Warmer weather is turning turtles on this South Florida beach female

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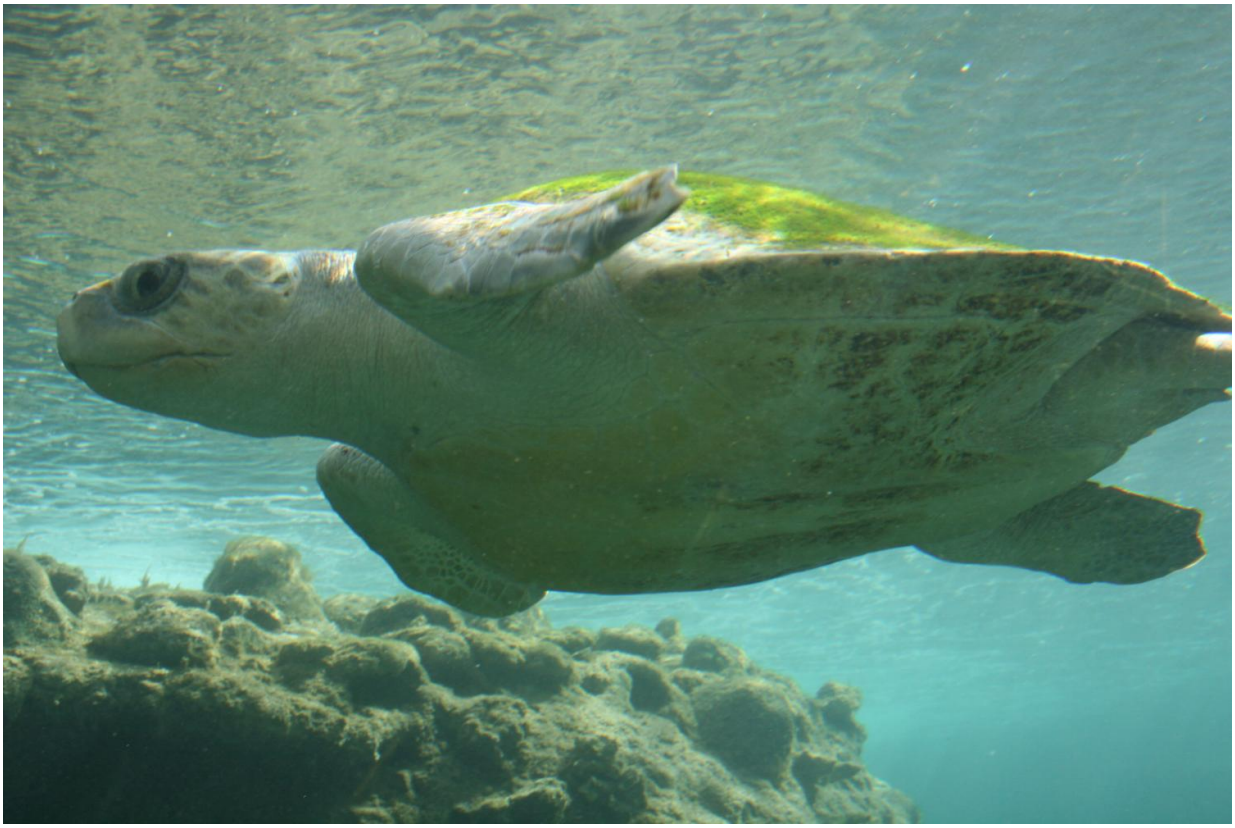

An olive ridley sea turtle, a species of the sea turtle superfamily. Credit: Thierry Caro/Wikipedia

Thanks to warmer temperatures, nearly all of the baby sea turtles hatching on a South Florida beach are turning out female.

The dominance of the female reptiles on Boca Raton's beaches appears to be the result of global warming, according to a Florida Atlantic University researcher whose new study was published in the journal Endangered Species Research.

That could mean trouble for these hatchlings in about 20 years, when today's baby turtles start looking for mates and find a dating pool that's drying up.

Unlike humans, the gender of sea turtles isn't determined by sex chromosomes. It's the temperature outside of turtle eggs while they incubate underground that plays a role in the gender, with only females being born when the nests heat up.

