Comparison of House Wren (*Troglodytes aedon*) Grids over Four Years at the Beaverhill Natural Area: Number of Nests with Nestlings

By: Zachary Antoniw & Shyla Golly

August 29, 2017

Introduction

The Beaverhill Bird Observatory (BBO) was initiated in 1984 to take advantage of the large numbers of migrating songbirds along the shoreline of Beaverhill Lake (Beaverhill Lake Bird Observatory, 2017). The BBO is surrounded by grasslands and aspen stands that provide ideal cover and shelter for many migrating bird species. The BBO has implemented many monitoring programs including Tree Swallow and House Wren nest box grids.

For this internship, two interns collected data on nesting House Wrens (*Troglodytes aedon*) in the Beaverhill Natural Area. House Wrens are a small, insectivorous, monogamous-sometime polygamous- species (Kendeigh, 1941; Alworth, 1996). House Wrens migrate to and breed in Alberta during the summer while flying back to the southern United States and Mexico in the winter (Kendeigh, 1963). House Wrens are known to be secondary cavity nesting species; however, they may nest in artificial nest boxes (Kaluthota & Rendall, 2017). Characterized by their long, de-curved bill and small, compact body, House Wrens can be easily identified by their aggressive, yet quite variable calls (Birds of Canada, 2016)

As secondary cavity species, House Wrens use pre-existing holes and cavities to build their nests. Males often place sticks into several, pre-existing cavities to attract mates (Alworth, 1996). Once a female chooses a cavity, or nest box, she will then layer the nest with feathers, roots, and grass (Alworth, 1996). The eggs are small and white with a tinge of pink/blush with numerous red/brown speckles (Smith, Elizabeth, & Zimmerman, 2017). If successful, nestlings fledge 14-19 days after hatching (Johnson et al., 2004).

Methods

At the BBO, there are a total of 99 House Wren nest boxes that are laid out in 4 grids. Grids A, C, and D are laid out 5x5, labeled A through E, 1 through 5. Grid B, however, is laid out 3x 8, labeled A through C, 1 through 8. The nest boxes were approximately 30m apart. Grid A and B were placed on the East and West sides of the BBO lab, while Grids C and D were placed across the weir that is located between Beaverhill Lake and Lister Lake. Each grid contained artificial nest boxes that have detachable lids, secured in place with a metal wire. The height and construction of the nest

boxes were consistent in all grids. The placement of the nest boxes was in aspen dominated stands, and were approximately chest high.

The nest boxes were checked every 6-10 days starting mid-May until September. First, we collected data on the nest status. We recorded whether the nest was empty, partially layered with twigs or fully layered with nesting materials. Once eggs were present, we would gently touch the eggs to determine if an adult was actively incubating them (ie. were they warm or cold) and we made note whether a parent was heard, seen, or flushed from the nest. Once hatched, we determined nestling age by using Brown's digital photo guide (2013). After determining the age of the nestlings, the nest was left alone and not checked for 25 days to ensure successful fledging of the young.

A two-way Anova without replication was constructed to analyze the data of the number of nests with nestlings between Grids A, B and C for the previous four years. For this analysis, number of nests with nestlings is defined by containing nestlings once hatched, and does not account for successful fledging.

Many other species occupied the nest boxes including: Flying Squirrels, Tree Swallows, and Woodpeckers. However, only data for House Wrens will be used in this report.

Results

A two-way ANOVA without replication was performed on data from 2014, 2015, and 2017 for Grids A, B, and C, to determine if there was a significant difference in the number of nests with nestlings. The ANOVA showed that there was no significant difference in the amount of House Wren nests with nestlings in each of the grids from 2014, 2015, and 2017 which means our null hypothesis was retained ($df=2$, $F=1.08$, $F_{critical}=6.94$, $p=0.421$). In *Table 1* and *Figure 1*, it is worth noting that Grid B, and the overall total number of nests with nestlings, appears to be declining since 2014, while Grids A and C seem to vary each year. The year 2016 was not included in our ANOVA test because the access to Grids C and D was flooded that year, so only Grids A and B were monitored consistently. Grid D was not included in the analysis as it was only recently established in 2015.

