

*Sea Turtle Conservation on Vieques, Puerto Rico**Dawn Lippert*

Vieques is a small island off the eastern coast of Puerto Rico that boasts a spirited civilian population and the largest National Wildlife Refuge in the Caribbean. I made the island my home for the summer to study predation of sea turtle eggs by invasive mongooses. Mongooses were introduced to Vieques in the early 20<sup>th</sup> century to control the island's exploding rat population, which had infested Viequense sugar plantations. After about a century the plantations are long gone, but mongooses have taken over much of Vieques' jungle-like land, feasting on the island's snakes and birds as well as the rats. Mongooses have also turned their appetites to the eggs of endangered sea turtles that make their nests on Viequense beaches, though the magnitude of the problem is unknown.

I intended to go beyond anecdotal evidence to a controlled experiment that quantified the mongoose predation problem, but a hurricane stymied my ecological plan. I had constructed wire protections around nests on beaches with different levels of human use in order to isolate the predation variable. I spent my evenings on Vieques' nesting beaches with local ecologists, looking for turtle tracks, recording new nests, and monitoring hatching events. The storm, uncharacteristic for early July, ruined almost every sea turtle nest on Vieques. For two days I watched helplessly as the storm's raging waves flooded all the beaches and washed the plum-sized turtle eggs, which normally lie buried under two to three feet of dry sand, out to sea. The tropical storm did not spare the eggs that were the subjects of my predation experiment; they were ripped out of the sand like all the others. My project morphed from a strictly ecological study into an exploration of the various forces—animal, human, and climatic—that have pushed every kind of Caribbean sea turtle onto the endangered species list. In the wake of the storm my research branched into interviews and a visit to the nearby island of Culebra in order to compare the Culebrense conservation approach with the one on Vieques. This is my journal entry after a morning spent on Culebra with Carlos, a turtle biologist who works for the Puerto Rican Department of Natural Resources (DNR).

“This species has problems. Too many problems,” Carlos observed with a chuckle as we hacked our way through the tangled vegetation from Brava Beach up to the road. This observation came after he gave me a lengthy explanation on the effect of seawater on turtle nests. According to Carlos, the eggs are safe for 2-3 days after a dousing before they get ruined, which is somewhat different from Mike's opinion that water is immediately damaging to turtle eggs.

We had arrived on huge Brava Beach about an hour and a half earlier after trekking downhill through the tall grasses and low-hanging branches of Culebra's northern coast. Brava Beach is Culebra's number one leatherback nesting beach, with over 60 nests still preparing to hatch as of our July 13<sup>th</sup> visit. In a great year, like 1999, Culebra has had as many as 90 turtles nesting for a total of almost 500 nests. This year the totals are much lower: an estimated 40 turtles and 260 nests according to Rolando. Rolando and Carlos are both technicians who are contracted by Puerto Rico's DNR to monitor leatherback nests daily. When Carlos, Adam and I arrived on Brava Beach at about 7:30 AM we hadn't walked more than 25 yards before we came across a small army of black leatherback hatchlings marching toward the sea. We ran to the source, where even more hatchlings were emerging from the sand; an anguished Carlos exclaimed, "it's too hot for them now" and constructed a shelter of planks and coconuts to protect the nest from the bright sun.

Overheating and dehydration are serious dangers for young turtles—Carlos said he once found 30 turtles dead in the hot sand of their nest after attempting to emerge in the murderous heat of the day. Even at 7:30 AM the sun glared off of the sand and we were sweating through our shirts. Carlos directed Adam and me to pick up all the hatchlings and place them close to the surf. We put each one at the top of the foot-high drop from the flat sandy beach to ocean, and watched them tumble down the shelf and flap around righting themselves.

