

# Bats and Waterways

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## *Guidance Notes for: Planners, engineers and developers*

*December 2010*

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## Waterways in Ireland

Waterways are an important habitat for wildlife including bats. Bats are a species-rich group widely distributed throughout the range of waterways in the Irish landscape. Waterway habitats such as rivers, canals, lakes and ponds offer insect rich feeding grounds for bats. Due to their reliance on insect populations, specialist feeding behaviour and habitat requirements, they are considered as valuable environmental indicators of the wider countryside.

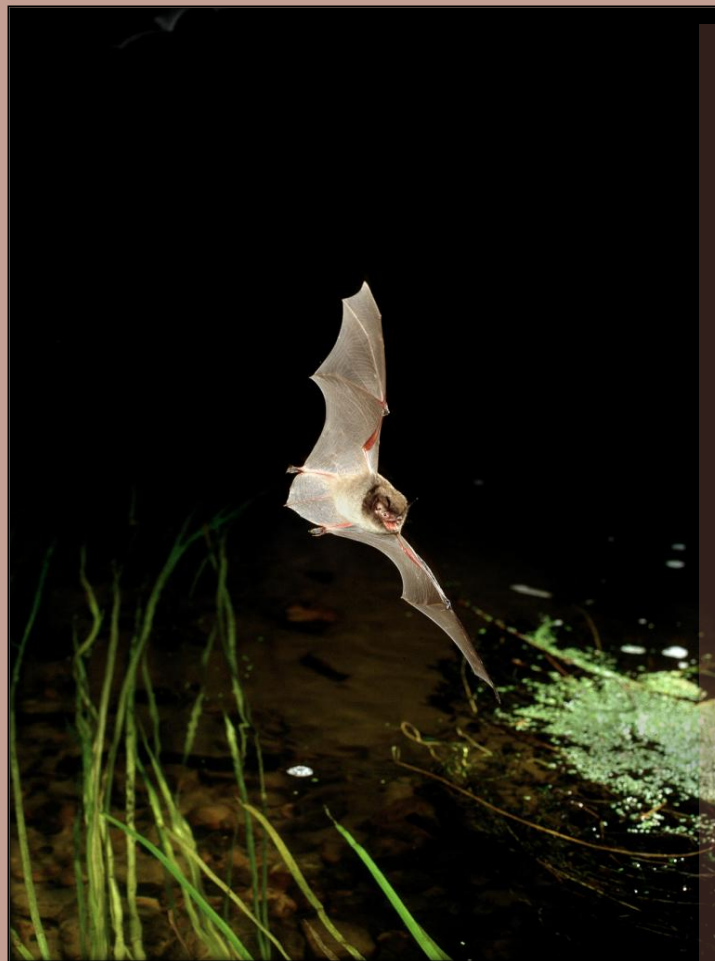
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### Important roosting sites

- *Crevices in stone work of old and modern bridges*
- *Crevices in stone work of sluice gates, pumping stations and tidal barrages*
- *Tree holes, spilt limbs and dead wood of mature trees especially adjacent to water courses, in woodland and parkland*
- *Trees with heavy ivy growth adjacent to water courses, along hedgerows and in woodland and parkland*

### Important foraging areas

- *Watercourses, especially those lined with hedgerows and treelines*
  - *Watercourses flowing through wooded areas*
  - *Watercourses with slow moving water*
  - *Extensively managed and grazed pasture adjacent to watercourses*
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Daubenton's bat foraging over water (© Frank Greenaway)



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Bat droppings can be deposited on stonework below an occupied crevice. Bat droppings crumble to touch and are less than 1cm long ranging from light brown to black in colour.

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## Recognising potential roosting sites for bats

*It is often difficult to tell if a structure is used as a bat roost because these small mammals can tuck themselves away from out of sight. Therefore, it is important to be vigilant for suitable roosting sites and for more obvious signs of occupation such as bat droppings (See Insert Below).*

*Irish bats are very small and a crevice greater than 50mm deep and 12mm wide can be used as a bat roost or allow the bat to access a larger chamber within the structure behind the crevice.*



*This 3D shape is 12mm high/wide and 50mm long, illustrating the dimensions of a suitable crevice for a single bat to use as a roost or to access a roost*

*Other evidence to be aware of are grease stains around access holes. As bats squeeze themselves through crevices oil from the bat's fur can leave dark polished surfaces indicating bat usage. In addition, the lack of cobwebs around a crevice can also indicate that it is used by bats.*



*Crevices should be checked by using a high powered narrow beam torch light or an endoscope. A single soprano pipistrelle was found in this crevice.*



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## Ireland's bat fauna

Ireland's bat fauna is comprised of nine resident species, forming one third of Ireland's land mammals. Eight species are vesper bats and all vespertilionid bats have a tragus (cartilaginous projection found inside the pinna of the ear). Vesper bats are distributed throughout the country. Nathusius' pipistrelle is a recent addition to the Irish list while the Brandt's bat is a potential tenth species.

