## Reptiles

Five species of **sea turtles** occur in Canaveral National Seashore (CANA) waters. All are federally classified as threatened or endangered. Three regularly nest on the park's 24 miles of beach averaging between 3500 and 4500 nests a year. In 2002, 3,158 loggerhead (*Caretta caretta*), 859 green (*Chelonia mydas*) and 8 leatherback (*Dermochelys coriacea*) nests were recorded. The other two species, Kemp's Ridley (*Lepidochelys kempi)* and hawksbill (*Eretmochelys imbricata*) occasionally show up in Mosquito Lagoon or offshore waters. A Kemp's Ridley nested just north of the park in New Smyrna Beach in 1996, while a hawksbill nested in the park in 1982. The park offers turtle watch programs in June and July each year, escorting small groups of people to see a loggerhead nest at night. Reservations are required and early requests are advised since the slots fill up quickly.

At CANA, the sea turtle nesting season for loggerhead and green sea turtles generally extends from late April to early September, with peak numbers occurring in late June and early July. During that time, up to 100 nests may be deposited a night. The leatherback nesting period is earlier and shorter, with nests recorded between April and June. Interesting patterns are noted when the number of nests in different years are compared. Loggerhead totals fluctuate up and down, with a peak about every 3-4 years. The green, in contrast, is extremely predictable, being high one year and very low the next. For example, 427 green nests were recorded in 1998, 5 in 1999, 662 in 2000, 7 in 2001 and 859 in 2002. Many of the greens must be on the same cycle, nesting every second or fourth year. As can be seen, the number of green nests in peak seasons has been rising in recent years.

It is exhausting work for the female sea turtles, normally buoyed by the ocean waters, to drag their heavy bodies onto the beach at night to lay their eggs. Loggerheads and greens weigh between 200-350 pounds, while leatherbacks range from 700-2,000 pounds! This makes a very obvious track in the sand, which can be used to identify the species of turtle, even without seeing it. If you notice a turtle crawl on the beach, look at the flipper marks on either side of the body drag. The loggerhead's are alternate, since it acts like a lizard, simultaneously moving the front flipper on one side and the rear flipper on the other. The green and leatherback have opposite flipper marks since they do a breaststroke-like crawl, moving the front and rear flippers together. Of course, the mere size of the leatherback crawl (about 6 feet across) separates it from the green. So the next time you spot a crawl on the beach, see if you can identify the species.

Although most females mate only once a season, they will nest from one to nine times (the average is about 3), at an interval of 10 days for the leatherback and 13-14 days for the loggerhead and green. The females will then take a much needed rest and not nest the next 2-3 years. The nest is dug with the supple hind flippers so that the female never actually sees what she is doing. She will form a flask-shaped cavity into which an average 100-120 eggs for the loggerhead, 100-140 for the green and 60-100 for the leatherback are deposited. Loggerhead and green eggs are the size and shape of a ping

pong ball while leatherback eggs are noticeably larger. The eggs are leathery as with most other reptiles. The female will then spend considerable time packing sand in the cavity, again with her rear flippers, before using both sets of flippers, as she gradually moves away, to throw loose sand over the nest. Loggerhead nests are about two feet deep, greens and leatherbacks are deeper, underneath a conspicuous mound. Eggs generally hatch in 50-60 days, depending on how hot the weather is. Temperature of the nest also determines sex of the hatchlings; higher temperatures produce more females.

As the hatchlings emerge from the eggshells they move about, gradually working their way towards the surface. The movement of one hatchling will generate movement in others. As they near the surface, they will become still if they sense higher, daytime temperatures outside. Once night comes, outside temperatures cool and the hatchlings emerge. They are genetically programmed to move towards light, since normally the dune behind the nest is dark, and the horizon over the ocean is relatively lighter. On beaches with artificial lights, like streetlights and vehicle headlights, hatchlings can become disoriented and go away from the water. This usually means death. Fortunately, the beach at CANA offers an oasis of darkness since it is closed to visitors at night and has virtually no artificial lights.

