

**A Study to Determine the Preference for Nesting Box Design of
Sialia sialis (Eastern Bluebird): Comparison of the Traditional Nesting Box
And the Peterson Box**

Year 1

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For the 2012 nesting season along the trail at the Powell River Education Center, nesting preferences were studied comparing the traditional box design and the Peterson box. Peterson boxes differ from the traditional boxes in that they have a lower internal volume, requiring less material for nest construction. By decreasing the amount of energy that the parents would have to put into nest building, they would have more energy available for rearing young, hence increasing fledgling success. The Peterson box was found to be an acceptable design by the three species that nest along the trail. Bluebirds, tree swallows and chickadees utilized the Peterson boxes; however, bluebirds built most of their nests in the traditional boxes (six clutches in traditional boxes to one in a Peterson box). Chickadees produced four nests, three of which were in traditional boxes. Both tree swallow clutches were in Peterson boxes. Egg and chick loss due to predation was high this season (11 eggs and 8 chicks) making it difficult to conclude whether the design of the Peterson box affected fecundity. Student volunteers from both the general biology and human anatomy and physiology classes at Mountain Empire Community College assisted in the installation of the Peterson boxes and the monitoring of nesting activity during the course of the breeding season.

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Introduction

Bluebird boxes are available in various shapes, hole sizes, hole shapes and materials, which have been the subjects of debate in birding literature (NABS Nest Box Specifications, 2010; Nesting Boxes and Accessories: Nest Boxes, 2007). During previous seasons at the bluebird trail established at the Powell River Education Center, nesting boxes designed to discourage nesting competitors were tested against the traditional design. Designs that were tested included open topped boxes open topped boxes with awnings and boxes with enlarged opening. Birds used the boxes with enlarged holes (Burkart et. al, 2010, 2011), while birds did not use the open top box design with or without the addition of an awning to reduce sun exposure (Burkart et. al., 2009 and Burkart et. al., 2007 and 2008, respectively). During 2012 breeding season, the sixth season at the trail, nesting preference was tested between the traditional rectangular box and the Peterson box. The Peterson boxes were developed and modified by Dick Peterson; these boxes have been widely used in Minnesota (Berner, 1994). This design has a slant roof found in some traditional box designs, but it also has a slanted front, which reduces the internal volume of the box. It has been proposed that the smaller size requires less nesting material, and therefore less time and energy spent by the parents in building the nest, freeing up energy to take care of chicks (Bluebird Nest Box Styles: Pros and Cons, 2010). The hole in the Peterson design is oval rather than round, which may allow the adults to feed chick and remove waste sacs without completely entering the box (Berner, 1994). In addition to the possible enhancement in fecundity, the Peterson design is reported to be better at keeping out rain, experience less internal temperature variability, and better at deterring predators such as cats and raccoons (Berner, 1994; Bluebird Nest Box Styles: Pros and Cons, 2010).

Student volunteers from biology and human anatomy and physiology classes at Mountain Empire Community College assisted in trail maintenance, removal of test boxes from the previous study, instillation of Peterson boxes, and monitoring of nesting activity.

Methods

Box design preference- The traditional rectangular boxes (figure 1a) were paired with Peterson boxes (figure 1b) at thirteen sites along fence lines in two separate fields (figure 2 a, b). When possible, both types of boxes were attached to posts facing the same direction. Monitoring began April 9, and continued on a weekly basis through July 6 when nesting activity was no longer observed. Monitoring activity followed the protocols established by the North American Bluebird Society (Fact Sheet: Monitoring Bluebird Nest Boxes, 2002) and the Virginia Bluebird Society (Virginia Bluebird Trail Monitoring Information, 2004). Data was recorded on forms provided on the Virginia Bluebird Society website. Data collected included partial and completed nests, species, number of eggs, number of young and number of young fledged.



Figure 1. (a) traditional rectangular nesting box, and (b) the Peterson box.