Common pipistrelle *Pipistrellus pipistrellus*

Soprano pipistrelle *Pipistrellus pygmaeus*

Nathusius' pipistrelle *Pipistrellus nathusii*

Leisler's bat *Nyctalus leisleri*

Brown long-eared bat *Plecotus auritus*

Natterer's bat *Myotis nattereri*

Whiskered bat *Myotis mystacinus*

Daubenton's bat *Myotis daubentonii*

Brandt's bat *Myotis brandtii*

The ninth resident species, the lesser horseshoe bat *Rhinolophus hipposideros*, belongs to the Rhinolophidea and has a complex nose leaf structure. This species current distribution is confined to the western counties of: Mayo, Galway, Clare, Limerick, Kerry and Cork.

Bats are widely distributed throughout a range of habitats in the Irish landscape. Due to their reliance on insect populations, specialist feeding behaviour and habitat requirements, they are considered to be valuable environmental indicators of state and condition of the wider countryside.

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Above: Natterer's bat (Photo: Tina Aughney).



Below: Daubenton's bat (Photo: Tina Aughney).

## Bats and the Law

Due to increasing pressure on bat populations, all Irish bat species are protected by the 1976 Wildlife Act and 2000 Amendment. They are also protected under the EU Habitats Directive.

Consequently, it is a criminal offence to

- Intentionally kill, injure or take a bat
- Possess or control any live specimen or anything derived from a bat
- Wilfully interfere with any structure or place used for breeding or resting by a bat
- Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose

This is a brief summary of the main points of the law. Further details of the Wildlife Act and the Habitats Directive may be found on [www.npws.ie](http://www.npws.ie).

More information about bats and their conservation can be sourced from the following documents:

McAney, K. (2006) A conservation plan for Irish Vesper bats. *Irish Wildlife Manuals* No. 25. National Parks & Wildlife Service, DoEHLG. [www.npws.ie/en/PublicationLiterature/IrishWildlifeManuals](http://www.npws.ie/en/PublicationLiterature/IrishWildlifeManuals)

Kelleher, C. & Marnell, F (2006) Bat mitigation guidelines for Ireland, *Irish Wildlife Manuals* No. 25. National Parks & Wildlife Service, DoEHLG. [www.npws.ie/en/PublicationLiterature/IrishWildlifeManuals](http://www.npws.ie/en/PublicationLiterature/IrishWildlifeManuals)

Marnell, F. & Presetnik, P. (2009) Protection of Overground roosts for bats, *EUROBATS Publication Series* No. 4. [www.eurobats.org/publications/publications\\_series.htm](http://www.eurobats.org/publications/publications_series.htm)

Mitchell-Jones, A.J. & A. P. McLeish [Eds.] (2004) *Bat Worker's Manual*, 3<sup>rd</sup> Edition. Joint Nature Conservation Committee Peterborough.

**If a bat is encountered during operations, please stop works and contact your local NPWS Conservation Ranger. The national helpline number is 1800 405 000.**

**Bat Surveys – Bridges, masonry sections  
sluice gates etc.**

Bridges and similar structures are an essential for roosting bats. Surveys should be undertaken using the methodology described below. The survey methodology follows that of Billington and Norman (1997) and involves a grading system where the bridge or similar masonry sections of structure examined is categorised as follows:

