

Warmer beaches influence sex ratios of loggerhead hatchlings

October 22 2013, by Geoff Vivian



"Western Australia hosts one of the largest loggerhead rookeries in the world but one of the least known in terms of its physiology and its nesting biology"—Dr Mitchell. Credit: Florida Fish & Wildlife

While Dirk Hartog Island is the southernmost rookery for loggerhead turtles (*Caretta caretta*), UWA and Murdoch University biologists say climate change may ultimately lead to the species nesting successfully on beaches further south.

As all marine turtles have temperature-dependent sex determination, UWA herpetologist Nicola Mitchell and her collaborators have been studying the effects of temperature on gestating [eggs](#) from the island.

"My main motivation is trying to anticipate impacts of [climate change](#),"

Dr Mitchell says.

"Our recent study contains the physiological work that was needed to inform our computer models of hatchling sex ratios."

She says warmer temperatures during the middle third of the egg incubation period result in a high proportion of female hatchlings.

A team led by her Master of Science student Lorian Woogar, collected loggerhead eggs from Gnaraloo Bay, near Carnarvon and studied them at the laboratory at UWA.

"It turned out that they don't have very different pivotal temperature to other loggerhead populations in the world," Dr Mitchell says.

"Western Australia hosts one of the largest loggerhead rookeries in the world but one of the least known in terms of its physiology and its nesting biology.

"Now we know that it has a typical pivotal temperature of 29 degrees; that's where you get equal balances of males and females.

"The other new thing we've done is to model how development rates vary with the temperature.

"We can predict when embryos slow down in development when they get too hot.

"We now can predict at any particular nest [temperature](#), how much development occurs each day.

"Using that information we can then say, 'okay the embryo reached 40 per cent of development on this date, and this is when its sex was

determined' and then we can infer the clutch sex ratio from there."

Dr Mitchell says the collected eggs were kept chilled for transport to Perth.

"We incubate eggs at certain temperatures we've optimised as temperatures of interest," she says.

Females breed every four years, producing five clutches of eggs during breeding season.

While sea turtles usually return to their own hatching site to nest, they have been known to lay eggs at other locations.

When events such as cyclones take them too far from preferred nesting beaches they will lay eggs at a nearby convenient beach.

Dr Mitchell says this combination of circumstances may in time lead to the establishment of viable rookeries on beaches further south.

Provided by Science Network WA

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