

Invasion alert: new record of the exotic *Gambusia holbrooki* Girard, 1859 in the Puna Austral region, Northwestern of Argentina

Alerta de invasão: novo registro do exótico *Gambusia holbrooki* Girard, 1859 na região da Puna Austral, Noroeste de Argentina

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Abstract

We report the first record of *Gambusia holbrooki* Girard, 1859 at elevations above 1,615 m in the Puna Austral, Provincia Catamarca, Argentina. This fish was introduced by intentional release. The Puna is characterized by an endorheic system, where the exotic species would cause a negative impact on the aquatic fauna by predation of eggs and larvae of native fish. Unfortunately, Argentinian conservation policies are directed to protect exotic fish before endemic ichthyofauna.

Resumo

Relatamos o primeiro registro da *Gambusia holbrooki* Girard, 1859 em altitudes acima de 1.615 m nas montanhas dos Puna Austral, Provincia Catamarca, Argentina. Este peixe foi introduzido por libertação intencional. A Puna é caracterizado por ser um sistema endorreico, onde a espécie exótica causaria impacto negativo sobre a fauna aquática pela predação de ovos e larvas de peixes nativos. Infelizmente, as política de conservação argentinas são direcionadas para proteger peixes exóticos antes da ictiofauna endêmica.

Keywords

Andes, Argentina, biological invasion, Cyprinodontiformes, elevation, mosquitofish

Palavras-chave

Andes, Argentina, Cyprinodontiformes, elevação, invasão biológica, mosquitofish

Introduction

The Andean fish fauna is minuscule (approximately 375 species) in relation to the ichthyofauna of the South American lowlands (over to 6,000 species), with the exception of a few endemic genera (*Orestias*, *Astroblepus*, *Silvinichthys* or *Bullockia*) (Schaefer 2011; Fernandez and Vari 2012; Reis et al. 2016). The geological Puna region is considered as two geological sub-regions: the Puna Austral (24° to 27°S) and Puna Septentrional (24° to 22°S), being the Olacapato megafault the boundary between them (Alonso and Viramonte 1987, Prezzi 1999). The Puna Argentina is inhabited by a particularly diversified ichthyofauna, with at least six endemic catfishes species (*Trichomycterus belensis*, *T. catamarcensis*, *T. minus*, *T. ramosus*, *T. varii*, and *T. yuska*) (Fernandez 2013; Fernandez and Andreoli Bize 2017). However, this fauna is drastically affected by the activities associated with mineral extraction (e.g., copper, ore, and lithium) and by the tourism relative to the fishing of exotic species (e.g., rainbow trout *Onchorhynchus mykiss*) (Fernandez 2005; Fernandez and Andreoli Bize 2018). Herein, we add a new record of the exotic fish *Gambusia holbrooki* Girard 1859 (Fig. 1) from a mid-elevation location (above 1,000 m) in Puna Austral of Northwestern of Argentina.

Seven specimens of *Gambusia holbrooki* were caught at the spring water in Saujil near to Fiambalá (27°34'05.40"S, 67°37'14.43"W), Departamento Tinogasta, Provincia Catamarca), 10 Apr 2019, at 1,615 m above sea level (Fig. 2). The specimens were deposited in the ichthyological collection of FACEN 142 (Facultad Ciencias Exactas Naturales, Universidad Nacional Catamarca, Argentina), including four males and three females (range: 20.8–49.4 mm and mean: 33.43 mm Standard Length). The specimens were identified following Rauchenberger 1989. The place was a clear water stream 0.20 to 0.40 m deep and 0.30 to 2.0 m wide over a sandy bottom. The water temperature was 23.6 °C and the air temperature was 19.2 °C. The only other species of fish collected at that site was *Trichomycterus corduvensis* Weyenbergh 1877 (Siluriformes) (FACEN 144, 6 specimens) and *Jenynsia obscure* (Weyenbergh 1877) (Cyprinodontiformes) (FACEN 145, 10 specimens). *Gambusia holbrooki* and *G. affinis* (Baird and Girard 1853) are freshwater poeciliid native fish of the United States of America and Mexico, commonly named “Eastern Mosquitofish” and “Western Mosquitofish”, respectively (Rauchenberger 1989; Pyke 2008). They are omnivorous, feeding on insects, crustaceans and many other macroinvertebrates and characterized by their rapid growth, high reproductive potential, short gestation period (15 to 50 days), aggressive behavior and the ability to adapt their life history to particular environments (Pyke 2008; Srean 2015). These two mosquitofish species have been



