Mulkear Lesser Horseshoe Bat

Conservation Project

Mulkear EIP

VWT Ireland Vincent Wildlife Trust

Mulkear EIP and Lesser Horseshoe Bat Conservation Project

Final Report

Ireland's European Structural and Investment Funds Programmes 2014-2020
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AGRICULTURE & INNOVATION

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

Table of Contents

Lesser horseshoe bat: ©Frank Greenaway

Executive Summary

This project set out to build new and permanent structures in County Limerick in the vicinity of the Mulkear River to function as suitable roosting sites for the lesser horseshoe bat. This is the first time that funding under an agri-environment scheme was solely targeted to benefit this bat species and is the first time that a series of new buildings in one county was constructed for it.

The fragmentation of the Irish landscape that has occurred due to changes in landscape use has created gaps in the distribution of the lesser horseshoe bat, with clusters occurring in counties Clare and Kerry. There are, however, large areas from Mayo to Cork, one of which is Limerick, that contain few or no colonies. One action to address this fragmentation is the provision of new roosts.
This project commenced in August 2021 and finished in March 2023. It was a partnership between Vincent Wildlife Trust (VWT) staff based in County Galway and members of the Operational Group of the Mulkear River Catchment European Innovation Partnership Project (LLOC 2065; www.mulkeareip.ie) based at Greanmore House, Pallasgreen, County Limerick.

The project was undertaken in an area of east Limerick associated with the Mulkear River Catchment. This area was chosen because the small population of lesser horseshoe bat in Limerick is a critical link between the larger populations in neighbouring Kerry and Clare, vegetated rivers are potential corridors for movement in the landscape by this species and there was an existing EIP framework within this catchment.

Six new permanent buildings were built on farmland during 2022 following Architectural Plans, for which specifications were provided by VWT, and the construction was supervised by a Quantity Surveyor. Prior to construction, the proposed locations were approved by both National Parks and Wildlife Service and Limerick City and County Councils as (1) not impacting on the two Special Areas of Conservation in east Limerick or (2) requiring planning permission, respectively.

The six farmers were provided with an information pack that included a satellite image showing the location agreed for their Bat House, the aspect of its roof to ensure maximum solar gain and the area that would require fencing post construction. Bat boxes and Bee Bricks were incorporated into the Bat Houses to benefit other wildlife in the adjoining landscape. Two newly designed Tilt Trays were installed at each Bat House at the openings created for the bats to prevent predators gaining access through these.

This project secured €166,749 funding from the Department of Agriculture, Food and the Marine (DAFM) under the European Innovation Partnerships Initiative ‘Farming and Community Biodiversity Initiative’ Competitive Call 5 for Proposals in February 2021. The European Innovation Partnerships Initiative (EIP) is under the Rural Development Programme 2014-2020.

Prior to the project, the lesser horseshoe bat had not been recorded in east Limerick and there were fewer than 30 locations throughout the rest of the county at which it had been recorded. Once the locations for the Bat Houses were selected, VWT placed passive bat detectors in the hedgerows adjacent to each of these to monitor bat activity from June to September 2022. Lesser horseshoe bats were detected for the first time in this part of Limerick near three of the locations selected for the new Bat Houses.

The project has been and will continue to be promoted by means of videos and information leaflets, bat walks, on websites, and at talks at National and International conferences and farm open days.

1 Description of Project

1.1 Project objective

This project set out to build new and permanent structures in County Limerick in the vicinity of the Mulkear River to function as suitable roosting sites for the lesser horseshoe bat. It marks the first time that funding under an agri-environment scheme was solely targeted for it. It is also the first time that a series of new bespoke roosts in one county has been constructed. This project, therefore, represents an innovative approach to the conservation of a bat species that is very dependent on access to man-made structures on farmland for its summer roosts.

Six new buildings were built during 2022 adhering to specifications provided by Vincent Wildlife Trust (VWT), detailed in Architectural Plans and completed under the supervision of a Quantity Surveyor. The choice of locations for the six buildings was based on the results of habitat modelling research that indicated vegetated rivers are a suitable landscape feature along which bats will navigate.

The project commenced in August 2021 and was completed in March 2023. It was a partnership between VWT staff based in County Galway and members of the Operational Group of the Mulkear River Catchment European Innovation Partnership Project (LLOC 2065) based at Greanmore House, Pallasgreen, County Limerick. The latter is a five-year project developing sustainable farming practices to enhance water quality in the Mulkear Catchment that commenced in April 2019 and is expected to run until at least December 2023.

Each Bat House was built using concrete hollow blocks on a concrete foundation. Salvaged natural slate was used for the roof. An enclosed loft space was created by fitting a ceiling with a small open hatch. Two predator-proofed bat access openings were incorporated on the ground floor and a small timber door provided for human access.

Features for solitary nesting bees (Bee Bricks) and other bat species (an external Bat Box) were fitted to each Bat House. No additional planting was necessary near any of the Bat Houses because there was already adequate mature hedgerow and tree cover in place. A stock-proof fence was erected around each Bat House.

1 Description of Project

1.2 Project rationale

The lesser horseshoe bat is one of nine bat species in Ireland and shares many features with the other eight species; it is insectivorous, uses echolocation for navigation and hunting and hibernates in winter. Yet it has many characteristics that set it apart from the other bats and that necessitate additional actions to conserve it. It has the smallest population estimate of any of the bats, with approximately 13,000 horseshoe bats recorded from six western counties.

