

**NPWS**

**Conservation objectives supporting document –  
lesser horseshoe bat (*Rhinolophus hipposideros*)**

Version 1

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**Please note that this document should be read in conjunction with the Site-specific Conservation Objectives documents published by National Parks and Wildlife Service for Special Areas of Conservation for which lesser horseshoe bat (*Rhinolophus hipposideros*) is a Qualifying Interest.**

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## 1. Introduction

### 1.1 Lesser horseshoe bat (*Rhinolophus hipposideros*)

Lesser horseshoe bat (*Rhinolophus hipposideros* Bechstein) (EU Habitats Directive species code 1303) is protected by European legislation through its listing on Annex II and Annex IV of the EU Habitats Directive (Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora). In Ireland, the species is also protected under the Wildlife (Amendment) Act, 2000.

Lesser horseshoe bat is widely distributed through western, central and southern Europe and as far east as Kashmir and through northern Africa to Arabia, Ethiopia and Sudan (Mitchell-Jones *et al.*, 1999). Ireland represents the most northerly and westerly limits of the species' distribution (Roche, 2001) and here it is confined to six west coast counties: Mayo, Galway, Clare, Limerick, Cork and Kerry (McAney, 1994). A single animal has also been recorded in Co. Roscommon in 2004 (B. Keeley, pers. comm.).

Although lesser horseshoe bat has declined in many European countries, Ireland is considered a stronghold for the species (Marnell *et al.*, 2009). Of the nine species of bat known to be established in Ireland, the lesser horseshoe bat is the only member of the Rhinolophidae; the eight other species belong to the Vespertilionidae family. Lesser horseshoe bats differ from the Vespertilionidae bats in that they have a number of folds of skin in the shape of a horseshoe around their nostrils called a noseleaf, with which it projects its echolocation call. Lesser horseshoe bats hang freely by their feet and wrap their wings around their bodies when at rest. They feed close to the ground, gleaning their prey from branches and stones. They often carry their prey to a perch to consume, leaving the remains beneath (Kelleher and Marnell, 2006).

Summer roosting sites are often in the attics of old or derelict buildings. The bats are faithful to a roost site and will return to the same site each year. Hibernation sites are typically caves, souterrains, cellars and icehouses (O'Sullivan, 1994; Kelleher, 2004). In Ireland, the EU Habitats Directive Annex I habitat 'Caves not open to the public' (EU habitat code 8310) is an important habitat for the species, predominantly in winter (see Section 1.2).

Lesser horseshoe bats forage on flying insects predominantly in deciduous woodland and riparian vegetation normally within a couple of kilometres of their roosts (Bontadina *et al.*, 2002; Motte and Libois, 2002). The bats rely on linear landscape features (e.g. treelines, stonewalls and hedgerows) to navigate and commute from roosts to feeding sites and they are reluctant to fly out in the open (Schofield, 2008).

Lesser horseshoe bats are sensitive to disturbance and normally do not occupy the same buildings as humans. Loss of roosting sites due to deterioration or renovation of old buildings, loss of commuting routes linking roosts to foraging sites and unsympathetic management of foraging sites are the major threats to this species (McAney, 1994; McGuire, 1998; Roche, 2001).

In Ireland, the overall conservation status of lesser horseshoe bat is assessed as Favourable. The population is estimated at approximately 14,000 individuals and both short and long term population trends showed slight increases during the last Article 17 reporting period 2007–2012 (NPWS, 2013a). The identified threats are considered manageable and a significant proportion of the

species' summer and winter roosts are protected within the Special Area of Conservation (SAC) network (NPWS, 2013a; see Section 1.3).

## **1.2 Caves not open to the public**

The EU Habitats Directive habitat 'Caves not open to the public' (code 8310) is defined in the Interpretation Manual of EU Habitats (European Commission, 2013) as "Caves not open to the public, including their water bodies and streams, hosting specialised or high endemic species, or that are of paramount importance for the conservation of Annex II species (e.g. bats, amphibians)". There is little evidence that Irish caves support much in the way of specialised troglobite fauna, or highly endemic cave species. However, lesser horseshoe bat occurs in caves in Ireland. Consequently, in practice, this EU habitat is confined in Ireland to caves not open to the public that host important numbers of lesser horseshoe bat (NPWS, 2013b).

Maternity (summer) roosts do not occur in caves in Ireland; however, individual lesser horseshoe bats may turn up in caves at any time of year. From September to November, bats leave summer roosts and go to hibernation roost sites for the winter. These hibernation sites are structures that maintain a constant low temperature throughout the winter, typically caves, but also souterrains, cellars and icehouses (O'Sullivan, 1994).

