

FURSCA End of Summer Report

A Home in the Heat: Investigating the Benefit of Heat-Shielded Nest Boxes on the Reproductive Success of Cavity Nesting Birds.

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It is no secret that global temperatures are warming. Every year we experience hotter and hotter spring and summer seasons, a troubling pattern that affects every organism on earth. Directly in the path of this harmful shift are birds, especially those that rely on ambient temperatures to keep their nests at an optimal temperature. Knowing this, the goal of my FURSCA project was to determine if the addition of a second roof to nest boxes would cool down the interior of the boxes and therefore lead to a greater rate of reproductive success for the birds living within them. The second roofs I installed were thin layers of one of three materials (plywood, aluminum, plastic), separated from the original roof by rubber spacers (Figure 1). Alongside these roofs I added temperature readers inside each box to collect internal box temperature and underneath each box to collect ambient temperature. It was my hope that these measurements would illustrate which roofs successfully cooled down the interior of the modified boxes.



Figure 1. The three variants of second roof installed onto pre-existing nest boxes. From left to right the materials are plywood, aluminum, and plastic.

My primary goal for the duration of my project was to collect all the necessary data to determine if the second roofs I installed were successful in lowering internal nest box temperatures. In this I was successful, all thirty-one boxes I monitored recorded temperature data across the thirty-seven days in which the temperature loggers were deployed (5/26/25 - 7/2/25). In addition to this information I also

collected nestling measurements, handling a grand total of seventeen chicks throughout their developmental period in hope of determining if the temperature at which they were incubated and raised affected development speed and overall size (Figure 2).



Figure 2. Nestling measurements. Tarsus length, wing chord length, and mass were recorded in the field using standard nestling measurement protocol.

Considering that the data will not be fully collected until the last day of the FURSCA period, most of my results will be finalized throughout this summer and the following semester to be ready for my honors thesis and Elkin Isaac presentation. However, I do have preliminary results regarding the difference between internal and external temperature in each nest box treatment. During the daytime hours, there was no significant difference between the control (unmodified) boxes and boxes with each of the second roof types (Figure 3). During the night however, there was a significant difference between the control and plywood roofs and the aluminum and plastic roofs (Figure 4). This means that boxes with aluminum or plastic roofs had internal box temperatures that were generally closer to the ambient nighttime temperatures, and occasionally even cooler than them. This data only encompasses the first half of the research period, before the drastic heatwave and hotter weeks, so I am confident that when the full summer dataset is collected, cleaned, and analyzed I will have clearer results.

