

High predation of marine turtle hatchlings near a coastal jetty

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Background

Flatback turtles (*Natator depressus*) are endemic to northern Australia and are listed as a Threatened Species. Adult females lay their eggs on beaches and do not provide parental care for offspring, with new hatchlings left to cross the predator-rich coastal areas to reach the relative safety of deeper water. It is thought that many new hatchlings will be eaten by predators in the first hour after entering the water. There have been few studies of in-water predation of hatchlings, with most observing hatchlings from boats, likely resulting in turtle or predator behavioural changes and in the underestimation of predation rates. New technology can be used to overcome this problem. This study used small acoustic tags (about the size of a tic tac) that are suitable for attachment to tiny hatchlings, combined with passive acoustic receiver arrays placed in the water, to study hatchling movements through the nearshore water remotely. The tags emit a signal which is picked up by the array of receivers, which is later used to plot the location of the hatchlings through complex algorithms. Previous studies by DBCA, the Australian Institute of Marine Science (AIMS), the University of Western Australia (UWA) and Pendoley Environmental showed that hatchlings move directly offshore, crossing the first 300m of coastal waters in 10-15 minutes. In contrast to this, tags from predated hatchlings can be distinguished by either lack of movement (indicating they dropped off on the seafloor) or from rapid changes in direction and speed as well as movement parallel to the shore (indicating consumption of tag by predatory fish).



Figure 1: Flatback hatchling with acoustic transmitter (Kellie Pendoley)



Several large flatback rookeries in the Pilbara are located close to coastal industrial developments with associated infrastructure, like jetties. Jetties and light pollution are recognised threats to marine turtles worldwide. Increased predation of hatchlings occurs where habitat, like reef, provides refuge for predatory fish. Structures like jetties also provide fish with shelter, as well as attracting both fish and marine turtles when lit at night. This has the potential to increase natural predation rates on hatchlings.

Figure 2: Predatory fish sheltering under jetty (Phillipa Wilson)

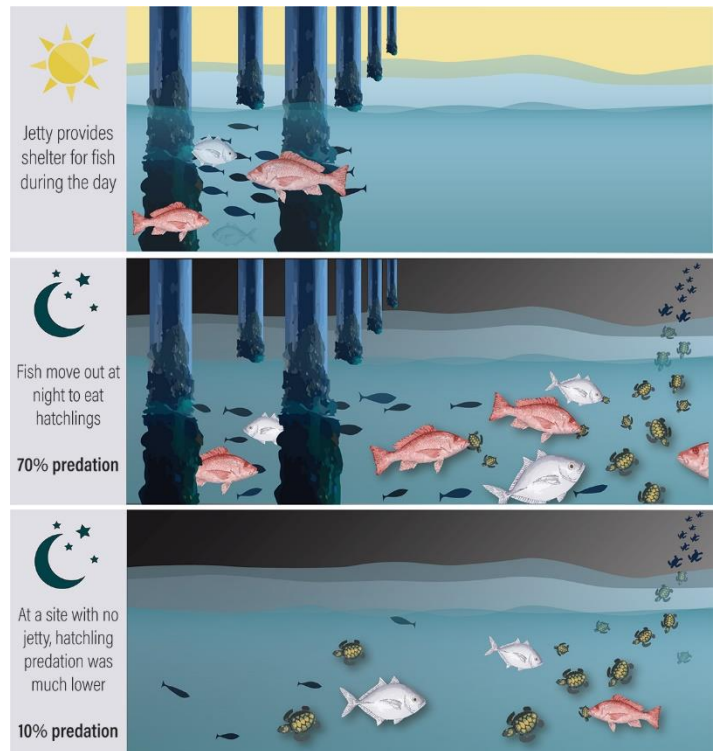
A localised study was devised by DBCA, AIMS, UWA and Pendoley Environmental to investigate the influence of a jetty structure on the survivorship and behaviour of flatback hatchlings. The 90m long jetty was located adjacent to a flatback turtle nesting beach. Hatchlings were released at various distances from a jetty, some under natural dark conditions and some with artificial lights on the jetty. Potential predators were identified using unbaited remote underwater videos to record species and estimate abundance under the jetty.

Findings

- Tagged hatchlings that were released near a jetty were nearly all consumed by fish predators (72%) before they could cross near-shore waters. There was no difference in predation rates with or without lights.
- As so many hatchlings were eaten so quickly after entering the water it was not possible to test the hypothesis that light affects predation, or whether hatchlings' attraction to lights decreases further from a light source.
- At a nearby site with no jetty, predation rates were much lower (~10%).
- The tags eaten by fish showed that most fish (70%) sheltered under the jetty during the day and then at night they moved out to waters next to the parts of the beach that had the highest concentrations of turtle nests.



Figure 4: Hatchlings from fish stomach (Michele Thums)



- Marine turtle hatchlings were found in the gut contents of predatory fish caught by local fishermen under the jetty e.g. lutjanid reef fishes.
- Hatchling predation occurred up to 400m away from the jetty, and these effects outweighed any effect of light pollution.
- It is likely that the sheltered habitat provided by the jetty increased the density of fish in the area, increasing the number of hatchlings lost to predation at this site.

Management implications

- This study has demonstrated the impact of near shore structures, like jetties, on marine turtle hatchlings by providing shelter for aggregations of predatory fish that readily consume them as they make their way to the open ocean.
- Marine turtle hatchling mortality from fish predation is a factor to be considered in effective management of marine turtle populations, which is anticipated to be significantly higher in locations where near shore structures occur in close proximity to nesting beaches.
- The potential impact of nearshore structures on the number of hatchlings that will successfully cross the predator-rich, nearshore waters is a factor to be considered in planning of marine infrastructure in areas close to marine turtle rookeries.
- The decommissioning of coastal infrastructure that is adjacent to marine turtle rookeries and no longer needed should be strongly considered, as a means to minimise the long-term decline of the local nesting population.

Further information

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