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Effects of vegetation density on nest box selection by house wrens

Introduction:

House wrens are cavity nesting birds that build their nests within small enclosed spaces that occur naturally or were previously created by other animals. This makes them ideal to study, as they will utilize nest boxes that are easy to monitor and control. By placing nest boxes in controlled grids, it is possible to manipulate variables that may influence their selection of nest boxes. One of these key factors that can vary based on location is the density of vegetation surrounding the nest box.

Variations in vegetation density surrounding the nest box may have many implications for the house wren. High density vegetation may provide more hiding areas and better protection from predators, as well as shelter from violent weather (ie. hail, wind). Thick vegetation may also correlate with higher abundances of insects, which the wrens use as a food source. More natural nesting cavities are also likely present in high density vegetation. For these reasons, high density vegetation may be beneficial.

Using nest boxes in low density vegetation areas may be beneficial to the house wrens as well. Uninhibited line of sight may allow the birds to identify predators from a distance, and allow them to defend their nests better. It also may allow them to fly away easier to escape a predator.

It must be noted, however, that the placement of nest boxes in both low and high density vegetation may artificially inflate the selection of nesting sites in both groups. The presence of nesting cavities may be the most significant factor in determining box selection, which would therefore significantly reduce any effects seen from differing vegetation densities.

The benefits of using nest boxes in high density vegetation appear to be much greater than low density, so I hypothesize that selection of nest boxes (for nesting and laying eggs) in the high density vegetation area (grid B) will be significantly higher than selection in grid A. This is due to increased protection from predators and weather, the potential for more invertebrate food and the presence of more nesting cavities.

Methods:

The area of our study was at the Beaverhill Bird Observatory, located approximately 10 km east of Tofield, Alberta. We replicated Mike Quinn's master of science study that was performed at the same location from 1986 to 1988. We set up two grids at the end of May, both located on the west side of Lister Lake, and south of Beaverhill Lake. When Quinn conducted his research, these lakes were still present, however they are now dried lake beds. Our grids corresponded with grid A and grid B in Quinn. Grid A had 5 nest boxes by 5 nest boxes, and grid B had 8 nest boxes by 3 nest boxes. This totaled 49 nest boxes. All nest boxes were made with custom holes that were smaller than standard nest boxes. This was done to prevent other species from utilizing the boxes. Every nest box was nailed to a tree with a south aspect, and were at approximately eye

level. The boxes were positioned in the grid with 30 meters between each successive box. The boxes were monitored approximately two or three times a week, and we recorded observations for each nest box. We observed for degree of nest completion, clutch size, date of hatching, number of hatchlings, date of fledging, and number of fledgelings. Each hatchling was banded when it was 8 days old, and was weighed at this point. This data was collected for three months, from the beginning of June to the end of August. Vegetation data was collected at the end of August. Densities of trees and shrubs were calculated for a five meter by five meter plot around each nest box, and were then averaged for each of the grids. Vegetation type was also recorded. Vegetation descriptions were also used from Quinn.

Results:

Vegetation Descriptions

Grid A was very open and dominated by poplar. The average tree density was was three trees per 25 m^2, or 0.12 trees per m^2. Most vegetation was mature poplar, with some aspen and thistles. Quinn described this area poplar forest, which would still be an accurate description for the current landscape. I will refer to grid A as the open grid.

Grid B was much more dense and dominated by poplar and aspen, with some willow. Average tree density was seven trees per 25 m^2, or 0.28 trees per m^2. Quinn described this area as willow scrub, which is still present, however this area is dominated by mature trees today. I will therefore refer to grid B as the dense grid.

Nest Box Selection

Grid A and grid B both had 8 complete nests built in the boxes (Table 1). Grid A had 8 boxes with eggs, whereas grid B had 6 boxes with eggs. Within grid B, each box that was selected to use as a nesting cavity was generally surrounded by more dense vegetation (ie. within willow scrub) than the boxes that were not selected in the grid. Grid A did not demonstrate this clear of a trend.

Grid	Number of Complete Nests	Number of Clutches
A	8	8
B	8	6

Table 1: Number of boxes used for complete nests and clutches for grid A (open vegetation) and grid B (dense vegetation) at Beaverhill Lake, in the summer of 2013

Discussion:

I hypothesized that the house wrens would select nest boxes in the dense vegetation grid at a higher frequency than the open area grid. This was not seen, as selection for nests was equal for

complete nests in both grid A and grid B. Selection to lay eggs was the opposite of my hypothesis, with more boxes being used for clutches in grid A than grid B.

These results seem to indicate that on a larger scale, there would be very little difference between house wren nest box selection in open and dense vegetation areas. This may be due to many factors. Grid A was set up approximately two weeks before grid B, meaning the wrens had more time to utilize the open grid for nests and laying eggs. This may not be the case, however, as grid A saw its first eggs two weeks earlier, but also saw its last eggs two weeks earlier than grid B. This indicates that the wrens used both grids for equal lengths of time.

An alternate explanation may be due to the use of nest boxes as artificial cavities. The house wrens may have been nesting in higher frequencies within the dense vegetation, however the presence of more natural cavities would mean that they would not have to use the boxes at as high of a frequency. The presence of the nest boxes in the open vegetation may have provided adequate habitat to nest in an area where they would not naturally do so. In this case, the presence of nesting cavities would be the primary factor in habitat selection, rather than vegetation density.

Another possibility for equal nest box selection in the open and dense grids is that vegetation does not play a great role in choosing nesting sites. The benefits of both having protection from predators from dense vegetation and having high visibility and being easy to escape in open vegetation may be equal, with no greater benefit to one of the other.

Quinn also found that nest box selection for the grids that we repeated was similar for both the high density willow scrub and open poplar areas (west grids A and B), which support my results. Strong preference for the willow scrub, however, was found by Quinn in the two other grids that he monitored that we did not replicate (east grids C and D)

Although there was no clear distinction in nest box selection between the open grid A and dense grid B, there was a trend within grid B. The boxes that were "claimed" first and used quickly for nests and laying eggs were located within dense willow bush. The other boxes that were used by the house wrens in grid B were the boxes that were located in the most dense vegetation. High density poplar was chosen for many nests. This was likely due to the protection the vegetation offered from predators, and may have also provided better food sources.

This study has shown that house wrens may prefer habitats with specific characteristics, however, it does not appear that they are limited by this. They are able to survive and reproduce in habitats with a variety of vegetation characteristics, which should allow them to continue to thrive in the Beaverhill Lake area, and other areas, as successional changes to vegetation occur over time.

Literature Cited:

Quinn, Michael S. Factors regulating the breeding population, reproductive success and mating system of house wrens (*Troglodytes aedon*) and Beaverhill Lake, Alberta. Master of Science Thesis. 1989.