

## Project Update: July 2015

### Expedition period

Our field trip was from June 6<sup>th</sup> to 10<sup>th</sup>. Our main goals in this trip were to collect acoustic records from our target species (*Natalus primus*), visit another cave near to cave La Barca to look for our target species and to develop some educational activities in the community living near cave La Barca.

### Developed Activities

Acoustic recordings were made using the same equipment (see previous reports). We set these in places missing in previous expeditions (Fig. 1). This time were one of the skylights above guano swaps (Fig. 2, A-B) and other cave entrance. We set also the recording unit in one of the galleries within the cave to check for presence of our target species (Fig. 2, C-D). Some modifications were made to this sketch (Fig. 1) of cave La Barca, in comparison to previous reports. Repeated visits to the cave give us a major knowledge of precise location of each one of the small galleries and holes frequently used by bats, that's the reason of such modifications done to the sketch.

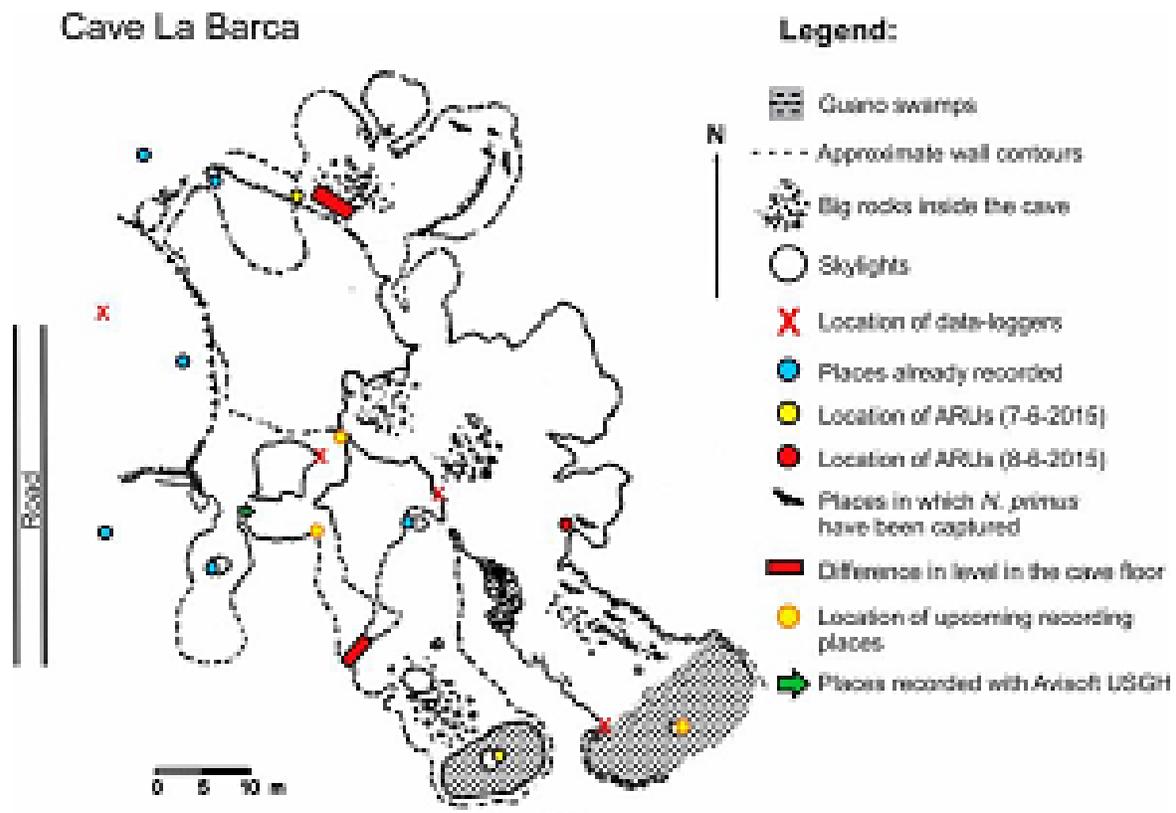


Figure 1. Sketch from cave La Barca, modified from Tejedor *et al.* (2005) signalling the places where ARUs and data-loggers were set, as well as the places in which *N. primus* was seen.



