25 Years Later:
Re-esatblishing the Beaverhill Lake Historical House Wren Grid
By Allyn Esau

Introduction

In 1989, Mike Quinn performed an in depth study on the House Wren (*Troglodytes aedon*) populations in the Beaverhill Lake Natural Area. At a site located approximately 72km east of Edmonton, near the town of Tofield. House Wrens are small, grayish-brown songbirds that are energetic with a loud and distinct call, which is often described as “bubbly”. Within Alberta, they occupy a southern to central range, and extend from the eastern border to the edge of the Rocky Mountains (Sibley, 2014). They are considered to be a Species of Least Concern and maintain relatively stable populations in recent years(Cornell Lab of Ornithology, 2014).

Quinn’s study focused on the factors that limit reproductive success. As a secondary cavity-nester, one of the main factors that limit breeding success is the availability of suitable cavities. When the availability of nesting sites increases, it is possible to observe other limiting factors more closely. In order to accomplish this, a surplus of nest boxes was installed in 4 grids within the natural area surrounding Beaverhill Lake (Figure 1). In 2013, Friske and Roberto-Charron established two new grids on the historic sites of the former west poplar 'Grid A' and west willow scrub 'Grid B'.

This year, work was undertaken to develop a third grid where the old east willow scrub grid had been located, in a continued effort to monitor House Wren success within the natural area. Data were collected in order to determine any reproductive trends between the two grids that were developed in 2013 and the newly established ‘Grid C’ (Figure 2).

Methods

Nest boxes were installed in mid-June on the east side of the weir at Lister Lake and Beaverhill Lake. The boxes were installed approximately 30m apart on the trunks of trees. They were mounted at a height of between 1.0-1.5m with the entrances facing east (Quinn, 1989). A combination of factors resulted in some of the boxes being installed in advance of others. A measurement error was made in the initial attempt to establish the grid, and as a result the boxes in the A row in Grid C ranged in distance from between 10m and 30m, from those in row B. Some of the boxes installed in the first phase had already been occupied before the construction of the remaining boxes, so these were left in their unintended positions for the remainder of the season. These factors may have had an impact on the settlement of the remainder of the grid.

All nest boxes were checked on average once every 5 days, throughout the nesting period of June-July. During this time data were recorded for the state of nest development, the number and temperature of eggs, the number and age of nestlings, and the presence or absence of adults. A guide of digital images compiled by Brown, et al was used to determine the age of nestlings. Each nestling was compared to the chart and an approximate age was determined. Actual age was verified at time of banding.

An effort was made to band all chicks when they reached 8 days of age. The nest boxes were not checked once nestlings had passed this age, to avoid early fledging. Once an additional 7-10 days had passed the boxes were checked to confirm that the birds had fledged. A statistical analysis on the resulting data collected from the three grids was performed.

At the end of the season, once all nestlings had fledged, the nest boxes were cleaned out to allow for occupancy in the spring of 2015. The positioning error in C grid from the initial phase of construction was corrected to correspond with the rest of the grid. An additional grid will also be available in the spring of 2015, which will provide a greater sample base for future research.

Results

The date of first attempted clutch ranged between late May in Grid B and June 23rd in Grid C. Grid B contained eggs as of the first round of checks on June 1st, between this date and June 7th eggs were laid in Grid A. Grid C has a first attempted clutch date of June 23rd, which is due to the fact that the nest boxes were installed in mid-June so occupancy was delayed. The size of each clutch varied between the grids, however this difference was not a significant factor in nestling success.

Chicks began to hatch in Grid B on June 15th; Grid A followed with an initial hatch date of June 26th. The hatch date of July 7th in Grid C relates to the late establishment date of the nest boxes. Nestlings had started to fledge by July 12th in Grids A and B, and July 27th in Grid C. Grid A no longer had any fledglings by July 23, Grid B by July 27th and August 10th in Grid C. The late establishment of the C grid resulted in later egg laying, later hatching as well as later fledging. This difference did not significantly impact the breeding success of the grid when compared to both other sites.

Within each grid there was indication of dummy nest development with an average of 19.17% of nest boxes within the grid occupied by a partially developed nest. This tactic is commonly used in House Wrens to secure multiple suitable breeding sites in an effort to improve the likelihood of successfully pairing (Finch, 1989). Observations of parental presence or absence reflect that there was no adult presence at these partial nests, once breeding sites were established within the grid. The rate of successful occupancy between Grid B and Grid C was relatively similar. Grid A exhibited a slightly significant rate of occupancy, with only 20% of the nest boxes occupied by a clutch producing at least one successful fledgling (Figure 3a), especially when compared to Grid B where 41.67% of the grid was occupied (Figure 3b). Grid C was occupied at a rate of 33.33% (Figure 3c).

