# Comparing the Nesting Density of House Wrens (*Troglodytes aedon*) in Artificial Environments with Natural Environments

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September 22, 2013

## Abstract

The nesting densities, clutch sizes and reproductive success were monitored on House Wrens (*Troglodytes aedon*) in the spring and summer of 2013 at the Beaverhill Bird Observatory in Tofield, Alberta. Procedures used in the thesis of Michael Quinn in 1986-1988 were followed in this study (Quinn, 1989). The nesting densities recorded in this study will be compared to the nesting densities found in Michael Quinn's study, as well as natural densities in undisturbed habitats. Results of our data showed that the nesting densities in 2013 were much lower than nesting densities in 1986-1988. Possible reasons for this included change in habitat/vegetation and possibly setting up nest box grids too late in the breeding season. In Michael Quinn's data, results showed that very high nesting densities resulted in monogamy amongst house wrens, as well as high competition, specifically intraspecies competition. These artificial habitats represented an average of four nesting boxes per average house wren territory. Research showed that house wren nesting densities are lower in areas without nest boxes? than in artificial nesting areas, because of a lack of suitable nesting cavities. Lower density rates result in lower competition and mortality rates. Although, the artificial nesting habitats still produced more young than a natural habitat would typically produce.

## Introduction

Every year, thousands of hectares of natural habitat are destroyed due to human activity worldwide (Laurance, 2010). Boreal regions in Canada are home to over 300 species of boreal and wetlands birds that use this natural habitat for migration and breeding purposes every year (Cheskey et al., 2011). Natural areas and other protected sanctuaries

serve as important undisturbed habitat for migrating birds. The house wren is an example of one of the many migratory birds that make the journey to the Canadian boreal regions during the spring and summer months to reproduce. Suitable nesting cavities for these migratory birds serve as a huge importance in order to successfully rear young (Quinn, 1989). In 1986-1988, Michael Quinn set up artificial nesting sites in order to study the breeding habits of house wrens. His area of study was at the Beaverhill Natural area. In the spring and summer of 2013, the nesting habits of the House Wren were studied and monitored in a way that mimicked the work of Michael Quinn's thesis in 1986 (Quinn, 1989) at the Beaverhill Bird Observatory. This paper will compare the results of nesting densities of house wren nest boxes monitored in 1986 and 2013, and how they compare to natural habitats with no artificial nesting cavities.

**Methods**

At the Beaverhill Bird Observatory in Tofield, Alberta, we observed the nesting habits of the House Wren from the beginning of June to the end of August 2013. Two small grids of nest boxes were set up (Grid A and Grid B) on the West side of Lister Lake, Alberta on the Southeast side of Beaverhill Lake, Alberta (53u22.839N, 112u31.639W; Priestley and Priestley, 2005). Two grids were set up the Grid A and Grid B following the same set up that Michael Quinn used for his research on house wrens in 1986-1988 (Quinn, 1989). The nest boxes were drilled into trees approximately 1-1.5 meters above the ground, with the nest box entrances facing the South. The nest boxes were set up thirty meters apart. In grid A 25 boxes were set up, and in grid B 24 boxes were set up. The boxes were checked one to two times a week. The stage of nest completion (partial or

incomplete), number of eggs, temperature of eggs, number of chicks, and age of chicks were recorded. Most of the House Wren chicks were banded with size zero butt end aluminum bands eight days after hatching to avoid premature fledging.