Lesser horseshoe bats require cool, stable temperatures and minimal disturbance for winter hibernation and suitable caves not open to the public (8310) were selected where available. 16 of the most important caves are protected within nine SACs (see Section 1.3).

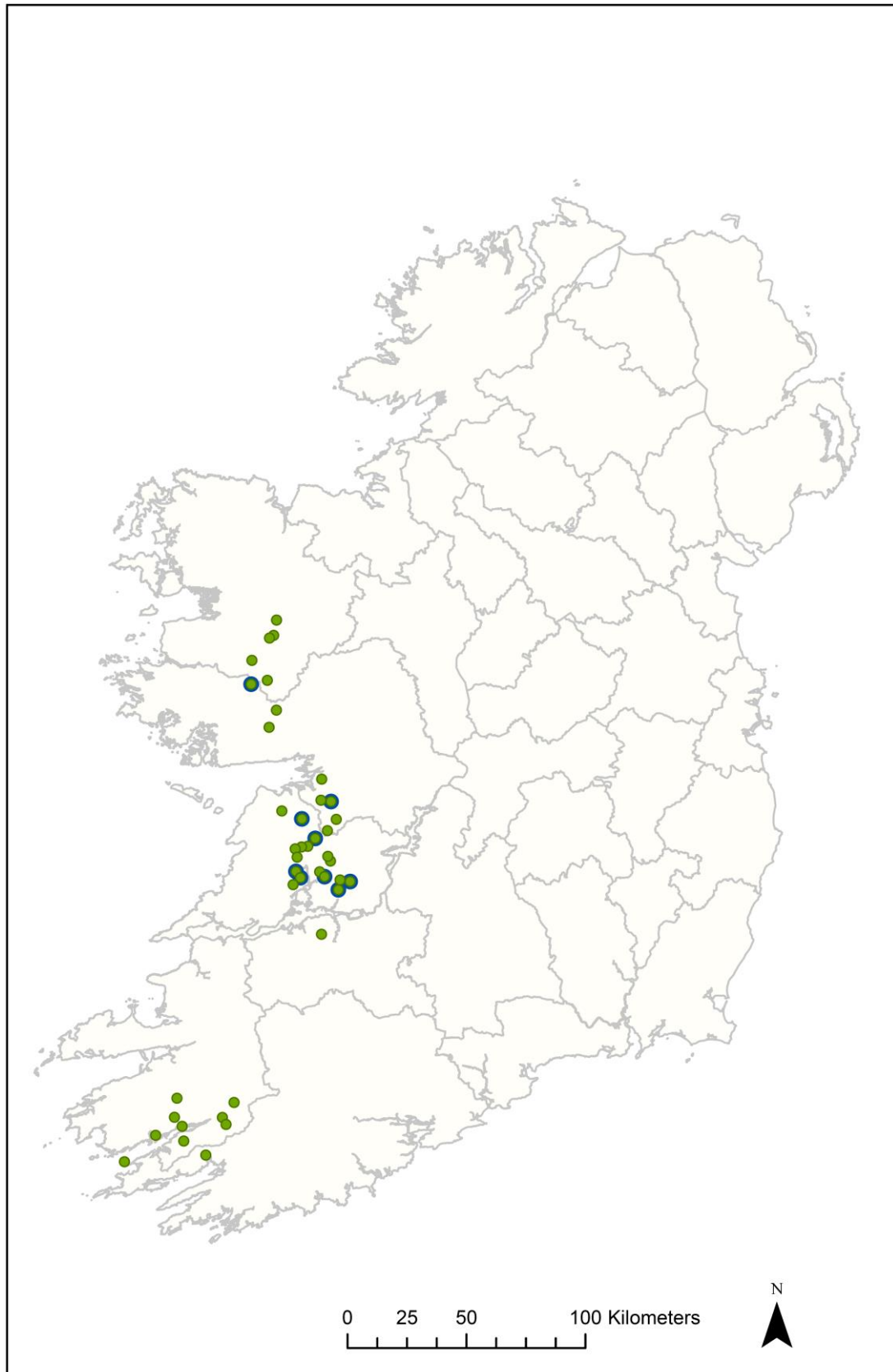
In Ireland, as the overall conservation status of lesser horseshoe bat is Favourable, the overall conservation status of caves not open to the public is also Favourable (NPWS, 2013b).

