

Environment & Heritage Service/National Parks and Wildlife Service

# ALL-IRELAND SPECIES ACTION PLAN

## BATS

April 2008



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



Environment &  
Heritage Service  
[www.ehsni.gov.uk](http://www.ehsni.gov.uk)



**All-Ireland Species Action Plan**  
**BATS**  
**April 2008**

This bat Species Action Plan (SAP) succeeds the draft Biodiversity Action Plan for Bats in Northern Ireland (Russ & Montgomery, 1999). The Irish population of Lesser Horseshoe bats (*Rhinolophus hipposideros*) is restricted to Counties Mayo, Galway, Clare, Limerick, Cork and Kerry in the Republic of Ireland and is therefore not included in this plan.

## **1 Current Status**

- 1.1** Bats are nocturnal mammals which, in Ireland, exclusively predate insects. Their range varies with species, from the Common Pipistrelle which is widespread throughout the island to Brandt's bat, which has to date only been identified from a few counties. This SAP covers nine of the confirmed resident bat species found in Ireland. These are Daubenton's bat (*Myotis daubentonii*), Whiskered bat (*Myotis mystacinus*), Natterer's bat (*Myotis nattereri*), Leisler's bat (*Nyctalus leisleri*), Nathusius' Pipistrelle (*Pipistrellus nathusii*), Common Pipistrelle (*Pipistrellus pipistrellus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Brown Long-eared bat (*Plecotus auritus*) and Brandt's bat (*Myotis brandtii*). Brandt's bat is similar to whiskered bat and its requirements are such that it is likely to occur in the north, though not yet recorded there.
- 1.2** There have been two major studies into the distribution of bats in Northern Ireland (Russ 1999, Allen *et al.*, 2000), and a National Bat Survey in the Republic of Ireland (O'Sullivan, 1994).
- 1.3** Between 1996 and 1998, Russ (1999) surveyed a random sample of 1km squares, selected from the Northern Ireland land classification (Murray *et al.*, 1992) using a time expansion bat detector. Common Pipistrelle, Soprano Pipistrelle, Nathusius' Pipistrelle, Leisler's bat, Brown Long-eared bat and *Myotis* species were identified. Allen *et al.*, (2000) compiled species distribution maps from data derived from householders' reports of bats in their homes, and from reports to the Northern Ireland Bat Group (NIBG) of grounded bats. It was reported that bat species were widespread across Northern Ireland, but interpretation of their distribution may be skewed due to biases in data collection methods. Population estimates can be made but their accuracy cannot be quantified.
- 1.4** In the Republic of Ireland, a 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 and it also raised the profile of bats with the general public

(McAney, 2006). A number of smaller surveys have also been carried out with funding from the Heritage Council (Keeley, 1999 and 2003; Roche, 1998; Shiel, 1999).

- 1.5** In 2004, Bat Conservation Ireland (BCIreland) received funding from the Heritage Council to set up an online database for bat records. NPWS have recently provided additional funds to further develop and populate this database. CEDaR, funded by the Environment and Heritage Service (EHS) of the Department of the Environment (Northern Ireland) and situated at the Ulster Museum, collates bat records for Northern Ireland.
- 1.6** There is anecdotal evidence that bat populations are declining in Ireland (Russ and Montgomery 1999). However, the data from ongoing monitoring of 3 species (Leisler's bat, Common Pipistrelle and Soprano Pipistrelle) does not support this (Roche *et al.*, 2005) and there is good evidence that Nathusius' Pipistrelle is expanding its range.
- 1.7** All nine bat species covered by this SAP are protected under the EU Habitats Directive (92/43/EEC). They are listed on Annex IV, which requires that a system of strict protection be put in place to ensure their conservation. The Habitats Directive is transposed into Northern Ireland law in the Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995. Bats are included in Schedule 2 of the Regulations which defines 'European protected species of animals'. In the Republic of Ireland the Directive was adopted through the European (Natural Habitats) Regulations 1997. Bats are also protected in Northern Ireland under the Wildlife (Northern Ireland) Order 1985, and in the Republic of Ireland under the Wildlife Acts (1976 and 2000). Both sets of legislation make it an offence to intentionally harm a bat or disturb its resting place.
- 1.8** Both the UK and Ireland are signatories 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.
- 1.9** The UK and Republic of Ireland are also signatories 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.