It needs to fly directly into a structure because it is unable to land and crawl so it cannot access the wide range of structures available to the other eight species. Although its echolocation call is perfectly adapted to detect small prey (in woodland, along hedgerows and vegetated waterbodies) it does not project far ahead of the bat so it cannot detect approaching predators, hence it must fly in the shelter of linear features such as hedgerows and treelines to safely navigate between its day roosts and feeding areas. It is the most photophobic of any of the Irish bat species.

The fragmentation of the Irish landscape that has occurred due to changes in landscape use (for example, historical and current deciduous woodland clearance, changes in farming practices, road networks and urban development) has created gaps in the distribution of this bat species. Clusters of horseshoe bats occur in counties Clare and Kerry but there are large areas from Mayo to Cork that contain few or no colonies, one of which is Limerick. A VWT survey in 1997 of potential lesser horseshoe bat roosts in Limerick ([1]Roche, 2001) noted that suitable buildings had been renovated or demolished and that access to roosts was a limiting factor for the species in the county.

The gaps in the distribution of the lesser horseshoe bat have given rise to the development of four distinctive genetic sub-populations of the species (Figure 1) in south Mayo/north Galway, south Galway/Clare, Limerick, and Kerry/Cork, based on the results of two genetic studies ([2]Dool et al, 2016; [3]Harrington, 2018). The results of these studies and ongoing monitoring by National Parks and Wildlife Service (NPWS) led to an 'Unfavourable – Inadequate' assessment of the species' conservation status in the most recent Article 17 Report to the European Union Commission ([4]NPWS, 2019).

The only way to prevent further genetic isolation of the small Irish lesser horseshoe bat population, which will threaten its long-term survival, is to provide targeted conservation actions for the bats comprising the sub-populations. One such action is to provide suitable roosts in suitable landscape, which was the aim of this project.

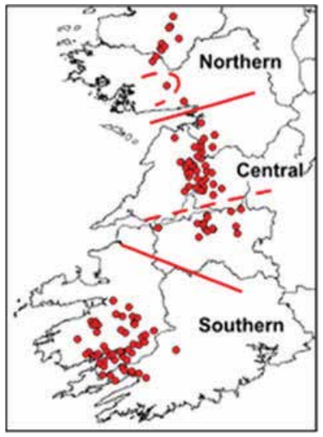


Figure 1. Map of roost locations for the sub-populations of the lesser horseshoe bat (Reproduced from Harrington, 2018).

1 Roche, N. (2001) The status of Lesser Horseshoe Bats *Rhinolophus hipposideros* (Bechstein) in County Limerick. Irish Naturalists' Journal 26: 446-452

2 Dool, S. E., Puechmaille, S. J., Kelleher, C., McAney, K. & Teeling, E.C. (2016) The effects of human-mediated habitat fragmentation on a sedentary woodland-associated species (*Rhinolophus hipposideros*) at its range margin. Acta Chiropterologica 18: 377-393.

3 Harrington, A. (2018) The development of non-invasive genetic methods for bats of the British Isles. Unpublished PhD Thesis Waterford Institute of Technology

4 NPWS (2019) The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments. Unpublished NPWS Report. Edited by Deirdre Lynn and Fionnuala O'Neill.

1.3 Project partners

The Trust employs two full-time staff, both based in Galway — a Mammal Programme Manager who has more than 30 years' experience in the research and practical conservation of the lesser horseshoe bat, and a Species Conservation Officer with 18 years' experience of habitat mapping and field studies. These staff were responsible for the following elements of the project: habitat assessment that informed the basis of site selection for the houses; liaising with participants, NPWS, Limerick City and County Council, Architect, Quantity Surveyor and Suppliers; monitoring bat activity at site locations; creating promotional material and report writing.

While VWT staff conducted the practical implementation of the project, they were guided, supported and in constant contact with the other members of the Project Management Team who were based in Limerick, by means of in-person or Zoom meetings and by regular email updates. The Limerick Team was responsible for liaising with DAFM, all the financial aspects of the project and ensuring GDPR obligations were upheld.

1.4 Project location

The project was undertaken in an area of east Limerick associated with the Mulkear River Catchment (Figure 2) for the following reasons:

- The Limerick lesser horseshoe bat population (approximately 1,000 animals) is a critical link between the larger populations in neighbouring Kerry and Clare
- Previous studies had highlighted vegetated rivers as potential corridors for movement in the landscape by the lesser horseshoe bat
- There was an existing EIP working with farmers within this catchment (LLOC 2065)

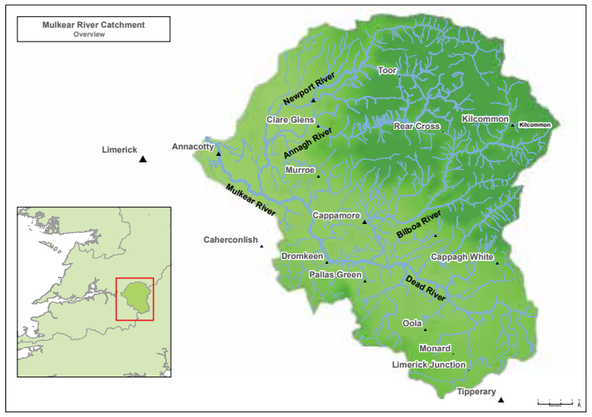


Figure 2 Location of LLOC 2065 project.

A desktop study of satellite imagery of the catchment was conducted by VWT to identify areas of suitable habitat and screenshots of those considered suitable were provided to the Limerick-based project team (Figure 3). This team then approached farmers in these areas to explain the aim of the project and the names of those who expressed an interest were provided to VWT. These farmers were contacted by telephone and then farm visits were conducted with them to assess a suitable location for a Bat House, should they agree to become part of the project.

