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Northern United

Cinderford

Lesser Horseshoe Colony Historical Review and Status

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1 Introduction

1.1 This document is designed to bring together all of the historical surveys and monitoring of the colony of Lesser Horseshoe bats at the Cinderford Northern Quarter site to identify the colony population trends as a whole and to identify historical and current trends of the use of each building to identify the current importance of the various roosts.

1.2 There are a number of surveys going back over 15 years to before the Hawkwell enclosure artificial roost was constructed, which are shown here, however, this document is mostly targeting the last 6 years monitoring

2 Background

2.1 The Northern united site originally had a total of 9 buildings present, 8 of these were within the main compound area and a single small structure in the woods to the east, the explosives store. Historical surveys of these identified that most had been used as a roost by some species, however the main roosts were the office building and Bath house building.

2.2 The construction of the Hawkwell artificial roost was completed in May 2004 and was monitored after this time. The structure did not originally have artificial heat supplied to the building, that was added as a later enhancement in 2007 with insulation added between the rafters.

2.3 Much of the surveys and reports from this period are not available or lack complete data, including methods and timing of what was done when.

2.4 In 2003 monthly internal checks were conducted of the Main office, Bath House and Canteen in May, June and July, with twice monthly checks in August and September. From 2004 to 2007 Monthly internal checks were made of the same buildings as well as the new artificial roost in April, May, September, October and November with twice internal counts in June, July and August.

2.5 In 2003 four emergence surveys were conducted of the main office from June to September. In 2007 seven emergence surveys were made of the main office and five of the artificial roost from June to September.

2.6 No emergence surveys were conducted in 2005 and 2006.

2.7 In 2007 three emergence surveys were made of the Bath House.

2.8 No reports have been provided that have any of the survey data showing what was found present on each survey, survey locations, or if the buildings were all surveyed on the same days or dates of any surveys each month. In many years and for most surveys the counts were from internal surveys only, and this has been repeatedly shown to be inaccurate. Most notably during the summer months, when high number of bats present in any building are active and moving around, accurate counts cannot be made. However, from the period of 2003 to 2007 the following maximum counts

have been recorded and reported, while these will not be 100% accurate these can be used as a reasonable guide of the population present.

Year	Main Office	Bath House	Canteen	Artificial Roost	Maximum count during a single visit
2003	97	22	2	0	103
2004	95	42	2	0	117
2005	78	92	1	1	157
2006	149	110	1	2	212
2007	145	46	1	6	192

Table 1 – Maximum counts of the 4 buildings surveyed (Knight Ecology)

2.9 Up to 2007 the peak colony population recorded was 212 in 2006. It is unknown which month this was recorded, or if the counts were in the same month, or if this was pre or post birth. However, given this is a peak count it is assumed that this was recorded when juveniles were flying and probably from around the August period.

2.10 Up to 2007 in most years the main roost was the Office building, with a peak of 149 in 2006 and the Bath House with 110 again in 2006. The artificial roost was not recorded as being used until 2005 and by 2007 had only recorded a peak count of 6 individuals.

2.11 There are no records of any surveys provided within any reports during 2008.

2.12 From April 2009 to February 2011 there were a number of surveys conducted, with 16 in total. However, there are limitations in interpreting this data as these were non standardised surveys, from August 2009 there were no surveys conducted during any of the summer months, April to September, when the highest numbers of bats are likely to have been present. These surveys identified a peak of 193 Lesser Horseshoe bats on the 27th July 2009. See table 2

