Bat Conservation Ireland

All-Ireland Woodland Bat Monitoring Scheme 2025

Clarke D., Langton S., and Roche N. (2026)

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1. Introduction

1.1 Woodland Bats in Ireland

Woodland bat species, namely the *Myotis* species Natterer's bat (*Myotis nattereri*) and Whiskered bat (*Myotis mystacinus*), comprise an important portion of the Irish bat fauna (Figure 1). These species rely mainly on woodland habitat for foraging opportunities (Smith & Racey, 2008). Brown long-eared bats (*Plecotus auritus*) are also strongly associated with woodlands and deciduous trees (e.g. Murphy et al., 2012; Swift, 1998).

Whiskered bat is one of the most rarely recorded bat species in Ireland. The paucity of records may be at least partly due to difficulty discriminating between the *Myotis* species and/or because it tends to roost in low numbers and exhibits regular roost switching (Buckley et al., 2013; Roche et al., 2014). While it occurs in all provinces it tends to be more frequently recorded in the southern half of the island (Roche et al., 2014).

Natterer's bat has been recorded more frequently than whiskered bat (Roche et al., 2014), although this may be because it tends to roost in higher numbers and is very roost faithful. It tends to favour wooded habitats early in the evening while later moving to forage in hedgerow and pasture habitats (Lundy et al., 2012). Similar to whiskered bat its core areas tend to occur in the east and south of the island although it has also been recorded across the island (Roche et al., 2014).

1.2 Woodland Bat Monitoring Scheme Pilot: 2023

In 2023, BCIreland conducted a pilot woodland bat monitoring scheme. This was funded in the Republic of Ireland by the NPWS, with additional grant assistance from four Local Authorities (Wicklow, Meath, Kildare and Cavan).

The primary objectives of the pilot scheme were to trial and compare the use of two different survey methods i.e. the use of bat detectors in a static surveillance capacity and in a walking transect approach, to:

(i) compare their effectiveness in surveying the woodland species of interest (mainly Natterer's bat and whiskered bat, but also brown-long eared bat),

(ii) to compare the statistical power of the two methods in detecting declines in bat activity at amber and red alert levels of decline (25% and 50% decline in activity levels, respectively),

(iii) assess the general feasibility of proceeding with an All-Ireland version of the scheme using either survey method.

1.3 Findings from the 2023 Pilot

Both methods were effective in detecting the woodland bat species (Aughney et al., 2024), with a substantially larger amount of data collected by the static surveillance (1,484 nights in total from all devices and survey periods) compared to 29 nights of data for walking transects. Unsurprisingly, this was reflected in the mean number of audio files with bats present per night for each method. With the static devices, the mean number of audio files per night with Natterer's bat was 30.2, for whiskered it was 132, and brown long-eared was 80.4. Using the walking transects the mean number of audio files was 4 for Natterer's bat, 6.8 for whiskered bat and 3 for brown long-eared bats.

Despite the higher number of recorded files with static surveillance, power analysis of the data revealed that when it comes to detecting declines in activity of Natterer's bat and whiskered bat, there is relatively little difference between the two methods. Alert level declines can certainly be detected slightly sooner and with fewer sites using static surveillance but following detailed analyses of the time, costs and data resulting from each of these methods we decided to proceed using the walking transect method for the surveys from 2024 onwards.

1.4 Roll out of an expanded monitoring scheme

In 2024, we expanded the scheme to include several new sites in both the Republic of Ireland and Northern Ireland. The scheme was expanded further in 2025, details of which are included in this report. More specific information related to the 2024 monitoring season can be found in the separate report by Clarke, D., Langton, S., & Roche, N. (2025) which is available at www.batconservationireland.org.

1.5 Funding in 2025

In the Republic of Ireland, funding was obtained primarily through the Local Biodiversity Action Fund which is a fund made available to Local Authorities via the National Parks and Wildlife Service to support biodiversity focussed initiatives taking place in their county. Some funding was also gained through the Ceangal initiative administered by The Heritage Council. Applications for funding were made to each local authority where surveys were planned for 2025 to cover the costs for equipment and the running of the scheme. In Northern Ireland, we received a funding commitment through the Department of Agriculture, Environment and Rural Affairs (DAERA) Environment Fund towards this project.

A)

B)

Figure 1. Whiskered bat *Myotis mystacinus* (top image) and Natterer's bat *Myotis nattereri* (bottom image). Image credit Paul van Hoof.

2. Method

2.1 Site Selection

Woodlands were selected based on a number of requirements which included habitat suitability, public access, suitable walking routes/trails and the potential availability of survey teams in the area. In relation to the site characteristics, some of the more specific criteria included the following:

(i) The site was a well-established woodland (natural broadleaved woodland is preferable, but non-native species such as conifer stands could be included) with about 4km of a walking track/route. A walking loop is preferable where possible so that the same ground does not have to repeated during the transect. This is not always possible depending on the layout of individual sites.

(ii) There should be at least one stopping point that is adjacent or close to either agricultural/open pasture or open grassland habitat. These are important foraging areas for Natterer's bat.

With these criteria in mind, sites were provisionally selected based on recommendations from people who possessed local knowledge of suitable sites. This was subsequently followed up by the scheme coordinator with some GIS work to devise a potential walking route for the surveys. Then, a site visit was conducted to walk the survey route and if it was suitable, to designate the survey stopping points (details outlined in Methods section). Where site visits by the scheme coordinator were not possible either due to time constraints or large travelling distances involved, the walking route was set out by the lead volunteer, while liaising closely with the scheme coordinator and adhering to the route selection criteria. Once sites were selected for the scheme, detailed documents that included site maps and descriptions of the walking routes were created by the scheme coordinator for each site. An example of a site map is shown in Figure 2 and an image of a typical walking path in a woodland is shown in Figure 3.