The short journey from the nest to the water is critical. It is a time when hatchlings are extremely vulnerable to ghost crabs, raccoons, birds and other predators. However, it also may be a time where young turtles becomes imprinted to their nesting beach, helping to guide them back as reproducing adults many years later. The fortunate hatchlings successfully running the gauntlet from the nest to the ocean must now elude fish and other aquatic predators waiting offshore. It is estimated that only one in 100 or 1000 (either way the odds are low) will survive to maturity. Upon entering the water, hatchlings shift into a gear called the "swimming frenzy", of one mile per hour and head straight out to sea. They continue on for about 24 hours until they reach rafts of floating seaweed (sargassum) 20 - 30 miles offshore. There they hide among the floating vegetation feeding on tiny plant and animal matter. It is uncertain exactly where they go after that, but about 10 years later, the juveniles return from the ocean and enter the Indian River Lagoon system and Mosquito Lagoon.

Mosquito Lagoon is an important nursery for juvenile loggerhead and green sea turtles which remain in the lagoon until they approach maturity around 20 -30 years of age. The greens feed on the extensive seagrass beds in the lagoon while the loggerheads eat mollusks, crabs, and, in particular, horseshoe crabs. Netting surveys of juvenile sea turtles in Mosquito Lagoon have revealed a dramatic and troubling reversal in the abundance of the two species over the last 20 years. In the late 1970's, 78% of the individuals captured were loggerhead and 22% were green. Netting in the late 1990's yielded about the same amount of turtles but at a percentage of 15% loggerhead and 85% green. One factor may be a significant decline in the horseshoe crab population, noted in the same study. Large numbers of horseshoe crabs were incidentally caught in the nets during the 1970's surveys; however, in the 1990's there were very few. Obviously something significant has occurred in the lagoon ecosystem. CANA obtained

funding to investigate the problem in 1999. A discussion of the study can be found in the section on Crustaceans.

In recent years, sea turtles in Mosquito Lagoon and the Indian River Lagoon ecosystem have shown signs of a disease known as fibropapillomatosis. This herpes-type virus manifests itself as grotesque-looking tumors on fleshy parts of the turtle's body. The condition can significantly impact fitness or kill individuals if swimming is impaired or lesions around eyes affect vision. The disease appears most frequently in juveniles. There are indications that fibropapillomatosis is connected to water quality.

Another threat to sea turtles at CANA is the raccoon. This animal causes tremendous damage to sea turtle nests, digging up and consuming the eggs. In the early 1980's, over 98% of the nests at CANA were being destroyed. In 1984, the park began a nest protection program by placing flat, wire mesh screens over the nests to deter predators. Teams of 2-3 seasonal employees and volunteers patrol the beach each night from May to September reducing predation from 98% to approximately 20%. A study by the University of Georgia (UGA) during the 1993 and 1994 nesting seasons examined several alternative protection strategies and determined that nest screening was most effective. This program also allows the raccoon to continue to function as an important component of the CANA ecosystem. Maintenance of natural ecosystems is one of the primary mandates of the NPS. See the Mammal section for more information on raccoons and the UGA study.

One of the main objectives of many CANA visitors is to see an **American alligator** (*Alligator mississippiensis*). Probably no other animal better represents Florida to other parts of the country. Some people confuse them with crocodiles which are only found in the southern tip of Florida. Notice that CANA's alligators are black and have a broadly-rounded snout. In contrast, crocodiles are gray-green color and have a pointed snout. Unlike crocodiles, alligators prefer fresh water over salt water and can often be seen basking along roadside ditch banks on sunny, spring days. An excellent place to see them is along South District access road between the fee booth and beach. *Be sure to use paved vista areas when stopping rather than pull onto the road shoulders. The latter breaks down the pavement edge and the storm berm constructed to stop runoff of pollutants into the lagoon.* Another good area for viewing alligators is the Bio-lab Dike Road running along the southwest side of Mosquito Lagoon.

