



SOUTENANCE DE THÈSE

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Breeding ecology and conservation of Cuban larids (gulls and terns) in an anthropogenic context



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RÉSUMÉ The breeding ecology of tropical seabirds remains poorly known even though understanding the ins and out of this critical life stage is essential for assessing the state of tropical marine ecosystems, or for evaluating marine spatial plans and the (re)design of marine protected areas. Within the Caribbean basin, Cuba stands out for hosting a large number of breeding seabirds, but also for lacking critically of ecological information on them. While collecting observations at sea may still be challenging, a combined use of classical, modern and state-of-the-art field and analytical methods allows extracting more out of the existing data.

This thesis addressed ecological and conservation aspects of the Laridae family (gulls and terns) in Cuba, this family of seabird species being the best represented in this tropical archipelago. The selection and suitability of breeding macro- and micro-habitats were evaluated using machine and deep learning methods on multispectral Landsat satellite images. Oceanographic variables at broad spatial scales were shown to be critical for breeding site selection, as well as vegetation and substrate for nesting site selection. Spatio-temporal trophic niche plasticity and overlap were assessed in Laridae breeding communities using the isotopic niche ($\delta^{13}\text{C}$ vs. $\delta^{15}\text{N}$) as a proxy. Interspecific trophic segregation was detected based on the breadth and overlap of the isotope niches. This allowed a better understanding of the successful sympatric nesting of Laridae in Cuba, considering that adults forage in common areas within poorly productive tropical marine waters. The breeding phenology of several Laridae species and the effects of laying asynchrony on egg morphometry were characterised. Phenological patterns (from field observations and camera trap monitoring) were remarkably synchronous, while most egg morphometric variables (obtained by digital photo processing) did not reflect differences between early and late clutches. Lastly, optimisation models - used as a supporting decision tool - were implemented to evaluate the priority areas for the conservation of Laridae breeding habitats. The overlap of these priority areas with Cuba's current system of marine protected areas was found to be remarkably low. In general, the potential of Laridae as sentinels of Cuba's coastal ecosystems is highlighted. Research priorities are also identified, such as spatial foraging patterns and prey consumption by these seabirds, as well as the assessment of marine pollution risks from metals and other persistent organic pollutants.

MOTS-CLÉS Seabirds / Tropical ecosystems / Conservation / Habitat modeling / Anthropogenic disturbance / Trophic ecology

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