraged for biological and human safety reasons, says Paul Krausman, a professor of wildlife ecology who studied the monument's deer and javelina population.

"Some of the javelina are essentially domesticated and living with the residents," Krausman says. He observed javelina responding to names the residents had given to the animals. "Some javelina have altered their behavior. It's very unhealthy for both the animals and the people." He believes residents get a distorted view of the javelina in the wild.

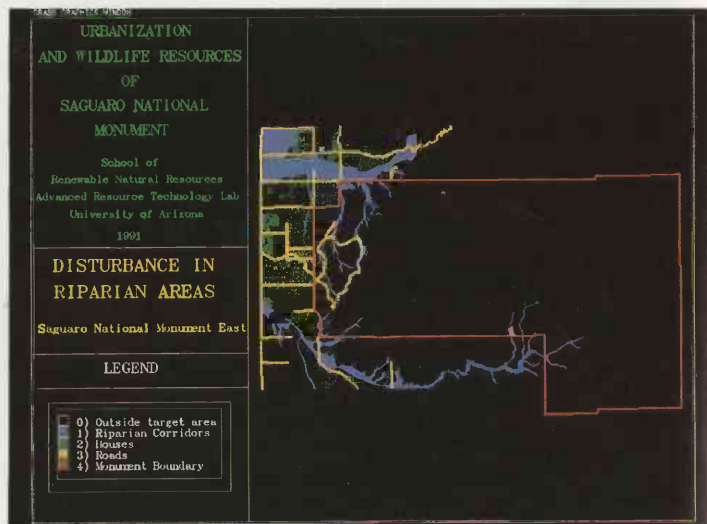
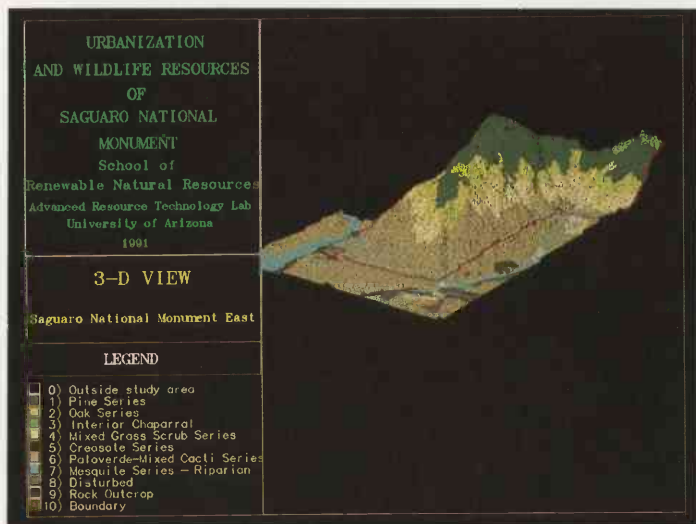
Krausman said results from studies

on mule deer showed that they exhibit a very different behavior from that of the javelina. The deer remained on the monument except during long drought periods, when they sought water provided by the residents. The monument has only a limited supply of water.

"In effect, the deer are being managed by the dictates of the public," Krausman says. The residents are unaware of their impact. This allows deer to inhabit areas that otherwise could not support the high numbers of deer presently found on the desert floor during these seasons.

"The habitat is being supported artificially," Krausman says.

If the residents ended this practice, the deer would likely seek out water in



Computer slides provided by William W. Shaw.

OVERVIEW

Urban Environments

By Maggy Zanger



Allan Ferris

Jimmy Tipton

For stewards of the Southwestern urban environment, most issues revolve around three concerns — water use, modifying the microclimate and air pollution.

Jimmy Tipton, a University of Arizona Cooperative Extension specialist in ornamental horticulture, says trees play a major role not only in beautifying the urban landscape, but also in improving air quality and in cooling hot desert temperatures. In addition, trees that are selected for their adaptation to an arid climate use little water.

As they grow, trees help reduce urban air pollution because they absorb pollutants such as carbon dioxide, and at the same time, they produce life-giving oxygen.

"Any plant contributes oxygen, and to a varying extent, reduces pollution levels," Tipton says. Some plants trap atmospheric pollutants on the surface of their leaves. Others actually pick up some pollutants — sulfur dioxide is one example — and use it internally. UA studies estimate that a single tree can absorb 400 to 500 pounds of carbon each year.

Trees also increase moisture in the air through transpiration. Water taken up in tree roots eventually passes through tree leaves and evaporates into the atmosphere. Increased moisture decreases temperatures in the microclimate around the tree. Enough trees can bring summer temperatures down several degrees, according to UA studies.

Michigan State University researchers estimate that in a 50-year life span, a single tree generates \$31,250 worth of oxygen, \$62,000 worth of pollution control, and recycles \$37,500 worth of water through transpiration. The scientists also believe that a tree also prevents \$31,250 worth of soil erosion because its roots hold soil in place. While monetary figures may vary in different parts of the country, the Michigan estimates illustrate the value of trees in the urban environment, Tipton says.

Trees and other plants are also important in urban environments because their shade and transpiration counter

higher elevations, resulting in some reduction in their numbers.

