

CONSERVING THE ENDANGERED LAGUNA-RAIMUNDA FROG (*ATELOGNATHUS REVERBERII*), ENDEMIC FROM NORTHERN PATAGONIAN STEPPE, ARGENTINA

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SUMMARY OF THE PROJECT

The Laguna-Raymundo Frog (*Atelognathus reverberii*) is an IUCN Endangered species only known from five temporary shallow lagoons scattered over the northern Patagonian steppe. This species is threatened by the dry off and eutrophication of its aquatic habitat caused by extreme weather but also by the trampling of livestock. Its area of occupancy is less than 500 km² and there is a continuing decline in the extent and quality of its habitat. We aim to assess the distributional range and current conservation status of the entire population of this species and to perform concrete actions to promote its long-lasting viability.



ACTIVITIES

We performed a total of 7 field trips from October of 2014 to March of 2015. Our objectives were, 1) to measure habitat variables at sites of known and unknown occurrence of frogs in order to use them for developing models of potential distribution for the species, 2) to search for new sites of occurrence for the species, 3) to have interviews with local farmers and select potential sites to build artificial ponds and, 4) to perform awareness raising activities.

OUTPUTS BY OBJECTIVE

DISTRIBUTIONAL RANGE AND CONSERVATION STATUS

Objective. Distributional range and conservation status of the species updated.

Methodology. We searched for frogs on its entire distributional range. We modelled species distribution using predictive methods (Maxent, BioClim and Domain 2.5), to search for potential habitats and to assess distributional range at the plateau. We visited 5 sites of known occurrence of the species and 8 sites where the species was not previously detected. Each site was intensively surveyed recording: a) presence and abundance of frogs (juveniles, adults and tadpoles), and; b) habitat variables: size of the lagoon, presence and abundance of vegetation and rocks and type of substrate. With a set of previous information and new information gathered through this project, we updated the conservation status for this species.

Results and discussion. At Figure 1 we show results obtained through analysis made with Maxent, Bioclim and Domain 2.5. The predictive power was better for Bioclim.

Environmental variables considered were not determinant for the distribution of this species. Future studies should incorporate more data of presence and should work with other variables besides of the ones used for this study, in order to improve the results and to assess the previous models.

We increased the distributional range for the species to 3 new localities. This should represent an improvement in the status of the species. However, at "Blue Lagoon", we observed tadpoles (in October of 2014) and later, adults (in March of 2015) trapped at a deep water pit (called "jaguel" by local people) placed at 10 mts from the lagoon. Jaguels are constructed by local people to take water for domestic use when the lagoons become dried. Since individuals cannot escape from this "jaguels", they die (we described this threat in more detail below). This observation demonstrates that artificial habitats are used by frogs for reproduction, probably because they are less threaten by livestock. However, artificial habitats must be constructed in a way that allows individuals to get in

and out easily. The way currently used by local farmers ends in a trap (a pitfall) for frogs. In that frame, the habitats that will be created will be of key importance not only for reproduction, but also as an alternative to this traps called "jaguels".

Considering that the new records do not represent a significant increase in the previous known distributional range and the discovery of some new and significant threats to the species, we consider that conservation status for the species should be maintained in "Endangered".

