

## **Past primary sex-ratio estimates of 4 populations of Loggerhead sea turtle based on TSP durations.**

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Ectothermic species are supposed to be strongly affected by climate change and particularly those that exhibit temperature-dependent sex-determination (TSD). Actually, predicting the embryonic response of such organism to incubation-temperature variations in natural conditions remains challenging. In order to assess the vulnerability of sea turtles, primary sex-ratio estimates should be produced at pertinent ecological time and spatial scales. Although information on this important demographic parameter is one of the priorities for conservation purpose, accurate methodology to produce such an estimate is still lacking. The most commonly used method invokes incubation duration as a proxy for sex-ratio. This method is inappropriate because temperature influences incubation duration during all development whereas sex is influenced by temperature during only part of development. The thermosensitive period of development for sex determination (TSP) lies in the middle third of development. A model of embryonic growth must be used to define precisely the position of the TSP at non-constant incubation temperatures. The thermal reaction norm for embryonic growth rate have been estimated for 4 distinct populations of the globally distributed and threatened marine turtle *Caretta caretta*. A thermal reaction norm describes the pattern of phenotypic expression of a single genotype across a range of temperatures. Moreover, incubation temperatures have been reconstructed for the last 35 years using a multi-correlative model with climate temperature. After development of embryos have been modelled, we estimated the primary sex-ratio based on the duration of the TSP. Our results suggests that Loggerhead sea turtles nesting phenology is linked with the period within which both sexes can be produced in variable proportions. Several hypotheses will be discussed to explain why *Caretta caretta* could be more resilient to climate change than generally thought for sex determination.