Date	Main Office	Bath House	Artificial Roost	Canteen	3	Total	Other Sp.
23.04.09	19	3	3	NS	0	25	
21.07.09	101	13	NS	0	0	114	Bath House: 1 Prob Natt.s
22.07.09	NS	NS	88	NS	NS	88	Art Roost: 1 Long-eared
27.07.09	107	7	78	0	1	193	
28.08.09	84	15	75	0	2	176	Bath House: 1 Prob Natt.s
25.09.09	39	9	48	0	0	96	Bath House: 1 Prob Natt.s
29.10.09	33	8	66	0	0	107	
20.11.09	15	4	54	0	0	73	
16.12.09	1	0	36	0	0	37	
22.01.10	0	0	8	0	0	8	
24.02.10	0	0	7	0	0	7	Dead LHS recorded
22.03.10	6	3	19	1	0	29	Dead LHS recorded
05.11.10	13	5	96	0	2	116	1 male Common Pip in Main Office
13.12.10	0	0	18	0	0	18	Art Roost: 1 Long-eared
26.01.11	0	0	16	0	0	16	
28.02.11	NS	NS	16	NS	0	16	

Table 2 – showing survey results from 2009 to February 2011

2.13 Five buildings were demolished under licence in 2013 and now the only buildings that remain are the Main office, Bath House, canteen, Artificial roost and woodland shed.

3 Recent Survey results

2011

3.1 In 2011 a scope of recommended bat work was produced by Knight ecology following a site meeting on the 28th February 2011 held with representatives from Natural England, Forest of Dean District Council, Gloucestershire Bat Group, ERM, Alan Baxter & Associates LLP, and Knight Ecology Ltd. This meeting recommended that there would be continued monthly daytime internal bat counts of the artificial roost, Main Office, Bath House, Canteen and woodland shed, and that these surveys were currently being completed.

3.2 A range of surveys were conducted at the site in 2011 by Kestrel Wildlife Consultants including surveys of the buildings. However, these surveys did not include the Artificial roost, which was known by this time to be the main roost used by Lesser Horseshoe bats..

3.3 As a result, there are no total population estimates for the Northern United colony in 2011, there are some results for the numbers of bats using the Office building and the Bath house, however it is unknown what proportions of the colony this represents. (see table 3)

Table 2:- Cinderford Emergence/Dawn swarming counts 2011
(unless otherwise noted, all figures refer to lesser horseshoe bats

Date	*Survey*	*OOR*						*BHR*			*Others (see map overleaf)*			
		Total	*Roller*	*Dormer*				*Total*	*E*	*S*	*3*	*4*	*5*	*6*
				Rt1	*Rt2*	*Rt3*	*Rt4*							
27-Jun	ES	48		25	10+1xLE	4	9	6	6					
12-Aug	ES	39		3	12	4	20	9	6	3				
13-Aug	DSS	11	7	4				32	28	4	1xMyo	2xLE?	1xLE	1xP45
27-Aug	ES	44	22	7	10		5	13	10	3				
28-Aug	ES	No bats seen emerging during survey												

Table 3 – Survey results 2011 – Kestrel Wildlife Consultants Northern united report 2011 (OOR-Office, BHR-Bath House)

2012

3.4 From May 2012 surveys of the site were conducted by Johns Associates. This predominantly consisted of internal counts for lesser horseshoe bats. This included internal counts of the artificial roost which were with populations of over 200 bats. Some caution should be applied to the exact figure as counting so many bats within such a small area when they are active and move around is difficult and can be inaccurate. It should also be noted that that asbestos surveyors conducted the surveys of the Bath House (for Health & Safety reasons), which is now known to be used by a number of species, as such the accuracy of the species counted as lesser horseshoe within the bath house cannot be accurately confirmed.

Date	Building C (main office)		Building H (Bath House)		Artificial Roost		Building G (Canteen)	Building 3	Total
	Adult	Juv	Adult	Juv	Adult	Juv			
29/05/12	66	-	52	-	161	-	0	0	279
22/06/12	34	-	9	-	>260	-	0	0	>303
31/07/12	45	2	15	-	>254	>10	0	1	>327
31/08/12	57	-	34	-	>233	-	0	0	>324
26/09/12	25	-	7	-	>310	-	0	0	>342
30/10/12	12	-	7	-	181	-	1	0	201
07/12/12	1	-	-	-	91	-	0	0	92
29/01/13	1	-	1	-	30	-	0	0	33

Table 4 – showing 2012 survey results from Johns Associates.