**1.10** The Irish Red Data Book for Vertebrates (Whilde, 1993) listed 5 bat species as Internationally Important (Lesser Horseshoe, Daubenton's, Leisler's, Pipistrelle and Long-eared), while the Whiskered bat and Natterer's bat were stated as having indeterminate populations due to the paucity of data. Only 7 species of bat were recognised in the country at that time. The most recent global assessments by the IUCN put all 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.

## **2 Current Factors Affecting the Population**

**2.1** Habitat change in the wider countryside and roost loss or disturbance were identified by Russ and Montgomery (1999) as the two major threats to bats in the island of Ireland. The bat species encompassed by this current SAP all have different habitat needs and these needs can be subdivided into habitat needs associated with summer roosts, foraging and hibernacula.

**2.2** Habitat change has two major effects: it can result in a loss of roosts and a loss of adequate foraging. Habitat fragmentation is also a major concern as bats rely on commuting routes through the landscape to link their varied seasonal habitat requirements. Treelines and mature well-managed hedgerows function as wildlife corridors, which provide cover and shelter between roost sites and foraging sites (Shiel & Fairly, 1998; Shiel *et al.*, 1998; Shiel *et al.*, 1999). A break in a hedge line for 10m or more can cut bats off from a foraging site (Entwistle *et al.*, 2001). There are also implications for breeding bats with hedgerow loss, because Leisler's bats have been shown to use hedgerow trees as advertising posts during mating (O'Neill, 2001) and the loss of these may have an effect on their ability to find a mate and to reproduce.

**2.3** In the island of Ireland all bats predate insects, but variations in morphology between bats have allowed species to specialise in different foraging habitats. Habitats especially used by bats include woodland edges and wetlands. However bats also forage over pastoral grassland and in some cases around white street lighting.

**2.4** Loss of foraging habitat can arise from a change in land use resulting in a loss of invertebrate habitat, land management measures which reduce the number of invertebrates present and a loss of habitat corridors which link roost sites to foraging sites.

**2.5** Changes in land use have been taking place in the island of Ireland since it was colonised by humans. However the loss of invertebrate populations has increased with the intensification of agriculture since the 1950s. Direct impacts on insects arise from the use of insecticides and indirect effects include the use of herbicides, which result in simplification and homogenisation of farmland habitats.

- 2.6** Changes in land management can range from an increased use of anti-parasitic treatments in farm animals which reduces the population of insects that can breed in dung, to changes in river management which may result in dredging or removal of dense stands of vegetation that provide habitats for water borne larvae.
- 2.7** The dependence on roost sites varies seasonally. Generally, the focus of attention has been on summer maternity roosts, as these contain the largest numbers of bats and are more frequently brought to the attention of bat workers by members of the public, usually the homeowners with roosting bats. Other important roosting sites include spring gathering roosts where some species gather in late spring before separating into smaller maternity groups, mating roosts around which individual males defend mating territories, and night roosts and feeding perches, which may be used temporarily during the night to rest or consume food. Prehibernal roosts are cooler sites used just before hibernation; sites that have a uniformly low temperature are used for hibernation (Russ and Montgomery, 1999).
- 2.8** Where large maternity roosts occur in dwelling houses this can be a cause of concern to the householders (McAney, 2006). In these cases, licences may be requested from EHS or NPWS. Such licences are provided for under Article 16 of the Habitats Directive, provided there is no satisfactory alternative and only for reasons of overriding public interest, preservation of public health, prevention of damage to property, the conservation of the species or where it can be shown that the conservation status of the bats will not be impacted. The removal of a maternity roost can have major consequences for a population because some bat species may have precise requirements for roost sites and exclusions increase the likelihood of population fragmentation. Early advice from local NPWS/EHS staff or NIBG/BCIreland volunteers can often help alleviate home owners concerns. In some cases practical assistance may be required as well (McAney, 2006).
- 2.9** Mature trees are also important for both roosting and foraging, especially when connected into a hedgerow or woodland. The main threat to the value of these trees comes from trimming or felling for health and safety reasons, or from adjacent developments.
- 2.10** Another major factor affecting some populations relates to the use of mammal-toxic pesticides to remove wood-boring insects from attics. This can result in direct bat mortality or the reduction of healthy reproductive condition in bats. As a result of the latter, *pre partem* events may produce a subsequent high mortality among the young.
- 2.11** Roosts and hibernacula under bridges may be lost due to bridge improvements. The practices of filling all voids with liquid concrete and using concrete to seal the undersides of bridges can not only result in a loss of roost space, but there is a possibility that bats may become entombed (Shiel, 1999). While EHS are often informed of bridge maintenance, it is the responsibility of all competent authorities to ensure that their activities do not adversely affect bat species. Notification of bridge

works in the Republic of Ireland to NPWS varies between local authorities. The result may be that roosts are being lost through a lack of information.

