The effects of interspecific competition between House Wrens, *Troglodytes aedon*, and Tree Swallows, *Tachycineta bicolor*, on Tree Swallow nesting success at the Beaverhill Bird Observatory, Alberta

BBO Summer 2014 Norma-Jane Young

Abstract

Tachycineta bicolor is a small migratory passerine that is an obligate secondary cavity nester which feeds mainly on flying insects. They are easy to catch and manipulate, readily breed in nesting-boxes and can be disturbed on a regular basis without abandoning their young. I examined the invasion of nest-boxes by the Tree Swallow's main competitor, *Troglodytes aedon* or the Northern House Wren, at a spiral nest box grid near the Beaverhill Bird Observatory (BBO) outside Tofield, Alberta. The grid is located within the natural area enclosed by primarily poplar forest to the east and south and open meadow to the north and west. This Tree Swallow grid has been operational for almost thirty years and, although it was initially in an open field, there has been establishment of shrubs and creep of the forest edge into the grid with some nest-boxes now being within shrubbery or less than 30 meters from the forest edge. My hypothesis states that changes in habitat dynamics at this grid has increased occupancy of nest-boxes by *T. aedon* compromising successful nesting of *T. bicolor* due to increased interspecific competition for limited nesting space. Results show that there was a big increase in House Wren nesting within the nest-box grid, occupancy more than doubled from four in 2013 to ten in 2014. However, there was no significant difference in Tree Swallow occupancy for these two years at 68.75% in 2014 compared to 70.83% in 2013. There has been a significant decrease in Tree Swallow nest-box occupancy when comparing the past two years to the mean occupancy of Tree Swallows for 1984-2011 which was 93.75%. There was no significant difference in mean clutch size or mean number of fledged young when comparing this year, last year and 1984-2011. However, there was an observable increase in destructive House Wren behavior at Tree Swallow nests over the past two years. This indicates some specific changes within the grid that may be compromising selection of these boxes by Tree Swallows in recent years. Continued comparison of longitudinal data in the upcoming years may begin to reveal other significant differences due to increased interspecific competitive interactions within this nest-box grid.

Introduction

Tree Swallows have shown declining populations over the last 10-15 years in Canada with a 2.8% decline annually from 1989-2009 across Canada (Canadian Wildlife Service, 2011). The population decline is a concern and has prompted studies to determine possible causes and ways to prevent further decline. One possible cause in the grid I surveyed may be increased competition for nesting sites with either conspecifics or another species, such as House Wrens or Mountain Bluebirds. Tree Swallows compete aggressively for nest sites with conspecifics and defend a small area, within a 10-15 m radius, around a nesting cavity from intruders (Hussell, 2012). In this study I observed the increase in interspecific competition over two years within the nest-box grid and the effects of this on Tree Swallow nesting success. Determining hindrance to successful Tree Swallow nesting can allow manipulation of grid locations to encourage selection by Tree Swallows and restore population numbers.

Previous research has revealed that House Wrens compete with Tree Swallows and deter them from nesting in a specific area by initiating chases and fights, filling nest-boxes with twigs, and by destroying eggs and nestlings (Finch 1990). An increase in the population of either species would lead to an increase in these interference behaviors to ensure access to nesting space and successful nesting and fledging of young. I spent some time each week observing interactions between the Tree Swallows and House Wrens within this nest-box grid to determine if any of these behaviors were occurring.

Tree Swallows and House Wrens generally prefer two very different habitats and are adapted for very different fundamental niches in order to decrease competitive interactions between the two species. Tree Swallows prefer to nest in open areas such as fields, marshes and meadows while House Wrens prefer woodlands, forest edges and shrubby areas (Rendell & Robertson 1990). The Tree Swallow grid observed has been operational for almost thirty years and succession has allowed the establishment of shrubs and creep of the forest edge into the grid. My hypothesis states that these changes in habitat dynamics have increased the invasion of *T. aedon* into the nest-box grid compromising successful nesting of *T. bicolor* due to increased interspecific competition. Monitoring the nesting grid will reveal if this is the case based on settling of boxes by either Tree Swallows or House Wrens and on observed

competitive behaviors during the nesting period. The changes in habitat dynamics may be deterring Tree Swallow settlement, limiting the size of their realized niche, and favoring House Wren settlement and an increasing their realized niche within this nest-box grid.

Study Area and Methods

Data were collected from mid-May through early August 2014. The model species is the Tree Swallow and its main competitor at the nest-box grid was also observed, the House Wren. I monitored the breeding activities of Tree Swallows in a 48 nest-box grid (n=48) at the Beaverhill Bird Observatory near Tofield, Alberta. The grid area is characterized by grasslands to the north and west and poplar forest to the south and east. The grid is located within the natural area which is enclosed by a fence and surrounded by small scale farms (hayfields, pasture and crop fields) to the west and by non-agricultural habitats (wetlands, grasslands and forest patches) on the north, south and east. North of the grid is primarily wetlands in the spring and grasslands in the summer. South of the grid is a deciduous forest primarily consisting of poplar (Figure 1). The extended area consists of two other Tree Swallow nest-box grids and the forest area houses nest-box grids for House Wrens as well.

Nest-boxes are mounted on metal poles to deter ground dwelling predators and arranged in a spiral throughout the field at varying distances from each other with the nearest box being 3.5 meters from its neighbor and the farthest being more than 30 meters. All boxes and entrances were standard size with the floor measuring 5x5 inches and an entrance 1.5 inches in diameter centered 6 inches above the floor of the box. Nesting material from the previous breeding season was removed.

Nest-boxes were visited weekly to determine occupancy (ie. nest building), clutch size, brood size at hatching and number of chicks fledged and to observe any evidence of competitive behavior between Tree Swallows and House Wrens. Nest material, dead nestlings and feces was removed from the nest-boxes following the breeding season when observation and monitoring ceased.

