

A Mexican long-tongued bat (*Choeronycteris mexicana*, left) and a Mexican long-nosed bat (*Leptonycteris nivalis*, right) captured during our PIT tagging workshop. Both are important pollinators of agaves and are threatened or endangered.



Report from the Field October 2017

Building local capacity for conserving the endangered Mexican long-nosed bat and its habitat through community bat-friendly agave management in northeast Mexico

Hola from Mexico!

The endangered Mexican long-nosed bat (*Leptonycteris nivalis*) has declined over 50% in the past 10 years, in part due to human harvest of agave plants that the bats rely on for food.

With support from the Rufford Foundation, our project aims to understand how to successfully preserve bat foraging habitat through community stewardship of agaves.

Our main objectives are to: 1) Find areas to implement bat-friendly agave management practices by identifying areas that are important for bat foraging and communities that are most open to adopting these practices; and 2) Determine how to design bat-friendly practices in ways that are most beneficial for the bats, and how to tailor the practices to the unique local contexts of each community.

This summer our project team spent three months in northeast Mexico (Nuevo León and Coahuila) collecting data and interacting with local communities. We visited 10 communities, where we monitored bat foraging at flowering agaves on 22 nights, conducted agave surveys around 31 focal agaves, and interviewed 16 community leaders and agave harvesters about their management practices and land uses.

The information we gain from this work will allow us to develop bat-friendly agave management programs in local communities around two important Mexican long-nosed bat roosting caves. We will be able to design these programs in ways that are most beneficial for both the bats and the local people who rely on agaves for their livelihoods.

We hope you enjoy some of the highlights from this summer!



Community interview

Kristen Lear and Ana interviewing an agave harvester about his management practices.



2017 Bat-Agave-People Field Team

Part of our field team for summer 2017 (from left to right): Jaileen Rivera-Rodriguez (Texas A&M University); Ana Castañeda Aguilera (Especies, Sociedad y Habitat, A.C. (ESHAC)); Kristen Lear (University of Georgia); Cuauhtemoc Ibarra Sanchez (ESHAC.).



Agave Survey

Bernardo Marino (left), Temo (middle), and Ana (right) conducting an agave survey in La Cebolla, Nuevo Leon.

Monitoring Efforts a Success

One aspect of our project is to understand the bats' foraging requirements so that we can effectively design bat-friendly agave management programs for their conservation. What characteristics of the agaves that they feed on and the surrounding landscape attract foraging bats? What do high quality foraging areas look like?

To answer these questions, we are conducting foraging studies and agave surveys. We use Sony camcorders and infrared lamps to record the bats' nightly feeding on flowering agaves. During the day, we measure each agave in the area so that we will be able to figure out just what it is about the agaves and the landscape that the bats like.

This summer, we successfully recorded bats feeding on agave flowers in five communities. We will return to the field next summer to complete this data collection. These video recordings of bats foraging in community agave fields will not only help us figure out the bats' foraging requirements, they will also serve as a valuable educational tool for teaching local communities about the importance of bats and their pollination services.



ONLINE VIDEO LINKS

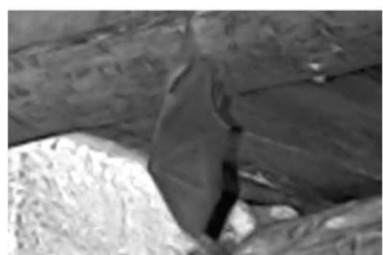
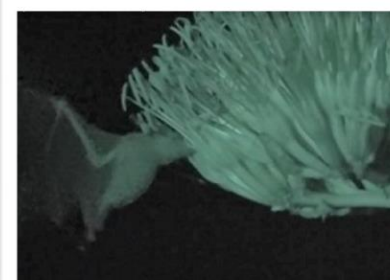
To view infrared video clips of the bats feeding on the agave flowers, visit our YouTube links:

<http://bit.ly/2hlgPqP>

<http://bit.ly/2ysa3Et>

<http://bit.ly/2jKoFso>

<http://bit.ly/2wAtjse>



To watch videos of the bats on YouTube, click on the photos above!

