How learning more about mass nesting can help conserve sea turtles

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This is an Olive ridley turtle fitted with satellite-relayed data logger in French Guiana. Credit: Copyright: JYGeorges

Ecologists are a step closer to understanding one of nature's most extraordinary sights – the 'arribada' or synchronised mass nesting of female olive ridley sea turtles. The new study, published today in the British Ecological Society's *Journal of Animal Ecology*, is the first to combine three different approaches – genetics, demography and behaviour, and the results should help conserve these vulnerable marine creatures.

The study, lead by Virginie Plot of the National Center for Scientific Research (CNRS) in France, gathered three sets of data. First, to get an accurate estimate of the size of the olive ridley population in French

Guiana, the ecologists monitored nesting beaches at Cayenne and Remire-Montjoly every night during the nesting season (May to September) each year between 2002 and 2010.

Then, to learn more about how the turtles behave before coming ashore, they attached satellite data loggers to the shells of 10 individuals. By recording data every 10 seconds and sending them by satellite every time the turtles surface for breathing, these units gave a detailed picture of the turtles' geographic location, the depth and duration of their dives and the temperature of the water.

Finally, the team took skin samples from the turtles so they could investigate the variability of their DNA. These tests reveal the genetic diversity of the population and also allow researchers to estimate past population levels.

The results show that although olive ridley numbers in French Guiana have increased during the past 10 years, the population suffered a massive collapse in the past 2,000 years.

These are Olive ridley turtle hatchlings in French Guiana. Credit: Copyright: Sébastien Barrioz, Kwata

According to Ms Plot: "Looking at the DNA of these turtles tells us that they come from a much larger population, one that has collapsed by 99% over the past 2,000 years. This is one of the sharpest collapses ever reported in large species and their population in French Guiana remains at a critical level."

The researchers found that even though fewer than 2,000 olive ridleys nest in French Guiana, they still synchronise their breeding, all leaving the sea to lay their eggs on the beach on the same nights. Until now, this behaviour had only been recorded among large populations of olive ridleys in India, Costa Rica and Mexico.

And thanks to the data loggers, the researchers gained a unique insight into how the turtles behave at sea between successive nesting events. During the first part of the nesting season individual turtles show a wide range of diving behaviour. Then, triggered by a cue that remains a mystery, they all start behaving in the same way, returning to the nesting beach and performing regular, systematic and shallow dives.

Together with local conservation efforts, the fact that such a small population of olive ridleys can synchronise their reproduction may explain why the number of nests laid every year in French Guiana has increased three-fold over the past 10 years. But, Ms Plot warns, this group behaviour also makes them more vulnerable.

"In terms of conservation, gathering together at the same time and in the same place to nest makes female olive ridleys vulnerable to human disturbance and could jeopardise their survival. By mapping more accurately how the turtles gather prior to coming ashore our study should help protect them," she says.

More information: Virginie Plot et al (2011), 'Reproductive synchrony in a recovering bottlenecked sea turtle population',

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doi:10.1111/j.1365-2656.2011.01915.x , is published in the *Journal of Animal Ecology* on Wednesday 19 October 2011.

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