Figure 3 Sample of imagery supplied to indicate potential locations.

Figure 4 shows VWT staff on site with one of the farmers discussing a potential location.

Figure 4 Assessing the location for Bat House 1 at Clare Glens.

Site suitability was assessed based on the following criteria:

- Habitat suitability – the presence of mature hedgerow and tree cover
- Water body within 1km
- Level and dry ground – to facilitate construction and future monitoring
- Adequate vehicular access – to facilitate construction traffic
- Minimum loss of productive land
- Outside of designated areas
- Risk of disturbance

Prior to final selection, all six sites were surveyed by NPWS to assess their location in relation to the two Special Areas of Conservation in this part of east Limerick: the Lower River Shannon SAC (002165) and the Clare Glens SAC (000930) and confirmation subsequently obtained to state that the Department of Housing, Local Government and Heritage did not have any nature conservation concerns regarding the proposed works. Figure 5 shows the six locations that satisfied all the above criteria and Figures 5 to 17 chart the construction phases at the six sites.

Figure 5 Location of six Bat Houses.

Bat House 1 (Figures 6-7): Clare Glens – V94 Y06N

This Bat House is located within 500 metres of the Clare River that divides Limerick and Tipperary counties and adjacent to the area known as the Clare Glens. The participant operates a substantial beef and suckler herd enterprise and built the Bat House himself.

Figure 6 Foundation laid at Bat House 1.

Figure 7 Quantity Surveyor assessing Bat House 1 during construction.

Bat House 2 (Figures 8-9): Grange Lower – V94 EW42

This Bat House is located within 100 metres of the Mulkear River and within 50 metres of the Ballybrophy railway line. The participant is retired but was formerly a dairy and tillage farmer and built the house himself.

Figure 8 Bat House 2 at level for fitting roof timbers.

Figure 9 Quantity Surveyor assessing Bat House 2 with farmer during construction.

Bat House 3 (Figures 10-11): Killeenagarriff – V94 TD5F

This Bat House is located within 150 metres of the Slievenohera River. The participant raises calves to store cattle, works off farm and engaged a builder to construct the Bat House.

Figure 10 View of loft before slating at Bat House 3.

Figure 11 Interior view of loft access after slating at Bat House 3.

Bat House 4 (Figures 12-13): Coolnahilla V94 V9PK

This Bat House is located within 100 metres of the Slievenohera River. The participant raises calves to finished beef cattle under 24 months, works off farm and engaged a builder to construct the Bat House.

Figure 12 Bat House 4 showing Bee Bricks embedded in the wall.

Figure 13 Bat House 4 showing blockwork prepared for plastering.

Bat House 5 (Figures 14-15): Madaboy V94 PK26

This Bat House is located 100 metres from the Mulkear River. The participant manages their land for forestry and leases sections for hay cutting and engaged a builder to construct the Bat House.

Figure 14 Slates being fitted to Bat House 5.

Figure 15 Guttering being fitted to Bat House 5.

Bat House 6 (Figures 16-17): Murroe V94 TF8P

This Bat House is located within 50 metres of a water body that forms part of the Mulkear River Catchment. The participant operates a part-time suckler cow enterprise and engaged a builder to construct the Bat House.

Figure 17 Foundation laid at Bat House 6.

Figure 17 Door fitted at Bat House 6.

1 Description of Project

1.5 Project delivery

Although VWT in Ireland has undertaken major restoration works at twelve buildings used by the lesser horseshoe bat in four counties (now used by over 4,000 bats in summer), this is the first time that it has been involved in a project to construct new roosts working with external partners and external funding. In addition, as stated earlier in this report, this project represents an innovative approach to the conservation of this species so the following approach was devised at the outset as a means of completing the construction element of the project. The nature of the project resulted in certain steps running concurrently, so not always in the order listed below.

1. Visit the new Bat House for the lesser horseshoe bat in Cork built by NPWS
2. Photograph all features of Cork Bat House to serve as a template for an architect
3. Engage an architect to create plans to ensure consistency in method and materials
4. Provide information to Limerick Team so it could promote the project
5. Meet all potential participants on site to determine site suitability and complete Expression of Interest Forms
6. Meet NPWS at sites selected to obtain approval
7. Provide Limerick City and County Council with locations of sites approved by NPWS
8. Obtain planning exemption for the Bat Houses
9. Engage a Quantity Surveyor to estimate the costs of materials and labour and to inspect each house during its construction
10. Provide drawings and Quantity Surveyor estimates to participants
11. Draw up Farmer Agreement Form
12. Source natural slate, roof felt, bat boxes, bee bricks and predator-proof tilt trays
13. Oversee the construction of the houses
14. Run Knowledge Transfer meetings with participants during the construction phase
15. Sign off on the completed houses

VWT organised the first meeting of the partners in September 2021, which took place at Glengarriff Nature Reserve, County Cork (Figure 18). The purpose of this visit was for members of the Limerick Team to view a new building for lesser horseshoe bats built by NPWS staff, based on information provided previously by VWT from a Spanish Conservation Project ([5]Alcalde *et al.*, 2017). This was to ensure that all parties were fully aware of the size of the new Bat Houses proposed under the Limerick project and to discuss with NPWS the practical issues that had arisen during construction.

5 Alcalde, J. A., Martínez, I., Zaldua, A & Inmaculada, A. (2017). Conservación de colonias reproductoras de murciélagos cavernícolas mediane refugios artificiales. https://doi.org/10.14709/BarbJ.10.1.2017.02

Figure 18 Project Team at Bat House in Glengarriff Nature Reserve.

