

Helping Endangered Species

The Desert Amphibian Breeding Project

By Joanne Littlefield

ARIZONA
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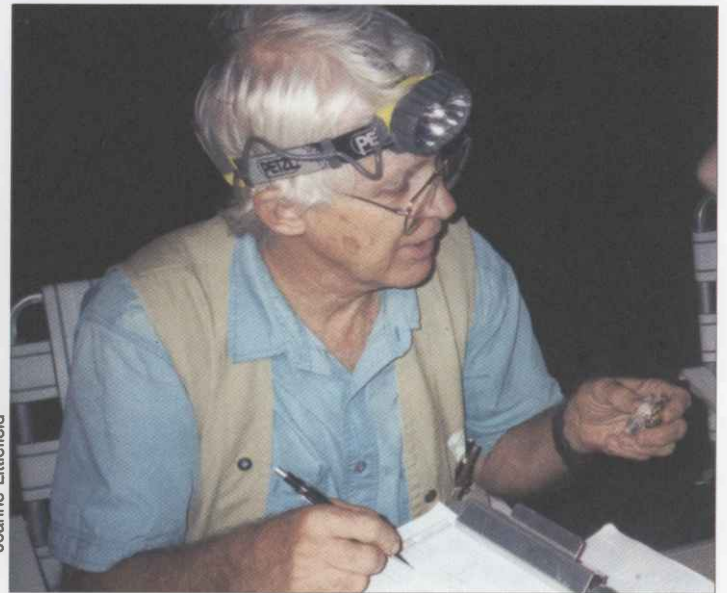
The 120,000 square miles of the Sonoran Desert stretch from northern Mexico into the lowlands of Arizona. Urban growth and more recreational use is causing increased pressure on the region's natural resources and wildlife species because this desert contains some of the fastest-growing municipalities in both countries. The Sonoran Desert Field Station (SDFS) at the University of Arizona focuses on gathering data about the ecology and management of desert resources.

The current plight of amphibians in Arizona provides an example of how some of the research projects at the SDFS originate. In response to publicity about a possible global decline of amphibians, the United States Congress appropriated money for the Amphibian Research and Monitoring Initiative (ARMI). This funding enabled researchers nationwide to 1) begin monitoring the status of U.S. amphibians to determine which species were, in fact, in decline, 2) develop methods for monitoring hard-to-study amphibians such as the desert-breeding frogs and toads (anurans) in Arizona, and 3) study causes of observed declines. The monitoring methods developed in Arizona can then be adapted for use on temporary-pond-breeding amphibians throughout the United States and in other countries.

Cecil Schwalbe, the principal investigator for the Arizona portion of the ARMI project, is an ecologist for the field station and an assistant professor with the Wildlife and Fisheries Resources program in the School of Renewable Natural Resources. He has been intensively involved in research on and conservation of amphibians and reptiles in the southwestern United States and northwestern Mexico for over a decade.

"Most people think of Arizona as this arid desert state and are astounded to find out that nearly 30 percent of the species of frogs and toads in the entire continental United States occur here," he says. "We have a large cadre of very successful species of toads and spadefoots that make it in the desert by staying underground approximately 10 months of the year. They come up, have these great breeding aggregations, scarf down as much food as they can for the next two months, then go back underground and wait 10 months to be wakened again."

The excitement of the desert amphibian project picks up markedly at the beginning of the monsoon season, with days of tracking locations of summer rains via computer. When the rains hit just right on the Buenos Aires National Wildlife Refuge, project personnel (including researchers, students and volunteers) head to pre-determined locations to capture and count the anurans emerging for their yearly courtship ritual.



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Cecil Schwalbe records data during nighttime spadefoot mating sessions in Buenos Aires National Wildlife Refuge. In early 2003, Schwalbe was honored by the Desert Tortoise Council at its annual symposium for the research he and his students have conducted on the Sonoran population of the desert tortoise.

Working through the desert night, the biologists capture as many of the anurans as they can at a breeding site. They measure and weigh each animal, inject a harmless dye beneath the skin that fluoresces under a black light so they can recognize animals already marked, then release them back into the pond. If necessary, the biologists play "love songs", pre-recorded breeding calls, to get the amphibians back in the mating mood. Two hours later they convene in the same area to see which of the original group plus any new anurans they come up with. The dye persists, which will also allow researchers to track the population over an extended period of time.

Double-marking and recapturing the amphibians in a single night is a new application of an old technique that satisfies the ARMI statisticians advising on the project. Previously, researchers have computed indices of relative abundances by counting numbers of calling anurans at breeding sites or numbers of toads and frogs on roads during rainy nights. The numbers of anurans calling at ponds and sitting on roads on rainy nights at Buenos Aires NWR will be compared to the population size estimates from the double-mark/recapture surveys to see how well they correlate.

The Sonoran Desert Field Station, a sub-unit of the United States Department of the Interior and U.S. Geological Survey (USGS), began as the Cooperative Park Studies Unit at the University of Arizona in 1973. The station collaborates with the Advanced Resources Technology Laboratory (ART) in the School of Renewable Natural Resources to gather, manage, and provide natural resource data to land managers throughout the desert region. The station maintains a node on a number of national geographic information system data serving systems such as the Federal Geographic Data Committee's Geographic Data Clearinghouse.

USGS Research Ecologist William Halvorson has been working the last few years in collaboration with members of the ART lab developing better methods of managing the

huge amounts of data that researchers gather. Putting the data in a format compatible with that of other investigators allows the information pool to be better shared, avoiding cross-research efforts. Halvorson is also working on fire management plans for national parks in the Southwest to make sure that each of the parks has a fire plan based on fire histories and the best science available.

Other scientists connected with the field station also conduct research on issues related to the ecology and management of desert resources to provide technical assistance to federal agencies such as the National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management and Department of Defense. These clients look to them for information when making decisions on the development and implementation of land and other resource use plans.

For more information, see www.snr.arizona.edu/nbs/.

"The species we have looked at this year are not endangered," Schwalbe says, "but there are some species and subspecies throughout the West that are rarer than others and these methods will work for those, as well as for other species of temporary pond-breeders all over the country."

In some places there may be as many as seven different species of frogs and toads breeding in the same pond, up to as many as 5,000 to 10,000 individuals. The intense mating calls can be heard over a mile away.

Schwalbe and his field team will also revisit the breeding ponds during the day in the weeks subsequent to the mark/recapture efforts to dip-net or trap tadpoles in those same ponds. All of these data collected — species present at breeding sites based on calling males and visual searches, species found on roads at night, species of tadpoles found by dip-netting and by trapping — will be analyzed to find the most effective methods to detect presence of these anurans in the Sonoran Desert.



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Captured Couch's spadefoots (*Scaphiopus couchi*) are weighed, measured, marked and released. They can grow up to 3 inches in length.

In addition to the desert amphibian breeding project, Schwalbe's graduate students have worked on a variety of research projects including causes of recent declines in native ranid frogs in the Southwest, ecology of rosy boas and whip-snakes, feeding ecology and conservation of black sea turtles, development of methods for monitoring reptile populations in various habitats, dietary and reproductive ecology of fringed-toed lizards, and the ecology and genetics of desert tortoises.

Other ongoing research projects include understanding the effects of and developing techniques for the removal of non-indigenous species such as buffelgrass and bullfrogs, and understanding the effects of fire in the desert. ■



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Research team member holds Couch's spadefoot. Females can lay up to 3,000 eggs.

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