Figure 2. Placing the recording units in the skylights (A-B) and in the gallery in which individuals of *Natalus primus* have been previously captured (C-D).

Schedule used for the ARUs on this field trip, was the same used in our last trip. Another ultrasonic detector (Echo Meter) was used to collect sound files from bats flying around the cave. Avisoft microphones were used too, in order to record high quality flight paths from bats getting out of the cave (green arrows in Fig. 1). Three data-logger to register temperature and relative humidity were set in different galleries on this cave and one out side of it. Data-loggers were set on June 6<sup>th</sup> and were removed from the cave on June 9<sup>th</sup>. These were recording the climatic variables every 15 minutes. We set up mist nets around the cave to look for our target species and to estimate what were the places around the cave that they were using to move to their foraging zones.

From the results gathered in the two previous field trips and from sound files obtained from the sound library of our Laboratory (more than 15 years recording bats in different Cuban environments) we made 260 spectrogram templates of 16 bat species inhabiting within Guanahacabibes Peninsula. For each species were made more than 5 templates, ensuring to cover almost all the variability as possible to improve detection of the species within the

recorded files in our sampled areas. Spectrogram templates were made also according to the sampling frequency used on each one of the recording devices: ARUs (384 and 192 kHz), Echo Meter3 (384 and 254 kHz) and Avisoft USGH (500 kHz). These templates were deployed over our 4 685 sound files gathered in total, since our first field trip to Guanahacabibes Peninsula. Figures and tables showing these results will be shown in future reports (due to the long processing time). This field trip concludes with the data collection (acoustics files) inside cave La Barca, to determine which cave entrance is used by our target species (one of our project goals).

Helped by forest rangers, we visited another cave near La Barca, known as “Bolondrón” (N21°51’47.1”; W084°45’06.9”) to explore if our target species was inhabiting this cave. This cave had a single entrance, with two skylights and two large galleries (approximately 40 meters long each) resembling tunnels (Fig. 3 A). There wasn’t a heat gallery and no water inside the cave. Visual observations were made to recognize bat species. Acoustics recordings were made also with a bat detector, in order to identify the species not detected through visual recognition.



Figure 3. Images from cave Bolondrón, located near from cave La Barca, showing one of its main galleries (A), inhabited by *Eptesicus fuscus* and *Artibeus jamaicensis* (B).

#### *Amount of data collected*

We collected 1 623 sound files from ARUs and 137 with Echo Meter.

#### *Obtained results*

Temperature and relative humidity profiles within cave La Barca showed a stable relative humidity for the galleries in which data-loggers were located (Fig. 4 B-D), although temperatures fluctuated more, but remained stable in the inner most part of the cave (Fig. 4 D). Data-logger located outside the cave showed a wider variation in both temperature and relative humidity (Fig. 4 A).

