Understanding the Early Offshore Migration Patterns of Turtle Hatchlings and the Effects of Anthropogenic Light: a Pilot Study Using Acoustic Tracking

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We report the results of a pilot study on in-water movement of flatback turtle (*Natator depressus*) hatchlings conducted at Eco-Beach (Lat 18°19.767'S, Long 122°04.939'E), WA, January 2012. Our study tested the effectiveness of acoustic tracking technology as a means of quantifying turtle hatchling movement and for the influence of artificial lighting on turtle hatchling in-water movement. New advances in technology have overcome the main issue hindering acoustic tracking of turtle hatchlings – the size of transmitters. Transmitters used in our study were only 0.4 g, approximately 1 % of the body mass of the hatchlings and did not appear to impede either swimming or buoyancy of the turtles to which they were attached. Acoustic tracking is routinely used to monitor fish movements, but this study is the first one to apply this technology to turtle hatchlings. We used both manual and automated acoustic tracking technology. Automated tracking consisted of an array of 18 monitoring receivers set up in the surf zone to detect signals from miniature, acoustic coded transmitters attached to 26 turtle hatchlings released into the array. We released hatchlings into the array either in the presence, or in the absence, of artificial lighting. We also fitted three turtle hatchlings with coded acoustic transmitters and then followed them in a small boat using a mobile acoustic receiver with directional hydrophone. Of the 26 individuals tagged and released in the study area, 22 were recorded by our tracking array. Turtles largely travelled against the direction of wave propagation, regardless of the artificial light sources, however, our experimental design precluded conclusive testing of whether artificial light has effects on in-water movement beyond the surf zone. Using the mobile acoustic receiver, we were able to track turtles 1–2 km from shore. Our pilot study highlights the potential for acoustic tracking as an effective tool for monitoring the in-water movements of newly-hatched turtles and is particularly useful for addressing questions related to the effect of light on navigation by turtle hatchlings. Careful consideration must be given to experiment siting and timing and conservative distances between receivers are required for successful animal positioning. Data provided by the technique will be essential for the appropriate planning of new industrial developments and in particular management of the type and positioning of lights in relation to turtle nesting beaches.