

# Investigating Changes in Diamondback Terrapin Nesting Behavior and Population Structure in Jamaica Bay, New York



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## Abstract

Little is known about the process by which turtles abandon old nesting areas and colonize new nesting areas, but this process must occur with some frequency as habitats undergo succession and erosion. This must be especially rapid in areas that are highly impacted by urban development. Jamaica Bay (JB) is a large estuary in New York City whose shore lines, islands, and marshes were heavily modified in the 20<sup>th</sup> century. Many nesting and feeding sites were destroyed and some new nesting sites were created. This process is ongoing, as salt marshes in the area are currently eroding at a rapid rate. A mark-recapture study of diamondback terrapins (*Malaclemys terrapin*) has been conducted in JB since 1998 to determine whether this population is sustained by recruitment. Nearly all nesting occurred on an island known as Ruler's Bar Hassock that was created in the 1920s. The number of nesting females in the population has remained fairly constant at just under 1000 adults but the number of nests on Ruler's Bar has been dropping steadily and is now 43% lower than in 1999. The decrease may be the result of females moving to other sites to oviposit, perhaps sites closer to remaining marshes. A genetic analysis of the terrapins in Gateway National Recreation area is currently being conducted to better understand the history of terrapin colonization and abandonment of nesting sites in Jamaica Bay and elsewhere in the region.

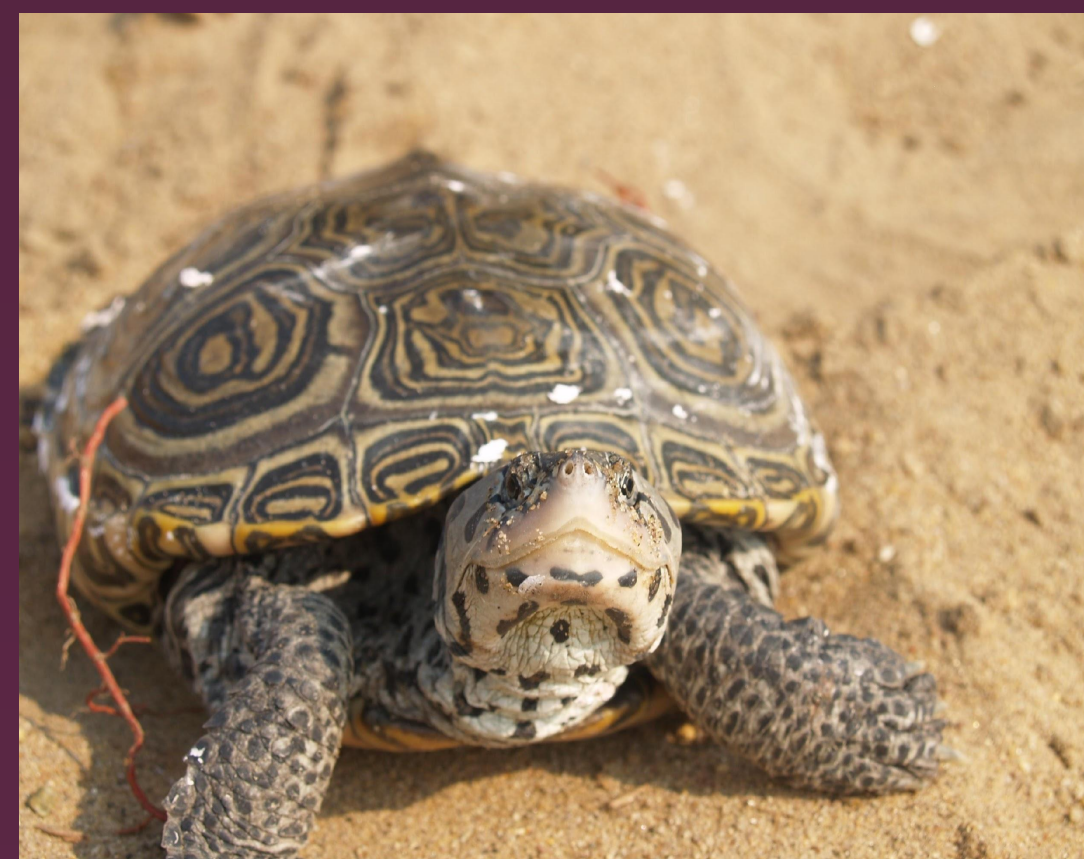


Fig. 1. Female terrapins, post-nesting



Fig. 2. NY/NJ terrapin collection sites

## The Diamondback Terrapin

The diamondback terrapin is the only turtle in North America that is adapted to a brackish environment (Gibbons *et al.* 2001). It inhabits salt marshes, estuarine habitats and mangroves along the eastern coast of the US, from Cape Cod to Florida and along the Gulf of Mexico, to Texas (Butler *et al.* 2006). Terrapins play important roles in their ecosystems, and there is evidence that they help to control populations of grazers (Silliman and Bertness 2002). Unfortunately, they have been exposed to numerous threats since their discovery by humans. A main ingredient in turtle soup, terrapins were harvested to the point of near extinction until the early 1900s (Hart and Lee 2006). Though turtle soup declined in popularity and regulations were put in place to protect terrapins, anthropogenic disturbance is now threatening the species (Hart and Lee 2006).

