Threat Response Plan

Vesper bats

2009 - 2011

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government

This document should be cited as:

NPWS (2009) Threat Response Plan: Vesper bats (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

Published by National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, 7 Ely Place, Dublin.

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Summary

This plan is prepared as part of Ireland's response to the judgement of the European Court of Justice in case C-183/05, and the requirement to establish a system of strict protection for bats, as species listed in Annex IV(a) of the Habitats Directive.

All bats are strictly protected in Ireland and a person who deliberately captures, kills or disturbs a specimen in the wild, or who damages or destroys a breeding site or resting place of such an animal, is guilty of an offence.

All nine vesper bat species are considered to be in favourable conservation status in Ireland and a number of significant steps have been take in recent years to secure the long term future of bats here:

- A comprehensive monitoring programme for Irish bats has been developed. Three separate schemes are now run on an annual basis and robust data is being collected for five species.
- A new centre of excellence for bat research in Ireland has been established. This centre, manned by a team of dedicated bat researchers, is investigating the feeding ecology and population biology of our three woodland species.
- An extensive national distribution survey for all bats has been initiated. Data from this will inform planning and development as well as conservation management policy.
- A programme of education and information aimed at planning authorities, state bodies and agencies and the general public is underway.
- Guidance documents have been published by NPWS, by the National Roads Authority and by UNEP/EUROBATS.
- Environmental schemes in both forestry and agriculture are providing incentives to landowners to manage land to the benefit of bats.

Despite this progress, Irish bats continue to face significant threats. In particular, roost loss and disturbance, unsympathetic management of foraging and commuting habitats, water pollution, and windfarms have been identified as significant concerns. While measures are already in place to address aspects of these threats, further action is required in certain areas. This three year plan sets out those actions, identifies who is responsible for implementing them and provides a time frame for delivery. Continuation of the current monitoring and education programmes, together with implementation of the additional actions identified in this document, should ensure the long term favourable conservation status of bats in Ireland.

1. Introduction

This three year plan supersedes the bat species action plan published by NPWS in April 2008. It is prepared as part of Ireland's response to the judgement of the European Court of Justice in case C-183/05, concerning *inter alia* Article 12 of the EU Habitats Directive 92/43/EEC and the requirement to establish a system of strict protection for the animal species listed in Annex IV(a) of the Directive. All ten species of Irish bat are listed in Annex IV(a), however the lesser horseshoe bat was not included in the court judgement and consequently this plan concentrates on the remaining nine species. All nine belong to the Vespertilionidae family and they are commonly referred to as vesper bats.

Article 12 of the Habitats Directive reads as follows:

> *1. Member States shall take the requisite measures to establish a system of strict protection for the animal species listed in Annex IV (a) in their natural range, prohibiting:*
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> > *(a) all forms of deliberate capture or killing of specimens of these species in the wild;*
> > *(b) deliberate disturbance of these species, particularly during the period of breeding, rearing, hibernation and migration;*
> > *(c) deliberate destruction or taking of eggs from the wild;*
> > *(d) deterioration or destruction of breeding sites or resting places.*
>
> *2. For these species, Member States shall prohibit the keeping, transport and sale or exchange, and offering for sale or exchange, of specimens taken from the wild, except for those taken legally before this Directive is implemented.*
> *3. The prohibition referred to in paragraph 1 (a) and (b) and paragraph 2 shall apply to all stages of life of the animals to which this Article applies.*
> *4. Member States shall establish a system to monitor the incidential capture and killing of the animal species listed in Annex IV (a). In the light of the information gathered, Member States shall take further research or conservation measures as required to ensure that incidental capture and killing does not have a significant negative impact on the species concerned.*

1.1 Overview of the species

There are currently nine vesper bats known in Ireland: common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), Nathusius pipistrelle (*P. nathusii*), Leisler's bat (*Nyctalus leisleri*), Daubenton's bat (*Myotis daubentoni*), Natterer's bat (*M. nattereri*), Brandt's bat *(M. brandtii*), whiskered bat (*M. mystacinus*) and brown long-eared bat (*Plecotus auritus*). All these bats lack the complex nose-leaf that characterises the horseshoe bats, of which Ireland has one species, the lesser horseshoe *Rhinolophus hipposideros.* All the vespertilionid bats are widely distributed throughout the country. Although

maternity roosts of Nathusius' pipistrelle have so far only been confirmed in Northern Ireland, it is expected that these will be found in due course in the Republic, because its distinctive echolocation call has been recorded in several locations (McAney pers. comm.). It has now been confirmed that Brandt's bat occurs in Ireland, on the basis of recent identifications that have been made of hand-held specimens and DNA samples taken from bats caught in Wicklow and Kerry (E. Mullen and C. Kelleher pers. comm.).

All nine vesper bat species are considered to be in favourable conservation status in Ireland (NPWS 2008).

The descriptions of the common and soprano pipistrelles below have been merged, as much of the Irish data refer to the time before these bats were known to be separate species. Brandt's bat and whiskered bat are considered to be cryptic species, very difficult to distinguish in the field. As the former has only recently been identified in Ireland and some older records of whiskered bats are thought likely to refer to Brandt's, these two species are discussed together.

Note on range
NPWS organised a two day meeting of Irish chiroptera specialists in October 2006 to discuss the conservation assessments for the ten Irish bat species. It was recognised at that meeting that while the distribution data held for most species was indicative of their national range, in all cases the species were more widespread than was apparent from the available data. Where it was clear that the data held by BCI was particularly inadequate, records from O'Sullivan (1994) were used as well. For most species the distribution / range maps (NPWS 2008) is presented at the 20km grid level. Where distribution data is particularly scarce, the 50km grid is used.

2. Common pipistrelle *Pipistrellus pipistrellus* (Schreber, 1774) & Soprano pipistrelle *Pipistrellus pygmaeus* (Leach, 1825)

2.1 Introduction

There are three resident pipistrelle species in Ireland. The relatively recent discovery that the species formerly known as the pipistrelle (*Pipistrellus pipistrellus*) was in fact two separate but cryptic species, the common pipistrelle and the soprano pipistrelle (*P. pygmaeus),* has been well documented (Barratt *et al.*, 1997; Barratt & Jones, 1999). Nathusius' pipistrelle (*P. nathusii*) is a relatively new arrival in Ireland (Russ *et al.*, 2001) and is dealt with separately below.

2.2 Range

Previous distribution maps refer to pipistrelle rather than common and soprano pipistrelles (e.g. Mitchell-Jones 1999; Hayden & Harrington 2000). These bats occur sympatrically across much of Europe, although the common pipistrelle is more frequent at central latitudes while the soprano pipistrelle is reported to be associated more with Scandinavia and countries bordering the Mediterranean (Barratt *et al.*, 1997). Russ (1999) found that the common pipistrelle was the most abundant and widespread species in Northern Ireland, and although the soprano pipistrelle is both common and widespread, it was less regularly recorded than the common pipistrelle. Data from the Irish, car-based monitoring scheme show both species to be widespread throughout the country, although the common pipistrelle is more common in the east and the soprano appears to be more abundant in the west (Roche *et al*. 2007) (NPWS 2008).

2.3 Population

O'Sullivan (1994) found 584 pipistrelle bat roosts during the National Bat Survey, the highest number for any species, and described it as the most abundant in Ireland and widely distributed. We now know that two separate species were being recorded. Nonetheless, from 2003 – 2005 in the car-based monitoring scheme, the common and soprano pipistrelles were the commonest and second commonest encountered species respectively (Roche *et al.*, 2007). Encounter rates vary between years and it is not possible to derive poulation estimates frrom this data. However, it has been calculated that, over an 10-year period, sufficient data should be accumulated to enable the detection of reliable population trends for both species.

2.4 Habitat

Roosting habitat

Summer roosts of soprano and common pipistrelles are normally in buildings. McGuire (1998) found 21 roosts of pipistrelle bats during a survey for lesser horseshoe bats in Co. Clare; 12 were located in dwelling houses, two in churches and the remainder in unoccupied structures such as sheds and garages. Roche (2001), in a similar search for lesser horseshoe roosts in Co. Limerick, found 11 pipistrelle roosts in primarily old, disused dwellings or large mansions. She comments that this is in contrast to the view that these bats prefer modern, well insulated or heated structures. In the UK, the average age of pipistrelle roosts has been estimated at 15.4 years (Wardhaugh, 1992). The Northern Ireland Bat Group has recorded 480 pipistrelle bat roosts (most not identified to either the soprano or common pipistrelle), all of which were located in buildings, the great majority in the eaves or the roof space (Allen *et al.*, 2000).

The National Bat Survey was undertaken before the separation of the species and the figure of 584 roosts must represent a mix of sites for both, although as many of the roosts found were large, it is possible that a large percentage were soprano pipistrelle roosts. In a survey of 100 houses by Bat Conservation Group Dublin (1999), the common pipistrelle was only the fourth commonest species encountered, present in only seven houses and in very small numbers, but the soprano pipistrelle was the most commonly encountered bat, present in 54 houses.

O'Sullivan (1994) describes pipistrelle summer roosts in very confined spaces, such as behind window sashes, under tiles and weather-boards, behind fascia and soffits, and within the cavities of flat roofs. Roche (1998) surveyed 42 churches in Cos. Laois, Kildare, Wicklow, Dublin, Westmeath, Meath and Louth, 27% of which had pipistrelle bats present, none identified as common pipistrelle. The bats were found in a variety of situations, in vestry and nave attics, crevices inside the nave and a small belfry. She also found two more pipistrelle roosts in other types of buildings, in the wall cavities and attic space of a rectory and under the flat roof of a pump house. Pipistrelles were the most abundant species recorded from churches in the UK National Bats in Churches Survey (Sargent, 1995).

Feyerabend & Simon (2000) reported frequent roost switching by a common pipistrelle colony during the course of two summers in Germany, with eight different roosts being used. As householders often describe the presence of small numbers of small bats for short periods of time during the summer in Ireland, it is possible that this species also exhibits roost switching here (K. McAney, pers. obs.).

There are a few records of pipistrelle bats (species not identified) roosting under bridges. Smiddy (1991) found up to two bats under three bridges during his systematic search of 364 bridges in mid and east Co. Cork and west Co. Waterford. Shiel (1999) found only one pipistrelle under a bridge during her study in Cos. Leitrim and Sligo, although both the soprano and common pipistrelles were recorded regularly foraging over water during emergence watches conducted at bridges.

Pipistrelle bats (species not always identified) were amongst the first bats, along with brown long-eareds, to begin roosting in Schwegler bat boxes erected in two woodlands in Co. Galway in March 1999 (K. McAney, pers. obs.). Pipistrelle bats were present by May 1999 and have been recorded during 63 out of 68 visits that have been made since. The bats roost singly and in groups, the latter varying in size from two to three to approximately 25.

Common pipistrelles appear to form smaller summer colonies within buildings than soprano pipistrelles. Barlow & Jones (1999) found a median colony size of 76 (n = 33 roosts) for the common pipistrelle compared to 203 (n = 40 roosts) for the soprano pipistrelle; roosts of >1000 individuals are known for this species (McAney 2006).

Little is known about where pipistrelle species hibernate. None were recorded during intensive winter surveys of a variety of underground sites along the west coast of Ireland (McAney, 1994 & 1997). It is assumed that pipistrelles hibernate in buildings and trees. The only reported hibernation record for Ireland is of several bats discovered in the crevices of a small stone building in the grounds of Connemara National Park in January 1996 (G.O'Donnell, pers. comm.). It is possible that small numbers hibernate in underground sites but go unnoticed as they squeeze into tight spaces. A small group of pipistrelle bats was discovered in a crevice of a pillar of rock in a disused limestone mine in Scotland in March 1994 and again in March 1995 (Herman & Smith, 1995). However, of the 3077 bats trapped swarming at underground sites in autumn in the UK, only 16 were identified as soprano or common pipistrelles (Parsons, *et al*., 2003).

Foraging habitat

Two studies have been undertaken on the diet of pipistrelle bats in Ireland (species not identified) and both point to an aerial hunting strategy of insects associated with aquatic or damp habitats. Sullivan *et al*. (1993) analysed 160 droppings from a roost in a house near the River Slaney and found 46% of the diet comprised insects associated with aquatic habitats (30% midges, 16% caddis flies), with other flies making up 36% of the remainder of the diet. Guillot (2003) analysed 202 droppings collected from Schwegler bat boxes during the summer months in 1999 and 2000 in three woodlands in Co. Galway: Knockma Wood (without a water body nearby), Portumna Wood (on the shores of Lough Derg) and Coole/Garryland Wood (an area with turloughs). She found that thread-horned flies comprised 85.5%, 82% and 60% of the diet in each of the woods respectively. Window midges were the most frequently taken thread-horned flies in Knockma Wood, followed by midges, whereas the opposite case pertained in Portumna Wood, but window midges, craneflies and midges, were almost equally represented in the droppings from Coole/Garryland. Much of the remainder of the diet in Coole/Garryland was made up of caddis flies, beetles, the wasp-waisted insects and harvestmen. Shiel (1999) observed both the soprano and common pipistrelles regularly foraging over water during emergence watches conducted at bridges.

In the UK, Oakley & Jones (1998) found that there was significantly more water (especially that with woodland or hedgerow on banks), and continuous hedgerow with trees within 2 km of maternity roosts of the soprano pipistrelle than expected by chance. This supports the results of diet studies showing the importance of aquatic insects to this species.