## **1.3 SACs for lesser horseshoe bat and caves not open to the public**

A total of 41 SACs have been designated for the Annex II species lesser horseshoe bat (1303), of which nine have also been selected for the Annex I habitat 'Caves not open to the public' (8310). The list of SACs is presented in Table 1. The distribution of SACs selected for lesser horseshoe bat in Ireland and the distribution of the nine SACs selected for caves not open to the public, based on the centroids of the SACs, is presented in Figure 1.

**Table 1** Special Areas of Conservation (SACs) selected for lesser horseshoe bat (*Rhinolophus hipposideros*) (EU species code 1303) and for caves not open to the public (EU habitats code 8310)

Site Code	Site Name	3130	8310
000030	Danes Hole, Poulnalecka SAC	3130	8310
000032	Dromore Woods and Loughs SAC	3130	
000037	Pouladatig Cave SAC	3130	8310
000054	Moneen Mountain SAC	3130	
000057	Moyree River System SAC	3130	8310
000064	Poulnagordon Cave (Quin) SAC	3130	8310
000090	Glengarriff Harbour and Woodland SAC	3130	
000174	Curraghchase Woods SAC	3130	
000238	Caherglassaun Turlough SAC	3130	
000286	Kiltartan Cave (Coole) SAC	3130	8310
000297	Lough Corrib SAC	3130	
000299	Lough Cutra SAC	3130	
000353	Old Domestic Building, Dromore Wood SAC	3130	
000364	Kilgarvan Ice House SAC	3130	
000365	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC	3130	
000474	Ballymaglancy Cave, Cong SAC	3130	8310
000527	Moore Hall (Lough Carra) SAC	3130	
000606	Lough Fingall Complex SAC	3130	
001312	Ross Lake and Woods SAC	3130	
001342	Cloonee and Inchiquin Loughs, Uragh Wood SAC	3130	
001774	Lough Carra/Mask Complex SAC	3130	
001926	East Burren Complex SAC	3130	8310
002010	Old Domestic Building (Keevagh) SAC	3130	
002041	Old Domestic Building, Curraglass Wood SAC	3130	
002081	Ballinafad SAC	3130	
002091	Newhall and Edenvale Complex SAC	3130	8310
002098	Old Domestic Building, Askive Wood SAC	3130	
002157	Newgrove House SAC	3130	
002158	Kenmare River SAC	3130	
002173	Blackwater River (Kerry) SAC	3130	
002179	Towerhill House SAC	3130	
002245	Old Farm Buildings, Ballymacrogan SAC	3130	
002246	Ballycullinan, Old Domestic Building SAC	3130	
002247	Toonagh Estate SAC	3130	
002314	Old Domestic Buildings, Rylane SAC	3130	
002315	Glanlough Woods SAC	3130	
002316	Ratty River Cave SAC	3130	8310
002317	Cregg House Stables, Crusheen SAC	3130	
002318	Knockanira House SAC	3130	
002319	Kilkishen House SAC	3130	
002320	Kildun Souterrain SAC	3130	



**Figure 1** The distribution of the 41 Special Areas of Conservation (SACs) selected for lesser horseshoe bat (*Rhinolophus hipposideros*) (EU species code 1303) and the nine SACs selected for caves not open to the public (EU habitat code 8130) in Ireland. Based on the centroids of the SACs designated for lesser horseshoe bat (green dots) and caves not open to the public (blue circles).

## **2 Conservation objectives**

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the Habitats Directive 92/43/EEC (European Commission, 2013). It is defined in positive terms such that a habitat type or species must be prospering and have good prospects of continuing to do so.

A site-specific conservation objective aims to define the favourable conservation condition of a habitat or species at site level. The maintenance of habitats and species within sites at favourable condition will contribute to the maintenance of favourable conservation status of those habitats and species at a national level.

Conservation objectives for species are defined using attributes and targets that are based on parameters as set out in the Habitats Directive for defining favourable status, namely population, range, and habitat for the species.

This conservation objectives supporting document explains and provides context for the attributes and targets set for lesser horseshoe bat.

Conservation objectives for habitats are defined using attributes and targets that are based on parameters as set out in the Habitats Directive for defining favourable status, namely area, range, and structure and functions.

As the habitat 'Caves not open to the public' (8310) is integrally linked to lesser horseshoe bat as part of the habitat for the species, separate conservation objectives have not been set for the habitat. However, further research is required to determine the aspects of cave structure and functions (e.g. size, air flows, light, humidity, temperature regimes and hydrology) which are critical for bat utilisation (NPWS, 2013b).