There were 3 cases where a full nest of eggs was unsuccessful, in each instance the eggs were abandoned without an immediately obvious cause. On the July 20th check of box C1 in grid B the eggs were warm, whereas on the check on July 23rd there was a shredded strip of dirty plastic covering now-cold eggs. From this point on there was no evidence of the parent returning to that nest. By July 23rd cobwebs began to form on box B7 in grid B. It is unclear why Box A1 in Grid C was unsuccessful, as a parent had been observed at this box several times throughout the breeding season. From July 20th to July 30th the eggs were warm when observed. When checked on August 10th the eggs were cold with no visible change in the condition of the nest itself. A total of 13 eggs were abandoned, out of the 172 total in the study area.

In addition to egg abandonment, egg destruction, and nestling mortality were observed. Grid A experienced the least overall mortality, with only 2.70% of potential nestlings not successfully fledging. Of 37 eggs laid, 36 resulted in a successful fledgling. Within this grid much less reproductive effort was required than in Grid B. Which experienced the highest rate of clutch failure, at 28.57%. Of the 84 eggs laid within the Grid, 60 successfully fledged. A higher rate of parental investment was evident within Grid B. Clutches were started earlier, and more nesting attempts were made. The greatest number of attempts was within Grid B, followed by C, then A with substantially fewer (12, 9, and 5 attempted clutches respectively). The difference between the rate of nest mortality between Grid A and C is significant, at 21.57%, and indicates an interesting trend.

Predation has long been believed to be one of the most significant factors limiting reproductive success in cavity-nesting species (Cody, 1981), including the House Wren (Belle-Isles, Picman, 1986b). In 1989, Quinn suggested that this was a factor impacting the breeding population within the Beaverhill Lake Natural Area. Predation does seem to remain a factor today, as some of the nestlings were discovered removed from the nest with evidence of predation.

Additionally, House Wrens have been shown to exhibit conspecific competition (Belle-Isles, Picman, 1986a). It is possible that some of the competitive pressure, especially in Grid B, is due to non-mated males or non-breeding females. This could explain some of the egg breakage seen within the study area. A more detailed review of the causes of nest failure within the natural area could provide greater insight. Another possible factor that may have impacted the breeding success of Grid B is interspecific competition. This competition appeared in the form of two successful nests of Black-Capped Chickadee (*Poecile atricapillus*), as well as one nest of Tree Swallows (*Tachycineta bicolor*). However, it is unlikely that this is crucial factor in the rate of mortality within our study area as there was a successful Tree Swallow nest in Grid A, and no competitive nests within Grid C.

There are several potential factors that may impact the selection of nesting sites, as well as the resulting nesting success. At this time there is not sufficient data to suggest a potential cause for the significant difference in mortality between Grid A and both Grids B and C. Additional research is required to indicate which factor, or factors, results in the difference in required reproductive effort within Grid A. Some areas to be considered are: vegetation types, availability of natural cavities, interspecific and conspecific competition, and success of returning breeding adults born within the natural area.

Appendices

Figure 1. The four grids established during Quinn's research published in 1989. The sites of these grids were used as a guideline for where to develop the modern implementation of the grids.

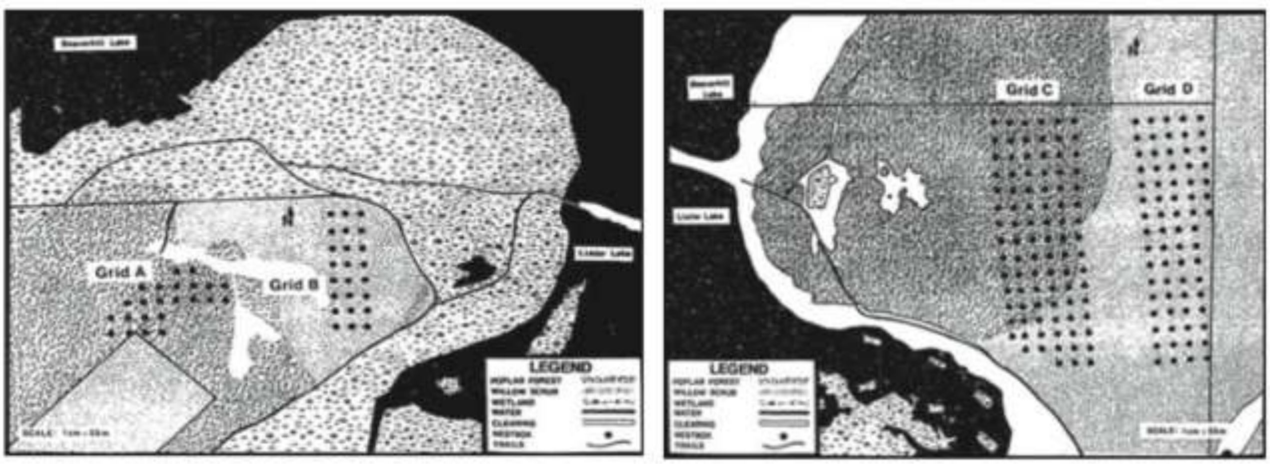


Figure 2. The GPS locations of the modern Grids overlaid on Google Earth satellite imagery.

