

# Unlikely COMPANIONS

Can birds and alligators really get along? The photo to the right might seem like a dangerous scene, but these animals seem to benefit from each other's presence. **Lucas Nell** explains.

In the Florida Everglades, nesting colonies of wading birds such as herons, egrets, storks, spoonbills, and ibis, face an existential, pervasive threat. After spending vast swathes of time and resources finding mates, building nests, and providing food for their chicks, a nest predator like a raccoon or opossum barges into the birds' nests to eat their offspring. Peck as they might, the adult birds have no effective defence against these brutish invaders, and must simply fly off in hopes of better reproductive luck next year. These mammalian nest predators systematically lay waste to entire colonies of nesting birds, totalling hundreds or thousands of nests. Mangled chick legs, piles of broken eggshells, and littered remains of nests are the only surviving evidence that birds once chose this location to rear their young.

So what can birds do to prevent such devastation? It turns out that nesting near even bigger, badder

predators can work quite well—especially if those predators cannot climb. For decades, scientists had speculated that crocodilians under nesting birds could create a protective moat from nest predators. Since crocodilians would be very happy to eat a raccoon or other nest predator, but cannot reach birds nesting in higher branches, they would seem to make a valuable predator deterrence.

No one had fully tested the idea, so my predecessor at the University of Florida, Brittany Burtner, set out to do just that. Her team made dozens of fake alligators and put them near tree islands (where wading birds typically nest) in the Everglades marshes and kept track of bird nesting in these and control islands. They also set up predator tracking stations on tree islands and along nearby canals to determine where raccoons were present. Her results were unequivocal: Herons and egrets nested near the fake-alligator sites in significantly higher numbers, and when water and



*Left: An alligator displays. Right: A colony of birds, including wood stork and cattle egret, nest in a tree above which an alligator lies in wait for other prey.*

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alligators were present (i.e., not during a drought year), raccoons were absent in the tree islands where birds nest. Burtner's work suggested that birds preferred to nest in alligator-inhabited areas, and that where there are alligators, mammalian predators are absent. This provided strong evidence that birds were benefitting from alligator presence via enemy-free space.

But what about the alligators? To understand how an ecological relationship evolved, and what the ecological ramifications are, knowledge of how both partners are affected is paramount. Thus the next major question to answer was whether wading bird nesting colonies have any effect on resident alligators. I enter the story here as a Masters student in the University of Florida's Department of Wildlife Ecology and Conservation, under the advisement of Research Professor Dr. Peter Frederick.

Our first thought was that alligators could be gaining food from the colony they reside under. I scoured the literature to estimate how much energy an alligator needed each day, and compared this to two possible sources of colony food. Wading birds practice "brood reduction", where they lay more eggs than they can raise and neglect a number of chicks based on how much food is available that year. The carcasses from these doomed chicks could become a valuable food source for the alligators below. The second source could come from fish that is regurgitated by the parents for their young, but falls out of the nest, providing the alligators an easy meal.

Top: Woodstork nest  
Bottom: Tricoloured heron nest

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When chicks are in the first stage of development, they do not move away from the nest upon approach; we call these chicks “nestlings”. During this time, we can mark nests and count how many chicks are still alive at each nest. Fortunately for me, the Frederick lab had been doing this for over 20 years and had accumulated a substantial dataset. From this, I assessed how often and at what age nestlings died, and combined these calculations with the numbers of nesting pairs of wading birds through time. I could then compute the amount of potential food via nestling carcasses each year over our entire study area – about 3,500 km<sup>2</sup> of wetlands just north of Everglades National Park, Florida.

Estimating the amount of regurgitated food that had been dropped required some rather fragrant fieldwork. We placed throughfall traps - 1 m<sup>2</sup>, open-topped cones of tarp and semi-rigid tubing - around great egret nests to catch fish that fell. Every week we collected, weighed, and measured any fish that were present in our traps. If you can imagine how a fish might smell if it had been eaten, regurgitated, and allowed to putrefy for a week, then you'll understand why this was not my favourite part of my research. Our results, however, were quite interesting. We found that regurgitated fish appeared to be of minor importance to foraging alligators, but nestling carcasses in prolific years for birds could potentially support the breeding female alligator population in our study area though the dry season. From these results, we had identified the potential for great benefit to alligators, but did this translate into a difference in reality?

We set out to capture alligators near tree islands with and without wading bird nesting colonies. We could then compare indices of body condition (i.e., fatness or health) from

each subpopulation. To minimise disturbance to the birds, this could only be conducted in June, immediately after nesting largely stopped, so we were under a substantial time crunch. By using aerial surveys to detect nesting colonies and satellite imagery to find nearby tree islands of similar size, we created pairs of islands at which to capture alligators. At each of these islands, we used nighttime airboat surveys to find alligators. Finding alligators in darkness might seem counterintuitive, but when casting a torch on an alligator, the light reflects from their eyes and they shine bright and demonically red – blowing the alligator's cover. When we spotted an alligator within 200 m of a focal tree island, we sidled up next to them in our airboat, slipped an anchored noose over their neck, cinched it tight, tightened one around their mouth, taped their mouth shut, and hauled them aboard. Once secure, we could draw blood and take body measurements.



To assess their body condition, we estimated their energy reserves through a relationship between their mass and their length. Our results were quite clear: Alligators near colonies had 13% higher body condition than non-colony individuals. This equates to a 200 cm long alligator being, on average, about 3 kg heavier near a wading bird nesting colony than in similar habitat without a colony. This difference is potentially large enough, as seen in other species using similar condition indices, to cause substantial differences in reproductive successes.

Our results are the first to demonstrate a mutually beneficial relationship between crocodilians and nesting birds. The Everglades is a particularly harsh environment for alligators because it is the hottest (i.e., most metabolically demanding) region in their range, is a low-nutrient wetland offering relatively little food, and has seasonal food shortages. Alligators here grow slower, reach sexual maturity later, and attain smaller sizes at maturity. Impacts to Everglades alligators might be exaggerated compared to other populations due to their comparatively poor overall condition. However, we do not believe that this relationship is entirely unique. Crocodilians and nesting birds occur together throughout many subtropical and tropical wetlands, and often the resident crocodilians face comparable seasonal food limitations, such as caiman in the Pantanal wetland. We encourage researchers studying crocodilians or birds in other regions to test for similar relationships, as associations between nesting birds and crocodilians could constitute ecologically important processes across the globe.

Nell, L. A., Frederick, P. C., Mazzotti, F. J., Vliet, K. A., & Brandt, L. A. (2016). Presence of Breeding Birds Improves Body Condition for a Crocodilian Nest Protector. *PLoS one*, 11(3), e0149572.