Discussion

With limited data for the three grids being studied, the ANOVA test showed there was no significant difference in the amount of House Wren nests with nestlings in each of the grids from the three years studied; however, it is apparent by looking at *Table 1* that Grid B, as well as the total number of nests with nestlings, is declining. A possible reason for the decline could be increased competition with Tree Swallows, which occupied a total of eight nest boxes in 2017 (three in Grid A, one in Grid B, and four in Grid C). Other reasons could be; human interference, as Grids A and B are much closer to the walking trails in the Beaverhill Natural Area than Grid C, predation and interaction with other animals, and/or House Wren nest site preferences. There are many factors that contribute to House Wrens reaching the point of having nestlings. Looking at previous studies and literature will help to get a better idea of a possible reason why there is an apparent decline and why Grid B in 2017 and Grid A in 2015 produced so few nestlings (three nests containing nestlings in both years).

Interaction with other animals is one of the biggest factors in House Wren nest success (Finch, 1989). Competition and predation are two types of interactions that can cause problems for nesting House Wrens. One scenario we occasionally encountered was the nest box lids being knocked off. This was most likely done by a moose scratching its head on the boxes which would over power the metal wire holding the box lids in place, resulting in the lids being ajar or completely off the box. Trail camera pictures confirmed this with one of our House Wren nest boxes. This made the House Wren eggs vulnerable to predators such as other birds and small mammals like weasels or squirrels.

Competition with Tree Swallows was likely another problem for House Wren success. A study from 1990 on House Wren and Tree Swallow nesting competition and predation, showed that House Wrens generally out compete Tree Swallows for nesting sites (Finch, 1990). Male House Wrens will fill Tree Swallow nests with twigs if they find them in their nesting territory (Finch, 1990). This behaviour usually results in the Tree Swallows finding a different nesting site (Finch, 1990); however, conflict does sometimes occur and fights between the two species can happen as we saw in our study. One box in Grid C had a deceased House Wren and Tree Swallow in it when the box was checked on the week of June 12, 2017, which is during the middle of the nesting period for both species. That week

there was a total of 13 out of 25 boxes in Grid C that were active with eggs, of which eight were House Wren and five were Tree Swallow.

Human interference is another factor that could be affecting House Wren nesting success. Recreational trails have been identified as one of the biggest risks and causes for the decline of biodiversity in protected areas (Thompson, 2015). Tolerance to intrusion varies between bird species, but some species will abandon their nests if disturbed early enough during the nesting period (Gutzwiller, Marcum, Harvey, Roth, & Anderson, 1998; Knight & Cole, 1995) Grids A and B are closer to walking trails in the Beaverhill Natural Area than Grid C. Grid C is across the weir and fairly isolated from humans in comparison to the other two grids. Refer to the appendix for a map of the approximate location of the grids. Studies on canopy-foraging and canopy nesting birds found that recreational trails had minimal impact on the species (Thompson, 2015; Gutzwiller et al., 1994; Deluca & King, 2014). The House Wren is a cavity nester and a forager in shrubs and the understory of the forest. Thompson (2015) classified the House Wren as a canopy forager in his study. With the nest boxes being at chest height in our study, the House Wrens were potentially more exposed to humans and other large mammals such as moose and deer. This leaves House Wren nestlings more prone to premature fledging, which is why the boxes were left alone for at least 25 days once nestlings were observed and aged. Overall, the trail system in the Beaverhill Natural Area is small and people are encouraged to stay on the trails so it's likely that the trail system does not interfere with the House Wrens; however, if new trails were to be opened it would be a good idea to consider where the trail goes to minimize disturbance to the birds of the natural area.