Russ (1999) reports that the common pipistrelle is very general in its habitat preference, foraging in woodland/riparian/parkland, along linear features in farmland, and in towns and cities. Similarly, Barlow (1997) studied the diet of the two species and found a greater range of prey in the droppings of the common pipistrelle (non-biting midges, biting midges and dung flies) than those of the soprano pipistrelle (non-biting midges). Russ & Montgomery (2003) studied the seasonal pattern in activity and habitat use of common and soprano pipistrelles in general in Northern Ireland from April to October 1998 using a car-driven transect. They found that there was significant variation in habitat use by the pipistrelles, with more bats found along roads with tree lines, cut hedges and deciduous woodlands. In the UK, Davidson-Watts & Jones (2006) radio-tracked both species to investigate whether there were any differences in foraging behaviour between them during summer. Their results suggest that the common pipistrelle makes more flights to a greater number of foraging locations than the soprano pipistrelle, and that these locations are closer to the day roosts. In contrast, the soprano pipistrelle spends less time flying, makes fewer foraging trips but travels farther, suggesting that it is selecting specific foraging habitats.

2.5 Future prospects

Both of these species are widespread and common in Ireland and they are adaptable in their use of roosting and foraging habitat. Their future prospects are considered good. However, their habit of roosting in domestic dwellings continues to lead to conflict. Public education about bats needs to continue. Furthermore, practical advise and assistance, together with a fall-back system for exclusion where all else fails, need to be made available to homeowners.

3. Nathusius' pipistrelle *Pipistrellus nathusii* (Keyserling & Blasius, 1839)

3.1 Introduction

The Nathusius' pipistrelle is one of three resident pipistrelle species in Ireland. Nathusius' pipistrelle is recognised as a resident bat species in Ireland following the discovery in 1997 of a maternity colony of 150 bats in Co. Antrim, Northern Ireland (Russ *et al.*, 1998). Up to then it was described as a migrant species in the British Isles based on a number of autumn and spring records during the 1980s and 1990s (Russ *et al.*, 2001). The first bat detector record in Northern Ireland was made in Derry in August 1996, with detector

records from Dublin in July 1997 and from Co. Laois in August 1998, (Russ *et al.*, 2001). Fairley (2001) describes how L. Rendle & A. Ross identified the first live specimen in Belfast in September 1996. He also makes a strong case for Nathusius' pipistrelle being a recent arrival in Ireland, as opposed to it having been previously overlooked. A website has been set up to aid the identification of this species in Britain and Ireland and to collect records (www.nathusius.org.uk).

3.2 Range

This species is widely distributed throughout Europe, where it is highly migratory, with most migrations in a NE-SW direction as bats leave areas with severe winters in the autumn, returning in spring to rear young. Little can be said as yet about this species' distribution in the Republic of Ireland, but there are bat detector records from Cos. Wicklow, Cavan, Longford and Tipperary (McAney 2006.), Westmeath (Roche, 1998), Dublin and Laois (Russ *et al.*, 2001), and Kerry (Kelleher, 2005). The species was detected during the car-based bat monitoring programme for the first time in 2005 from an area covering parts of Cos. Louth and Monaghan. In 2006 it was recorded from 8 survey squares including 2 in the south-west of the country (Roche *et al.* 2007) suggesting that this species is spreading rapidly south and west across Ireland (NPWS 2008).

3.3 Population

Although no breeding sites have yet been discovered for this species in the Republic of Ireland, some are known from Northern Ireland. It seems likely that a resident population is being supplemented by seasonal migrants. If records of the species continue to be collected at increasing frequencies in the car-based monitoring scheme then it will become possible to conduct statistical analyses on population trends over the coming years.

3.4 Habitat

Roosting habitat

In Europe Nathusius' pipistrelle uses hollow trees, bat and bird boxes, wooden churches and buildings during summer and crevices in cliffs, hollow trees and buildings in winter. In Northern Ireland it was found roosting in a mid-19th century farm stable block and storehouses that had undergone extensive renovation. The bats were using crevices in stone and brickwork, as opposed to roof spaces. The property was situated 50 m from a river.

Foraging habitat

Dietary analysis has yet to be conducted in Ireland for this species. Vaughan (1997) reports that it feeds on insects associated with water, such as non-biting midges. Russ (1999) describes it as feeding along rides, paths, woodland edge

(both deciduous and conifer), meadows, and water, but avoiding built up areas, such as towns, in contrast to the common and soprano pipistrelles.

3.5 Future prospects

This species is expanding across Ireland, perhaps as a result of population expansion in other parts of its range, although the reasons for this are unclear. It appears to have found a niche in Ireland and its prospects are considered to be good, but more research is required to establish its roosting and foraging requirements here.

4. Whiskered bat *Myotis mystacinus* (Kuhl, 1817) & Brandt's bat *Myotis brandtii* (Eversmann, 1845)

4.1 Introduction

The whiskered bat is one of four *Myotis* species found in Ireland. It has bristles on the lips, chin and forehead, which give it its name. It was classified as a threatened species in the *Irish Red Data Book 2: Vertebrates* (Whilde, 1993) based on the lack of records and the small numbers of bats known at that time. This situation has generally remained unchanged. The whiskered bat was separated from Brandt's bat in 1970 (Baggoe, 1973) and these two species have been described as cryptic, but a recent genetic study revealed that they had different evolutionary histories and are more closely related to other *Myotis* species than to each other (Ruedi & Mayer, 2001). Nonetheless, they are very difficult to tell appart in the field and because historical records never distinguished then they are taken here together.

Brandt's bat is the most recently discovered bat species in Ireland, with records of single animals in 2003 from Co. Wicklow and from Co. Meath and three female bats from Co. Clare in 2004 (McAney 2006). The most recent discovery was of a nulliparous adult female trapped in Killarney National Park in August 2005 during an international bat fieldcraft workshop (Kelleher, 2005). Brandt's bat holds the longevity record for a free-living mammal, with a 41 year-old male recorded in Siberia (Podlutsky *et al.*, 2005).

4.2 Range

Although the whiskered bat is widely distributed throughout Ireland, there are relatively few records. It occurs throughout Europe, but is absent from northern Scotland and most of Denmark. Worldwide it is found in Korea, Japan, the western Himalayas and southern China (Mitchell-Jones *et al*., 1999).

Brandt's bat has been recorded from Cos. Wicklow, Meath, Clare and Kerry. It occurs throughout northern and central Europe, is absent from south-western

France, Spain and Portugal and the distribution extends to Korea and Japan (Mitchell-Jones *et al*., 1999) (NPWS 2008).

4.3 Population

The whiskered bat is described as rare in southern Europe and Ireland (Mitchell-Jones *et al*., 1999). Whilde (1993) considered it to be the rarest bat in Ireland. O'Sullivan (1994) reported only 34 roosts during the National Bat Survey, with 22 having less than five bats though he did comment that it was the only species found roosting regularly with other species and hence may be overlooked. N. Roche (pers. comm.) states that the Car-based Bat Monitoring Programme cannot monitor this species, primarily because its echolocation calls are more quickly attenuated compared to those of pipistrelles and Leisler's bats. A few individuals were caught during mist netting studies near Lough Corrib in June 1997 and in Portumna Wood in 1998 (K. McAney, pers. obs.) and five were caught in Killarney National Park during a bat detector workshop in August 2005 (Kelleher, 2005). Nothing can yet be said about the population size of Brandt's. A new Centre for Irish Bat Research (CIBR) was established in 2008 with the express aim of investigating the population ecology of these two species (together with *M. nattereri*).

4.4 Habitat

Roosting habitat

Whiskered bats are found in houses during the summer, roosting in small numbers in the roof space, often between the rafters and felt or in narrow slits where timbers meet, where they are difficult to observe (O'Sullivan 1994). All eight known roost sites in Northern Ireland were in the roof spaces of dwellings, five in houses dating from the late 18th to 19th centuries (Allen *et al*., 2000). Buckley (2005) studied a maternity colony of 45 whiskered bats from July to October 2004. The roost was located in a 100-year old house and the bats roosted in the attic, between the eaves and the chimney column. The roost was only discovered in June 2004, so no information was available on when the bats took up residence, but they abandoned the building in October 2004. Emergence was observed on seven nights, giving a mean emergence time of 34.7 minutes after sunset.

Smiddy (1991) found two female and one male whiskered bats roosting under bridges during a survey in mid and east Co. Cork during 1988 and 1989. One of the females was heavily infested with a flea species new to Ireland and this may have accounted for her being found roosting in the open as opposed to tucked away in a crevice. Shiel (1999) found three whiskered bats in crevices of three different masonry arch bridges in Co. Leitrim in September, October and November 1998.

Four of the five Irish Brandt's records have been in houses. Summer roosts are nearly always in buildings, but it is also found in bird and bat boxes (Mitchell-Jones *et al*., 1999). One female whiskered/Brandt's bat was found in a Schwegler bat box in Garryland Nature Reserve in May 2000 (K. McAney, pers. obs.). Only nine maternity colonies of whiskered/Brandt's bats are known in England (McAney, 2006).

Whiskered bats hibernate in a range of underground sites in winter. One was found hibernating in a cave in Co. Galway in 1994 (McAney, 1994) and another in a cave in Co. Kilkenny in 1997 (McAney, 1997). Whiskered and Brandt's bats were the third and fourth commonest species respectively recorded swarming in late summer and autumn at underground sites in the UK, yet only small numbers of either species are ever seen hibernating at these same sites (Parsons, *et al*., 2003).

Foraging habitat

Nothing is currently known about the diet of either species in Ireland, as no faecal analysis has been undertaken. In a study of the diet of whiskered and Brandt's bats from southern England, while there were many prey in common, there were significant differences in the percentages of prey items eaten by two species, with window midges comprising 30% of the diet of the whiskered bats, but only 15% of Brandt's (McAney, 2006).

Due to the difficulty in distinguishing *Myotis* species in the field, little is known about the flight or foraging behaviour. However, Buckley (2005) used a bat detector set to 45kHz to pick up the echolocation calls of this and other species along a transect through a variety of habitats in a 2 km square adjacent to a known whiskered bat maternity roost over 10 nights between July and September 2004. He found that 12.7% of the bat passes recorded were from whiskered bats, and that this species used a narrow range of habitats, with tree lines, the centres of broadleaf woods, mixed woodland edges and rivers the most important. The bats avoided conifer woodlands, intensively managed grasslands and lakes. L. Berge (cited in McAney, 2006) radio tracked a number of whiskered bats in southern England and found they foraged in different types of grassland (improved, semi-improved and semi-natural) surrounded by hedgerows. These areas were often used as horse or cattle pastures. Russ (1999) describes whiskered bat habitat as parkland, meadows, flowing water, woodland and gardens.

L. Berge (cited in McAney, 2006) radio-tracked a number of Brandt's bats in southern England and found they foraged in woodland and along woodland edge, often in close proximity to water.

4.5 Future prospects

There is limited data on the range and population of these two species in Ireland. Further research into their ecology is also required. Nonetheless, the area of their main foraging habitat – woodland – is increasing across Ireland and their future prospects are considered good.

5. Natterer's bat *Myotis nattereri* (Kuhl, 1817)

5.1 Introduction

Natterer's bat is one of four *Myotis* bat species to occur in Ireland. It was classified as a threatened species in the *Irish Red Data Book 2: Vertebrates* (Whilde, 1993) based on the lack of records and the small numbers of bats found at that time. A new Centre for Irish Bat Research (CIBR) was established in 2008 with the express aim of investigating the population ecology of this species (together with *M. brandti* and *M. mystacinus*).

5.2 Range

Although this species is widely distributed throughout Ireland, it is one of the least recorded bat species. It occurs throughout Europe and worldwide it is found in the Urals, the Near East, Turkmenia and north western Africa (Mitchell-Jones *et al.*, 1999) (NPWS 2008).

5.3 Population

O'Sullivan (1994) found only 44 roosts during the National Bat Survey, with 20 containing single bats, and only seven with more than 50 bats. A number of authors have reported the difficulty in making accurate counts when it emerges from a roost site, primarily because it leaves relatively late after sunset and also because it can make return flights back into the roost or fly repeatedly outside, making it difficult to establish actual numbers leaving (Haddow, 1995; Ahlen *et al*., 2000). Four males were caught in Killarney National Park during a bat field craft workshop in August 2005 (Kelleher, 2005).

5.4 Habitat

Roosting habitat

Natterer's bat is found in buildings during the summer, roosting in small numbers in the roof space, often between the rafters and felt, or in narrow slits where timbers meet, and where they are difficult to observe (O'Sullivan 1994). Only one roost was found during a survey of 100 houses by the Bat Conservation Group Dublin (1999). A number of large colonies (>50 bats) have been recorded in Church of Ireland churches and other old buildings in Cos. Galway, Limerick and Cavan (K. McAney, 2006). All eight known roost

sites in Northern Ireland were in the roof spaces of dwellings, five in houses dating from the late 18th to 19th centuries (Allen *et al*., 2000).

Smiddy (1991) found four single bats in four bridges during a survey in mid and east Co. Cork and west Co. Waterford during 1988 and 1989. It was the second most frequently encountered during a bridge survey of Co. Leitrim, when 66 individuals were recorded in 31 bridges (Shiel, 1999). It has not yet been recorded from bat boxes that have been in place in three woodlands in Co. Galway since 1999 (K. McAney, 2006), although it is found in boxes in the UK (Mortimer, 2005).

Smith & Racey (2005) used the term 'itinerant' to describe the roosting behaviour of Natterer's bat arising from the results of their radio tracking study on the borders of England and Wales. Two maternity colonies studied each used between 21 and 31 roosting locations distributed across 15 to 25 roost sites. Temperature was considered to be the most important factor determining the use of roost sites, with the bats appearing to need access to a large number of roosts offering a range of temperatures. Although a variety of day roost sites were located within buildings, trees comprised 67% of all roost sites. Mortimer (2005) found this species using natural cavities in predominantly mature Corsican pines, the first record of Natterer's bats using commercial conifer plantations for roost sites.