Jeanette Wyneken, a biological sciences professor at Florida Atlantic University, and her team have studied underground sea turtle nests on Boca's beaches since 2002. They documented temperatures and rainfall and collected hatchlings to determine the gender.

Wyneken's published study uses data collected from 2010 through 2013. She has continued collecting more turtle nest data since then.

"I haven't found a male hatchling in three years," said Wyneken, who directs the university's marine biology lab at Gumbo Limbo Nature Center in Boca Raton.

After examining thousands of hatchlings over the years, Wyneken estimates that out of every 100 female sea turtles, she's found one male. Right now, there are 285 hatchlings wriggling in water-filled compartments in her lab.

"One male in 5 (females) doesn't sound too bad," Wyneken said. "One male in 100 sounds awful—that would be a pretty tired boy."

Figuring out a sea turtle's gender is not as easy as just flipping the turtle over.

After they hatch on the beach in Boca, the baby turtles are taken to Wyneken's lab. There, they're allowed to mature for four to six months—until they're old enough to undergo laparoscopic surgery. That lets Wyneken peek at whether there are girl or boy parts in there.

A handful of males could have gone to the ocean without being found by Wyneken's team, but enough hatchlings were gathered from each of the monitored nests to be considered a representative sample.

Biologists have determined that nest temperature during the egg incubation is key in determining whether males or females emerge from the nest.

Wyneken's data found that males hatched only in the early hatching season—April or May—or the last hatching in August.

The nests that produced some males had temperatures ranging from 74 degrees to 95 degrees during the incubation period. In contrast, the majority of nests that produced 100 percent females generally had 80-degree lows and 95-degree highs during the incubation period.

There's an abundance of female baby sea turtles being found in other parts of the world, too.

In a new report this month in the journal *Current Biology*, researchers found that heat was making nearly all of the young turtles near Australia's east coast turn out female. Of the young turtles sampled, 99 percent were female. In contrast, 87 percent of mature turtles were female.

Instead of performing surgery for that study, researchers used new technology that measures turtle hormones for large-scale gender testing.

The study's researchers, with the National Oceanic and Atmospheric Administration, were convinced climate change was the reason for all the females.

The studies fall amid a backdrop of new reports that the temperatures continue to climb.

Government scientists from NASA and the National Oceanic and Atmospheric Administration reported last week that 2017 was among the warmest years on record and the last four years collectively represent the hottest span in recorded history.

The expectation is that the sea turtle population is going to keep increasing before a decline happens in the coming decades. For now, counts and studies suggest that having more females than male sea turtles might be, in the short term, resulting in more nests—and hatchlings, Wyneken said.

State data from the Florida Fish and Wildlife Conservation Commission shows loggerhead nests in Florida have increased by 34 percent between 2012 and 2016, the latest year that data is available.

The National Oceanic and Atmospheric Administration changed the status of green turtles in Mexico and Florida from "endangered" to "threatened" in 2016, as populations showed signs of rebounding.

Still, the Florida Fish and Wildlife Conservation Commission has concerns that the higher temperatures pose an immediate threat to turtle survival even before the full results of females dominating become clear.

"A more recent concern is that temperatures are increasing so much that they are reaching lethal values so there is a decrease in hatchling success, (meaning) fewer hatchlings are emerging," an conservation commission spokeswoman said. Admittedly, not much is known about the sex life of turtles, Wyneken said.

She points out that turtles have proven to be one of the most adaptable species to walk the Earth—considering they walked along with dinosaurs 65 million years ago.

"They have some ability to adapt and respond," she said, pointing out that they've gone through ice ages and hot periods. "But we don't know if they (have) enough resilience to respond now."

For Wyneken, the findings about turtle gender ratios points out a problem that needs attention, even though the results of this gender bias might not be seen until 50 years from now.

Turtles are part of the ecosystem and their disappearance could affect parts of the food chain going from the animals that eat turtles right down to the sand, which is enriched by the fragments of turtle eggshells.

"We also have to be solving the problem of what's making the beaches too hot to begin with—that's a bigger deal and that's a global response," she said.

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