

The Urban Bat Survey Project

Contents

1. Executive Summary	2
2. Introduction	3
3. Aims of the project	4
4. Methodology	5
5. Results	11
6. Conclusion	29
7. Future	31
8. Feedback from Volunteers	32
9. Acknowledgements	33

This report is likely to be of interest to a variety of audiences. In the first instance it is for the volunteers who took part in the project and those wishing to become involved in future.

They will find the results and recommendations for future survey of interest.

For planners and developers the maps showing the survey areas with an Index of Occurrence, and hot spots of activity although this comes with a health warning that this is only a snap shot of activity and it should not be taken as a definitive map of bats in the areas surveyed.

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1. Executive Summary

The Urban Bat Survey took place across four areas of south Wales, Newport, Cardiff, Neath and Swansea. 228 volunteers, the majority of whom are new to bat conservation and survey work, took part in the training and the surveys. 108 one Km squares were surveyed and the volunteer time that was donated into this project is over 1194 hours. 24 squares had a High Index of Occurrence and 25 squares showed hotspots of bat activity.

This project was funded by Environment Wales, the Heritage Lottery Fund and the Countryside Council for Wales under the Count Bat project.



2. Introduction

The concept of the Urban Bat Survey Project stemmed from a similar project that was run in Scotland (Dundee City Bat Project¹) that aimed, amongst other things, to engage new volunteers in bat conservation.

This project in Wales was slightly different in that it was designed to act as a platform under the Wales Count Bat project. The Count Bat project's primary aim was to engage with so-called 'hard-to-reach' audiences such as urban communities, visually impaired, disabled groups, socially disadvantaged and minority ethnic groups. The urban bat project itself would not only target urban communities by definition, but it would also be the foundation for including other groups and have the added advantage of giving participants something tangible to work towards whilst taking place in a relatively safe environment. It would also facilitate greater integration between such diverse groups and the wider community.

Funding for this work came from the Heritage Lottery Fund, Environment Wales and the Countryside Council for Wales.

¹ The Dundee City Bat Project. January 2008, Bat Conservation Trust

3. Aims of the Project

The main aims of this project were:

- To engage volunteers new to bat conservation
- To increase an awareness and appreciation of bats and to the role of biodiversity science
- To record and map bat activity in the urban environment
- To develop new skills in volunteers so that they can go on to do other types of survey such as the National Bat Monitoring Programme surveys

Additional aims

- To identify areas for further survey and conservation work

All information gained would be passed to the South East Wales Biological Records Centre, the Countryside Council for Wales and the relevant local planning authorities. A copy of the data has also been passed to Dr Kirsty Parks at Stirling University where it is hoped that there will be a PhD studentship into urban bats and to Dr Dan Forman at Swansea University.

3.1 Background

Bat numbers have declined over many years and as a result, bats have been legally protected since 1981. Although some species are showing some signs of recovery² their secretive nature and lack of widespread and accurate survey data has meant that conservation measures and land-use planning decisions are often based on insufficient information.

At a practical level, there is a misconception that using a bat detector and surveying for bats requires expensive high-end equipment. The reality is that surveying for bats can be undertaken relatively cheaply and that even simple survey methods can produce good quality information.

² BCT NMBP report

4. Method

The project ran started in mid 2008 with no anticipated end date as the project should continue to evolve.

During summer 2008, bat groups and local biodiversity partnership officers³ were invited to take part and as a result, the project was taken forward in the Newport, Cardiff, Neath and Swansea areas working with the local bat group and or LBAP partnerships⁴.

4.1 Role of the bat group / LBAP Partnership

In each area, the bat group and/or LBAP partnership were asked to recruit volunteers and to identify suitable venues for training presentations. The preferred method for advertising was left for local decisions with support from BCT if it was required. Extensive use was made of LBAP partnerships that already have long lists of contacts from a wide range of organisations.

As well as press releases to local papers and community newsletters such as Swansea Environment Centre's GreenLight, group also advertised on their LBAP web page⁵ as well as intranet services and these also attracted several enquiries. On another occasion, the local Swansea Sound radio station was made aware of the project by one of the volunteers and this resulted in a live interview with Radio Swansea one Friday evening.

It was decided that the production of fliers would not be undertaken, as previous experience⁶ has shown these not to be effective in recruitment. As the project continued it was anticipated that other volunteers would come forward through word-of-mouth, as well as those joining from so-called 'hard-to-reach' audiences.

4.2 Role of Bat Conservation Trust

BCT had two main roles:

- a. to provide the loan of equipment. This was principally bat detectors (either heterodyne Magenta 4/5, or Batbox Batons, and in some circumstances, digital recorders (Creative Zen V 2Gb). Hi-vis jackets were also available.
- b. to provide training and technical assistance.

³ LBAP officers usually are hosted by and sit within their relevant local authority

⁴ Bat groups for Cardiff and Newport; LBAP partnerships for Swansea and Neath

⁵ <http://www.swansea.gov.uk/index.cfm?articleid=29784>

⁶ Discussion with Anney Youngman (BCT Scottish Bat Officer) and Catalena Angele (Cardiff Bat Group)



Indoor training at Swansea © Jo Mullett

4.3 Role of South East Wales Biological Records Centre

SEWBReC is one of the four local records centres in Wales. They were approached to assist in the project, not only because they would have an interest in the data but also because they are able to undertake the mapping of data and produce maps under their Ordnance Survey licence agreement.

4.4 Survey method

The survey method was a walking survey based on a 1 Km square. Where possible, participants were allocated a 1 Km square that encompassed the area in which they lived. This had the advantage that not only did surveyors not have to drive to carry out their survey, but this would also be 'their' adopted patch so that they could get to know the bats in that immediate area. However, some surveyors were keen to survey their own village area rather than travel into the main survey area. Where this remained within the local postcode then volunteers were not discouraged. They were asked to identify a route, preferably a circular route, starting from their homes if possible that passed through their urban environment. Participants were asked not to specifically target entire areas most likely to find bats although they could include such areas within the route. The route should ideally be about 1 Km long although this would mean that only a portion of that 1Km square would be surveyed.

Three survey windows were identified: w/c 6 June 2009 to coincide with Wales Biodiversity Week, w/c 25 July and w/c 12 September these being six weeks apart. Although participants were asked to try to carry out the surveys in those weeks, it was not imperative that that happened as there could be many reasons why a survey could not take place. Surveys were to start at sunset – the time of sunset have being determined from <http://www.good-stuff.co.uk/suntimes>.

