

SURVEYING FOR BATS AT PAIGNTON ZOO

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Paignton Zoo Environmental Park is owned and managed by the Whitley Wildlife Conservation Trust (WWCT) and is more known for its exotic species rather than native ones. Adjacent to the zoo is 25ha of land which makes up the Clennon Gorge nature reserve. This is also owned by WWCT but is managed for native species and is largely inaccessible to the public.

The whole site is a mosaic landscape of deciduous woodland, botanical gardens, scrub, grassland, artificial water bodies, buildings, disused limestone quarries and caves, providing a wide variety of potential foraging and roosting opportunities for bats. Part of the site is a designated county wildlife site for its semi-natural ancient woodland and calcareous grassland.

Paignton Zoo and its associated reserves sit in a sheltered valley forming a green link between the coastal areas and the agricultural landscape inland. The importance of such links for bats is well documented. They provide sheltered commuting routes between roosting and foraging sites and provide additional foraging in themselves. Clennon Valley has been identified as a potential flight corridor for Greater Horseshoe Bat *Rhinolophus ferrumequinum* and much of the work done at the Zoo by George Bemment has been to look at the Greater and Lesser Horseshoe bats that roost in the limestone caves on site. From George Bemments work we know that several bat species use the site but no data has ever been collected to look at the importance of the different habitats for foraging bats. Knowing how bats use the site and being able to see where the key foraging areas are, is vital if we are to manage the site with an aim of supporting bat populations. Reduction in the quality and availability of foraging sites is thought to be one of the main causes of population decline for many bat species.

Katie Luxmoore, a student from the University of Plymouth was keen to take up the challenge of investigating habitat use by foraging bats. A grant from the Devon Mammal Group enabled her to attend training days run by BCT and to purchase equipment that will also be used for future monitoring. Dr. Paul Chanin kindly spent a day with Katie and myself unraveling the mysteries of sound recording interpretation and provided further support in this area.

Katie carried out her study during 2009, investigating the foraging activity of bats in four different habitats within the zoo and WWCT reserves.

The four study habitats were:

Semi natural ancient woodland. Part of which is managed as hazel coppice with standards, there is a non intervention policy for the remainder.

Wetland. An artificially constructed lake and a series of moats, all fed by a small stream that flows through the site.

Semi-improved grassland: The selected area consists of a number of adjacent paddocks, all of which are grazed regularly.

Unimproved grassland: The fourth habitat was an area of unimproved calcareous grassland, bordered predominantly by immature trees and encroaching scrub.

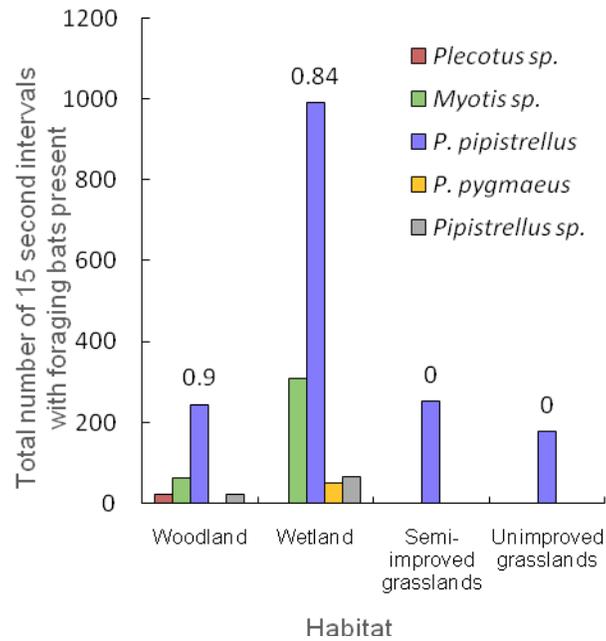
A Batbox Duet detector combined with an Eridol R-09 recorder was used to record bat activity at randomly selected points within each habitat area. Data was collected between 0 and 180 minutes after sunset, over 20 nights during June and July 2009. The species were identified from the recorded echolocation calls in combination with field notes made on flight and heterodyne sound.

Only foraging activity was included in the analysis although commuting bats were recorded and noted. In total nine species of bat were recorded: Noctule *Nyctalus noctula*, Serotine *Eptesicus serotinus*, Greater Horseshoe *Rhinolophus ferrumequinum* and Lesser Horseshoe *Rhinolophus hipposideros*, Common Pipistrelle *P.pipistrellus*, Soprano Pipistrelle *P.pygmaeus*, Barbastelle *Barbastella barbastellus*, *Myotis* species and *Plecotus* species (long-eared bats). The barbastelle was a new record for this site, identified and confirmed from a recorded single pass.

The foraging activity in the wetland area was higher than the other habitat areas; it was also more sustained with activity still high at the end of the three hour sampling period. Bat foraging activity peaks after sunset, when insect numbers are at their highest. As different bat species feed on a variety of insects and also have different hunting styles these peak times will vary between sites. Common pipistrelle was the most common species foraging in the deciduous woodland and wetland, and the only species detected in the semi-improved and unimproved grasslands. *Myotis* species foraged in both the deciduous woodland and wetland, Soprano pipistrelle foraged only in the wetland and *Plecotus* species were recorded foraging only in the deciduous woodland.

The woodland supported the greatest number of species, although the foraging activity was lower than the wetland habitat. There are difficulties in using ultrasound detection in woodland. This is due to the complex structure of the vegetation, which cause bats to alter their call to negotiate what is generally known as 'clutter'. This means that identification of bat calls can be difficult or impossible in these circumstances. Bats may also avoid places where there is too much 'clutter' as it is very costly in terms of energy to hunt in this environment. It has been suggested that coppiced woodland may be less desirable than other types of woodland due to a combination of exposed clearings and coppice regrowth. Surprisingly the unimproved grassland seemed to support few foraging bats despite good numbers of moths and other flying insects recorded from moth traps. Katie was unable to avoid nights when wind speed was higher and a combination of exposure to wind and potential predators may have influenced this result.

The outcomes of this study were to underline the importance of our wetland areas for foraging bats. Maintaining good vegetative cover on the margins and maintaining or improving the level of water quality is integral to conservation of this foraging area. Many questions were raised such as how representative are these areas of the rest of the zoo? Are there ‘hot spots’ not linked to particular habitats? for example the compost areas are known to attract bats. Further survey on the woodland is needed, particularly those areas not managed by coppicing. There are plans to introduce ongoing monitoring to increase our knowledge of how bats are using the site as a whole and carry out some dawn observation to see if any roosts can be identified. This type of information can inform site management which promotes conservation of native bats.



Total levels of relative habitat use for each species. Each bar represents the total number of 15 second intervals in which foraging bats were present, for the entire study (out of a possible total of 2000 intervals). Data labels above bars show the species diversity index for each habitat (H).