

IMPACT OF LIGHTING ON BATS

Demand for floodlighting has increased in recent years. Glowing night skies are rapidly replacing dark, starry skies. Buildings (including many churches) are being illuminated for aesthetic reasons. Previously dark rural locations are being lit up with increasing need for security on private and public property. Lighting is used along roads between towns, on bridges and on sport complexes. Excessive lighting not only causes light pollution and wastes energy but also impacts on the natural environment by affecting the activity rhythms of both plants and animals (Outen 1998).

All bat species are nocturnal, resting in dark conditions in the day and emerging at night to feed. Many species of bats are known to sample the light levels before emerging from their roost; only emerging for their night's hunting when the light intensity outside reaches a critical level after sunset (Swift 1980). Floodlighting disrupts the normal 24-hour pattern of light and dark which is likely to affect the natural behaviour of bats. Light near a roost access point will delay bats from emerging and shorten the amount of time available to them for foraging. Bright light may reduce social flight activity and cause bats to move away from the light area to an alternative dark area. Illuminating a bat roost creates disturbance and may cause the bats to desert the roost.

Due to the decline in bat numbers, all species of bat are protected by the Wildlife & Countryside Act (1981) and the Conservation (Natural Habitats etc.) Regulations 1994. This makes it illegal to: kill, injure, capture or disturb bats, obstruct access to bat roosts or damage/destroy bat roosts. Lighting in the vicinity of a bat roost causing disturbance could constitute an offence, unless English Nature has been consulted and allowed time to provide advice.

In addition to causing disturbance to bats in the roost, artificial lighting can also affect the feeding behaviour of bats. In most bat species there is an evening period of activity followed by another at dawn. These two flights correlate with the peak flight times of nocturnal insect prey. Insects are attracted to light particularly if it is a single light source in a dark area.

A range of lighting equipment is available with three basic types of street lamps used.

- 1) Low pressure sodium lights (typical yellow lamps seen along roadsides). Light is emitted at one wavelength, contains no ultraviolet (UV) light and has a low attraction to insects.
- 2) High pressure sodium lamps (brighter pinkish-yellow lamps). Light is emitted over a broad band of long wavelengths. Insects are attracted to the brighter light which are preyed on by some species of bat.
- 3) Mercury lamps (bluish-white lamps). These emit light over a very broad spectrum including UV light to which insects are particularly sensitive. Insects are attracted in large numbers along with high densities of bat species particularly of the genera *Nyctalus*, *Eptesicus* and *Pipistrellus*. (Rydell & Racey 1993)

Studies have shown that, although noctules, Leisler's, serotine and pipistrelle bats swarm around white mercury street lights feeding on the insects, this behaviour is not true for all bat species. The slower flying broad winged species such as *Plecotus*, *Myotis* and the *Rhinolophus* species avoid street lights. In an important bat site in Suffolk, numbers of Natterer's, whiskered, Daubenton's and brown long-eared bats fell following the installation of street lamps nearby.

Artificial lighting can increase the chances of predation. It is believed that *Plecotus* and *Myotis* species shun bright light as a predator avoidance strategy. Many avian predators will hunt bats,

which may be one reason why bats avoid flying in the day. Observations have been made of kestrels (diurnal raptors) hunting at night under the artificial light along motorways.

Floodlighting will deter bats from using their usual foraging areas. Lighting can be particularly harmful if used along river corridors, near woodland edges and near hedgerows used by bats. Studies have shown that continuous lighting along roads creates barriers which bats cannot cross. For example, Daubenton's bats move their flight paths to avoid street lamps. In Europe, in areas where there are foraging bats, stretches of road are left unlit to avoid isolation of bat colonies.

Small-scale lighting needs no planning permission and depends on direct advice being given to the householder. Lighting associated with new development or a listed building does require planning permission. Planning officers or Developers when dealing with applications for floodlighting in an area of suitable bat habitat (eg. woodland, old pasture, linking hedgerows and water habitats) should ensure the local bat group is consulted for any information on bat roosts in the area. If bat roosts are suspected, it may be necessary to conduct a bat survey. A survey may need to determine the species of bat affected, their population levels, the likely impact of the lighting on the bats and possible mitigation.

The need to install lighting should be questioned. Where lighting impacts on the local bat population, the benefits from the lighting installation should outweigh the needs of the local bat population. Where lighting is permitted, as may be necessary for public safety, conditions should be imposed to ensure the impact of the lighting on the bats is kept to a minimum.

The impact on bats can be minimised by: the use of low pressure sodium lamps instead of high pressure sodium or mercury lamps, mercury lamps used should be fitted with UV filters, the brightness should be as low as legally possible, the times during which the lighting can be used should be limited to provide some dark periods and the lighting should be directed to where it is needed to avoid light spillage. Any upward lighting should be minimal to avoid light pollution. Light can be restricted to selected areas by fitting hoods which direct the light below the horizontal plane, at preferably an angle less than 70 degrees. Limiting the height of lighting columns and directing light at a low level reduces the ecological impact of the light. Road or trackways in areas important for foraging bats should contain stretches left unlit to avoid isolation of bat colonies.

No bat roost (including access points) should be directly illuminated. If it considered necessary to illuminate a building known to be used by roosting bats, the lights will need to be switched off at bat emergence time and during peak bat activity times. During the months May - September a bat roost should not be illuminated outside after 8.30pm. Lighting of buildings should be limited to special occasions.

References

Outen, A.R. (1998) The possible ecological implications of artificial lighting. Hertfordshire Biological Records centre

Rydell J & Racey, P A (1993) Street lamps and the feeding ecology of insectivorous bats. Recent Advances in Bat Biology Zool Soc Lond Symposium abstracts

Swift (1980) Activity patterns of pipistrelle bats. J. Zool.London 190

The Institution of Lighting Engineers(1992) Guidance Notes for the Reduction of Light Pollution

These guidelines were compiled by Dr Jenny Jones May 2000