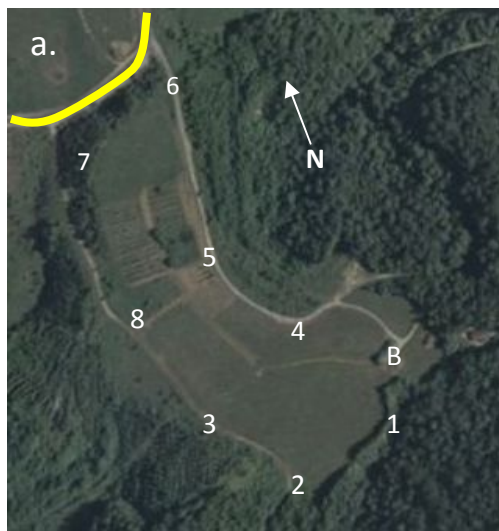


Figure 2. (a) Nesting box sites in field 1 and (b) field 2. Numbers indicate the box locations. Arrow indicates north. The B indicates the position of the barn. Yellow lines indicate the location of the main road. (Image from Microsoft Virtual Earth.)

Results

Nesting activity: Eastern bluebirds, black-capped chickadees and tree swallows were successful in fledging young along the trail during the 2012 breeding season (table 1). Monitoring began in field 1 on April 9 and April 10 in field 2, when the Peterson boxes were installed. Bluebirds were already active in both fields with 2 eggs in box 4A, 5 eggs in box 5A, 4 eggs in box 6A, and 5 eggs in box 9A. The pair in box 4A latter added 3 additional eggs to the clutch, all of which hatched and fledged by May 16. The

bluebirds in box 5A successfully fledged 5 chicks by May 10, while the eggs in box 6A were lost to predation sometime between April 12 and 19. The bluebird eggs in box 9A were also lost during the same period. Five bluebird eggs were observed in box 13a on May 3. The eggs had hatched by the next week and appeared healthy on May 16, but on May 24 the box was found with the door ripped open. It is assumed that the chicks were lost to a bear.

Chickadees were also active the first week of monitoring, having produced 5 eggs in box 2A. This pair produced an additional egg by April 12; however, only 5 of the eggs hatched and only 4 of the nestling fledged. Chickadees were active in box 3A having produced 5 eggs by April 12. Four of the 5 eggs hatched by May 3, but the chicks and eggs were missing when the nest was checked on May 10.

Table1. Nesting results for the 2012 nesting season. (A: traditional nesting box; B: Peterson nesting box; BB: bluebirds; CH chickadees; TS tree swallows). Sites 1-8 are in field 1, while sites 9-13 are in field 2.

Box	Species	Nest building	# of Eggs	# of Hatchlings	# Fledged
1 A	---	No	---	---	---
1 B	---	No	---	---	---
2 A	CH	Yes	6	5	4
2 B	---	No	---	---	---
3 A	CH	Yes	5	4	4
3 B	---	No	---	---	---
4 A	BB; BB	Yes	5; 5	5; 5	5; 5
4 B	TS	Yes	5	5	5
5 A	BB	Yes	5	5	5
5 B	---	No	---	---	---
6 A	BB	Yes	4	0	0
6 B	TS	Yes	5	5	5
7 A	---	No	---	---	---
7 B	BB	Yes	5	4	4
8 A	---	No	---	---	---
8 B	---	No	---	---	---
9 A	BB	Yes	5	0	0
9 B	---	No	---	---	---
10 A	---	No	---	---	---
10 B	---	No	---	---	---
11 A	---	No	---	---	---
11 B	---	No	---	---	---
12 A	CH	Yes	0	0	0
12 B	CH	Yes	5	3	0
13 A	BB	Yes	5	5	0
13 B	---	No	---	---	---

The first activity in Peterson boxes was observed in early May (May 3). Five bluebird eggs were noted in box 7B (the only activity at site 7), of which only 4 hatched and fledged. A chickadee

nest was observed in box 12B on May 10. By May 16, 5 eggs were present in the nest, 3 of which hatched by the following week (May 24). When the nest was checked on May 31, all eggs and chicks from the clutch were gone. A nest was built in box 4B at the beginning of the month, and 5 tree swallow eggs were laid by May 24. All the eggs hatched and fledged by June 21.

Nesting activity was observed in box 6B on May 24, and a tree swallow was sitting on the nest May 31. Five tree swallow chick were successfully fledged from the nest.

