Using Trail Cameras to Determine Behavior and Timing of Species Utilizing a Diamondback Terrapin (*Malaclemys terrapin*) Artificial Nesting Area in Marion, MA

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Introduction

The Diamondback Terrapin (*Malaclemys terrapin*) is a threatened species of estuarine turtle that ranges from Massachusetts to Florida (Brennessel, 2006). The creation of artificial nesting areas is an important conservation tool for the survival of this species due to the reduction in suitable nesting areas as a result of climate change (Wnek et al., 2013). Another threat to terrapins is predators such as Eastern Coyote, Red Fox, and Striped Skunk. Trail cameras were utilized at The Cove's Turtle Garden, Marion, MA, to monitor behavior and activity of terrapins and their predators in relation to time of day and tidal cycles. Data collected in spring and summer 2020 and 2021 were analyzed to identify trends and patterns of terrapin and predator occurrences.

Research Hypotheses

H1: Reproductively mature terrapins will utilize the Turtle Garden for nesting activity, during high tide, slack or flood current, and from sunrise to sunset (daylight hours).
H2: Predators will predominately exhibit investigating or digging behaviors.
H3: Predators of terrapins will be documented during high tide, slack or flood currents, and daylight hours while predators of nests will be observed during low tide, slack or ebb currents, and from 1 hour after sunset to 1 hour before sunrise (nocturnal hours).

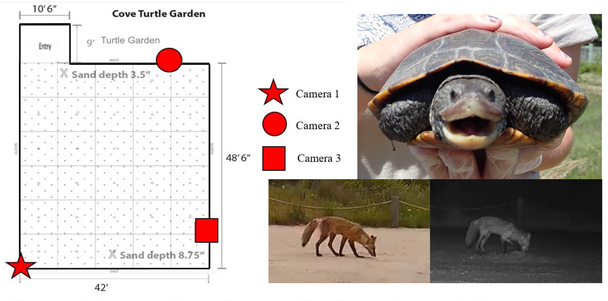

Figure 1. Map of the Turtle Garden at The Cove in Marion, MA with locations of 2021 trail cameras (left) and photo of adult terrapin (top right) Red Fox in 2021 (bottom right).

Materials/Methods

This study occurred at The Cove's Turtle Garden (187.3 m^2) in Marion, MA from 05/31/2020 to 08/02/2020 and from 06/14/2021 to 08/10/2021. Browning Strike Force Pro cameras were utilized: 2 in 2020 and 3 in 2021 (Fig. 1). Data in 2020 were collected by 2020 NECWA intern, Olivia Reed. Data from both years were analyzed for species occurrence, diurnal activity, and behavior exhibited. Occurrences for each variable were examined and a Single Factor ANOVA was utilized to determine significant differences between occurrences of species and behaviors, tidal cycle, and time of day within each year.

Results

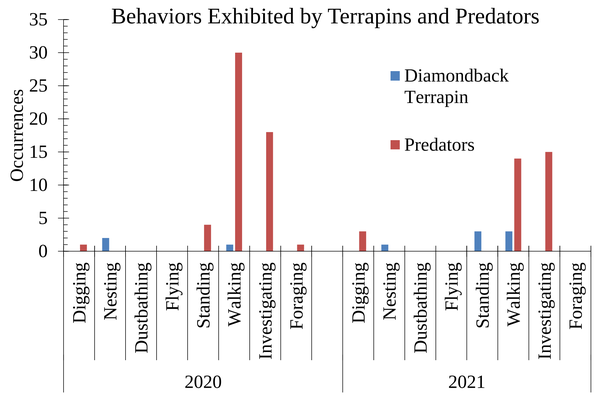

Figure 2. Total number of behaviors exhibited by terrapins and predators documented at the Turtle Garden in 2020 and 2021.

In 2020, terrapins were documented exhibiting various behaviors on 3 occurrences: 2 nesting and 1 walking. In 2021, terrapins were seen exhibiting various behaviors on 7 occurrences: 1 nesting, 3 walking, and 3 standing. In 2020, predators were documented exhibiting different behaviors on 52 occurrences: 18 investigating, 30 walking, and 1 digging. In 2021, predators were documented exhibiting different behaviors on 31 occurrences: 15 investigating, 14 walking, and 3 digging (Fig. 2).

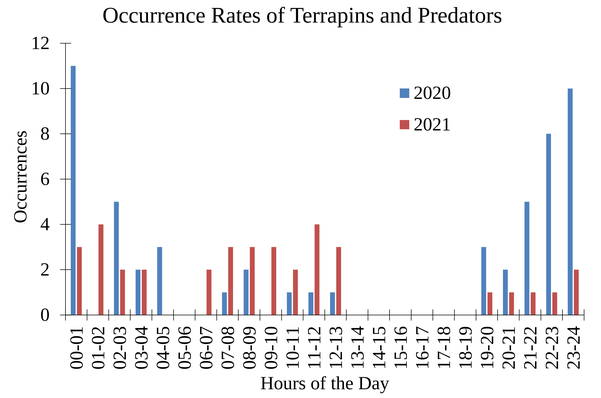

Figure 3. Total number of terrapin and predator occurrences over a 24-hour period documented at the Turtle Garden in 2020 and 2021.

