Avian Nest Predation and the Impacts of Freshwater Ecosystems

Created and Designed by: Keith R. Clayton and Dr. Gregory A. George

Abstract:

Nest predation is the leading cause of reproductive failure in birds, accounting for about 70% of net loss (Ricklefs 1969)

At the conclusion of the project, a total of 119 predation events occurred over 6 weeks. The leading predators being: Eastern Gray Squirrel, Raccoons, and various Crow species.

It was determined that nest height did not play a significant role in predation, but the leading influence on predation was the presence of a freshwater ecosystems (lake, river, stream).

Photo 4. Blue Jay predation at Delaware Valley University

Introduction:

The project consisted of three active nesting sites: The Pine Barrens in Medford, NJ; Bottoms Lake in Clementon, NJ; and Delaware Valley University's campus in Doylestown, PA. The Pine Barrens site will take place on the property of Woodford Cedar Run Wildlife Refuge.

All sites will consists of 12 nests (4 ground level/ 4 shrub level/ 4 Lower-mid-story).

The goal with multiple levels would be to determine if predation rates change at various heights and to see if predator species change.

All sites consisted of similar features where 8 of 12 nests were surrounded primarily by trees; and 4 of 12 were within close proximity of freshwater.

References:

Gill, Ryan A., W. A. Cox, and Thompson, Frank R., I.,II. 2016. "Timing Of Songbird Nest Predation as Revealed by Video Surveillance: A Journal of Ornithology." *The Wilson Journal of Ornithology* 128 (1) (03): 200-203

Minelli A., 2008. "Predation." *Encyclopedia of Ecology.* 2923-2929

Ricklefs RE (1969) "An Analysis Of Nesting Mortality In Birds." *Contribution Zoological* 9:1–4

Methods:

This project spanned five months, March through July 2022. March and April have been used to perfect the nest mounting techniques, to gather materials, and create the artificial clay eggs.

All nests were be set up April 27-30; and data collection and monitoring began on May 1st and concluded June 18th. All nests were observed on a weekly basis, where impacted clay eggs were collected and quail eggs were replaced. At each visit camera traps were replaced and photographs reviewed. All data was late analyzed using 'R'.

Results:

From May 1st to June 18th, 119 predation events occured.

68% of all predation occurred around a freshwater ecosystem.

Nest height did not play a significant role in predation.

After reviewing photos and dental imprints, the most abundant species are:

- Eastern Gray Squirrel
- Raccoon
- Crow spp.

An honorable mention is the Yellow-Billed Cuckoo who destroyed a nest in the Pine Barrens. This is intriguing because Cuckoos are known being brood parasites.

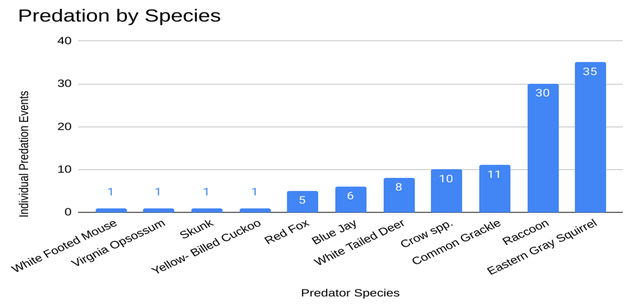

Figure 1. Predation totals by Species

Photo 1. Yellow-Billed Cuckoo (Coccyzus americanus) at Pine Barrens Nest #6

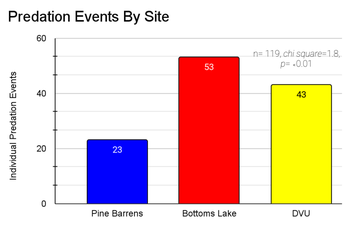

Figure 2. Predation Events by Site

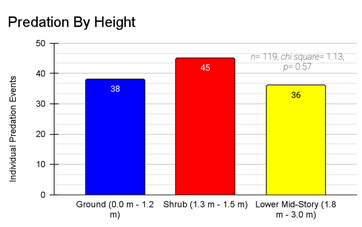

Figure 3. Predation by Height Category

Photo 3. Example Nest containing 4 quail eggs

Photo 2. Crow Spp. at Bottoms Lake, NJ. Nest #9 05/11/22

Discussion:

"Predation is the ecological process by which energy is transferred from living animal to living animal based on the behavior of a predator that captures and kills a prey before eating it (Encyclopedia of Ecology, 2008).

The use of camera traps and clay eggs to observe predators was incredibly successful. Cameras traps took photos at all times of day when set off by motion. The clay eggs remained malleable and rendered perfect dental imprints from various species.

The primary purpose of three different sites was to observe the effects that forest fragmentation has on predator density.

Conclusion:

At the conclusion of the experiment, we successfully determined what predators are interacting with avifauna nests during summer months.

Our initial hypothesis was that more than 50% of shrub-level nests will experience predation, and at least 60% of all nests will show signs of predation. The project concluded with 100% of shrub-level nest experiencing predation at least once, and 99% of all nests experiencing predation at least once.

Knowing what predators are actively interacting with song bird nests can lead to observations and new conservation strategies for subjected passerines.

Acknowledgements: I would like to thank Bristol Myers Squibb and Delaware Valley University for making this project possible. Thank you to my various "field assistants" who courageously assisted in data collection in various weather conditions. I am forever grateful to Woodford Cedar Run Wildlife Refuge and the Borough of Clementon, NJ for allowing me to use their land for the duration of this project.