END OF THE LINE? NESTING PHENOLOGY SHIFTS UNABLE TO MITIGATE ADVERSE IMPACTS OF CLIMATE CHANGE ON WINTER NESTING SEA TURTLES*

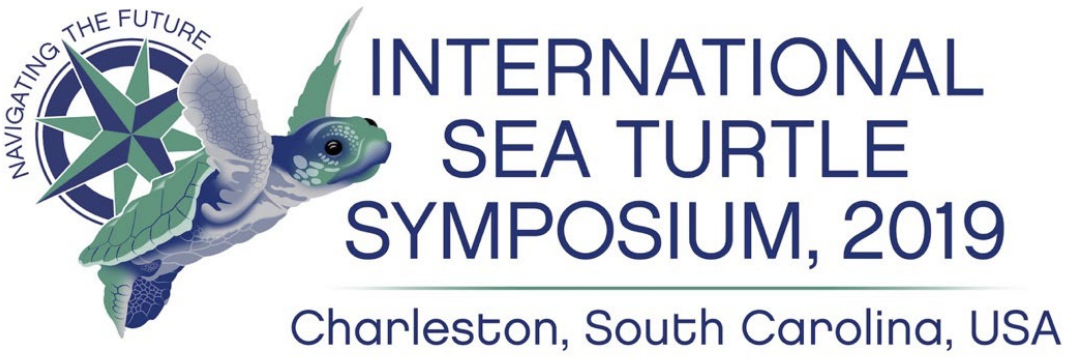
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Understanding how climate change will affect sea turtle nesting beaches is a fundamental consideration for threat abatement and species recovery plans. Increasing ambient temperatures are expected to lead to increased embryonic mortality and wide-scale rookery feminization for all sea turtle species across the globe, threatening population persistence. These effects will vary between species and populations as a consequence of existing environmental heterogeneity, regional differences in the magnitude of climate change impacts, and population-specific thermal thresholds. We employ a population-specific mechanistic modelling approach to assess the impacts of climate change on embryonic mortality and sex ratios at four flatback (*Natator depressus*) sea turtle rookeries. The model provides an overview of rookery outputs over a broad spatial scale at typical nest depths, using temporally robust interpolated climate surfaces. We show that climate change will have the greatest impact on winter nesting populations of *N. depressus* in the tropical north of Western Australia. These rookeries are most susceptible as sand temperatures at nesting depths are generally warmer than other rookeries, and their current nesting phenology does not allow for temporal shifts in nesting to a cooler period of the year. In contrast, summer nesting populations of *N. depressus* appear to be less at risk from increasing ambient temperatures, due in part to their slightly higher thermal thresholds and because they can alter their nesting phenology to avoid suboptimal temperatures. Taken together, our findings demonstrate the need for population-specific models to guide the most appropriate conservation strategy.

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