

Introducing BATS & The Millennium Link. A study of bats and their use of canal corridor habitat in the Central Belt of Scotland

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Abstract

The BATS & The Millennium Link (BaTML) project was launched in late 2000 with a view to studying the bat populations along and adjacent to the canal network that connects the east coast of Scotland with the west coast. Primarily the project set out to study three species of bat, namely; *Myotis daubentonii*, *Pipistrellus pipistrellus* and *Pipistrellus pygmaeus*. We herewith provide an overview surrounding the background to the project along with a summary of the various challenges we sought to tackle. In addition to this, where appropriate to do so, we comment upon progress to date with regards to some of our initial objectives.

Key words: *Myotis daubentonii*, *Pipistrellus pygmaeus*

Introduction

The BATS & The Millennium Link (BaTML) project was launched in late 2000 with a view to studying the bat populations along and adjacent to the canal network that connects the east coast of Scotland with the west coast. We commenced our survey programme in spring 2001 with a methodology designed primarily to monitor the following species of bat:

- *Myotis daubentonii* - Daubenton's Bat
- *Pipistrellus pygmaeus* - Soprano pipistrelle
- *Pipistrellus pipistrellus* - Bandit (or Common) pipistrelle

We herewith provide an overview surrounding the background to the project along with a summary of the various challenges we sought to tackle. In addition to this, where appropriate to do so, we comment upon progress to date with regards to some of our initial objectives.

As at October 2004 we have completed four years work and are confident that we will meet all of our initial objectives.

Background to the project launch

In 2000 the Forth & Clyde and Union Canals in the Central Belt of Scotland were, after heavy investment, in the process of being reopened to water traffic along their entire length (approximately 110 km). These canals were originally constructed in the late eighteenth (Forth & Clyde Canal) and early nineteenth (Union Canal) centuries (British

Waterways Scotland, website). During the latter half of the twentieth century they had been allowed to fall into disrepair and left to the devices of nature. This period of neglect came to an end in March 1999 when work commenced on a reopening programme that was scheduled to be concluded in May 2002.

Along with the clearing of the waterways came many other changes to the local infrastructure including; new sections of canal, new bridges, new aqueducts and new tunnels. This in turn also meant improved public access throughout the area.

The canal system is approximately 110 km in length and stretches from Edinburgh city centre in the east through to Bowling, a small town on the Firth Of Clyde, to the west of Glasgow. In addition to this, the Forth & Clyde Canal also allows boats to enter and exit the Forth Estuary at Grangemouth. By far the most spectacular evidence of the changes that were occurring can be seen in Falkirk where the two canal systems have been connected by The Falkirk Wheel. This unique structure allows water traffic to travel innovatively between the canals which lie at different heights above sea level. The Union Canal on average is 70 m above sea level, whilst the Forth & Clyde Canal sits at a lower altitude of approximately 40 m.

All of the fore-mentioned has, in many respects, meant considerable physical changes to the canal corridor, along with which comes the anticipated increase in leisure use, new business ventures and new housing developments that understandably are now being attracted into the area.

In amongst all of the excitement of technology and investment it must not be forgotten that one of the main attractions to places such as this is the natural beauty and the fauna and flora that inhabits these areas. In many respects the canal network is a valuable wildlife corridor allowing its natural inhabitants to feed, find shelter and commute to other areas of suitable habitat. Without this asset being carefully managed, the natural history of the area would most certainly suffer and it is indeed arguable that many of the people who are now starting to use the area more readily would begin to, once again, stay away.

Against this backdrop of change BaTML set out to monitor the impact that these developments were having upon the area. Studying aspects of the local biodiversity would help demonstrate a positive, neutral or negative impact upon the flora and fauna represented. Bats are a good indicator of an areas natural health because they feed upon vast amounts of insect prey, which in itself is a good indicator of suitable vegetation and in some respects water quality. As such we decided to explore the feasibility of conducting bat studies in the area.

After initial meetings with British Waterways in 2000, agreement was reached as to how such a project could progress, along with a commitment to contribute towards project costs. Further funding was then obtained from Scottish Natural Heritage and Falkirk Environment Trust in order that the specific study of bats along these canal corridors could begin in April 2001. A monitoring survey programme was agreed that anticipated carrying out in excess of 120 surveys at 22 randomly selected sites over a five year period. This initial survey methodology adopted a new and innovative method (Middleton *et al.*, in prep.) to measure bat activity and also collected data that could contribute towards other useful aspects of bat studies locally (i.e. finding and monitoring roosts, study of prey, foraging activity, use of commuting corridors, habitat use, interaction with other nearby sites).