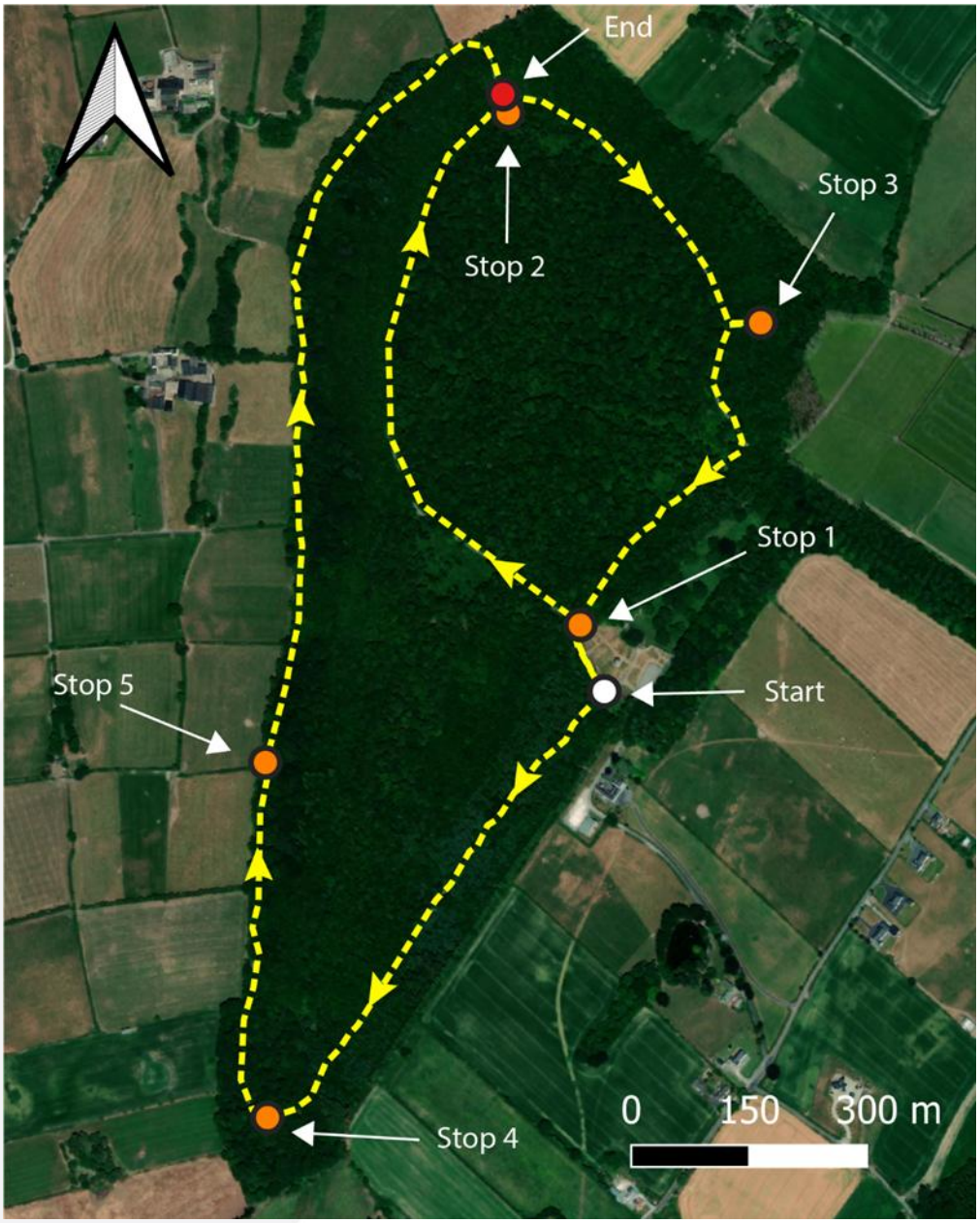

Figure 2. Example of a walked transect route at a woodland site surveyed in the woodland scheme in 2025.

Figure 3. A typical woodland path used for one of the walking transect routes in the woodland bat monitoring scheme.

2.2 Volunteer Recruitment and Training

Volunteers were mainly recruited by advertising the scheme on BCIreland's social media channels, but also through liaising with staff such as the Biodiversity Officers at various Local Authorities and the NPWS in the Republic of Ireland. In Northern Ireland, volunteers were primarily recruited through the involvement of organisations including the National Trust, the Woodland Trust and Northern Ireland Bat Group. In the case of the National Trust and Woodland Trust, some of the selected sites for the scheme were actively managed by these organisations, so volunteers based at these sites were already very familiar with the sites in question.

Most volunteers were trained online via Zoom during the months of May-June 2025, but in the case of the National Trust, volunteer training was in person on 5th June 2025. Following training, volunteers were provided with access to a folder with survey files (e.g. site description, survey protocol, and survey sheets) as well as a secure folder to which they could upload the raw recorded files from the monitoring device. Bat detectors were loaned to volunteers for the duration of the survey period (June-August) and were delivered either via courier/post or given to volunteers in person. In addition to the detectors, volunteers also received (where applicable) reflectors for marking the start point, end point and all of the survey stopping points along the walking route.

2.3 Survey Method

Walking transect routes were designed during the daytime, mapped (GPS) and habitat/management parameters noted. The survey co-ordinator designed the walking transect route (approx. 4 km) and selected the five stopping points for each woodland. Stopping points aimed to sample different habitat types present within the woodland or adjacent to the woodland (e.g. agricultural fields). At least one stopping point was located along the interface between agricultural or grassland landscape and woodland edge to increase the likelihood of detecting Natterer's bat.