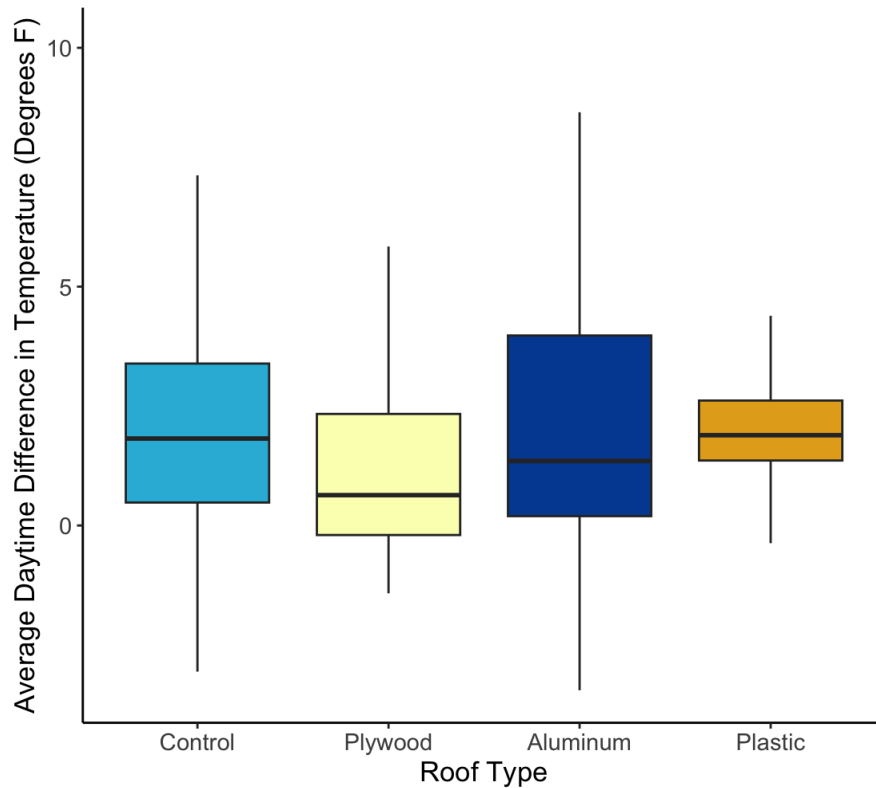


Figure 3. Box plot showing the relationship between second roof type and the average daytime difference in internal and external temperature. There is no significant difference between the four treatment types.

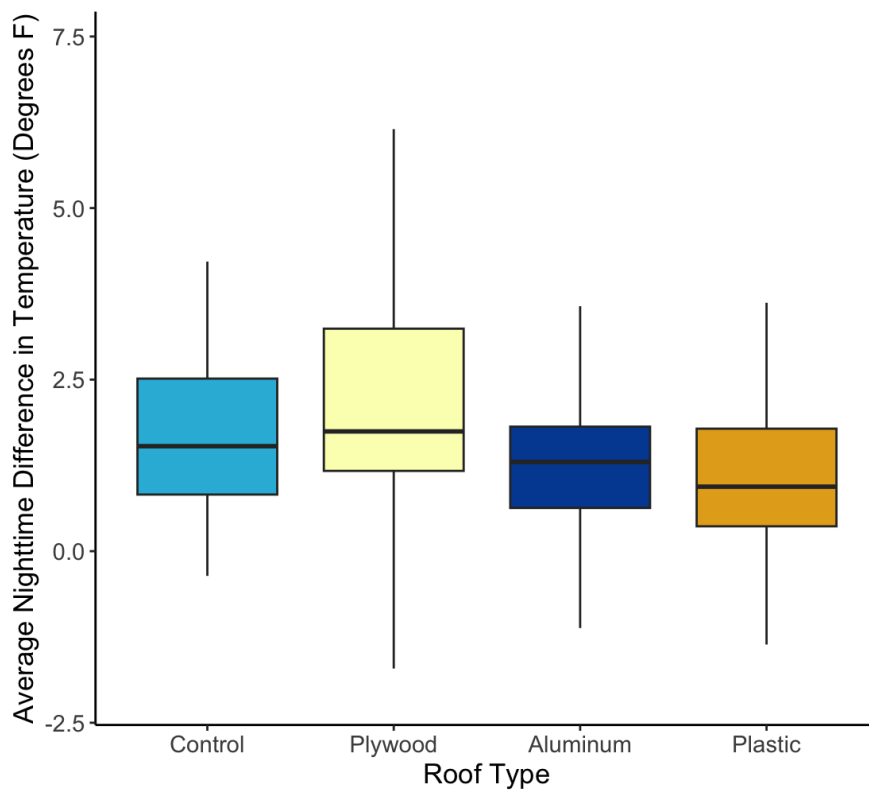


Figure 4. Box plot showing the difference between second roof type and average nighttime difference between internal and external temperature. There was a significant difference between the control and plywood treatment and the aluminum and plastic treatments.

This project will serve to fill gaps in the field of bird and nest box study, as it is one of the first of its kind to study second roofs. I hope to provide insight into how we can provide birds that use nest boxes with more comfortable and successful homes. Additionally, by measuring nestling growth I will better understand tree swallow development and how temperature affects such a critical period of life. These results will also contribute to the wider field of ornithology. I am hoping that I will be able to publish my thesis as well as present at various conferences to extend its reach, likely starting with Elkin Isaac where the results will be presented in their final form.

I would like to thank my advisor, Dr. Sblendorio, as well as the FURSCA committee and generous donors to the program. This summer has been a formative and exciting experience that has solidified my interest in and passion for not only birds but also the whole natural world.