

LESSER HORSESHOE BAT POPULATION ESTIMATE 2024

Report to the NPWS

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NOTES ON THE PREVIOUS ESTIMATES

2012

- Population estimates calculated in 2012 and previous years were boosted by estimated counts from 183 maternity roosts that were identified in the NPWS database (Kelleher, 2004). I suggested dropping this figure of 183 maternity roosts from our calculations since the vast majority of known and existing roosts are now counted and we can impute counts for a given site where we are missing data for a time period. We have counts from 162 sites that are monitored on at least a 3 year basis. There are an additional three sites with insufficient information which are not included in calculations below.
- We also have 223 sites with summer data that are not on the monitoring list. The average count at these sites is 4.5 while the median is 0. Most of them have just been visited once and droppings have been observed or they are winter hibernacula that have been visited in summer. While we could add the total mean for each of these sites to our working estimate I suggest that by doing so we could end up double accounting for some males. Therefore, I suggest that we only include monitored sites for the time being.
- We now have revised data on the proportion of males to females in lesser horseshoe bat summer roosts based on the DNA genotyping research carried out by Harrington and O'Reilly (2018). I have back calculated the previous population estimates in respect of this new information.

2018

- Roosts are categorised as monitored in summer or not (those that are = SummerMon sites)
- A mean count (all data from May, June and July) was calculated for each of the SummerMon sites using all available count data from 2000-2017.
- I then used the previously used date windows: 2005-2006 and 2010-2011 as well as a more recent 2016-2017 date range¹. For each of these date windows I extracted the maximum count for each SummerMon site. Where no data was available for a particular date range I imputed from the average for that site (2000-2017). Totals for the three date ranges + imputed missing counts for all 162 sites are shown in the first row of the table below.
- Harrington and O'Reilly's work suggests that within monitored roosts we have a range of 14.1% to 76% male representation in summer.
- Harrington and O'Reilly identified 456 individuals from six separate roosts and of those, 46.7% were male and 53.3% were female.
- If we discard data from the roost with the very high proportion of males (Courtneys Cottage) and low number of males (Curraghchase), we end up with a figure of 43.7% males to 56.3% females – this is based on the total number of individuals in the four sites, not on average percentages per site.
- The population estimate is then based on the following assumptions.
 - a) We now have data for all or next to all of the females in the population due to the availability of information from 162 sites
 - b) There is a 1:1 ratio of males to females in the entire population
 - c) Male to female representation in the roosts studied by Harrington and O'Reilly is reflective of their representation in roosts across the distribution.

¹ Note that some minor differences may be seen between previously published count data and that shown here for 2005-2006/2010-2011 due to ongoing updates and revisions in the lesser horseshoe database.

- POPULATION ESTIMATE A**

Harrington and O'Reilly's estimate of male to female abundance in all six sites (including the two extreme sites), where there is 53.3% representation of females in the six roosts. Assuming 1:1 female to males in the overall population then:

(Sum of Count Data + Imputed Missing Count Data for 162 Sites) * 0.533 * 2 = 100% of the population, Population Estimate A
- POPULATION ESTIMATE B**

Alternatively if we drop the lowest and highest percentages of males (Curraghchase and Courtney's Cottage, respectively) from Harrington and O'Reilly's data, and total the individuals in the remaining four roosts we end up with 56.3% female representation. Therefore:

(Sum of Count Data + Imputed Missing Count Data for 162 Sites) * 0.563 * 2 = Population Estimate B

Table 1: Lesser horseshoe bat population estimates for various date ranges using Harrington and O'Reilly's sex ratio data.

	POPULATION ESTIMATE		
	2005-2006	2010-2011	2016-2017
RAW COUNT DATA (sum of: max count per date range + imputed missing counts)	8838.69	9319.86	11357.97
ESTIMATE A based on sex ratio data from six roosts Raw Count Data * 0.533 * 2	9422.9	9935.9	12108.7
ESTIMATE B based on sex ratio data from four roosts Raw Count Data * 0.563 * 2	9953.5	10495.3	12790.5

I suggest that it might be better to pick the slightly conservative male to female breakdown in the estimate (56.3% females), which gives us a slightly higher overall population estimate (Estimate B), and not try to account for the many tiny roosts that may or may not be used in the summer, however there is only a difference of roughly 500 to 600 individuals between them so it does not make a huge difference overall.

Either way, we see that as discussed, the previous population estimate for 2010-2011 is considerably revised downwards by approximately 3,500 individuals from 14,010 to approximately 10,500. This has since increased, however, to approximately 12,790 individuals.

According to these population estimates, while there was just a marginal change in population from 2005-2011, since then there has been a considerable increase. This tallies with observed population trends where we have seen a steeper increase in both summer and winter, over the past six years compared with the previous six.

Updated Population Estimate 2024

In the years since the last estimate for 2016-2017 there has been an increasing trend in the summer population as follows:

Year	Index
2017	125.90
2018	129.12
2019	132.25
2020	136.40
2021	140.45

2022	144.64
2023	147.41

This works out as a cumulative increase of 17.09% from 2017 to 2023. By multiplying the previous estimate of 12,790 for 2016-2017 by the % increase in the intervening period, the estimated population would be

14,975 in summer 2023.

Long-term trend

2.36% per annum from 1999 to 2023, or cumulative growth of 74.93% over that time period - summer trend.

References and Sources of Information

NPWS Lesser horseshoe bat database: Version LHB_20180601.accdb

Harrington A. and O'Reilly C. (2018) Report on Sex Ratio of Adult Lesser Horseshoe Bats in Summer Roosts. Waterford Institute of Technology. Unpublished report to NPWS.

Roche N., Langton S. and Aughney T. (2012). Lesser Horseshoe Bat: Population, Trends and Threats 1986 to 2012. Bat Conservation Ireland. Unpublished report to NPWS.