Research on the effects of exotic (non-native) species — the European Starling and English Sparrow — on native bird species was led by R. William Mannan, a professor of wildlife ecology. He suspected that the increasing number of exotic species, who also use the cavities in cactus for nesting, were displacing the native birds.

Over the course of the two-year study, scientists prevented the exotic species from using their nests by plugging them up in areas off the monument. Researchers wanted to see if the exotic species would then usurp the nest cavities of native species.

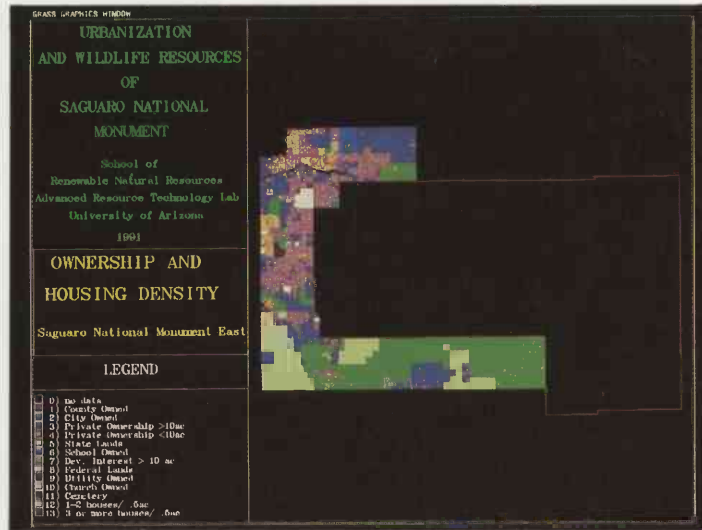
“But, after watching the exotic species for a year, we didn’t see them exclude the native nesters,” Mannan says.

Two factors influenced the results. First, native woodpeckers drilled new holes, creating an excess of holes, some of which were available to the exotic birds. Second, the native birds had a different nesting schedule from the exotic species, thereby reducing competition for the holes at the same time.

However, Mannan warns that if the present number of saguaros on the monument were to decrease significantly or if the number of exotics increased, competition for existing holes might increase. Also, to avoid a larger number

of exotic species from entering the monument, certain types of development that support the non-native species should be avoided, such as lawns, golf courses and stables.

Contact Krausman in the Wildlife and Fisheries Unit, School of Renewable Natural Resource, 108 Bio Sciences East, University of Arizona, Tucson, AZ 85721, or call (602) 621-3845. Contact Mannan at the Wildlife and Fisheries Unit, School of Renewable Resources, 201 Bio Sciences East, University of Arizona, Tucson, AZ 85721, or call (602) 621-7283. Contact William Shaw in the Wildlife and Fisheries Unit, School of Renewable Natural Resources, 216 Bio Sciences East, University of Arizona, Tucson, AZ 85721, or call (602) 621-7265.



the “heat island effect,” created in cities by miles of concrete buildings and roadways. As cities grow and farmland decreases, average temperatures increase in the urban area.

“Landscaping really can do quite a bit to reduce the heat island effects,” Tipton says.

The shade provided by trees reduces the cost of cooling buildings during hot summer months. Through transpiration, trees and other plants cool an area with moisture. But, Tipton points out that trees planted in the middle of a yard do little to help cool a house. Trees need to be planted near the house where they provide shade during the summer months but don’t block the sun during cooler winter months. It is simple, but crucial, information like this that Tipton and extension agents provide to the public, nurseries and organizations.

Another group, the American Forestry Association, has a Global Releaf program that seeks to plant a tree for every person on the planet. The program intends to try to counteract the destruction of the rain forests and to beautify urban areas. Also, it’s aimed at increasing an awareness of the importance of trees in any ecological balance.

“In Arizona, Global Releaf is a big activity,” Tipton says. For example, “Trees for Tucson” aims to plant 500,000 trees in that city by 1996. The organization suggests 54 varieties of low-water-use trees that Tucsonans can purchase and plant.

“Trees for Tucson jumped in early and has quite a reputa-

tion, nationally, for its program,” Tipton says. Similar programs have been established in Phoenix and some of its suburbs, and in Prescott and Nogales.

In Nogales, Richard Harris, the Santa Cruz County Extension director, helped organize the “2000 by 2000 Foundation” to promote tree planting in the Nogales area. Harris also serves as the organization’s technical advisor. Working with 21 Nogales High School students, the organization installed drip irrigation and planted 35 trees in Nogales’ Anza Park in October 1991.

Harris, the foundation, and Nogales High School are also in the final stages of establishing a nursery to propagate, grow and sell affordable trees suited to Nogales’ arid but higher elevation environment. Students in science classes will operate the nursery and sell the trees to the public at cost.

“The idea is making low-cost, low-water-use, native trees available to the public by early summer,” Harris says.

Through the efforts of local organizations such as the 2000 by 2000 Foundation, and with the landscaping expertise provided by people like Tipton and Harris, the urban environment can be more beautiful, cooler and more healthy with little increase in water use.

Contact Tipton at the Department of Plant Sciences, 439 Forbes, University of Arizona, Tucson, AZ 85721, or call (602) 621-1060. Contact Harris at the Santa Cruz County Extension Office, P.O. Box 1585, Nogales, AZ 85628, or call (602) 281-4965.