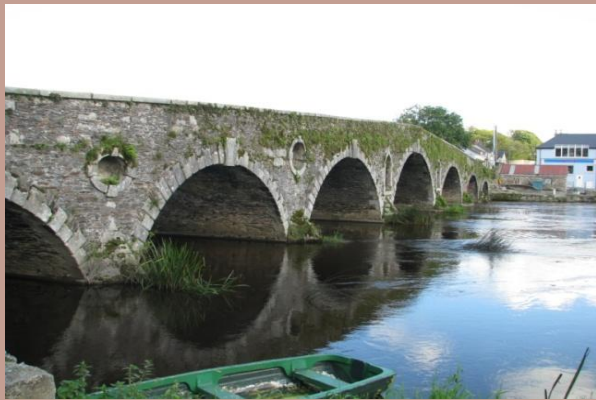
- 0 = no potential (no suitable crevices)
- 1 = crevices present may be of use to bats
- 2 = crevices ideal for bats but no evidence of usage
- 3 = evidence of bats (e.g. bats present, droppings, grease marks, urine staining, claw marks or the presence of bat fly pupae)

To complete this grading, each bridge or structure is inspected using a high-powered, narrow beamed torch or endoscope. The following sections of bridges should be inspected: crevices, holes, cracks and joints beneath bridge arches and abutments, joints within culverts and any external structures that may offer a roosting site for bats. Similar masonry sections of sluice gates, tidal barrages and pumping stations should also be inspected.

Where a bat is recorded but not identified to species level or highly suspected in a structure, a dusk bat detector survey should be undertaken. A dusk survey requires the use of a bat detector (Heterodyne, Frequency Division or Time Expansion). The surveyor should be in position 30 minutes before sunset and survey for a minimum of 2 hours.

Billington, G. E. & Norman, G. M. (1997) *A report on the survey and conservation of bat roosts in bridges in Cumbria*. Kendal: English Nature.

Below: Typical stone masonry bridge which often provides suitable roosting sites for bats (Photo: Hannah Denniston).



Below: An example of a modern concrete bridge. Expansion joints of such bridges may be used as roosting sites for bats (Photo: Ger Stanton).



Above: Brown long-eared bat roosting in a stone crevice (Photo: Tina Aughney).

**Historical Survey Results**

Bridges are considered to be important roosting sites for bats, in particular, stone masonry bridges. Irish bat species have been recorded in such bridges in previous independent surveys (Shiel, 1999 and Masterson et al, 2008). Such species include: Daubenton’s bat, Natterer’s bats, brown long-eared bat, whiskered bat and common pipistrelle bat. Additional surveys commissioned by local authorities have focused on stone masonry bridges because of their heritage value (e.g. Keeley, 2003). Therefore, an inventory of important bridges for bats can provide local authorities with information on ‘best practice’ for future maintenance works

Keeley, B. (2003) An initial examination of Bridges in Carlow and Kilkenny to evaluate the potential for roosting bats and the significance of bridge repairs for bat conservation. Report prepared for The Heritage Council, Carlow County County and Kilkenny County Council.

Masterson, M., Buckley, D., O’Brien, M. & Kelleher, C. (2008) An investigation into bridge usage by bats within the Sullane & Laney River Catchments, County Cork. Cork County Bat Group.

Shiel, C. (1999) Bridge usage by bats in County Leitrim and County Sligo. The Heritage Council, Rothe House, Kilkenny City.

**Timing of Surveys**

Bat usage can be very transitional. Therefore, it is essential that structures with suitable roosting sites are surveyed 2/3 times in a year to document seasonal bat usage.

Winter	Spring	Summer	Autumn
optional	recommended	recommended	recommended

**A BAT’S YEAR (January to December)**

J	F	M	A	M	J	J	A	S	O	N	D	
Hibernation – bats go into torpor to conserve fat reserves		Bats hungry and active, move from hibernation		roost to summer roosts	Maternity females gather and give birth to a single young			Bats leave summer roosts, mating takes place, prepare for hibernation				Hibernation



## **Mature trees, treelines and hedgerows**

All Irish bat species feed on insects associated with trees and shrubs, especially native species. The importance of trees to bats varies between bat species. Mature trees offer roosting sites for Leisler's bats all year around while other species such as Daubenton's and Natterer's bat will use them primarily in the summer. Tree species of particular importance include ash, oak, beech and Scot's pine.

Treelines and hedgerows are also very important linear landscape features for commuting bats in the countryside as bats prefer to travel in the shelter of such features to reduce predation. Loss of such habitats affects the ability of bats to travel safely from roosting sites to foraging areas. A gap of as little as 10m may force some species to seek an alternative commuting route and even change roosting sites.