The final factor to discuss is House Wren nesting preference. A study from Belles-Isles & Picman, (1986) suggested that House Wrens prefer nesting in cavities in the forest with sparse vegetation rather than medium or dense vegetation. Another study done by Finch (1989) also found that House Wrens preferred sparsely vegetated understories to nest in and found that nest boxes in these areas had higher outcomes of successfully fledged offspring (Finch, 1989). This could be a possible reason for the differences seen between the grids with the number of nestlings during the 2017 season, as Grid B seemed to have more nest boxes located in tighter cover, such as willows, than the other two grids. A similar study to the one done by Belles-Isles & Picman (1986) would have to be done

focusing on the boxes in sparse, medium, and dense cover, to determine if it is an influential factor in this case. By nesting in areas with sparse vegetation, House Wrens avoid predators as they are likely to detect predators quicker than if their nest was in dense cover, and can potentially fend off or distract the predator before their nest is discovered (Belles-Isles & Picman, 1986; Finch, 1989). Another potential benefit to nesting in sparse vegetation is that they are generally more exposed to sun which can affect incubation time but this theory needs to be studied further (Belles-Isles & Picman, 1986). The House Wrens nesting preferences are important to consider for future House Wren studies when determining the best location for nest boxes.

Competition with Tree Swallows, interaction with other animals, human interference, and nesting preferences are all factors to consider when looking at the apparent decline in House Wren nests with nestlings. While all these factors could be effecting the House Wrens ability to produce nestlings, they need to be studied further for one to be sure. It is important to continue monitoring the House Wren grids in the Beaverhill Natural Area to create a greater data base to come to more accurate conclusions.

Conclusion

In conclusion, the data collected at the BBO is insufficient to determine the reasons why Grid B, and the total number of nests with nestlings, appear to be in decline. For future studies, we would recommend collecting data on vegetation densities, as there looked to be a difference in certain spots on different grids. As well, improvements to the nest box system to avoid the lids coming off may lead to better protection from predators and increase nestling numbers. Predation loss and human interference are both factors that may be worth researching given appropriate timing and means. As previously mentioned, the most important thing to do is continued monitoring of the House Wren grids to gather a larger data base for future and ongoing studies.

Acknowledgments

Thank you to Serving Communities Internship Program for making this internship possible. Thank you to Sara Pearce Meijerink for your mentorship and dedication towards

this internship. To the other staff at the Beaverhill Bird Observatory, thank you for your guidance and patience with this internship.

Tables and Figures

Table 1. Nests with nestlings from House Wren Grids A, B, and C, from years 2014, 2015, and 2017.