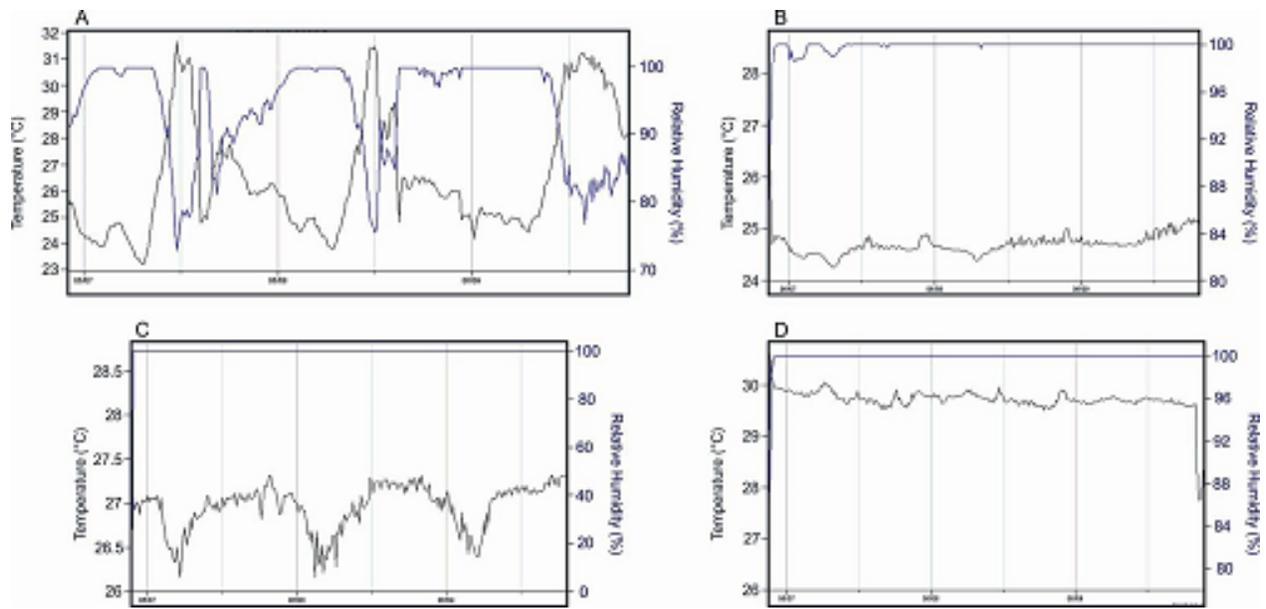


Figure 4. Temperature and relative humidity profiles from one place outside the cave (A) and 3 galleries from cave La Barca (B-D). Temperature is represented in black and relative humidity in blue. Sampled days are shown in x axis.

We capture one individual from *N. primus* in one of the mist nets and other 32 individuals from other bat species outside La Barca. All of them were previously reported for this cave (Tejedor et al., 2005). The fact of finding one individual outside the cave helped us to know where to locate automatic recorders on future expeditions to find the foraging zones from *N. primus*. This individual fall off in the last bag from the mist net very close to vegetation. We suppose this individual was displacing through a clear space within vegetation, very near from the place in which our mist nets where located, as well as the other bat species that fell off in the mist net, as a commuting route to their foraging zones.

From cave Bolondrón, we founded 2 bat species living within it: the big brown bat (*Eptesicus fuscus*) and the big fruit-eating bat (*Artibeus jamaicensis*). No direct captures were made, although bats were identified through their echolocation call features by means of previous descriptions done for these species (Macías and Mora, 2006; Rodríguez and Mora, 2005).

#### *Educational/Scientific materials made in this period*

We had the opportunity to meet kids living in the community near cave La Barca. Only seven kids live there and are in the primary school (6 to 12 years old). We had a brief talk with them where we made presentations and talked about bats (Fig. 5). We made reference to the following topics:

- Cuban bat fauna: we asked them if they knew: what was a mammal? How many mammals they think we have in Cuba? They have seen bats alive? What do they eat?
- Bat threats: which are the potential threats to our bats? Have you ever seen any cave disruption here?

- Importance of bat conservation: how useful are bats to our ecosystems? What they could do to preserve bats?

This talk was supported by a power point presentation in which the kids saw mainly photographs and drawings illustrating these topics (Fig. 5). We used also other materials delivered to the staff of the National Park (Fig. 6).

To work with children is a real challenge: asking questions all the time and an endless energy that makes you keep them attract all the time. That's why we limited our talk to 15 minutes and we spend the rest of the time talking with them about the activities they develop in the Park: which are they preferred games, how much do they know about other animal groups, etc. We found that these kids are well prepared in the knowledge regarding sea turtles and birds, but no one have spoken with them about bats.