14 Natterer's bats were recorded during hibernation surveys in west and south west Ireland; 10 in caves, two in ruined buildings and one each in a mine and bridge (McAney, 1994, 1997). In all cases the bats were tucked away in crevices and required careful searching to discover them. This species was the commonest recorded swarming in late summer and autumn at underground sites in the UK, but, because of its habit of concealment in cracks and crevices, only small numbers were ever seen hibernating at these sites (Parsons *et al*., 2003).

Foraging habitat

Shiel *et al.* (1991) analysed droppings from a Natterer's colony in Co. Limerick and found that 68% of the prey eaten consisted of diurnal insects, insects which rarely fly, and non-flying arthropods. These results support the general view that this bat gleans or removes most of its prey from foliage or other surfaces, rather than catching it in the air.

Smith (2000) discovered by radio-tracking this species that it selected semi-natural broad leaved woodland and tree-lined river corridors, ponds and grassland. However, a more recent study has shown that Corsican pines

(*Pinus nigra)* were the most preferred foraging habitat for this species in Scotland (Mortimer, 2005).

5.5 Future prospeects

This species is known to be widely distributed in Ireland, but, because of its secretive roosting habits, it is one of the least recorded bats in the country. Given that its preferred foraging habitats are increasing the prospects for this species are considered good, however further research into its ecological requirements is needed.

6. Daubenton's bat *Myotis daubentonii* (Kuhl, 1817)

6.1 Introduction

Daubenton's bat is one of four *Myotis* species found in Ireland, but is probably the easiest to recognise in flight due to its habit of flying just a few inches above the surface of water when feeding.

6.2 Range

The waterways survey which was carried out across the Republic of Ireland and Northern Ireland in 2006 showed this species to be widely distributed throughout the island (Aughney *et al*. 2007). This widespread status was confirmed by the 2007 and 2008 monitoring surveys (T. Aughney pers. comm.). Daubenton's bat occurs throughout Europe, although it is scarce in the southwest and is absent from northern Scandinavia (Mitchell-Jones *et al*., 1999) (NPWS 2008).

6.3 Population

Daubenton's bat was the second commonest species recorded during the National Bat Survey; 213 roosts were discovered, the majority in bridges with only one to ten individuals present (O'Sullivan, 1994). There is little information on numbers at nursery roosts as these are rarely discovered. It is regularly recorded using bat detectors in the field but these records are of individual bats. In the all-Ireland waterways survey, whereby a 1 km stretch of river or canal is walked after sunset in August and the number of bat passes heard during a 40 minute period is recorded, Daubenton's were reported at 91% of the 134 sites surveyed in 2006 (Aughney *et al*. 2007) and 86% of sites were positive in 2007 (T. Aughney pers. comm.). Data from 2008 is still being analysed. This survey will be repeated annually to provide the basis for future assessment of population trends.

Elsewhere in Europe, Daubenton's bat is considered to be one of the most abundant species, with populations showing an increase in several locations

(Mitchell-Jones *et al.,* 1999). Kokurewicz (1995) suggested that the observed increase in the Polish population could be attributed to eutrophication, which resulted in an increase in non-biting midges, a major prey item. It has been recorded in mist nets set up close to the shores of Lough Corrib in Co. Galway; 11 bats were caught in June 1997, and five and three were caught in June 1997 and September 2000 respectively (K.McAney, 2006).

6.4 Habitat

Roosting habitat

Most of the published information on the roosting behaviour in Ireland relates to roosts in bridges. In addition to the bridge roosts discovered during the National Bat Survey, two other surveys have shown that it is the commonest species using bridges. Smiddy (1991) found Daubenton's bats at 38 bridges in mid and east Co. Cork and west Co. Waterford, although only a mean number of 1.76 bats per bridge. The largest number recorded at one site was seven. It was also suggested that bats may use bridges as hibernation sites, as a single torpid bat was found at a bridge in December. Shiel (1999) recorded 180 Daubenton's bats in bridges in Cos. Leitrim and Sligo between late April and mid November 1998. While most bridges held small numbers of bats, two different bridges each had approximately 20 bats using one crevice - these were thought to be nursery colonies due to the presence of young.

Daubenton's bats can also be found in buildings during the summer, generally those located close to water. Fairley (2001) cites just one nursery roost of more than 100 in Co. Waterford. There are a number of unpublished records of bats using crevices in the walls of large, usually unoccupied or partially occupied, buildings such as castles and mansions during the summer months, although there is one colony roosting near heating pipes in the cellar of a busy west of Ireland hotel (K. McAney, 2006). Only three roosts were found during a survey of 100 houses by the Bat Conservation Group Dublin (1999); all were in old buildings located close to water. This group believe that Daubenton's bat is rarely found in modern buildings and hence is under reported. All eight known roost sites in Northern Ireland were in the roof spaces of dwellings, of which five were in houses dating from the late 18th to 19th century (Allen *et al*., 2000).

Elsewhere in Europe, Daubenton's bat is considered to be a woodland species, using tree roosts as nursery sites (Schober & Grimmberger, 1989). In a Dutch study, it was found to prefer natural cavities in oak trees, close to the edge of woodland (Boonman, 2000). However, it is extremely difficult to survey trees for roosting bats, although the use of radio tracking has proved very useful, as in the study of Natterer's bats by Smith & Racey (2005). Daubenton's bats began to occupy Schwegler bat boxes in deciduous woodland in Co. Galway

in 2002; three years after the boxes were erected, and continue to do so. A colony was also found roosting in an old beech tree close to water in east Galway during summer 2005 (K. McAney, 2006).

Only one Daubenton's bat was recorded during a hibernation survey of the west and south west of Ireland, but as it roosts in cracks and crevices, it is undoubtedly overlooked (McAney, 1994, 1997). Two Daubenton's bats were recorded from caves in the northwest of Ireland (Hopkirk, 1996). This species was the second commonest recorded swarming in late summer and autumn at underground sites in the UK, yet only small numbers were ever seen hibernating at these sites (Parsons *et al.*, 2003).

Foraging habitat

The Daubenton's bat is known as the water bat, because of its association with wetlands and the 2006 All-Ireland Waterways survey recorded this species at 91% of sites surveyed including streams as small as 2m wide (Aughney *et al.* 2007). The two dietary studies of this species undertaken in Ireland also support this aquatic association. Sullivan *et al*. (1993) analysed droppings from a colony using a dry arch of a bridge in Co. Galway. The diet consisted primarily of insects associated with water, with 33% caddis flies and 33% thread-horned flies, mainly midges. Flavin *et al.* (2001) obtained similar results in their study; 24% of the diet consisted of midges and 26% caddis flies. In the latter study, pre-adult forms of the insects were discovered in the diet. A quarter of the diet was deemed to have been caught from the water's surface. These results support the general view that Daubenton's bats gaff insects from the water or catch them in the air using the tail membrane. Shiel (1999) ran a statistical test on data from her bridge survey and found that there was a significant positive association between the presence of Daubenton's bats and the presence of slow-flowing water/pools. This was also found to be the case in a UK study by Warren *et al.* (2000), who found that Daubenton's bats also preferred sections of river with trees on both banks. However, although strongly associated with water, Daubenton's bat can also forage in other habitats, such as woodland (Russ, 1999).

6.5 Future prospects

This is one of our commonest species, recorded at approximately 90% of all sites surveyed for it in 2006 and 2007. As large-scale wetland drainage has ceased and water quality is generally improving, its future prospects are considered to be good. However, further education of our local authorities and the Office of Public Works is required to ensure that roosts are not inadvertently disturbed and damaged during bridge and building repair works.

7. Brown long-eared bat Plecotus auritus (Linnaeus, 1758)

7.1 Introduction

The brown long-eared bat is the only member of the Genus *Plecotus* in Ireland and offers the non-specialist no difficulty with identification. A pilot monitoring programme for this species based on summer roost counts begins in 2007.

7.2 Range

The species is widespread throughout Ireland (Richardson, 2000). It has also been recorded on several islands off the coast of Cos. Donegal, Mayo and Kerry, and at Tuskar Lighthouse, Co. Wexford (Fairley, 2001). It is widespread in Europe and found across Asia (Mitchell-Jones *et al*., 1999) (NPWS 2008).

7.3 Population

O'Sullivan (1994) describes the brown long-eared bat as the second most abundant bat species in Ireland and widely distributed; 294 roosts were recorded during the National Bat Survey although most contained less than 50 bats. In Northern Ireland, most of the 77 nursery roost sites of this species discovered there since 1985 contained around 20 bats. In a survey of 100 houses by the Bat Conservation Group Dublin (1999), the brown long-eared bat was also considered widespread but forming small colonies. A pilot monitoring programme for this species, commissioned by NPWS, run by Bat Conservation Ireland and based on summer roost counts began in 2007. This approach has provided robust monitoring data in other countries (e.g. U.K.).

7.4 Habitat

Roosting behaviour

In Ireland, this species roosts in large open attics where the bats cluster together, often in the angle created by the rafters where they join the ridge beam (K. McAney, 2006). Entwistle *et al*. (1997) found that tree holes and farm buildings were used as temporary roosts at times when food was in short supply and bats became torpid to save energy, but nursery roosts were almost always in houses. Brown long-eared bats show a high degree of fidelity to nursery roosts and they have been shown to be selective in picking houses in which to roost.

Brown long-eared bats were amongst the first, along with pipistrelles, to begin roosting in Schwegler bat boxes erected in two woodlands in Co. Galway in March 1999 (K. McAney, 2006). The long-eared bats were present by May 1999, and have been recorded during 66 out of 68 visits that have

been made since. The bats generally roost in groups varying in number from five to ten, with singletons found less frequently.

Only four long-eared bats were recorded during a hibernating survey in west and south west Ireland, two from caves and two from ruined buildings (McAney, 1994, 1997).

Foraging habitat
This species has broad habitat preferences. It forages in broad-leaved woodlands and along tree lines, but also uses scrub, conifer plantations, gardens with mature trees, parkland and orchards. It will commute along hedgerows and tree lines. Shiel *et al*. (1991) studied the diet in Ireland from droppings collected in Co. Clare and found that the main prey items belonged to four categories: flies (craneflies and window-midges) comprising 30.4%; moths (26.5%); caddis flies (11%); and earwigs, centipedes and harvestmen (16.8%). The latter three categories represent non-flying arthropods and support the view that the brown long-eared bat often gleans its prey from foliage.

Entwistle *et al.* (1996) found this species to be strongly associated with tree cover and to select roosts within 0.5 km of deciduous woodland but also that it uses a variety of habitats such as birch scrub, gardens with large trees, scattered woodland, orchards and parkland among meadows.

7.5 Future prospects
This species is widepsread and common. It has adapted to roosting in buildings and has broad habitat preferences. Its future prospects are considered to be good.

8. Leisler's bat Nyctalus leisleri (Kuhl, 1817)

8.1 Introduction
Leisler's bat is the only member of the Genus *Nyctalus* in Ireland. It has been described as a 'typically Irish bat' (Fairley, 2001) due to its abundance in Ireland compared to the rest of the Europe, where it is considered to be vulnerable (Mitchell-Jones *et al.*, 1999). Its abundance in Ireland has been attributed to the absence of larger competing species, such as the closely related noctule *Nyctalus noctula*. It is the only vespertilionid bat species that has been studied in detail, with seven published papers on varying aspects of its ecology in southern Ireland. In Northern Ireland its pre-hibernal and hibernation behaviour has been studied (Hopkirk & Russ, 2004) and there is

ongoing research into its roosting behaviour and molecular ecology and conservation genetics (McAney, 2006).

8.2 Range

Data from the car-based monitoring scheme shows that this species is found throughout Ireland (Roche *et al*. 2007). It is also recorded from Western Europe to south western Asia, north western Africa and east to India (Mitchell-Jones *et al.*, 1999) (NPWS 2008).

8.3 Population

It is impossible at present to estimate the Leisler's bat population in Ireland, although this country is generally considered to be the world stronghold for this species, and at one time held the largest known summer colony (O'Sullivan, 1994). It is currently being monitored by means of a car-based monitoring programme that began in 2003 and it is believed that sufficient data will be accumulated by this method over a 10-year period to enable the detection of a 'Red Alert Population Decline' for this species (the IUCN term to describe a 50% or greater decline in population within 25 years). On the basis of data collected in 2004, 2005 and 2007, Leisler's bat is the third most commonly encountered species. In 2006, however, it overtook the soprano pipistrelle to become the second most frequently encoutered species after the common pipistrelle (Roche *et al.*, 2007).

8.4 Habitat

Roosting habitat

In Ireland, Leisler's bats form nursery colonies in buildings (many inhabited) during the summer. O'Sullivan (1994) recorded 71 roosts in buildings and Allen *et al.* (2000) 106. Fourteen roosts were recorded during a survey of 100 houses by the Bat Conservation Group Dublin (1999). However, roost records from Europe indicate that trees are preferred, particularly holes created by woodpeckers (Ruczynski & Bogdanowicz, 2005). A few tree roosts have been found in Ireland, some of which have been described by Fairley (2001). A group of juvenile Leisler's bats were found in a beech tree in Co. Galway in July 1996 (K. McAney, 2006) and two tree roosts were reported by Allen *et al*. (2000), in an oak and an ash. Singletons and small groups of bats are regularly recorded during the summer from Schwegler bat boxes in woods at three locations in Co. Galway (K. McAney, pers. obs.). This species has also been found using Schwegler bat boxes erected as part of mitigation measures following tree removal during a road improvement scheme in Co. Mayo (T. Aughney, pers. comm.).