3.5 These results are notably higher than the last summer colony counts conducted in 2009 from 193LHB to >342LHB in November 2012. This represents a 77% colony growth in 3 years, however this growth should be taken cautiously due to the variability in survey methodology used. As bats move when they are counted the chance of repeat counting individuals is high. This was demonstrated in the 2013 surveys where an internal survey counted 108 bats but the emergence survey identified only 78 individuals, this represents a 38% extra count.

2013

3.6 The start of 2013, April to June, surveys were conducted by Johns Associates and then later with the assistance of AEWC Ltd, utilising both internal surveys on suitable buildings and emergence surveys of the three buildings where higher numbers of bats were identified present, the Bath House, Office and Artificial Roost. Following this from July onwards surveys were conducted by AEWC Ltd. (NB internal surveys of the Bath House were only conducted from August 2013 onwards by a qualified ecologist)

3.7 From July 2013 the scope of the bath house survey was extended to include previously un-surveyed emergence locations and improve the accuracy and confidence in the survey results. The surveys and population counts of the bath house, and hence the colony are only considered to be fully accurate from July 2013 onwards.

3.8 The 2013 surveys identified a peak count of 355 on the 30th August. This was not notably different to the 2012 peak counts, however, the previous surveys may have over counted and 2013 was identified as a very poor breeding year with an exceptionally cold spring and poor breeding success.

	25th April	29th May	22nd June	11th July	30th August	19th September	14th October	28th November	19th December
Artificial roost	97	78	237	283	301	179	99	101	41
Shed oposite	0	3	0	0	0	0	0	0	0
Office	20	19	26	25	42	22	22	1	2
Canteen	0	0	0	0	0	0	0	0	0
Bath House	NA	23	NA	9	12	4	6	1	0
Peak Total	117	123	263	317	355	201	127	103	43

Table 5 – showing survey results form 2013

2014

3.9 During all of 2014 all surveys were consistent with internal surveys of all buildings and emergence counts on the same day. 2014 saw a notable population jump from 355 in the previous year to 432 recorded in July, this was just over a 21% population jump on the previous year's peak count.

3.10 The peak count in July was observed to fall away rapidly into August to 348, where it remained consistent through to October.

3.11 June saw a peak of 51 bats using the Office building and July had a peak of 32 use the Bath House.

	20th January	11th February	17th March	28th April	27th May	23rd June	18th July	20th August	16th September	16th October	17th November	12th December
Artificial roost	31	28	52	148	244	286	371	298	296	320	188	93
Shed oposite	0	0	0	0	0	0	1	0	0	0	0	0
Office	1	1	3	9	21	51	28	45	30	14	8	1
Canteen	0	0	2	1	0	0	0	1	1	0	0	0
Bath House	0	0	2	4	2	25	32	4	1	5	6	0
Peak Total	32	29	59	162	267	362	432	348	328	339	202	94

Table 6 – showing monthly peak counts during 2014

2015

3.12 This year again saw a notable increase in the peak population count, to a peak of 555 individuals in August, over a 28% increase on the population recorded the previous year and over 500 individuals recorded present in the artificial roost alone.

3.13 The office and the Bath house both had lower numbers of bats present, potentially due to the continued dilapidation and increasing damp present within these buildings with a peak of 28 in the office and only 17 in the Bath house, approximately half the numbers found the previous year.