Participants were asked to identify set recording stations or survey points along the route. From the start point, these survey points should be about 100 metres apart although Health and Safety considerations and the route itself might mean that this distance varied a little. At each survey point, surveyors would listen out for bat activity using their bat detector tuned to 50 KHz and record within a two-minute period, the number of bat passes and the number of feeding buzzes. This would possibly help to identify foraging areas as well as flight lines. Surveyors were not asked to identify bat species as the project was designed to be as simple as possible for people with little or no previous experience. It was anticipated that the route should take between 40 and 60 minutes to walk and survey.

When bats first leave a roost after sunset they are hungry, they will not have fed since just before dawn and adult females may have been suckling a baby bat (so are extra hungry). Their priority is to reach a good feeding place as quickly as is safely possible. To do this they tend to follow particular flight lines to reach favourite feeding areas. These flight lines are usually landscape features such as hedges or tree avenues. This behavior is sometimes called commuting.

While commuting the bats tend to fly fairly fast and relatively straight, they emit echolocation calls which are heard as bat passes on a detector. Bat sounds heard when bats are commuting sound like a variety of popping or clicking sounds.

They may make some feeding buzzes if they encounter insects along their route but their main purpose is to get somewhere else to feed. Someone standing under or near a flight line and listening with a bat detector would expect to hear lots of bat passes but few feeding buzzes. In addition if it was light enough to see bats flying they would generally all be heading in the same direction. Seeing and hearing these signs would indicate that the surveyor was beside or on a bat "flight line".

Flight lines can be identified where lots of bat passes are heard (or seen), where bats appear to be flying in a particular direction and where few feeding buzzes are heard.

Foraging areas can be identified where both bat passes and feeding buzzes are heard and if bats are visible appear to be flying a regular backwards and forwards beat.

From Dundee City Bat Project report

Survey forms were provided and surveyors were asked to return these to their local bat group or LBAP contact as soon as possible after each survey. Surveyors were asked to record as a minimum, the names of all people who undertook that survey, start and end times, brief weather conditions, and brief details of each survey point. Not only did this permit a better picture of bat activity, but it also meant that there was a greater chance of squares being surveyed if people were going to be away or if weather conditions did not allow a survey to take place. Surveyors were instructed not to survey if the temperature was below 10 degrees as bat activity decrease below this temperature, or

if conditions were particularly wet and/or windy. Surveyors could also, record other useful information as they saw fit for example, direction of bat flight that might indicate flight lines.

4.5 Maps

Maps were provided to each survey team so that they could mark on the map, the route and the survey points. This would enable grid references to be determined at a later date. At the time of preparing this report, not all maps have been returned.

4.6 Health and Safety

It was essential that Health and Safety considerations were paramount throughout the project. In deciding the route, participants were instructed

- to avoid areas that they knew or suspected might pose a danger to them such as areas where they might feel threatened or vulnerable, and locations close to water;
- to work in groups of at least two people; and
- to familiarise themselves with the route by walking it during the day before starting the survey

4.7 Training

For each area, an introductory presentation was given. This described the project and why it was important for bat conservation. The presentation described the survey method, route selection, Health and Safety considerations, and what was expected of people if they wanted to get involved. This enabled potential volunteers to have a reasonable understanding of what was required and therefore if they could devote the time to the project.

Those who wished to take part were invited to attend a second training session, which went over the survey method again and introduced surveyors to their bat detector and how to use them. Participants could choose to use either the heterodyne Magenta detectors or the Batbox Baton. They were shown how to switch on their detector, and for heterodyne detectors, how to tune them. Recordings of bat activity, pipistrelles, noctules and myotis bats were played so that surveyors could hear what bat calls sound like. They were also provided with the WAV recordings to listen at home. Participants were also made aware of non-bat sounds that they might encounter such as clothes swishing, jangling keys, dog chains and so on.

A second follow up training session was offered to take place after the first survey window. This gave participants an opportunity to come together to share their experiences and to raise any issues they had encountered during the first survey.

Post survey training, was offered not only to develop further the skills that volunteers had gained during the 2009 season but also to give them an idea of what they could go onto do. This took the form of a one-day session held at Swansea University, at which two programmes were delivered. The first is called Using Your Ears and it is a standard BCT National Bat Monitoring Programme training package to teach surveyors the



Photo – follow up training at Roath Park, Cardiff © BCT.

finer art of how to listen to and get more out of a heterodyne detector. The second was a basic introduction to sound analysis – the sort of equipment needed, the software programmes and how to go about recording bat sounds for analysis.

4.8 Data analysis

Bat survey data was extracted onto a single spreadsheet and an Index of Occurrence or ‘battiness’ of a square was derived by counting the number of survey points that recorded bat activity – bat passes and feeding buzzes. This gave a score ranging from Zero (no activity at all) through to 10 (activity at each recording point). Scores ranging from Zero to 3 were ascribed as Low, those ranging from 4 to 6 as Medium and those ranging from 7 – 10 as High. Zero was included in Low as a zero return does not itself mean that there is no bat activity in that square, rather that bat activity was simply not recorded on the survey nights. Where recorders made more than 10 stops only the first 10 records have been included in the Index but for consistency, however all data has been considered in the evaluation. No assessment has yet made of the proximity of the High/Medium Index squares to features that might be favourable for bats.

Where a survey extended into an adjoining square then each square was treated separately for the purpose of analysis.

5 Results

5.1 Volunteer input

	Nos Volunteers took part	Nos 1Km squares surveyed	Time spent surveying hrs	Total time spent training	Total time spent
Swansea	55	32	145	131	276
Neath	22	11	45	132	177
Cardiff	141	58	315	247	562
Newport	10	5	13	24	37
Co-ordinators	5				142

Across the 4 areas, 254 people came along to the initial presentations to find out more about the project and of these, 228 continued with the project and took part in the training and subsequent surveys.