The six farmers received an information pack that included a satellite image showing the location agreed for their Bat House, the aspect of its roof to ensure maximum solar gain and the area that would require fencing post-construction (Figures 19–21). They also received a full set of Architect drawings (Figure 22) and the information provided by the Quantity Surveyor.

Figure 19 Hatched area indicating location of Bat House 1.

Figure 20 Image to illustrate the aspect of the roof for Bat House 1.

Figure 21 Extent of area required to fence off Bat House 1 from livestock.

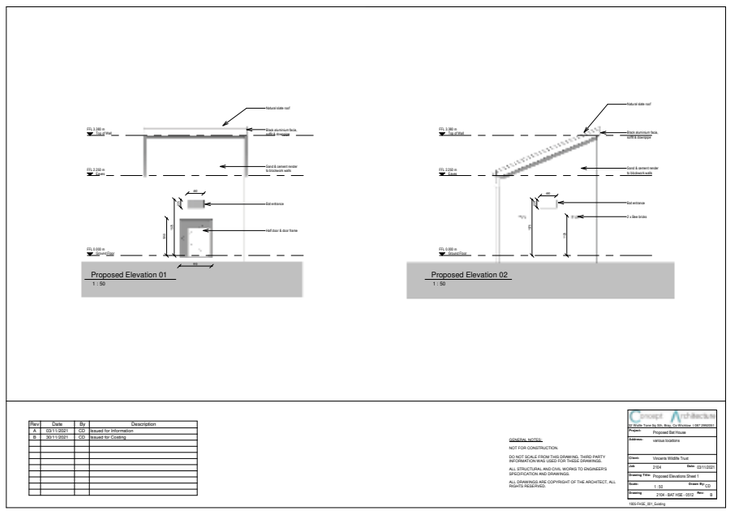


Figure 22 Sample of architect drawings for Bat Houses.

2 Project Budget

This project secured funding from the Department of Agriculture, Food and the Marine (DAFM) under the European Innovation Partnerships Initiative 'Farming and Community Biodiversity Initiative' Competitive Call 5 for Proposals in February 2021. The European Innovation Partnerships Initiative (EIP) is under the Rural Development Programme 2014-2020.

The initial budget for this project submitted with the Application Form in March 2021 of €166,749 was revised in August 2022. The reasoning behind this revision was due to substantial increases in material costs, cost of living and supply chain issues from the date of the original budget.

The original estimated cost of constructing each Bat House was €7,000. Building quotations received after all planning requirements and specifications were concluded were in the range of €10,500 to €14,750. This necessitated reducing the number of Bat Houses constructed from ten to seven. The overall budget of €166,749, however, did not change. The project team had initially anticipated that the farmers would construct the Bat Houses but when it came to the final decision only two farmers opted to do so. Builders were engaged by four farmers to construct the remaining houses at a cost of €10,500 (inclusive of VAT) and the farmers who undertook self-builds were paid a similar amount.

In addition, each farmer received a participation payment of €2,000 and received a fee for attending the Knowledge Transfer Meetings. It had been anticipated that farmers would need to plant hedgerow and trees at the Bat Houses to connect these to linear features elsewhere on the farms, but this action was not necessary.

The roof felt and natural slates for each house were sourced by the Project Team and distributed to the participant farmers. This course of action was chosen because of very specific standards for both these products for the success of attracting and maintaining the lesser horseshoe bat to the Bat Houses. The custom-made Tilt Trays, Bee Bricks and Bat Boxes were sourced by the project team and supplied to each farmer.

Finally, one of the participant farmers did not construct the Bat House as was agreed so the total number of Bat Houses constructed was six. Tables 1 and 2 present budget details for the project.

Table 1 Budget details and final spend for the project.

	Original Budget 2021	Revised Budget 2022	Final Spend 31/03/2023
Project Direct Costs			
Farmers Payments	€95,500	€39,200	€35,028
Implementation Costs	€47,479	€110,749	€109,441
SUB TOTAL	**€142,979**	**€149,949**	**€144,469**
Project Management and Administration costs	€17,000	€8,250	€10,703
Monitoring, evaluation, outreach and dissemination costs	€6,770	€8,550	€11,251
TOTAL	**€166,749**	**€166,749**	**€166,423**

Table 2 Direct costs (excluding VAT) of Bat House construction.

Direct Costs	
Construction Costs	€9,250.00
Roof felt	€45.00
Natural slates	€395.00
External Bat Box (one per house)	**€53.00**
Bee Bricks (two per house)	€57.00
Tilt Trays (two per house)	€560.00
Sign (one per house)	€78.00
TOTAL	**€10,438.00**

3 Baseline Data

Lesser horseshoe bat records

Prior to the project, the lesser horseshoe bat had not been recorded from east Limerick and there were fewer than 30 locations throughout the rest of the county at which it had been recorded. In contrast, there are over 300 location records for this species in neighbouring County Kerry and approximately 175 in County Clare — and these account for thousands of horseshoe bats. Only one Limerick roost, at Curraghchase Forest Park over 40km away, qualifies as a Special Area of Conservation (SACs) because it has >100 bats present in summer, while there are 40 SACs for this species in the other five counties in which it occurs. The closest roosts to east Limerick, which contain low numbers of horseshoe bats, are 20km away (Figure 23).