If you spend much time in Florida, however, you will learn that alligators can show up almost anywhere there is water. Young males are sometimes displaces by older males during the spring breeding season and may gravitate to saltwater areas or unexpected places, such as city retention ponds and backyard swimming pools. Drought can also force gators into submarginal habitat. Alligators play a very important role in the marsh. The "gator holes" they maintain are a critical source of water for many different animals during period of severe drought.

On warm spring mornings if you get away from the traffic and listen carefully, mature males and females can sometimes be heard bellowing, a noise that sounds somewhat like

distant thunder. This is thought to announce their presence to prospective mates and warn rivals. About two months after courtship, females construct a nest in the marsh by scraping vegetation into a large pile about seven feet in diameter and three feet high. A cavity is then dug with the hind feet near the top of the mound large enough for 20 - 25 eggs. Some females will stay around during the incubation period of about 65 days to protect the nest from predators. As the young begin to hatch, they emit a barking noise which attracts the female. She then scrapes open the nest, even gently "gums" the eggs to help the young break free and carries them to the water in her mouth. They stay near her from several days to several months. For the first two years, the yellow-striped young stick together in groups called pods. Due in part to predators such as herons, egrets, raccoons, otters, hogs, skunks and others, few survive to adulthood.

Alligators attain maturity when they reach about six feet long. Really big "gators" are much less common than in the past. The current record for Florida is 14 1/2 feet long, although today 10 feet long is considered good-sized. A good way to estimate an alligator's size, if you can only see its head, is that the distance from the snout to the front of the eyes in inches is equal to the length of the animal in feet. Alligators are not dangerous when treated with proper respect. However, when fed by people, they lose their natural fear of man and can become a problem. Pets and toddlers are prey size and should not be allowed to wander along the banks of alligator-infested waters.

Nature's submarine, alligators have a long and ancient history, dating back millions of years. Yet, hunted extensively for for their meat and hides from the late 1880's through mid-1900's, they almost became extinct. Florida outlawed hunting alligators in 1961, although extensive poaching continued, causing the alligator to be placed on the Endangered Species List in 1967. Finally, similar laws by other states and the Lacy Act, which prohibits interstate trade of illegally obtained reptile hides, halted the slaughter. Today, the species has enjoyed a dramatic resurgence, to the point where hunting is allowed on a carefully regulated basis.

The **gopher tortoise** (*Gopherus polyphemus*) is one of CANA's "keystone species" meaning that it plays a particularly vital role in the ecosystem. Two to three times the size of a box turtle, it lives in a variety of upland habitats with well drained soil. The tortoise is a prodigious digger constructing extensive burrows that average 15 feet long and six feet deep. In this part of Florida, males have an average of 17 burrows and females nine. These burrows provide critical shelter for dozens of other species of animals, including the federally threatened Eastern Indigo snake (*Drymarchon corais couperi*). Biologists are deeply concerned about the future of the tortoise. Listed as a Species of Special Concern, there is strong evidence the species warrants an upgrade to the more serious federal designation of threatened. Habitat is rapidly being lost to development and fire suppression (see Florida scrub jay under Animals/Birds for more on the detrimental effects of fire exclusion). Road mortality and habitat fragmentation are other impacts.

In the last 10 years another very serious threat has arrived, a bacterial disease called upper respiratory tract disease syndrome (URTDS). First observed in the desert tortoise

populations of the western states, the disease has reached the gopher tortoise population of the southeast. Symptoms of the disease include a runny noise and watery eyes and eventually severe loss of weight. Blood tests have revealed URTDS antibodies in tortoises in the southern part of the park. It is thought to have been introduced by people dropping off tortoises from areas being developed outside the park. If the population at CANA crashes, the other species that rely upon its burrows for shelter will be impacted as well. The park is currently funding a study using telemetry to track newly born tortoises to determine rate of survival during the critical first year.

The **Eastern Indigo snake** (*Drymarchon corais couperi*) is a federally protected species and North America's largest snake. Harmless to man, it feeds on a variety of animals, including birds, small mammals, amphibians and other snakes, particularly the rat snake. At CANA it can be found in dry habitats, bordered by water. It faces several threats: habitat loss, the pet trade (because of its size, beautiful sheen and docile nature when tamed), and most significantly at CANA, road mortality. The impact of URTDS on gopher tortoises is also a grave concern. The indigo snake relies upon tortoise burrows for habitat and would be significantly impacted if the tortoise population declines. Little is known of indigo snake biology. Studies are being done at CANA and Kennedy Space Center, tracking snakes with transmitters and utilizing special cameras designed to look in gopher tortoise burrows.

