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Research Article

Predicting the effects of climate change on tadpole stage fitness in the Korean brown frog *Rana uenoi* Matsui, 2014 (Amphibia: Ranidae)

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ABSTRACT

Jeju Island, South Korea is a biodiversity hotspot, but the vulnerability of Jeju Island fauna to climate change has not been thoroughly investigated. In this paper, we tested the adaptability of the Korean large brown frog *Rana uenoi* to future climate change. While increased temperatures did not affect the hatchability of frog eggs, hatched tadpoles in greenhouse treatment with less exposure to sunlight (less maximum temperature) were significantly (14%) shorter in length after three weeks of growth, indicating increased temperature of early season helps growth of tadpoles. However, right after three weeks, all tadpoles in a higher-temperature treatment (outside) died after the experiment logged a maximum temperature of 34.3ºC. In the field, the average temperature of puddles without tadpoles (puddles in the middle of the rivulet with all day exposure to sunlight) was 33.2ºC. During an indoor temperature elevation experiment, tadpoles suddenly died at 32.4ºC. Therefore, the expected maximum survivable temperature for *R. uenoi* is around 32ºC. Our results therefore suggest that *R. uenoi* tadpoles are vulnerable to elevated temperatures and could suffer mortality from climate change. Climate change will continue to cause extreme weather events like this (sudden elevation of temperature in spring), and frogs, especially tadpoles with restricted movement, will be particularly vulnerable to these events. Identifying how adaptable these amphibian species are to the weather events predicted by future climate change scenarios will be key for their conservation on Jeju Island.

Key words: Brown frog, global warming, hatchability, Jeju island, Climate data