

## UNDERSTANDING MULTI-SPECIES PREDATION ON EMERGING SEA TURTLE HATCHLINGS\*

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Two of the most vulnerable stages in a sea turtle's life are experienced when incubating as an egg and in the first minutes after emerging from the nest. These are highly vulnerable stages for all marine turtle species, particularly at rookeries with high densities of potential predators. Many animals have been implicated in the predation of hatchlings but there are few quantified observations to confirm these interactions. Over two summers, we used burrow densities as proxy to estimate the abundances of ghost crabs, did pre- and post-season nest inventories to estimate the number of predated eggs, and used infrared videography, filming nests continuously over several days, to capture both diurnal and nocturnal predator interactions with emerging loggerhead turtle (*Caretta caretta*) hatchlings at Bungelup Beach and Gnarlloo Bay, situated along the Ningaloo Reef on the west coast of Australia. Quantified observations of predation were derived from the examination of more than 7,500 hours of video footage. Overall, at Gnarlloo Bay ghost crab burrow densities were up to twice as high compared to Bungelup Beach. Generally, burrow densities were greater during the hatchling emergence period (February/March) compared to the egg laying period (December/January). Multiple species were observed predated sea turtle hatchlings, including ghost crabs (*Ocypode spp.*), silver gulls (*Chroicocephalus novaehollandiae*) and the invasive black rat (*Rattus rattus*). At Bungelup Beach, 36% of eggs were predated by ghost crabs and 44% hatched. Of the hatchlings that emerged, 43% were predated, primarily by ghost crabs but also by silver gulls. Quantified observations include incidences of klepto-parasitism, where silver gulls and a rat steal hatchlings from ghost crabs. At Gnarlloo Bay, 79% of eggs were predated by ghost crabs and for the 16% of eggs that hatched, there was no clear evidence that any hatchlings reached the water. To our knowledge, this study provides the most accurate hatchling predation estimates yet reported and the first real quantified data on hatchling predation by seagulls and of klepto-parasitism. These research findings increase the understanding of predator-prey interactions at sea turtle rookeries through well-established as well as novel methods, which could help determine appropriate intervention thresholds and management strategies for sea turtles.



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