The survey co-ordinator fixed a circular reflective marker on a point at eye level or as close as possible to eye level to indicate each starting and stopping point. These proved extremely useful to surveyors when walking at night under the woodland canopy.

Each route was located along accessible tracks but not always along the main trails in order to include more cluttered zones.

The methodology for walking transects was similar to that presented in Boston et al. (2017) with some slight modifications. The device used for walking transects is an Anabat Scout (Titley Scientific), which is a full spectrum bat detector (Figure 4).

Figure 4. The Anabat Scout full spectrum bat detector used for the surveys.

The walking transect surveys were carried out as follows:

1. Surveys commenced 40 minutes after sunset.
2. Surveys were carried out in 'good weather' where temperature at the start of the survey was >10°C, wind <20km/h and no rain. Weather conditions were recorded at the start of the survey.
3. Following a review after the 2024 survey, the number of transects was revised from three down to two surveys. In 2025, two transects were completed over the course of the summer, in most cases one in June and a repeat survey in July. Volunteers were asked to leave a period of at least 20 days between successive surveys if possible.
4. Surveyors commenced at the designated starting point with their detectors switched on, walking to the first stopping point at a slow walking pace of approximately 3.4km/hr.

5. The time was noted when each stationary position was reached. At the stopping point, surveyors recorded for 5 minutes while rotating the detector around to face in different directions.

6. The surveyors then resumed walking to the next stopping point and repeated this for all five stopping points until the transect was completed.

7. Each walking transect took approximately 1.5hrs to complete.

8. Following the completion of the surveys, data was either downloaded from Anabat Scout SD cards by the surveyors and shared with the survey coordinator via a cloud sharing platform, returned via courier to the survey coordinator, or in some cases collected in person from the surveyors.

2.4 Data Processing and Analysis

All recorded data from each Anabat Scout device was processed using Kaleidoscope Pro software. Sound recordings of bat echolocation activity (sonograms) are recorded as .wav files and are stored in a folder for a particular session on the monitoring device (i.e. in this case a separate folder of files for each night). Therefore, files from each transect were processed together in a batch while using the software's audio ID function to 'screen' the files and auto-assign bat species identifications to the recorded files. After this, each assigned auto ID in the output files was manually checked to verify the software's auto ID results. Manual checking of files involved the following steps:

- All species identified files assigned by the auto ID as *Myotis* and *Plecotus* species were manually confirmed.
- Manual checking of all other bat species, to check if there were *Myotis* or *Plecotus* calls present that were not identified by the auto ID and therefore could be reassigned.
- All 'UNIDENTIFIED' audio files were manually checked.
- All 'NOISE' audio files were manually checked.

An example of a sonogram which shows bat activity is shown in Figure 5. Once all of the files were processed and verified, tables of these results data were compiled and the results were sent to our statistician for statistical analyses.

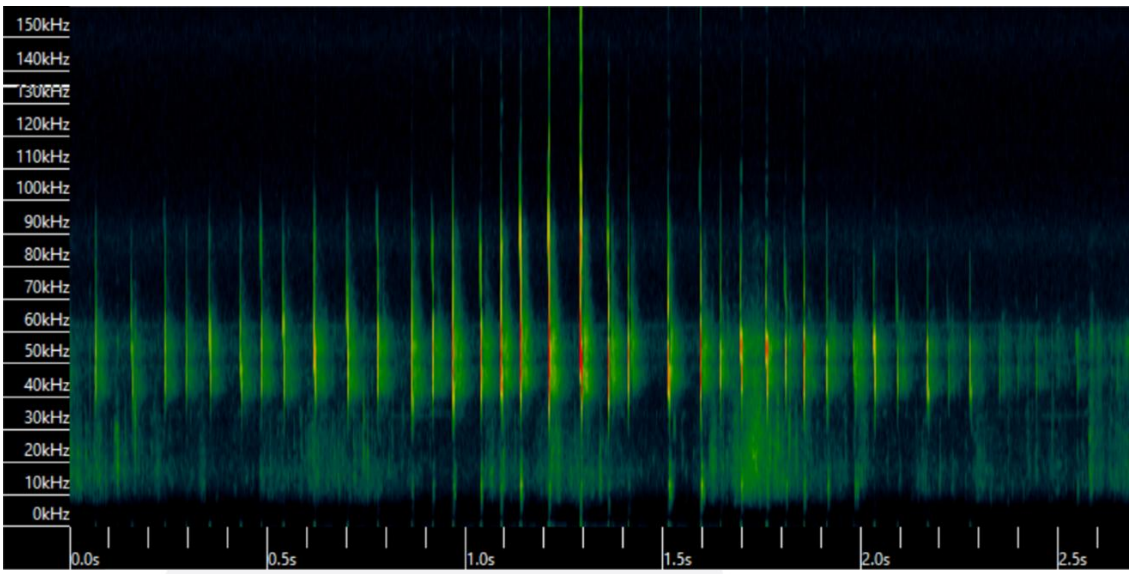

Figure 5. Sonogram showing an echolocation call from a whiskered bat, processed during the 2025 sonogram analysis using Kaleidoscope Pro. The sonogram shows multiple 'pulses' emitted by the bat as it uses echolocation in the wooded environment, each of which is represented visually here with each vertical line. The x-axis in this image shows the duration of the recorded call shown in seconds (in this case all of this activity is occurring in just over 2.5 seconds). The y-axis indicates the frequency in kHz within which these pulses are occurring, in this case mostly spanning 30-100Khz which is typically the range for this species.