- 2.12** Another practice which may have a detrimental effect on bat roosts is the closure of caves and mines for health and safety reasons. Mitchell-Jones and McLeish (1999) provide guidelines regarding the structure of suitable ‘bat friendly’ security grilles around cave entrances. If caves are sealed without making the relevant authorities aware i.e. NPWS/EHS, roost sites may be lost because the microclimate of the cave may be altered.
- 2.13** Wind turbines may have a negative impact on bat populations. Johnson *et al.*, (2000) while studying bird strike, recorded that the number of dead bats found under wind turbines was sometimes greater than the number of dead birds. Guidelines for the planning process and impact assessments in relation to wind turbines and bats have been prepared on behalf of the Advisory Committee of the EUROBATS Agreement (Rodrigues *et al.*, 2006).
- 2.14** Climate change potentially will result in changes in the vegetation communities and insect populations. Summary predictions for temperature and sea level rise as a result of global warming have been modeled by the MONARCH project (Harrison *et al.*, 2001). Although these models indicate a much smaller impact in Ireland than in Britain any rise in temperatures could result in increased availability of aerial insects and potentially an increase in reproductive success among Irish bat species, although an increased occurrence of droughts could have a negative impact on species reliant on aquatic/riparian habitats for feeding.

### **3 Current Action**

- 3.1** In the Republic of Ireland, the National Roads Authority (NRA) has established guidelines and procedures that focus on the impacts on bats during the construction of new national road schemes and these can also be adopted for road realignment and bridge maintenance programmes (NRA, 2005). NPWS has recently published a manual (Kelleher & Marnell, 2006) which gives advice in relation to the legal protection of bats and provides guidelines on surveys and mitigation for bats during development works. NPWS has also published a review of the conservation status and needs of all nine vesper bats (McAney, 2006).
- 3.2** NPWS has a network of trained conservation staff throughout the Republic of Ireland. These field officers provide advice to members of the public in relation to all aspects of wildlife protection and conservation, including bats. They also advise planning authorities on the potential impact of developments on bat populations.
- 3.3** BC Ireland was formed as an umbrella group for existing bat groups. It organises public events and detector workshops to encourage volunteers and, with funds from the Heritage Council and NPWS, has developed a national database of bat records for

the Republic of Ireland. BCIreland also runs ‘Batline’, a telephone helpline service for members of the public, and coordinates elements of the National Bat Monitoring Programme on behalf of NPWS and EHS (see below).

- 3.4** In the Republic of Ireland, the Heritage Council has established a Bat Specialist Panel to survey listed buildings before renovation. The Heritage Council has also produced guidelines for local authorities regarding bat conservation and protection.
- 3.5** A National Bat Monitoring Programme is being developed in the Republic of Ireland, with much of the work now done on an all-Ireland level. In 2003 the Heritage Council commissioned the Bat Conservation Trust (BCT) to design a car-based survey for monitoring bats in the Republic of Ireland. This scheme has expanded year on year. In 2004, NPWS became involved and BCIreland took over project management for the scheme - fifteen 30km squares were surveyed; in 2005, eighteen 30km squares (1056km of monitoring transects) were surveyed. In 2006, with EHS cooperation, the car transect programme was expanded to 26 squares including 3 in Northern Ireland. In 2007 27 squares were surveyed with 4 of these in the North. Robust data is being collected for 3 widespread species – Common Pipistrelle, Soprano Pipistrelle and Leisler’s bat. The survey is also providing information on the expanding Nathusius’ Pipistrelle population.
- 3.6** NPWS commissioned a small pilot waterways bat survey in summer 2005 based on the established BCT protocol. This methodology is known to provide good data on Daubenton’s bat. The survey was rolled out across Ireland in 2006, with the cooperation of EHS. During June and July 2006, 207 people attended training courses throughout the island and data on over 100 transects has been returned for analysis. This scheme was also expanded in 2007, with almost 200 transects surveyed throughout the island. The waterways survey is funded by NPWS, EHS and Waterways Ireland and, as with the car-based survey, is being coordinated by BCIreland.
- 3.7** Preliminary studies aimed at monitoring woodland bat species are being funded by NPWS. These are trialling the Anabat – a bat detector system designed for remote monitoring. If successful, this approach should provide data on Whiskered, Brandt's bats and on Natterer’s bats.
- 3.8** In Northern Ireland, as part of the Northern Ireland Biodiversity Strategy, Local Biodiversity Action Plans (LBAPs) are being prepared by a number of local biodiversity officers. The LBAP framework provides a system by which the important habitats and species in a local area can be assessed and can include action plans for habitat and species which are of local interest and importance. For the Craigavon Borough Council area a Species Action Plan for Leisler’s bat has been prepared.
- 3.9** The locations of all known roosts in Northern Ireland are stored on the CEDaR (Ulster Museum) database, which makes data available for research, monitoring, conservation, education and commercial purposes.