	19th January	13th February	11th March	14th April	18th May	15th June	10th July	11th August	5th September	15th October	18th November	16th December
Artificial roost	30	27	63	111	158	319	385	519	326	251	144	94
Shed oposite	0	0	0	0	0	0	0	0	0	0	0	0
Office	0	0	0	21	9	26	25	28	15	13	5	1
Canteen	0	0	0	1	0	0	0	0	0	0	0	0
Bath House	0	0	0	5	2	8	17	8	4	4	5	1
Peak Total	30	27	63	138	169	353	427	555	345	268	154	96

Table 7 – showing monthly peak counts during 2015

2016

3.14 This year again saw a notable increase in the peak population count, to a peak of 614 individuals in August, over a 10% increase on the population recorded the previous year even though this had been a poor breeding year.

3.15 The Bath house continued to have notably lower number present with a peak of 14 although the office peaked at 48 individuals.

	19th January	18th February	15th March	18th April	11th May	20th June	15th July	15th August
Artificial roost	55	54	87	151	233	453	498	551
Shed oposite	0	0	0	0	0	0	0	1
Office	0	0	4	20	6	21	18	48
Canteen	0	0	0	2	1	0	0	0
Bath House	0	1	2	6	8	3	3	14
Peak Total	55	55	93	179	248	477	519	614

Table 8 – showing monthly peak counts during 2016

4 Conclusion

4.1 The Northern United lesser horseshoe colony has obviously changed notably in recent years, both in its use of buildings as roosts, the importance of various buildings and in its population.

4.2 The earliest population count was 102 individuals in 2003, this is now 6 times higher with 614 individuals over a 13 year period, with some years having notable population increases. While some years inaccurate and inconsistent survey counts may be a factor in this, the monthly surveys conducted since 2013 have seen some notable population increases in 2014 and 2015 where combined there was a 56% population increase from 355 to 555 individuals. See Figure 1

