

## Abstract

# Habitat Suitability of Threespine Stickleback (*Gasterosteus aculeatus* L.) in the Southern Limit of Its Global Distribution: Implications for Species Management and Conservation <sup>†</sup>

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**Abstract:** The conservation of fish biodiversity requires reliable information on their distribution and habitat use, especially of endemic species that generally occur in restricted geographic areas and specific habitats. This is the case of threespine stickleback (*G. aculeatus* L.), that is a small freshwater fish listed as Endangered (EN) in Portugal, which represents the southern limit of the species global distribution. The monitoring and conservation of populations placed near to the species distribution limits is very important because in these places, small environmental changes can lead to the significant decline of local populations. However, due to the lack of knowledge about its regional distribution, ecology, and macrohabitat preferences, few measures have been proposed aiming the conservation of this species. This project aimed to identify which macro-scale environmental factors determine regional distribution of *G. aculeatus*, to predict their potential distribution and, therefore, define the most important areas for their protection and conservation. The occurrence data, from existing databases and specific sampling campaigns, together with 15 environmental macrohabitat predictors, were used to model the potential distribution of sticklebacks in Portugal, through an ensemble of species distributions models (SDM). Through the results of our ensemble model, we found that threespine stickleback may occur predominantly at lower stretches of river systems, where sandy substrate is dominant, and flow is higher. Sticklebacks are also more likely to occur in sites with high levels of rainfall in the driest month, thus avoiding locations with high potential for drying during summer, which tend to be common in the Iberian Peninsula. The species also tends to avoid steep slope areas, with high levels of annual precipitation. Based on our results, a probability map of occurrence was generated; from this, some river stretches were categorized into levels according to their importance for the conservation of the species. With the results obtained, it was also possible to identify some atypical populations, occurring in areas with low or null habitat suitability, which need to be further studied, because they must have developed physiological characteristics that allow them to subsist in places that are not conducive to their survival.

**Keywords:** Gasterosteidae; species distribution models; ensemble forecasting; species distribution and conservation; Iberian Peninsula



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