There was however a major challenge in delivering what was seen by many as being a very ambitious set of goals. It became apparent early on that a combination of a few very dedicated individuals along with a larger group of volunteers would be required in order for the project to commence. We would also need to ensure that the momentum would be maintained for the five years envisaged to deliver the results. Initially we had hoped for circa six additional volunteer surveyors to support the initial hardcore of three bat surveyors. Various strategies were therefore adopted to ensure that the required volunteer base would be available. Local bat groups were approached along with other

organisations that could potentially have interested participants. We decided that a project newsletter could attract other people to join us and would also help to keep our supporters and funders up to date with our progress. Four years later we can proudly boast having an active annual volunteer base in excess of 30, with almost 100 people having assisted us to date with practical help. Our newsletter, with an original circulation of less than 25 in March 2001, is now issued to almost 190 people/organisations twice per annum.

Defining the initial scope of the project

During the planning and preparation stage for the project we quickly began to understand the advantages that our chosen habitat presented to us. Our original assessment concluded that the canal corridor was ideal for bat studies in a variety of ways, including:

- It is a large area focusing on one main feature involving fresh water (deemed valuable habitat for many bat species). It provides a link between many other valuable habitats via other connecting corridors (i.e. woodland and river systems).
- The canals themselves travel through a diverse range of other associated habitat.
- Unhindered access to the whole system is possible via the public towpaths.
- Other environmental studies had been carried out with regards to certain aspects of the local biodiversity. There would be opportunities to tap into some of this work and/or have relationships with new studies as they commenced.
- The area has captured the imagination of the general public in a variety of ways.
- The potential existed to involve volunteers from some of the most heavily populated areas in Scotland, within which three bat groups are also represented.

In order to support our work and ensure that we maintained our focus in the key areas where the success of the project would be judged, the following initial core objectives were put in place:

- Establish benchmark data regarding bat activity and monitor trends thereafter.
- Gather information regarding behaviour and use of habitat.
- Study the local insect populations (potential bat prey) and bat diet through the analysis of droppings.
- Establish the local geographic distribution for the three species of bat being studied.
- Locate, monitor and protect bat roosts found in the study area.
- Raise public awareness of bat related issues and improve the public image of bats overall.

- Contribute towards the various Local Biodiversity Action Plans that exist in the area.
- Share the experience we gain in pursuing the above objectives with a wider community through the publishing of our results, training events and formal/informal interaction with interested parties.

In preparation we also conducted two other important pieces of work as follows.

First of all we decided to make a number of educated assumptions about the impact that the changes to the canal corridor was likely to be for bats. In the fullness of time we would have many hundreds of hours of survey data that would help make some considerably more robust conclusions. In the meantime, however, we anticipated being regularly asked for an opinion and we felt that it was important to try and convey a balanced approach until such time as our results showed otherwise. Table 1 below describes our initial thoughts regarding the potential impact (positive or negative) to bat populations in the area. The list of changes described below is by no means exhaustive, however the ones shown were, in our opinion, the most relevant at the time.

Table 1: Potential impact of habitat changes to bat populations

Changes Taking Place (1999 onwards)	Potential Impact	
	Positive	Negative
Creation of new canal waterways (5.6 km) connecting existing waterways	YES	
Addition of new bridges and tunnels		
Creation of new habitat	YES	
Repair/Repainting of existing structures (i.e. old bridges, tunnels)		YES
Clearing the water surface of excess vegetation. Clearing of winding pools	YES	
Removal of bank side vegetation from towpath (92 km of towpath upgraded)		YES
Increased canal traffic disturbing canal bed and affecting insect populations		YES
Addition of artificial lighting to support new infrastructure		YES

Secondly, we were made aware that some bat work had been carried out in the past by various parties and we sought to find out exactly what the current knowledge of bats on these canals concluded. British Waterways, as part of the programme of developments for the area, had sought professional advice from various consultants regarding the impact of the proposed changes on local biodiversity and bats in particular. Unconnected to this work a number of other ad hoc bat surveys had also been undertaken on these canals by various other parties looking at specific aspects (Haddow, 1999) or contributing towards The Bat Conservation Trust's National Bat Monitoring Programme (Anon, 1998, 1999, 2000). In summary most of the work carried out previously did not highlight the canal habitat as being heavily used by *Myotis*

daubentonii. We proceeded with this in mind, however we did also have the benefit of some pilot work undertaken by ourselves in autumn 2000 that suggested, for some sites at least, we could expect to find good levels of bat activity. Some four years later we can report that all of our monitoring sites produce activity relating to *Myotis daubentonii*, albeit to differing degrees.

Monitoring survey methodology

In total 22 sites were randomly selected to be monitored over the five year period (2001 to 2005). The length of the canal network is approximately 110 km. Therefore on average we have a study location approximately every 5 km across the Central Belt of Scotland. Table 2 below describes the location of our monitoring sites.