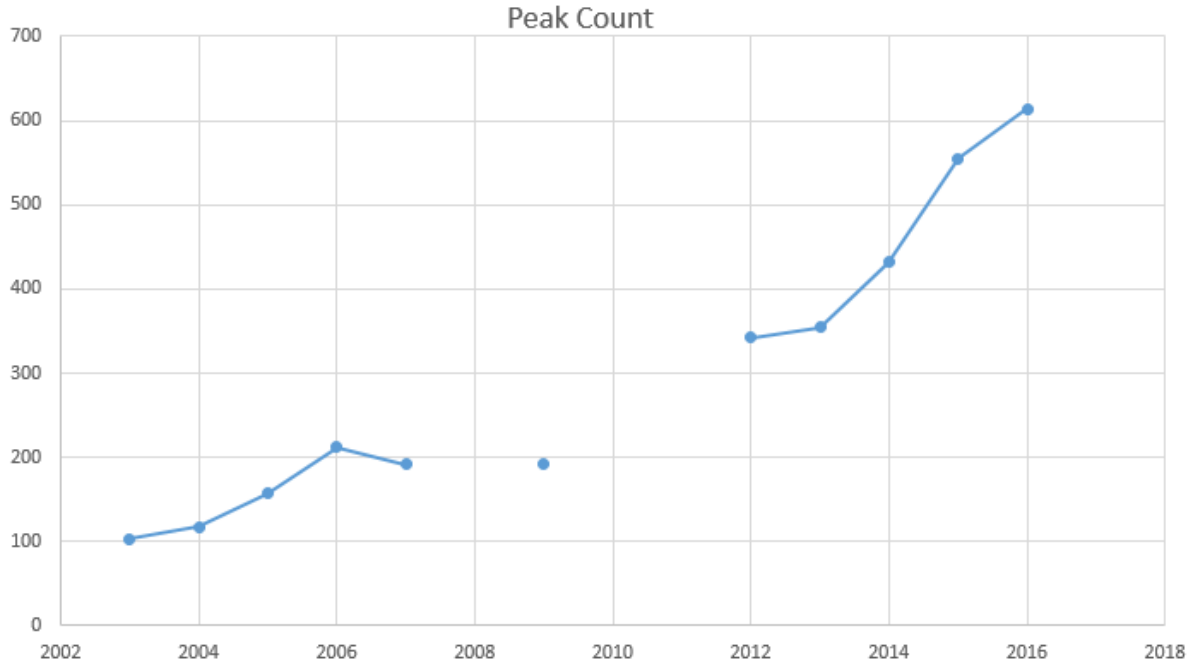

Figure 1 – showing peak monthly counts from 2003 to 2016

4.3 This population increase is also quite notable given how many males were identified present using the main artificial roost during the 2013 trapping surveys. Male bats are normally present in Lesser Horseshoe maternity colonies and make up about 10-15% of the population (H. Schofield) However trapping at the artificial roost caught notably high proportions of male bats, as this means that a high proportion of the colony would not be breeding such notable population increases are more unusual.

4.4 One theory that cannot be dismissed is that during this period there may have been a colony influx due to immigration to the colony, possibly as the result of a roost outside of the Northern United complex becoming less favourable or lost.

4.5 The main notable change in the colony has been the use of the various buildings at roosts. The Office and Bath House building were the colonies main identified roosts, and in 2006 over 100 individuals were identified in each building, over 98% of the colony were using these two buildings.

4.6 Following the construction, and more importantly the later modification of the artificial roost notable numbers of bats were first recorded using this roost in 2009 with a peak count of 88 individuals present in July with the majority of bats, with peaks of over

100, were still found in the office building. However, the numbers of bats identified using the Bath House decreasing.

4.7 Over the last decade the condition of the Bath house has continued to deteriorate making the internal conditions less suitable for LHB's. Internally it is becoming increasing wet at times with increasing water ingress and many areas pooling water. Earlier on in this period the building was subject to vandalism and break-ins.

4.8 Using the proportion of a colony use of a building can be a more accurate way of interpreting how import a roost may be for any colony rather than simple total counts. A roost may only be used by a low number of bats, however if that colony is small it indicates that the roost may be an important resource for that colony, however if a roost is only used by a low proportion of the colony it can show that the roost is less significant for the colony as a whole. Figure 2 shows the total colony count and the total counts in each building each month from April 2013 to August 2016.