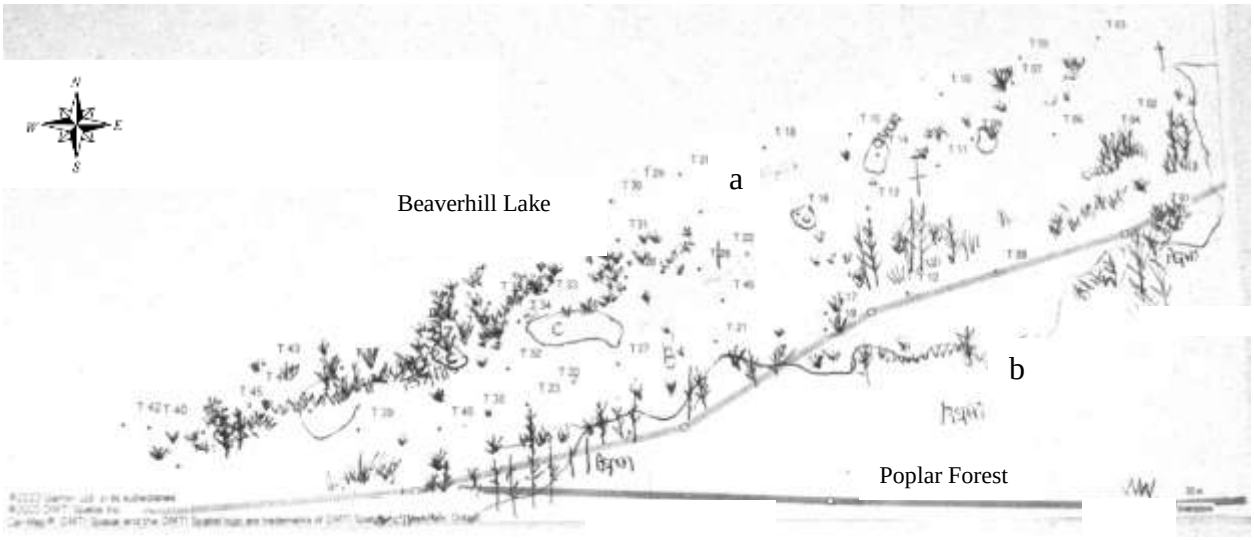

Figure 1. Scale diagram of spiral nesting grid (old grid) showing arrangement of boxes within the grid, boxes at the grid edge (a), and forest edge (b). The location of each nest-box is indicated with a black dot and labeled with the box number, T1-T48. South of the drawn in forest edge line (b) is thick poplar forest (drawn in characteristics are not to scale). The poplar forest area shown contains a House Wren nest-box grid. The light gray line is a walking trail and the dark grey line is a vehicle road, scale is in lower right corner.

Results

The percentage of nest-boxes occupied was 91.67% compared to 81.25% in 2013, a 10.4% increase (n=48). The two main competitive species in the area, House Wrens and Mountain Bluebirds, occupied 20.83% and 2.08% respectively compared to 8.33% and 2.08% respectively in 2013, a significant increase of 12.5% in the House wren population over one year (p=0.05). Total occupancy by Tree Swallows was 68.75% compared to 70.83% in 2013, while still the majority of nesting boxes there has been a 2.1% decrease (Figure 2). The mean total Tree Swallow occupancy obtained for 1984-2011 was 93.75%, therefore occupancy has significantly decreased in this grid over the past 20 years revealed by ANOVA (p=0.05).

The mean Tree Swallow clutch size was 6.1 ± 1.3 (n=33) compared to 6.5 ± 0.8 in 2013 (n=34), a 6% decrease over one year (Table 1), with a maximum clutch size of 7 this year compared to 8 last year and a minimum clutch size of 2 compared to 5 in 2013. The mean number of hatchlings that fledged per nesting attempt was 5.7 ± 1.8 (n=33) with a minimum of 0 and a maximum of 7 compared to 6.2 ± 1.7 in 2013 (n=34) with a minimum of 3 and a maximum of 8

representing an 8% decrease. The mean number of young fledged per successful nest also shows a slight decrease of 2.4%. This year five hatchlings did not survive and seven eggs did not hatch compared to five dead hatchlings and five unhatched eggs last year. All values are given as means ± SD. Data was available for 1984-2011 and revealed a mean clutch size of 6.2, a mean fledgling number of 5.6 per successful nest and a mean fledgling number of 5.0 per nesting attempt. The mean date of first egg was earlier this year at May 29 compared to June 2, 2013, but both are within the range observed for years 1984-2011 (Table 1). No significant difference was found between means using T-tests and ANOVA (p=0.05).

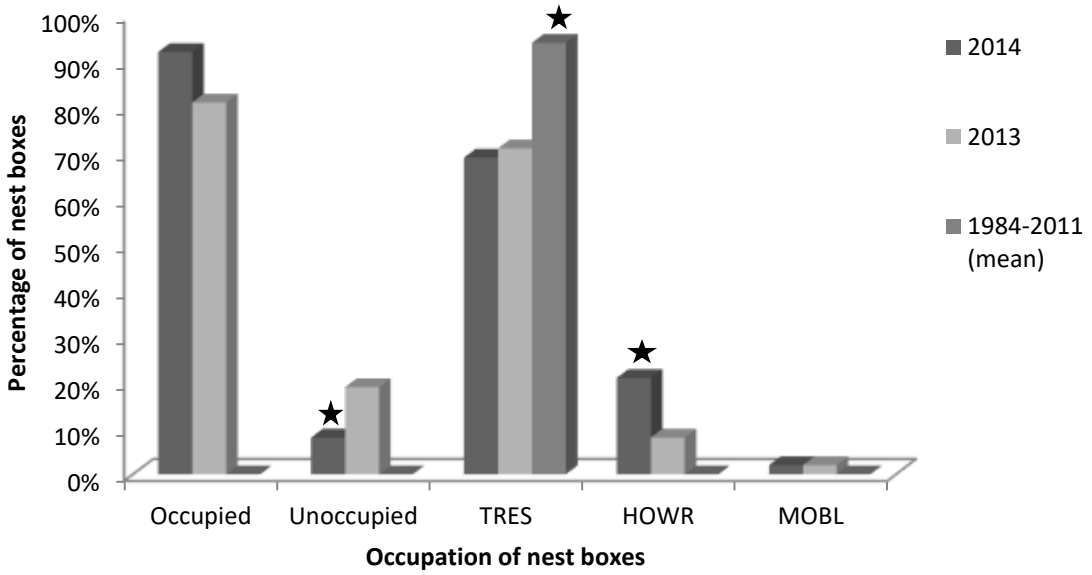

Figure 2. Comparison of distribution of nest-boxes occupied by Tree Swallows (TRES), House Wrens (HOWR), Mountain Bluebirds (MOBL) and total occupied and unoccupied for 2014 and 2013. The mean total Tree Swallow occupancy for years 1984-2011 is included but no data were available during this time span for the other categories (n=48). ★ Represents a significant difference between years by ANOVA (p=0.05).

