

Making a Home in the Desert

Burrowing Owl Ecology and Conservation Studies

By Joanne Littlefield

At dawn and dusk they wing their way through the desert, tracking small prey. During the day they can be found chasing down grasshoppers or beetles, or posted as sentinels outside their nesting burrows. Although small in size, burrowing owls (*Athene cunicularia*) are helping to answer big questions researchers have about avian migration. Once a purely migratory species, many of these eight-inch birds are now making themselves at home year-round in the desert grasslands, golf courses and agricultural fields of the Southwest. Their petite size and unusual nesting habits make them interesting wildlife for both urban and rural residents to watch.

Courtney Conway, a research biologist in the Arizona Cooperative Fish and Wildlife Research Unit, part of the School of Natural Resources in the UA College of Agriculture and Life Sciences, has been studying the ecology and conservation needs of burrowing owls throughout the western United States for the past seven years. He has devised reliable methods of estimating their populations, examined the birds' use of artificial nesting boxes on golf courses, and has directed graduate and undergraduate students as they study the birds' food and nesting habits. These studies focus on the factors that influence nest site selection and reproductive success.

"Here in Arizona we have burrowing owls that are migratory and we have owls that are year-round residents within the same population," Conway says. To find out more, Mark Ogonowski, one of his graduate students in natural resources, is conducting a food supplementation experiment by placing food at some nests and withholding it at others. He wants to find out what influence, if any, food availability has on the decision each individual owl makes either to migrate south for the winter or stay in Arizona. In another study, graduate student Alberto Macias Duarte is using genetic markers and other molecular biology tools on blood and feather samples from burrowing owls at different latitudes



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throughout their breeding range, to provide pieces to the migration puzzle. As one of the more visible owls, they are fairly easy to catch for banding and sampling.

"You can put leg bands on them," Conway says. "It's very easy to observe those leg bands because the owls stand out in front of their burrow for a good portion of the day."

Burrowing owls have historically colonized abandoned prairie dog and ground squirrel burrows. The decline of prairie dog numbers has led, in part, to an adjustment in the owls' traditional nesting habits.

"They've been very successful at colonizing in other areas," Conway says. "They're very common in human-dominated landscapes." These include airports, golf courses and crop fields.

More than 100 years ago biologists noted that burrowing owls had what seemed to humans to be an odd behavior of gathering mammal manure, shredding it, and lining the nest burrow with it, including the entrance. Their nest chamber is typically ten feet or more underground. Lining it with manure is labor-intensive for the tiny birds.

"It just kind of begs the question of why in the world would they go through this effort to bring manure around their eggs and nestlings," Conway says. "It's very odd in a sense that many other birds want to hide the location of their nests. By bringing all this manure back and shredding it up, it's making the nest more obvious." In fact it's one of the ways that researchers know that a hole in the ground is actually a burrowing owl nest.

Because burrowing owls are primarily associated with urban and agricultural settings, they've been known to use horse, cow and domestic dog or coyote manure. Conway, graduate student Matt Smith and undergraduate Chris Nadeau have been investigating theories for this choice of nest lining, including whether it might be to attract food, to aid in water absorption during heavy rains or to serve as

a signal to other owls. Conway suggests that nest lining may be a way to let other owls know that “the nest burrow that they’re in is occupied and ‘don’t dare come down this burrow.’”

Because they eat insects, the owls may also be providing a fast-food alternative for their nestlings. The manure that lines the burrows attracts insects that the nestlings can eat. The added advantage is that the baby owls can feed in the safety of the burrow in case a predator approaches, so that when they’re first learning how to forage they don’t have to go far from the nest.

While burrowing owls are listed as an endangered species in Canada, in the United States they are considered a nationally designated “bird of conservation concern.” According to Conway they appear to be most in danger at the northern part of their distribution, including Canada, Montana, North and South Dakota and Washington, although they are also endangered in the northeastern corner of their range in Nebraska and Iowa.

“Birds that used to make the trip to points north in the summer may be taking up residence in the lush habitats associated with agricultural fields and urban areas in the desert,” Conway says. Conservationists are looking for ways to keep burrowing owls off the endangered or threatened lists. Efforts include Conway’s research, along with research by the Arizona Game and Fish Department and projects by volunteer groups such as Wild at Heart who are helping to construct artificial burrows in habitat areas impacted by development.

In more urban settings, golf courses attract herbivores, insects and small rodents, providing a food source for the owls. A grant from the U.S. Golf Association drew Conway to the state of Washington to work with golf course superintendents and grounds crews there.

“The golf industry saw this as a potentially good opportunity to help some conservation efforts while at the same time attracting some cute wildlife to their golf courses,” he says. Conway and his team installed 150 artificial burrows, placing them in different locations, from right in the rough near the fairways, to areas close to tee boxes and to others further away, just outside the maintained areas. These efforts paid off—the burrows got some takers. The owls prefer open areas that have low vegetation, avoiding even tall grasses or shrubs.

“We found that they did not use nest burrows that were close to sprinkler heads,” Conway notes. “They preferred to be off into the arid, native vegetation adjacent to the golf course.” He is applying the information gleaned in Washington to see how it applies in other parts of the owl’s range, including nesting sites in central Arizona near agricultural fields and the Grande Ruins National Monument, in urban areas of Tucson and in agricultural areas in California’s Imperial Valley, near the Salton Sea.

Because maintenance workers typically apply pesticides and herbicides to keep golf courses in top form, there is a concern about attracting burrowing owls to these areas. Conway and his research team have been on the lookout for increased deformities and even mortality among the nestlings. The researchers haven’t seen any deformities but they have noted some reduced success in reproduction.

“It’s certainly something that needs to be addressed before golf courses throughout North America would want to encourage burrowing owls to nest on their grounds,” Conway says. ☐



Burrowing owl nestlings

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Artificial nesting burrows in foreground have been placed near agricultural fields and encroaching development.

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