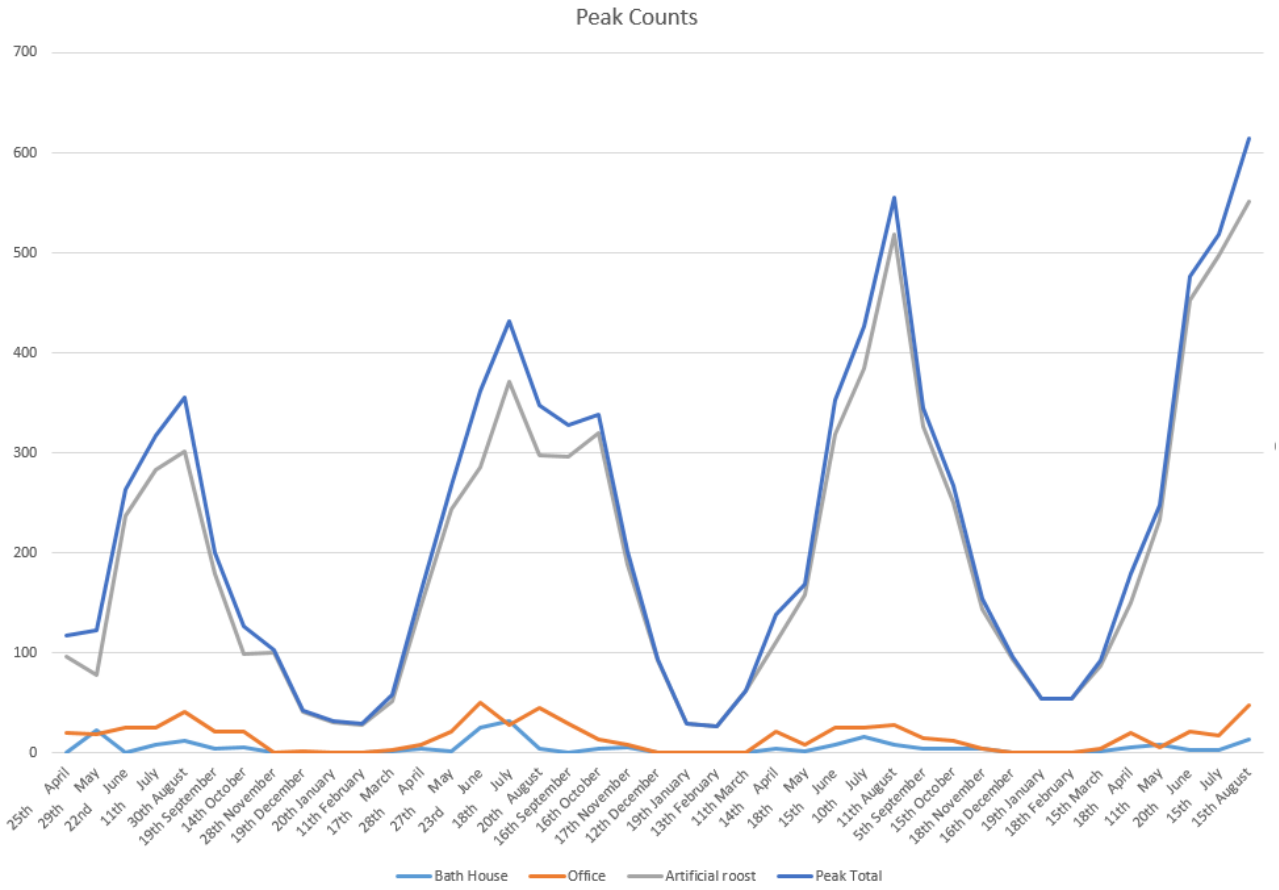

Figure 2 – showing peak counts in the Bath house, Office and Artificial roost each month from April 2013 to August 2016

4.9 In recent years the peak number of bats identified using the Bath House was 52 in May 2012 representing 18% of the colony and again in May 2013, with only 23 individuals, however this was still 18% of the colony. Since then, despite the colony experiencing a notable population growth the number and proportion of bats using the Bath House has notably reduced with a peak count over the last two years being only 17, representing only 4% of the colony. The average proportion of the colony present within this building since 2013 is 2.4%

4.10 The last recorded time a notable proportion of the colony was identified present within the Bath House was in May 2013 with 18.7%, notably higher than any other time since then, one possible reason for this was the change in survey methodology. AEWC Ltd changed the surveys to stop internal counts of the artificial roost when high numbers of bats were present which was considered to be very disturbing and could have caused some roost switching.

4.11 A similar trend has been clearly seen with the use of the Office Building. This building was still the main roost in 2009 with over half the colony present in this building, in 2011 there were still good numbers present with 48 individuals present, although it is unknown what proportion of the colony this represents.

4.12 Since 2013 the highest number of bats recorded has been 51 individuals, the proportion of bats using the Office has consistently reduced, although it is still commonly higher in April when only part of the colony is present. The average proportion of the colony using the bath house since 2013 is 6.3%. during 2016 the peak was 11.2% and the average (up to August) was only 4.2%

