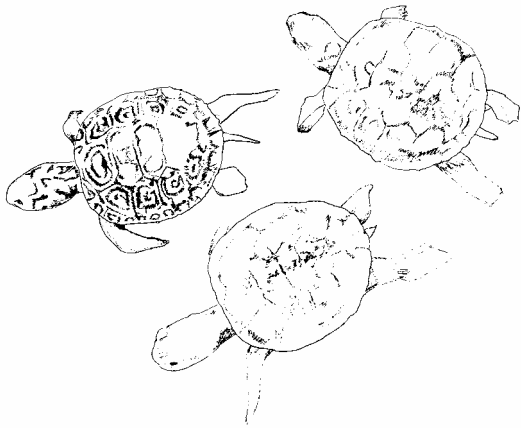


## SOLUTIONS

The future of diamondback terrapins at Gateway is uncertain. The Sandy Hook population appears to be large and stable. At Jamaica Bay Wildlife Refuge, raccoons are a new and serious problem, and that terrapin population appears to be vulnerable.

Visitors are strongly discouraged from doing anything that might disturb terrapins because human disturbance can prevent females from nesting. While it is tempting to approach a terrapin, remember, these wild animals are afraid of humans. The best way to view terrapins is with binoculars, at a minimum of 150 feet. That way, you are less likely to scare a terrapin and more likely to witness nesting take place. If you encounter a terrapin up close, try to walk past it as quietly and quickly as possible. Be sure to let park staff know where and when you see turtles, so they can add to the ongoing research.



At JBWR, the Park Service has taken measures to reduce human/terrapin encounters by closing the sand trail (known as the "Terrapin Trail") during the critical nesting season. Unfortunately, some visitors ignore this closure. Trespassing onto the trail during this time is not allowed. Please respect this rule.

In addition to walking with caution, care should also be taken while driving the roads in and around Gateway. Drive slowly and carefully to avoid hitting terrapins crossing roads, especially in June and July. Visitors should also be aware that collection of terrapins anywhere in Gateway is harmful to the overall population, and is also ILLEGAL.

## RESEARCH

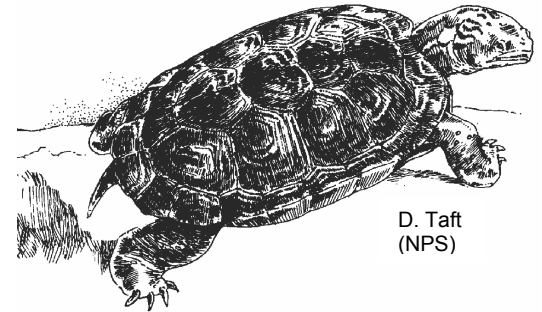
In an effort to learn more about diamondback terrapins, the Park Service at Gateway NRA and Hofstra University continue to study terrapins throughout the Park. Research efforts are focused on studying the raccoon population, collecting more information on the nesting biology of terrapins, learning more about remote nesting sites, studying the daily and seasonal movements of terrapins, and making better population estimates. As researchers learn more about Gateway terrapins, more can be done to help preserve this population. Each year a large volunteer effort makes this possible, and your help would be greatly appreciated.

If you would like to learn more about terrapins or about opportunities to participate in the on-going research in this area, please contact either **Dr. Russell Burke**, Department of Biology, Hofstra University, Hempstead, NY, 11549, (516) 463-5521, russell.l.burke@hofstra.edu or the **Division of Natural Resources**, Gateway NRA, 210 New York Avenue, Staten Island, 10305.



## THE DIAMONDBACK TERRAPIN GATEWAY'S SALT MARSH TURTLE

The familiar diamondback terrapin (*Malaclemys terrapin*) lives year-round in the bays and estuaries of Gateway National Recreation Area. Summer visitors to Gateway often see nesting terrapins, and this may be the only reptile they ever see in its natural habitat. The terrapin story is an interesting one, in part because humans have had such dramatic impacts on this harmless and appealing turtle.



D. Taft  
(NPS)

Diamondback terrapins are the only turtles that live in the ocean, except for the much larger sea turtles. Adult female terrapins have shells 6-9 inches (15-23 cm) long, while males reach only 4-5 ½ inches (10-14 cm) long.

## DISTRIBUTION & HABITAT

Terrapin populations occur along much of the East Coast and Gulf Coast of the U.S. Although the length of this range covers thousands of miles, terrapins only inhabit the thin strip of estuaries and coastal marshes right along the coast, so their actual range is quite small in area.

Terrapins inhabit coastal marshes, tidal creeks, estuaries, bays and coves. These waters are *brackish*; meaning they are mixtures of fresh and salt water. Marshes containing salt-marsh cordgrass (*Spartina alterniflora*) are important feeding habitats for terrapins. Cordgrass marshes can be seen in many places throughout Gateway NRA, at the Jamaica Bay Wildlife Refuge (JBWR) and the Sandy Hook Unit in NJ. Cordgrass marshes look like flat islands of grass, and are often covered by water during high tide.