- 3.10** EHS funds the post of Vertebrate Officer based at the Ulster Museum whose main duties include provision to the public of advice on bats and liaison with the Northern Ireland Bat Group, which carries out the associated practical work. Over 600 enquiries are dealt with in some years.
- 3.11** The Northern Ireland Bat Group, which receives grant aid from EHS, deals with the practical aspects of public enquiries and gives approximately 25 – 30 talks or workshops per year, promotes the awareness of bats and carries out other survey work.
- 3.12** The National Trust in Northern Ireland coordinates the Northern Ireland Bat Project, with funding from the Environment and Heritage Service. Detailed bat surveys have been conducted at most National Trust properties with buildings. Roost sites have been located and reports written to highlight the location of the bats to property managers. National Trust staff has been made aware of the importance of bats and building managers have attended a bat conservation course to make them aware of the potential for bats in buildings, their legal responsibilities and how to manage bats during building works.

## **4 Action Plan Targets**

- 4.1** Maintain the populations of all bat species in Ireland.
- 4.2** Maintain the present range of all bat species in Ireland.

## **5 Proposed Actions with Lead Agencies**

### **5.1 Policy and Legislation**

- 5.1.1** Ensure that bat conservation management requirements are recognised, and where appropriate, site protection policies are included in statutory and non-statutory plans (Development Plans and Local Biodiversity Action Plans)  
(ACTION: Local Planning Authorities (RoI), Bord Pleanála, NPWS, Forest Service (RoI), Coillte, DAF, DOE Planning Service, EHS, DARD, Forest Service (NI))
- 5.1.2** By 2009, retain bat-friendly tree composition, including retention or planting of small-leaved broad-leaved species, in specified forests.  
(ACTION: Forest Service (RoI), Coillte, NPWS)
- 5.1.3** By 2009, review *Planning Policy Statement (PPS2) on Planning and Nature Conservation*, to include policies relating to priority habitats and species.  
(ACTION: DOE Planning Service, EHS)

## **5.2 Site Safeguard and Management**

- 5.2.1 By 2009, identify sources of cross-border funding to facilitate the implementation of this action plan.  
(ACTION: NPWS, EHS)
- 5.2.2 By 2008, bring the procedures of DRD Roads Service into line with those employed by the National Roads Authority (RoI) regarding bat policies and procedures.  
(ACTION: DRD Roads Service, EHS)
- 5.2.3 By 2009, identify sites suitable for designation as Natural Heritage Areas under the Wildlife Acts for the protection of bats.  
(ACTION: NPWS)
- 5.2.4 Maintain database of records of all known bat roosts and make this information available to local authorities and developers as appropriate.  
(ACTION: NPWS, BC Ireland, EHS, NIBG, CEDaR)
- 5.2.5 By 2009, provide householders with support, advice and, where appropriate, with assistance, to best manage their bat roosts.  
(ACTION: NPWS, Local Councils (RoI) BC Ireland, EHS, DOE Planning Service)
- 5.2.6 By 2009, create a grant scheme for the maintenance of bat roosts in houses.  
(ACTION: NPWS, Local Councils (RoI), EHS)
- 5.2.7 By 2009, produce management plans for the enhancement of selected woodland/ riparian fringes, in order to increase roosting and foraging opportunities.  
(ACTION: Forest Service (RoI), Coillte, Forest Service (NI))
- 5.2.8 By 2009, promote co-operation between multiple owners of contiguous woodlands in order to ensure that the aims of this action plan are furthered as effectively as possible.  
(ACTION: Forest Service (RoI), Coillte, Forest Service (NI))