The federally threatened **Atlantic Salt Marsh Snake** (*Nerodia clarkii taeniata*) is a very rare snake whose known range is primarily contained within one county (Volusia) and Mosquito Lagoon. This small, docile snake lives on lagoon islands in high marsh habitat, consisting of glasswort (*Salicornia* spp), saltwort (*Batis maritima)*, and salt hay (*Distichlis spicata*), with scattered black mangroves (*Avicennia germinans*). It can be seen in shallow ditches, where it feeds on small fish. When pursued it often retreats into fiddler crab burrows. It is well adapted to its saltwater environment. Dehydration is prevented by the skin, which limits salt uptake and, unlike other snakes, it refuses to drink saltwater even when thirsty. Instead the snake will wait until rainwater or dew is available. Sailors stranded in lifeboats could take a lesson from this little animal. A major threat to the Atlantic salt marsh snake is the loss of its limited habitat. Management of mosquito impoundments by state and county agencies to alter water levels and vegetation may impact its survival. Once habitat is disturbed, it is also threatened by hybridization with other species, such as the Florida banded water snake.

In 1992, a long range monitoring program for reptiles and amphibians (herptofauna) was implemented at CANA and adjacent Kennedy Space Center. Due to their tremendous biomass and sensitivity to change, herptofauna are excellent indicators of overall health of upland and wetland ecosystems. To date, 50 reptile and 19 amphibian species have been recorded. The five most common snake species, according to road surveys, are the ribbon (*Thamnopis sauritus*), banded water (*Nerodia fasciata*), garter (*Thamnopis sirtalis),* corn (*Elaphe guttata*), and racer (*Coluber constrictor*). Visitors are often curious about the species of poisonous snakes that occur here, although the chances of encountering any are extremely rare. There are four, cottonmouth (*Agkistrodon piscivorus*), diamondback rattlesnake (*Crotalus adamanteus*), pygmy rattlesnake

(*Sistrurus miliarius*) and coral snake (*Micrurus fulvius*). The well known copperhead does not occur in Florida, except for two counties in the extreme northwest section of the state. These species play important roles in controlling rodent populations, prefer to avoid people and should be left to attend to their own business.

Comparison of recent data with a survey conducted in the 1970's indicates some marked changes in the reptile population of CANA over the last 25 years. The number of cottonmouths and Florida green water snakes (*Nerodia floridana*) observed during road surveys declined significantly. The attractive diamondback terrapin (*Malaclemys terrapin*), once present in large aggregations, is now rare, probably due to raccoon predation, crab traps and habitat reduction. Several non-native or exotic species have invaded the park, including the brown anole (*Anolis sagrei*), Mediterranean gecko (*Hemidactylus turcicus*), and Indo-Pacific gecko (*Hemidactylus garnotii*). Other species sighted near the park and soon to occur here are the tropical gecko (*Hemidactylus mabouia)*, crested anole (*Anolis cristatellus*) and Cuban treefrog (*Osteopilus septentrionalis*).

These invaders can have a negative affect on native species. For example, studies show the brown anole is displacing the native green anole (*Anolis carolinensis*) by preying on its young and monopolizing habitat at the base of trees. The green anole is forced into marginal habitat higher in the trees where it is more vulnerable to birds. Once the green anole was quite common - now notice as you walk through the park how many greens you see versus browns. Also, take the time to sit quietly and observe the fascinating behavior of the males as they defend their territories and try to attract mates. Normally quite inconspicuous, they bob their heads and expand their throats to flash a startlingly bright red patch. When a winner has driven off a rival, he will celebrate with a series of push ups. It almost seems as if today's football players engaged in their "touchdown dances" are mimicking the behavior of anoles.