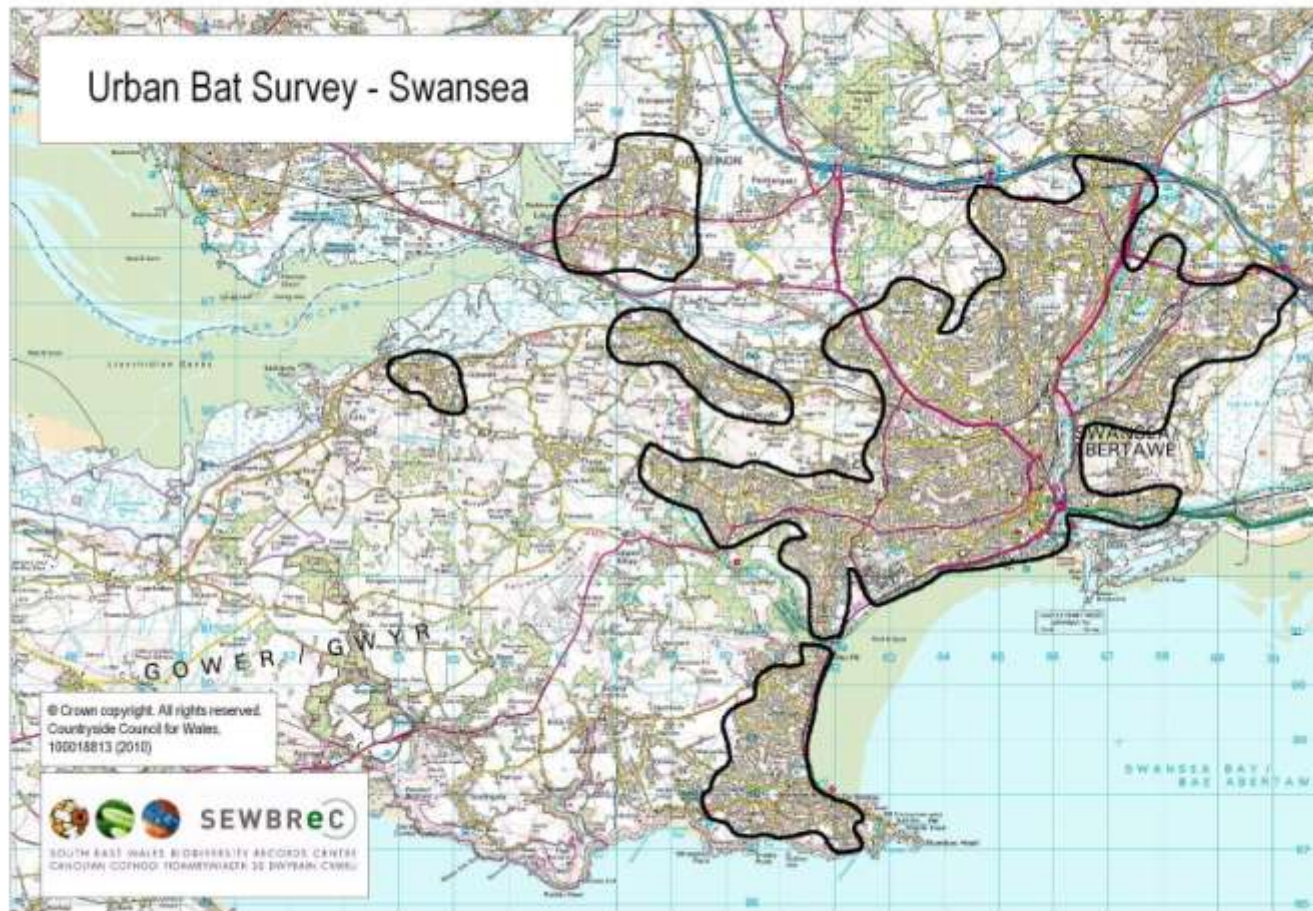
The total contribution was 1194 hours of volunteer time and it is likely that this is an underestimate.

5.2 Survey areas

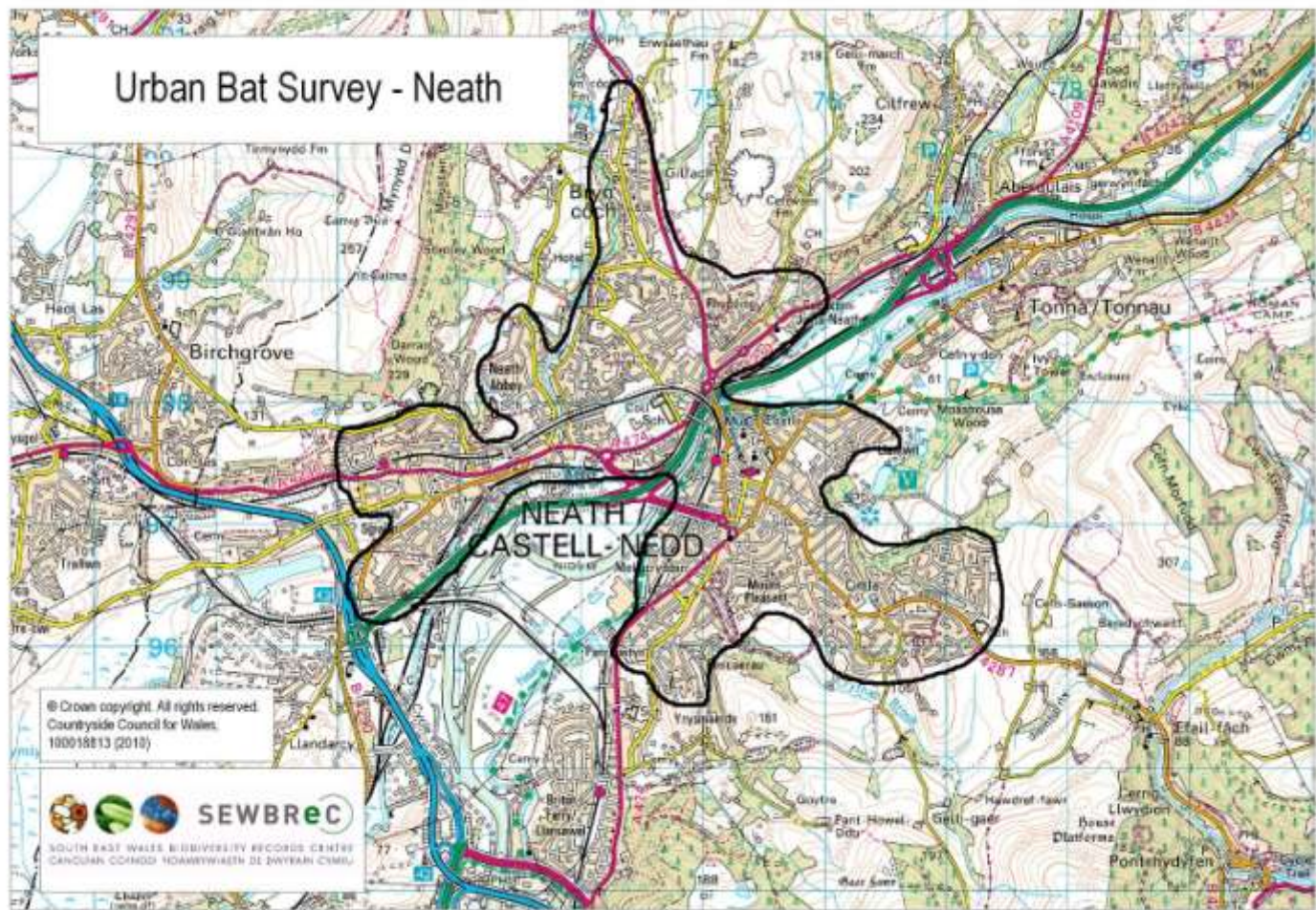
Map 1 – 4 show the intended areas to be covered by the project. It was not always easy to be precise about the boundaries other than to examine the Ordnance Survey 1:50,000 maps and to look at the extent of urbanisation as defined by those maps and to take into account man-made boundaries such as motorways and A roads as well as natural features such as rivers .