Figure 1. *Gambusia holbrooki* FACEN 142, female 49.4 mm SL (above) and male 20.5 mm SL (below).

introduced worldwide since the early 1900s, as a biological control to reduce mosquito populations (Srean 2015). In Argentina, the mosquitofishes were introduced by 1943 to control malaria (Ringuelet et al. 1967; Menni 2004; Cousseau et al. 2010). In 2017, Cabrera et al. (2017) confirm the presence of both species in Argentina based on the mitochondrial cytochrome oxidase c subunit I (COI, 650bp). According to Cabrera et al., the westernmost populations of Argentina of *G. holbrooki*, were found at 66°34' in La Rioja province and we report an expansion with a new record for the species in Andean Catamarca (67°37'). The highest altitude populations of *G. holbrooki* in Argentina, was 600 m (Cabrera et al. 2017: fig. 1).

Based on a new record of Fiambala, we report 1,000 m higher than previously known (Fig. 2). Thus, we add a new threat by exotic species to the depauperate ichthyofauna from the southern of Puna and the Andes of mid-elevation. Environmental policy implementations are necessary to promote conservation of native fauna, especially the endemic catfishes, such as *Trichomycterus* species. In the Argentinian Puna five endemic *Trichomycterus* species occur above 3,000 m; however Argentinian conservation policies are directed to protect exotic rainbow trout before endemic catfishes.

Unfortunately, fish conservation in Argentina is still weak because the legal framework has lately addressed environmental issues in which alien species play a significant role. The high environmental heterogeneity adds to a federal governmental organization of the country that hinders the implementation of sound conservation measures across different jurisdictions at National, State and county levels as well as disparate goals of conflicting policies and socio-economic pressure like

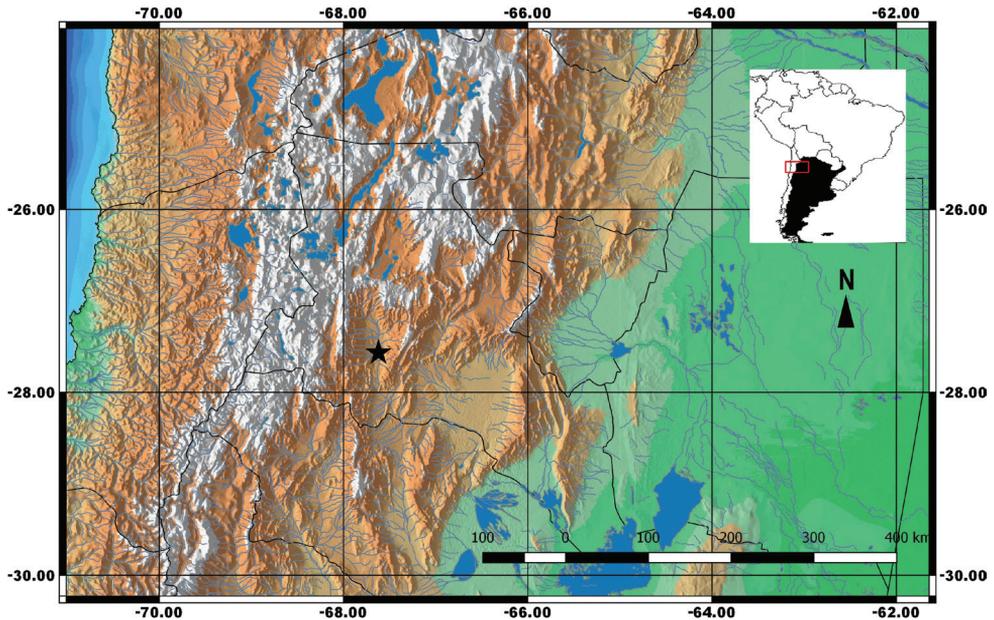


Figure 2. Map showing the sample site of *Gambusia holbrooki* (black star).

commercial and recreational fisheries, unsustainable wetland use and aquaculture related fish dispersal among other factors. Hence an integrated policy support is needed to strengthen conservation in the future.

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