

1st Quarterly Project Update

We began our fieldwork in mid-January 2026, when we started surveying the trails and marking them with GPS to begin creating a map using QGIS, as well as identifying the best locations for conducting population transects of the various species. We have selected five transects across the mosaic of different ecosystems found in the Cocobolo Nature Reserve: secondary forest (Hidden Valley transect), primary forest (Primary transect), riparian forest (River transect), the transition zone between tropical rainforest and cloud forest (Transition transect), and cloud forest (Ridge transect). In this way, we also cover Cocobolo's altitudinal gradient, monitoring from approximately 200 m a.s.l. to 700 m a.s.l. We have been able to observe, empirically, the presence of species in only some of these transects. Two of these transects—Ridge and Transition—are difficult to access but are of great importance for continuing sampling of species found only in the upper zone of the reserve (e.g. *Pristimantis moro*).

During our first round of fieldwork, Cocobolo experienced significantly wetter conditions than are typical for this time of year. In Panama, the dry season usually extends from mid-December through mid-April. These unusually rainy conditions may have influenced the species we encountered during surveys. By the time of our second round of fieldwork, the climate appeared to have stabilized to conditions more consistent with the expected dry-season pattern.

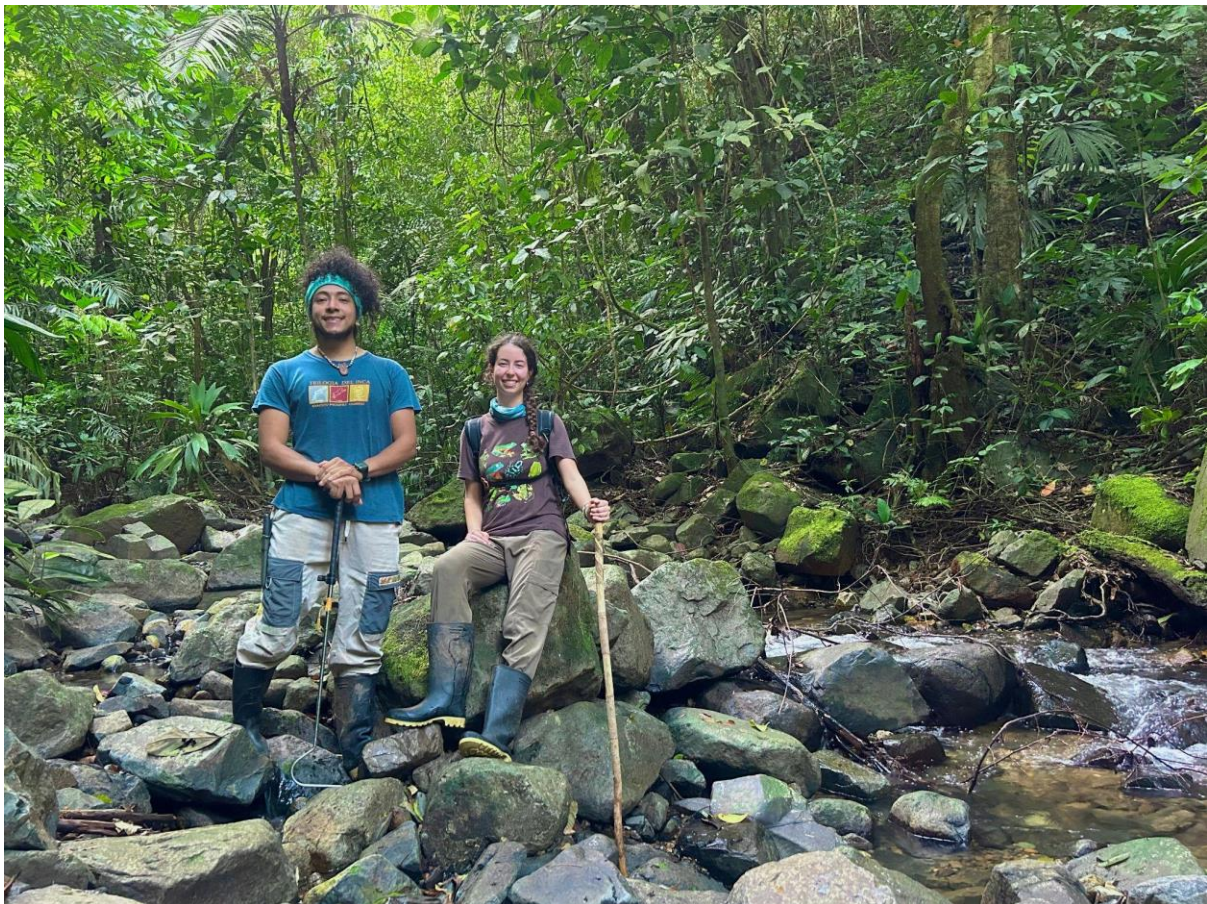


Figure 1. Camila Shannon (right) and Erick Barría (left) searching for *Atelopus limosus* in what we call “Quebrada Atelopus,” one of the sites where the species has historically been reported. (Photo: Camila Shannon)

We have conducted three expeditions in search of the Limosa Harlequin Frog in what we have dubbed the “Atelopos River,” as the species has historically been reported in this area; however, we have not yet been able to find any individuals. We have conducted both daytime and nighttime searches in the lower reaches of the river. This river features numerous waterfalls, which we have marked on the map (**Figure 2**) as “Lower Atelopos Waterfalls.” This makes it impossible to continue through the river in some places, so it is necessary to use the “River Side trail” to continue exploring the river. During our exploration of the upper reaches of the river, we were able to find individuals of another species of interest classified as Vulnerable (VU) by the IUCN: *Silverstoneia nubicola* (**Figure 3, A and B**). This species appears to have a stable population in the new sites we have explored, as we have found multiple individuals along the two streams; although not as frequent as *Silverstoneia flotator* or *Colostethus pratti*, they continue to appear in relatively high numbers.