Administrative local authority boundaries were considered but these were discarded as being too wide for the purpose of this survey.

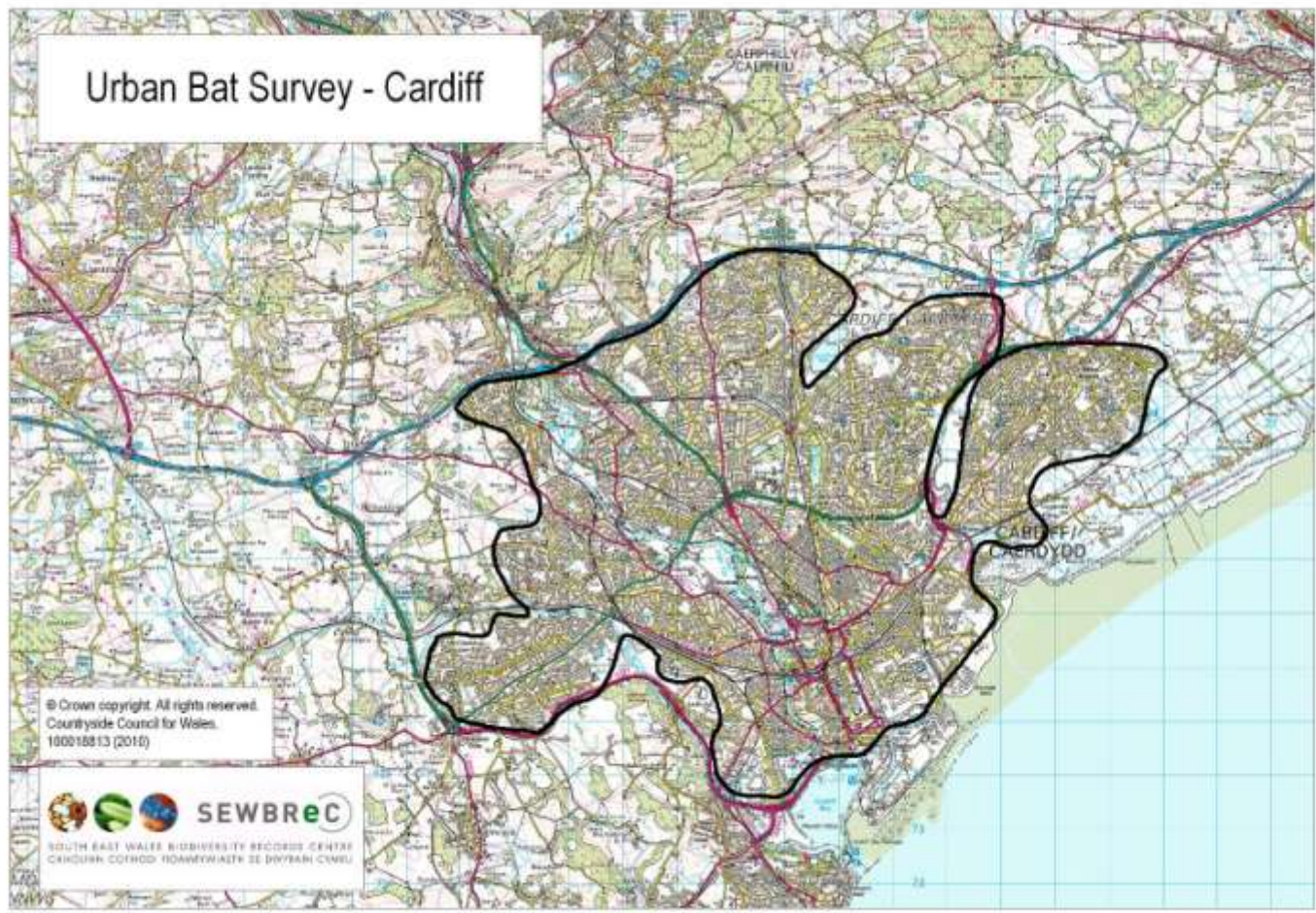
Aerial photographs using Google maps were also used to help clarify limits.