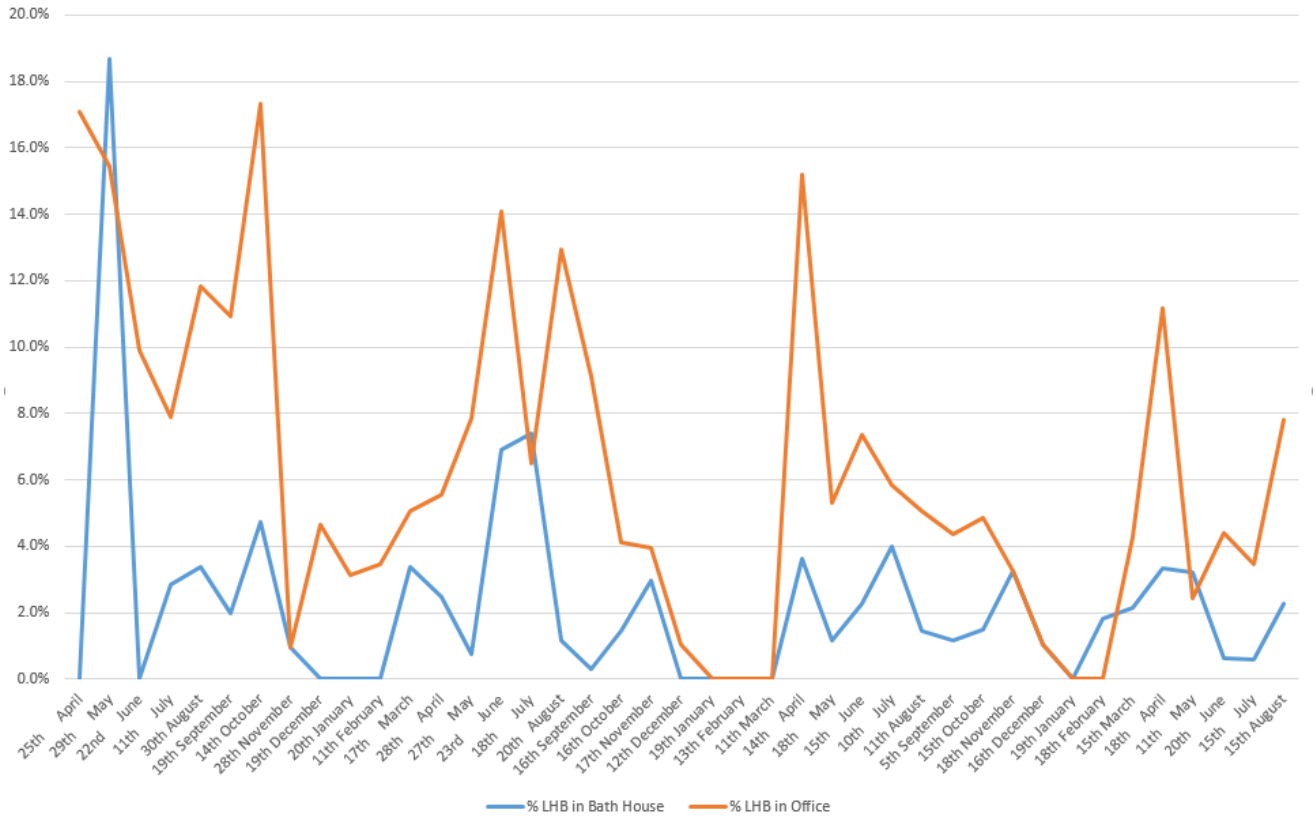

Figure 3 – Showing the proportion of bats present in the Bath House and Office each month from April 2013 to August 2016.

4.13 Looking at the trends over the last 4 years and the historical data it clearly shows that the colony has moved from the Office and Bath house to the artificial roost, however, the use of the Office, and more notably the Bath house has continued to reduce in use by the colony, and hence become less important.

4.14 The Bath house and Office are clearly no longer main roosts, and have not been for a number of years. The office is a satellite roost, this is still periodically used by a number of bats and does have breeding females present, but is subsidiary to the main roost.

4.15 The bath house is becoming more of a minor roost, used by low numbers of bats and the evidence shows that it is rarely if ever used as a hibernation roost by Lesser Horseshoe bats. During 2016 no pups were observed present within the bath house.

4.16 It is anticipated that the use of the Bath house and Office will continue to reduce especially through the continued degradation and dilapidation of the building making it increasingly damp, leaking and less suitable.

