

Re-establishment of an extinct local population of the Valcheta Frog, *Pleurodema somuncurense*, in a restored habitat in Patagonia, Argentina.

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SUMMARY

In March 2017 and March 2018, we reintroduced 196 and 50 individuals Valcheta frogs *Pleurodema somuncurense*, respectively (tadpoles and juveniles). The individuals were translocated from an *ex situ* colony to a restored habitat at the hot springs of the Valcheta stream (Rio Negro, Argentina). The aim was to re-establish a local population of this species that had gone extinct at this site. After the individuals were released, we monitored them using night visual encounters to register the number of individuals and other relevant records that suggested acclimatization (feeding, escaping and reproduction). In addition, we performed a Capture-Mark-Recapture study to estimate the density of the reintroduced population using POPAN models. By September 2018, the estimated density was 62 ± 27 SD in a stream area of 50 m². This does not differ from density estimates of wild populations of the Valcheta Frog. Additionally, reproduction of reintroduced frogs was recorded in September 2018 and January 2019. Egg clutches, tadpoles and juveniles were all observed at the reintroduction site. These results suggest that the reintroduction of captive bred individuals to the wild might be an effective management action to restore local populations of this species that had gone extinct.

BACKGROUND

The distributional range of the Valcheta frog *Pleurodema somuncurense* is restricted to the headwaters of the Valcheta stream, in the Somuncura Plateau, Rio Negro Province, Argentina (Latitude, 40°19'S to 41°30'S; longitude, 65°54'W to 70°10'W). In addition to the small area of occurrence of this species, the local populations are facing a combination of threats including livestock grazing, exotic trout and habitat fragmentation (Velasco *et al.* 2016). This scenario has caused at least two local populations to go extinct. For these reasons the species was listed as Critically Endangered on the IUCN Red List (IUCN 2016) and as one of the top 100 EDGE species worldwide by the Zoological Society of London (ZSL 2019).

In the frame of a Conservation Action Plan for the Valcheta frog we developed a programme to re-establish extinct local populations of this species. The first stage consisted of the establishment of a survival colony in *ex situ* facilities located at La Plata Museum, Buenos Aires, Argentina. The colony was founded from 40 adult frogs collected from the wild. The second stage consisted of the restoration of a native habitat where a local population of this species had gone extinct by establishing enclosures to impede the access of livestock to the springs and removing a small dam to restore water flow. These actions resulted in a rapid and full recovery of vegetation (Arellano *et al.* 2017). After successful breeding of the survival colony, the third stage consisted of the translocation of first generation captive bred individuals from the *ex situ* facilities to the restored habitat.

ACTION

First reintroduction: In March 2017, 146 juveniles and 50 tadpoles of the Valcheta frog were released in a hot spring within the restored habitat (40°58'27"S; 66°39'16"W) at the headwaters of the Valcheta stream. We followed standard biosecurity protocols to avoid disease spread prior to reintroduction (Pessier & Mendelson 2010; IUCN/SSC 2013). All individuals tested negative for chytrid fungus *Batrachochytrium dendrobatidis* (Arellano *et al.* 2018) and parasites. Bacteria and *Ranavirus* were not analysed but an indirect assessment was conducted, based on the health status of the colony plus necropsies of dead individuals (Pessier & Pinkerton 2003). The frogs were transported in individual containers placed in a cold chamber (20°C) by truck from the breeding colony to the restored habitat (1,300 km). Park rangers and children from the local school along with local authorities were involved in the releases (Figure 1).



Figure 1. Park rangers (left) and researchers (right) releasing the first captive bred individuals at the reintroduction site.

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Second reintroduction: In March 2018, another reintroduction of 50 juveniles was performed at the same site with regional authorities. We followed same standard protocols as in the first release.

Monitoring: After each release, a monitoring programme was conducted to assess the effectiveness of these conservation actions. Immediately after each release, 10 days of monitoring was conducted to assess the acclimation of the individuals to wild conditions and following that the monitoring was carried out monthly. Additionally, a Capture-Mark-Recapture study was conducted over 12 days, distributed evenly between 2017 and 2018 (six days each year). The first survey was conducted 15 days after the reintroduction and subsequent surveys were carried out approximately every two months. The sampling consisted of a one-hour night visual encounter survey (Scott & Crump 1994) conducted by two people searching for frogs on the stream shore using powerful torches. Frogs found were caught by hand and identified using Visible Implant Elastomers specific to each juvenile and made previously at the breeding colony. Tadpoles were not marked, but unmarked juveniles found during the sampling were marked. Data collected during 2018 was analysed to obtain a single density estimate for that period using POPAN models through program MARK 8.2 (Cooch & White 2001). These models take into account detectability and survival probability. On September 2018, the first clutches of eggs and tadpoles were found at the reintroduction site. On revisiting the site in January and February 2019, juveniles were observed along with new tadpoles and egg clutches.

DISCUSSION

Based on the results obtained, we suggest that the reintroduction of individuals is an effective management action for the Valcheta frog. A quick acclimatization of juveniles to wild conditions and the fact that the individuals were successfully breeding one year after the reintroduction event were good signs of the establishment of this local population. In addition, the average density estimate of this local population was higher than the value found in a wild population of the Valcheta frog of 31 ± 8 individuals in 50 m^2 , although SDs were also higher indicating no significant differences (Velasco *et al.* 2019).

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