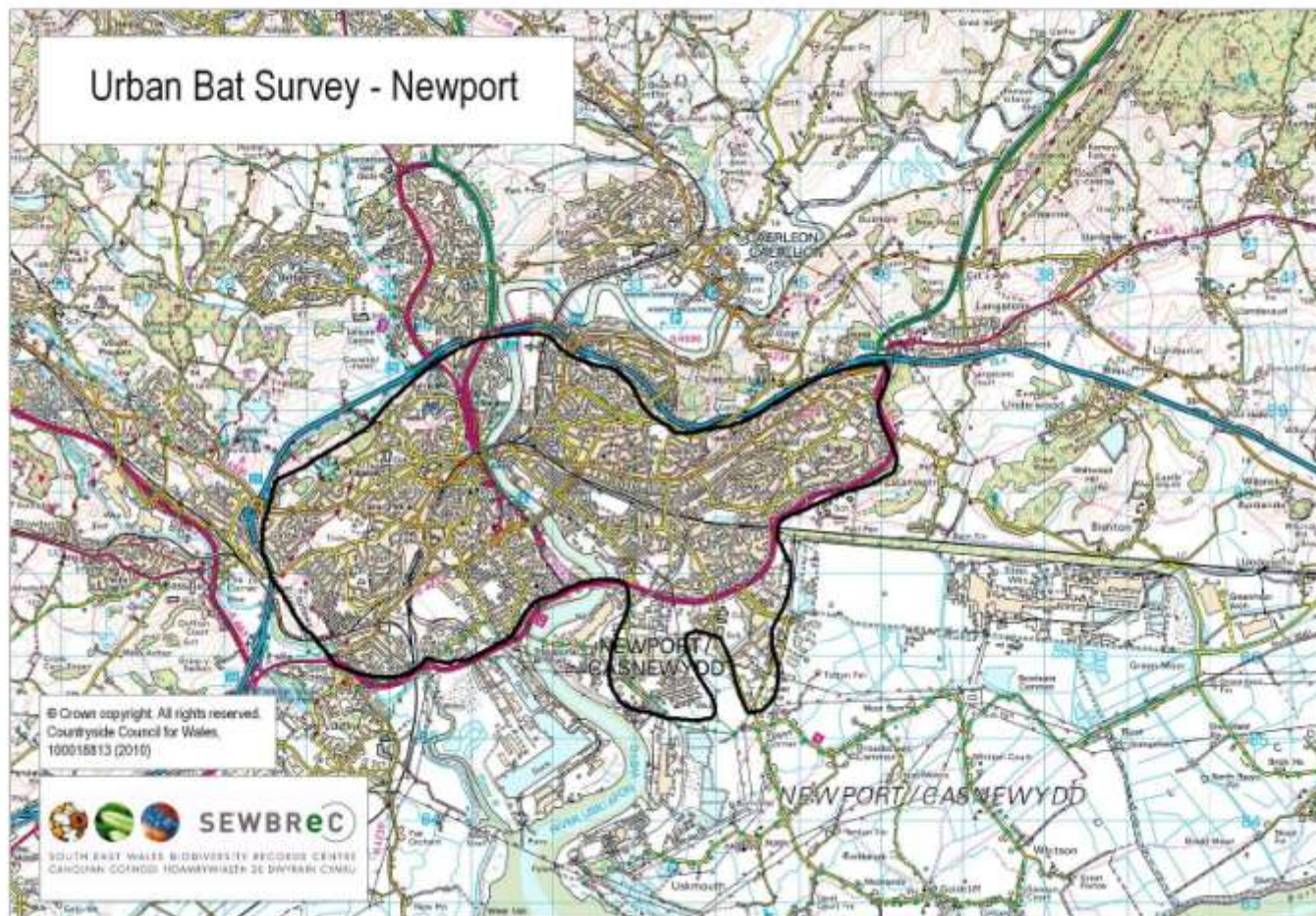
Map 1



Map 2



Map 3



Map 4

5.3 The Results

For each survey area, three maps are shown.

The first map shows the one Km squares that could possibly be surveyed.

The second is an Index of Occurrence for each one Km Square where Red = High, Yellow = Medium and Blue = Low. The Index was derived by scoring out of 10, the number of times bats were encountered along the transect. The highest score for each transect was used.

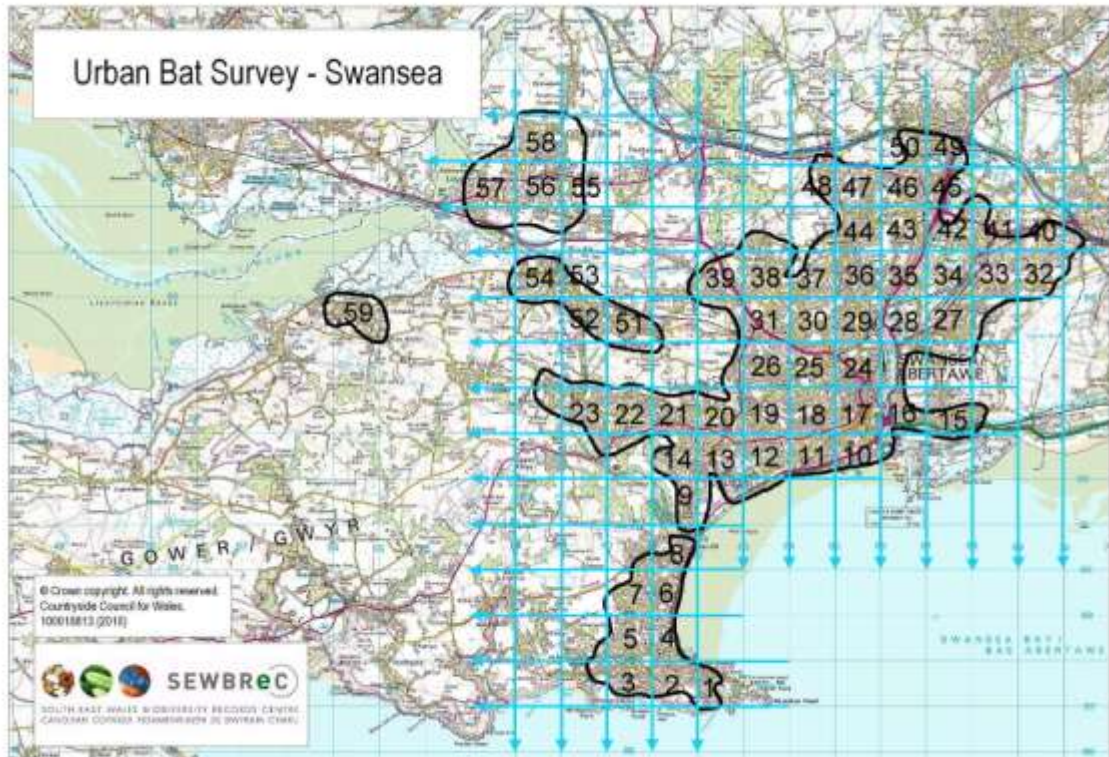
The third map identifies those squares that were considered to have a Hotspot of activity. This was arbitrarily defined as, any single point along the transect in which 13 or more bat passes were recorded. This figure is based on the basis of one bat pass every five seconds. Clearly where there is constant activity, then there is likely to be more than one bat pass in that time frame. These squares are identified with a letter H.

Historical data has not been sought.

5.3.1 Swansea

Out of a possible 59 squares that could be surveyed, surveys were undertaken in 32 of them.

One survey showed a High Index of Occurrence, but this return has had to be excluded from the mapping pending clarification over which squares had been covered - a 2 figure grid reference could encompass 4 one Km squares.