Discussion

In this study I observed the increase in interspecific competition over two years within this nest-box grid and its effect on Tree Swallow nesting success. The grid I studied had a high total occupancy rate of 91.67% compared to 81.25% in 2013, however total occupancy of Tree Swallows was 68.75% this year down from 70.83% last year and significantly less than the average occupancy of 93.75% between 1984-2011 (p=0.05, n=48). This indicates that while

more nest-boxes are occupied there has been a change in species occupation of the boxes. There are two other sympatric species, House Wrens and Mountain Bluebirds, which occupied 20.83% and 2.08% respectively compared to 8.33% and 2.08% in 2013. While the bluebird population remained stable, there was a significant increase in the presence of House Wrens in the grid ($p=0.05$). The population more than doubled from 4 nests last year to 10 nests this year. The data is not available to determine a conclusive correlation between the increase in House Wren occupancy and the decrease in Tree Swallow occupancy and other factors may be influencing these occupancy numbers. However, this does cause an increase in interspecific competition between House Wrens and Tree Swallows as they compete for nest-boxes and more evidence of this was observed this year compared to last year.

Some of the observed interference by House Wrens included usurping Tree Swallows by covering partial nests with sticks, entering and exiting boxes with Tree Swallow nests, removing Tree Swallow eggs from their nests and possibly causing Tree Swallow adults to abandon nests with eggs and young. Actions of interference by House Wrens previously documented include chases and fights, filling boxes with twigs causing desertion, destroying eggs by piercing them or emptying them from the nest and pecking nestlings to death (Finch 1990). This year ten boxes in a grid of 48 boxes were filled with sticks by House Wrens. House Wrens successfully raised young in five of these ten boxes while possibly just filling the others to prevent Tree Swallow nesting or as a distraction for predators (Finch 1990). An additional five boxes were filled with sticks after Tree Swallows or Mountain Bluebirds had fledged from them, including the only box occupied by Mountain Bluebirds, although the House Wrens did not lay eggs in this box. There was only one case of a House Wren nest being removed from a nest-box and successful nesting and fledging of Tree Swallows in that same box, indicating that House Wrens outcompete Tree Swallows at a rate of 5:1 based on successful nesting and fledging of young after usurping the competitive species. Therefore interference competition for nest-boxes can result in exploitation competition and possibly competitive exclusion in the future if this trend continues in this nest-box grid.

House Wrens were observed flying in and out of boxes with Tree Swallow nests. This activity was witnessed at one Tree Swallow nest containing three eggs and this nest was abandoned

early after laying. There were also similar sightings of this behavior at other boxes containing Tree Swallow nests throughout the observation period, but these boxes were either abandoned by the Tree Swallows before eggs were laid or, if a clutch had been laid, the interference did not force the Tree Swallows to abandon the nest.

House Wren interference with Tree Swallow eggs was also observed. In one case an entire Tree Swallow nest of five eggs disappeared and was replaced with a House Wren nest that successfully fledged six chicks. There were two cases of nests where three eggs were removed from each nest and found broken on the ground in front of the boxes. In one nest these were three of five eggs and the Tree Swallow adult remained in the nest and successfully fledged the remaining two young. In the other nest the three eggs were all of the eggs in the nest and the box remained empty for two weeks before a new Tree Swallow nest with seven new eggs appeared and these all successfully fledged, however four weeks later than the others.

Obvious egg destruction was observed, however nestling destruction is harder to determine. Five Tree Swallow chicks were discovered dead, all were discovered singly in separate nest-boxes from different clutches. The cause of death may have been something other than pecking by House Wrens, such as adult abandonment of the nest after the other chicks had fledged or just death of the runt chick of the brood, as obvious pecking punctures were not observed. Last year there were five dead hatchlings observed with three of these being from one box that was within three feet of a nest of eight House Wren chicks, like this year it is difficult to say if House Wrens destroyed the young but all three appeared sick the week before dying. In 2013 only four of the 48 boxes were filled with sticks, all four of these boxes successfully fledged House Wren chicks, and no other evidence of interference was observed. No additional boxes were filled with sticks and no eggs ever went missing or were observed broken. All eggs were accounted for and hatched, with the exception of five individual eggs from separate nests that did not hatch. The most recent observed events represent an increase in interspecific competition between Tree Swallows and House Wrens within this grid and indicate a more destructive form of interference than that observed in the previous year.

Competition for nest-boxes starts as soon as swallows return north to breed, in this study that appears to be early-mid May, and is weather dependent early in the season becoming more

intense as the height of nest building approaches. This year all species appeared to be settling at the same time with the one Mountain Bluebird nesting earlier this year than last year. House Wrens continued to settle after fledging of the other two sympatric species, unlike last year when House Wrens and Tree Swallows were fledging at the same time in this grid. Robillard, Garant and Belisle (2013) observed that some nest-boxes in their grid remain empty every year or were used at low frequencies by other bird species like Mountain Bluebirds and House Wrens. This appears to be the case in this grid as well with some of the same boxes remaining empty this year and some of the boxes that were empty last year being occupied by House Wrens this year, increasing the total boxes occupied overall even though the total occupied by Tree Swallows decreased.