A Fortuitous Encounter

by Kristen Lear

On our last night in the field, we got inundated with rain on our drive to our monitoring site, and we ended up calling off the monitoring with the infrared cameras (rain and cameras do not mix!). Of course by the time we got back to the little cabin where we were staying, the rain had stopped. Wanting to explore a little, I took a short walk and discovered a lone flowering agave next to one of the unoccupied cabins. I sat in the darkness for several minutes, long enough to hear the chirping of bats flying near the agave. I hurriedly went back inside for an infrared camera, and once back at the agave was happy to discover that the bats were indeed Mexican long-nosed bats!

I recorded video for about 45 minutes, watching the small group of four bats come and go in bouts of feeding lasting about 10 minutes each. Between bouts, the bats disappeared and the air got quiet. But then, coming from down the hill about 30 feet away, I heard loud, continuous chirping. Bats often socialize and "talk" to each other as they fly around, but this sound was coming from one spot and wasn't moving. I grabbed my night vision binoculars and went to investigate. As I drew closer to the sound, I realized it was coming from the beams of the porch on one of the cabins!

I slowly peered around the corner with my binoculars. To my surprise, the four bats were roosting together on the beams. I had found a night roost! Mexican long-nosed bats gather in large colonies during the day in day roosts (typically caves), and leave these caves in small groups at night to forage. They can travel over 50 km from a day roost to forage, and when they need to rest throughout the night, they find and use temporary night roosts. I was lucky enough to have stumbled upon one!

I sat down on the ground and began recording videos of their behaviors. The bats spent much of their time grooming their fur and wings, grooming each other, and socializing (and sometimes squabbling!). It also became clear that two of the bats were a mother-pup pair, and I witnessed the full-grown pup drink milk from the mom. I even watched as one bat stuck out its long tongue to lick the extra agave nectar!

A Pallid bat (*Antrozous pallidus*) also joined the group, landing on a nearby wall and hanging right-side-up to munch on the katydids and beetles it had caught.

After observing the bats for almost an hour, I quietly slipped off the porch and let them continue their grooming and socializing in peace. It was definitely a thrilling experience to have discovered a night roost and observed up close the behavior of this endangered bat!

Connecting Bats and People

Agave plants are known for being one of the only plants for which all the parts can be used in some way by people. Communities use the leaves and tall, thick stalks to feed to their cattle and for building houses. People use the leaves' long spines as needles, and make clothing from the fibers. They eat the flowers and plant agaves on their land to control erosion and serve as fences. Most famously, agaves are harvested to make tequila and mezcal from their rich sugary sap. All of these uses make agaves a very important cultural and economic resource to many farmers and communities in Mexico, including in northeast Mexico where we are working. However, agave harvest often entails removing the stalk prior to flowering, thus removing the food for the bats.

While one part of our project aims to understand the bats' foraging requirements, conservation is not just about the animals or plants we are trying to protect.

Conservation is also about people. In situations where wildlife and people are tightly connected, as in the case of the agave-bat-people system, paying attention to human needs and engaging local people is just as important as studying wildlife needs. In our project, we are working with rural Mexican communities to understand how they use and manage agaves on their land, and to understand how best to encourage and implement bat-friendly management practices (such as planting agaves and letting them flower for the bats) in areas where practices are not already bat-friendly.



We have so far visited 14 communities across the states of Nuevo Leon and Coahuila in 2016 and 2017. In each community, we first meet with the leader and conduct a semi-structured interview to gain an understanding of how community members use and manage agaves, what rules govern agave harvest (if any), what the main livelihoods and land uses are in the community, and what changes have occurred in the community over time. These interviews give us an overview of the local social, political, and economic contexts, which may influence whether the community will be willing to participate in bat-friendly agave management programs in the future.

Following leader interviews, we interview several agave harvesters from the community. These interviews allow us to gain a more detailed understanding of the specific management practices they use as well as a better understanding of the agaves themselves (how well they grow in the area, how populations are doing, etc.).