Unfortunately we couldn't have the meeting with the major authorities of the National Park to show them our results in the project so far. Although they promise to have a reunion with us in August in which we need to go there to pick up the new permission to get into the Peninsula. In relation to the forest rangers, we explain them the materials that we wanted to leave at Caleta del Mangle to teach them about bat conservation and especially the importance to preserve cave La Barca (Fig. 7, A-B). Some of these materials were hang up in this place (C-D) for their long-term use.



Figure 5. Pictures took during our talk for the children in the community.



Figure 6. Materials used during our talk about bats: a bat tabloid, power point presentations and posters.



Figure 7. Talk with the forest rangers working with us at Caleta del Mangle, explaining them the materials made with information about our target species and its roost (A, B). Materials hang up in this place (C, D)

## Next Steps

- To coordinate a meeting with the major authorities managing the National Park to let them know which activities we have been developing (to have a feedback with them).
- To prepare Forest rangers, in relation to the techniques of acoustic recording and mist netting. We will make a good use of a monthly reunion they have (30 participants approximately); to have a talk with them about bats and our project goals. Some forest rangers (those directly in touch with our work) were very interest in our topic, we will like to extend the information to other forest rangers not directly involved with us that equally work at this area. Forest rangers are strictly involved with the places within Guanahacabibes, we have learned a lot from their field experiences and locations within Guanahacabibes. Teaching them a little bit more about the fauna they are protecting, will ensure a long lasting effort to continue, not only our work with bats, but also with the rest of the animals inhabiting this place. They could suggest which other caves resembling the features from La Barca could be visited to look for our target species. This coordination have been made for our next field trip in August.
- To prepare a practical activity for children with bats alive (NOT our target species), regarding the International Day of Bat Conservation (August 27<sup>th</sup>) to show them to the kids and personnel from the park, together with other entertainment activities.
- To collect acoustic data, this time outside La Barca cave. Taking into account the place in which *N. primus* was caught with our mist nets outside the cave on this field trip, we would like to monitor this place looking for a potential foraging zone from this species (Fig. 8). Most of the main entrances of cave La Barca have been already monitored (Fig. 1), we would like now to look for the species outside the cave. Guanahacabibes National Park didn't have originally cave La Barca within its protected area. After the rediscovery of this species here (Tejedor et al., 2004), La Barca was included within the park limits. But only the roost was considered, what about its foraging zones? It has been established for other natalid species, that roost is more important that the features of the habitats in which they forage, but this is unknown for our target species. By means of acoustic recordings we could detect which are the foraging zones of *N. primus*. If these zones are not included in the National Park, we could make a proposal requesting an extension of it, taking our project results as the main arguments for it.



Figure 8. Places to be monitored in our next field trips to locate the foraging zones from *Natalus primus*.

#### *Additional comments*

Another headlamp and a flash-light was delivered to the forest rangers to contribute to our work. Alkaline batteries were also delivered to them to power these items.

#### *References:*

Macías, S., and Mora, E. C., 2006, Variability in the echolocating behavior of the big fruit-eating bat *Artibeus jamaicensis parvipes* (Chiroptera: Phyllostomidae) in Cuba: *Biología*, v. 20.

Rodríguez, A., and Mora, E. C., 2005, Acoustic Identification of *Nycticeius cubanus* (Gundlach, 1867) and *Eptesicus fuscus dutertrei* (Gervais, 1837) (Chiroptera: Vespertilionidae) in western Cuba: *Biología*, v. 19.

Tejedor, A., Silva, G., and Rodríguez-Hernández, D., 2004, Discovery of extant *Natalus major* (Chiroptera: Natalidae) in Cuba: *Mammalian Biology*, v. 69, no. 3, p. 153-162.

Tejedor, A., Tavares, V. d. C., and Rodríguez-Hernández, D., 2005, New records of hot-cave bats from Cuba and the Dominican Republic: *Boletín de Sociedad Venezolana Espeleología*, v. 39, p. 10-15.

