Nightly Wings, Nectar Sips

by Rodrigo A. Medellín and Steve Walker

***Lesser long-nosed bats are important pollinators for saguaros and agaves, such as this* Agave palmeri.**
Photo © Merlin D. Tuttle, Bat Conservation International

We reached the cave entrance at around 5:00 p.m. At that time, hardly anyone was around the impressive cliff, with striking overhanging vegetation, that contained one of the most species-rich caves in all of México. A young boy approached us and asked for one peso in exchange of him telling us about *los murciélagos que viven en la gruta* (the bats that live in the grotto). One of us hurriedly dug for the coins and gave them to the self-confident child.

The boy started telling us about how important bats are to maintaining the surrounding forest by pollinating the flowers of the ceiba trees, morning glory trees, agaves, and many other species, and dispersing the seeds of some soft-fleshed fruits, including those of the garambullo columnar cactus *(Myrtillocactus geometrizans)*. The bright-eyed boy also emphasized the importance of some of the other bat species in the cave, such as the insectivorous Mexican free-tailed bats *(Tadarida brasiliensis)* that roost there by the thousands. He mentioned not only that bats feed on important insect agricultural pests, but also that they provide rich organic fertilizer in the form of guano.

After the 10-minute lecture, the boy's mother joined us. She explained that she and her son, together with a few other people from the nearby town, had been designated cave stewards after having participated in an environmental education program presented by a coalition of scientists and educators from the National University of México and a U.S.-based organization, Bat Conservation International. She was referring to the *Programa para la Conservación de los Murciélagos Migratorios de México y Estados Unidos* (PCMM), or Program for the Conservation of Bats of México and the United States. She also explained how, as recently as two years ago, children used to throw rocks at the bats and sell fossils (limestone imprints of vegetation) to tourists, and how this activity slowly but steadily was destroying the cliff the people in town are so proud of. Today, the children earn money by telling tourists about bats and their important ecological roles and economic benefits.

La Gruta, near the western México town of Ciudad Hidalgo, in the same region as the world-famous monarch butterfly winter roosts, is one of the 15 lesser long-nosed bat *(Leptonycteris curasoae)* roosts the PCMM has been monitoring for up to seven years. The lesser long-nosed bat is listed by the U.S. as endangered and by México as threatened. Although the species can be found roosting in groups of up to 200,000 in some of the summer maternity colonies in the Sonoran Desert (see "A Bat Boom at Fort Huachuca" in *Bulletin* Vol.XXV, No. 6), many colonies have been dramatically depleted. This is primarily due to lack of knowledge about their role as pollinators and seed

Rodrigo Medellín (right) explains to 5th and 6th graders at Ciudad Hidalgo, Michoacán, México, about the bats at La Gruda, the cave near their school.
Photo by Brian Keeley, Bat Conservation International

dispersers on which so many plant species depend, or about the destruction of their habitat (which includes primarily dry tropical forests and deserts).

The PCMM works on a combination of research, environmental education, and conservation actions (such as the protection of roost sites) to determine and counter the causes that have harmed the bats. Eleven teams from universities, nongovernmental organizations, and government agencies are working to document the biology of this and other migratory species, and to determine their conservation needs. Some of the questions that we are addressing are: How far do the bats migrate each summer? What are the geographical/ecological factors determining their reproductive patterns? Do all lesser long-nosed bats migrate? This last question has sparked an interesting debate. We know there are two reproductive pulses in this species: one in the summer in the northern part of the species' distribution (the Sonoran Desert), and one in the winter in the dry tropical forests of western and southern México. We also know that at least some bats remain behind in central and southern México when most females are giving birth in Sonora and Arizona.

Migration is not a clear-cut pattern in which all bats move as a flock from one location to the other. Rather, migration is an evolutionarily adaptive response to selective pressures that are determined by when and where food is available. All habitats go through seasonal peaks of food availability. In some habitats, like the Sonoran Desert, food is virtually absent during the winter. But other habitats, such as dry tropical forests, contain food throughout the year in variable abundance, depending on the year, the region, and certain aspects of the habitat. That way, in the summer, when resources are scarce in the dry tropical forest, some bats are able to remain behind while others carry out the long migration to the north, where such foods as the flowers and fruits of the saguaro, cardon, and organ pipe giant cacti are plentiful.

This rather complex ecological cycle is slowly being pieced together with other conservation components as part of the species' recovery plan. Environmental education is a key long-term component that yields results soon after its initial application, but it needs to be extended in time to reach successive generations of people. Some caves have management plans in place, and all caves we have been monitoring show signs of bat population stability, a good initial step toward monitoring improvements in the population status throughout the species' range. The first results are encouraging, both in terms of the biology of the species and the response of local inhabitants that have adopted the cause of bat conservation. We hope the future will be one of plentiful, continuous, and widespread resources and undisturbed roosts for the welfare of our shared bat species, ecosystems, and ecological processes.

Rodrigo A. Medellín (medellin@miranda.ecologia.unam.mx) is a professor and researcher at the Institute of Ecology, National University of México, and Director of the Program for the Conservation of Mexican Bats. Steve Walker was Executive Director of Bat Conservation International when the article was written and is now Director of Resources, México Program, for The Nature Conservancy (swalker@tnc.org).