

## **Effects of Vegetation Management within Maritime Forests on Gray Tree Frog (*Dryophytes chrysoscelis*) Populations**

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Amphibians play an important role in the ecosystem as they act as indicators of ecosystem health due to their sensitivity to environmental change and their biphasic lifestyle. Habitat loss and degradation threaten amphibian species including Cope's Gray Tree Frog (*Dryophytes chrysoscelis*), a species listed as endangered in New Jersey due to its limited population size and habitat availability. Understanding how tree frogs respond to restoration practices is necessary to guide management practices and protect populations. In this study, we monitored Cope's Gray Tree Frog presence and distribution of tree frogs within artificial refugia. We considered an experimental plot in an area that was treated with herbicide and ploughed to remove invasive vegetation as well as a nearby control plot. Data was collected for two years before and after management. To gain an additional sense of tree frog distribution within treatment and control plots, I also conducted evening call surveys. My results indicate that year, relative humidity, and plot significantly affected frog occupancy ( $X^2_5=202.3$ ,  $P<0.01$ ). Furthermore, frog occupancy was significantly greater in 2021 prior to restoration ( $P<0.01$ ). Years prior to restoration showed lower frog occupancy in the control plot, which is less favorable habitat, compared to the experimental plot (2020:  $X^2=32.2$ ,  $P<0.01$ ; 2021:  $X^2=4.3$ ,  $P<0.05$ ). In 2022 after treatment there was no significant difference in frog occupancy between plots ( $X^2=0.4$ ,  $P=0.50$ ). These results suggest restoration approaches at the site should be modified in the future to reduce impacts to the tree frog population.

## **Comparing Avian Habitat Use and Nesting within Enhanced and Natural Marsh Areas Surrounding The Wetlands Institute**

*Kaycee Doherty, Catawba College*

Historic and recent placement of dredged material has played a significant role in shaping marsh landscapes. Many marsh areas enhanced with dredged materials have become important nesting habitats for sensitive marsh birds and may become increasingly valuable as sea level continues to rise. This study investigated how marsh enhancement through the placement of dredged material influences species diversity, abundance, and nest site selection to help inform future conservation and management efforts. Results show a significant difference in species diversity by site ( $X^2_2=11.3$ ,  $P<0.01$ ), with habitat surrounding a historic placement area having significantly higher species richness compared to habitat surrounding a more recent placement area ( $P<0.01$ ) and a natural marsh area ( $P<0.01$ ). I observed more foraging within the historic placement area compared to the recent placement area ( $P<0.01$ ) and natural marsh ( $P<0.01$ ), and more nesting behavior within both the historic ( $P=0.03$ ) and recent placement ( $P=0.03$ ) areas when compared to natural marsh ( $X^2_2=6.2$ ,  $P=0.04$ ). Throughout the study period, the control plot had two total nests (2 species), the recent thin-layer placement had ten (3 species), and the historic site had thirty total nests (5 species), with significant differences in species nesting at each site ( $X^2_{10}=39.1$ ,  $P=<0.01$ ). This study contributes to our understanding of biological succession associated with marsh restoration and how these changes may affect the species using each habitat type. Furthermore, this information will help inform decisions in creating and maintaining more resilient avian habitats in the face of sea level rise.

## **Understanding Diamondback Terrapin Activity on an Elevated Nesting Habitat in a Southern New Jersey Salt Marsh**

*Carly Shaw, Flagler College*

The diamondback terrapin (*Malaclemys terrapin*) is a candidate for Special Concern status in New Jersey, due to threats including road mortality, bycatch in commercial crab traps, coastal development, climate change, and predation. To mitigate risk from flooding and roads, elevated nesting habitats (ENHs) have been created in the salt marsh via the beneficial reuse of dredged materials. I analyzed terrapin activity on and around an ENH on Ring Island in Stone Harbor, New Jersey, including evidence of nest attempts and nest predation and live terrapin encounters, to better understand use of this site. All terrapins found (N=12) were scanned for passive integrated transponder (PIT) tags, and if untagged (N=8), were marked. I recaptured two terrapins last found in the 1990s, which suggests that they might have changed their nesting location to the ENH after its construction. The number of terrapins found on the ENH was not correlated with tidal stage ( $X^2=0.06$ ,  $P=0.87$ ) or with the number of terrapins encountered on a nearby nesting site at The Wetlands Institute ( $P=0.75$ ). I created ArcGIS maps to visualize where terrapins are most active on and immediately adjacent to the Ring Island ENH, and results show that the highest amount of activity was found at elevations from 1.2m-1.5m ( $X^2_3=94.7$ ,  $P<0.01$ ). This information helps to demonstrate the conservation value of ENHs to terrapin populations, as they are well-used by nesting terrapins and may be more suitable environments located farther away from road traffic and well above the high tide line.