	2017	2015	2014
Grid A	6	3	5
Grid B	3	8	10
Grid C	5	11	8
Total	14	22	23

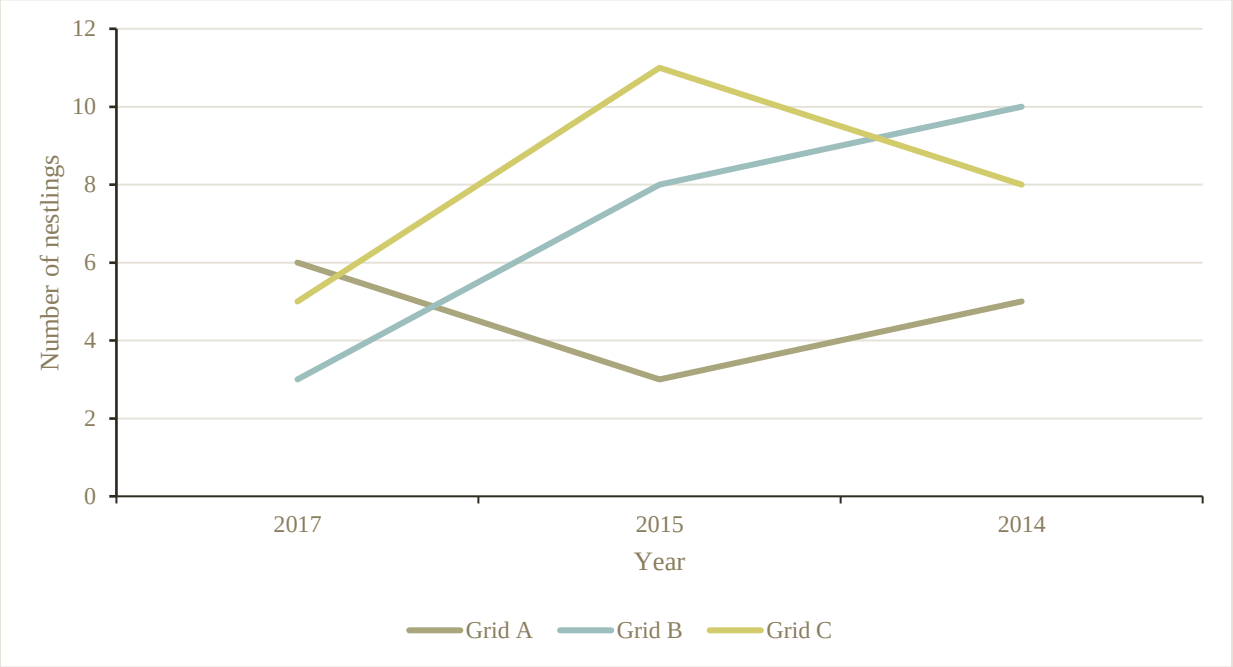
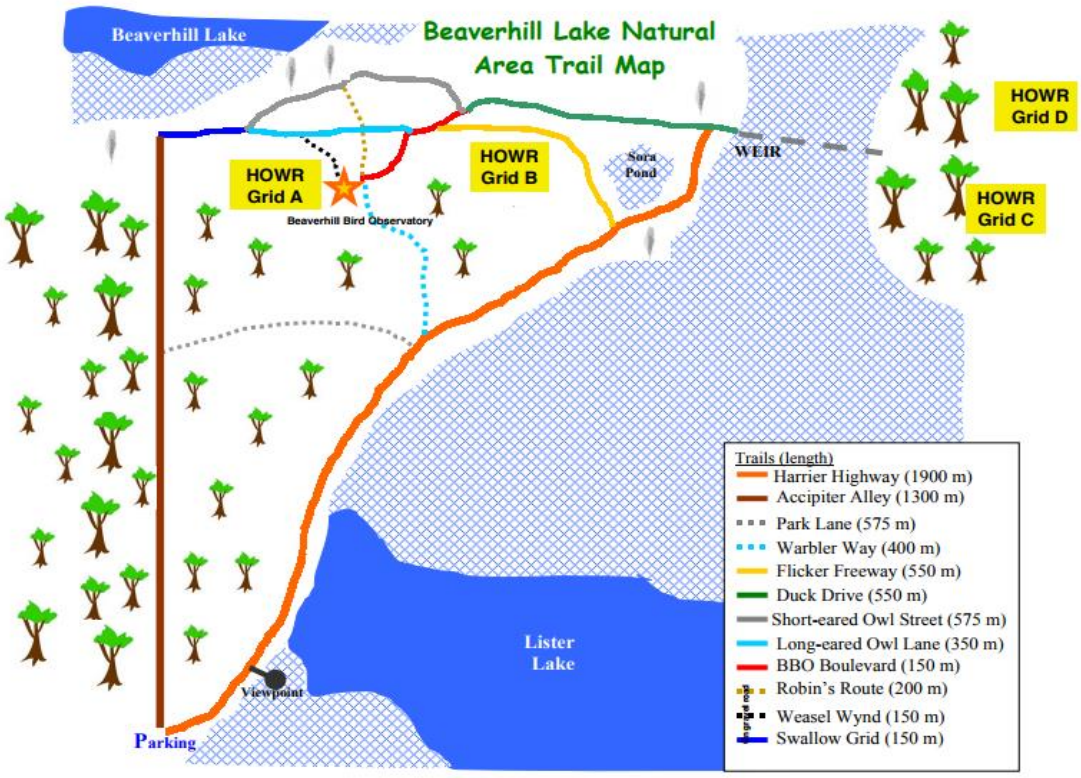


Figure 1. Line graph of the number of House Wren nests with nestlings from 2014, 2015, and 2017, from Grids A, B, and C.