Rendell and Robertson (1990) carried out a study involving daily monitoring between March-August in 1986-89 (n=77) where they also observed competitive interference by House Wrens and found that the likelihood of a Tree Swallow nest being destroyed by a House Wren decreases as distance from the forest edge increases. A high presence and aggressiveness of House Wrens in the area may have influenced their data and results, but these same conditions were observed within the grid studied here. Rendell and Robertson (1990) concluded that nesting away from the forest edge decreases competition with House Wrens and allows clear paths for foraging in the vicinity of the nest site. It appears likely that the changes in habitat in recent years within this grid, such as the increase in shrubs and decrease in distance to the forest edge, has increased the likelihood of House Wrens nesting in the grid and decreased its appeal as an ideal habitat for Tree Swallows.

Longitudinal data reveals that there is no significant difference in the mean clutch size, mean number of young fledged per nest attempt or successful nest attempt or in the mean date of first egg laid over the years of data collection between 1984 and the present. However, these numbers have all decreased over the past year including the maximum clutch size and the maximum number of fledged young. If Tree Swallows settle and nest in the grid they are still quite successful in reproducing and fledging young despite competition, whether with conspecifics or with House Wrens. Also once Tree Swallows have started laying eggs they are usually successful in defending them, with the exception of two nests this year where eggs

were destroyed. The main concern is not with reproductive success but rather with initial nesting success, as stated in my hypothesis. It appears that Tree Swallows are usurped from the boxes when initial box selection and nest building begins by the House Wrens piling sticks on top of partially constructed nests. This may make the increasing House Wren presence, associated with the shift in habitat due to succession, a deterrent to Tree Swallow nesting within the grid and may explain the continuing decline of Tree Swallows nesting here.

My hypothesis was that changes in habitat dynamics would increase the invasion of *T. aedon* into the nest-box grid compromising successful nesting of *T. bicolor* due to increased interspecific competition between the two species. Results show that while there was a significant increase in House Wren nesting within the nest-box grid ($p=0.05$), it more than doubled from four in 2013 to ten in 2014, there was no significant decrease in Tree Swallow occupancy over these two years. However, there has been a significant decrease in Tree Swallow nest-box occupancy when comparing the past two years to the mean occupancy of Tree Swallows for 1984-2011 which was 93.75% ($p=0.05$). There was an observable increase in destructive House Wren behavior at Tree Swallow nests, but this has not yet significantly affected reproductive success of the Tree Swallows. Continued comparison of longitudinal data in the upcoming years may begin to reveal some significant differences due to increased interspecific competitive interactions within this nest-box grid.

In conclusion, this study was successful in documenting the destructive effects of interspecific competition between Tree Swallows and House Wrens within this nest-box grid. However, it was not successful in finding a statistically significant correlation between the increase in House Wren nesting and nesting success of Tree Swallows. There are some specific changes within the grid that may be compromising selection of these boxes by Tree Swallows in recent years. Determining hindrance to successful Tree Swallow nesting can allow manipulation of grid locations to encourage selection by Tree Swallows and restore population numbers. The case could be made for relocating the nest-boxes that are closest to the forest edge to the exterior area of the grid. The relocation of boxes that are within shrubs and near trees to a more open area may restore Tree Swallow occupancy numbers. It is difficult to conclusively establish the effects of increased competition because the presence of competing species is often correlated

with other factors and competition is not necessarily observable on all scales. Further research is necessary over a longer period of time with specific focus on the competitive interference by House Wrens to determine the exact effects of this on the nesting success of Tree Swallows. Clearly it is apparent that interspecific competition between Tree Swallows and House Wrens is a complex interaction of multiple variables, some of which may still be unknown. The information obtained for this study may not be applicable to natural populations where nesting occurs in cavities other than man-made nest-box grids.

Table 1. Means ± SD of clutch size, number of young fledged per successful nest and per nest attempt and date of first egg laid for Tree Swallows in 2014, 2013 and combined years of 1984-2011. T-TEST (p=0.05) revealed no significant difference between any two years.

Old Grid	**2014**	**2013**	**1984-2011**
Mean clutch size	6.12±1.3	6.47±0.8	6.2
Mean number of young fledged per successful nest	6.06±1.1	6.21±1.1	5.6
Mean number of young fledged per nest attempt	5.70±1.8	6.21±1.1	5.0
Mean date of first egg	May 29	June 2	May 20-June 7

Acknowledgments

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Literature Citation

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APPENDIX I

Statistical Analysis Summary

2013:				2014:			
Clutch size	Fledglings	Clutch size	Fledglings	Clutch size	Fledglings	Clutch size	Fledglings
5	4	7	6	7	7	7	7
7	6	7	7	5	5	7	6
5	4	6	6	6	5	7	7
7	6	8	8	4	7	7	7
6	6	6	6	6	7	7	7
6	6	7	7	7	6	4	4
7	7	6	6	7	6	6	6
6	5	7	7	5	7	7	0
7	7	6	6	6	7	7	7
6	6	6	6	7	2	7	7
8	8	7	7	7	7	Mean 6.121212	5.69697
7	7	8	8	7	6	SD 1.254582	1.806603
6	6	6	3	6	6		
5	5	7	7	5	5		
7	7	Mean 6.473684	6.210526	3	0		
7	6	SD 0.796507	1.069425	6	5		
6	6			6	5		
7	7			2	7		
5	5			7	7		
6	6			6	6		
6	6			7	5		
7	7			7	5		
6	6			7	7		

t-Test: Two-Sample Assuming Equal Variances

Fledglings

	Variable 1	*Variable 2*
Mean	6.210526	5.69697
Variance	1.14367	3.467803
Observations	38	33
Pooled Variance	2.221529	
Hypothesized Mean Difference	0	
df	69	
t Stat	1.448045	
P(T<=t) one-tail	0.076067	
t Critical one-tail	1.667239	
P(T<=t) two-tail	0.152133	
t Critical two-tail	1.994945	

t-Test: Two-Sample Assuming Equal Variances

Clutch size

	Variable 1	*Variable 2*
Mean	6.473684	6.121212
Variance	0.634424	1.672348
Observations	38	33
Pooled Variance	1.11578	
Hypothesized Mean Difference	0	
df	69	
t Stat	1.402345	
P(T<=t) one-tail	0.082648	
t Critical one-tail	1.667239	
P(T<=t) two-tail	0.165295	
t Critical two-tail	1.994945	