Nursery roosts begin to form in April, the young are born in June and are on the wing a month later. There is a dramatic decrease in the number of bats at

the nursery roost once the young are independent, as the adult females leave at this time, followed some weeks later by the juveniles (Shiel & Fairley, 2000). Leisler's bats emerge early in the evening, often leaving the roosts before sunset; they emerge earlier on overcast nights (McAney & Fairley, 1990; Shiel & Fairley, 2000). Forsyth (cited in McAney, 2006), in a study of a maternity roost in the Lagan Valley in Northern Ireland using passive identification transponders and an infrared video camera, found that females moved between 20 roost sites a total of 120 times during a 6-year period; also, up to a quarter of the bats using the roost would often not emerge on a given night.

Little is known about where Leisler's bats hibernate. Two bats were found under roof slates during repair work in Connemara National Park in February 1994 (S. Hassett, pers. comm.) and one bat was found on roof beams of an old building, also in the National Park, in January 1996 (G. O'Donnell, pers. comm.).

Hopkirk & Russ (2004) studied pre-hibernation and hibernation behaviour in Northern Ireland by fitting small temperature sensitive radio transmitters to 29 bats. These bats were subsequently tracked from July – November in 2002 and from August 2002 - January 2003. Harems (consisting of a lone male and several females) were found in bat boxes up to mid-October. Both trees and buildings were used from August until the beginning of November and after that, only trees. The most important tree species used were oaks and beeches. All the roosts used were within 200m of a path or a forest edge. Bats became torpid once ambient temperature dropped below 6^0 C and there was evidence to suggest that some males migrated to the coast in October. Shiel & Fairley (1998) also suggested that Leisler's bats in Wexford migrated, in this case from the coast to inland areas, as bats were never detected at known summer foraging sites during the winter. Long distance migration has been reported for this species; Ohlendorf *et al.* (2000) reported the discovery of a female Leisler's bat ringed in Germany in May 1998, recaptured in May 1999, and subsequently found 1,567 km away in Spain in September of that year.

Foraging habitat

Foraging behaviour has been studied using bat detectors and radio tracking (Shiel & Fairley, 1998; Shiel *et al.*, 1999). The detector study revealed little indication of habitat selection, with bats found in a wide variety of habitats, including canals, estuary/open water, roadsides, street lamps, orchards, mature trees, pasture, farmland, railway embankments and streams. However, the radio tracking study revealed that two thirds of the recorded foraging time was over pasture or drainage canals, while foraging in other habitats, particularly lakes and conifer forests, was greatest before the bats gave birth. Bats commuted directly from the day roosts to foraging sites up to

13.4 km away at speeds often exceeding 40 km per hour. Except during lactation, individuals sometimes day-roosted in buildings or hollow trees away from the nursery roost. These alternative day roosts were also sometimes used as night roosts, especially during rain, which also caused the bats to return to the day roost. Most activity was observed during the early part of the night and, on most nights, the first flight lasted the longest.

Although the largest bat species in Ireland, its prey is composed primarily of small to medium-sized insects, many of which form swarms. Both Sullivan *et al*. (1993) and Shiel *et al*. (1998) found that the major prey items were true flies, moths and caddis flies. Of the flies eaten, small insects such as midges were eaten more than larger insects such as craneflies, and the yellow dung fly was also important. The only other food item of significance was beetles, mainly carabids.

8.5 Future prospects

This species is widespread across Ireland and shows considerable flexibility in habitat use. It has adapted to roosting in buildings which can lead to conflict. However, if public education about bats continues and practical advise and assistance is made available to homeowners the future prospects of this species are considered to be good.

Species	**Roosts : Foraging habitats**
Common & Soprano pipistrelles	Buildings : aquatic places, woodland edge, tree lines, farmland, hedges, gardens, urban areas.
Nathusius' pipistrelle	Buildings : Aquatic places, along rides, paths, woodland edge, meadows, avoids urban areas.
Whiskered	Buildings, bridges and underground sites : Along tree lines, centres of broad leaved woodland, edges of mixed woodland, rivers.
Brandt's	Buildings : Woodland and along woodland edge with water.
Brown long-eared	Buildings : Woodland, birch scrub, gardens with large trees, orchards, parkland with meadows.
Natterer's	Buildings and underground sites : Semi-natural broad leaved woodland, tree-lined rivers, grassland.
Daubenton's	Buildings, bridges & trees : Rivers with slow moving water and bankside vegetation, also woodland.
Leisler's	Buildings and trees : Pasture, drainage canals, over lakes and conifer forests.

Table 1. *Summary of roosting and foraging habitats used by the nine vesper bats in Ireland*

9. Scientific Monitoring

Introduction

In its judgment, the European Court of Justice found that the monitoring in place for bats in Ireland was inadequate noting that, for the purpose of challenging the Commission's complaint, Ireland had referred to a number of initiatives which had not yet been concluded. Since the time to which the judgment relates, important steps have been taken to rectify the deficiencies to which the Court referred.

The Irish Bat Monitoring Programme (IBMP) was initiated in 2004 and a comprehensive programme has been built up over the past five years. Three separate schemes are now run on an annual basis and robust data is being collected for five of our nine vesper species (the lesser horseshoe bat is covered by a separate, comprehensive summer and winter monitoring programme). Detailed research is underway to identify the best methods for monitoring three more species. The final species – *Pipistrellus nathusii* – has only recently been identified from Ireland and is not yet turning up in sufficient numbers to be monitored. Ireland plays an active role in the UNEP/ EUROBATS monitoring working group where best practise guidance for bat monitoring is being developed and reviewed (EUROBATS 2008). The individual bat monitoring schemes in operation in Ireland are explained here below in detail.

9.1 Car survey transects

The car-based transect survey was the first scheme to be launched in the IBMP. It is based on an original methodology designed for Ireland in 2003 by Jon Russ and Colin Catto of Bat Conservation Trust UK, at the invitation of The Heritage Council (Roche *et al*. 2005). In 2004 BCI were taken on to manage the scheme and NPWS became funding partners with The Heritage Council. The number of survey squares has increased annually, from eight in 2003 to 23 in 2008. In 2005 Northern Ireland's Environment and Heritage Service (now the Northern Ireland Environment Agency) joined the project, making it one of the first international bat monitoring schemes in Europe. Four surveys squares from Northern Ireland are now monitored annually, making a total of 27 across the island. BCI has a three year contract with NPWS to manage this scheme. This contract will end and be re-advertised early in 2009 to ensure continuity of survey in 2009 and beyond.

The car-based monitoring involves driving along a mapped route of approximately 100km with a time expansion bat detector attached to the passengerside window. For 20 individual 1.6km transects along the route the vehicle is driven at a speed of 24km/hour and the detector records bat

echolocation calls. These are recorded onto minidisc and species are identified post-survey by sonographic analysis. Each route is surveyed twice annually, once in July and once in August (Roche *et al*., 2006). By the end of 2007, data had been collated from 889 independent monitoring transects (Roche *et al*. 2007). Analysis of data from 2008 is ongoing.

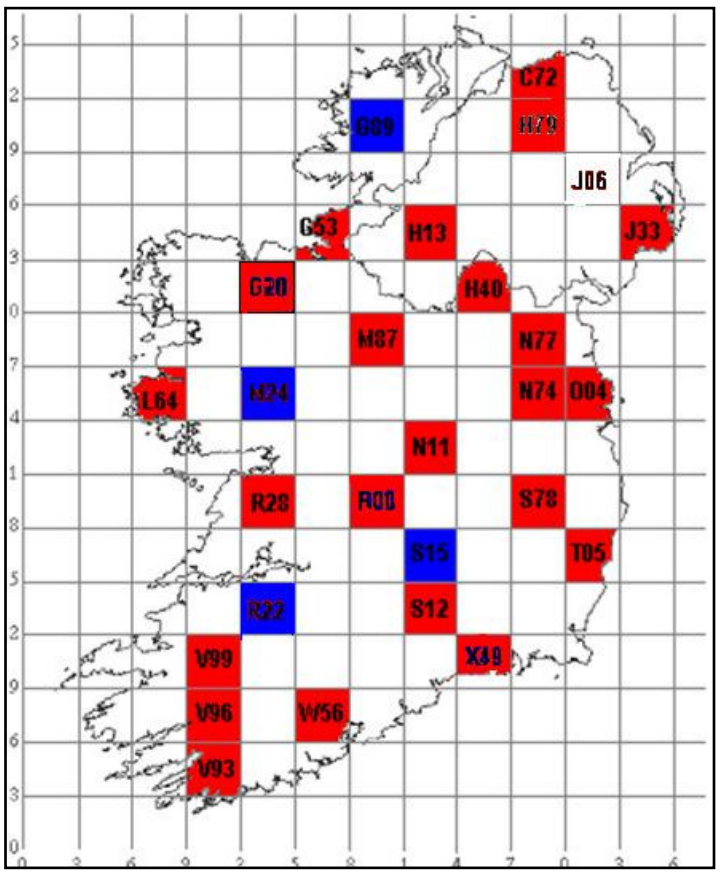

Fig. 1. Location of the 30 km squares used in the Car based monitoring scheme: Red squares (surveyed twice in 2008), Blue squares (surveyed once in 2008) and White square (not surveyed in 2008) (Source: BCI).

Our three most widespread bat species are being monitored using this technique: *Pipistrellus pipistrellus, P. pygmaeus* and *Nyctalus leisleri.* This innovative car-based scheme has now been adapted for use in several other European countries including Austria, Bulgaria, Romania and the UK.

9.2 Waterways survey

The IBMP was expanded by NPWS in 2006 to include a national waterways survey, with particular focus on *Myotis daubentonii*. With cooperation from the Environment & Heritage Service in Northern Ireland this was extended to an all-Ireland programme. Waterways Ireland also participate. The project is managed under a three year contract by BCI. This 3 year contract will be re-advertised early in 2009 to ensure continuity of survey in 2009 and beyond.

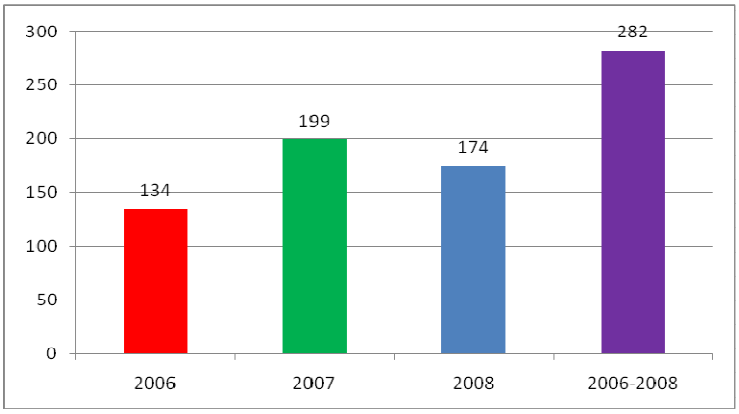

Fig. 2. Number of sites surveyed over the 3 years of the waterways monitoring scheme (Source: BCI).

The waterways survey methodology developed by the UK's Bat Conservation Trust has been modified for use in Ireland. Trained volunteers survey a 1km transect stopping to record bats 10 times at 100 m intervals. Transects are surveyed twice during August each year. In the first year of this project, 2006, 134 waterways were surveyed throughout the Republic of Ireland and Northern Ireland; in 2007 199 sites were surveyed. Inclement weather reduced survey opportunities in 2008, but still 175 sites were surveyed, with all 32 counties represented. Over 250 volunteers have been trained to date, making this one of the most successful volunteer based wildlife surveys ever undertaken in Ireland. This survey is producing robust data for *Myotis daubentonii* and showing the species to be extremely widespread throughout the country; 91% of sites were positive in 2006; 86% of sites were positive in 2007 (analysis of 2008 data is ongoing). The training programme has also provided an introduction to and appreciation of bats to an impressive number of people across the country.

9.3 Roost surveys

Plecotus auritus shows a high degree of roost fidelity and consequently roost monitoring has been used for this species in several parts of Europe (Aughney & Roche 2008; EUROBATS 2008). However, reliance on emergence counts alone to determine colony size has proven unreliable. Consequently, the relative merits of three different count methods (Interior daytime counts; Exterior dusk emergence counts; and Interior, post-emergence counts) were explored in a pilot project funded by NPWS in 2007. 35 volunteers completed 30 individual surveys of 18 roosts. Of the 18 sites surveyed, 12 (67%) were deemed suitable for inclusion in the national monitoring programme. Arising from this pilot project, it was discovered that certain sites would be best monitored by using internal counts while emergence counts could be used at other sites. It was also determined that 50 roosts would need to be monitored on an annual basis to provide robust population trend data (Aughney & Roche 2008).

In 2008 a three year contract to implement and expand a national brown long-eared bat roost monitoring scheme was awarded to BCI. 50 potential monitoring roosts were assessed in 2008 with 21 of these surveyed at least twice. Of the 54 roosts assessed to date (2007-2008), 25 have been deemed suitable for inclusion in the national monitoring programme and these will be monitored again in 2009 and 2010. The brown long-eared bat roost monitoring scheme will grow year on year so that by 2010 50 roosts across the country will be included in the annual monitoring programme.