Appendix


Beaverhill Lake
Beaverhill Lake Natural Area Trail Map
HOWR Grid A
HOWR Grid B
HOWR Grid C
HOWR Grid D
Beaverhill Bird Observatory
Sora Pond
WEIR
Lister Lake
Viewpoint
Parking
Trails (length)
Harrier Highway (1900 m)
Accipiter Alley (1300 m)
Park Lane (575 m)
Warbler Way (400 m)
Flicker Freeway (550 m)
Duck Drive (550 m)
Short-eared Owl Street (575 m)
Long-eared Owl Lane (350 m)
BBO Boulevard (150 m)
Robin's Route (200 m)
Weasel Wynd (150 m)
Swallow Grid (150 m)

Literature Cited

Alworth, T. 1996. The Experimental Test of the Function of Sticks in the Nests of House Wrens. *The Condor* 98:841

Beaverhill Lake Bird Observatory- *Beaverhill Lake.* Retrieved from: beaverhillbirds.com/welcome/beaverhill-lake/. Accessed August 22,2017.

Beaverhill Lake Bird Observatory- *About BBO*. Retrieved from: beaverhillbirds.com/welcome/about-bbo/. Accessed August 22, 2017.

Belles-Isles, J., & Picman, J.1986. Nesting Losses and Nest Site Preferences in House Wrens. *The Condor,* 88: 483-486.

Bird, D.M. 2016. Pocket Birds of Canada. First edition. Dorling Kindersley Limited, Toronto, Ontario, Canada.

Brown, W.P., M.E.Zuefle, T.J. Underwood, A.L. Alexander, and D.A. Alexander. 2013. House Wren Nestling Age Can Be Determined Accurately From a Guide of Digital Images. *North American Bird Bander* 38:150-159.

DeLuca, M. V., & King, D. L. 2014. Influence of Hiking Trails on Montane Birds. *J Wildl Manag* 78:494–502.

Finch, D. M. 1989. Relationships of Surrounding Riparian Habitat to Nest-box Use and Reproductive Outcome in House Wrens. *The Condor,* 91:848-859.

Finch, D. M. 1990. Effects of Predation and Competitor Interference on Nesting Success of House Wrens and Tree Swallows. *The Condor*, 92:674-687.

Gutzwiller, K. J., Wiedenmann, R. T., Clements, K. L., & Anderson, S. H. 1994. Effects of Human Intrusion on Song Occurrence and Singing Consistency in Subalpine Birds. *Auk* 111:28–37.

Gutzwiller, K. J., Marcum, H. A., Harvey, H. B., Roth, J. D., & Anderson, S. H. 1998. Bird Tolerance to Human Intrusion in Wyoming Montane Forests. *The Condor,* 100: 519-527.

Kaluthota, C.D. and D. Rendall. 2017. Nest site selection and breeding biology of Western House Wrens (*Troglodytes aedon parkmanii*) using natural cavities in Western Canada. *Canadian Journal of Zoology* 95: 505-514.

Kendeigh, S.C. 1941. Territorial and mating behavior of the House Wren. *Illinois Biol. Monogr*. 18:1-120.

Kendeigh, S.C. 1963. Regulation of nesting time and distribution in the House Wren. *Wilson Bull* 75: 418-427.

Knight, R. L., & Cole, D. N. 1995. Factors that Influence Wildlife Responses to Recreationists. In R. L. Knight, & K. J. Gutzwiller (Eds.), *Wildlife and recreationists: coexistence through management and research* (pp. 71-79). Washington, DC: Island Press.

Johnson, L.S., R.L. Rauch, and S.N., Dellone. 2004. The process and causes of fledging in a cavity-nesting passerine bird, the House Wren (*Troglodytes aedon*). *Ethology* 110:693-705.

Smith, Elizabeth Zimmerman. 2017. sialis.org, Woodstock CT. Retrieved from: http://sialis.org. Accessed on August 22, 2017.

Thompson, B. (2015). Recreational trails reduce the density of ground-dwelling birds in protected areas. *Environmental Management*, 2015: 1181-1190. doi: 10.1007/s00267-015-0458-4