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Occupied	3	83	27.66667	580.3333
Unoccupied	3	13	4.333333	20.33333
TRES	3	112	37.33333	44.33333
HOWR	3	14	4.666667	25.33333
MOBL	3	2	0.666667	0.333333

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	3255.6	4	813.9	6.067843	0.009605	3.47805
Within Groups	1341.333333	10	134.1333			
Total	4596.933333	14				

APPENDIX II

Raw Data

Date: May 11, 2014 Time: 2:30 pm

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-Full	N		N	N		MOBL
42	Y-Partial	N		N	N		
40	N	N		N	N		
45	N	N		N	N		
44	N	N		N	N		
43	N	N		N	N		
37	N	N		N	N		
39	N	N		N	N		Pair sitting on top
48	N	N		N	N		
38	N	N		N	N		
23	N	N		N	N		
20	N	N		N	N		
32	N	N		N	N		
47	Y-HOWR	N		N	N		
35	N	N		N	N		
34	N	N		N	N		M flew out
33	N	N		N	N		
36	N	N		N	N		M sitting on top
30	N	N		N	N		
29	N	N		N	N		

31	N	N	N	N	
28	N	N	N	N	
27	N	N	N	N	
21	N	N	N	N	
46	N	N	N	N	
26	N	N	N	N	
22	N	N	N	N	
24	Y-Partial	N	N	N	
25	N	N	N	N	
18	Y-Partial	N	N	N	
16	N	N	N	N	
17	N	N	N	N	
19	N	N	N	N	
12	N	N	N	N	
13	Y-Partial	N	N	N	M sitting on top
14	N	N	N	N	
15	N	N	N	N	
10	N	N	N	N	
9	N	N	N	N	
11	N	N	N	N	
8	N	N	N	N	
6	N	N	N	N	
7	N	N	N	N	
5	N	N	N	N	
3	N	N	N	N	

2	N	N		N	N	
4	N	N		N	N	
1	N	N		N	N	Needs new wire

Date: May 18, 2014 Time: 6:00 pm

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-MOBL	Y-4	Cold	N	Y-F		F sitting on eggs
42	P	N		N	N		
40	F	N		N	N		
45	P	N		N	N		
44	F	N		N	N		
43	N	N		N	N		
37	N	N		N	N		
39	N	N		N	N		
48	N	N		N	N		
38	N	N		N	N		
23	P	N		N	N		
20	P	N		N	N		Missing screw
32	N	N		N	N		Dead TRES M inside
47	N	N		N	N		
35	P	N		N	N		
34	P	N		N	N		
33	P	N		N	N		
36	F	N		N	N		
30	P	N		N	N		

29	F	N	N	N
31	N	N	N	N
28	F	N	N	N
27	P	N	N	N
21	N	N	N	N
46	N	N	N	N
26	F	N	N	N
22	P	N	N	N
24	F	N	N	N
25	N	N	N	N
18	F	N	N	N
16	N	N	N	N
17	N	N	N	N
19	N	N	N	N
12	F	N	N	N
13	F	N	N	N
14	F	N	N	N
15	N	N	N	N
10	P	N	N	N
9	P	N	N	N
11	P	N	N	N
8	N	N	N	N
6	P	N	N	N
7	F	N	N	N
5	N	N	N	N

3	F	N		N	N		
2	F	N		N	N		
4	N	N		N	N		
1	N	N		N	N		

Date: May 25, 2014 Time: 11:00 am

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-MOBL	6	Warm	N	N		
42	F	N		N	N		
40	F	N		N	N		
45	P	N		N	N		
44	F	N		N	N		
43	P	N		N	N		
37	F	N		N	N		
39	F	N		N	N		
48	F	N		N	N		
38	N	N		N	N		
23	F	N		N	N		
20	P	N		N	N		
32	N	N		N	N		
47	N	N		N	N		
35	F	N		N	N		
34	P	N		N	N		
33	F	1	Cold	N	N		
36	F	N		N	N		

30	F	2	Cold	N	N
29	P	N		N	N
31	F	N		N	N
28	F	N		N	N
27	F	N		N	N
21	F	N		N	N
46	N	N		N	N
26	F	N		N	N
22	F	N		N	N
24	F	4	Cold	N	N
25	F	N		N	N
18	F	N		N	N
16	F	N		N	N
17	HOWR	N		N	N
19	N	N		N	N
12	F	1	Cold	N	N
13	F	N		N	N
14	F	N		N	N
15	N	N		N	N
10	F	N		N	N
9	P	N		N	N
11	F	2	Cold	N	N
8	F	N		N	N
6	P	N		N	N
7	F	N		N	N

5	N	N		N	N		
3	F	1	Warm	N	N		
2	F	N		N	N		
4	F	N		N	N		
1	N	N		N	N		
Totals:	32	17					

Date: May 25, 2014 Time: 11:00 am

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-MOBL	6	Warm	N	N		
42	F	N		N	N		
40	F	N		N	N		
45	P	N		N	N		
44	F	N		N	N		
43	P	N		N	N		
37	F	N		N	N		
39	F	N		N	N		
48	F	N		N	N		
38	N	N		N	N		
23	F	N		N	N		
20	P	N		N	N		
32	N	N		N	N		
47	N	N		N	N		
35	F	N		N	N		
34	P	N		N	N		

33	F	1	Cold	N	N
36	F	N		N	N
30	F	2	Cold	N	N
29	P	N		N	N
31	F	N		N	N
28	F	N		N	N
27	F	N		N	N
21	F	N		N	N
46	N	N		N	N
26	F	N		N	N
22	F	N		N	N
24	F	4	Cold	N	N
25	F	N		N	N
18	F	N		N	N
16	F	N		N	N
17	HOWR	N		N	N
19	N	N		N	N
12	F	1	Cold	N	N
13	F	N		N	N
14	F	N		N	N
15	N	N		N	N
10	F	N		N	N
9	P	N		N	N
11	F	2	Cold	N	N
8	F	N		N	N