## HISTORY OF A MEAL

Terrapins were once highly prized for their meat, and connoisseurs of the nineteenth and early twentieth century considered them a delicacy. Starting in the mid-1800s, terrapins were harvested in huge numbers to make soup. This led to the loss of many populations, especially those near large cities. The close proximity to New York City, coupled with the fact that Long Island terrapins were considered to be the best tasting on the market, led to severe declines in many local terrapin populations. By the mid-1930s terrapins had become so rare in the Long Island-New York City region that naturalists thought the species was locally extinct.

Luckily for terrapins, the onset of World War I and the Great Depression resulted in a rapid end of the turtle soup industry. Since that time, terrapin populations in many areas have slowly and steadily recovered. This recovery is now threatened by a number of new threats.

## NATURAL HISTORY

Terrapins primarily feed on invertebrates such as mollusks and crustaceans. Where there are many terrapins, their active foraging can have a significant impact on their prey, and so terrapins may be an important component of coastal food webs. However, it is probably impossible to truly understand the natural ecological significance of terrapins now, because their numbers have been so low for so long.

Within Gateway NRA, the only major terrapin nesting areas we know of are in Jamaica Bay Wildlife Refuge and the Sandy Hook Unit. The majority of the research on nesting terrapins in our region has been conducted at JBWR, but these results are probably typical of terrapins throughout the region. Mating occurs in May and June, when aggregations of more than 100 terrapins can sometimes be seen in the offshore channels. In June and July, female terrapins come on shore to nest, and this is when visitors have most of their "close encounters" with terrapins. They nest most commonly in dunes, grassland, shrubland, beaches, and sand and gravel trails. Females lay 3 to 18 eggs per nest, but average about 11. Some females can lay two nests per year. After nesting, females join the males in the deeper bays and estuaries, where they feed until hibernation.

Eggs take 70 days or more to hatch, and some hatchlings emerge in the late summer and early fall. The other hatchlings overwinter in their nests, and emerge the following spring. Like many turtles, terrapins grow slowly, taking 3-8 years to mature (males mature earlier than females). No one knows how long they may live.

Survival is tough for the diamondback terrapin at any stage in life, but no age is as perilous as the incubation and hatchling stages. Predators destroy many nests. Little is known about behavior of terrapins that do manage to hatch, but their survivorship is likely to be very low. Hatchlings tend to avoid open water, and they prefer burrowing under shoreline debris, mud and tidal wracks of cordgrass.

## THREATS TO TERRAPINS

**Predation** – Predators such as raccoons and foxes often pose a serious threat to turtle eggs, hatchlings, and occasionally even adult turtles. While raccoons and foxes occur naturally at Sandy Hook, neither originally occurred at JBWR. Studies conducted at JBWR in the early 1980s suggested that the great reproductive success of terrapins there was due to the fact that there were no raccoons or foxes. Nest survivorship was an astonishingly high 93%! With about 2,000 nests being laid each year, the Jamaica Bay terrapin population became one of the largest and most robust populations in New York State.

However, in the early 1990s, depredated terrapin nests were seen in noticeable numbers at JBWR. Although nest predation appeared to be minor until 1995, the situation got worse. By 1998, over 1,300 depredated nests were found at JBWR, and in 1999, more than 1,800 depredated nests were found. In the last few years the survivorship of terrapin eggs has dropped to less than 3%. While this is startling, this new rate is actually quite similar to rates seen at terrapin populations elsewhere in their range.

The cause of this change? A dramatic increase in the raccoon population. Little is known about how raccoons colonized JBWR or how many live there now. Park officials attribute the increase in raccoons to humans, because people sometimes release "nuisance" urban raccoons into parks. Not only is this illegal, but it obviously harms native species. The availability of garbage has probably also played a role in raccoon population increases.

The impact of other predator species is not as well studied as that of raccoons. Foxes occur in the Sandy Hook Unit. Laughing gulls and crows may also eat terrapin nests in Gateway. In addition to these nest predators, "root predation" has been observed at JBWR. This occurs when the roots of beach plants actually invade a nest, penetrate eggs, and absorb their nutrients.

**Development** – A number of other human actions harm adult terrapins, as well as eggs. One important threat to terrapin survival is development of their habitats. Dredging, filling, and marshland alterations reduce the aquatic habitat critical to terrapin survival. In our area, lawns and bulkheads now replace many of the areas that were once terrapin nesting beaches.

**Collection** – Although terrapins will never be harvested like they were during the heyday of the soup industry, harvesting and collection continues today. It is illegal to harvest or remove terrapins from GNRA without a permit. Many terrapins unintentionally drown as bycatch in crab pots. Fitting crab traps with Bycatch Reduction Apparatus (BRAs), as is occurring in New Jersey, can reduce "incidental" bycatch.

**Other Threats Posed by Humans** – Especially around urban regions, tide-borne debris may harm nesting terrapins and hatchlings. Automobiles also injure and kill terrapins. Hundreds of terrapins are killed on Long Island and New Jersey roads each year. Marine vehicles such as boats, wave-runners and jet-skis may also kill terrapins in our local waters.

**Release of Captive Terrapins** – While releasing turtles from pet stores and food markets might seem like a humane action, it is illegal and may be dangerous to local populations. Released turtles may introduce new diseases into native populations, with potentially disastrous results.