Note that the attributes and targets for lesser horseshoe bat outlined below may change/become more refined as further information becomes available.

## **3. Population**

### **3.1 Population per roost**

The measure used for this attribute is: Number of individual bats.

Each particular SAC was selected for lesser horseshoe bat because of the presence of one or more "Qualifying roosts". The minimum qualifying standard (MQS) for an SAC roost was set as 100 bats for a summer roost and 50 bats for a winter roost. This initial figure was considered, on the basis of expert opinion, to reflect roosts of international importance. Some roosts with slightly lower numbers were also considered to be internationally important (with consequent SAC designation) because of their strategic location at the edge of the lesser horseshoe bat's national range.

The number of bats varies greatly from roost to roost depending on numerous factors such as roost suitability, habitat availability in the area, landscape connectivity, etc. Numbers may also vary from

year to year at a roost due to disturbance, weather and other factors. NPWS conducts annual counts at each qualifying roost. Counts are carried out in winter sites from January 1<sup>st</sup> to February 28<sup>th</sup> and in summer sites from May 23<sup>rd</sup> to July 7<sup>th</sup>. The target number of individual bats for a roost is set as the mean over the five most recent years of available count data, but with the highest count and the lowest count removed. Just one count is taken for any given season, i.e. the highest available within the monitoring date range ( $\pm 1$  week). This qualified mean is therefore considered a roost-specific reflection of bat numbers. A total combined count is used for any roosts that are considered paired or linked (i.e. the same bats move between them between years).

The target for population per roost is the qualified mean number of bats, except in certain instances:

- In some cases, the minimum qualifying standard (MQS) target has not been achieved during recent counts, i.e. the qualified mean is less than the MQS, in which case the target for the particular SAC is set to 50 bats for a winter roost site and 100 bats for a summer roost site.
- In other cases, the target may be set to a number other than the qualified mean or the MQS because of factors that pertain to that particular SAC.

## **4. Habitat for the species**

### **4.1 Winter roosts**

The measure used for this attribute is: Condition

Condition in this instance refers to the suitability of a winter roost site to host lesser horseshoe bats in numbers at or exceeding the MQS. It comprises a number of elements, any of which may interact, and which include locational context, landscape connectivity, structural integrity, microclimate, levels of artificial light at night, level of disturbance by humans or predators and risk of catastrophic events, such as flooding (Ransome, 1990; Altringham, 1996; Schofield, 2008; Stone *et al.*, 2012; McAney *et al.*, 2013; Reiter *et al.*, 2013; Stone, 2013; Roche *et al.*, 2015).

Suitable sites in winter generally witness low levels of disturbance and have high humidity and stable temperatures. These conditions are typically met in underground structures such as souterrains, cellars, tunnels, ice houses and natural caves (including those selected as habitat 8130 'Caves not open to the public'). Hibernacula may be abandoned or numbers of bats using the site may decline in circumstances when there is a decline in condition. Examples of decline in condition may include, but are not limited to:

- increased use of an underground site by humans (i.e. increased disturbance)
- cave or tunnel closure
- loss of structural integrity (e.g. roof collapse in a souterrain)
- flooding in a cave system causing entrapment and/or drowning of bats

The target is that there is no decline in the condition of winter roosts.



## 4.2 Summer roosts

The measure used for this attribute is: Condition

Condition in this instance refers to the suitability of a summer roost site to host lesser horseshoe bats in numbers at or exceeding the MQS. It comprises a number of elements, any of which may interact, and which include landscape connectivity, structural integrity, microclimate, levels of artificial light at night, level of disturbance by humans or predators and risk of catastrophic events, such as storm damage (Ransome, 1990; Altringham, 1996; Schofield, 2008; Stone *et al.*, 2012; McAney *et al.*, 2013; Reiter *et al.*, 2013; Stone, 2013; Roche *et al.*, 2015).

Suitable sites in summer generally witness low levels of disturbance, have appropriate access points for lesser horseshoe bats and achieve the microclimatic conditions required for raising young. These conditions are typically met in buildings, for example stables, abandoned cottages and farm buildings, attics of large houses, large chimneys of ruined buildings, modern boiler houses, sheds and garages. Summer roosts may be abandoned or numbers using the site may decline in circumstances when there is a decline in condition. Examples of decline in condition may include, but are not limited to:

- increased use of a site by humans (i.e. increased disturbance)
- loss of structural integrity (e.g. roof deterioration)
- closure of the lesser horseshoe bat access point(s)
- predator disturbance (e.g. domestic cat, pine marten)
- reroofing or redevelopment of the site

The target is that there is no decline in the condition of summer roosts.