6	P	N		N	N		
7	F	N		N	N		
5	N	N		N	N		
3	F	1	Warm	N	N		
2	F	N		N	N		
4	F	N		N	N		
1	N	N		N	N		
Totals:	32	17					

Date: May 31, 2014 Time: 1:00 pm

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-MOBL	6	Warm	N	Y-F	No band	
42	F	N		N	N		
40	F	3	Cold	N	N		
45	E	N		N	N		
44	F	6	Warm	N	N		
43	P	N		N	N		
37	F	1	Cold	N	N		
39	F	2	Cold	N	N		M on top
48	F	5	Warm	N	N		
38	N	N		N	N		
23	F	3	Cold	N	N		
20	P	N		N	N		
32	N	N		N	N		
47	N	N		N	N		Dead M inside

35	F	4	Warm	N	N		
34	P	N		N	N		
33	F	5	Warm	N	N		
36	F	4	Cold	N	N		
30	F	6	Warm	N	N		
29	P	N		N	N		
31	F	2	Cold	N	N		
28	F	6	Warm	N	N		
27	F	3	Cold	N	N		
21	F	3	Warm	N	N		
46	N	N		N	N		
26	F	4	Cold	N	N		
22	F	3	Cold	N	N		
24	F	6	Warm	N	N		
25	F	3	Warm	N	N		
18	F	5	Cold	N	N		
16	F	3	Cold	N	N		
17	HOWR	N		N	N		
19	N	N		N	N		
12	F	7	Cold	N	Y-F	2351 46493	
13	F	6	Warm	N	N		
14	F	1	Cold	N	N		
15	N	N		N	N		
10	F	4	Cold	N	N		Pair flew out
9	P	N		N	N		

11	F	2	Warm	N	N	3 eggs broken on ground	
8	F	3	Cold	N	N		
6	P	3	Cold	N	N		M flew out
7	F	2	Cold	N	N		F flew out
5	N	N		N	N		
3	F	6	Warm	N	Y-F	no band	
2	F	5	Warm	N	N		Pair on top
4	F	N		N	N		
1	P	N		N	N		
Totals:	32	122					

Date: June 7, 2014 Time: 9:00 am

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-MOBL	N		6	M	No band	
42	F	N		N	N		
40	F	7	Warm	N	N		
45	E	N		N	N		
44	F	6	Warm	N	F	No band	
43	P	N		N	N		
37	F	6	Warm	N	N		
39	F	7	Warm	N	F	No band	
48	F	7	Warm	N	N		
38	N	N		N	N		
23	F	6	Warm	N	N		
20	P	N		N	N		

32	N	N		N	N	
47	N	N		N	N	
35	F	6	Warm	N	N	
34	F	N		N	N	
33	F	N		N	N-check this, eggs present last week	
36	F	6	Warm	N	N	
30	F	6	Warm	N	N	
29	F	N		N	N	
31	F	7	Warm	N	N	
28	F	6	Warm	N	N	
27	F	5	Warm	N	F	no band
21	F	7	Warm	N	N	
46	N	N		N	N	
26	F	7	Warm	N	N	
22	F	7	Warm	N	F	no band
24	F	6	Warm	N	N	
25	F	7	Warm	N	N	
18	F	7	Warm	N	N	
16	F	3	Warm	N	F	no band
17	F	1	Cold	N	N	
19	F	N		N	N	HOWR
12	F	7	Warm	N	N	2351 46493(F)
13	F	7	Warm	N	F	no band
14	F	7	Warm	N	N	
15	N	N		N	N	Pair sitting on box(decoy)

10	F	7	Warm	N	F	no band
9	P	N		N	N	
11	F	2	Cold	N	N	
8	F	3	Warm	N	N	3 eggs broken on ground
6	F	7	Warm	N	N	
7	F	6	Warm	N	N	
5	N	N		N	N	
3	F	6	Warm	N	Y-F	no band
2	F	7	Warm	N	F	no band M on top
4	N	N		N	N	
1	F	3	Warm	N	F	2351 46568
Totals:	36	181				

Date: June 14, 2014 Time: 3:30 pm

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-MOBL	N		6	No band(M)	Young ready for banding	
42	F	N		N	N		
40	F	7	Warm	N	N		
45	E	N		N	N		
44	F	1	Warm	5	N	No band(F)	Newly hatched
43	P	N		N	F	No band	
37	F	5	Warm	N	F	2351 46482	
39	F	7	Warm	N	N	No band(F)	
48	F	7	Warm	N	N		
38	N	N		N	N		

23	F	6	Warm	N	N		
20	P	N		N	N		
32	N	N		N	N		
47	F	N		N	N		HOWR
35	F	5	Warm	N	N		
34	F	4	Warm	N	N		
33	F	N		N	N		
36	F	6	Warm	N	N		
30	F	N		6	N		
29	P	N		N	N		
31	F	7	Warm	N	N		
28	F	1	Warm	5	N		
27	F	1	Warm	3	N	no band(F)	Newly hatched
21	F	7	Warm	N	N		
46	N	N		N	N		
26	F	7	Warm	N	N		
22	F	7	Warm	N	N	no band(F)	
24	F	N		6	N		3-4 days old
25	F	7	Warm	N	F	2521 61104	
18	F	7	Warm	N	N		
16	F	3	Warm	N	F	no band	
17	F	4	Warm	N	N		
19	F	N		N	N		HOWR
12	F	1	Warm	6	N	2351 46493(F)	
13	F	4	Warm	3	N	no band(F)	

14	F	7	Warm	N	N	
15	N	N		N	N	Pair sitting on box(decoy)
10	F	7	Warm	N	N	no band(F)
9	P	N		N	N	
11	F	N		2	N	3 eggs broken on ground
8	F	3	Warm	N	N	
6	F	7	Warm	N	N	
7	F	6	Warm	N	F	no band
5	N	N		N	N	
3	F	1	Warm	6	N	no band(F)
2	F	7	Warm	N	N	no band(F) M on top
4	N	N		N	N	
1	F	3	Warm	N	F	2351 46568
Totals:	37	145		48		

