

A Study to Determine Whether Natural Camouflage Will Increase
Usage of Artificial Nesting Boxes by Eastern Bluebird,
Tree Swallow and Chickadees

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Previous studies at the Powell River Project Education Center Bluebird Trail have involved comparisons between standard nesting boxes and open topped design, boxes that were modified by enlarging the holes to 2.75 inches, and most recently, the wedge shaped Peterson Box. The one factor that all these boxes had in common was that they were made of plain hewn wood. For this study, one box at each site was covered with tree bark to determine whether the three species of birds common along the trail (Eastern Bluebird, Tree Swallow and Chickadee) had a preference for naturally camouflaged nesting boxes over the hewn lumber boxes. Birds built nests and laid eggs in both camouflaged and hewn lumber boxes; however, only one clutch laid in an unadorned box successfully fledged.

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Introduction: The natural nesting sites for cavity nesting birds are dead trees, while most nesting boxes available for purchase are made from hewn lumber. The purpose of this study was to test whether the cavity nesting species active along the Powell River Bluebird trail would choose bark covered boxes over hewn lumber boxes. The three cavity nesting species that utilize artificial nesting cavities along the Powell River Bluebird trail include Eastern Bluebirds, Tree Swallows and Chickadees (Burkart et. al, 2007, 2008, 2009, 2010, 2011, 2012, and 2013). Bluebirds and Tree Swallows are secondary cavity-nesting birds, utilizing nesting cavities excavated by woodpeckers, while Black-capped Chickadees are primary cavity-nesters who will construct their own nests in dead tree (May, 2001).

Nesting boxes come in various designs, the most common of which are column shaped boxes (standard box design North American Bluebird Society), wedge shaped (Peterson design) and round with either a flat or slant roof (Bluebird Nest Box Styles: Pros and Cons, 2010). Most boxes are constructed using lumber rather than materials resembling natural nesting cavities (Cranmer Earth Designs Information: Birdhouse Comparisons, 2014; NABS Nest Box Specifications, 2010; Nesting Boxes and Accessories: Nest Boxes, 2007). Studies have been conducted comparing the shapes, hole diameter (Bluebird News, 2001; Bluebird Nest Box Styles: Pros and Cons, 2010; Burkart et. al, 2007, 2008, 2009, 2010, 2011, 2012, and 2013) and construction materials (Bluebird Nest Box Styles: Pros and Cons, 2010; Cranmer Earth Designs Information: Birdhouse Comparisons, 2014). Various documents caution against painting boxes or using preservatives on boxes, because these substances can be toxic to chicks and adults (Bluebird Nest Box Styles: Pros and Cons, 2010; My Nature Apps: Building a Bluebird Box, 2014; Nesting and Roosting Boxes for Birds, 2014). Painting boxes a dark color is cautioned against, because dark colors absorb heat and can cause daytime temperatures to rise above 41° C (107° F) which is fatal to eggs and chicks (*Sialis*, 2012). However, no study has been found testing plain wood boxes and boxes with a natural camouflage.

During the ninth season (Spring/Summer 2015) along the Powell River Educational Center Bluebird Trail, our study focused on testing whether Bluebirds, Tree Swallows and Chickadees have a preference for naturally camouflaged artificial nesting cavities over plain hewn lumber boxes. Data on species specific nesting activity was collected during the study, including nest building, number of eggs laid, number of eggs hatched and number of young fledged. In addition to the nesting data, high/low temperatures were measured in a pair of boxes to determine whether a box covered with bark developed higher internal temperatures than hewn lumber boxes.

Methods

Box preference and clutch success: Eight nesting sites were distributed around field 1 (figure 1 a) and an additional four sets were located around field 2 (figure 1 b). Each site in field 1 consisted of one nesting box camouflaged with tree bark (figure 2a) and a plain hewn lumber nesting box (figure 2b). None of the boxes in field 2 were camouflaged. Boxes in field 1 were attached to 2 x 4 x 4 boards, wrapped with aluminum flashing to deter predators, and nailed to posts along the fence lines. When possible, both of the boxes at a site were attached to posts so that the nesting box openings faced the same direction.