**Discussion/Results**

Michael Quinn's findings showed that in grid A ten out of 23 nest boxes were occupied in 1986, and 14 out of 23 nest boxes were occupied in 1987 (Quinn, 1989). Therefore, the total percentage of occupied nest boxes was 43% in 1986 and 61% in 1987 in grid A (Quinn, 1989). In grid B, 14 out of 24 nest boxes were occupied in 1986, and in 1987, nine out of 24 nest boxes were occupied (Quinn, 1989). Therefore, the total percentage of occupied nest boxes was 58% in 1986 and 38% in 1987 in grid B (Quinn, 1989). In 1988, no data was collected in grid B (Quinn, 1989). The high density of occupied nest boxes does not reasonably compare to natural densities of house wren nesting sites, and therefore, one must be careful when comparing results of scientific findings (Quinn, 1989). In his study, Quinn found that male house wrens typically display polygyny in areas with low nest densities because there is less competition for food (Soukup & Thompson, 1997). In areas of high nest densities, competition is high, and therefore both adults are required to rear the young (Quinn, 1989). High densities of occupied nests can cause high mortality rates in young house wrens, such as in Quinn's results in 1987 for the number of successful nests. In grid B in 1987, only two ne sts out of the nine occupied nests had successfully reared young. Intraspecific competition or food shortages due to high densities of occupied nests could have been the cause of the low number of successful nests in this case. Another cause could have been the high level of predation by weasels noted by Quinn in 1987 (Quinn, 1989).

We studied house wrens in the spring and summer of 2013. For our results, grid A had a total of seven nests occupied out of a total of 25 nest boxes. This means that the total percent of occupied nest boxes was 28% in grid A. Grid B had a total of six nests occupied out of a total of 24 nest boxes. Therefore, the total percent of occupied nest boxes in grid B was 25%. House wren nesting densities are significantly lower in this study as compared to the nesting densities in Michael Quinn's study. This could be a result of setting up the house wren nest boxes too late in the season in 2013. Another cause could be the vegetation and habitat change from the late 1980s-2013, which changed from primarily willow and poplar forest to primarily aspen and willow forest. Beaverhill Lake was also large enough to be considered a lake in the late 1980s, whereas in 2013 the water level had shrunk to a much smaller volume closer to a pond classification.

The results for our study showed that: In grid A, one of the house wrens had produced a second clutch later in the season, which had hatched but later died from unknown causes at an age of about ten days. The death may have been a result of the death of the parent. Throughout the season, a nest of long-eared owls had been spotted approximately 100 meters away from the house wren grids. Intraspecies competition and food availability also may have been factors in the death of the hatchlings, due to the high density of occupied nests in the area (Kroodsma, 1973). In grid B, a similar occurrence happened with one nest having a second clutch of eggs that later did not hatch. Evidence of intraspecies competition was found in this case because small puncture holes were found in the eggshells. House wrens are one of few passerines known to destroy eggs and nests of the same species or other species in order to prevent competition (Belles-Isles &

Picman, 1985). In natural habitats free of artificial nesting cavities, levels of intraspecies competition are assumed to be relatively low, but in this case of having numerous available nesting sites, it is more common (Kroodsma, 1973).

The natural density of the house wren is 0.56 hectares (Quinn, 1989). Therefore, for every average house wren territory there were four artificial nest boxes in place (Quinn, 1989). In natural habitats, bird species are limited to where they can nest because there is a lack of suitable nesting cavities. House wrens need to choose a nesting cavity that suits their need for shelter and protection, as well as perching areas for feeding and rearing young (Quinn, 1989). In natural habitats, house wrens typically nest in low densities to avoid territorial aggression (Quinn, 1989). Nesting in low densities results in higher survival rates of young, and a lower rate of intraspecies competition (Quinn, 1989). Conversely, a territory with many suitable nesting cavities (as in the next box grids) will have higher densities of house wren nests, but will ultimately have a higher output of nestlings even with high competition between adults (Quinn, 1989).

**Conclusion**

The results showed that nesting densities in natural habitats are significantly lower than nesting densities in habitats with artificial nesting cavities. The main reason being that house wrens are more constrained to finding suitable nesting cavities in a natural, undisturbed habitat. Having lower nesting densities resulted in a higher survival rate of hatchlings, as well as a lower rate of intraspecies competition, and a higher number of polygynous male house wrens. In areas of higher nesting densities, there was a lower survival rate of hatchlings and a higher rate of intraspecies competition. When all of this

information is taken into account however, it is ultimately the higher nest density areas that produce the most hatchlings.  In comparing all of this to a natural habitat setting, more offspring are produced when artificial nesting cavities are present.

**References**

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