3. Results

3.1 Sites and Dataset

A total of 40 sites were surveyed across the island as part of the All-Ireland Woodland Bat Monitoring Scheme in 2025. This consisted of 26 sites in the Republic of Ireland and 14 sites in Northern Ireland. Sixteen sites that were surveyed in the Republic of Ireland in 2024 were re-surveyed in 2025, along with ten new sites located in counties Kilkenny (two sites), Limerick (two sites), Offaly (two sites), Donegal (two sites), Meath (one site) and Louth (one site). One site that was surveyed in 2024 (Dún na Rí, Co. Cavan) was not accessible in 2025 due to storm damage that had occurred earlier in the year and was not surveyed. In Northern Ireland, all of the nine sites surveyed in 2024 were resurveyed in 2025, in addition to five new sites in 2025 which were located in Derry (one site), Tyrone (one site), Down (one site) and Antrim (two sites). A full table of the site locations and individual results for each site can be found in Appendix 1.

In total, 79 nights of data were recorded comprising more than 40,000 individual recordings, each of which was manually verified for the presence of woodland bats. Two surveys were completed at most sites over the course of June and July as per the survey protocol. There were a couple of cases where due to logistical reasons or volunteer availability, two surveys were carried out in July or into August, while in one instance, only one survey was completed (see Appendix 1 for details).

In addition to Natterer's bat and whiskered bat, we also assessed the presence of other bat species including Daubenton's bat, brown long eared bat and a 'Myotis spp.' category. This latter category consisted of audio files that were clear enough to be identified as belonging to one of the *Myotis* species of bat, but which did not have enough information present within the call structure to make a definitive species confirmation.

3.2 Species Distribution

Of the 40 sites surveyed in 2025, Natterer's bat was detected at 28 (70% of the total, Table 1). Whiskered bat was detected at 33 (82.5%) of the sites surveyed, while both species were detected at 24 (60%) of the sites. There were four sites where only Natterer's bat was detected and nine sites where only whiskered bat was detected. Three of the sites surveyed had no recorded calls from either Natterer's bat or whiskered bat (Figure 6).

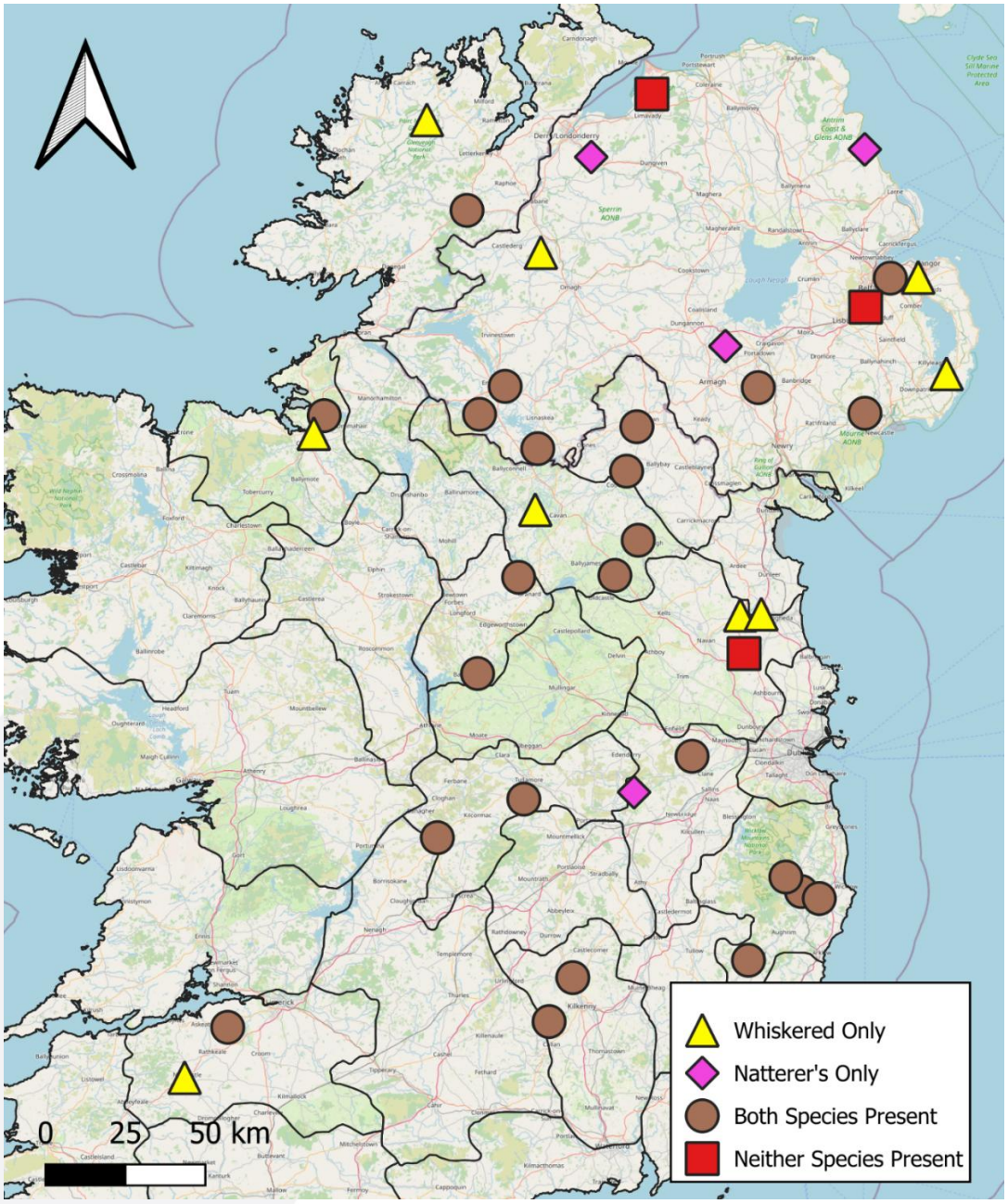

Figure 6. Presence of whiskered bat and Natterer's bat at sites surveyed in the All-Ireland Woodland Bat Monitoring Scheme 2025. Sites where only whiskered bat was found are indicated by the yellow triangles. Pink diamonds represent sites where only Natterer's bat was detected, while brown circles represent sites where both species were present. Sites where neither species were detected are shown with red squares.