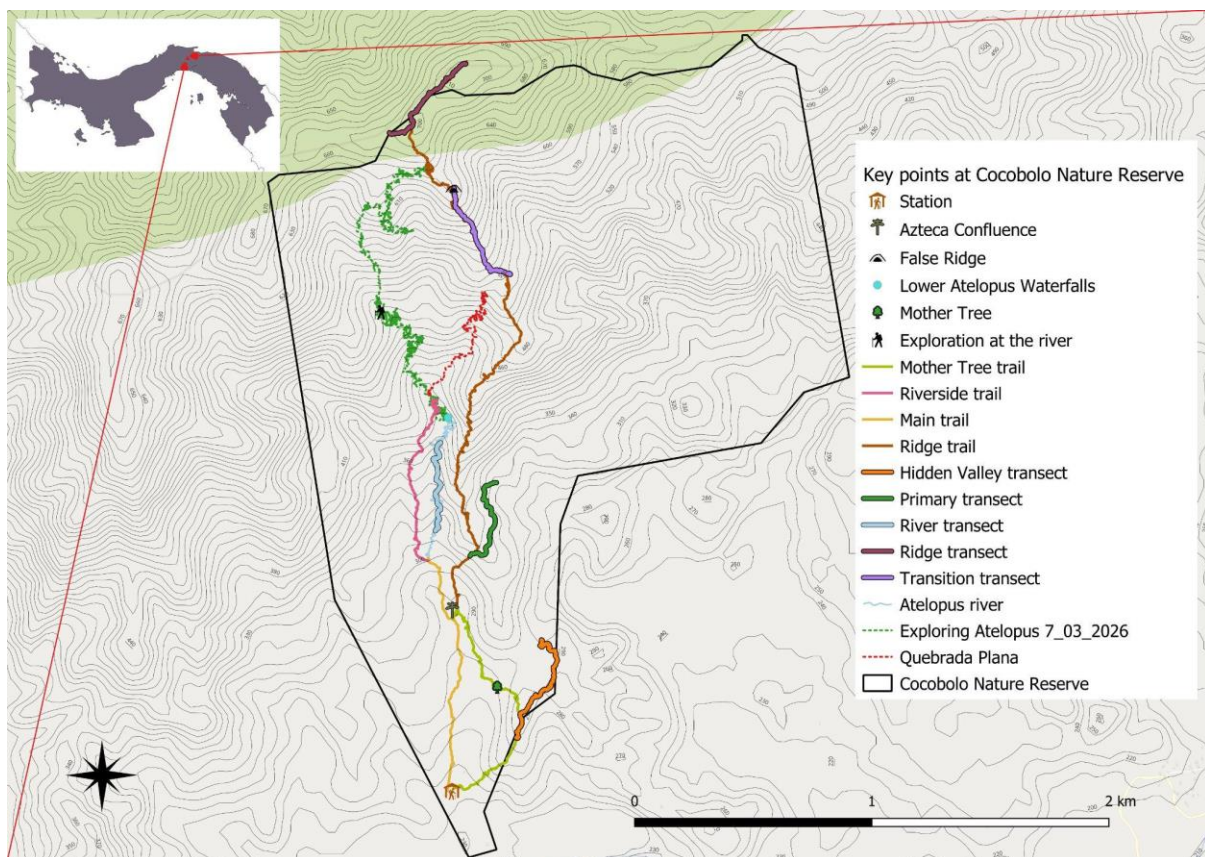


Figure 2. Map of Cocobolo Nature Reserve. It depicts the trails we have been covering, the sampling transects, and the explorations conducted outside the transects. It is clear how much of the eastern part of the reserve remains to be explored. (Figure by Erick Barría)

So far, we have observed a total of 84 species of herpetofauna—38 amphibians and 46 reptiles—among which we can highlight some interesting findings, such as a widened distribution range of the lizard *Lepidophima flavimaculatum*, this being the easternmost record for this species. We have found other species of great importance, such as the Panamanian bromeliad boa (*Ungaliophis panamensis*); although its conservation status is of least concern (LC), it has only been reported twice in the country according to the IUCN. We have also found the *Bolitoglossa cuna* salamander, a species classified as EN, of which we have observed

about three individuals so far. The last notable encounter during our most recent survey was with the *Ecnomiohyla bailarina* frog, listed as NT, but it also has very few records in Panama, which is common for this genus of entirely arboreal frogs.



Figure 3. Representative species recorded during surveys. Female (A) and male (B) of *Silverstoneia nubicola*; adult of *Bolitoglossa aff. cuna* (C); adult of *Ungaliophis panamensis* (D); and *Ecnomiohyla bailarina* (E). (Photos A, B, C, D by Erick Barría, Photo E by Camila Shannon)

Using the data obtained to date, we constructed species accumulation curves for amphibians and reptiles, including both rarefaction and extrapolation (**Figure 4**). The extrapolation for amphibians suggests that species richness is approaching an asymptote, indicating that most species present in the reserve may have already been detected. In contrast, the reptile curve has not yet reached an asymptote, suggesting that additional sampling effort is needed to more fully capture reptile diversity.