## **5.3 Management and Protection**

- 5.3.1 By 2009, develop, in cooperation with pest control companies, best practise guidelines for the correct treatments to use for wood-boring insect infestations where bats may be present.  
(ACTION: NPWS, EHS)
- 5.3.2 By 2009, begin investigations on habitat use by bats based on the Car Transect Survey data.  
(ACTION: BC Ireland, NPWS, Heritage Council, Northern Ireland Bat Group, EHS)

- 5.3.3 By 2009, develop a code of practice to promote bat conservation which is suitable for adoption by all owners of buildings that support bats.  
(ACTION: Forest Service (RoI), Coillte, DAF, DARD, Forest Service (NI))
- 5.3.4 By 2009, develop a protocol for researchers on the capture and handling of bats, to include advice on surveys during the breeding season.  
(ACTION: NPWS, EHS)
- 5.3.5 By 2008, ensure that the review of Animal Welfare legislation takes into consideration the needs of bats conservation and ecological research.  
(ACTION: NPWS)
- 5.3.6 By 2008, consider the provision of a Bat Notice to be fixed inside roosts and on occasion to outside roosts.  
(ACTION: EHS, NPWS)

#### **5.4 Advisory**

- 5.4.1 By 2008, ensure that information on bats is readily available for anyone who may be able to play a role in bat conservation.  
(ACTION: EHS, DARD, NPWS, DAF, Coillte)
- 5.4.2 By 2009, ensure that forest managers, private woodland owners, householders, local councils and conservation bodies have received training and advice on best land management, hedge maintenance and bat habitat enhancement.  
(ACTION: Forest Service (RoI), NPWS, DAF, Coillte, COFORD, EHS, DARD)
- 5.4.3 By 2008, produce practical guidelines on bat conservation for developers.  
(ACTION: NPWS, EHS)
- 5.4.4 By 2008, update and review the Red List of Irish mammals in light of the discovery of new bat species, amended IUCN categories and recent conservation status data.  
(ACTION: NPWS, EHS)

#### **5.5 International**

- 5.5.1 Develop and maintain links between Northern Ireland and the Republic of Ireland individuals and organisations to promote the exchange of information and experience in research, management techniques, education and conservation strategies.  
(ACTION: NPWS, EHS, BC Ireland, NIBG)
- 5.5.2 Continue cooperation with UNEP Eurobats including input into and the implementation of guidelines developed and published by Eurobats e.g. wind-farms, roost protection, monitoring.  
(ACTION: NPWS, EHS)

## **5.6 Future Research and Monitoring**

- 5.6.1 Continue car transect surveys annually at a minimum of 20 sites, including 3 sites in Northern Ireland.  
(ACTION: NPWS, BC Ireland, EHS, NIBG)
- 5.6.2 Continue waterways survey annually at a minimum of 50 sites, including 10 in Northern Ireland.  
(ACTION: BC Ireland, NPWS, Heritage Council, Northern Ireland Bat Group, EHS, Waterways Ireland)
- 5.6.3 By 2008, initiate monitoring programme of long-eared bat roosts.  
(ACTION: NPWS, BC Ireland, EHS)
- 5.6.4 By 2008, expand bat monitoring programme to include woodland bat species.  
(ACTION: BC Ireland, NPWS, Coillte, Northern Ireland Bat Group, EHS)
- 5.6.5 By 2008 initiate a bat distribution survey to target under-recorded species and under-recorded areas with a view to producing an updated Bat Atlas for Ireland by 2011.  
(ACTION: NPWS, EHS)
- 5.6.6 Carry out a strategic survey of bat distribution every ten years to establish the rate and extent of change of bat populations.  
(ACTION: NPWS, Forest Service (RoI), Coillte, EHS, Forest Service (NI), UWT)
- 5.6.7 By 2010 research cost-effectiveness of strategies for bat habitat creation and enhancement in areas of detrimental land use development.  
(ACTION: NPWS, EHS, COFORD)
- 5.6.8 By 2009 consider including a condition to licenses that information gathered during surveys etc. must be passed to national biological recording centres i.e. CEDaR in NI and to the National Biodiversity Data Centre in the Republic of Ireland.  
(ACTION: NPWS, EHS)
- 5.6.9 By 2008, promote practical research into bat ecology and biology, with particular emphasis on less well studied species i.e. *Myotis* spp.  
(ACTION: NPWS, EHS)