A total of 186 audio files containing Natterer's bat were recorded in 2025. The highest number of files containing Natterer's bat that was recorded at a site during the survey was 38, which was recorded at Ardress House in Co. Armagh. This site also had the highest mean number of audio

files containing Natterer's bat activity, with a mean of 19 files per transect. This was followed by Tomnafinnoge Wood (Co. Wicklow) with 15 audio files with Natterer's bat activity and a mean of 7.5 files per transect.

In 2025 there was a total of 228 audio files with whiskered bat activity. The site with the highest number of audio files containing whiskered bat calls was Deputy's Pass in Co. Wicklow, with a total of 53 and a mean number of 26.5 per transect. The second highest was recorded at Crom Estate, Co. Fermanagh with 21 audio files containing whiskered bat activity and a mean of 10.5 per transect.

Daubenton's bat was also frequently recorded at the woodland sites surveyed (70% of sites) with the highest number of audio files with this species present compared to any other (284 files). Similarly, the unspecified Myotis spp. category had the third highest total out of all of the species of interest, with 393 files. Although brown long-eared bat was detected at 28 of the 40 sites (70%) a lower number of audio files containing this species was recorded than for any other (117). The highest number attributed to this species was recorded at Baronscourt Estate in Co. Tyrone, with a total of 10 files and a mean of 5 per transect.

Table 1. Summary of the total number of audio files recorded for each species of interest in the survey.

Species	No. of files	% of sites
Whisk	228	82.5
Natt	186	70.0
Daub	284	70.0
Myotis spp.	393	87.5
BLE	117	70.0

A comparison of the annual mean number of files with calls from each species recorded in the 2023, 2024 and 2025 surveys is shown in Table 2. There are some noticeable differences in the results between the years, in particular for whiskered bat and Daubenton's bat. For both species, the mean number of calls per transect were higher in 2024 than either 2023 or 2025. Conversely, the mean number of audio files containing Natterer's bat and brown long eared bat activity was generally very similar between the years. There was a large increase in the mean number of Myotis spp. calls per transect in 2024 (5.04 files per transect) compared to 2023 (2.72 files per transect) but in 2025 was very similar to the previous year at with a mean of 4.97 files per transect.

Table 2. Mean no. of audio files containing calls from each species per transect recorded in the 2023, 2024 and 2025 surveys.

	N	N	Mean audio files per transect				
Yr	**Sites**	**Surv**	**daub**	**natt**	**whisk**	***Myo***	**BLE**
2023	10	29	2.31	2.41	3.62	2.72	2.34
2024	26	72	8.11	2.74	5.47	5.04	1.49
2025	40	79	3.59	2.35	2.89	4.97	1.48

There have also been differences in the mean number of audio files recorded for the species between the months and years (Figure 7). There are signs of an interaction between year and month of Daubenton's bat and whiskered bat, with the latter being highly significant (F=4.09 with 4 and 76 d.f., P=0.005) due to the July mean being much higher than June in the first two years, whereas this is reversed in 2025.

