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## Turtles, Eggs, and Nesting a Simple Primer

My quest for information regarding turtle nesting grew out of a concern about ORV and even pedestrian access to our beaches at CHNSRA toward the end of summer and into the fall fishing season, one of the most active and economically important times of the year. Without a doubt, the terms of the consent decree mandate closures that may far exceed those required for Piping Plovers and could in fact close all access at some point from Buxton to Hatteras spit and beyond, if only for a short time. And it's all about location and timing.

The vast majority nests that occur at CHNSRA are those of Loggerheads. Growing to almost four feet in length and weighing up to 800 pounds, they crawl from the sea and make their nests which usually contain from 75 to 150 eggs. Once hatched, the new turtles return to the ocean to make quite a swim to the Sargasso Sea where they mature and eventually set forth to breed and lay their nests. Sounds simple but it's not.

When I began to ask questions, I was talking to Irene Nolan of Island Free Press who steered me in the direction of Michelle Baker the NPS turtle Biologist and also Matthew Godfrey, reputedly one of the foremost experts on sea turtle biology worldwide. I was careful to make both of them aware of my pro-access stance early on and was rewarded with some very excellent information and opinion that I found unbelievably informative.

Once again, I came to Hatteras to fish, not become an amateur biologist.

Our turtles as it turns out are some very complex critters. Apparently unlike say, Plovers, they don't return to nest yearly and in fact will go for up to three years between returning to shore. Mr. Godfrey explains that this is a function of regaining nesting strength which correlates to the availability of food sources. These turtles are pelagic, meaning they migrate great distances to both breed and nest. Most males return to the same oceanic vicinity, perhaps spread out over thousands of miles to mate while the females sometimes, but not always, will return to the same general area in which they were hatched to nest. Ms. Baker says that the females don't show anywhere near the nest fidelity, returning to the same spot, as a lot of people are taught. In fact, they have been known to nest as far away as 300 miles from their beach of origin.

Loggerheads and their other turtle buddies have been around for quite a while. Estimates range upwards of 110 million years and more. Rather impressive. They've survived tens of thousands of hurricanes, the Jurassic period and beyond when the predators swimming about the world's oceans would have considered even the greatest of currently living sharks to be a joke. They have survived ice ages, extremely warm periods and if modern theory is to be believed, even the phenomenal comet impact that left a huge crater centered at the Yucatan Peninsula in Mexico, blamed for the demise of 90% of life on earth including the dinosaurs.

Currently, Loggerhead turtles are considered threatened though Godfrey says that

there is a push to move them up a notch to endangered status based primarily on the nesting numbers in Florida. These turtles nest world wide. From Japan, Australia, Brazil, the Arabian Peninsula, throughout the Gulf of Mexico, Africa and beyond. Last years Florida numbers state that 45,084 nests were found; down from previous years. It's important to note that that figure though down, cannot be used to determine trends. What makes that true also means that Derb Carters' assertion that the Consent Decree and the ban on night driving are responsible for the increase in nests at CHNSRA in 2008, utterly false. Here's the science:

Loggerheads, the only turtle nesting at CHNSRA in 2008, nest on average, only once every three years. Each turtle lays an average of five nests per season at about one hundred eggs per nest. The nests are laid almost exactly fourteen days apart and can closely tie to lunar cycles. In a year like this one where water temperatures warmed earlier, allowing for earlier nesting, some turtles will lay seven or even as many as ten nests.

Based on their nesting cycle, comparing last years numbers to this years is like comparing apples to oranges. While it's true that numbers are up this year, (2007, 82 nests, 2008 as of 8/1/08, 99 nests) in no way can this be construed as a result of the CD or the ban on night driving. In fact, for Mr. Carter to even suggest that in front of the Senate as he did this week, as a misleading statement, would qualify him for Contempt of Congress were he sworn in prior to testimony.. My argument is further bolstered by the fact that turtle numbers are up all over N.C., S.C. and Georgia as well. Pea Island has had a record number of nests this year. It's likely that an increase will also be noted in Florida at seasons end.