From our work so far, we have discovered several key themes that will likely be important when moving forward with designing and implementing bat-friendly agave management programs:

- One of the main differences between communities is in their current level of agave harvest and use. In some communities, agave use for products like *agua miel* and *pulque* (both traditional beverages) has drastically diminished in recent years, to the point where only a couple people in the community currently harvest agaves. In other communities, agave harvest and use are increasing rapidly.
- Many interviewees did not know that any bats fed from agaves, or that the bats pollinate the plants. Educational campaigns that focus on bats and their pollination services will be an important part of gaining support for bat-friendly agave programs.
- Many interviewees discussed the important role that the Mexican government plays in the communities' wellbeing. The government has provided resources (money, equipment, etc.) to some of the communities, including for agave planting programs to help control erosion and to harvest agaves to make products for export. However, other communities have received little government support. A more in-depth analysis of the role the Mexican government may play in developing and implementing bat-friendly agave management programs will be needed as we move forward with our project.



- From preliminary analysis of the interviews, it appears that community members may be more willing to adopt or try bat-friendly agave management practices if those practices can be proven to attract pollinating bats and subsequently increase the long-term health of agave populations in the area. This again points to the importance of educational programs for the communities, as well as the importance of monitoring whether bats visit the agaves planted during bat-friendly management programs.

We will continue working with local communities next summer to better understand the factors underlying these themes and how best to incentivize bat-friendly management practices to support bat conservation.

A cow eating chopped agave leaves after the harvester extracted the juices (top right); A harvester beginning to hollow out the base of an agave to collect the sap (agua miel) (middle left); Cooked quite (agave stalk) at a roadside stand (middle right); Kristen and Ana interviewing a community leader (bottom left).



Top left: Ana and Jose Juan Flores Maldonado (ESHAC Executive Director) taking a bat out of a mist net; Top middle: A Mexican long-nosed bat covered in yellow agave pollen; Top right: Claudia Ramos Silva (ESHAC) inserting a PIT tag; Below: (From left to right) Winifred Frick (BCI), Brittany Stamps (Texas A&M), Emma Gomez-Ruiz (UANL), Arnulfo Moreno (TAMUX), and Ana Ibarra (UNAM) discussing the range map of the Mexican long-nosed bat.

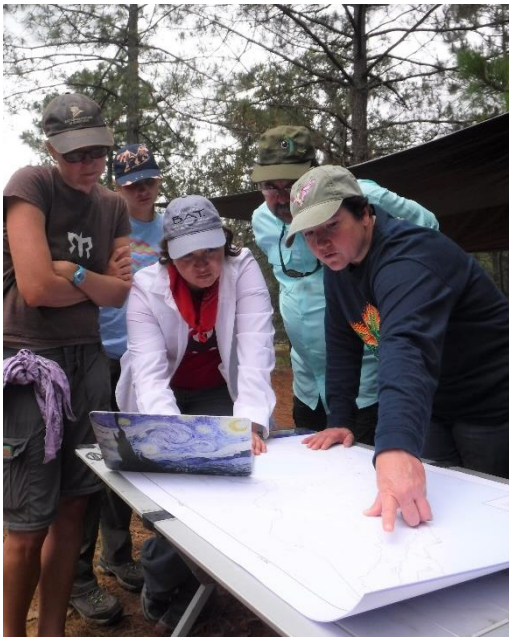
Collaborating Across Borders

In July, we coordinated a PIT tagging workshop for 15 members of the [Nivalis Conservation Network](#), a group of researchers, NGOs, and government agencies from Mexico and the U.S. working to conserve the Mexican long-nosed bat. Participants came from the National Autonomous University of Mexico (UNAM), Autonomous University of Nuevo León (UANL), Tamaulipas Museum of Natural History (TAMUX), Texas A&M University, New Mexico State University (NMSU), and Bat Conservation International (BCI). We gathered at a Mexican long-nosed bat roosting cave in the Parque Nacional Cumbres de Monterrey, Nuevo León.