Figure 3a. Distribution of Nest Box Occupancy within Grid A

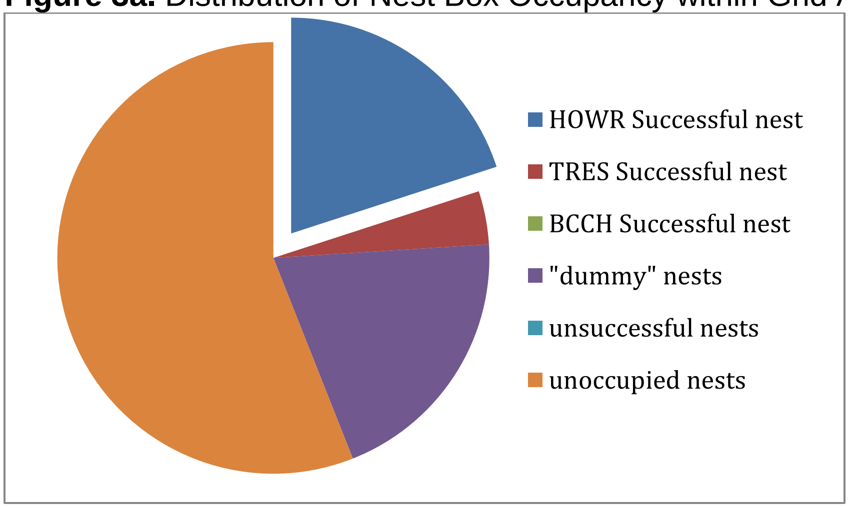


Figure 3b. Distribution of Nest Box Occupancy within Grid B

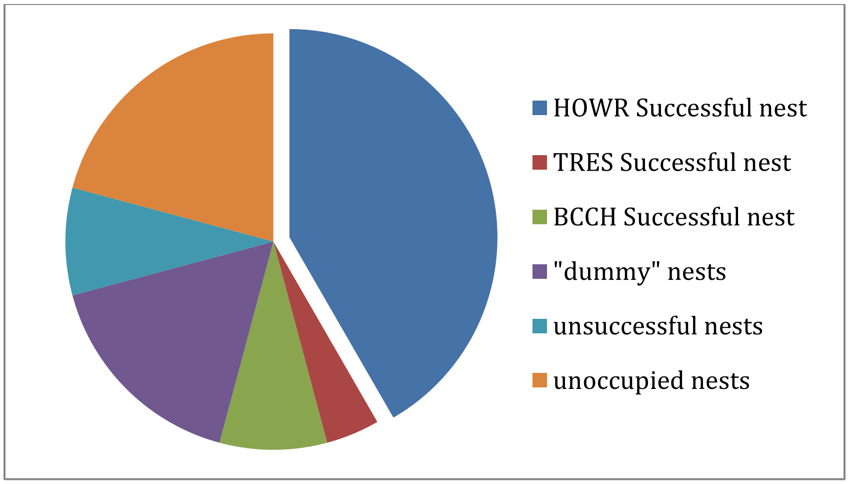
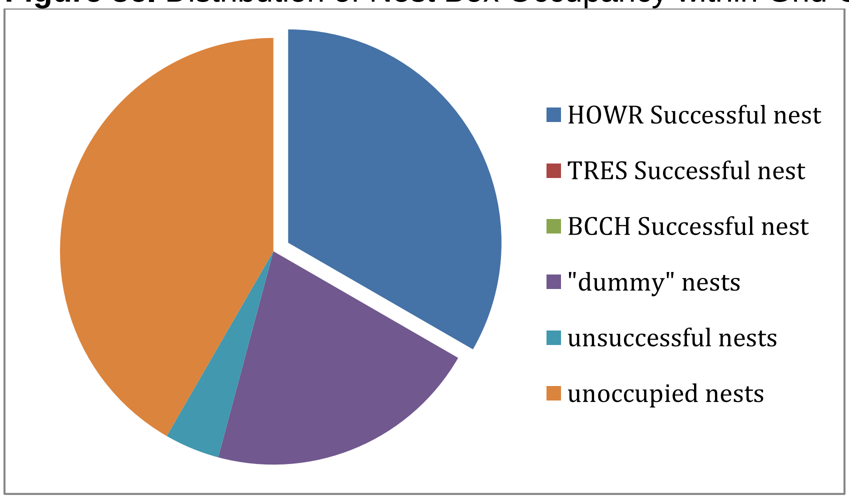


Figure 3c. Distribution of Nest Box Occupancy within Grid C



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