Date: June 22, 2014 Time: 10:00 am

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-MOBL	N		6	No band(M)		Young ready to fledge
42	P	N		N	N		
40	F	N		7	N		Newly hatched
45	Y-HOWR	N		N	N		
44	F	N		6	N	No band(F)	Young ready to band
43	P	N		N	N	No band(F)	
37	F	N		6	N	2351 46482(F)	Last years band
39	F	1	Warm	6	N	No band(F)	Newly hatched

48	F	N		7	N		
38	N	N		N	N		
23	F	N		6	N		
20	P	N		N	N		
32	N	N		N	N		
47	Y-HOWR	6	Warm	N	N		
35	F	N		5	N	Young ready to band	
34	F	5	Warm	N	N		
33	Y-HOWR	N		N	N		
36	F	1	Warm	5	N		
30	F	N		6	N	Young ready to band	
29	P	N		N	N		
31	F	N		7	N		Newly hatched
28	F	1	Warm	5	N	Young ready to band	
27	F	N		5	N	no band(F)	Newly hatched
21	F	1	Warm	5	N		Newly hatched
46	N	N		N	N		
26	F	N		7	N		
22	F	1	Warm	5	N	no band(F)	
24	F	N		7	N	Young ready to band	
25	F	N		7	N	2521 61104(F)	Young ready to band
18	F	7	Warm	N	N		
16	F	N		3	N	no band(F)	HOWR entered box
17	F	5	Warm	N	N		
19	Y-HOWR	7		N	N		

12	F	1	Warm	6	N	2351 46493(F)	
13	F	N		7	N	no band(F)	
14	F	1	Warm	6	N		
15	N	N		N	N	Pair sitting on box(decoy)	
10	F	N		7	N	no band(F)	Newly hatched
9	Y-HOWR	N		N	N		
11	F	N		2	N	Young ready to band	
8	F	N		N	N	3 eggs on ground	
6	F	1	Warm	6	N		
7	F	1	Warm	5	252161102Geolocator#012Mband#252161140&Geolocator 026		
5	N	N		N	N		
3	F	1	Warm	6	N	no band(F)	Young ready to band
2	F	1	Warm	6	N	no band(F)	Young ready to band
4	N	N		N	N		
1	F	3	Warm	N	F	2351 46568	HOWR spotted at box
Totals:	38	45		162			

Date: July 1, 2014 Time: 1:00 pm

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-HOWR	N		N	N	MOBL chicks have fledged	
42	P	N		N	N		
40	F	N		6	N		Ready to band
45	Y-HOWR	N		N	N		
44	F	N		6	N	No band(F)	Have been banded, 1 chick missing an eye
43	P	N		N	N	No band(F)	

37	F	N		6	N	2351 46482(F)	Ready to band
39	F	N		6	N	No band(F)	Ready to band
48	F	N		7	N		Ready to band
38	N	N		N	N		
23	F	N		6	N		Ready to band
20	P	N		N	N		
32	Y-HOWR	N		N	N		
47	Y-HOWR	6	Warm	N	N		
35	F	N		5	N	Have been banded	
34	F	N		5	N		Newly hatched
33	Y-HOWR	6	Warm	N	N		
36	F	N		5	N		Ready to band
30	F	N		5	N	Have been banded, 1 fledged	
29	P	N		N	N		
31	F	N		7	N		Ready to band
28	F	N		6	N	Have been banded, 1 fledged	
27	F	N		5	N	no band(F)	Ready to band
21	F	N		5	N		Ready to band
46	Y-HOWR	N		N	N		
26	F	N		7	N		Ready to band
22	F	N		6	N	no band(F)	Ready to band
24	F	N		N	N	All young have fledged	
25	F	N		6	N	2521 61104(F)	Ready to band
18	F	N		6	N	Ready to band and fledge(2)	
16	F	N		4	N	no band(F)	Ready to band

17	F	N		6	N		Newly hatched
19	Y-HOWR	?		5	N		Newly hatched
12	F	N		6	N	2351 46493(F)	Ready to band and 1 fledged
13	F	N		6	N	no band(F)	Have been banded
14	F	N		6	N		Ready to band
15	N	N		N	N		
10	F	N		7	N	no band(F)	Ready to band
9	Y-HOWR	7	Warm	N	Y		Flew out
11	F	N		2	N		Have been banded
8	F	5	Cold	N	N		
6	F	N		5	N		Ready to band
7	F	N		5	N	2521 61102	Ready to band
5	Y-HOWR	N		N	N		
3	F	N		4	N	no band(F)	Have been banded ready to fledge
2	F	N		6	N	no band(F)	Young ready to band
4	Y-HOWR	N		N	N		
1	F	3	Warm	N	N	2351 46568	
Totals	42	27		167			

Date: July 6, 2014 Time: 3:00 pm

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-HOWR	N		N	N	MOBL chicks have fledged	
42	P	N		N	N		
40	F	N		5	N		Not banded, 1 fledged
45	Y-HOWR	6	Warm	N	Y		Adult flew out

44	F	N		1	N	61135-140	Banded and fledged except 1 dead chick
43	P	N		N	N	No band(F)	
37	F	N		6	N	2351 46482(F)	Not banded, ready to fledge
39	F	N		6	N	No band(F)	Not banded, ready to fledge
48	F	N		N	N		All fledged
38	N	N		N	N		
23	F	N		2	N		Fledged except 2
20	P	N		N	N		
32	Y-HOWR	N		N	N		
47	Y-HOWR	1	Warm	5	Y		Newly hatched
35	F	N		5	N	61328-32	Have been banded
34	F	N		5	N		Ready to band
33	Y-HOWR	6	Warm	N	N		
36	F	N		5	N	Not banded, ready to fledge	
30	F	N		5	N	2521 61327	One banded 4 too old, 1 fledged
29	P	N		N	N		
31	F	N		7	N	Not banded, ready to fledge, replaced wire	
28	F	N		5	N	60050-55	Have been banded, 1 fledged
27	F	N		5	N	no band(F)	Skipped, tall box
21	F	N		5	N		Not banded, ready to fledge
46	Y-HOWR	N		N	N		
26	F	N		N	N		All young have fledged
22	F	N		N	N	no band(F)	young have fledged, 1 infertile egg remaining
24	F	N		N	N	Too old to band, All young have fledged	
25	F	N		6	N	60150-1533	Banded, 3 Not banded, ready to fledge