## **5.7 Communications and Publicity**

- 5.7.1 Raise awareness of bat conservation through ongoing public relations campaign, using press releases and news letters.  
(ACTION: NPWS, EHS, UWT, Local Bat Groups)

- 5.7.2 Continue to raise public awareness through the promotion of volunteer involvement in bat surveys e.g. All-Ireland Waterways survey; BCT National Bat Survey in Northern Ireland, as part of the UK Bat Monitoring Programme.  
(ACTION: NPWS, BC Ireland, UWT, EHS, Forest Service (NI), Local Bat Groups)
- 5.7.3 By 2008, establish an all-Ireland Steering Group for the delivery of this action plan to ensure that it is accepted and implemented by all relevant organisations.  
(ACTION: NPWS, Forest Service (RoI), Coillte, DAF, EHS, Forest Service (NI), DARD, UWT, Local Bat Groups)
- 5.7.4 By 2009, promote awareness in schools through a revised education action pack.  
(ACTION: EHS, NPWS)
- 5.7.5 Encourage monitored public access to key priority sites through guided walks and, where feasible, CCTV.  
(ACTION: NPWS, Forest Service (RoI), Coillte, EHS, Forest Service (NI), National Trust)

## 6 Links with Other Action Plans

- 6.1 This plan should be considered in conjunction with, among others, the all-Ireland Species Action Plan for the red squirrel and the following Northern Ireland Habitat Action Plans:
- Species-rich hedgerows
  - Parkland
  - Wet Woodland
  - Upland Mixed Ashwoods
  - Upland Oakwoods

## 7 References

- Allen P., Forsyth I., Hale P. and Rogers S. (2000) Bats in Northern Ireland. *Irish Naturalists' Journal*, Special Zoological Supplement.
- Entwistle, A.C., Harris, S., Hutson, A.M., Racey, P.A., Walsh, A., Gibson, S.D., Hepburn, I. and Johnston J. (2001) *Habitat management for bats: A guide for land managers, land owners and their advisors*. JNCC Peterborough.
- Harrison, P.A., Berry, P.M. and Dawson, T.P. 2001. Climate Change and Nature Conservation in Britain and Ireland: Modelling natural responses to climate change (the MONARCH project). UKCIP Technical Report, Oxford.
- HM Government (2000) *Biodiversity in Northern Ireland*. HMSO Belfast.
- Hutson, A.M., Mickleburgh, S.P. and Racey, P.A. (2001) *Microchiropteran bats: Global Status Survey and Conservation Action Plan*. IUCN/SSC Chiroptera Specialist Group. IUCN, Gland, Switzerland and Cambridge.
- Johnson, G.D., Erickson, W.P., Strickland, M.D., Shepherd M.F. and Shepherd D.A. (2000): Avian monitoring studies at the Buffalo Ridge, Minnesota Wind

- Resource Area: Results of a 4-year study. Unpublished report for the Northern States Power Company, Minnesota.
- Keeley, B. (1999) Bats in houses. Unpublished Report to the Heritage Council.
- Keeley, B. (2003) Survey of bridges on the River Barrow. Unpublished Report to the Heritage Council.
- Kelleher, C. & Marnell, F. (2006) Bat mitigation guidelines for Ireland. *Irish Wildlife Manuals* No. 25. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government. Dublin.
- McAney K (2006) Conservation Plan for Irish Vesper Bats. *Irish Wildlife Manuals*, No. 20, National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- Mitchell-Jones A.J. & McLeish A.P. (eds) (1999) *The Bat Workers Manual*. JNCC.
- Murray, R., McCann, T. & Cooper, A. (1992). *A land classification and landscape ecological study of Northern Ireland*. Environment and Heritage Service. Belfast.
- National Roads Authority (2005) *Best Practice Guidelines for the Conservation of Bats in the Planning of National Roads Schemes* National Roads Authority. Dublin.
- National Roads Authority (2005) *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*. National Roads Authority. Dublin.
- O'Neill J.K. (2001) *Aspects of the ecology and conservation of Leisler's bat (Nyctalus leisleri) in Northern Ireland*. PhD thesis. The Queens University of Belfast.
- O'Sullivan P. (1994) Bats in Ireland. *Irish Naturalists' Journal* 24: Special Zoological Supplement.
- Roche, N. (1998). A survey for bat roosts in Church of Ireland churches. A report prepared for the Heritage Council.
- Roche N., Catto C., Langton S., Aughney T., and Russ J. (2005) Development of a Car-Based Bat Monitoring Protocol for the Republic of Ireland. *Irish Wildlife Manuals*, No. 19. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.
- Rodrigues L., Bach L., Biraschi L., Dubourg-Savage M., Goodwin J., Harbusch C., Hutson T., Ivanova T., Lutsar L., and Parsons K. (2006). Wind Turbines and Bats: guidelines for the planning process and impact assessments. Doc.EUROBATSMoP5.12.Rev.3.Annex1
- Russ J.M. (1999) *The Microchiroptera of Northern Ireland: community composition, habitat associations and ultrasound*. PhD thesis. The Queens University of Belfast.
- Russ J.M. and Montgomery W.I.(1999) *Biodiversity Action Plans for Bats in Northern Ireland*. Report of the Environment and Heritage Service.
- Shiel C.B. (1999) *Bridge usage by bats in County Leitrim and County Sligo*. A report prepared for the Heritage Council.
- Shiel, C.B., Duverge, P., Smiddy, P. and Fairley, J.S. (1998). Analysis of the diet of Leisler's (*Nyctalus leisleri*) in Ireland with some comparative analyses from England and Germany. *Journal of Zoology*. 246: 417-425.

