

QUINNIPIAC RIVER FUND FINAL REPORT- 2018

Please complete and submit completed form via e-mail to dcanning@cfgnh.org at The Community Foundation for Greater New Haven by March 29, 2019 (or as otherwise stated on the terms of grant).

Date: 9/30/2019

Group/Organization Name: Quinnipiac University

Address: 275 Mt. Carmel Avenue

City, State, & Zip: Hamden, CT, 06518-1942

Telephone #: 203-582-7304

Project Name: Monitor the ecology of songbirds in the Quinnipiac River watershed

Grant Number: 20180204

Name & title of person completing this form: Professor Scott Davies

E-mail address: Scott.Davies@quinnipiac.edu

Please respond to the following statements:

1. List the specific objectives/outcomes of the project and tell how they were met during the grant period. Also, provide an update on any special conditions of the grant (if applicable).

Objective 1

The first goal of my project was to construct and erect bird nest boxes on the Quinnipiac River and the surrounding area. Furthermore, each location was to differ in the degree of urbanization so I could study whether birds are affected by the degree of urbanization.

In April and May 2018, I constructed wooden nest boxes and erected them at four different locations in and around the Quinnipiac River watershed. I requested an extension to the deadline of the grant so I could also study the boxes in the 2019 breeding season. To quantify the degree of urbanization at each of my sites, I used published software that uses satellite images to measure the amount of buildings, vegetation, and impervious surface, such as roads and parking lots. This analysis showed that the habitat around the boxes I erected along the Quinnipiac River in North Haven is indeed more urbanized than the boxes places around the Quinnipiac River watershed (Fig. 1).

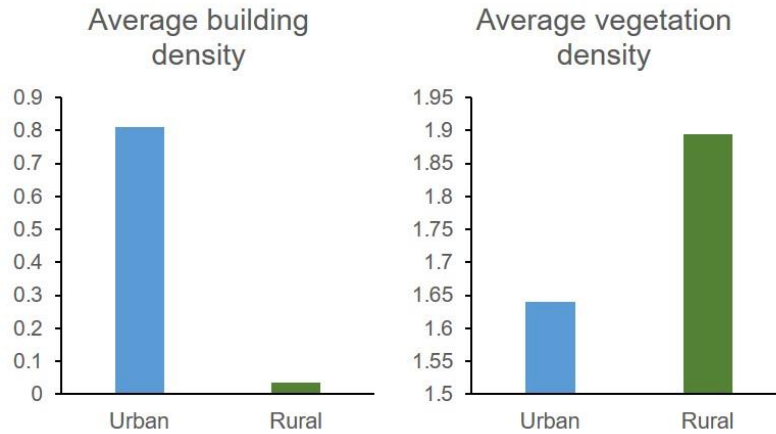


Figure 1. Measures of building and vegetation density at the habitat around boxes along the Quinnipiac River in North Haven (urban) and at locations around the Quinnipiac River watershed (rural).

Objective 2

The second goal of my project was to monitor the reproductive success of birds nesting in the boxes. I monitored these boxes in the 2018 breeding season and approximately 75% of the boxes were occupied by breeding songbirds (mainly tree swallows, *Tachycineta bicolor*), and the nests produced over 100 nestlings. Due to a delay in receiving the necessary permits to study wild songbirds, monitoring of the 2018 breeding season was limited. However, in 2019 I monitored the boxes in full.

We found that two measures shown to reflect breeding success (the date the first egg in a nest hatched and the date the nestlings left the nest) were both delayed in swallows breeding along the Quinnipiac River. We also found that the proportion of nestlings surviving to leave (fledge) the nest was substantially lower in swallows breeding beside the Quinnipiac River (Fig. 2). Together, these findings suggested that reproductive success in swallows breeding in urbanized areas beside the Quinnipiac River is lower than swallows breeding in rural areas farther away from the Quinnipiac River.

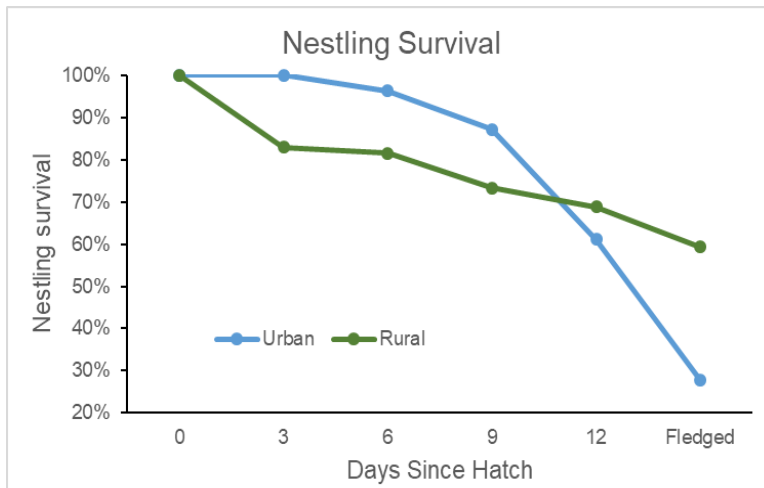


Figure 2. The proportion of tree swallow nestlings surviving from hatch (day 0) to leaving the nest (fledged) was lower in swallows breeding beside the Quinnipiac River (urban) than in swallows breeding in rural areas farther away from the Quinnipiac River.