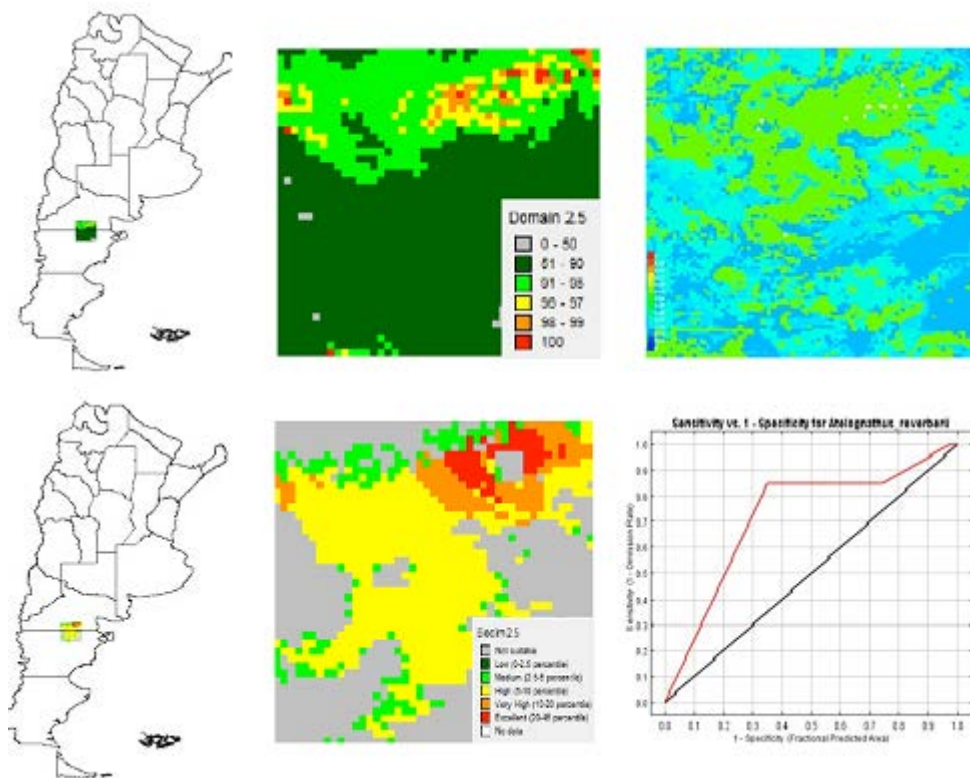


Figure 1. Results obtained through the application of models of Domain, Bioclim y Maxent.

Achievements

- First record of this species at the "Lagoon of the Gumps" (S 41°36', 66°64' W). At this place we found tadpoles in several metamorphic stadiums, indicating that the species uses that site for reproduction (Fig. 2).
- First record of the species at "Estancia El Puntudo" (S 41°37' S, 66°80' W).
- First record of the species at "Estancia Echeverría" (S 41°13' S, 66°44' W).
- First analysis of variables that could be limiting the occurrence of the species.
- Conservation status of the species updated.
- Results presented at Museo de La Plata, in a meeting called: "Al Rescate de los Anfibios Argentinos" http://www.museo.fcnym.unlp.edu.ar/articulo/2015/3/18/taller_cururu.



Figure 2. Tadpoles and adult individuals detected at the pond of the Gump and Blue Lagoon respectively.

HABITAT REQUIREMENTS

Objective. Knowledge about habitat requirements increased

Methodology. At each lagoon we recorded: a) presence type and abundance of vegetation and rocks; b) type of substrate; c) size and depth, and; d) water variables: PH, Temperature, NH₃ /NH₄, NO₂ and hardness. We used linear generalized models and multivariate approaches to search for differences between lagoons used and non-used by frogs.

Results and Discussion. We found that lagoons with and without records of frogs have very similar features and no significant differences were found (Fig. 3). The lagoons are semi-permanent, it has clay substrate, scarce shore vegetation and lot of rocks of several

sizes placed at the shore and into the water. Aquatic vegetation is scarce or absent. We found that frogs use shore rocks as shelter during the day. We also found that frogs prefer to leave eggs at small water ponds (instead of lagoons) probably because these habitats are less threatened by livestock. Another hypothesis is that these habitats are less affected by drought. We will test this hypothesis during the next field trips.



Figure 3. The access to the field sites is very difficult. In these images, the field team working at sites of known and of unknown occurrence of the frogs.

Achievements

- Although no differences were found at lagoons with confirmed and unconfirmed presence of the species, we gathered enough information to describe the habitat and microhabitat for the species.
- We found some differences in habitats used by adults and tadpoles (concluding that frogs prefer to leave eggs at specific habitats).
- Results presented at Museo de La Plata, in a meeting called: "Al Rescate de los Anfibios Argentinos" http://www.museo.fcnym.unlp.edu.ar/articulo/2015/3/18/taller_cururu.

EFFECT OF THREATS

Objective. Knowledge about effect of threats increased

Methodology. At each lagoon (both, with presence and absence of frogs), we measured presence and frequency of livestock. We used occupancy models and linear generalized models to search for effects of threats on frogs' occupancy. We also searched for and described new threats recorded at the area not previously recorded.

Results and Discussion. Although the livestock occur in small abundances, during dry seasons, the lagoons become smaller and the pressure of livestock becomes higher. The effect on frogs is clear since they need these habitats for reproduction, and dry season occurs during reproduction season. However, analysis did not show significant differences between sites, which could probably be related with the fact that threats are similarly distributed along all the lagoons of the plateau.

New threats recorded at the area. A mortal trap called Jaguel. As described previously during January of 2015, at "Laguna Azul" we observed 300 individuals of Somuncura frog trapped at a deep water pit (= "jaguel") placed 10 mts far from the lagoon. Jaguels are constructed by local people to take water for domestic use.



Figure 4. Individuals trapped (and then rescued) from the "jaguel".

Since individuals cannot escape from this "jaguels", they die (we found at least 10 dead individuals). Considering that all the frogs would die in this trap, we decided to rescue them and to put a fence around the water pit. However, the use of these water pits are very common among local farmers, becoming in a great threats for frogs (Fig. 4).

First record of chytrid fungus for the species. We took skin samples of live individuals (using a cotton swamp) and of dead individuals (trapped in the water pit) and we analysed them with QPCR and histological approaches respectively. Lamentably we found that all samples were highly infected with chytrid fungus (Fig. 5).