The goal of the workshop was to provide training for all attendees on the use of PIT (Passive Integrated Transponder) tags, and to tag the bats roosting in the cave. PIT tags are small tags that are inserted under the skin and transmit a signal to PIT tag readers. Each tag has a unique ID. Whenever a bat flies by a reader, the reader records the identity of the bat, the time and date, and the location. We currently have a network of PIT tag readers installed at several important roosting caves throughout Mexico and the U.S. Southwest. By tagging bats in northeast Mexico, we can track where the bats migrate, and when. This information is important to help us understand where to target conservation efforts and to understand future threats that the bats may face as the timing of flowering of their food plants (like agaves) shifts with changes in climate.

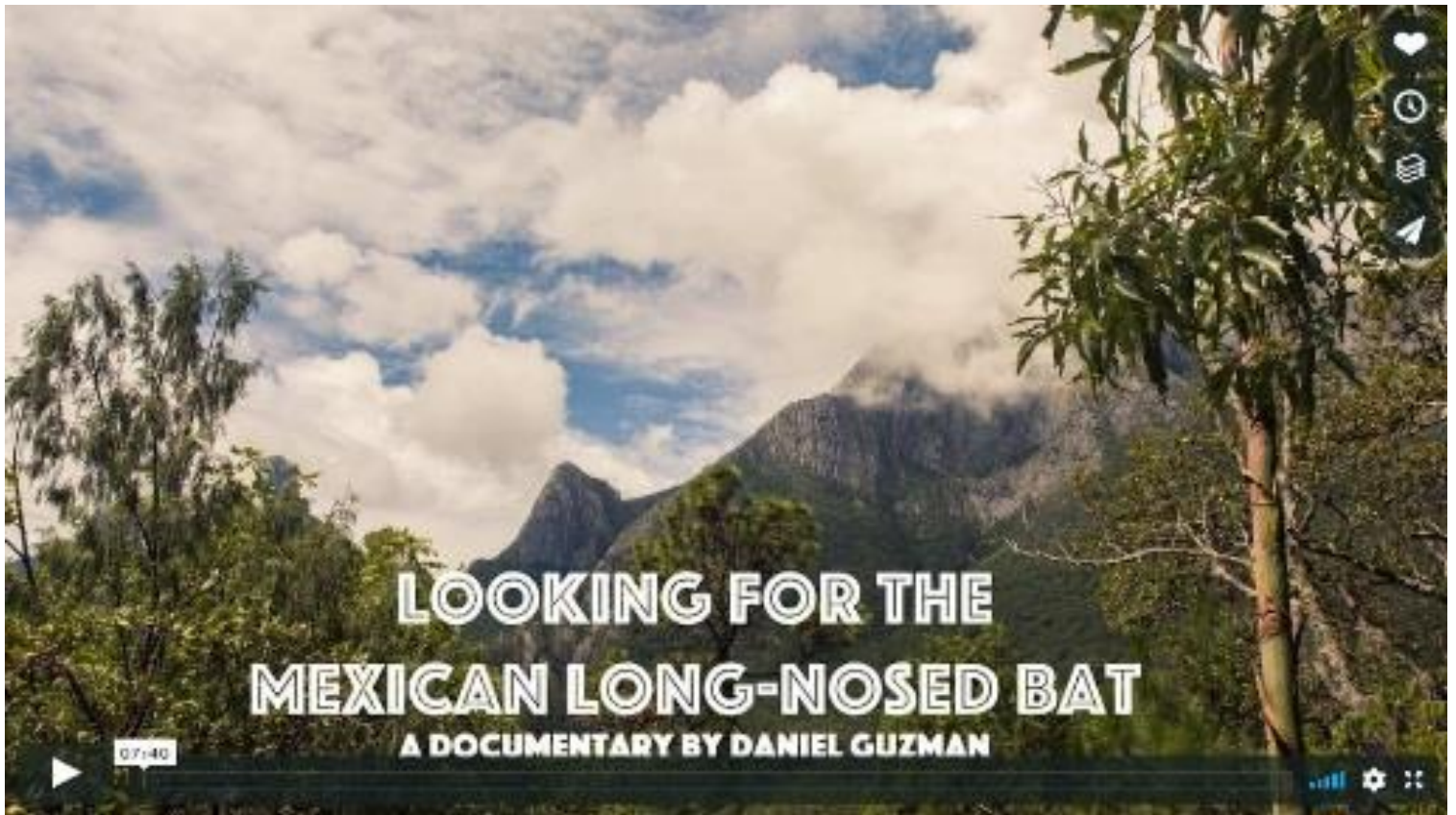
During our six-day workshop, we successfully tagged over 20 bats. Now we are just waiting to see if any of the readers in our network pick up these individuals as they migrate back south for the winter!