## Nesting Behavior in Jamaica Bay

Perhaps one of the most interesting populations of terrapins resides in Gateway National Recreation Area (GNRA), and specifically in Jamaica Bay, at the heart of an extremely urbanized and developed area (New York City). Jamaica Bay is a 2509 ha estuarine bay located in the southwest corner of Long Island. As much as 90% of the bay's marshland has disappeared and threats to the marshland still continue in the form of sea level rise and changes in sediment deposition patterns (NPS 2007). Nearly all nesting in the western portion of the bay occurs on Ruler's Bar island but there has been a steady decrease in the number of nests laid, with there now being 43% fewer nests than there were in 1999 (Fig.3). The terrapin population nesting on Ruler's Bar is thought to depend on marshland that is experiencing rapid decline.

Fig. 3. Decline in number of nests laid/year by terrapins on Ruler's Bar



Fig. 4a. Predated terrapin nest

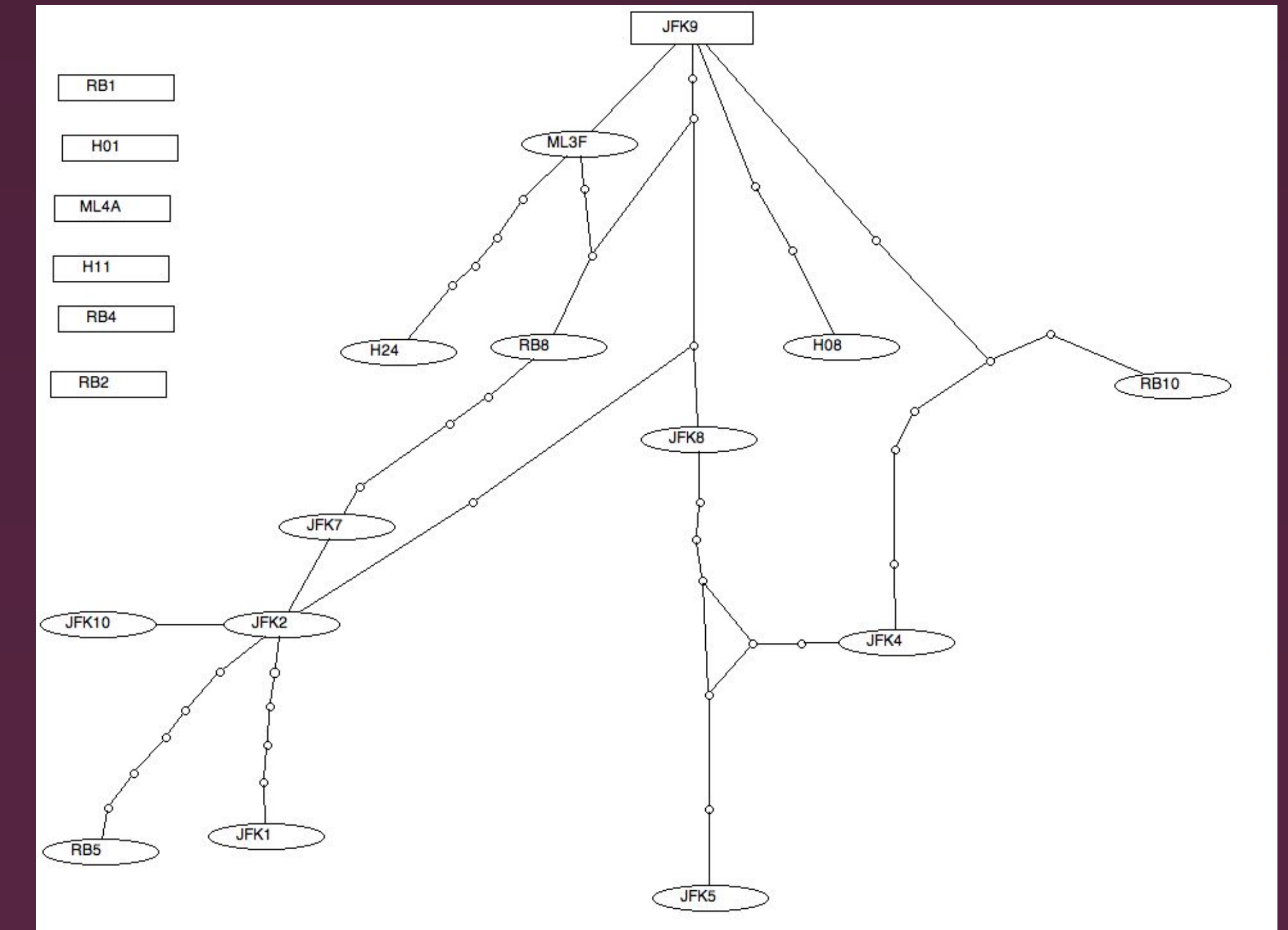


Fig. 4b. Raccoon tracks in the vicinity of predated terrapin nests

## Are Females Moving to New Nesting Sites?

In summer 2011 we surveyed potential terrapin nesting sites in order to investigate if the decrease in nesting activity on Ruler's Bar correlated with an increase in nesting activity elsewhere. We visited Jamaica Bay Riding Academy, Ruffle Bar Island, Subway Island, Dubos Point, Edgemere Park and the east side of Ruler's Bar and searched for predated nests as a sign of terrapin nesting activity. We noted a significant amount of nesting activity in the eastern part of the bay, which correlated with a large number of terrapins attempting to nest on the shores of JFK airport this summer. JoCo Marsh, adjacent to JFK, seems to be the healthiest marshland remaining in the bay.