Table 2: Location of BaTML monitoring survey sites

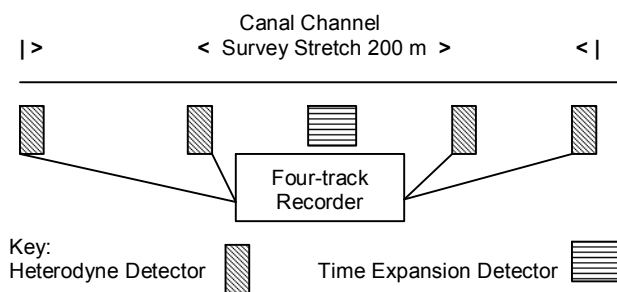
Survey Site Name	Canal	OS Grid Reference
Netherton	Forth & Clyde	NS5469
Possil Loch	Forth & Clyde	NS5870
Jellyhill	Forth & Clyde	NS6172
Kirkintilloch West	Forth & Clyde	NS6473
Tintock	Forth & Clyde	NS6874
Auchinstarry	Forth & Clyde	NS7276
Kelvinhead	Forth & Clyde	NS7578
Underwood East	Forth & Clyde	NS8079
Carmuir	Forth & Clyde	NS8580
Falkirk Tunnel East	Union	NS8878
Purliehill	Union	NS9078
A801	Union	NS9477
Causewayend	Union	NS9675
Avontoun	Union	NS9776
Wilcoxholm	Union	NT0177
Fawnspark	Union	NT0676
Winchburgh North	Union	NT0875
Learielaw	Union	NT0871
Wilkie's Basin	Union	NT1171
Gogar Moor Bridge	Union	NT1570
Slateford	Union	NT2270
Harrison Park	Union	NT2371

A bespoke monitoring survey system (Middleton *et al.*, in prep.) was developed. It allowed a number of aspects of bat activity to be recorded, including the initial direction of evening flight relating to *Myotis daubentonii*. This particular aspect would help to provide some useful detail regarding the possible location of roosts and in time would also tie in with other studies regarding the use of the habitat by bats for commuting and foraging purposes.

This monitoring survey system involves the use of four remotely positioned heterodyne bat detectors. Each detector is linked, simultaneously, by cabling to its own channel on a four-track recording station. These heterodyne detectors are used to record all of the activity relating to *Myotis daubentonii*. In addition to the heterodyne detectors, a single time expansion detector is positioned at the centre of the

200 m survey stretch and primarily serves the purpose of recording activity relating to *Pipistrellus* spp. Figure 1 describes the layout of the survey equipment. Each survey commences at 30 minutes after sunset and we record activity for 90 minutes thereafter. All data is recorded onto tape and analysed at a later date. The survey methodology also allows for the collection of habitat data and weather conditions.

Figure 1: Plan of the monitoring survey model



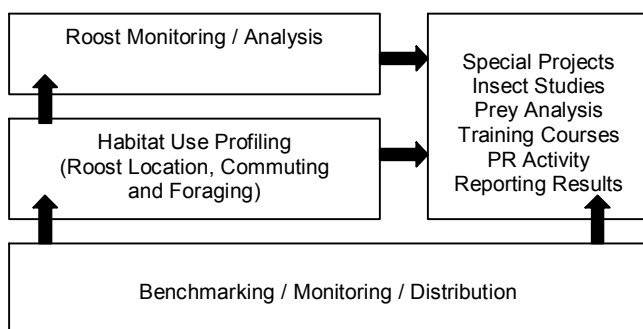
We initially recorded benchmarks for bat activity in the area during 2001 and thereafter began to monitor against our initial findings. By doing this we will be able to measure trends throughout a period of five years (2001 to 2005) and possibly beyond. After the end of the initial five year period (September 2005) we will report fully on our results.

BaTML Project Model

As discussed, prior to commencing with our practical activities, much preparation was required in order to put in place what was to be a fairly large project conducted by, potentially, only a small number of people. The preparation work covered many areas including; project planning, tendering for funds, stakeholder management, volunteer recruitment and the development of new survey techniques.

As the project has grown, more and more the necessity to explain simply the various aspects of our work became more apparent. As such during 2004 a higher level project model was created and this is reproduced below in Figure 2.

Figure 2: BaTML Project Model as at year end 2004



This flow chart shows how the various activities being carried out by BaTML relate to each other. Reports relating to most of our work will be made available as and when it is appropriate to do so.

Acknowledgements

The BaTML project relies heavily upon a network of enthusiastic volunteers, without whom we would struggle to come anywhere close to our goals. Unfortunately, these volunteers are too numerous to mention here, however we would like to thank everyone involved to date.

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References

- Anon. (1998/1999/2000). National Bat Monitoring Programme. Daubenton's waterway surveys of canals in central Scotland. The Bat Conservation Trust. (Unpublished).
- British Waterways Scotland, website details: www.scottishcanals.co.uk.
- Haddow, J. (1999). Bat Survey Of Falkirk Tunnel. Unpublished report prepared for British Waterways.
- Middleton, N. E., Gould, C., Macadam, C. R., Mackenzie, S. and Morrison, K. (in prep.). A methodology for surveying bats in narrow habitat corridors. (publication pending).