9.4 Woodlands surveys

Monitoring Myotid bats, particularly the elusive and even cryptic woodland species (*Myotis nattereri, M. brandtii, M mystacinus*), is notoriously difficult and has been the subject of much discussion in EUROBATS (EUROBATS 2008). For example, Brandt's bat, which was only discovered in Ireland in 2003, is physically quite similar to the whiskered bat and the two species can only be confidently distinguished using DNA markers. Limited success has been reported with various monitoring approaches taken for these species elsewhere in Europe (EUROBATS 2008) and initial trials in Ireland, funded by NPWS in 2006 and 2007, proved inconclusive (Roche & Aughney 2008). Consequently it was decided that a dedicated team of bat biologists was required to examine the issues with a view to developing an effective monitoring tool which would allow Ireland to meet its requirements under the Habitats Directive.

Fig. 3. CIBR field team harp-trapping at a *Myotis* roost (Photo: D. Buckley)

In May 2008 NPWS awarded a three year contract worth €700,000 to a joint team from University College Dublin and Queens University Belfast to set up a new centre of excellence for bat research in Ireland. This Centre for Irish Bat Research (CIBR) will investigate the feeding ecology and population biology of our three woodland species - *Myotis nattereri, M. brandtii* and *M mystacinus*

– and examine novel ways of monitoring these species with a view to developing and informing best international practise in this field. The research team consists of four principal investigators: Dr Emma Teeling and Professor Tom Hayden of UCD and Professor Ian Montgomery and Dr Paulo Prodohl of Queens University Belfast together with two PhD students and two post-doctorate researchers. The first field season (2008) concentrated on surveying maternity roosts from historical records but has also produced some exciting discoveries about bat swarming activity. The project will take a holistic approach to studying these species by using genetics to look at population structure in Ireland and phylogeography (the origins of the Irish populations in Europe), radio-telemetry to look at home ranges and habitat usage and GIS to look at building a predictive distribution model for these species. An effective monitoring methodology will be one of the main contract deliverables from this three year project.

9.5 Batlas 2010 project

One of the shortcomings identified in the ECJ judgement was the limited understanding of bat distribution in Ireland. The first National Bat Survey was conducted by the National Parks and Wildlife Service (NPWS) between 1985 and 1988 (O'Sullivan, 1994). This was a countrywide exercise using both environmental professionals (foresters/conservation rangers) and members of the general public. It provided a baseline for population distribution of bat species (while also raising the profile of bats with the general public (McAney, 2006)). A number of smaller surveys have also been carried out since with funding from the Heritage Council (Keeley, 1999 and 2003; Roche, 1998; Shiel, 1999) and recent monitoring programmes (see above) have greatly increased our knowledge for many species. However, gaps in distribution are still evident for all species, and even for our more common species - the soprano and common pipistrelles, Daubenton's, Leisler's and brown long-eared bats - the percentage of 10km squares that held records in 2007 was only 26%, 24%, 20% and 11% respectively. For some of the more elusive species it was only possible to include indicative distribution maps, at the 50km level, with the recent Article 17 report (NPWS 2008).

To address these shortcoming an extensive survey programme was initiated in 2008. The aim of this project, which is being managed by BCI with three-year funding from NPWS, is to systematically map the current distribution of Ireland's nine species of vesper bats by 2010. Survey work began in earnest in mid-summer 2008, and despite the poor weather 259 10 km squares were surveyed. This work will continue in 2009.

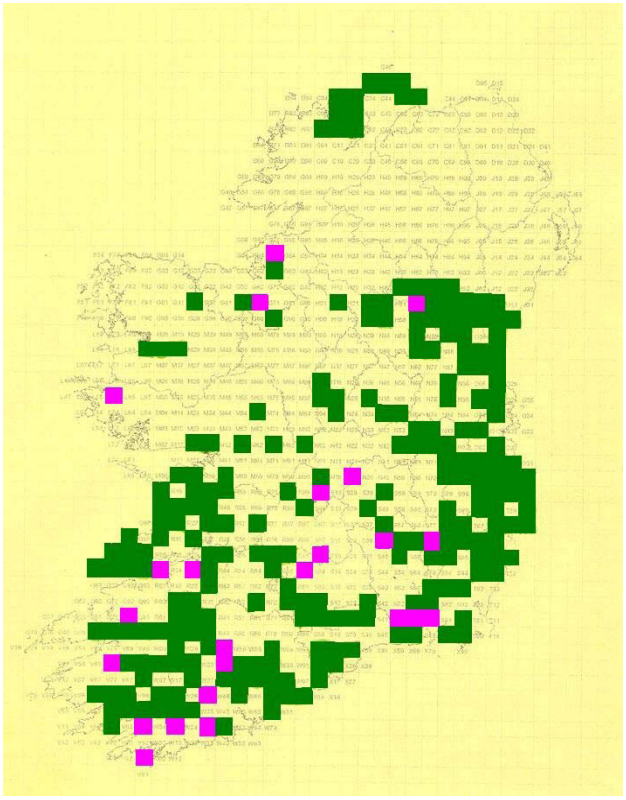

Fig. 4. 10km squares surveyed in 2008 Batlas field season. Fully surveyed squares are green (n = 235), partially surveyed squares are pink (n = 24) (Source: BCI).

9.6 Data collation

The Commission has queried whether Irish bat data is being "gathered and organised in a coherent way"[1]. All bat distribution data collected during the IBMP and the Batlas project are collated centrally by BCI. They are stored electronically in a purpose built database (the development of which was funded by the Heritage Council and NPWS) and a simple mapping tool is available to the public on the BCI website: http://www.batconservationireland.org/php/data.php

Annual updates of the database are provided to NPWS where all biological data is collated by a bioinformatics officer and stored on Recorder 6 software. More sophisticated querying and mapping of all bat data is then available through the ArcGIS programme. A copy of all bat data is also provided annually to the National Biodiversity Data Centre.

[1] Letter of formal notice from Commission to Ireland, Sep 2008. Pg 6.

10. Protection

All bats have been protected in Ireland under national legislation since 1976 (Wildlife Act 1976). Under the Wildlife Acts (1976 and 2000) it is an offence to capture or kill any bat. Licences may be issued however, under Section 23, to permit capture or killing for scientific research. Licences may also be issued under Section 32 to facilitate the tagging of bats e.g. for radio-tracking studies.

All Irish bats are also listed on Annex IV of the EU Habitats Directive (92/43/EEC).

10.1 Regulation 23 - Strict protection

Annex IV listing requires Member States to implement a system of strict protection for the species. Under the provisions of Regulation 23 of the Habitats Regulations 1997, the following offences relating to Annex IV (a) are set out:

(2) A person who in respect of the species set out in Part I of the First Schedule—

> *(a) deliberately captures or kills any specimen of these species in the wild,*
> *(b) deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,*
> *(c) deliberately takes or destroys the eggs from the wild, or*
> *(d) damages or destroys a breeding site or resting place of such an animal,*

shall be guilty of an offence.

This follows closely the provisions of Article 12 of the Directive. In relation to (a) to (c) above, it is clear that to obtain a conviction in a court, it would be necessary to establish that the person concerned committed the action deliberately. However, under Section 23(5) of the Wildlife Act 1976, as amended, it is an offence to injure a protected wild animal and this allows for a prosecution in cases in which bats were being injured or killed. It should be noted that the derogation provisions of Section 23 (7) of the Wildlife Act do not apply to Annex IV animals (see Regulation 2(3) of the Habitats (Amendment) Regulations 2005, which amended the Wildlife Acts).

Given that Irish Constitutional law gives no latitude for extending the scope of offences beyond that specified in the Directive itself outside primary legislation, any further extension of the legal protection of bats would require primary legislation.

In the case of Regulation 23 (d) of the Habitats Regulations, it is not required that the person damaging or destroying a breeding site or resting site should

have done so deliberately or knowingly. This places an onus of due diligence on persons concerned to inform themselves of the risk of such damage or destruction that their plans, operations or activities might cause. If they consider that, notwithstanding such a risk, they want to proceed with such a plan or operation or activity, then they must seek a derogation licence from the Minister under Regulation 25 of the Habitats Regulations.

10.2 Regulation 25 – Derogations

The criteria under which a derogation licence can be issued by the Minister are narrow:

> *25. (1) Where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range, the Minister may, in respect of those species, grant a licence to one or more persons permitting a derogation from complying with the requirements of the provisions of section 21 of the Principal Act and Regulations 23 and 24 where it is—*
>
> > *(a) in the interests of protecting wild fauna and flora and conserving natural habitats, or*
> > *(b) to prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property, or*
> > *(c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment, or*
> > *(d) for the purpose of research and education, of repopulating and re-introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants,*
> > *(e) to allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent (if any) specified therein, which are set out in the First Schedule* (Annex IV(a) species).
>
> *(2) The Minister shall forward to the Commission every two years a report, in accordance with a format established by the Commission, on the derogations to which paragraph (1) relates.*
>
> *(3) The report referred to in paragraph (2) shall specify—*
>
> > *(a) the species which are subject to the derogations and the reason for the derogation, including the nature of the risk with, if*

appropriate, a reference to alternatives rejected and scientific data used;

(b) the means, devices or methods authorised for the capture or killing of animal species and the reasons for their use;

(c) the circumstances of when and where such derogations are granted;

(d) the authority empowered to declare and check that the required conditions obtain and to decide what means, devices or methods may be used, within what limits and by what agencies, and which persons are to carry out the task;

(e) the supervisory measures used and the results obtained.

A person convicted of an offence shall be liable on summary conviction to a fine not exceeding £1,500 or to 6 months imprisonment or to both.

The *Bat Mitigation Guidelines* published by NPWS (Kelleher & Marnell, 2006) provides an overview of the derogation process and offers some advice on whether a derogation licence may be required or not for a particular activity. Ultimately, however, this is a decision to be made by the consultant or client. To ensure that no illegal activities are undertaken, it is recommended that a licence is applied for if, on the basis of survey information and specialist knowledge, it appears that:

- the site in question is a breeding site or resting place for bats
- the proposed activity could result in an offence

However, the *Bat Mitigation Guidelines* reminds developers and planners that if the proposed activity can be timed, organised and carried out so as to avoid committing offences then no licence is required. The advice given in the document aims to assist the consultant in arriving at a decision on this matter, though it is recognised that determining whether a particular site is used as a breeding or resting place can be problematic for such mobile animals as bats.

Examples of works that are likely to need a licence because they may result in the destruction of a breeding or resting place and/or disturbance of bats include:

- Demolition of buildings known to be used by bats
- Conversion of barns or other buildings known to be used by bats
- Restoration of ruined or derelict buildings
- Maintenance and preservation of heritage buildings
- Change of use of buildings resulting in increased ongoing disturbance
- Removal of trees known to be used by bats, when carried out as part of a development

- Significant alterations to roof voids known to be used by bats

Examples of works that, if carefully planned, may not need a licence include:

- Re-roofing, if carried out while bats are not present and the access points and roosting area are not affected;
- Remedial timber treatment, carried out with the correct (non-toxic to bats) chemicals while bats are not present.

Bats are also the subject of further international protection. Ireland is a signatory to the Convention on the Conservation of Migratory Species of Wild Animals 1979 (the Bonn Convention). The Convention places bat species in Appendix II, which recognises that they would benefit from international co-operation regarding their conservation. The Agreement on the Conservation of Populations of European Bats (EUROBATS) is an agreement under the Bonn Convention which aims to address threats to all 45 species of bat identified in Europe arising from habitat degradation, disturbance of roosting sites and harmful pesticides. The signatories agree to work through legislation, education and conservation measures and international co-operation both between themselves and with non-signatories. Ireland plays an active role at EUROBATS including chairing one of the working groups.

Ireland is also a signatory to the Convention on the Conservation of European Wildlife and Natural Habitats 1979 (the Bern Convention). All bats are listed in Appendix II of the convention, bar the Common Pipistrelle which is listed on Appendix III. The principal aim of the Convention is to conserve wild flora and fauna and their natural habitats, especially those species and habitats whose conservation requires the co-operation of several States.

The most recent global assessments by the IUCN put all vesper bat species found in Ireland in the Least Concern category [http://www.iucnredlist.org]. A review of the Irish Red List for Mammals is underway (Marnell, Kingston and Looney in prep).

NPWS's *Bat Mitigation Guidelines* (Kelleher & Marnell, 2006) provide a detailed overview of the protection afforded bats in Ireland. This report is available to download for free from the NPWS website at http://www.npws.ie/en/media/Media,4981,en.pdf

11. Enforcement

NPWS Conservation Rangers, whose number now stands at 81, are the main enforcement body for wildlife offences including offences relating to Annex

IV species. Rangers regularly patrol within and outside areas designated for nature protection and are in regular contact with interested members of the public as well as colleagues in other enforcement agencies in order to combat breaches of wildlife laws.

The maximum penalty for summary conviction under the 2000 Wildlife Amendment Act has been increased to €1,904 and/or 12 months imprisonment and, on indictment, is €63,487 and/or two years imprisonment. It should be noted that fines may be imposed in relation to each offence committed, so operations involving many animals or repeated offences can potentially accrue large fines. In addition, items which may constitute evidence of the commission of an offence may be seized and detained. However, as in any Member State, prosecutions must be taken within the constraints of the law and with sufficient evidence to support a prosecution.

Cooperation between agencies provides for synergies with regard to enforcement patrols and compliance surveillance. The Regional Fisheries Boards (RFBs) employ approximately 200 staff who undertake enforcement work as part of their remit. While RFB staff are not responsible for enforcement of legislation which protects bats, their surveillance efforts are focussed on rivers, lakes and canals which are important habitats for bats. Good communication between local RFB and NPWS officers means that infringements of the Wildlife Acts and Habitats legislation in these areas are quickly identified and can be followed up where appropriate.