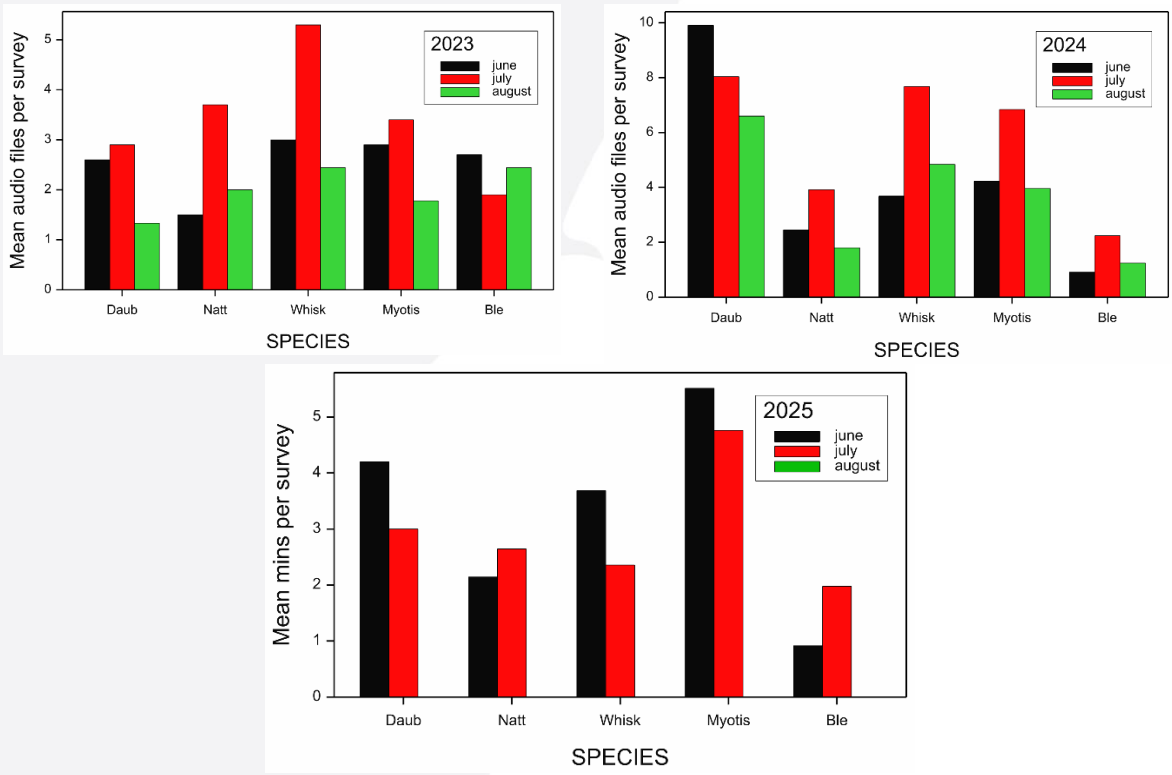

Figure 7. Mean number of audio files (y-axis) with bat species (x-axis) per survey recorded in each month in the 2023, 2024 and 2025 surveys.

3.3 Power Analysis

The power analyses described below use a simulation approach, broadly based on that used to estimate the power of car-based monitoring in Ireland (Roche et al., 2011) and NBMP surveys in Great Britain (Barlow et al. 2015). Briefly, this involves calculating the variance of the (transformed) data, then using these variances to produce a large number of simulated datasets with a variety of levels of change over a 25-year period (in this case red and amber alert levels). A Poisson GAM model is then fitted to each dataset using the method described by Fewster (2000), changing the number of sites and years in order to determine the numbers required to detect change with 80% power. The tables of results presented here are for simulations using two months, since in 2025 the survey method was revised to conduct two surveys instead of three over the course of the summer.

Results are shown in Table 3 in terms of the number of years taken to detect amber or red level alerts (i.e. a 25% or 50% decline over 25 years) in populations of Natterer's bat and whiskered bat with 80% power. Similarly, amber and red alert parameters for the other woodland species of interest were also calculated and are shown in Table 4. The figures for 50 sites are the most important to consider, as the number of sites surveyed is now approaching this level. There is considerable consistency between species shown in Table 3 and Table 4, with a red alert trend being detected with 80% power between 13 and 15 years.

Amber alerts are more evasive, with at least 25 years needed to detect them. However, it should be remembered that an amber alert is a very gentle decline, of only just over 1% per year on average.

Table 3. Number of years taken for walked transects to detect change in the populations of Natterer's bat and Whiskered bat with 80% power using various numbers of sites. 'Amber' refers to a decline of 1.41% p.a. (25% over 25 years), 'red' to 2.73% p.a. (50% over 25 years). Two replicate surveys per site per year.

	Natterer's Bat		Whiskered Bat	
N Sites	**Amber**	**Red**	**Amber**	**Red**
10	>25 yrs	>25 yrs	>25 yrs	>25 yrs
20	>25 yrs	20 yrs	>25 yrs	21 yrs
50	>25yrs	14 yrs	>25 yrs	14 yrs
75	22 yrs	12 yrs	23 yrs	12 yrs
100	21 yrs	10 yrs	20 yrs	11 yrs

Table 4. Number of years taken for walked transects to detect change in the populations of other species with 80% power using various numbers of sites. 'Amber' refers to a decline of 1.41% p.a. (25% over 25 years), 'red' to 2.73% p.a. (50% over 25 years). Two replicate surveys per site per year.

	Daubenton's Bat		Myotis spp.		Brown long eared bat	
N Sites	**Amber**	**Red**	**Amber**	**Red**	**Amber**	**Red**
10	>25 yrs	>25 yrs	>25 yrs	>25 yrs	>25 yrs	>25 yrs
20	>25 yrs	20 yrs	>25 yrs	21 yrs	>25 yrs	21
50	>25yrs	14 yrs	>25 yrs	14 yrs	>25 yrs	14
75	22 yrs	12 yrs	23 yrs	12 yrs	23	11
100	21 yrs	10 yrs	20 yrs	11 yrs	20	10

4. Discussion

It is widely accepted that bat populations have declined all over the world during the last few decades. This has been exacerbated by the loss of roosts and hibernacula, the felling of trees and the loss of broadleaved woodland habitat, and the loss and degradation of feeding habitats (Hill & Greenaway, 2008; Razgour et al., 2024). Monitoring schemes assessing the population trends of most of the Irish bat species have been in place for almost two decades now (Roche et al., 2025) helping us to better understand the conservation needs of these species. Despite this, relatively little is known about woodland bats in Ireland, highlighting an urgent need to establish an island-wide annual monitoring scheme for these species.

Woodland coverage across the island of Ireland is low compared to other European counties, standing at approximately 11.6% in the Republic of Ireland (Forest Statistics Ireland, 2023) and approximately 8.7% in Northern Ireland (Northern Ireland Woodland Register and Basemap, 2020). But only a small portion of this, in both jurisdictions, comprises broadleaf or mixed broadleaf-conifer. This means that suitable roosting and foraging habitat for these species is likely to be already extremely limited, further illustrating the need to adopt a comprehensive monitoring scheme focussing on these species in representative woodlands across the island before populations decline any further.

In 2025, the National Parks and Wildlife Services published a document outlining the Status of EU Protected Habitats in Species in Ireland (NPWS 2025). Under the guidance of the best records available, the report deemed the status of our woodland bat, namely Natterer's bat and whiskered bat, to be favourable. However, Bat Conservation Ireland remains very concerned about trends in these species because car-based monitoring surveys have seen long-term decreasing trends in Myotis spp. of -3.8% per annum over 22 years. This is a combined species index that is based on low numbers of observations which must, therefore, be interpreted with caution (see Roche et al 2026). In addition, decreases in both species were observed across a 10-year period between islandwide BATLAS 2010 and BATLAS 2020 surveys (see Pickett et al 2019). The development of this monitoring scheme will help us determine whether trends in these species are indeed favourable, or whether more work needs to be done to ensure their continued conservation.