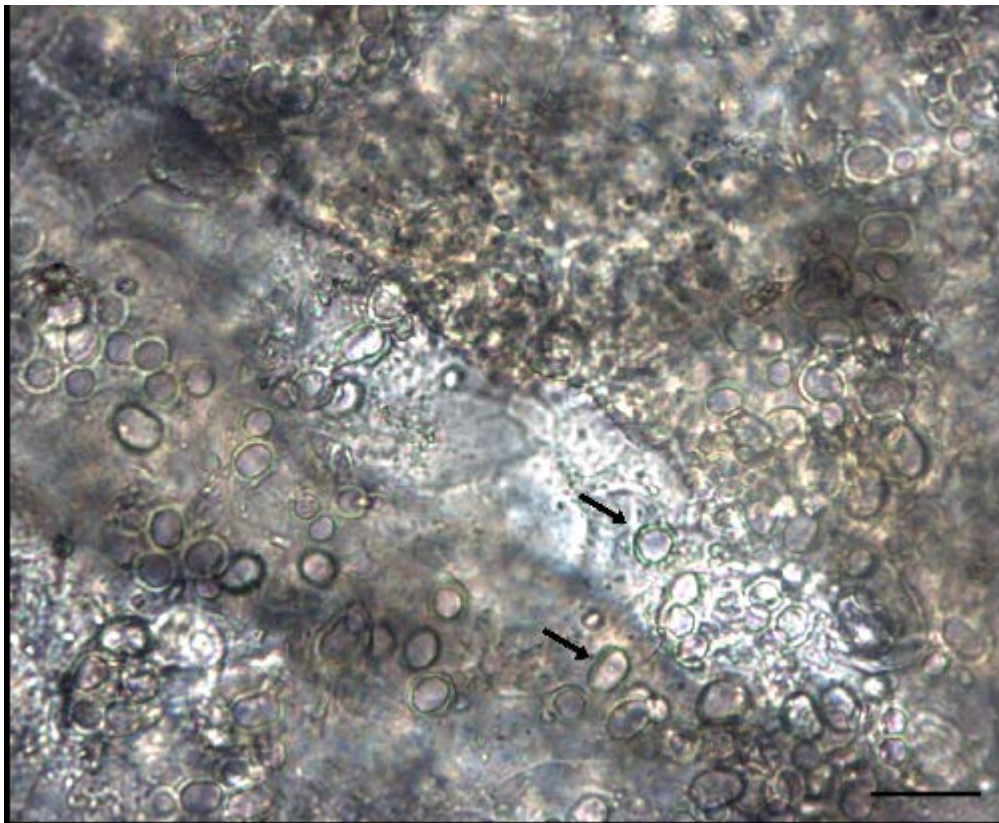


Figure 5. Pictures of samples of skin of *A. reverberii* showing the presence of zoospores of chytrid fungus.

Achievements

- Two new threats recorded for the species which can be now considered in conservation action plans.
- Results sent for publication at peer reviewed journals (manuscripts attached at appendix).

CREATION OF SANCTUARIES FOR FROGS

Objective. Artificial ponds created in order to develop “natural sanctuaries” for the frogs

Activities. We created new habitats of high quality and free of main threats. Steps: 1) Interviews with local farmers made, to select two sites for the creation of the “sanctuaries”; 2) Creation of water wells or improvement of previous ones; 3) Creation of a pond associated with that water well, and; 4) Fencing with “pircas” rock fences used by local farmers to avoid the entrance of livestock.

Achievements. We successfully created the two sanctuaries for Somuncura Frog at two sites (Figure 6 and 7). Sanctuaries were of 6 X 5 mts and were placed near to water well. We also leave a water pump at each site in hands of the local farmers. By this way, local farmers can take water from a water wells for their own use and, at the same time, they can fill the pond created for the frogs (in case of drought).



Figure 6. Activities related to the creation of the sanctuaries for frogs.

This activity is aimed at creating an empathy feeling between local farmers and frogs. The frogs are benefitted by having a new habitat for reproduction, free of threats, and local farmers receive a water pump which helps them to acquire water for their own use. In this way, farmers and frogs are benefitted, and this action allows the promotion of the conservation of this species and its habitats by local people.



Figure 7. Map showing the Somuncura plateau in Argentina (in yellow) and the approximate area where both ponds were created (right map).

EDUCATION ACTIVITIES

Objective. Local community and tourist promotes the conservation of this species and its habitats.

Activities. Conferences in local schools and a local Museum. Outreach material. Workshops with local people and Park Rangers. Information updated in social networks.

Achievements. We performed educational activities at school No 76, (Chipauquil, Valcheta) and at Instituto CEM 87 (Valcheta) about the ecology and conservation of the Laguna-Raimunda frog. We performed a clip about the frog problematic that was uploaded to YouTube (<https://www.youtube.com/watch?v=6YOIIGelmdY>) and to our Facebook page (<https://www.facebook.com/EstepaSalvaje>). We printed and spread posters and stickers among local community and we also leave a banner showing the importance of this frog at the Valcheta Museum (Fig. 8).



Figure 8. Some of the educational activities performed in the frame of this RSG.