12. Threats and pressures

A review of the major threats and pressures facing bats in Ireland was conducted during a workshop of bat experts organised by NPWS in Athlone, in 2006. Some threats apply to all species, others are particular to one or two species. The main activities identified are listed below with their EU code:

110 Use of insecticides
141 Abandonment of pastoral systems
151 Removal of hedges and copses
152 Removal of scrub
164 Forestry clearance
400 Urbanisation
507 Bridge repairs
701 Water pollution
790 Roost disturbance and destruction
804 Infilling of wetlands
811 Management of aquatic and bank vegetation for drainage
900 Wind farm developments

These activities can be grouped under four main threats:

1. Roost loss, destruction and disturbance
2. Unsympathetic management of commuting and foraging habitats
3. Water pollution
4. Wind farm developments

Each of these threats is dealt with in detail below. An introduction to each threat is followed by a statement of the actions recently completed or currently underway to address the threat. This is followed by a section on future actions. These are actions deemed necessary to ensure that any outstanding elements of the identified threat are fully managed and that no significant negative impact to the favourable conservation status of the individual bat species arises.

Threat 1 Roost loss, destruction and disturbance

Background

Because their metabolic and social requirements vary throughout the year, most bats will use a variety of roosts of different types. Some species are particularly closely associated with buildings, but the majority use a range of roosts, which includes trees, buildings and underground sites.

Man-made structures regularly used by bats in Ireland include bridges, castles, churches, houses and sheds. Some species have come to rely on such structures, e.g. *Pipistrellus* species usually roost in buildings and *Myotis daubentonii* is particularly associated with bridges. Bats can be found in buildings all year round, but summer is the most important time as this is when maternity roosts are formed. These are often in the roofs of buildings to take advantage of the heat provided by the sun; during this phase of their life-cycle breeding females are seeking warm areas to minimise the energy cost of maintaining a high body temperature. Females leave maternity roosts in the Autumn, at which stage some species congregate at swarming sites. Little is know of these yet, but the sites we do know are caves. The CIBR is investigating the importance of these swarming sites as part of its remit. More information is also required about the roosting behaviour of bats in winter, however animals have been recorded hibernating in various parts of buildings, particularly in cooler areas with stable temperatures such as cellars and basements. Trees, caves, bridges and ice-houses are also used in winter.

Although some bats will use multiple roosts and have a variety to chose from at any time of year, the loss or destruction of important roosts can impact severely on local populations of some species. Roosts in old buildings (e.g. churches, heritage buildings) are vulnerable to destruction during renovations / repairs. Deliberate exclusion of unwanted bats, from the attics of dwelling houses in particular, also occurs. Unsympathetic bridge repair is also a problem. Floodlighting of historic monuments and buildings can also lead to disturbance or even abandonment. Felling old trees (e.g. during road construction or agricultural improvement) is another cause of roost loss. The crevices and holes found in old trees provide important refuges for certain species.

Disturbance of roosts can cause bats to abandon the site. In summer this can lead to significant mortality of young bats. In winter it can cause bats to emerge from hibernation, using up valuable fat reserves and reducing their chances of survival.

Bats can also suffer from the treatment of timber within attic spaces, when poisons are sprayed on the wood to prevent furniture beetle or fungi. The treatments on the market are now less toxic than in the past, but application when bats are present will cause adult bats to abandon the roost and can lead to mortality of any young present.

Current action

Planning process

Under the Planning and Development Regulations, a planning authority must refer all planning applications that might have significant effects in relation to nature conservation to the Minister for the Environment, Heritage and Local Government. NPWS examine applications for impact on the qualifying interests of designated sites and taking into account the provisions of domestic and European legislation. On the basis of this appraisal, the Department may recommend to the planning authority that further information should be requested from the developer (for instance, assessment of impacts on specific species) or that certain planning conditions should be included in a grant of permission. In cases where significant negative impacts on nature conservation may not be mitigated the Department may recommend to the planning authority that planning permission not be granted.

A letter issued to all Local Authorities from NPWS in May 2007 reminding them of the need to consider Annex IV species when considering planning applications. This circular also highlighted the circumstance under which derogation licences may be required. NPWS has also published a detailed guidance document on the protection of bats and how to avoid or mitigate the deleterious impacts of developments (Kelleher & Marnell, 2006; see Section 10.2 above for further details.). This *Bat Mitigation Manual* has been widely circulated and is also available to download for free from the NPWS website: http://www.npws.ie/en/PublicationsLiterature/IrishWildlifeManuals/2006-2007/

Renovation / repairs of old buildings

The Heritage Council (HC) provide grants under two separate schemes: for essential repairs to old buildings of cultural heritage importance and for repairs to traditional farm buildings. Applicants are required to carry out bat surveys in advance of any works where buildings are likely to contain bats and, if necessary to apply for a derogation licence from NPWS where works may impact on a bat roost. The HC maintain a panel of qualified bat experts to conduct the necessary surveys and have published a document to guide their surveys and reports. Derogation licences are only issued for these schemes where the proposed works will have no negative impact on local bat populations. In most cases these repair works are undertaken in such a way that they provide immediate and long-term benefits to the bats by improving the integrity and stability of the roost.

Road developments

All national roads are developed within guidelines produced by the National Roads Authority (NRA). These documents, which were drafted in

consultation with NPWS, provide detailed information to road developers and ecological consultants regarding survey requirements, mitigating measures, follow-up monitoring and all aspects of bat protection and the conservation of their habitats during national road development.

The NRA guidance documents of direct relevance to bats are listed below. These are all available to download for free at: http://www.nra.ie/Publications/Environment/

- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes*
- *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*
- *Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, during and Post Construction of National Road Schemes*
- *Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*
- *Environmental Impact Assessment of National Road Schemes - A Practical Guide*
- NRA (2004) *Guidelines for Assessment of Ecological Impacts of National Road Schemes*

The NRA have commissioned a PhD study on the effectiveness of current mitigation practise for bats in national road schemes. This project is investigating various types of mitigation including the use of bat boxes, commuting lines and purpose built bat houses. The results will inform future NRA policy.

Education
Information leaflets on bats are available from the Government's environmental education office – ENFO. (See http://www.enfo.ie/)

Bat survey training courses have been organised by BCI throughout Ireland in the last three years. The waterways survey in particular has attracted much public interest, with more than 250 people trained in basic bat ecology, bat detector usage and survey techniques for Daubenton's bat in particular.

BCI, with funding from NPWS, have recently published an identification leaflet for Irish bats. This has been widely circulated.

NPWS local staff and BCI organise regular local bat "talks and walks" throughout the country, where an initial indoor presentation is followed by a dusk walk to suitable bat habitats.

BCI, with funding from the Heritage Council, run a Bat Helpline for the public. This provides a source of free advice to the public about bats and is particularly important in dealing with queries from homeowners concerned about roosts on their property.

EUROBATS

EUROBATS (The Agreement on the Conservation of Populations of European Bats), which came into force in 1994, presently numbers thirty European states among its Parties, including Ireland. This UN Environmental Programme was set up under the Convention on the Conservation of Migratory Species of Wild Animals, which recognises that endangered migratory-species can be properly protected only if activities are carried out over the entire migratory range of the species. The Bat Agreement aims to protect all 45 species of bats identified in Europe, through legislation, education, conservation measures and international co-operation with Agreement members and with those who have not yet joined. In 2006, UNEP/EUROBATS initiated a new series of publications, with three highly informative volumes published and widely circulated across Europe to date:

- **No. 1.** (EUROBATS, 2006) *1991 - 2006. EUROBATS celebrates its 15th anniversary* provides reports from most EUROBATS range state, including Ireland, on their ongoing programmes of bat conservation, survey, protection and education.
- **No. 2** (Mitchell-Jones *et al*., 2007) *Protecting and managing underground sites for bats* provides an overview of how bats use underground sites, outlines the threats to these sites and provides advice on site protection, site management and creative conservation.
- **No. 3** (Rodrigues *et al.,* 2008) *Guidelines for consideration of bats in wind farm projects* provides advice on all aspects of wind-farm developments in relation to bats.
- **No. 4** (Marnell & Presetnik, 2009) *Protection of overground roosts for bats* will be published in early 2009. It provides detailed information on the use of overground roosts by bats across Europe and the various methods used to protect such roosts. It also provides practical advice, illustrated by case studies, on ways in which the potential conflicts

raised by the protection of bats in both domestic dwellings and in historical buildings can be managed.

Future action

- An educational DVD on Irish bats, with various elements suitable for a wide audience from schoolchildren to university undergraduates, NPWS staff, Heritage officers and consultants, should be developed in 2009.

ACTION: NPWS, BCI

- Public education about bats will continue. New updated leaflet on Irish bats to be printed and widely circulated in 2010.

ACTION: NPWS; ENFO

- By 2010, investigate potential to install webcam at bat roost to enhance public awareness and appreciation of bats.

ACTION: NPWS

- From summer 2009, the Bat Helpline service will be expanded and more widely advertised to ensure a reliable, consistent and up to date source of free advice to the public about bats and in particular to homeowners concerned about roosts on their property.

ACTION: NPWS, Heritage Council (HC), BCI

- In 2009, NPWS will explore the potential for maintenance grants to homeowners / churches who manage bat roosts on their properties.

ACTION: NPWS

- In 2009, develop a derogation system suitable for roost exclusions from homes where all else fails.

ACTION: NPWS

- To ensure that consideration of the roosting requirements of bats are included in the planning process, training will be provided, by or on behalf of NPWS, to the planning sections of all Local Authorities, to An Bórd Pleanála and to the OPW. This training will begin in 2009.

ACTION: Local Authorities (LAs), An Bórd Pleanála, NPWS, Office of Public Works (OPW).

- Ensure that considerations of the roosting requirements of bat are taken into account in future REPS schemes and in all other agri-environmental schemes.

ACTION: Department of Agriculture, Fisheries and Food (DAFF), Forest Service (FS), NPWS, Teagasc.

- From 2010 ensure that any roost exclusions from domestic dwellings are subjected to the derogation process.

ACTION: NPWS

- In 2009, develop policy guidelines on the floodlighting of monuments and historical buildings, that take into consideration the requirements of Article 12 of the Habitats Directive. These guidelines should clearly indicate the protected nature of bats and highlight the potential for floodlighting to disturb their roosting behaviour.

ACTION: LAs, OPW, Department of the Environment, Heritage and Local Government (DEHLG).

- By 2009, review with OPW their procedures and written guidance to ensure that it complies in all respects with the requirements of EU and national law for the protection of bat breeding and resting places.

ACTION: OPW, NPWS

- From 2010, ensure that all operations affecting watercourses, including 'bank improvement' for angling, take account of bats and retain features such as old trees.

ACTION: Central Fisheries Board (CFB), FS, LAs, NPWS, Regional Fisheries Boards (RFBs), OPW.

- Ensure that NPWS rangers, fisheries officers and Teagasc advisors are trained in the identification of potential breeding sites for bats by 2010.

ACTION: NPWS, Teagasc.

- Ensure that REPS advisory talks include information on bat roosts where appropriate by 2009.

ACTION: DAFF, NPWS, Teagasc.

- By 2010, evaluate the effectiveness of the current NRA-recommended mitigation guidelines for protection and replacement of bat roosts and ensure that the guidelines are updated as required.

ACTION: National Roads Authority (NRA), NPWS.

Threat 2 Unsympathetic management of commuting / foraging habitats

Background

Certain bat species are associated with specific foraging habitat types e.g. Daubenton's and waterways; whiskered and woodlands, whereas others are known to be generalists e.g. common pipistrelle. However, when commuting habitats for each species are also considered, it becomes clear that in Ireland all bat species rely on a wide variety of habitats during their life cycle. This is

further facilitated by the extensive network of linear, connecting habitats (e.g. treelines, hedgerows, waterways) in the Irish landscape. The ubiquity of hedgerows, in particular, in effect means that even ostensibly unsuitable habitat, such as areas of intensive arable farmland, may still be used by bats. Clearly, the destruction of hedgerows and tree lines will have a direct impact on local bat populations due to loss of sheltered feeding areas or interruption of vital commuting routes.

Two key habitat types are particularly important for foraging bats in Ireland: woodland and wetland. The areas of broad-leaved and coniferous woodlands are both increasing across the Irish landscape, with an average afforestation rate of c. 12,000ha per annum between 1980 and 2005. The area of woodland habitat has effectively doubled in the last 30 years and Government policy is for a continuation of planting at similar of even higher rates in the coming years with a target of 17% woodland across Ireland by 2030. Although planting targets have not been met in recent years, it is considered that the level of ongoing afforestation is in general compensating for the loss of hedgerows arising from roadway development and agricultural improvement. The quality of the replacement habitat requires further investigation however as it is likely that dense forestry plantations are of limited value to bats. Scrub can also be an important component of a bat's habitat and while there is evidence of scrub clearance in some areas, again mainly associated with agricultural improvement, there are also significant areas with increasing scrub encroachment due to abandonment. Although detailed statistics are not available on these changes it is considered that they are likely to be, at present, balancing each other out.

Wetlands, because of the high number of invertebrates they support, provide important feeding areas for many bat species. In general severe pollution of waterways is becoming less common in Ireland as evidenced by the results of our 2006 waterways survey which recorded Daubenton's bat at 91% of all sites surveyed (Aughney *et al.* 2007). And while extensive arterial and field drainage was practised in the past, this does not take place now on any significant scale. Overall, the availability of this habitat to bats is considered to be stable.

The wholesale use of pesticides and insecticides on the land is reducing the quality of certain habitats by reducing the available food for bats. Flies and beetles that lay their eggs in cattle dung are particularly important prey items for bats. Some chemicals used in eradicating lice in cattle persist in the cow's dung where they prevent insects' eggs from hatching. Consequently, there are now less dung beetles and flies for the bats to eat. Equally widespread

application of pesticides during forestry operations can have significant negative impact on prey availability for bats.

