

Shark pups lose gains in stressed environments

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The reef study area in St Joseph. Credit: Ryan Daly at Save Our Seas Foundation.

A prominent JCU shark researcher is part of an international team that found shark babies can't reach their physical peak if they're born into

environments degraded by human-induced stressors, including climate change.

Dr. Jodie Rummer from the ARC Centre of Excellence for Coral Reef Studies at James Cook University (Coral CoE at JCU) is a co-author of a new study that compared the foraging and condition of two populations of newborn [reef sharks](#): one in St Joseph atoll in Seychelles and the other in Moorea, French Polynesia.

"We found that although shark pups are born larger, heavier and better conditioned in Moorea, they soon lost their physical advantage over the pups in St Joseph," Dr. Rummer said.

St Joseph is an uninhabited, remote and small atoll in the outer islands of Seychelles, where no environmental changes happened at the time of the study. However, Moorea is a popular tourist destination—one that is still recovering from a loss of up to 95 percent of its live coral cover about five years before the four-year study commenced.

"At birth, newborn sharks receive extra fat reserves from their mother," said Ms Ornella Weideli, lead author from the Save Our Seas Foundation D'Arros Research Centre (SOSF-DRC) and Ph.D. student at the Centre de Recherches Insulaires et Observatoire de l'Environnement (CRIOBE) in France.

"These energy reserves sustain them during the first days and weeks after birth," Ms Weideli said. "The 'energy boost' is important, as sharks are independent from their mothers from the moment they are born."

A total of 546 young sharks were captured and measured in that time. What they ate was also analysed. The study found the amount of energy reserves varied between locations.

"Bigger mothers give birth to bigger babies, which is what happens in Moorea," Dr. Rummer said. "But that doesn't necessarily mean the babies will eat and grow quickly after that."

Instead, the bigger pups from Moorea soon lost their advantage in size, weight, and condition.

"Against our expectations, the larger pups from Moorea that received greater energy reserves started foraging for food later in life, which resulted in considerable declines in their body condition," Ms Weideli said.

"On the contrary, despite being smaller and lighter for their size, the pups from St Joseph started foraging for food earlier in life and became more successful predators than their Polynesian counterparts."

The authors think the bigger pups lost their physical advantage because Moorea was experiencing a degraded quality and quantity of prey, coupled with human-induced stressors such as over-fishing, climate change and coastal development.

This new study is crucial for informing critical shark nursery areas, sanctuaries, and marine protected areas.

The corals in Moorea bleached earlier this year during very hot temperatures after the completion of the study. Dr. Rummer says the sharks in this area will now have an even more difficult time growing and surviving, as the conditions around them continue to degrade and water temperatures rise.

"Sharks are at risk from human-induced stressors because they may not be able to adapt fast enough to keep pace with the changes that are happening in their environment," Dr. Rummer said.

"They are slow growers and take a long time to reach sexual maturity. When they do reach sexual maturity, they only have a few babies. Even fewer survive," she said.

"Not enough generations are being born fast enough to make the genetic changes to adapt to what's going on in their habitats."

"Mitigating human-induced stressors, especially during shark pupping season, is key to protecting these species and the ecosystems they support."

More information: Ornella C. Weideli et al, Same species, different prerequisites: investigating body condition and foraging success in young reef sharks between an atoll and an island system, *Scientific Reports* (2019). [DOI: 10.1038/s41598-019-49761-2](https://doi.org/10.1038/s41598-019-49761-2)

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