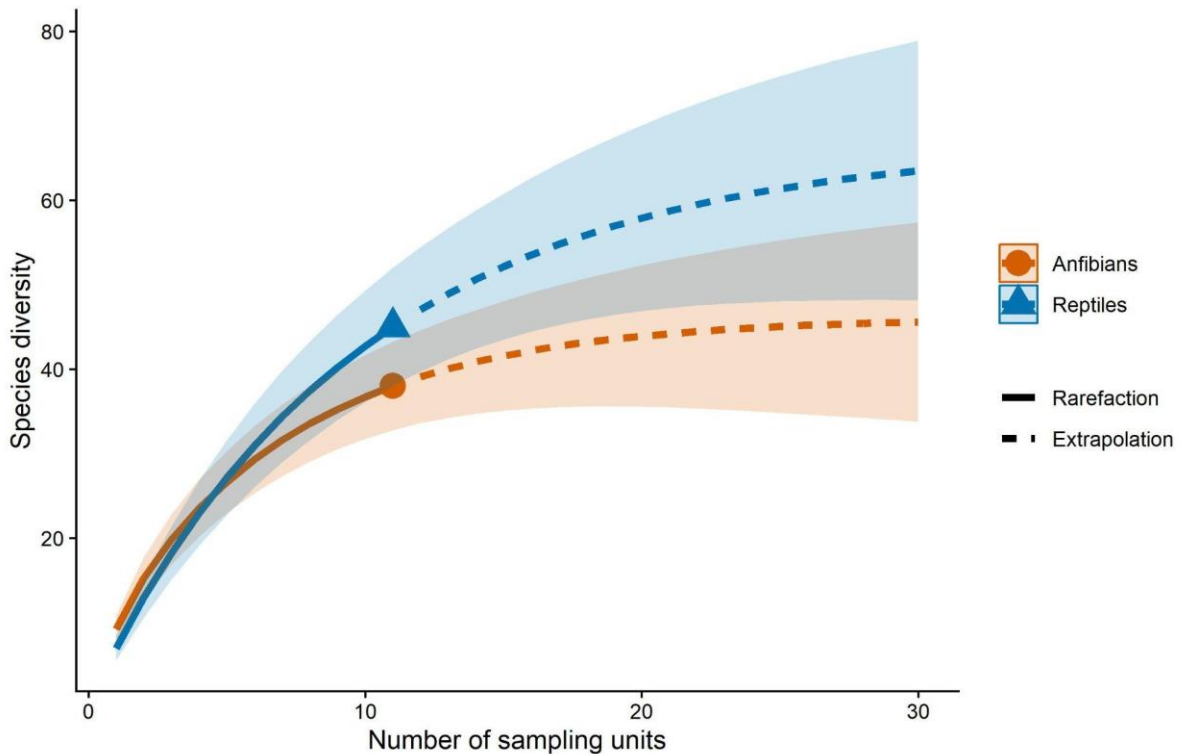


Figure 4. Site-based rarefaction and extrapolation curves of species richness for amphibians and reptiles. Solid lines represent rarefied richness, dashed lines represent extrapolated richness, and shaded areas correspond to 95% confidence intervals. Points indicate observed values. (Figure by Erick Barría)

Community Work

We have been in communication with the director of the Geoversity Foundation, who has been working with the Mamoní Arriba community for more than five years. Her guidance has been invaluable in helping us coordinate community-based activities. She recommended that we focus our efforts on the Mamoní Arriba community, as most of the youth from La Zahina travel there during the week to attend school.

Together, we have planned the first two workshops on *Atelopus limosus* and the reptiles and amphibians of the region, as well as their importance for ecosystems and watershed health. These workshops will be conducted over the next three weeks. We have also met with the principal of the Mamoní Arriba school, who supports our initiative to share knowledge with students. We have been informed that photographs of students are not permitted; therefore, any images taken will focus on the research team and on materials produced during the activities.

For the first workshop, we prepared and printed black and white illustrations of different reptile and amphibian species along with short captions, beginning with *Atelopus limosus*. These materials are intended for students to color and learn about local biodiversity through art. This workshop is scheduled for Monday, March 29.

Future Explorations

So far, we have focused on areas where *Atelopus limosus* has historically been recorded, but we have not been able to locate the species. We will continue monitoring these areas during future expeditions. We have also surveyed two additional sites near historical records that have the potential to harbor the species, visiting each of them three times; neither of these sites had previously established trails. During these explorations, we observed the presence of multiple additional streams to which the species may have dispersed.

To date, our surveys have been concentrated in the western sector of Cocobolo Nature Reserve (**Figure 2**), as it is easier to connect newly explored sites with existing ones in this area. Cocobolo is characterized by steep, hilly terrain that descends sharply toward bodies of water, making it difficult to establish and connect trails; therefore, progress during future explorations is expected to be slow.

The eastern sector of the reserve remains largely unexplored. We anticipate that future surveys will focus on this area, systematically assessing bodies of water.