It will take some time before accurate trend data on the status of woodland bats in Ireland can be revealed. Reaching this target and continuing to collect up to date activity data on woodland bats is the main objective of this current monitoring scheme.

Since 2023, we have expanded the All-Ireland Woodland Bat Monitoring Scheme in each survey year. As of 2025 there are 40 sites included in the scheme, with 26 located in the Republic of Ireland and 14 located in Northern Ireland. This has been a very positive step in attaining better survey coverage of woodland bats across the island. Two new bat groups in Co. Offaly and Co. Louth were established in 2025, both of which contributed directly to this scheme by putting forward sites and volunteers which was a wonderful development. We also had a lot of assistance from other organisations in Northern Ireland in 2025 including the National Trust, the Woodland Trust and Northern Ireland Bat Group. These organisations contributed significantly to the selection of sites and the recruitment of volunteers. This has been key to the successful rollout of the scheme and the delivery of survey objectives in Northern Ireland so far.

Although it is too early to predict trends for the target species, it is at least encouraging to see the relatively widespread presence of woodland bats at the monitoring sites. A higher number of audio files containing whiskered bat was recorded in 2025 than for Natterer's bat, a result that was also reflected in the data collected in 2023 and 2024 (Table 2). Although the mean number of audio files containing Natterer's bat has remained relatively consistent between survey years, there was a rather large reduction in the mean number of audio files containing whiskered bat activity in 2025 (mean 2.89 files per transect) compared to 2024 (5.04 files per transect). Similarly, for Daubenton's bat the mean number of files per transect was 3.59 in 2025 compared to 8.11 in 2024. There was also a shift in 2025 in relation to the timing of peak whiskered bat and Daubenton's bat activity, with highest mean number of files being recorded in June in 2025, in contrast to July in both 2023 and 2024.

In the case of Daubenton's bat, some of the difference in the mean number of audio files may be explained by the survey design approach adopted in 2025. For new sites recruited in 2025, there was a concerted effort made to avoid routes in woodlands that were located adjacent to waterways whenever possible. This was specifically done for the purpose of reducing the likelihood of recording a high volume of Daubenton's bat calls. This was an issue at some sites surveyed in 2024 where the sheer number of Daubenton's obscured the presence of other bat calls in the recorded sonograms. Therefore, it is likely that some of the reduction in the number of files containing Daubenton's bat activity was a result of this effort. On the other hand, the mean number of audio files from the Myotis spp. category in 2025 (4.97 files per transect) remained very similar to that of the same category from 2024 (5.04 files per transect). Similarly, the mean number of files containing brown long-eared bat calls in 2025 (1.48 files per transect) was almost identical to that of 2024 (1.49 files per transect).

Although the number of survey nights remained similar between 2024 and 2025 (72 nights in 2024 compared to 79 nights in 2025), there are differences in the nature of the data being compared. In 2025, two surveys were carried out over two months instead of three surveys over three months, as in 2024. In addition, 14 entirely new sites were added to the scheme in 2025. Therefore, these variables could be influencing the results. However, any artefacts of the data analysis arising from this will be resolved in time as a larger number of the same sites are monitored consistently. Additionally, year to year variation is generally present in most datasets and, in practice, at least five years of data are usually needed before a consistent trend can be demonstrated, except in the most extreme population crashes.

Habitat type or quality have not been assessed during the surveys so far, but this is something that will be added to the scheme in future surveys as we approach the projected final number of 70-75 sites to be included in the scheme. Although the relationship between woodland composition and bat presence or activity is likely to be complex, it would be worthwhile to use some form of habitat grading criteria that may show a relationship between woodland habitat characteristics and bat activity in Ireland over time.

Regarding power analysis and amber and red alert levels, in 2024 we only had a small number of sites that had been visited in more than one year, leading to imprecise estimates in site by year variation (i.e. the degree to which sites vary from year to year). As of 2025 we now have many more repeat sites, with 20 visited in two years and six visited in all three years. This gives much better variance estimates for use in the power simulations and has altered some of the estimates of the number of years to detect trends. The estimates are unlikely to change much further as more data is collected, so there will be no great need to repeat these power calculations from next year.

It should be remembered that the power analysis simulations are based on the simplistic assumption of a linear decline that is uniform across the island of Ireland. In practice any decline is likely to vary geographically and be non-linear, so larger sample sizes are preferable to ensure detection of significant population change that is confined to a particular area, or a particular type of habitat. As power analysis is not an exact science in these complex ecological situations, results should be interpreted as providing a general indication as to whether the survey design is adequate, without putting too much stress on exact values.

5. Acknowledgements

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7. Appendix 1

Table of complete results from the walking transects carried out at each site during the 2025 woodland surveys. Sites are listed in alphabetical order.