Squares with High Index of Occurrence

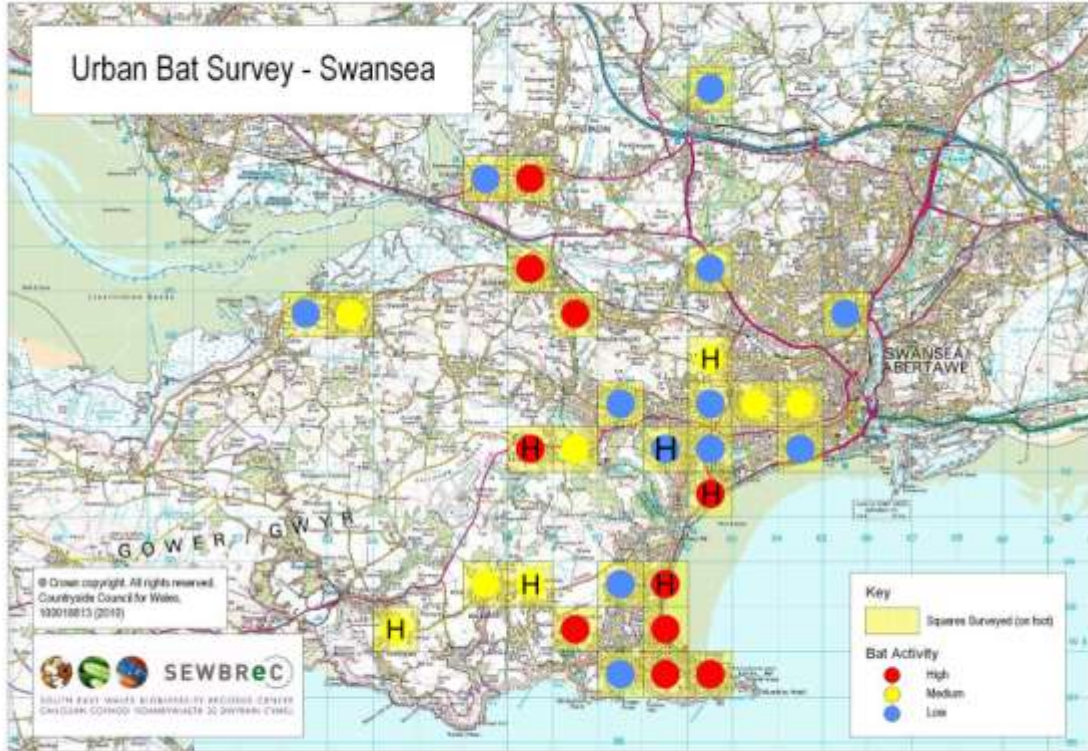
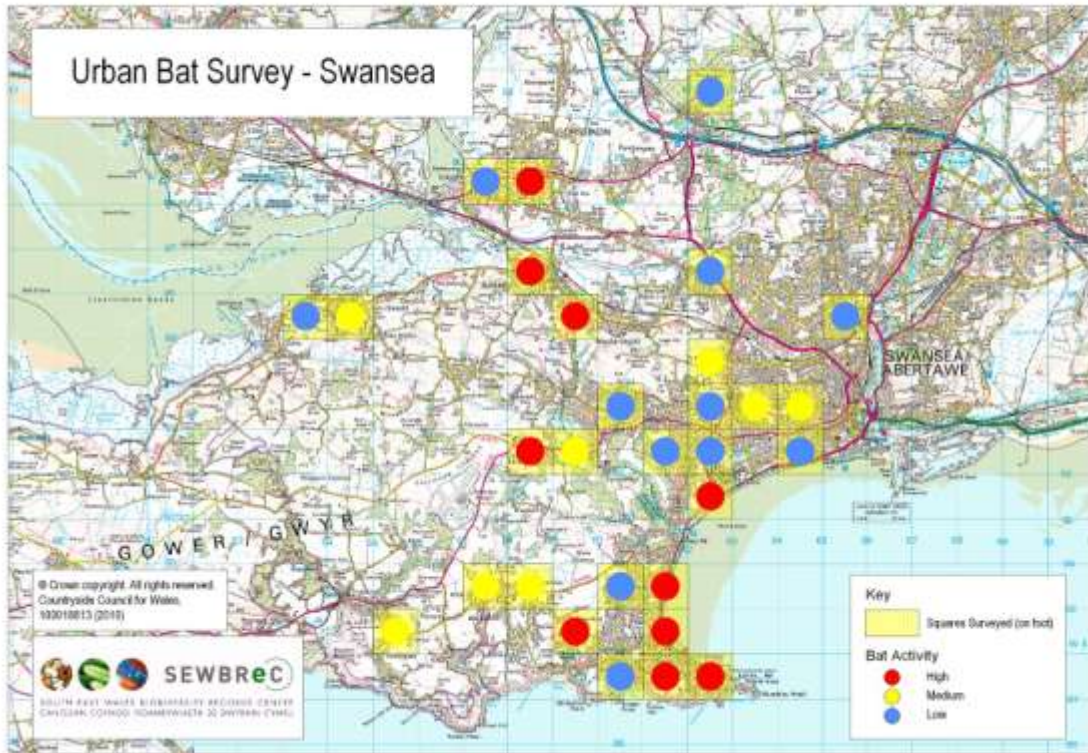
SS5892	SS5896	SS5898	SS5995	SS6187	SS6189
SS6291	(SS88)	SS5988			

Squares with Medium Index of Occurrence

SS5588	SS5789	SS5889	SS5992	SS6294	SS6393
SS6493	SS6495				

Squares with Low Index of Occurrence

SS6293	SS6296	SS6087	SS6089	SS6093	SS6192
SS6292	SS6492	SS6595	SS5395	SS5798	SS6200



Six squares showed some very high activity in terms of passes and feeding buzzes (SS5888, SS5889, SS5892, SS6189, SS6291 and SS6294). Most activity was during the June and July survey windows however, SS5892 and SS6189 had constant activity throughout the survey period. A seventh square, SS6192 also had a hotspot of activity but this was recorded after the first 10 survey points hence that square had an Index of Occurrence score of low.