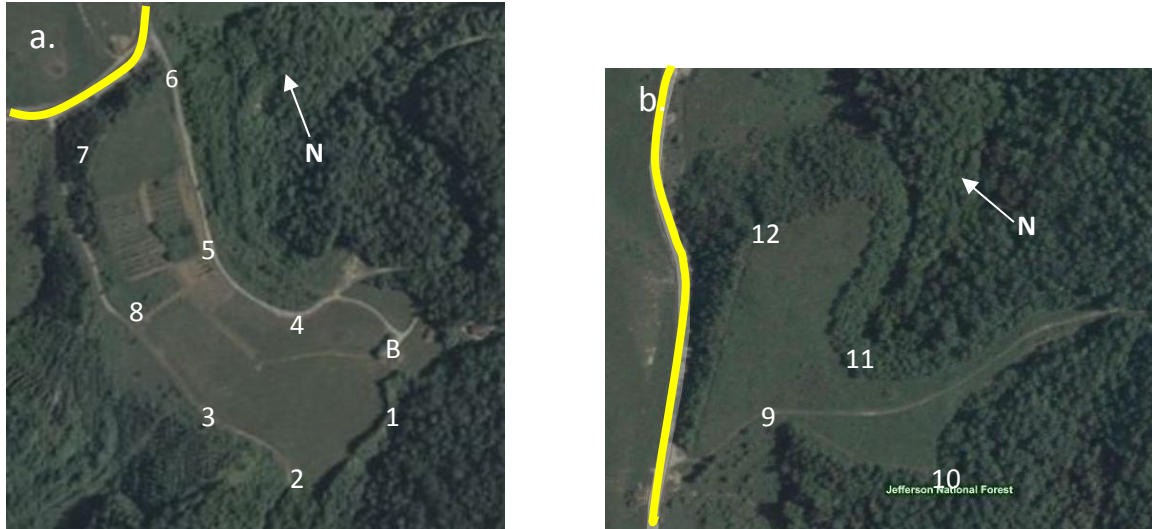


Figure 1. (a) Nesting box sites in field 1 where camouflaged boxes were installed alongside plain boxes and (b) field 2 where boxes were not altered. Numbers indicate the box locations. Arrow indicates north. The B indicates the position of the barn. Yellow lines indicate the location of the main road. (Image from Microsoft Virtual Earth.)



Figure 2(a). Camouflaged nesting box and (b) hewn nesting box with attached recording thermometers at nesting box site 4.

Monitoring began April 24, and continued on a weekly basis until June 23. In addition, internal and external temperatures were monitored from June 9-23 at site 4 in field 1. The thermometers recorded the maximum high and low temperatures both inside and outside boxes. This enabled comparisons to be made between internal and external temperatures for each box and for comparisons to be made between the internal temperature ranges between the camouflaged and hewn boxes. Probes were stapled to the inside of the nesting box doors, while the body of the thermometers were placed in plastic bags and to protect them from rain, and hung below the boxes (figure 2 a, b).

Monitoring activity followed the protocols established by Virginia Bluebird Society (Virginia Bluebird Trail Monitoring Information, 2004) and the North American Bluebird Society (Fact Sheet: Monitoring Bluebird Nest Boxes, 2002). Data was recorded on forms downloaded from the Virginia Bluebird Society website. Data collected included partial and completed nests, species identity, number of eggs, number of young, condition of young (recently hatched, feather development, etc.) and number of young fledged. Condition of the boxes was also noted, including the presence of ants, snakes, spiders or mice.

Results

Nesting activity: Delays in ordering and receiving supplies and the presence of active nests at sites 3, 4, 5 and 8 delayed the installation of camouflaged boxes and the transferring of the unmodified boxes to posts fitted with predator guards. As in previous seasons, nest building had begun in early April, with active nest present by the first monitoring visit on April 24. Nesting activity was extremely low in field 1 during this season (Table 1). There was no nesting activity in any of the boxes in field 2 (Table 1).

