Individual identification patterns as a monitoring strategy for American crocodiles: Tayrona National Natural Park as a study case

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Abstract: The American crocodile (Crocodylus acutus) is one of the four true crocodiles present in the neotropics and the only one inhabiting across all the Americas. In Colombia, C. acutus has shown an increasing trend with larger populations documented in the last two decades. However, the lack of long-term monitoring programs has limited the knowledge regarding the population ecology of the species. We assessed the effectiveness and robustness of a monitoring method of American crocodiles remotely in the Tayrona National Natural Park (individual identification pattern recognition (IIPR)), identifying flaws and improvements necessaries to use these data in a technical-wise manner. We collected a total of 92 events from 2008 to 2020 of which only 22.83 % of them were useful to do the IIPR analysis and 77.17 % had not the quality to do so mainly because lack of resolution (16.9 %), presence of visual obstacles (4.2 %), animal under the water (12.7 %), or the impossibility to clearly recognize the scutellation patterns per TLS due to the picture angle (66.2 %). From the useful events, we identified seven individuals only requiring 4.57 ± 1.51 TSLs on average to obtain complete individual identification, with the lowest variation in the post occipital (TSL 1) and nuchal (TSL 2 and 4) regions (only one pattern) compared with the dorsal area (average 4.67 ± 1.15 patterns per TSL). The probability of repeating the most and less common patterns found was 2.28×10^{-6} and 1.03x 10^{-11} , respectively, and to repeating the same pattern of each individual range between 4.95 x 10^{-10} to $1.26 \ge 10^{-7}$. Recommendations of how to use these data to analyze some population parameters (abundance, animal movement, hotspots) as well as how to improve the number of useful events for a more robust monitoring are presented and discussed.

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