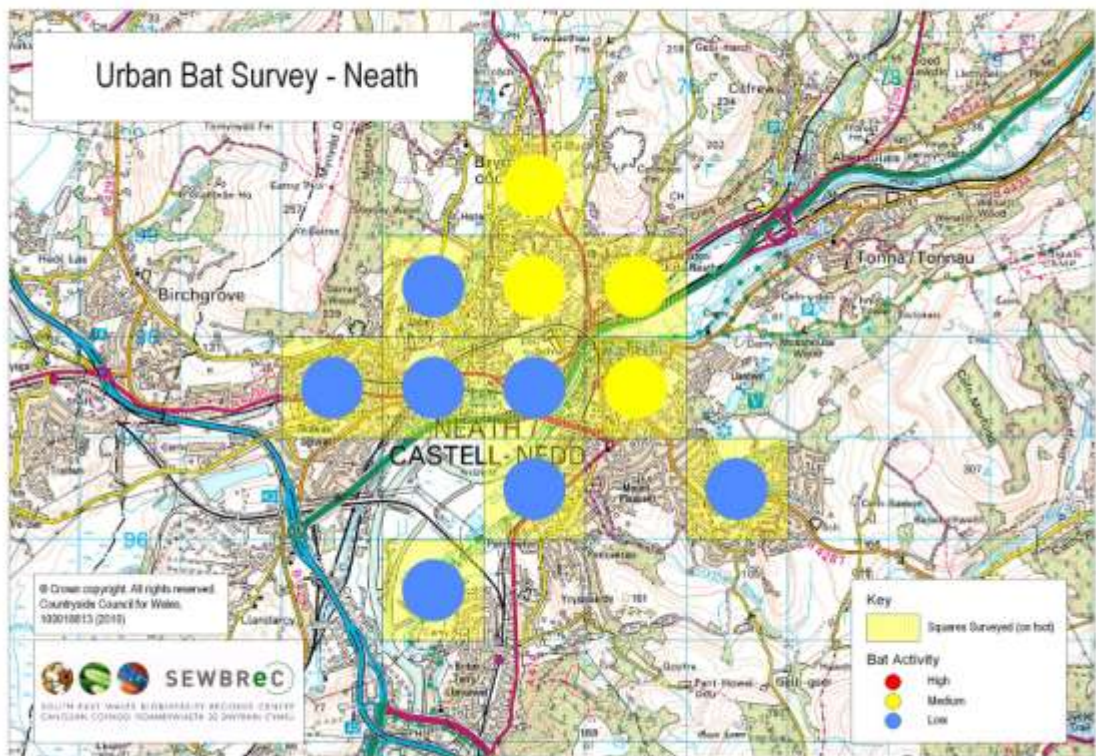
5.3.2 Neath

Identifying the boundaries in Neath was especially problematic as increasing urbanisation and coalescing of villages with adjoining areas such as Skewen to the east and Briton Ferry to the south made it hard to identify where one area ended and another began. Out of a possible 16 squares, 11 squares were surveyed within the target area.

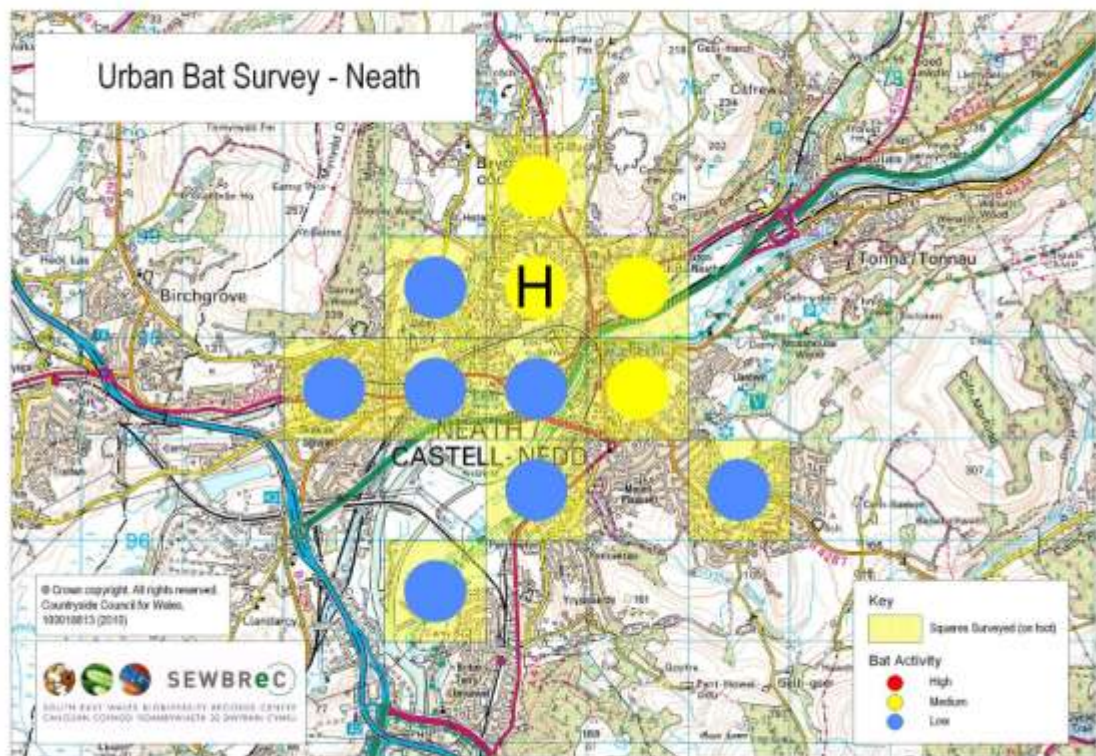


None of the squares showed a high Index of Occurrence. Four squares had medium Index and these appear to be aligned to the north east of Neath.

Low	Medium
SS7496	SS7499
SS7398	SS7498
SS7297	SS7598
SS7397	SS7597
SS7497	
SS7696	
SS7395	



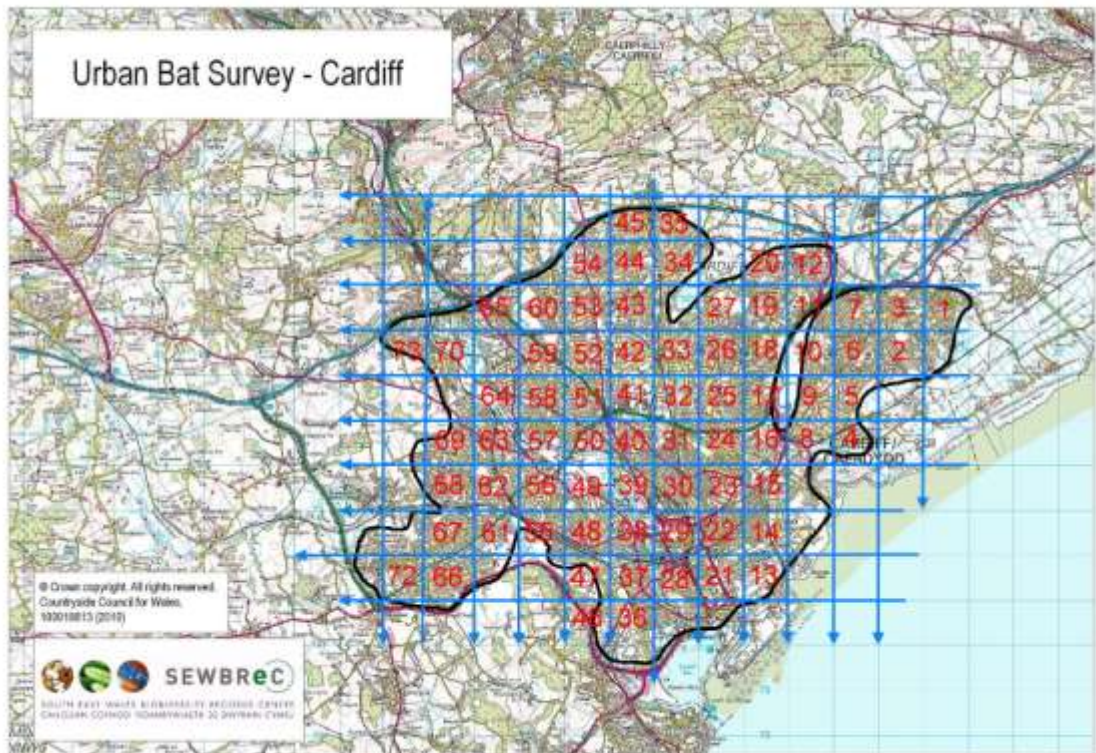
Only one square, SS7498, showed a hotspot of activity. Most of this activity was during July and September but what was interesting was the apparent shift of activity from towards the end of the survey transect in June and July, to the beginning of the transect in September. SS7598 also had good levels of activity and had a lower threshold be chosen for determining a Hotspot then this square would also have been duly highlighted as might have SS7497.