His statement that nesting this year will not interfere with fall fishing is also false in that NPS identifies upwards of 15 nests that will force full beach closure as a result of the CD on 9/15/08, including the Point.

### **NESTING, RELOCATION and OVERWASH**

Nesting turtles are driven instinctively to try and ensure the survival of their species just like any other animal. When they climb from the sea they will nest in somewhat of a "shotgun" pattern. They will lay some nests close to shore; others further away and even some nests into the dunes. Like alligators, it's the nest temperature that will determine the sex of the hatchlings. Our relatively cooler sands as opposed to, say Florida, mean that on average, 90% of the hatchlings in this area are male. This can vary depending on how early the nests are laid. Earlier nesting this year may very well result in more female hatchlings as the early nest would have been perhaps a few degrees cooler, longer. This could result in a male/female ratio of close to 50%. Currently, turtle biologists are conducting a three year temperature survey to better understand sex ratios in our area and others. In each nest, a small egg like temperature sensor is inserted which records at different intervals, changes in nest temperature.

Turtle nests are considered within their hatch window when they are fifty days old. Most will hatch within a week or two later. Nest placement can also affect hatch rates and incubation times. Nests laid in the toe of a dune generally have a high success rate and shorter incubation times than a nest laid on a flat beach due to nest temperatures according to both Godfrey and Baker. This might account for the increased hatch rates of relocated nests as reported by Ginny Luizer in her statistical study.

Moving a nest is a very complex and time consuming affair. Part of that complexity is as you might expect, is policy. NPS is issued a permit annually by the North Carolina Wildlife Resources Commission (NCWRC) who in turn is permitted by the US Fish and Wildlife Service through the Endangered Species Act. There seems to be a bit of the "do as I say, not as I do" affect going on here because as of mid July 2008, USFWS had moved over half the nests (11 of 17) on Pea Island NWR. What makes moving them so difficult is a function of the eggs themselves.

Within each egg there is the yolk and an air bubble. As the eggs are laid, the air bubble and embryo both migrate to the top of the egg. Initially, this allows for a quick relocation of the nest but within nine hours of being laid, the embryo will attach itself to the top of the egg and utilize the air bubble to breathe. Rotating the egg after that nine hour window will cause the embryo to drown as the bubble will move but the turtle to be, cannot. Once that nine hour window passes relocation becomes extremely risky. This is further complicated by any change in temperature the nest will experience in the moving process.

Policy dictates that nests are not moved after the window has passed unless it is in imminent danger of destruction. Policy also dictates that nests are never moved closer to shore but always away from it, precluding the creation of access corridors behind a nest laid close to the dune line.

Overwash as it turns out, is a tricky situation as well. As the eggs develop, they begin to rely less on the diminishing air bubble and more on aspiration. This is where air that permeates the egg shell provides a significant portion of the oxygen needed for continued development. Overwash can in some circumstances be beneficial to the nest as it forces an exchange of air and tends to rid the nest of fungus that reduces hatch rates. Total inundation for an extended period however, often will drown a nest. What seems to be a dominant factor in whether harm comes to the nest is its stage of development. The older the nest, the more mature the embryo, the greater the oxygen requirement. Godfrey explains that because of that, even a heavy rain can drown a nest as it approaches its hatch date.

As you can clearly see, turtle nesting is a very complex situation and was long before the Consent Decree and its draconian rules were set in place. Clearly NPS is not at fault for the closures now present at CHNSRA as once again they don't dictate policy but are forced to follow the regulations set forth by others. It should be obvious as well that the Consent Decree had little or no effect on turtle nesting this year. Increased number across the southern Atlantic seaboard, where the CD has no reign attests to that fact.

My hopes are that this has helped our community to better understand the turtles that nest here and provide any who read this, insight as to just how ridiculous the provisions set forth in the CD really are. These provisions should immediately be re-negotiated by all the intervening parties involved in the CD based upon the science presented here. SELC has no basis for its current claims and should be called to task on each and every one of them.

With Respect,

Jeffrey Golding

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