### **Signs of bat roosts in trees, what to look for:**

- obvious tree holes, cavities, spilt limbs, dead wood, loose bark
- dark staining on the tree bark just below a hole
- staining around the outer edge of a tree hole
- tiny scratch marks around a hole from bat claws
- bat droppings below a hole or stuck to the bark
- on warm days, audible squeaking noises can be heard
- on close inspection of a potential roost, bats are visible or there is a musky smell of bat and bat droppings are present



Above: Leisler's roosts in dead branches of beech and oak trees respectively (Photos: Tina Aughney & Brian Keeley)



Above: Good foraging areas for bats along rivers (Photos: Daniel Buckley and Tina Aughney)

## **Conservation of tree and shrub habitat during works**

Retain mature trees and resist 'tidying up' dead wood and spilt limbs on tree specimens.

Retain treelines and hedgerows adjacent to watercourses.

Confine any management works on watercourses to one side of the channel to minimise damage to the wildlife corridor.

Where trees and shrubs have to be removed to access a watercourse, ensure that mature trees are assessed prior to works to determine wildlife value.

Protect treelines and shrubs to be retained during works.

Operate a tree and shrub management plan where removal of such is replanted with similar species within the same year of works.

### **What does bat urine staining look like?**



This staining (indicated by arrows) is often present in a regularly used roosting site including stone crevices, trees, buildings etc.



### Creating roosting sites for bats in bridges and other structures



A selection of suitable crevices in stone structures should be retained (similar to those illustrated in the photographs to the left). These can be filled temporarily with timber or bubble wrap while all remaining crevices are re-pointed by hand. Once works are finished, remove temporary filling. Crevices should be at least 25cm deep, by 15cm long and 1-3cm wide.

Left: Example of crevices retained for bats in bridge works (Photos: Caroline Shiel)



Above: Example of bat tubes incorporated into structures to create roosting sites for bats. Left: Bat tube was built into a new bridge. Right: Bat tube attached to the underside of a culvert. While 2 straps are shown here, it is recommended to use 3-4 straps to ensure long-term attachment. (Photos: Austin Hopkirk & Caroline Shiel)

Ready-made roosting boxes or tubes are available and can be easily inserted into structures to provide roosting sites for bats. Where natural crevices are not available or cannot be retained, a bat tube should be attached to the structure. Ensure that the bat tube is located at sufficient height (at least 1m) above winter flood waters to prevent residing bats from being drowned. Bat boxes are also available for attachment to mature trees or buildings

Below: Lesser horseshoe bat, an Annex II species



While this species is not a crevice dweller like all other Irish bat species and therefore unlikely to roost in bridge crevices, it is a species that is highly vulnerable to poor watercourse management. Uninterrupted treelines and hedgerows are essential for economic commuting by this species.

It is also likely to use stone structures adjacent to rivers as night roosts. Such roosts have an opening into the structure to allow unimpeded flight because this bat cannot land and crawl. It hangs freely from the roof. Buildings or structures used by this species should be retained with the appropriate openings: approximately 15cm by 30 cm in dimensions. This species has also been recorded hanging freely inside culverts and similar structures.

This species is only found in the western counties of Mayo, Galway, Clare, Limerick, Kerry and Cork. Therefore, works on watercourses in these counties must ensure that this species is considered. Please contact your local NPWS Conservation Ranger 1800 405 000.



*Bat potential of other structures found along waterways – how to assess?*



Examples of typical culverts that is **not suitable** for the erection of bat boxes or bat tubes. These structures are too low over the water level to erect safe roosting sites for bats as there is a potential of flooding.

*Bridges scheduled for maintenance need to be considered for the likelihood of bat roosting sites. Agricultural accommodation bridges and low profile culverts and bridges as shown above have a low bat potential due to the possibility of flooding.*



Above left: Large box culverts – fit bat box or bat tube internally at the highest

(Photos: Nathy Gilligan, OPW).

Above right: Road Bridge – fit bat box to soffit or face of bridge

*Minor maintenance works such as wing wall repair or underpinning foundations tend have little or no impact on bats. If in doubt do contact the local NPWS Conservation Ranger (1800 405000) However, larger maintenance (e.g. replacement or strengthening of structures above the water level works do require a bat assessment and contact with the local NPWS Conservation Ranger. Advice from a bat specialist maybe required in such circumstances to ensure that works do not impact on roosting bats.*



ABOVE: These trees are too immature to provide roosting sites for bat.



ABOVE: Trees with heavy ivy growth as show in photograph above can provide roosting sites for bats.