## 4.3 Auxiliary roosts

The measure used for this attribute is: Number and condition

Lesser horseshoe bat populations will use a variety of roosts during the year besides the main roosts listed above. Lesser horseshoe bats rely on a network of sites that may include satellite, transitional and night roosts along with summer and winter roost sites, to fulfil their lifecycle requirements within a locality. Transitional roosts may be used after hibernation but prior to occupation of the maternity roost. Alternative day roosts used by a colony are known as satellite roosts; these are typically used by individuals or small clusters (Schofield, 2008). Night roosts are often situated in home core range areas and are used by the bats to minimise commuting distances between foraging bouts. Availability of night roosts within and close to key foraging areas ensures that these remain suitable for lesser horseshoe bats (Knight and Jones, 2009). In addition, males may set up mating roosts in autumn and attract females to their territory (Schofield, 2008). While the largest number of individuals may be found in the summer roost and winter roost sites, a full complement of varied roosting structures is required to maintain populations and facilitate successful reproduction.

Condition in this instance refers to the suitability of an auxiliary roost site to host lesser horseshoe bats. It comprises a number of elements including locational context, structural integrity,

microclimate, levels of artificial light at night (ALAN), level of disturbance by humans or predators and risk of catastrophic events.

The target is that there is no decline in the number and condition of auxiliary roosts.

#### **4.4 Extent of potential foraging habitat**

The measure used for this attribute is: Hectares

Lesser horseshoe bats tend to forage in summer in broadleaved woodland and around riparian vegetation (Bontadina *et al.*, 2002; Biggane, 2003). In 2016, the Bat Conservation Trust (BCT) carried out a review of literature pertaining to mean and maximum bat foraging distances (BCT, 2016). In their review, a Core Sustainance Zone (CSZ) refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost. For the BCT review, lesser horseshoe bat data was available from 83 radio-tracked individuals from four separate studies. The weighted average maximum foraging distance for lesser horseshoe bats was 2.02km. The BCT noted that for Annex II species there is justification for increasing the CSZ to reflect use of the landscape by all bats in a population. Some researchers have found that lesser horseshoe bats normally forage in woodlands/scrub within 2.5km of their roosts (Bontadina *et al.*, 2002); thus, for each roost, a 2.5km zone is considered an appropriate distance to foraging areas for the purpose of the current SSCO targets. The 2.5km zone around each known roost is mapped and potential foraging grounds within the zone are identified and mapped for each SAC using the Forestry Inventory and Planning System (FIPS) (2007/2012) spatial dataset.

The target is that there is no significant decline in potential foraging habitat within 2.5km of qualifying roosts.

#### **4.5 Linear features**

The measure used for this attribute is: Kilometres

This species follows commuting routes from its roost to its foraging grounds. Lesser horseshoe bats will rarely cross open ground and are particularly averse to doing so unless it is very dark (e.g. Schofield, 2008). Consequently, in order to link roosting and foraging sites, linear features such as hedgerows, treelines and stone walls provide vital connectivity for this species, most importantly within 2.5km around each roost (Schofield, 2008). Linear features such as tree lines are also sometimes used for foraging by lesser horseshoe bats (Bontadina *et al.*, 2002).

The target is that there is no significant loss of linear features within 2.5km of qualifying roosts.

## 4.6 Light pollution

The measure used for this attribute is: Lux

Lesser horseshoe bats are very sensitive to light pollution and will avoid brightly lit areas. Artificial light at night at or near roosts may impact bats in a number of ways, for example, delaying emergence time after dusk, causing abandonment of roosts when exits are lit at night and/or reducing reproductive success (e.g. Stone, 2013). Lesser horseshoe bats have been found to avoid commuting along routes lit with artificial light at levels as low as 3.7 lux emanating from energy efficient LED lights (Stone *et al.*, 2012). Other lamp types producing light at similar levels have also been found to prevent commuting (Stone *et al.*, 2009). Foraging areas that become lit at night may be abandoned, thus potentially increasing energetic costs for bats and reducing reproductive success at a population level (Schofield, 2008; Stone, 2013).

The target is that there is no significant increase in artificial light intensity adjacent to qualifying roosts or along commuting routes within 2.5km of those roosts.

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