## Project Materials

### Bat Cartoons

# Conoces a nuestros murciélagos?

1<sup>er</sup> de Octubre: Día Latinoamericano de los Murciélagos

En Cuba contamos con 26 especies de estos mamíferos, de ellos, 7 son exclusivos de nuestra isla. Estos mamíferos alados son importantes dentro de los ecosistemas, actuando como controladores de insectos que constituyen plagas y como polinizadores de muchas flores.

La mayoría de los murciélagos viven exclusivamente en cuevas, por lo que perturbaciones o modificaciones en estas pueden atentar contra la supervivencia de los murciélagos que allí habitan.



Ilustración: Joel Corrales Márquez  
Diseño: Lida Sánchez Sánchez



**Sabías que...**

de las 26 especies de murciélagos cubanos

6 de ellos se alimentan de diferentes partes de las plantas como las flores y frutos?



CUBAN FLOWER BAT.



## Posters

### Cueva La Barca

Guanahacabibes, Sandino, P. del Río, Cuba

Cueva La Barca está ubicada en la península de Guanahacabibes en el extremo más occidental de Cuba dentro del Parque Nacional Guanahacabibes. Es una de las cuevas cubanas que alberga un gran número de especies de murciélagos, reconociéndola como una de las de mayor riqueza de especies dentro del archipiélago.

Cueva La Barca consta de una extensión de 500 m, con múltiples entradas y claraboyas (Fig. A). Presenta cinco galerías principales, de ellas una constituye una cámara de calor. El suelo de las galerías más internas constituyen pantanos.



Esta cueva constituye el único refugio conocido para la población del murciélago grande de orejas de embudo (*Natalus primus*) (Fig. B). El hecho de albergar de manera exclusiva en relación a otras cuevas cubanas esta especie de murciélago, otorgaron a Cueva La Barca el reconocimiento de SICOM por parte de la Red Latinoamericana de Conservación de Murciélagos.



La Red Latinoamericana para la Conservación de los Murciélagos certifica que Cueva "La Barca", Península de Guanahacabibes, Cabo San Antonio, Cuba, es un SITIO DE IMPORTANCIA PARA LA CONSERVACIÓN DE LOS MURCIÉLAGOS.

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**Referencias:**  
-Tejedor, A., Tavières, V. J. C., and Rodríguez-Hernández, D., 2005. New records of hot-caves bats from Cuba and the Dominican Republic. *Boletín de Sociedad Venezolana Espeleología*, v. 39, p. 10-15.



### Murciélago oreja de embudo

*Natalus primus* (Chiroptera: Natalidae)

*Natalus primus* es una especie de murciélago endémica de nuestro país. Se conoce una sola población existente en Cueva La Barca, ubicada dentro del Parque Nacional Guanahacabibes, localizado en el municipio de Sandino, provincia de Pinar del Río, Cuba. Este quiróptero está categorizado según la IUCN como una especie en Peligro Crítico de Extinción.



*N. primus* emite vocalizaciones ultrasónicas que abarcan desde los 45 a 100 kHz que le permiten localizar y capturar insectos al vuelo de los que se alimenta. Esta especie presenta un ligero dimorfismo sexual en cuanto a las dimensiones corporales, donde los machos tienen las tibias y el cráneo más largo que las hembras.

Los individuos de esta especie se dispersan en las zonas bajas (1 m de altura) de las paredes de las galerías más calurosas de la Cueva. Muchos aspectos de su historia natural aún son desconocidos, el cuidado del refugio donde vive esta singular especie nos permitirá estudiarla y saber cómo protegerla.

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**Referencias:**  
Tejedor, A., et al. (2004). "Discovery of extant *Natalus major* (Chiroptera: Natalidae) in Cuba." *Mammalian Biology* 69(3): 153-162.  
Tejedor, A. (2011). Systematics of funnel-eared bats (Chiroptera: Natalidae). A. M. o. N. History. New York.