Objective 3

The third goal of the project was to study potential factors to explain why some, but not all, individuals can successfully live in urban areas. In particular, we aimed to explore why Quinnipiac River swallows have lower reproductive success than swallows breeding in rural areas farther away from the Quinnipiac River. We found that growth rate of nestlings near the Quinnipiac River was slower than that of rural nestlings farther away from the Quinnipiac River (Fig. 3). Gaining mass during nestling development is crucial to reaching the size necessary to successfully leave the nest and be able to fly. Therefore, it is likely that reduced growth rate contributed to the lower reproductive success of swallow nestlings beside the Quinnipiac River. We also explored potential factors that may account for the reduced growth rate of Quinnipiac River nestlings and found that the increase in blood glucose levels typically seen in developing nestlings was also slowed in Quinnipiac River nestlings compared to rural nestlings farther away from the Quinnipiac River. Lower blood glucose levels of nestlings is potentially due to lack of food provided by the parents. It is possible that the habitat close to the Quinnipiac River does not provide sufficient food to support breeding swallows; however, we have not yet tested this hypothesis.

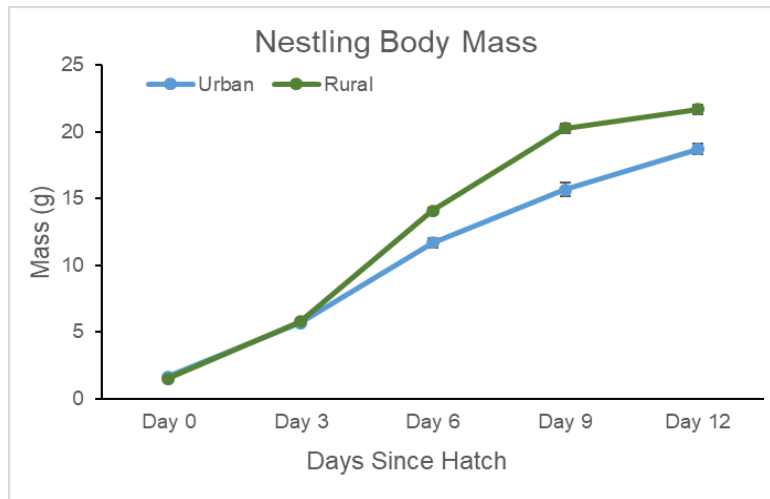


Figure 3. Growth rate of tree swallow nestlings in boxes beside the Quinnipiac River (urban) was slower than that of nestlings in rural areas farther away from the Quinnipiac River.

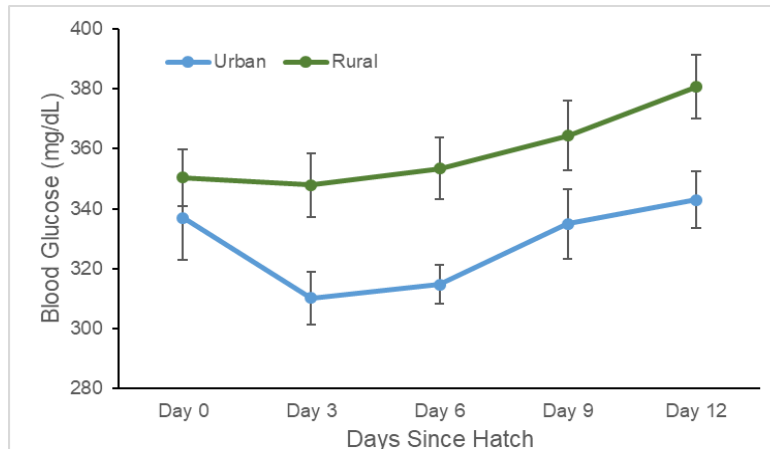


Figure 4. Blood glucose levels of swallow nestlings beside the Quinnipiac River (urban) was lower than that of rural nestlings farther away from the Quinnipiac River.

2. Please share your successes, challenges and any lessons learned through the implementation of your project. Were there any unintended consequences or lessons learned that may affect how you operate your program moving forward?

The major challenge associated with my project was to obtain all of the necessary permits to study wild birds. Although I was eventually granted all of the permits, because it was my first time applying for these permits in Connecticut, the initial review took longer than expected and delayed the start of my project. Now that I have all necessary permits in hand, future renewals should be more straightforward, so this factor is unlikely to be a problem in future. Another challenge was that the swallow nestling mortality along the Quinnipiac River was high, which made it difficult to obtain nest clutches that successfully survived all the way to fledging. A potential solution to this is to erect more boxes at these locations. The final challenge I faced with this project is in regards to personnel. My grant budget included funds for an assistant, and I had a Quinnipiac University student lined up for the position in 2018. Unfortunately, however, my student declined to take up the position at the last minute, leaving me with insufficient time to find a replacement. I therefore requested an

extension to the grant deadline so that I could employ an assistant during the 2019 breeding season. My assistant during 2019 was excellent and we accomplished all of our goals.

The primary success of my project is the high occupancy rates of the nest boxes I erected. Furthermore, there has been no vandalism of any of the boxes, which was a concern at the start of the project. I am therefore confident that the boxes can be used to monitor the ecology of songbirds in the Quinnipiac River watershed for many years to come.

3. What are the opportunities and needs of your organization as it continues to move forward with its work to positively impact the Quinnipiac River?

The major opportunity of my organization is to continue monitoring the ecology of songbirds in the Quinnipiac River watershed. The findings of my project suggest that tree swallows breeding along the Quinnipiac River have lower reproductive success than swallows breeding farther away from the Quinnipiac River. My organization and I could continue to explore what factors are responsible for this reduced reproductive success. Potential hypotheses to explore include reduced food availability and/or contaminants in the food sources (flying insects). By working with my colleagues in the departments of chemistry and engineering, I could explore the possibility that contaminants are present in the food of swallow nestlings in the Quinnipiac River watershed.

Also, please include a photo or image that can be uploaded along with your report to The Quinnipiac River Fund website.



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