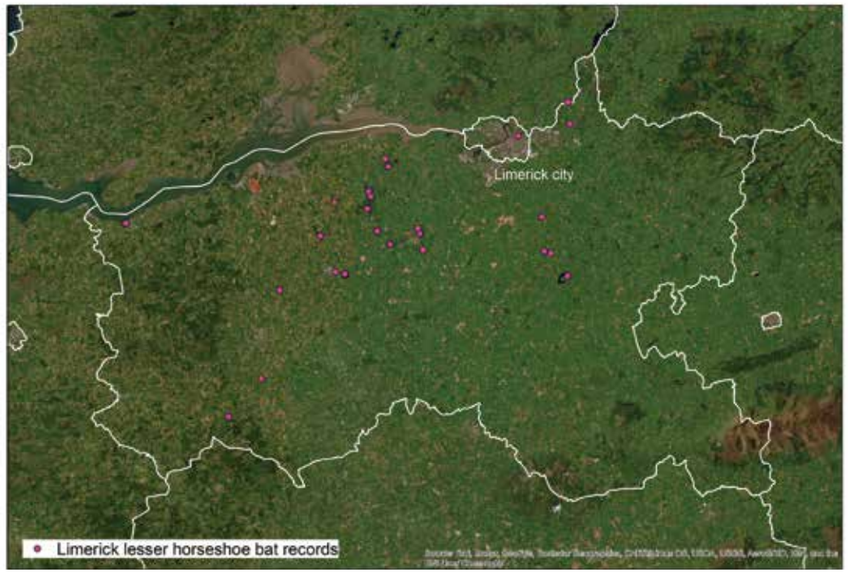


Figure 23 Lesser horseshoe bat records known before the project began.

Field visits and meetings

Forty-one visits were made during the course of this project. Table 3 provides the details for these. In-person farm visits were prioritised and considered necessary to ensure that each farmer was happy with the location on their farm for the Bat House and to monitor progress during construction. Meetings with the Management Team, DAFM and the Architect were generally conducted via Zoom. Initially ten farmers were interviewed, of which seven agreed to participate in the project and six completed the construction work. Telephone conversations only were conducted with two farmers but were sufficient to determine that they did not wish to participate and one farm was visited but the habitat was unsuitable.

Table 3 Record of visits made during the project.

Year	Period	No. of visits	Purpose
2021	Q3	2	Viewing NPWS house in Glengarriff, first meeting with a farmer
	Q4	6	Meeting with farmers, Management Team, NPWS
2022	Q1	1	Meeting Management Team
	Q2	13	Meeting Management Team, farm visits, KT meeting, Open Day, detector monitoring
	Q3	12	Farm visits, KT meeting, detector monitoring
	Q4	7	Farm visits, detector monitoring

Monitoring bat activity prior and during construction

Once the locations for the Bat Houses were selected, VWT placed bat detectors in the hedgerows adjacent to each of these to record bat activity from June to September (Figure 24).

The detectors, Song Meter 4 (SM4), are battery operated fully weatherproof passive bat detectors that record the ultrasonic call of any bat species that flies close to the unit. They were programmed to begin recording 30 minutes after sunset and to end 30 minutes before sunrise and the bat calls detected were stored on Secure Digital (SD) cards designed for high-capacity memory storage.

The SD cards and batteries were checked and replaced as necessary. Kaleidoscope Pro (Version 5.4.8) software was used to analyse the call data so that bats could be identified to species.

Figure 24 SM4 detector being set out in a hedgerow at a Bat House.

Lesser horseshoe bats were detected for the first time in this part of Limerick near three of the locations selected for the new Bat Houses. Figures 25-27 show the sonograms confirming the species' presence at the farms of Bat Houses 4, 5 and 6. A lesser horseshoe bat echolocation call has a short frequency modulated (FM) and long constant frequency (CF) structure is produced at a peak frequency of 110kHz and cannot be confused with any other Irish species.

Other bat species recorded were soprano pipistrelle (*Pipistrellus pygmaeus*), common pipistrelle (*Pipistrellus pipistrellus*), Leisler's bat (*Nyctalus leisleri*), brown long-eared bat (*Plecotus auritus*) and the Myotid bat species (*Myotis daubentonii, Myotis nattereri* and *Myotis mystacinus*). It is difficult to differentiate between the Myotis species recorded calls so these are grouped as Myotid bat species.

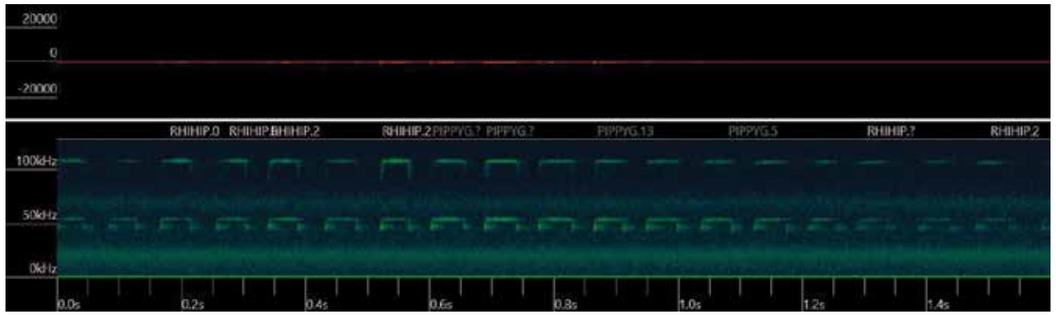


Figure 25 Sonogram of the lesser horseshoe bat in hedgerow at Bat House 4.