- Shiel, C.B. and Fairley, J.S. (1998). Activity of Leisler's bat *Nyctalus leisleri* in the field in south-east County Wexford, as revealed by a bat-detector. *Biology & Environment*. Vol. 98B, No. 2. 105-112.
- Shiel C.B., Shiel R.E., and Fairley J.S. (1999). Seasonal changes in the foraging behaviour of Leisler's bats (*Nyctalus leisleri*) in Ireland as revealed by radio-telemetry. *Journal of Zoology*. 249: 347-358.
- Whilde A. (1993) *Threatened mammals, birds, amphibians and fish in Ireland. Irish Red Data Book 2: Vertebrates*. HMSO, Belfast.

[www.batconservationireland.org](http://www.batconservationireland.org)

[www.bats-ni.org.uk](http://www.bats-ni.org.uk)

[www.bats.org.uk](http://www.bats.org.uk)

[www.coillte.ie](http://www.coillte.ie)

[www.ehsni.gov.uk](http://www.ehsni.gov.uk)

[www.npws.ie](http://www.npws.ie)

[www.nra.ie](http://www.nra.ie)

### **List of Acronyms**

BCIreland	Bat Conservation Ireland
BCT	Bat Conservation Trust
COFORD	Council for Forest Research and Development
DAF	Department of Agriculture and Food
DARD	Department of Agriculture and Rural Development
DOE	Department of Environment
DRD	Department of Regional Development
EHS	Environment and Heritage Service
HAP	Habitat Action Plan
HC	Heritage Council of Ireland
IUCN	International Union for Nature Conservation
LBAP	Local Biodiversity Action Plan
NI	Northern Ireland
NIBG	Northern Ireland Bat Group
NGO	Non Governmental Organisation
NMNI	National Museums of Northern Ireland
NNR	National Nature Reserve
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
NT	National Trust
RoI	Republic of Ireland
SAP	Species Action Plan
UWT	Ulster Wildlife Trust
VWT	Vincent Wildlife Trust



*Our aim is to protect, conserve and promote the natural and built environment for present and future generations.*

**Environment & Heritage Service  
Klondyke Building  
Cromac Avenue  
Gasworks Business Park  
Lower Ormeau Road  
Belfast  
BT7 2JA  
Tel: (028) 9056 9273**

**[www.ehsni.gov.uk](http://www.ehsni.gov.uk)**



*To promote the conservation, appreciation and sustainable use of our natural heritage and biodiversity.*

**National Parks & Wildlife Service  
Department of the Environment,  
Heritage & Local Government  
7 Ely Place  
Dublin 2  
Tel: (00353) (1) 8882000**

**[www.npws.ie](http://www.npws.ie)  
[www.environ.ie](http://www.environ.ie)**



An Agency within the Department of the  
**Environment**  
[www.doenvi.gov.uk](http://www.doenvi.gov.uk)



INVESTOR IN PEOPLE



Comhshaol, Oldhreach agus Rialtas Áitiúil  
**Environment, Heritage and Local Government**