Current Action

Forestry

Ireland is committed to the principles of Sustainable Forest Management (SFM). As the national regulatory body for forestry, the Forest Service of the Department of Agriculture, Fisheries and Food implements SFM through its environmental guidelines and Requirements, the *Code of Best Forest Practice – Ireland* and its inspection, referrals and monitoring procedures. Forest Service Guidelines and Schemes have provided for the protection of biodiversity. To date, guidelines for specific species or habitats have not been published with the exception of the Forestry and Freshwater Pearl Mussel Requirements that were published in March 2008.

It is intended to publish guidelines in 2009 for selected Annex IV species, including bats. These Guidelines will include the requirement for systematic surveys for the identification of the species, their habitats, breeding and resting places in areas where forestry activities are planned and for the monitoring of the impact of those activities on the species.

Adherence to the Forest Service guidelines and Requirement is a condition for all grant aided, approved and licensed forest activities. The Forest Service has provided information days on biodiversity, the Forest Biodiversity Guidelines and national and European legislation and obligations (e.g. Wildlife Act, 1976; Wildlife (Amendment) Act 2000; Habitats Directive, Birds Directive) to Registered Foresters and Forestry Companies. The most recent information days were on the 11th – 13th of November 2008. The protection provided in the current Forest Service practices, schemes and guidelines for Annex IV species is detailed below.

Forestry practices and controls that prevent damage to protected areas include:

- Forest referral system – all applications (approvals and licenses) within or within 3km upstream of a designated area (SAC, SPA, NHA, pNHA) are referred to NPWS for comment
- Sub-threshold EIA assessment is part of all afforestation prior approval procedures
- Forest Service Guidelines and Requirements
- Forest Service inspection procedures (all applications receive desk inspection backed up by GIS data, selected sites receive field inspection).

The requirement to use insecticides is currently confined to the control of pine weevil in reforestation sites. In this regard, plants for use on restock sites are increasingly treated off site. Any chemical to be used in forestry must be on the up to date approved Pesticide Control Service list (www.pcs.agriculture.gov.ie or Pesticide Control Service, Department of Agriculture, Fisheries and Food Laboratories, Backweston Campus, Young's Cross, Celbridge, Co. Kildare) and used in accordance with Forest Service guidelines, in particular the *Forest Protection Guidelines* and the *Guidelines for the Use of Herbicides in Forestry.*

The conservation of biodiversity in all stages of the forest cycle, including the Annex IV species especially otters, bats and the Kerry slug, is inherent in Forest Service Guidelines and Schemes.

Forest Biodiversity Guidelines provide for the consideration of biodiversity in all Forest Service approved and licensed activities. Biodiversity factors (including habitats and species of particular interest) should be identified and incorporated into the site development plan. The Forest Biodiversity Guidelines state:

- Identify important woodland and non-woodland habitats present on the site, many of which may be of local significance even though they are not included within the formal nationally designated conservation areas. Their location should be indicated on the map and include a written description. This measure protects both foraging habitat and commuting corridors for bats.
- Note the presence of fauna of particular interest present on the site, such as birds of prey (buzzard, eagle, falcon, harrier, hawk, kite, osprey and owl) and important mammals such as badger, bat species, red deer, hare, hedgehog, otter, pine marten and red squirrel. Identify considerations for management e.g. specific nesting periods, suitable proactive measures such as the installation of bat boxes etc. Also note the location of features such as badger setts and heronries, together with a prescription for protection and enhancement measures e.g. broadleaf planting and heavier thinning in the proximity of badger setts. Therefore any Annex IV species present on the site should be noted and measures taken to ensure their protection and where possible, enhancement.
- Existing hedgerows, areas of low-lying scrub, pockets of native broadleaf cover and individual old trees should be retained to form wildlife corridors between forest patches. These corridors are essential as they facilitate the movement of both plants and animals between forests, providing biological continuity and connectivity. This measure is of particular benefit to bats.

- Approximately 2m^3/ha of deadwood (standing dead stems, naturally fallen trunks and/or felled logs) should be present on the site immediately after each thinning and approximately 5m^3/ha after final felling.
- Approximately 15% of the forest area must be treated with particular regard to biodiversity. These Areas for Biodiversity Enhancement (ABEs), which comprise open spaces and retained habitats, are aimed at encouraging the development of diverse habitats, native flora and fauna and biodiversity. Management can be used to encourage a gradual transition from ground layer within the open space through low-lying native shrub and medium sized native broadleaf trees to the forest canopy itself. Widely spaced groups of native broadleaf species associated with riparian zone habitats (e.g. alder, willow, birch, hazel) planted within the aquatic buffer zone can contribute greatly to water and ecosystem enhancement of adjoining aquatic zones. Retained habitats should be clearly designated both on relevant maps and on the ground during sensitive times such as planting, thinning and harvesting. In order to avoid disturbance, forest roads and extraction routes and all commercial operations should be excluded from these retained habitats. The sustainability of these habitats can be enhanced further by enforcing a 3m protective zone. All afforestation sites must have ABEs and they must be identified on the biodiversity map. The aim of the ABEs is to protect and enhance biodiversity and if Annex IV species are present on the site this measure can be used to protect the species itself and its breeding, foraging or resting site.

The Native Woodland Scheme (NWS) provides support for the protection and enhancement of existing native woodlands and to establish new native woodlands. NWS applications involve a site specific Native Woodland Plan (NWP) prepared jointly by an ecologist and a forester in consultation with the applicant. The NWS has a particular role in the development of native riparian woodland along streams, rivers and lakes - these are known to be particularly important habitat for bats. Part 2 of the NWP requires the identification of special habitats and species by seeking answers to the following questions:

- Are any of the habitats and species listed in Annex I or Annex II of the EU Habitats Directive or in Annex I of the EU Birds Directive, known to occur on the site? If so, specify and, where appropriate, show location.
- Are there any known protected species or Red Data Book species present? If so, specify, and where appropriate, show location.

- Are you aware of any other species on the site that may be considered rare, either regionally or nationally? If so, specify, and where appropriate, show location.

The Forestry Environment Protection (Afforestation) Scheme (FEPS) encourages farmers to combine the establishment of high nature-value woodland with their participation in the Rural Environment Protection Scheme (REPS). The objectives of the Scheme include:

- To encourage farmers to establish and maintain high nature-value forestry through measures such as increasing biodiversity and protecting water quality;
- To support, establish or provide habitat for wildlife;
- To encourage the provision of protective forestry, for example riparian planting;
- To produce a commercial crop of timber while making an enhanced contribution to the environment;
- To increase Ireland's woodland cover to contribute positively towards climate change mitigation.

In FEPS an applicant must undertake all 12 mandatory measures plus either six of the optional measures as outlined in Annex 3 of the Scheme document or plant as per the terms and conditions of the Native Woodland Scheme. The primary objective of the mandatory and optional measures is to make an enhanced contribution to biodiversity, archaeology or landscape. Mandatory measures that conserve and enhance species (includes species that are strictly protected) and habitats include:

- 18%- 20% of plantation to qualify as Area of Biodiversity Enhancement (as opposed to 15% in the afforestation scheme).
- The ABE of the forest to have approximately 5% Open Space, approximately 5% Retained or Created Habitat; any balancing % may be planted with widely spaced native trees or shrubs. If an Annex IV species is present on site the ABE may be tailored to ensure its protection and to enhance the habitat for that species.
- External Forest Boundaries: Where a hedge is present along an external boundary, maintain a setback of 5 metres from centre of the hedge, unless the hedge runs along a road, where normal setback distances apply. Where no hedge exists, either create new hedge boundary using local hedge species or where appropriate, establish a woodland margin with a mixture of local tree and shrub species. Roadside boundaries: All forests to have an indented roadside margin with a mixture of local tree and shrub species.
- 15% broadleaves minimum, where land is suitable or 10% broadleaves together with 5% of Scots Pine or other native evergreen trees. In

afforestation scheme there is a 10% broadleaf requirement site permitting.

FEPS optional measures that conserve and enhance species (includes species that are strictly protected and not) and habitats include:

- Create new habitat such as ponds, or extend existing ponds or wet areas.
- Provide deadwood for invertebrate populations.
- Create wildlife corridors between habitats.
- Install wildlife props: bat boxes, bird boxes, badger gates in rabbit fencing.
- Augment wildlife food supply – Plant fruiting/berry-bearing species or crab apple etc in ABE areas.
- In broadleaf plantations, include holly, Scots Pine or native shrubs, intimately mixed, or planted in groups, or a combination of both.
- Increase *average* set back from road and/or houses by 5 metres and use additional set back to establish undulating edges using local tree and shrub species.
- Widen internal hedgerows by planting 2 rows of an appropriate hedgerow species along each side.
- Where appropriate, increase riparian zone and plant with suitable species. Consult with Forest Service.
- Extend exclusion zone around monuments by 5m and plant as per woodland edge described in Option 8.
- Leave 20m unplanted corridors for future harvest road development and open space for loading areas, turning bays, on-site chipping areas etc.
- An alternative environmental option may be used. This option includes measures to protect and enhance conditions for a particular species.
- Develop woodland to a Native Woodland Scheme standard

Riparian corridor management

Riparian corridors provide particularly important foraging habitat for some bats species. Furthermore, large riparian trees can provide resting and breeding sites. Historically, the environmental impacts of drainage activities were seldom considered and these maintenance schemes were responsible for reducing the quality and quantity of riparian habitats available to bats. In recent years the Office of Public Works (OPW), who are responsible for these drainage programmes, has become aware of the effects of its activities on the natural environment. The OPW recognises the need to fully understand the impacts of drainage maintenance operations with the aim of both minimising negative impacts and focusing through studies and research on identifying future positive impacts (OPW 2006).

Agriculture

REPS (Rural Environment Protection Scheme), is a scheme designed to reward farmers for carrying our their farming activities in an environmentally friendly manner and to bring about environmental improvement on existing farms.

The objectives of the Scheme are to:

- Establish farming practices and production methods which reflect the increasing concern for conservation, landscape protection and wider environmental problems
- Protect wildlife habitats and endangered species of flora and fauna
- Produce quality food in an extensive and environmentally friendly manner.

Participants in REPS are required to carry out their farming activities for a five year period in accordance with an agri-environmental plan. They must comply with 11 basic measures, 7 of which are particularly relevant for the conservation of bats:

- follow a farm nutrient management plan prepared for the total area of the farm
- protect and maintain all watercourses and wells
- retain wildlife habitats
- maintain farm and field boundaries
- protect features of historical and/or archaeological interest
- cease using herbicides, pesticides and fertilisers in and around hedgerows, lakes, ponds, rivers and streams, except with the consent of the Minister
- produce tillage crops: without burning straw or stubble; leaving a specified field margin uncultivated where no nutrients or sprays are applied

Approximately 2 Million hectares are being managed under REPS in Ireland at present with 58,000 participating landowners (source: DAFF).

Additional payments may be made to a farmer for participating in Supplementary Measures (SM) one of which is particularly relevant to bats: SM 4 - Riparian zones. Participants in this measure create a zone of between 10 and 30 m (for salmonid or crayfish rivers), or of between 20 and 50 m (for pearl mussels rivers), in which vegetation is allowed to develop naturally, with additional planting of native trees where necessary to bring the tree cover to 50%. The riparian zone must be permanently fenced to prevent

livestock encroachment and the application of fertiliser or pesticide is prohibited without permission from the National Parks and Wildlife Service or the Central Fisheries Board. Lands managed in this way can provide ideal foraging habitat for bats. 256 farmers have opted for this additional measure to date with 427ha being managed specifically as SM 4 riparian zones (source: DAFF). REPS 4 ties in with the Heritage Council's Traditional Farm Building scheme where grants can be drawn down to repair old farm buildings in full recognition of their value for bats. There is also an additional option in REPS 4 to erect bat boxes around the farm.

Planning process

Article 32 of the EU (Natural Habitats) Regulations, 1997, requires planning authorities to ensure that an appropriate assessment of the environmental implications of a development proposal for the SAC in view of its conservation objectives is undertaken. Planning permission can be granted only after ensuring no detrimental effect, save under a small number of special circumstances. The DEHLG issued a circular in February 2008 advising Planning Authorities of their obligations with regard to Article 6.

Under the Planning and Development Regulations, a planning authority must refer all planning applications that might have significant effects in relation to nature conservation to the Minister for the Environment, Heritage and Local Government. NPWS examine applications for impact on the qualifying interests of designated sites and taking into account the provisions of domestic and European legislation. On the basis of this appraisal, the Department may recommend to the planning authority that further information should be requested from the developer (for instance, assessment of impacts on specific species) or that certain planning conditions should be included in a grant of permission. In cases where significant negative impacts on nature conservation may not be mitigated the Department may recommend to the planning authority that planning permission not be granted.

Guidance on Article 6 assessment is available at:
http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm#art6

Article 23.2 and Article 25 of the EU (Natural Habitats) Regulations, 1997 apply as do the Wildlife Acts (see 6. Protection above)

Future Action

- By 2010, ensure that suitable habitat in state and semi-state-owned lands is managed in a manner that is beneficial to the conservation of the bats.

ACTION: Coillte, FS, NPWS, Dept. of Defence, Department of Communications, Energy and Natural Resources (DCENR).

- From 2010, ensure that operations affecting watercourses, including 'bank improvement' for angling, take account of bats and retain features such as old trees and native bank side vegetation.

ACTION: CFB, FS, LAs, NPWS, RFBs, OPW.

