

## THE EASTERN BOX TURTLE IN THE GREAT SWAMP NWR

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The only totally terrestrial turtle in the Great Swamp National Wildlife Refuge (GSNWR) is the Eastern Box Turtle (*Terrapene carolina carolina*). While it can swim, it spends its life on land. The box turtle is usually found in open woodland but also occurs in meadows and marshy areas. These habitats are common in the Great Swamp. The Eastern Box Turtle's range extends from southern Maine to Florida and into the mid-west.



Figure 1A: Orange patterned adult.

It seems that box turtles were once quite common. This recollection is confirmed in the literature as box turtle populations have been reduced in half since the 1940s in several study areas (Ernst, et al. 1994). Box turtles are slow to reach sexual maturity (7-10 years on average) (Buhlmann, et al. 2008), lay few eggs (3-8) per clutch and are long lived (40-50+

years). Once they grow to around five inches and are able to encase themselves in their shell, they are essentially safe from natural predators. Their greatest threat comes from being run over by road traffic. It takes an extended period to replace an adult that has been crushed by a car. If you see a turtle on a road, please take a moment and move it off the road to safety. Always move the turtle to the side of the road to which it was headed.



Figure 1B: Yellow patterned adult.

All the other turtles in the GSNWR hibernate in or near water. Box turtles usually hibernate underground in natural dens or by excavating holes in soft soil. Box turtles like other turtles are known to hibernate in groups at times. Box turtles have a range of a few hundred meters where they spent the bulk of their lives. Within this range they have a

hibernaculum. They may need to leave their territory, however, to find a suitable nesting site. It is important never to remove a box turtle from their territory or eventually to return it where it was found. If the box turtle cannot find its hibernaculum or a suitable alternative, it could freeze to death in the winter.

enables the box turtle to completely enclose itself in a defensive posture that protects it against predation. The plastron fits snugly inside the larger carapace. This special feature gives the box turtle its name.

In most but not all male box turtles the iris is red. In females the iris is usually yellowish brown. As in most turtles the



Figure 2 – Box turtle in protective posture.

Adult box turtles have a variety of patterns on their highly domed carapaces or top shell (Figure 1). These bright and varied patterns of radiating lines, spots, bars or irregular blotches are usually either all orange or yellow but also can be red on an individual turtle. Figure 2 shows a box turtle's plastron or lower shell. The plastron is tan to dark brown/black or any mixture in between. It has a single hinge (Arrow A). This hinge

posterior of the plastron is slightly concave in the male and slightly convex or flat in the female. The claws on the male's hind feet are fairly long and considerably curved. Those of the female are shorter and straighter. The tail of a male is also larger than that of a female.

Arrow B in Figure 2 points to growth lines called annuli on a plastron scute (the segments that compose the shell). Like their name implies, one new line is produced on a scute each year. Just as with trees, it is possible up to a point to age a box turtle by

counting their annuli (Buhlmann, et al. 2008). Once they reach maturity, however, most box turtles stop producing annuli. Therefore, a box turtle with twenty annuli could be 50+ years old. On very old turtles the plastron can be worn smooth and the growth lines may not be visible at all.

the hatchling could enclose itself in its shell like an adult it would not provide any protection because of its diminutive size. A predator would likely swallow an entire box turtle hatchling.

Hatchling and juvenile box turtles are seldom found. The young immediately take



Figure 3: Box turtle hatchling next to Black Walnut

Figure 3 shows a hatchling box turtle that was recovered from a protected nest. The nest was covered with wire mesh and staked down to prevent predators (raccoons, skunks, foxes etc) from raiding the nest and eating the eggs. Unlike most other turtles the hatchling does not resemble a mature adult. Hatchling box turtles have a dull brown carapace with a pale yellow spot on each large scute. The plastron cannot close up like an adult. The dull carapace provides some camouflage. Even if

shelter and hide in vegetation or beneath debris. The box turtle is omnivorous. When young it is chiefly carnivorous feeding on snails, slugs, centipedes, caterpillars, beetles, spiders and worms. Adults become more herbivorous and supplement their diets with fruits, seeds and fungi; even those that are poisonous to humans. People have been known to get sick from eating box turtles – evidently a reaction to their poisonous fungi diet.

The GSNWR biological technician Osborn has been gathering data on box turtles throughout the Refuge since 2008.

When a box turtle is found, it is photographed, weighed, measured, sexed and aged. The location where it was found is recorded via GPS. The turtle is then marked to identify it if it is found again. This is done by filing a unique pair of grooves on its marginal carapace scutes (the scutes on outer edge of the carapace). Making these grooves is painless for the turtle.

One hundred and eighteen box turtles have been found to date. Some turtles have noticeable scars likely obtained from predation attempts or from contact with vehicles or mowers. Table 1 shows the age and sex distribution of the turtles found.

Table 1: Age and sex distribution of box turtles found in GSNWR 2008-2012.

Adults	
Males	37
Females	56
Juveniles	10
Hatchlings	15
Total	118

The high ratio of adult females to males found in the Refuge indicates a healthy population. More females produce more nests. This increases the probability some of the nests will escape predation. If more nests hatch, then a greater the number of hatchlings will be recruited into the turtle population. The male population in the Great Swamp is sufficient to produce a good genetic diversity in subsequent generations.

Approximately twenty box turtles have been recaptured. All recaptured turtles were found in the vicinity of where they were originally located. A radio-transmitter was placed on a female box turtle in October 2009 and she was tracked until the transmitter stopped working in 2011. She was always found within the same several hundred meter square area. She has also used the same hibernaculum during two winters (2009/2010 and 2010/2011). These behaviors are consistent with those described in the literature.

The survey data will give a good indication of the density of box turtles in the GSNWR. In time it will provide information on box turtle population dynamics, growth rates, survival rates and longevities. This type of information is especially valuable because box turtles continue to decline throughout their range due to habitat loss, habitat fragmentation, road mortality and illegal collection for the pet trade. Eastern Box Turtles are currently listed as a species of special concern in New Jersey.

**Literature Cited**

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