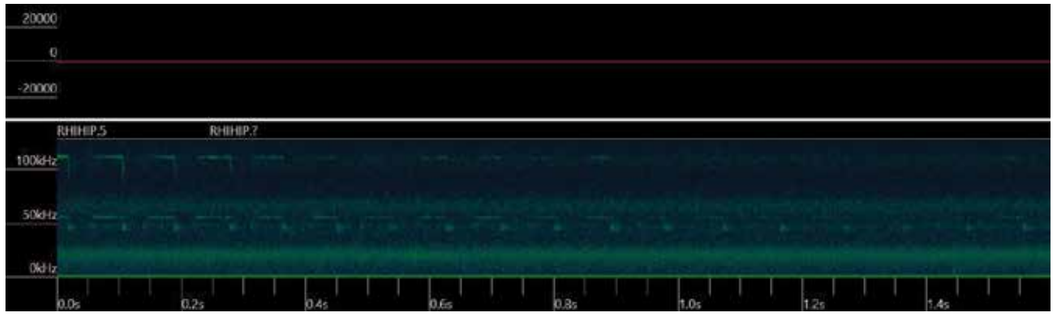


Figure 26 Sonogram of the lesser horseshoe bat in hedgerow at Bat House 5.

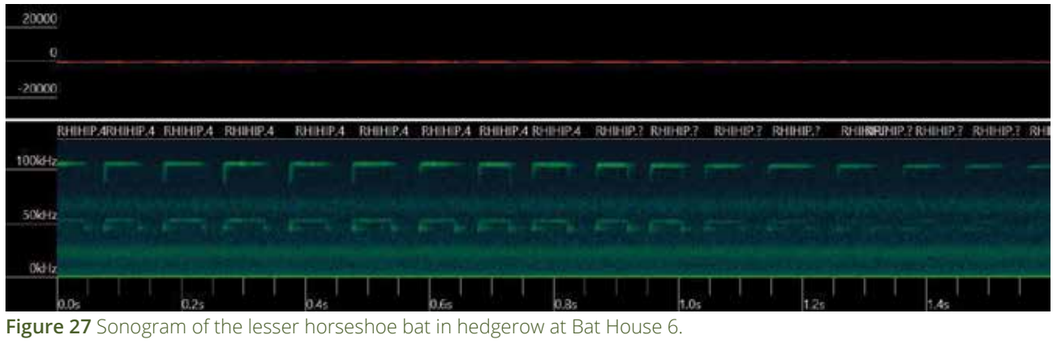


Figure 27 Sonogram of the lesser horseshoe bat in hedgerow at Bat House 6.

Additional features at each Bat House

Building a new structure presented the project with the opportunity to test other features that would provide new roosting conditions for other wildlife. An ANS-1 Bat Box (Figures 28-29) was fitted to each house and is suitable for use by all of the other eight species of bat found in Ireland because these bats land and crawl into a roost site, in contrast to the lesser horseshoe bat that needs to fly directly into its roosts. The ANS-1 Bat Box is made of a mixture of wood and concrete that reduces temperature fluctuations and provides these bats — known collectively as the vesper bats — with a rough surface that they can easily grip. It is maintenance free, because it has been treated with a protective paint and has no hinged parts, and droppings fall downwards out of the box. The design of this box is ideal for fixing to a flat surface, such as a wall.


Figure 28 Close-up of bat box suitable for vesper bats.


Figure 29 A bat box fitted to Bat House 3.

Two Bee Bricks were fitted into the block work of each Bat House to test their efficacy in providing suitable cavity roosts for solitary bees, the first time this has been undertaken in Ireland (Figure 30). Although some of the actions recommended by the All-Ireland Pollinator Plan (www.pollinators.ie) to help make farms more pollinator friendly were beyond the scope of this project, incorporating Bee Bricks was considered feasible, particularly as there already was suitable flowering hedgerow adjacent to each of the houses. Red bricks were chosen based on the results of research conducted in the UK ([6]Shaw *et al*. 2021) that showed red bricks located at least 0.6m off the ground were used by bees.

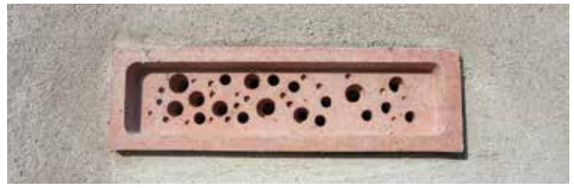


Figure 30 Bee Brick at Bat House 6.

6 Shaw, R.F., Christman, K., Crookes, R., Gilbert, C.N. & Osborne, J.L. (2021) Effect of height and colour of bee bricks on nesting occupancy of bees and wasps in SW England. https://doi/org.10.52201/CEJ18KMBE7709

The access points or openings into buildings used by the lesser horseshoe bat need to be secured against predators either sitting at the openings and predating bats as they emerge or gaining access to the interior of the buildings, where they may be able to catch bats or cause the bats to abandon the building due to disturbance. In the past, VWT attached sheets of metal around openings to deter predators but currently deploys a specially-designed predator unit called a Tilt Tray, which was adapted from a design tested during a LIFE project on the species in Poland.

Plans of this design were obtained and quotations for its construction for this project were sought from two engineering firms. A Limerick company was selected because of their ability to make a prototype that could first be tested at a Bat House to ensure the unit was fit for purpose. Two of these Tilt Trays were fitted to each Bat House and Figure 31 shows one of these in situ. The outer portion of the tray tilts forward when a predator lands on it so closing off the opening temporarily.

Figure 31 Tilt tray fitted at an opening into a Bat House.

4 Key Performance Indicators (KPIs)

It was always emphasised, in both the initial application form completed under the Competitive Call 5 for Proposals and the subsequent Project Initiation Document completed on commencing the project, that it was never anticipated that lesser horseshoe bats would be recorded within the new structures during the lifetime of this project, which came to end in March 2023.