*Bat Box Schemes (BBS)*

*Pilot BBS is recommended, using either bat boxes or bat tubes, with yearly monitoring to determine species usage. Erect on bridges with soffit at least 1m above winter water-levels. This allows bats to safely drop into flight from bat boxes.*



## Case Study: Carrick Bridge, Foxford, County Mayo

**Bridge Type:** single-arch stone masonry structure.

**Bat Surveys:** completed in 2006 & 2007.

**Results:** a maternity colony of approximately 20 Daubenton's bats *Myotis daubentonii* was located in a large structural fissure under the arch. In addition, a single Natterer's bat was recorded in a small crevice in the stonework under the arch. Bats were recorded roosting in 7 separate crevices. The damaged section which was housing the maternity colony was large with many interconnecting voids in the stonework.

**Proposed Works:** strengthening of bridge.

**NPWS Derogation Licence:** applied for and received.

**Mitigation Measures:** Retention of numerous small crevices (Crevices were clearly marked with white paint for retention) in the stonework and retention of part of the damaged section used by the maternity colony. Works were timed to take place during the month of September when the nursery colony had dispersed. For structural reasons it was not possible to retain all the voids being used by the maternity colony. It was noted that there was one main void in the section used by the maternity colony. It was decided to concentrate on retaining this void. The retention of each crevice/void was discussed with engineers on site to ensure that their retention would have no impact on the stability of the structure.

**Bat Measures Completed Prior to Works:** The day before the repairs works were scheduled to commence a bat survey was conducted to investigate if bats were still present. A number of bats were found to be still occupying the bridge so it was necessary to devise a system to allow the bats to leave the structure at dusk but to prevent them from regaining entry. A heavy duty tarpaulin was hung on both faces of the bridge that could be easily lowered to water level after the bats had emerged. That evening the tarpaulins were lowered to effectively exclude the bats from the structure. All crevices marked for retention were stuffed tightly with bubble-wrap to prevent grout entering. A wooden platform was erected running under the length of the arch and was covered with heavy plastic in order to prevent any building materials falling into the water course. On completion of the works the bubble wrap was removed to allow bats re-access the site.

**Monitoring as specified by NPWS Derogation Licence:** The maternity colony returned to the large void retained for them in 2008 and have been recorded present each year since monitoring began.

Case Study provided by Dr Caroline Shiel.

## Case Study: Carrick Bridge, Foxford, County Mayo



Photographs (From Top left to bottom right): Carrick Bridge; Location of maternity roost (red arrow); Close-up of void used by maternity colony; Crevices marked for retention (blue arrows); Tarpaulins in place on bridge.



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**Bats Surveys** – surveying should determine potential roosting sites in structures and mature trees adjacent to the waterway, map important foraging areas and record the principal commuting routes to and from the waterway. This valuable information will allow a strategic plan to be formed in order to protect local bat populations using waterways in question. All bat surveys should undertaken at the appropriate time of year to collate the information required i.e. summer surveys to detect maternity roosts and winter surveys to detect hibernating bats.

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**Lighting** has increased dramatically over the last number of years with many new developments. This includes aesthetic lighting of bridges, monuments and buildings, flood lighting of sports grounds, street and road lighting and security lighting of urban and rural areas to name but a few.

Lighting can impact on bats' roosting sites, commuting routes and foraging areas especially along waterways. Bats commute and forage along dark wildlife corridors such as rivers and canals and consequently shy away from highly illuminated sections. Therefore, an illuminated structure such as a bridge can impede their flight to suitable feeding areas. Lighting along waterways should be avoided at all times. In addition, buffer zones (dark zones) should be included adjacent to waterways.

Please consult the BC Ireland leaflet - **Bats & Lighting: Guidance Notes for Planners, engineers and developers** for further information.

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## Good Practice for minimising impacts on bats along waterways

### Bat Roosts

Protect and retain roosting sites along waterways

Do not light up structures especially around exit points used by bats

Retain trees, hedgerows and shrubs adjacent to buildings and structures

Bat Conservation Ireland welcomes any comments on this leaflet. Please send them to [info@batconservationireland.org](mailto:info@batconservationireland.org). Leaflets will be reviewed and updated as required.

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### Foraging & Commuting

Ensure that linear habitat features leading from bat roosts to principal foraging areas are retained and protected

Avoid lighting at all times along rivers, lakes and canals

Avoid lighting along important commuting routes adjacent to waterways

Re-plant gaps in treelines or hedgerows with similar shrub and tree species