Meanwhile Carlos went further down the beach to check for new tracks of mother turtles that indicated new nests and little turtles that emerged. Adam went to help him excavate a nest that had emerged the previous night—the nest had only 24 yolked and hatched eggs, along with three yolked but unhatched eggs and 44 yolkless. Leatherbacks generally deposit about one hundred eggs and 60% of usually hatch successfully. Carlos guessed that the leatherback responsible for the rather unsuccessful nest was either very young or very old. Adam and Carlos only counted 7 tracks, which means that the other 17 hatchlings probably emerged a day or so earlier and their tracks were erased by wind and rain. Carlos explained that leatherback hatchlings sometimes emerge in two stages—the “elevator” that Mike had described to me effectively makes two one-way trips. While Adam and Carlos were at the end of the beach, I babysat the original nest and took each new turtle to the sea. They tended to emerge in pairs, and I took each pair down together to enter the sea with his or her sibling. I cannot say ‘brother’ or ‘sister’ because it's not possible to tell the sex of a leatherback hatchling without doing DNA tests or “going inside” them,

as Carlos put it, but this nest was probably female-dominated. Carlos explained that nests that develop and hatch within 55 to 65 days—the hotter the weather the quicker the development—usually produce predominantly female offspring. Conversely, nests that take 65-75 days to hatch tend to have a majority of males. The sex skewing is significant and can result in a batch of offspring with 70% females or 70% males. Thus the weather has a strong bearing on the sex ratio of hatchlings that come from a particular island or region each nesting season.

Adam and I put 31 turtles in the sea that day, which was a little over half the number that successfully hatched from the nest. I called Carlos the next weekend and he reported that when he excavated the nest two days later he found 7 live turtles, 2 unhatched fertilized eggs, 46 unfertilized eggs, and 57 empty shells for a total of 105 eggs laid. That's about average for a leatherback here, as is the hatching success rate of 54%. The rest of the eggs probably hatched that night or the next—when the sand was cooler and the beach darker—in a second hatching event. Carlos estimated that only one or two of the 57 turtles would survive their first day at sea; the mortality rate for turtles is extremely high early on, but the few that manage to survive their introduction into the ocean grow quickly and have a good chance of becoming reproducing adults.

The turtle conservation case on Vieques is notable both for its resemblance to similar sea turtle nesting sites throughout the Caribbean and for its uniqueness. No other turtle nesting site was subject to U.S. Navy maneuvers and test bombing for over half a century, just as no other island has been free of infrastructural development on almost all of its nesting beaches. During the past sixty years only Sun Bay, on Vieques' southern coast, was adorned with showers, public bathrooms, a campground, and other beachside amenities that have sprung up along most of the Caribbean's soft, wide beaches favored by humans and leatherback turtles alike. The Navy's legacy of undeveloped and relatively untouched coastlines is just as much a part of the story as the contamination, unexploded ordinance, and restricted access areas that cover the eastern half of the island.

Just two years ago the Navy bequeathed its land to the U.S. Fish and Wildlife Service in a hotly contested deal that was the culmination of decades of local protests and civil disobedience. An understaffed U.S. Fish and Wildlife Service (FWS) office based in the "capital" of Vieques, barrio Isabel Segunda, manages the 17,700 acres of the infant Vieques National Wildlife Refuge. Vieques' civilian area, which was never owned by the Navy, is home to 9300 Viequenses but only spans about 12,000 acres. The staff of the FWS office not only carries out conservation and wildlife management duties, but also is responsible for the myriad policing duties on the Refuge. Bryant is one of the Refuge's

two full-time law enforcement officers, and on any given day his duties range from confiscating poached land crabs and reporting murdered sea turtles to pursuing cartels of drug runners that use Vieques as a gateway to the U.S. cocaine market.

Amid such challenges, the interventions practiced by dedicated Viequense volunteers and FWS staff on behalf of sea turtles—monitoring beaches nightly, relocating turtle nests that are too close to lagoons, and digging out wayward hatchlings—are admirable, but neither replicable nor ultimately sustainable. During my two months on Vieques it became clear that the sea turtle story is a tangled web of interrelatedness: sea turtles are affected by weather, the Navy’s conservation efforts of the past fifteen years, current beach management by FWS, and predators of all stripes—humans, birds, fish, and crabs, as well as mongooses. This is one strand of the story that is sea turtle conservation on Vieques, a story that I am currently developing into an interdisciplinary senior thesis. Turtle conservation is at a truly critical crossroads as coastlines and beaches are developed around the world and fishing intensifies in many turtle-sensitive areas. I am grateful to the Class of '64 and the Richter Summer Fellowship for making my research possible this summer and supporting my continued research of this topic; the future of sea turtles and beach management on Vieques is a complex story that I look forward to further discovering and articulating over the next few months.