Eleven KPIs were, however, devised at the outset as a means of measuring the success of the project, although there was little evidence on which to base these because the scale of this project had not been undertaken before. Despite this, three KPIs were fully achieved, and varying degrees of success achieved under several more, with the reminder scheduled for completion in 2023.

These KPIs and the level of achievement of each are listed below.

1 Ten new lesser horseshoe bat roosts constructed with biodiversity features incorporated for other wildlife: Six Bat Houses completed with external Bat Boxes and Bee Bricks fitted.

2 Additional green-infrastructure created to link the Bat Houses to existing linear features. Not completed as sufficient linear features present at all locations.

3 Two bat detector workshops run: Not completed — one scheduled for August 2023.

4 Video produced that documents the various aspects of the project: Completed.

5 Produce an ‘Actions for lesser horseshoe bats on farms’ leaflet: Completed.

6 Post-project support for farmers by VWT staff: Scheduled for April-September 2023.

7 Post-project bat monitoring programme in place: Scheduled for April-September 2023.

8 Lesser horseshoe bats or their droppings recorded in Bat Houses: Not achieved yet.

9 Lesser horseshoe bats recorded on detectors along flight lines to the Bat Houses: Recorded at three of the six locations.

10 Template of project for adoption in other counties: Delayed until temperature data collected during monitoring is assessed.

11 End of project event: Scheduled for April 2023.

5 Lessons Learned

This project presented many opportunities to record actions that could benefit similar projects in the future. The knowledge gained during the 20 months of this project has been categorised under four headings, (1) Planning Permission, (2) Construction Phase, (3) Cost Estimation and (4) Recording Progress.

1 Planning permission

During the preparation of the project proposal in February 2021, the planning requirements for new built structures on farms was researched (https://bit.ly/3KgyQ5c). The animals listed for housing in roofed structures were cattle, sheep, goats, donkeys, horses, deer and rabbits and these structures were defined under Class 6 (limited in size to under 200 square metres and 300 square metres on aggregate). Although the new Bat Houses fell within the size limit, VWT also consulted the Planning and Environmental Services of Limerick City and County Councils for their opinion, providing maps of the location of the proposed structures. The consensus of this planning authority was that planning permission was not required.

Recommendation: Assurances regarding planning exemption should be obtained in writing by future projects so that no risk is attached to the expenditure of considerable finance for the construction of a Bat House and to provide assurance to participating farmers.

2 Construction Phase

The seven farmers selected to participate in the project were given the choice of building the Bat House (self-build) or engaging an external builder. Four of the farmers elected to use a builder and these houses were constructed between June and September within the period that had been estimated (four weeks) and when the ground was dry. The self-builds took longer to complete so the construction period extended into less favourable weather conditions. The third farmer who chose to self-build had not been able to begin work by September, so it was decided not to proceed with this Bat House.

Recommendation: Although it was considered desirable to offer the choice to farmers to undertake the building work, engaging a professional builder ensures that the construction work is undertaken during the specified time, essential in the case of short-term projects. The self-build option is more suited to projects of longer duration (two or more years).

3 Cost estimation

An estimate of the total cost to build a Bat House (€7,000) had been based on consultation with NPWS in Glengarriff who had constructed a similar building for bats and the intention was to build ten Bat Houses at this cost during this project. Unfortunately, the commencement of this project coincided with a rapid and unforeseen increase in the cost of raw building materials and tenders obtained from builders ranged from €10,500 to €14,750. It was also extremely difficult to obtain tenders from builders because of the additional time associated with transporting materials to the locations for the houses and lack of access to electricity and water. In order to stay within budget, the number of houses built was revised down to seven, of which six were completed.

Recommendation: As noted above, while it was considered desirable to offer the choice to farmers to undertake the building work, future projects would benefit if one builder was offered the option to build all the Bat Houses being considered, because there would be a cost advantage to this approach. This approach might also make it more attractive to builders and therefore elicit more tender options.

4 Recording Progress

Although the implementation of this project was well documented by photography and video footage, this aspect in future projects would benefit by ensuring that vantage points for obtaining this material are agreed at the outset, clearly marked and adhered to so that there is a consistency to the images captured.

6 Actions to Carry Forward

As described in Section 3, there are four actions yet to be delivered and they will be completed in 2023. The first of these is an event in April to formally mark the end of the project and to launch the project video and leaflet. Also in April, SM4 Bat Detectors and iButton Temperature Loggers will be installed in the six Bat Houses to allow monitoring of bat activity and temperature conditions within the new roosts from April to the end of September.

The results of this monitoring study will be placed on the Mulkear EIP website (www.mulkeareip.com) and VWT's website (www.vincentwildlife.ie).

A bat detector walk will be conducted in August to coincide with National Heritage Week. It is hoped that this will be take place in the grounds of Glenstal Abbey, where the lesser horseshoe bat was recorded on SM4 detectors for the first time during summer 2022 in a separate project undertaken by VWT under the NPWS Grants for Small Recorders Scheme 2022.

The final action listed was the creation of a project template, which is intended to summarise the lessons learned from this project along with details of materials used to build the houses, guidelines of costs, time requirements, etc, so that other parties could repeat the project in other counties. A Time Lapse video was made in anticipation of completing this action, in addition to creating a library of photographs, some of which appear in this report. Funding will be sought during 2023 to cover the time involved in completing this action and the guidance template will then be available on the Mulkear and VWT websites.