Fig. 5. TCS parsimony network of mitochondrial DNA



## Population Genetics of NY/NJ Terrapins

Preliminary TCS analysis (Fig. 5) seems to indicate that there is a moderate amount of both gene flow and genetic diversity among the sub-populations sampled. No one population is so genetically distinct that TCS considers it unique and unrelatable to the other populations. Furthermore, the same sequence is found in at least two geographically distinct locations. The TCS network, however, displays only a small sample of sequences collected, and only mitochondrial DNA has been analyzed. Further analysis is needed to fully understand migration and colonization patterns.



Fig. 6a. Taking blood from the caudal artery for DNA analysis

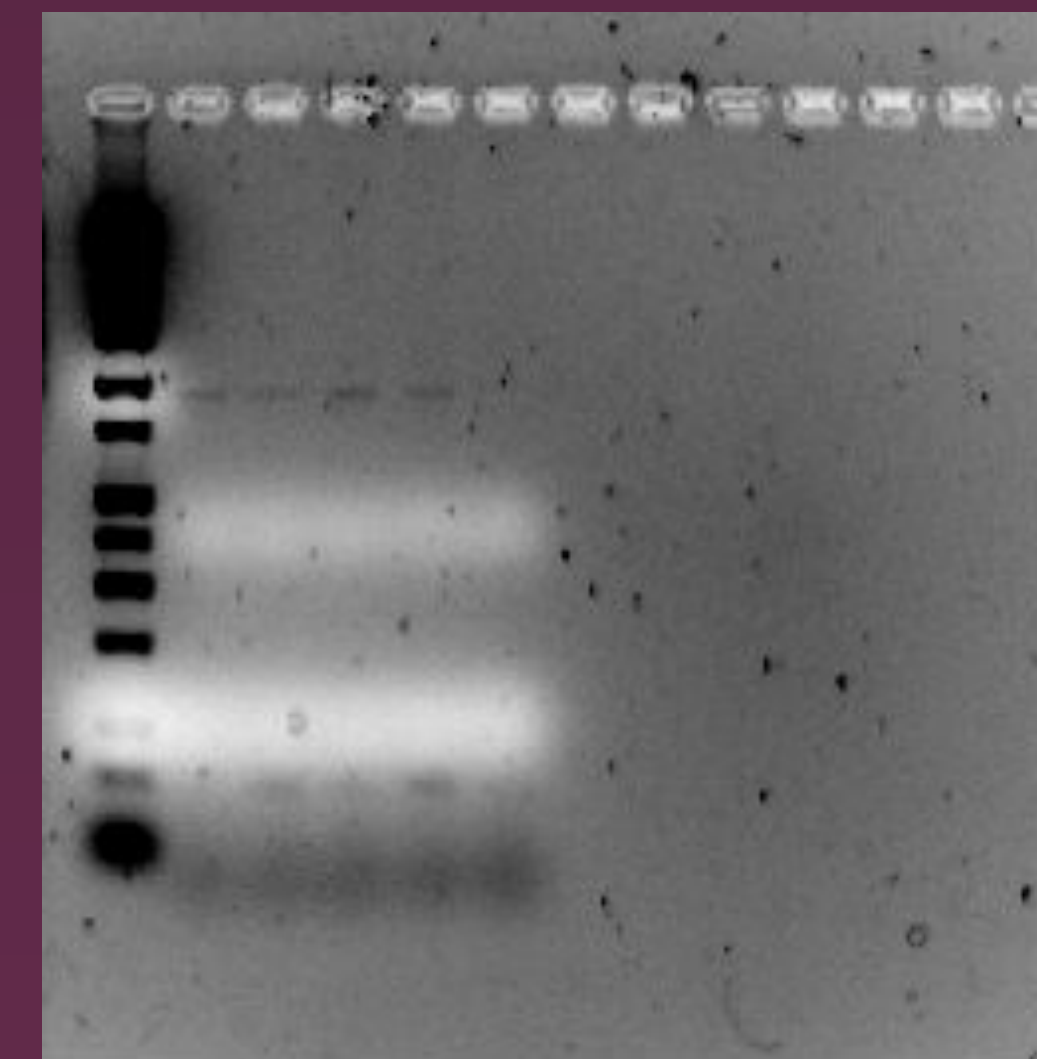


Fig. 6b. PCR products using *M. terrapin* D-loop primers on extractions from blood-soaked gauze

## Works cited

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