18	F	N		N	N		All young have fledged
16	F	N		N	N	no band(F)	All young have fledged
17	F	N		6	N		Ready to band
19	Y-HOWR	N		6	N		Ready to band
12	F	N		N	N	2351 46493(F)	All young have fledged
13	F	N		6	N	60041-47	Have been banded
14	F	N		6	N		Not banded, ready to fledge
15	N	N		N	N		
10	F	N		7	N	no band(F)	Not banded, ready to fledge
9	Y-HOWR	7	Warm	N	Y		Flew out
11	F	N		2	N	60048-49	Have been banded
8	F	5	Warm	N	N		
6	F	N		5	N		Not banded, ready to fledge
7	F	N		1	N	2521 61102	All fledged except 1
5	Y-HOWR	N		N	N		
3	F	N		4	N	60130-134	Have been banded ready to fledge
2	F	N		N	N	no band(F)	All young have fledged
4	Y-HOWR	N		N	N		
1	F	3	Warm	N	N	2351 46568	
Totals	42	28		116			

Date: July 13, 2014 Time: 5:00 pm

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-HOWR	N		N	N	MOBL chicks have fledged	
42	P	N		N	N		

40	F	N		N	N	Fledged
45	Y-HOWR	6	Warm	N	Y	Adult flew out
44	F	N		1	N	61135-140Banded and fledged except 1 dead chick
43	N	N		N	N	No band(F)
37	F	N		1	N	2351 46482(F) Fledged, 1 dead not banded
39	F	N		N	N	No band(F) Fledged
48	F	N		N	N	Fledged
38	N	N		N	N	
23	F	N		N	N	Fledged
20	P	N		N	N	
32	Y-HOWR	N		N	N	
47	Y-HOWR	1	Warm	4	Y	Ready to band
35	F	N		5	N	61328-32 Have been banded
34	F	N		5	N	Ready to fledge, not banded
33	Y-HOWR	N		6	N	Newly hatched
36	F	N		N	N	Fledged
30	F	N		N	N	2521 61327 Fledged
29	P	N		N	N	
31	F	N		N	N	Fledged
28	F	N		N	N	60050-55 Fledged
27	F	N		N	N	no band(F) Fledged
21	F	N		N	N	Fledged
46	Y-HOWR	N		N	N	
26	F	N		N	N	Fledged
22	F	N		N	N	no band(F)All young have fledged, 1 infertile

24	F	N		N	N		Fledged
25	F	N		N	N	60150-153	Fledged
18	F	N		N	N		Fledged
16	F	N		N	N	no band(F)	Fledged
17	F	N		6	N	Not banded, ready to fledge	
19	Y-HOWR	N		6	N	Not banded, ready to fledge	
12	F	N		N	N	2351 46493(F)	Fledged
13	F	N		N	N	60041-47	Fledged
14	F	N		N	N		Fledged
15	N	N		N	N		
10	F	N		N	N	no band(F)	Fledged
9	Y-HOWR	1	Warm	6	Y		Newly hatched
11	F	N		N	N	60048-49	Fledged
8	F	7	Warm	N	N		
6	F	N		N	N		Fledged
7	F	N		N	N	2521 61102	Fledged
5	Y-HOWR	N		N	N		
3	F	N		N	N	60130-134	Fledged
2	F	N		N	N	no band(F)	Fledged
4	Y-HOWR	N		N	N		
1	F	3	Cold	N	N	2351 46568	

Date: Aug 5, 2014 Time: 10:00 am

Box#	Nest Present	Eggs Present	Eggs warm/cold	Young present	Adult present	Band#	Comments
41	Y-HOWR	N		N	N		Replace HOWR
42	P	N		N	N		Replace
40	F	N		N	N		Replace
45	Y-HOWR	N		N	Y		HOWR
44	F	N		N	N	61135-140	Dead chick
43	F	1		3	N	Ready to band	3 young, 1 egg
37	F	N		N	N	no band(F)	Dead chick
39	F	N		N	N		Fledged
48	F	N		N	N		Fledged
38	N	N		N	N		Replace
23	F	N		N	N		Fledged
20	P	N		N	N		S facing
32	Y-HOWR	N		N	N		Replace HOWR
47	Y-HOWR	N		N	N		Replace HOWR
35	F	N		N	N		Replace
34	F	N		N	N		Fledged
33	Y-HOWR	N		N	N		Fledged HOWR
36	F	N		N	N	no band	Dead chick
30	F	N		N	N	2521 61327	Dead chick
29	Y-HOWR	N		N	N		HOWR
31	F	N		N	N		Fledged
28	F	N		N	N		Fledged
27	Y-HOWR	N		N	N		Fledged HOWR

21	F	2 infertile		N	N	Fledged, 2 infertile eggs
46	Y-HOWR	N		N	N	HOWR
26	F	N		N	N	Fledged
22	F	1 infertile		N	N	All young have fledged, 1 infertile egg remaining
24	F	N		N	N	Fledged S facing
25	F	N		N	N	Replace
18	F	N		N	N	Fledged
16	F	N		N	N	Fledged
17	F	N		N	N	Fledged
19	Y-HOWR	N		N	N	Fledged
12	F	N		N	N	Fledged HOWR
13	F	N		N	N	Fledged
14	F	N		N	N	Fledged
15	N	N		N	N	
10	F	N		N	N	Fledged
9	Y-HOWR	N		N	N	Fledged HOWR
11	F	N		N	N	Fledged
8	F	N		4	Y	3 Fledged, 4 in nest
6	F	N		N	N	No band Dead chick
7	F	N		N	N	Fledged
5	Y-HOWR	N		N	N	HOWR
3	F	N		N	N	Fledged
2	F	N		N	N	Fledged
4	Y-HOWR	N		N	N	HOWR
1	F	3	Cold	N	N	2351 46568 3 Abandoned eggs