- Ensure that REPS advisory talks include information on bat habitats where appropriate by 2009.

ACTION: DAFF, NPWS, Teagasc.

- By 2010, evaluate the effectiveness of the current NRA-recommended mitigation guidelines for the protection of bat habitats and ensure that the guidelines are updated as required.

ACTION: NRA, NPWS.

- By 2009, review with OPW their procedures and written guidance to ensure that it complies in all respects with the requirements of EU and national law for the protection of bats and their habitats.

ACTION: OPW, NPWS

Threat 3 Water pollution

Background

Wetland habitats produce large numbers of insects and are favoured foraging areas for many bats. Water pollution can lead to reduced numbers and diversity of insect prey for bats thus lowering the carrying capacity of an affected area. Severe pollution incidents can make stretches of water completely unsuitable for bats.

Water quality is monitored by the EPA in 13,200km of river and stream channel and in over 440 lakes, using a biological assessment method. The data are collected on a three-year cycle and it is clear that the standard of water quality has declined substantially since the early 1980s (Stapleton *et al.*, 2000). Although recent years have shown some improvement in the extent of river and lake water quality, 28% of river channels and 15% of lakes remain in an unsatisfactory condition (Lucey, 2006).

A worrying trend is the continuing decline in the number of river stations recording the highest biological water quality. Efforts need to be stepped up if Ireland is to meet water quality targets set out in the Phosphorus Regulations and indeed the more stringent targets of the EU Water Framework Directive.

Tackling pollution from sewage treatment and agricultural sources remains the greatest challenges (EPA, 2006a).

Almost all of Ireland's urban waste water, irrespective of the level of treatment, is discharged to estuaries and freshwaters. The most recent report by the OEE (EPA 2006a) concluded that 18% of waste water arisings received no treatment, 13% received preliminary treatment, 2% received primary treatment, 58% received secondary treatment, and 9% received nutrient reduction in addition to secondary treatment. It was evident that the frequency and method of emissions sampling was, in many cases, not to the standard required by law and was not sufficient to establish compliance with the relevant regulations.

Current Action

Waste water treatment

There has been major investment in water services over the past 10 years and the investment in municipal waste water treatment will yield improvements in the quality of receiving waters. While some dramatic improvements have been noted, such as the improvement in water quality in Dublin Bay resulting from the installation of secondary treatment at Ringsend, persistent problems remain, particularly at smaller plants around the country (EPA 2006a).

Improvement of wastewater treatment is being funded through continuation of the Water Services Investment Programme, funded by the Department of the Environment, Heritage and Local Government. The 2007-2009 Programme is made up of 955 projects that have an overall capital value of €5.8 billion. It includes 77 ongoing major schemes and 443 new schemes to commence construction in the period 2007 – 2009, while more schemes will advance through planning stages.

The Office of Environmental Enforcement (OEE) within the Environmental Protection Agency (EPA) was established in 2003 to improve compliance with environmental legislation in Ireland and ensure that those who flout the law and cause environmental pollution are held to account. The OEE delivers enhanced enforcement in two ways:

- It is directly responsible for enforcing EPA licences issued to waste, industrial and other activities.
- It supervises the environmental protection activities of local authorities by auditing their performance, providing advice and guidance, and, in appropriate cases, giving binding directions. In this respect, the OEE is a resource for members of the public who have exhausted all other avenues of complaint.

The OEE established the Environmental Enforcement Network (EEN) in 2004. The network aims to harness the collective resources, expertise and investigative capacity of all public sector agencies and government departments that can contribute to enforcing environmental law and stamping out illegal waste activity and other environmental crime in Ireland. Over 900 staff from about 50 agencies are now involved in the network.

The OEE has conducted a detailed analysis of water pollution in Ireland to pin-point areas of rivers that are being polluted by discharges from municipal waste water treatment plants. Of the 1,222 river sites known to be polluted in Ireland in 2003, almost one quarter of these were suspected to have been effected by discharges from a waste water treatment plant. Of these 354 sites, 22 were seriously polluted. The OEE has prioritised the seriously polluted sites where a waste water discharge was the main suspected cause of serious pollution. All relevant local authorities have now been contacted and instructed by the OEE to prepare action plans to improve plant management.

The Water Framework Directive

The EU Water Framework Directive (2000/60/EC) was transposed into National legislation by the European Communities (Water Policy) Regulations (S.I. No. 722 of 2003). The Directive requires catchments to be managed through the use of river basin management plans. The objectives for surface water bodies are to:

- prevent deterioration,
- protect high and good status waters where they exist,
- achieve the objectives of associated protected areas (where relevant) and restore waters of less than good status to at least good status by 2015.

Where improvements are necessary, the competent authorities must plan improvements through programmes of measures (POMs).

Extensive work on the screening and management of dangerous substances in watercourses, together with a nation-wide monitoring programme of the water quality of rivers, lakes and coastal waters are underway as part of Ireland's implementation of the Water Framework Directive (National Dangerous Substances Expert Group, 2008; EPA 2006).

River Basin Management

A practical guide to river basin management planning for public authorities was prepared by DEHLG (2008). This includes guidance on how the specific obligations in relation to nature conservation sites are to be addressed in practice within the overall river basin planning process. The guidance document is aimed at LAs, the EPA and other public authorities directly

involved in the river basin management planning process and who are involved in delivery of WFD objectives. It describes steps that these authorities should take to integrate objectives of regional planning guidelines, county development plans (with constituent Local Area Plans), Water Services Strategic Plans, and other pollution reduction and/or control programmes (e.g. forestry programmes, farm inspections, review of IPPC licences) with objectives of river basin management plans. LAs and the EPA are the authorities with primary responsibility for implementing the WFD in Ireland. The Water Framework Directive presents a major opportunity for strengthened protection of aquatic ecosystems and their associated terrestrial ecosystems.

Agriculture

New powers under the European Communities (Good Agricultural Practices for the Protection of Waters) Regulations enhance the enforcement tools available to local authorities to deal with agricultural pollution.

The Nitrates Directive (91/676/EEC) and Regulations for Good Agricultural Practices for the Protection of Water (S.I. 378/2006) attempt to avoid input of nitrogen and phosphorus to watercourses through better farming practices, including: limiting the amount, timing, and location of fertiliser application.

The Rural Environmental Protection Scheme (REPS) places a particular emphasis on preventing water pollution, and also aims to 'protect wildlife habitats and endangered species'. Subscribers to the voluntary scheme are required to maintain a clear buffer around watercourses of 1.5m for bovids, pesticides, insecticides, and artificial fertilisers, and 10m for slurry and animal manure.

Forestry

The *Forestry and Water Quality Guidelines* require the provision of buffer zones, the width of which depends of the site slope and soil, with a minimum width of 10m. Within the buffer zone, which includes the riparian zone, natural ground vegetation is allowed to develop, with additional planting of suitable riparian tree species. The aquatic zone, the vegetation in the buffer zone and the forest canopy provides foraging habitats for bats while the forest edge may be used as a commuting corridor, potentially increasing the area of foraging habitat available to bats. Measures required under the *Forest and Water Quality Guidelines* also benefit bats by protecting and providing undisturbed potential roosting sites.

One of the optional measures under the Forest Environment Protection (Afforestation) Scheme (FEPS) is to increase the riparian zone and to plant

with suitable species. Both FEPS and the Native Woodland Scheme (NWS) provide for additional measures to protect water quality. The role of riparian woodlands in protecting water quality and their potential value for species such as bats is reflected in the recent Forest Service publication entitled *Native Riparian Woodlands – A Guide to Identification, Design, Establishment and Management.*

Future action

Waste water treatment and water quality

- Continue the current annual monitoring programmes of rivers, lakes and coastal waters.

ACTION: EPA

- Continue to fund the improvement of waste water treatment nationally through the Water Services Investment Programme

ACTION: DEHLG

from EPA 2006a

- All local authorities should review the operation, maintenance and management of urban waste water treatment plants in their functional areas and prepare corrective action programmes for plants that are in breach of the standards. Priority should be given to implementing corrective action programmes at plants that are having a demonstrably negative impact on the waters to which they discharge
- Ensure that local authorities are giving priority to improving the management of waste water treatment plants.
- Seek to close identified gaps in the management of urban waste water sludges.
- Publish a revised manual on the treatment of waste water from single houses.
- Update guidance on discharges from small communities, businesses, leisure centres and hotels through the Environmental Enforcement Network.
- New powers under the European Communities (Good Agricultural Practices for the Protection of Waters) Regulations, 2005 enhance the enforcement tools available to local authorities to deal with agricultural pollution and the OEE recommends that local authorities fully enforce these Regulations.

Environmental Enforcement Network future actions

Key priorities for the future are:

- Consolidating and building on the regional approach to tackling unauthorised waste activity.
- Continuing to develop linkages between the OEE, local authorities, An Garda Síochána and the various other bodies enforcing
- Environmental protection legislation, particularly in relation to the detection, investigation and prosecution of environmental crime.
- Building capacity within the network for water enforcement activities.
- Launching and implementing the national environmental complaints system, including awareness-raising so that members of the public will know how to avail of the system.
- Implementing a consistent approach to conducting environmental inspections in all relevant authorities and agencies, to include training for enforcement officers in how to conduct environmental inspections.
- Developing the water enforcement working groups by focusing on farm inspections and water quality issues related to sewage.

Threat 4 Windfarms

Background

The increasing development of alternative energy sources has led to a new threat to bats. Work in the US and on continental Europe in recent years has shown that bats can be killed at wind turbines, sometimes in large numbers (Rodrigues *et al*. 2008). The development of wind farms can also lead to damage or disturbance of bat foraging habitat and commuting corridors. The Irish government is committed to increasing the proportion of renewable energy generated nationwide and the increasing spread of windfarms across the country has led to concerns about the potential for Irish bat populations to be affected.

Current action

EUROBATS, with input from NPWS, has recently reviewed the potential impact of wind farms on bats (Rodrigues *et al*. 2008). Several studies have been undertaken in Europe, in particular in Germany. From these it appears that impacts can vary greatly between sites and between species, with some wind farms showing no impact on bats and others leading to regular mortality and to clear disturbance of foraging and roosting behaviour. Eight of Ireland's nine vesper bat species are listed as "at risk of collision" (the exception being *Myotis nattereri*). However, much of the evidence accumulated to date, both in Europe and the US, points to seasonal migrations as the main period of risk. To date there is little evidence of any seasonal migration of bat populations into or out of, or indeed within, Ireland.

Disturbance of bat foraging habitat and commuting corridors can occur during the development of wind farms. However, careful siting can overcome most of these concerns. In particular, wind farms should not be located in areas of important foraging habitats such as river corridors, wetlands and woodlands, and the removal and disturbance of linear features (e.g. hedgerows, treelines) should be minimised.

The Department of the Environment, Heritage and Local Government has published guidelines for wind farm development (DoEHLG 2006). These guidelines state that:
The designation of an area for protection of natural or built heritage or as an amenity area does not automatically preclude wind energy development. However, consideration of any wind energy development in or near these areas must be subject to Ireland's obligations under the Habitats Directive (92/43/EEC).

Future action

- By 2010 conduct a review of bat mortality at windfarm developments. If mortality if found to be significant, amend DEHLG guidelines to reflect the need for more detailed consideration of bats during siting, construction and operation of wind farms.

ACTION: DEHLG

11. Review

This Threat Response Plan covers a three year period [2009 - 2011] and will be reviewed annually following publication. The reviews will examine progress on the implementation of actions and recommend updates where appropriate. The review will be organised and chaired by NPWS with input from other stakeholders as required.

12. Future Prospects

All nine species of vesper bats found in Ireland are considered to be in favourable conservation status (NPWS 2008). The quality and quantity of suitable habitat is generally stable or increasing; the agricultural and forestry sectors (which account for approximately 80% of Ireland's land use between them) are showing a growing awareness for nature conservation matters in general, and a number of significant steps have been taken in recent years to improve our understanding, and to secure the long term future, of vesper bats in Ireland.

A comprehensive monitoring programme for Irish bats has been developed. This Irish Bat Monitoring Programme has drawn on international best practise where available, but has also been innovative where necessary. Three separate schemes are now run on an annual basis and robust data is being collected for five of our nine vesper species. To better understand the needs of three further species a new centre of excellence for bat research in Ireland was established in 2008. This centre, manned by a team of dedicated bat researchers, will investigate the feeding ecology and population biology of our three woodland species - *Myotis nattereri, M. brandtii* and *M mystacinus* – and examine novel ways of monitoring these species with a view to developing and informing best international practise in this field. Furthermore, an extensive national distribution survey for all bats was initiated in 2008. The aim of this project is to systematically map the current distribution of Ireland's nine species of vesper bats by 2010. This data will in turn inform planning and development as well as conservation management policy.

A programme of education and information aimed at planning authorities, state bodies and agencies and the general public has commenced and will be expanded in 2009. In particular guidance about the protected status of bats in Ireland and the requirements of the Habitats Directive has been circulated to all Planning Authorities and to An Bórd Pleanála. This will be followed by targeted training courses during 2009. Up to date information has also been made available to the general public and further initiatives in this area will follow in 2009, including an expanded Bat Helpline service, in particular to homeowners concerned about roosts on their property.

Despite the considerable progress highlighted above, Irish bats continue to face significant threats. While measures are already in place to address aspects of these threats, further action is required in certain areas. This plan sets out those actions, identifies who is responsible for implementing them and provides a time frame for delivery. Continuation of the current monitoring and education programmes, together with implementation of the additional actions identified in this document, should ensure the long term favourable conservation status of vesper bats in Ireland.

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