Box	Species	Nest building	# of Eggs	# of Hatchlings	# Fledged
1A	CH	Complete	6	5	0
1B	CH	Complete	0	---	---
2A	CH	Complete	2	0	---
2B	---	---	---	---	---
3A	---	---	---	---	---
3B	BB; CH	Complete	5; 5	0; 0	---
4A	BB	Complete	1	?	?
4B	CH; TS	Complete	0; 5	-; 0	---
5A	TS	Complete	6	5	5
5B	?	Complete	---	---	---
6A	---	---	---	---	---
6B	TS	Complete	3	---	---
7A	---	---	---	---	---
7B	BB	Complete	4	0	---
8A	---	---	---	---	---
8B	?; CH	Complete	5; 4	5; 4	0; 0
9A	---	---	---	---	---
9B	---	---	---	---	---
10A	---	---	---	---	---
10B	---	---	---	---	---
11A	---	---	---	---	---
11B	---	---	---	---	---
12A	---	---	---	---	---
12B	---	---	---	---	---

Table 1. Nesting activity during the 2015 season. Boxes labeled "A" were camouflaged, while boxes labeled "B" were hewn lumber boxes. Boxes 1-8 were located in field 1, while boxes 9-12 were located in field 2.

Chickadees produced 17 eggs (the highest number for the three species), 9 of which hatched; however, none of the hatchlings were fledged. Bluebirds produced 10 eggs. Nine of the eggs disappeared from nests. The fate of the egg present in the camouflaged box at site 4 is unknown; monitoring was halted on June 23 due to an unforeseen event. Tree swallows produced 14 eggs. The five eggs in box 5 A were laid before the box was camouflaged. All five eggs hatched, and these were the only young known to have fledged. The species that produced the first clutch of eggs in box 8 B was never identified. The chicks had hatched just before the first monitoring, no adults were ever observed entering the box, and the chicks disappeared before they developed identifying markings.

Box Temperatures: Internal and external temperature ranges were measured at site 4 from June 9-23. Both external and internal temperatures varied widely during this period. External temperatures ranged from 2° C to 32.7° C and 2.3° C to 37° C for boxes A and B, respectively. Internal temperatures were higher than external, with internal temperatures in box A ranging between 12° C and 44° C and between 11.8° C and 46.4° C in box B.

Discussion

Nesting activity along the bluebird nesting trail was low for all three species in comparison to previous seasons along trail. During the 2012 season, a total of 60 eggs were laid by the three species active along the trail, with 37 of those eggs successfully hatching and fledging (Burkart, et. al. 2012), while only 46 eggs were laid during the 2015 season with only 5 chick successfully fledging. The only activity was in field 1. The lack of nesting activity in field 2 may have been due to the two black snakes had taken up residence at nesting sites 10 and 12 (figure 3 a, b) in this field.



Figure 3. (a) Black snake in box 10 B and (b) box 12 A.

With the exception of the tree swallow chicks in box 5A, none of the eggs or chicks in field 1 fledged. All were assumed to be lost to predators before the predator guards could be put in place. However, birds did utilize both the camouflaged and hewn lumber boxes. Birds built nine nest in the hewn lumber boxes resulting in five clutches and five fledglings. Four nests were built in camouflaged boxes resulting in four clutches of eggs but no fledged young. Higher ambient temperatures during June [average high 25° C and 29° C for May and June, respectively (Weather Underground, 2-15)] resulting in high daytime temperatures inside the boxes may have discouraged nesting activity in the artificial boxes. The boxes along the trail receive sun throughout the day and the high temperatures measured in each box (44° C in the camouflaged box and 46.4° C in the hewn lumber box) were high enough to kill eggs and chicks (41° C; *Sialis*, 2012).

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