Woodland	Grid Ref.	WT Date	No. of audio files with the following bat species				
			Natt	Whisk	Daub	Myo	BLE
Ardress House, Co. Armagh	H 91327 55851	18/06/2025	4	0	0	3	0
		30/07/2025	34	0	0	6	1
Ballykeefe, Co. Kilkenny	S 40780 50888	17/06/2025	5	1	1	3	0
		28/07/2025	0	1	0	0	0
Balrath, Co. Meath	N 98783 64123	19/06/2025	0	0	0	1	0
		21/07/2025	0	0	0	0	0
Baronscourt Est, Co. Tyrone	H 36400 82699	26/06/2025	0	4	8	19	3
		31/07/2025	0	4	14	3	7
Binevenagh, Co. Derry	C 68399 29442	10/06/2025	0	0	0	0	0
		24/07/2025	0	0	0	0	0
Castle Coole, Co. Fermanagh	H 26094 43099	20/06/2025	1	1	4	6	0
		24/07/2025	1	0	3	1	3
Castle Lough, Co. Cavan	N 66296 97616	11/07/2025	2	3	13	0	2
Castle Ward, Co. Down	J5713149454	13/06/2025	0	0	2	0	0
		18/07/2025	0	4	0	1	9
Castlewellan, Co. Down	J 33244 36983	31/07/2025	2	1	16	7	0
		14/08/2025	0	0	10	0	2
Clandeboye Est., Co. Down	J 47812 77652	15/06/2025	0	0	10	2	0
		25/07/2025	0	1	9	2	1
Clara Vale, Co. Wicklow	T 17888 92149	18/06/2025	4	6	0	3	4
		29/07/2025	5	5	0	4	2
Clare Glen, Co. Armagh	J 01325 43780	19/06/2025	1	2	11	11	0
		13/07/2025	4	7	0	12	0
Clonad Wood, Co. Offaly	N 32484 19045	15/06/2025	2	1	0	5	0
		27/07/2025	0	2	0	1	0
Crom Est., Co. Fermanagh	H 35943 24644	30/06/2025	6	16	27	29	1
		31/07/2025	3	5	10	17	4

Woodland	Grid Ref.	WT Date	No. of audio files with the following bat species				
			Natt	Whisk	Daub	Myo	BLE
Curraghchase, Co. Limerick	R 41271 49289	28/06/2025	0	0	0	1	3
		29/07/2025	3	1	2	2	3
Dartrey, Co. Monaghan	H 62538 18220	07/07/2025	2	2	0	7	0
		30/07/2025	4	0	7	5	5
Deerpark, Co. Cavan	N 59433 86979	11/07/2025	6	9	1	11	2
		31/07/2025	2	2	1	5	1
Deputy's Pass, Co. Wicklow	T 23455 90159	12/06/2025	2	48	3	12	0
		23/07/2025	1	5	0	3	8
Derrycassin, Co. Longford	N 30475 86135	29/06/2025	8	2	2	11	1
		30/07/2025	2	5	4	3	0
Donadea, Co. Kildare	N 83618 32727	16/06/2025	3	11	1	6	6
		24/07/2025	4	4	3	4	0
Drumboe Wood, Co. Donegal	H 14578 94958	25/06/2025	0	0	6	0	0
		14/07/2025	1	1	1	7	0
Faughan Valley, Co. Derry	C 50923 10848	14/06/2025	0	0	11	3	0
		15/07/2025	11	0	8	14	0
Florence Court, Co. Fermanagh	H 18506 34756	19/06/2025	2	7	7	42	2
		27/07/2025	9	5	9	27	4
Glenarm Forest, Co. Antrim	D3094514703	29/06/2025	3	0	24	2	0
		29/07/2025	3	0	5	2	0
Glendalough, Co. Wicklow	T 13011 96499	24/06/2025	9	0	2	4	1
		24/07/2025	0	1	0	3	3
Glenveagh, Co. Donegal	C 02782 21416	24/06/2025	0	0	0	0	0
		29/07/2025	0	1	0	4	2
Hazelwood Forest, Co. Sligo	G7225934424	10/06/2025	3	1	0	3	1
		11/07/2025	0	3	0	5	0
Jenkinstown Wood, Co. Kilkenny	S 47979 64506	10/06/2025	4	3	0	2	1
		28/07/2025	1	3	0	2	8
Killinthomas, Co. Kildare	N 66109 21512	07/06/2025	0	0	0	0	0
		23/07/2025	1	0	0	0	0
Killykeen Forest, Co. Cavan	H 35311 06436	13/06/2025	0	2	4	1	0
		03/07/2025	0	0	0	0	0
Littlewood, Co. Meath	N 97406 75671	10/06/2025	0	1	0	0	1
		10/07/2025	0	0	0	0	1
Minnowburn, Co. Antrim	J 32553 68384	09/07/2025	0	0	0	2	0
		14/08/2025	0	0	1	0	0

Woodland	Grid Ref.	WT Date	No. of audio files with the following bat species				
			Natt	Whisk	Daub	Myo	BLE
Newcastle West, Co. Limerick	R 27707 33906	20/06/2025	0	1	0	2	2
		18/07/2025	0	5	0	7	4
Newcastle Wood, Co. Longford	N 18231 57080	17/06/2025	6	0	4	4	3
		24/07/2025	0	2	0	4	1
Redburn Country Park, Co. Antrim	J 39584 77164	17/06/2025	2	2	0	1	1
		26/07/2025	0	0	0	0	0
Rossmore, Co. Monaghan	H 65406 31501	28/06/2025	2	0	1	2	0
		30/07/2025	0	2	2	3	1
Tomnafinnoge, Co. Wicklow	T 02089 70670	17/06/2025	8	5	5	6	1
		16/07/2025	7	10	3	17	7
Townley Hall, Co. Louth	O 03725 76111	27/06/2025	0	5	7	3	0
		25/07/2025	0	1	12	7	3
Tullynisk House, Co. Offaly	N 06123 07197	14/06/2025	0	9	5	6	1
		18/07/2025	3	2	3	2	1
Union Wood, Co. Sligo	G 69136 29100	24/06/2025	0	1	2	0	0
		30/07/2025	0	2	0	0	0

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