7 Details of dissemination

As the focus of this project was the construction of new roosts for the lesser horseshoe bat on private land, there was little opportunity to advertise or promote the work of the project in the early stages to the public. However, once all the approvals were obtained and work began on building the Bat Houses, there was scope to begin sharing information and images.

A short video was prepared for the formal launch of the project at a Farm Open Day in June 2022 and then shared on the Mulkear and VWT websites (www.mulkeareip.ie; www.vincentwildlife.ie). Figure 32 shows the information stand at the Open Day. A stand to promote the project was taken at the EIP-AGRI National Conference 2022 that was organised by National Rural Network in November 2022.

Two Trail Cameras were installed at the location for Bat House 3 during summer 2022 to record footage of the construction of this Bat House in Time Lapse mode and it is hoped that this will be available on the Mulkear and VWT websites during 2023. A professional video was produced when the Bat Houses were completed or close to completion and is now available on the Mulkear and VWT websites. VWT will promote this video via all its Social Media Platforms (www.mulkeareip.ie; www.vincentwildlife.ie).

Figure 32 Stand at Open Day in June 2022.

A six-page A5 leaflet (Figure 33) was produced to describe the actions of the project but also to list other actions that farmers can take to promote the conservation of the lesser horseshoe bat. This is available in hard copy but also in pdf format to download from both websites (www.mulkeareip.ie; www.vincentwildlife.ie).

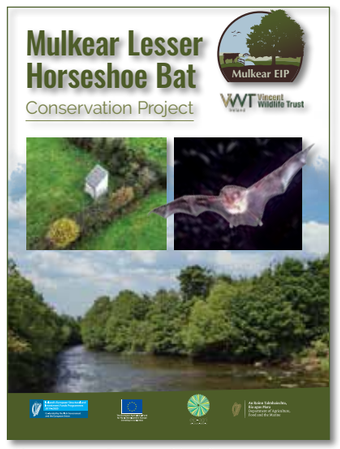
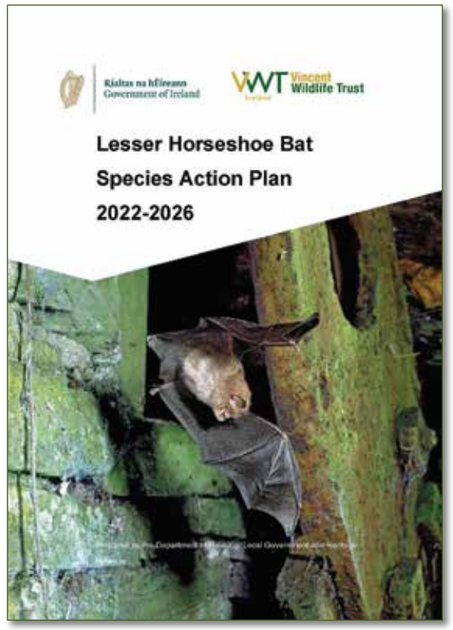


Figure 33 Cover of leaflet.

VWT presented an oral paper about the project at the National Bat Conference in March 2023 and a preview version of the project video was viewed there by Minister Malcolm Noonan, TD, who then formally opened the conference and praised the actions undertake by the project (Figure 34).

Figure 34 Minister Noonan with Kate McAney (VWT) at the Irish Bat Conference in March 2023.

VWT was involved in co-authoring the [7]Lesser Horseshoe Bat Action Plan with NPWS in 2022 and remains a member of the Steering Group responsible for implementing the actions within that plan, which also provides an opportunity to promote the Limerick Project during the lifespan of the action plan.



7 NPWS and VWT (2022) Lesser Horseshoe Bat Species Action Plan 2022-2026. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

8 Closing Evaluation

This project undertook to build ten new roost sites for the lesser horseshoe bat in County Limerick as a way of assisting the small but critically-important horseshoe bat population in the county. Roost construction on this scale on privately owned land had not been attempted before. The completion, therefore, of six new roosts on six farms within 20 months during a period of unprecedented increase in the cost of raw materials is a major achievement.

The enthusiasm shown by the six farmers who participated in this project must be acknowledged. Unlike other agri-environmental projects, where participation brings a direct benefit to the farm enterprise, the aim of this farm-based project was solely to benefit a bat species and required that each participant permanently donate an area of ground to benefit wildlife. Requests for farm visits by the project team were always accepted and accommodated, regardless of the time of day.

The success of this project was also due to the partnership formed between VWT and the Mulkear EIP (LLOC 2065) because each of the partners provided the elements necessary to ensure the completion of the project, such as knowledge of the roosting needs of the lesser horseshoe bat, knowledge of farmers willing to participate, mapping and recording skills, an existing relationship with the Department of Agriculture, Food and the Marine, and financial expertise and oversight. The working relationship between VWT and staff in NPWS and the local authority prior to this project was also key to ensuring the project was able to proceed within the short time frame for its delivery.

It was never envisaged that lesser horseshoe bats would be recorded within the new roosts during the course of this short-term project. However, recording its presence on bat detectors in the project area for the first time (in hedgerows beside three of the locations selected for the new roosts) validates the rationale for choosing this part of the county for this project.

The lesser horseshoe bat is the Irish bat species most dependent on the rural landscape because it requires a well-connected landscape with hedgerows, treelines and vegetated water bodies that are not illuminated by artificial light, as well as access to structures free from human activity, in which to roost and into which it can fly directly. It is currently the only Irish bat species with a conservation status deemed Unfavourable and Inadequate.

It is expected that the species will adopt the new Bat Houses created for it by this project in east Limerick and, along with the educational material and future promotional events associated with this project, prove to be a template for similar projects elsewhere in the species' distribution.

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