## **Analysis of Avian Habitat Use and Behavior within Recent Dredged Material Placement Sites**

*Rebecca Miller, Stockton University*

With many tidal marshes deteriorating due to erosion, subsidence, and sea level rise, coastal birds have less available and suitable habitat for feeding and nesting. Within the Seven Mile Island Innovation Lab, dredged material placement has been used to increase marsh elevation to provide augmented nesting sites for wading birds near existing wading bird colonies. This study investigates how successful these dredge sites have been at creating nesting sites, as well as how other coastal birds respond to recent placement areas on Sturgeon, Gull Island, and a non-enhanced marsh. During this study, no instances of wading bird nesting were observed. However, results from this study suggest that dredged material placement may increase species richness ( $F_{2,16}=32.0$ ,  $P<0.01$ ) and abundance ( $X^2_2=6.1$ ,  $P<0.05$ ). Species richness was significantly higher for the Sturgeon placement compared to the Gull placement ( $P<0.01$ ) and the control site ( $P<0.01$ ). However, there were no significant differences in species richness between the Gull placement and the control site ( $P=0.50$ ). Birds also exhibited fewer behaviors within the control site ( $F_{2,16}=16.9$ ,  $P<0.01$ ) compared to the Gull placement ( $P=0.01$ ) and Sturgeon placement ( $P<0.01$ ). Among recently enhanced sites, common behaviors varied in frequency, with more foraging and less alert birds on the Gull placement versus Sturgeon (foraging:  $P<0.01$ ; standing: 0.05). These results can provide a baseline for understanding how coastal bird habitat use changes when marshes are enhanced through beneficial reuse of dredged material. This effort will help researchers to target marsh enhancement projects to increase habitat functionality for coastal bird species in the future.

## **Understanding Intraspecific and Interspecific Interactions of Black-crowned Night Herons at Key Nesting Colonies**

*Oliver Puckett, Texas A&M University – Corpus Christi*

The Black-crowned Night-Heron (*Nycticorax nycticorax*), a small, stocky heron species that nests in wetland ecosystems, is recognized as a threatened species in New Jersey. To better understand competition at one of the most important mixed-species colonies of wading birds in New Jersey, I investigated the intra- and interspecific interactions of night-herons at two nesting areas on Gull Island, a site of ongoing research and restoration activities. Results indicate that intra- and interspecific interactions may be influenced by both researcher presence ( $X^2_9=24.3$ ,  $P<0.01$ ) and site ( $X^2_9=24.1$ ,  $P<0.01$ ). While researchers were present, aggressive interactions were observed more than when researchers were not present ( $X^2_1=4.13$ ,  $P=0.04$ ). While disturbed, there were more intraspecific (58.3%) and gull (12.5%) interactions, while without disturbance, there were fewer intraspecific interactions (10%) and more with other wading birds (70%) ( $X^2_9=24.3$ ,  $P<0.01$ ). On the western site, interactions were higher with other night-herons (62.5%) and gulls (25%), while the eastern site saw less night-heron interactions (30.8%) and more with other wading birds (53.9%) ( $X^2_9=24.1$ ,  $P<0.01$ ). During researcher activity, fish crows were present around the colony for shorter amounts of time ( $X^2_2=59.4$ ,  $P<0.01$ ), indicating that risk of nest predation by fish crows may not be influenced by researcher presence. Future research may be necessary to better understand nest or chick vulnerability within important night-heron nesting areas, further refine methods that minimize disturbances of nesting birds while conducting monitoring efforts, and optimize monitoring design to improve our understanding of intra- and interspecific dynamics within key mixed-species colonies.

## **Hotspot Analysis of Diamondback Terrapin Encounters on Sea Isle Boulevard**

*Rachel Helt, Lebanon Valley College*

The Diamondback Terrapin (*Malaclemys terrapin*) is a candidate species of special concern in New Jersey, and is the only turtle in North America that strictly inhabits brackish marshes. Each summer, female terrapins emerge from the water to nest above the high tide line, putting them at risk for road mortality during peak tourist season in coastal New Jersey. High rates of terrapin mortality were documented over decades of surveys on Sea Isle Boulevard, a heavily traveled coastal road in southern New Jersey. From 2015 to 2019, this boulevard underwent construction to elevate the roadway and install permanent wire fencing to mitigate terrapin road mortality. I examined changes in terrapin encounter hotspots along Sea Isle Boulevard pre- (2013-2014) and post-construction (2022-2023) using *Siriema* software. Additionally, I compared terrapin encounters for a subset of days and times when patrols were conducted every year. The results indicate that terrapin crossing hotspots shifted post-construction, and some hotspots increased in intensity from pre-construction. Moreover, a standardized proportion of terrapin encounters per patrol for Sea Isle Boulevard on Wednesdays and Thursdays did not significantly decrease after fence installation ( $X^2_3=5$ ,  $P = 0.18$ ). Overall, although the installation of the fencing on Sea Isle Boulevard may have been initially successful, lack of fence maintenance could lead to breaks in the fence, resulting in higher terrapin encounters and mortality along these areas due to the funneling of terrapins into them. This study highlights the importance of fence maintenance after installation to effectively reduce wildlife mortality on roads.