



# Effects of salinity on the growth and survival of tadpoles of the Puerto Rican Crested Toad (*Peltophryne lemur*)

## Introduction

Aquatic habitats play an important role in the reproduction of adult amphibians and in the development of their larvae. In these habitats, the interactions of biotic and abiotic factors influence tadpole ecology. Tadpole growth rates, duration of larval period, size at metamorphosis and survival to metamorphosis can be influenced by the physical environment (Alford 1999). In the case of tadpoles, abiotic parameters like desiccation risk, water temperature, dissolved oxygen concentration, pH, and salinity are a major concern for the success of a breeding event (Ultsch et al. 1999).

Salinity is an abiotic factor that has raised concern for the management group in charge of ensuring the conservation of the Puerto Rican Crested Toad (*Peltophryne lemur*), the only endemic toad in Puerto Rico, currently listed as a threatened species. *P. lemur* breeds at the Tamarindo Pond, the main natural breeding pond in Puerto Rico. This pond has been influenced in the past by salt intrusion events and it is believed that this may affect negatively the development of the tadpoles.

## Objective

To identify the effects of increasing salinity on the survival and growth of tadpoles of *P. lemur*.

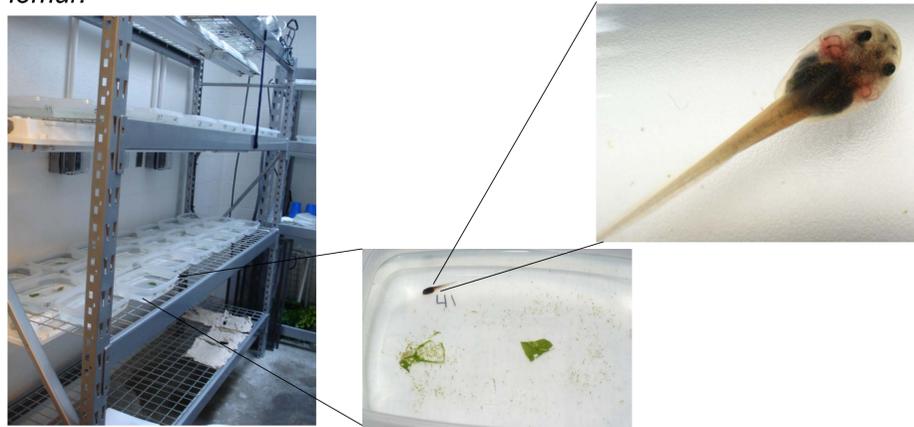


Fig. 2: Randomized block design and a plastic container with a tadpole in the salinity 2ppt treatment

## Preliminary results

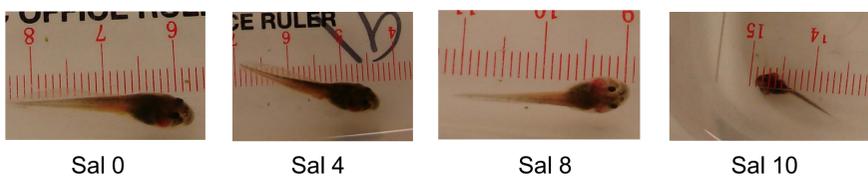
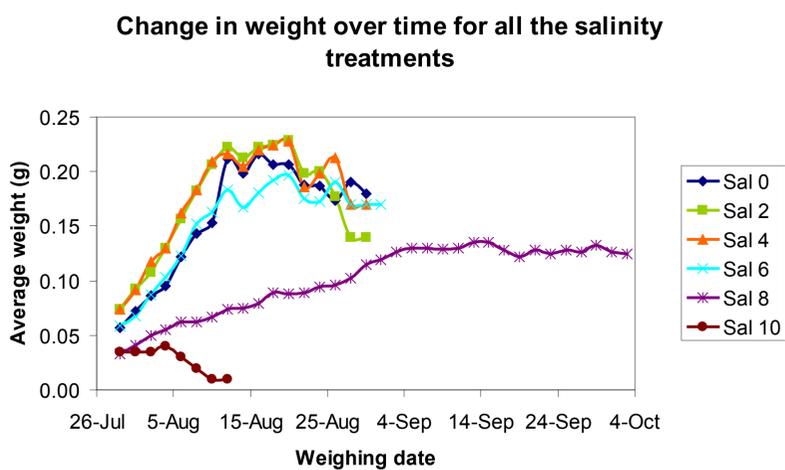


Fig. 3: Tadpoles at day 21, respective weights 0.15, 0.19, 0.09, 0.04 g.



Fig. 1: Life cycle of the Puerto Rican Crested toad

## Experimental design

The laboratory experiment was set up in a randomized block design. After being reared, tadpoles (Gosner stage 24 – 26) were housed individually in plastic containers. Water temperature was maintained 27 – 28 C in 12h:12h light-dark periods. Water in the containers was replaced daily and their placement on the shelves was rotated between shelves. Tadpoles were fed once a day fish flakes and a spinach leaf. There were six salt water treatments: control group (0 ppt), 2, 4, 6, 8, 10 ppt, ten replicates per treatment. Aquarium commercially available salt was used to do the salt water mixtures. Pictures and tadpole weights were taken every other day from the beginning of the experiment till the tadpoles metamorphosed.

## Discussion

Some of the negative effects of increased salinity for tadpoles include reduced growth rate, delayed metamorphosis, physical abnormalities, and increased mortality (Chinathamby et al. 2006, Rios-López 2008). We did not report any type of deformity or malformation. However, two of the most important results are the higher mortality rate at 10ppt and the increased time to metamorphosis in the 8ppt treatment. Seven out of ten tadpoles raised at a 10ppt died within 72 hours of exposure. Tadpoles raised at 8ppt lived for about 80 days without metamorphosing, three times longer than tadpoles raised at 0, 2, 4 and 6ppt. As the salt concentration in the water increased, the weight of the tadpoles was reduced. These preliminary laboratory results have relevance compared to what we have seen in the natural pond where tadpoles have tolerated levels up to 8ppt for various days and can metamorphose at 5ppt successfully (M. Canals, DRNA, personal communication). We have also reported that if the salt concentration is higher than 10ppt the toads will not breed (C. Pacheco, FWS, personal communication). Monitoring salt concentration in the natural breeding pond are important in managing the only breeding pond available for the toads.

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