4.17 Additionally, the two new roosts that have been constructed now have the first evidence of use. Solar heat was added to the roosts in 2016 and bats have been observed present within one of the roosts with a notable number of droppings present.

4.18 Both of these buildings are obviously considered highly suitable for the LHB colony and it is anticipated that the use of these buildings could potentially increase dramatically. If this happens then the importance of the Bath House and Office buildings for the colony as roosts will further decrease.

Annex 1 – All monthly survey counts and % of colony present in Bath house and Office from April 2013 to August 2016

Total Lesser Horseshoe counts for each building 3013

	25th April	29th May	22nd June	11th July	30th August	19th September	14th October	28th November	19th December
Artificial roost	97	78	237	283	301	179	99	101	41
Shed oposite	0	3	0	0	0	0	0	0	0
Office	20	19	26	25	42	22	22	1	2
Canteen	0	0	0	0	0	0	0	0	0
Bath House	NA	23	NA	9	12	4	6	1	0
Peak Total	117	123	263	317	355	201	127	103	43

% LHB in Bath House	#VALUE!	18.7%	#VALUE!	2.8%	3.4%	2.0%	4.7%	1.0%	0.0%
% LHB in Office	17.1%	15.4%	9.9%	7.9%	11.8%	10.9%	17.3%	1.0%	4.7%

Total Lesser horseshoe counts for each building 2014

	20th January	11th February	17th March	28th April	27th May	23rd June	18th July	20th August	16th September	16th October	17th November	12th December
Artificial roost	31	28	52	148	244	286	371	298	296	320	188	93
Shed oposite	0	0	0	0	0	0	1	0	0	0	0	0
Office	1	1	3	9	21	51	28	45	30	14	8	1
Canteen	0	0	2	1	0	0	0	1	1	0	0	0
Bath House	0	0	2	4	2	25	32	4	1	5	6	0
Peak Total	32	29	59	162	267	362	432	348	328	339	202	94

% LHB in Bath House	0.0%	0.0%	3.4%	2.5%	0.7%	6.9%	7.4%	1.1%	0.3%	1.5%	3.0%	0.0%
% LHB in Office	3.1%	3.4%	5.1%	5.6%	7.9%	14.1%	6.5%	12.9%	9.1%	4.1%	4.0%	1.1%

Total Lesser horseshoe only counts for each building 2015

	19th January	13th February	11th March	14th April	18th May	15th June	10th July	11th August	5th September	15th October	18th November	16th December
Artificial roost	30	27	63	111	158	319	385	519	326	251	144	94
Shed oposite	0	0	0	0	0	0	0	0	0	0	0	0
Office	0	0	0	21	9	26	25	28	15	13	5	1
Canteen	0	0	0	1	0	0	0	0	0	0	0	0
Bath House	0	0	0	5	2	8	17	8	4	4	5	1
Peak Total	30	27	63	138	169	353	427	555	345	268	154	96

% LHB in Bath House	0.0%	0.0%	0.0%	3.6%	1.2%	2.3%	4.0%	1.4%	1.2%	1.5%	3.2%	1.0%
% LHB in Office	0.0%	0.0%	0.0%	15.2%	5.3%	7.4%	5.9%	5.0%	4.3%	4.9%	3.2%	1.0%

Total lesser horseshoe counts for each building 2016

	19th January	18th February	15th March	18th April	11th May	20th June	15th July	15th August
Artificial roost	55	54	87	151	233	453	498	551
Shed oposite	0	0	0	0	0	0	0	1
Office	0	0	4	20	6	21	18	48
Canteen	0	0	0	2	1	0	0	0
Bath House	0	1	2	6	8	3	3	14
Peak Total	55	55	93	179	248	477	519	614

% LHB in Bath House	0.0%	1.8%	2.2%	3.4%	3.2%	0.6%	0.6%	2.3%
% LHB in Office	0.0%	0.0%	4.3%	11.2%	2.4%	4.4%	3.5%	7.8%