Livestock management and dam removal allowed the recovery of an aquatic habitat for endangered frog and fish species in Argentinian Patagonia

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SUMMARY: Placement of fencing around a stream to prevent livestock damage and water flow restoration via removal of a dam allowed riparian and aquatic vegetation recovery (76%) in less than one month. This subsequently allowed the reintroduction of a Critically Endangered frog as well as protection of an Endangered fish species.

BACKGROUND: The Valcheta stream is one of the most important watercourses on the Somuncura Plateau in Argentina. It supports several endemics, such as the Critically Endangered Valcheta frog *Pleurodema somuncurense*, the Endangered naked characin *Gymnocharacinus bergii* and three species of snail: *Heleobia rionegrensis*, *Potamolithus valchetensis* and *P. elenae* (de Lucia & Gutiérrez, 2017). In 2009, a dam was built downstream from a spring (known locally as El Destacamento (-40° 58′, -66° 39′)). The purpose of the dam was to irrigate the land by accumulating water into the land around the stream. This led to local livestock (cattle, sheep and horses) approaching a section of the stream (around 20 m long) to drink and feed, resulting in trampling and destruction of both riparian and aquatic vegetation. The Valcheta frog was a common species at the site, last recorded five years prior to dam construction (Diminich 2006). It was not found afterwards despite several exhaustive attempts at sampling between 2013 and 2016 (Velasco *et al.* 2016). Since aquatic and riparian vegetation represents the main feeding and breeding habitat for the Valcheta frog, and considering the species still occurs at similar sites without dams, we assume a direct effect of the dam and livestock on the frogs' occurrence. Aiming to reintroduce the Valcheta frog to this site and protect the current population of naked characin, we conducted habitat restoration through two actions: the exclusion of livestock, found in studies to be effective in aiding anuran conservation (e.g. Phillips *et al.* 2002; Knutson *et al.* 2004) and by restoring the original water flow in the river.

ACTION: In November 2016 we erected an enclosing wire fence of nearly 400 m^2, surrounding a specific area of the river to prevent damage from livestock on aquatic and riparian vegetation. We restored the stream's original water current by manually creating a hole the width of the original channel in the dam. To assess the degree of plant recolonisation, we measured the percentage of vegetation cover in a total of 56 sample units of 1 m^2 systematically distributed along the stream, within the enclosure area. We applied a paired Student t-test to compare vegetation cover before and after interventions.

CONSEQUENCES & DISCUSSION: Riparian and aquatic vegetation showed an increase in cover (comprising mainly *Hydrocotyle bonariensis* and *Cardamine* spp.) of up to 76% in one month (Figure 1). Vegetation cover showed significant differences ($p < 0.001$) when comparing percentages observed before (average 5%, range 0-50%) and after both interventions (average 81%, range 10-100%). Although we did not measure it, there was also a visible increase of vegetation cover in the surrounding grassland. We visually recorded a great increase in the abundance of the snail *H. rionegrensis* on the site. The dam rupture restored the original width (from 5 m to 2 m), depth (from 1.5 m to 0.5 m), and water flow of the stream. We consider that the increase in vegetation covering the streams' perimeter and a large percentage of the water offers key species both suitable breeding habitat and a refuge from predation by birds. This conservation action gives us valuable information about the potential speed of restoring this habitat to be considered in future Action Plans for other endemic species.

Figure 1. El Destacamento, before (left) and after (right) habitat restoration.

REFERENCES

Diminich, M. C. (2006) Historia Natural y características de hábitat de *Somuncuria somuncurensis* (Anura, Leiuperidae), un anfíbio amenazado de extinción. Capital Federal, Buenos Aires (MA). Universidad de Buenos Aires, 46 p.

De Lucía, M. & Gutiérrez G.D.E. (2017) The genus *Potamolithus* Pilsbry, 1896 (Gastropoda, Tateidae) on the Somuncurá Plateau, Patagonia, Argentina. *Molluscan Research*, DOI: 10.1080/13235818.2017.1279476.

Velasco, M.A., Kacoliris F., Berkunsky, I., Quiroga S., & Williams, J.D. (2016) Current distributional status of the Critically Endangered Valcheta Frog: Implications for conservation. *Neotropical Biology and Conservation*, **1**, 110-113.

Phillips R.A., Patterson D. & Shimmings P. (2002) Increased use of ponds by breeding natterjack toads, *Bufo calamita*, following management. *Herpetological Journal*, **12**, 75-78.

Knutson M.G., Richardson W.B., Reineke D.M., Gray B.R., Parmelee J.R. & Weick S.E. (2004) Agricultural ponds support amphibian populations. *Ecological Applications*, **14**, 669-684.

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