The last activity for the season was in box 4A. A bluebird egg was found in the nest on June 6, and 4 more eggs were present by the next week. All 5 eggs hatched and the chicks fledged by July 6.

Discussion

The 2012 nesting season was the first year of testing for the Peterson boxes. Bluebirds, black-capped chickadees and tree swallows all utilized the Peterson boxes. While Berner (1994) reported bluebirds and tree swallows favoring the Peterson design over the traditional box design, neither bluebirds nor chickadees used the new design in the same frequency as the traditional boxes (figure 3). This may, in part, have been the result of nesting activity starting before the Peterson boxes were installed. Four of the 7 bluebird nest were active on the day the Peterson boxes were installed, while only 1 of the 4 chickadee nest were active on the date of installation. The two tree swallow nests were both found in Peterson boxes. The Peterson boxes will also be tested during the 2013 season; therefore, we will have more data points to test whether or not bluebirds, as well as chickadees and tree swallows have a preference for one design or the other.

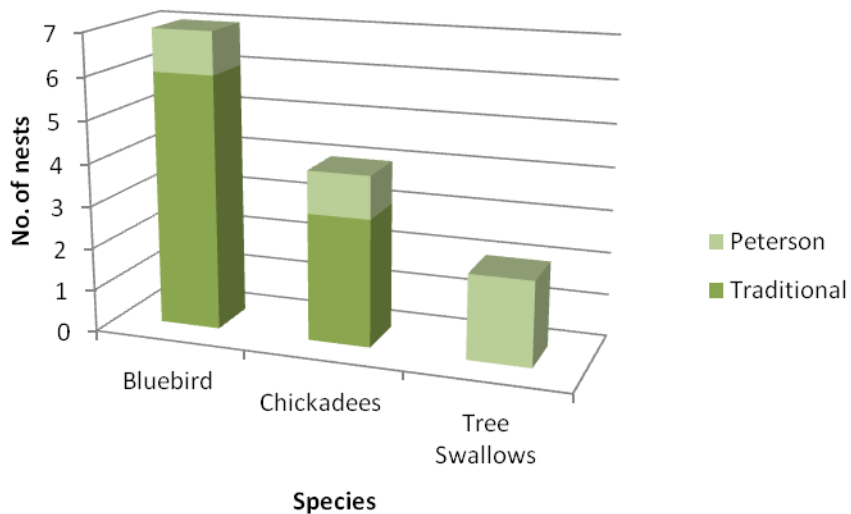


Figure 3. Number of clutches per nesting box design.

It is difficult to determine whether the Peterson boxes enhanced fecundity for any of the three species nesting along the trail, not only due to the low nesting activity in the Peterson boxes, but because of the numbers of eggs and chicks lost to predation. Five clutches (3 bluebird and 2 chickadee) were lost to predators. This was the highest number of nests lost to predators during the 6 years of study at the site. Two nests were lost during the 2011 season (Burkart et. al, 2011), 3 clutches during each of the 2009 and 2010 seasons (Burkart et. al., 2009, 2010), and 1 nest each during the 2007 and 2008 seasons (Burkart et. al., 2007, 2008). All 3 nests in field 2 were lost to predation. It is most likely that the bluebird nest in box 13A was most likely lost to a bear. The box was pulled open and the chicks were missing. The same thing happened to box 13A during the 2008 season, when a black bear was reported in the area (Burkart et. al., 2008). The clutches lost from boxes 9A and 12B in field 2 may have been lost to snakes. A week after the eggs went missing from box 9A, a large black snake was observed sunning on the path just down from the box (figure 4). Two clutches were lost in field 1, one from box 2A and one from box 6A. Nests in field 1 have experienced less predation over the years, most likely due to the electrified fence that surrounds the field and the height of the grass in most areas. Unlike field



Figure 4. Black snake found along the road in field 2 one week after eggs disappeared from box 9A. The clipboard is 34.3 cm in length.

2, the grass in much of field 1 is kept short or relatively short by frequent mowing or the activities of the cattle that are in the field during the spring. For the next season, snake deterrents will have to be devised that will work on the fence posts in field 2.

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