In 2020 and 2021, terrapins only occurred during daylight hours, 3 in 2020 and 7 in 2021, with no occurrences between 1300 and 1900 hours. In 2020, predators had 39 occurrences during nocturnal hours and 3 occurrences during daylight hours from 0700 to 0900. In 2021, the Red Fox was the only predator and occurred almost equally during day and night with 14 and 16 occurrences, respectively. Similar to terrapins, predators were absent during the period between 1300 and 1900 for both 2020 and 2021 (Fig. 3).

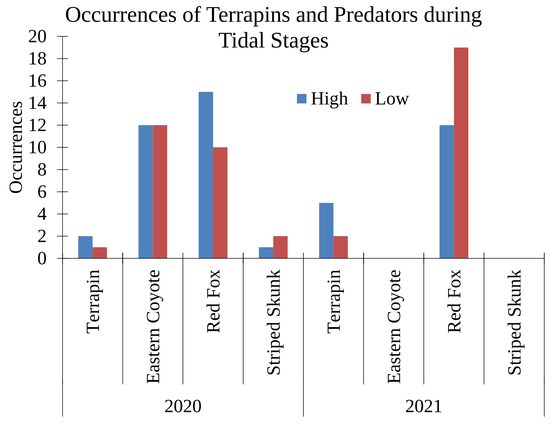

Figure 4. Total number of terrapin and predator occurrences documented during high and low tide at the Turtle Garden in 2020 and 2021.

In 2020, terrapins were documented during high tide on 2 occurrences and low tide on 1 occurrence. In 2021, terrapins were documented during high tide on 5 occurrences and low tide on 2 occurrences. In 2020, Eastern Coyote occurred equally between high and low tides with 12 occurrences each. Red Fox had 15 high tide occurrences and 10 low tide occurrences. Striped Skunk had 1 high tide occurrence and 2 low tide occurrences. In 2021, Red Fox was the only predator and had 19 low tide occurrences and 12 at high tide (Fig. 4).

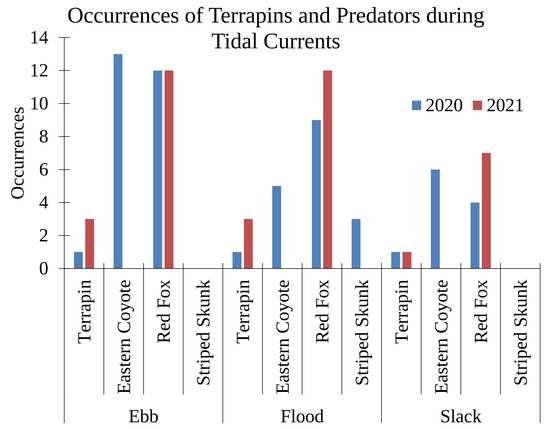

Figure 5. Total number of occurrences of terrapins and predators documented during tidal currents at Turtle Garden in 2020 and 2021.

In 2020, terrapins had 1 occurrence for each tidal current while in 2021, terrapins had 3 occurrences during ebb and flood currents with 1 occurrence at slack current. In 2020, Eastern Coyote occurrences varied with 13 at ebb, 5 at flood, and 6 at slack. Red Fox occurrences also varied with 12 at ebb, 9 at flood, and 4 at slack. Striped Skunk had 3 occurrences during flood current. In 2021, Red Fox had 12 occurrences during ebb and flood currents and 7 during slack current (Fig. 5).

Discussion and Conclusion

Terrapin activity in both 2020 and 2021 supports Hypothesis 1. Nesting during daylight hours helps females avoid predators, which are predominantly nocturnal. Nesting around high tide decreases their exposure to predators and reduces energy needed to reach suitable nesting areas. This also ensures that nests are above the water table, preventing saltwater inundation at extreme high tide. (Burger and Montevecchi, 1975).

Data collected on predators supports Hypothesis 2 that investigating, and walking were predominant behaviors. These behaviors suggest that predators utilize the garden for foraging of terrapins or nest contents.

Timing of predator activity varied between the two years providing limited support for Hypothesis 3. In 2020, predators of terrapins, Eastern Coyote and Red Fox, were primarily observed during high tide and ebb current, but the majority of occurrences were at non-daylight hours. These species also prey on nest contents which explains their occurrences at this time. In 2021, Red Fox, the only predator observed, was seen predominantly during low tide with similar rates of occurrences for tidal currents and time of day. Red Fox are known to target both adult terrapins and nest contents which could explain this pattern. This change in activity between the two years could be due to the absence of the Eastern Coyote in 2021 which resulted in more available resources for other predator species (Mueller et al., 2018; Brennessel, 2006).

Trail cameras were useful in documenting predator activity but had difficulty documenting terrapin activity. In 2020, terrapins were documented only 3 times, however 18 nests were laid. In 2021, terrapins were documented 7 times, however 21 nests were laid. This thesis provides the basis for future research on monitoring wildlife populations within an artificial nesting area designated for conservation of the Diamondback Terrapin.

Literature Cited

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