The workshop also offered an opportunity to discuss everyone's research on the species and to brainstorm ways we can coordinate our research and conservation efforts to be most effective in protecting the species. We are now collaborating on revising the U.S. Fish and Wildlife Service Species Status Assessment for the bat to improve implementation of the Endangered Species Act and enhance conservation success.



Above: Winifred Frick from Bat Conservation International demonstrating how PIT tagging works; Right: Group photo after the workshop.





Project Featured in Short Documentary

During our PIT tagging workshop, we were fortunate to be joined by videographer Daniel Guzman, who filmed a short documentary of our conservation work with the Mexican long-nosed bat in northeast Mexico. Watch the video on Vimeo (<https://vimeo.com/228372359>) or YouTube (<https://www.youtube.com/watch?v=gaJ44Al3Eg0>)!

Popular Media Articles

Kristen has written several popular media articles about our work on conserving the Mexican long-nosed bat. Check them out at the links below!

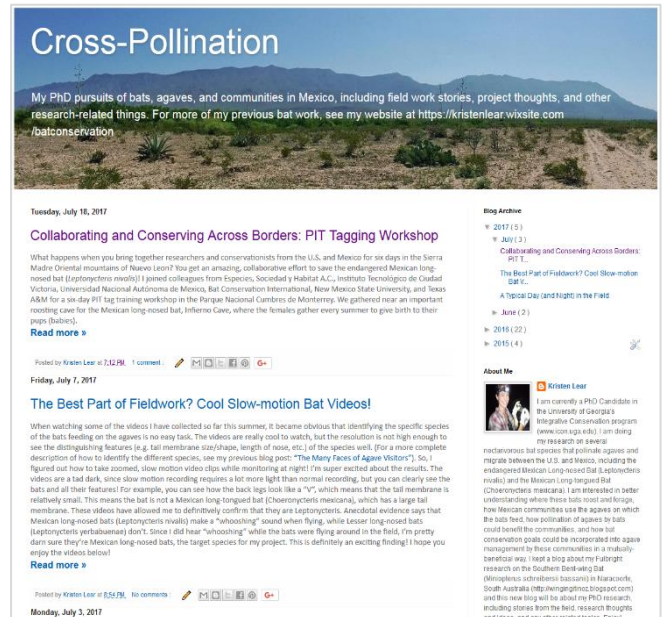
“Bat-friendly agriculture: Conserving the Mexican long-nosed bat with bat-friendly agave harvesting”, BATS Magazine, Bat Conservation International, Issue 2, 2017, Pages 16 – 17: <http://www.batcon.org/pdfs/BATSmag/BatsIssue2017.pdf>

“Not Just Tequila”, Bat News, Bat Conservation Trust: https://docs.wixstatic.com/ugd/98e4ec_968a69f9662e45f5a6b6ea92aa9deca8.pdf



Kristen Keeps a Blog!

In addition to writing articles, Kristen has also documented her experiences in the field on her research blog, “Cross-Pollination”.



Other Project Funders

We would like to thank our other project funders for their support of our work with conserving the endangered Mexican long-nosed bat:

Bat Conservation International

Bat Conservation Trust

Explorers Club

Idea Wild

Latin American and Caribbean Studies Institute

Phoenix Zoo



About Us

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To learn more about us, visit our websites or find us on Twitter and Facebook!

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Especies, Sociedad y Hábitat, A.C.:

<http://www.eshaconservacion.org/online/>

Red para la Conservación de Murciélagos del Noreste de México:

<https://www.facebook.com/MurciRed/>

