Climate change will speed spread of invasive fish to northern Europe

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Climate change will speed the spread of invasive fish to northern Europe. Credit: Carles Alcaraz.

Spanish and French researchers have evaluated the spread of the invasive mosquitofish *Gambusia holbrooki*, which is native to the United States and lives in Mediterranean rivers in Spain and France. The scientists warn that climate change will extend the current distribution area of this and other invasive species to the north.

The scientists at the University of Girona (UG) who coordinated this study say it is important to understand the interaction between climate change and invasive species. To this end, they have assessed the impact of geographical latitude on the vital features of *Gambusia holbrooki* and its rate of parasitic infestation in Europe.

"This study shows that temperature affects the abundance of this species, its reproduction and other characteristics of its life cycle", Emili García-Berthou, lead author of the study and a researcher at the UG's Institute of Aquatic Ecology, tells SINC.

The results, published recently in the journal *Biological Invasions*, show that gambusia is more abundant in its southern populations, where its reproductive effort is greater than in more northerly populations, meaning that this invasive species originating in the United States shows a "clear latitudinal variation in its life cycle and invasive success".

The author says it is "likely that climate change will enable this species to expand to areas further north than its current distribution area".

"Over a latitudinal gradient of more than 5º, the abundance of this species in river mouths varies, as do its reproductive effect, its size at maturity and prevalence of parasites", the Catalan researcher adds.

The research team sampled a total of 929 gambusias in the summer of 2004 in the mouths (final 1,500 metres) of eight Mediterranean rivers from the south of France to Murcia.

The invasive path of gambusia

Aside from their overall effects on the trophic chain, gambusias and their most closely related species Gambusia affinis have caused the decline of many native fish and amphibian species worldwide.

Although this ecological impact has been "well documented" in the United States and Australia, other studies in Spain have used observational and experimental data to show that *Gambusia holbrooki* "competes with and displaces cyprinodontiform fish (small fish that live in fresh or brackish water), such as the Spanish toothcarp (Aphanius

iberus) and the Valencia toothcarp (Valencia hispanica), both of which are endemic to the Peninsula and have seen their distribution area greatly reduced, now being considered to be in danger of extinction", explains García-Berthou.

The gambusia is currently one of the most widely distributed continental fish species, and has been introduced into more than 50 countries over every continent except Antarctica.

The species, which prefers warm waters, is abundant throughout all the countries in the Mediterranean basin, but has yet to become established in countries such as the United Kingdom, Germany or the Nordic countries. "Its distribution is clearly limited by temperature", says the scientist.

Spain was the first European country in which *Gambusia holbrooki* was introduced, in 1921.

More information: Lluís Benejam; Carles Alcaraz; Pierre Sasal; Gael Simon-Levert; Emili García-Berthou. "Life history and parasites of the invasive mosquitofish (Gambusia holbrooki) along a latitudinal gradient" Biological Invasions (2009) 11:2265.

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