5.3.3 Cardiff

The target area was defined by the M4 to the north and the A4232 to the west. There are 72 * 1 Km squares in the Cardiff area that could be surveyed.

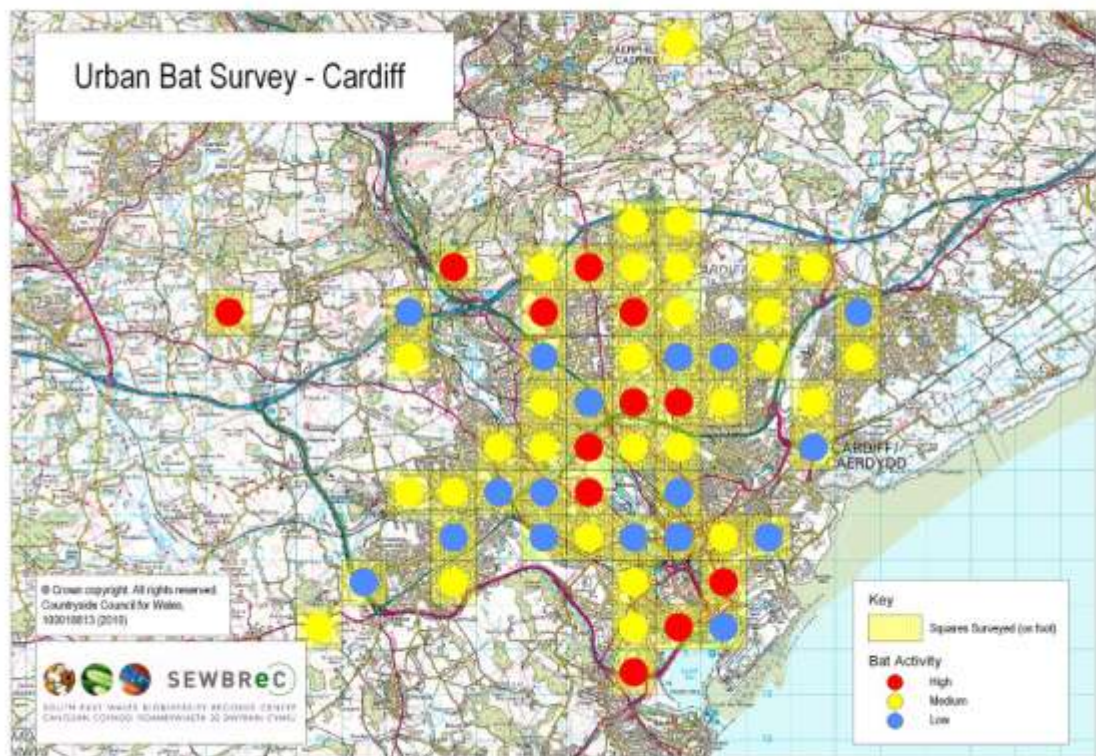
11 of these showed a High Index of Occurrence and 29 had Medium Index. One other square outside the target area also had a High Index.



High	11
Medium	27
Low	17

Squares with High Index of Occurrence

ST0811	ST1382	ST1581	ST1677	ST1678	ST1682
ST1773	ST1779	ST1781	ST1874	ST1879	ST1975

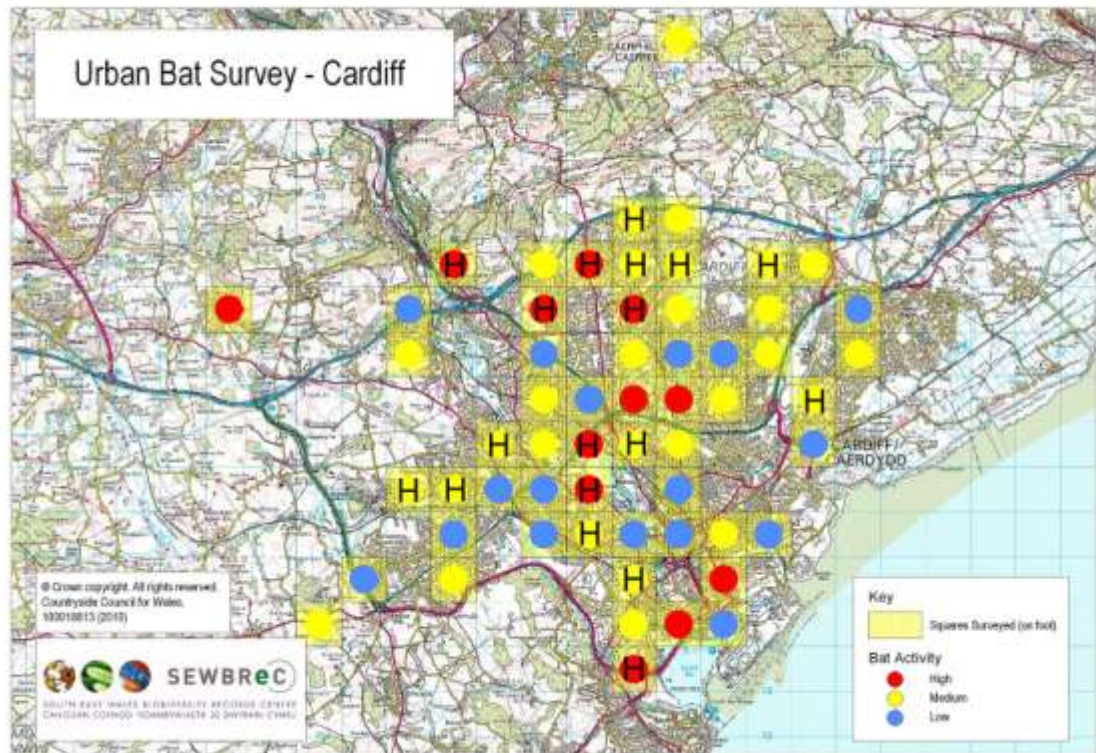


Squares with Medium Index of Activity

ST1582	ST1074	ST1277	ST1280	ST1375	ST1377
ST1478	ST1578	ST1579	ST1676	ST1774	ST1775
ST1778	ST1780	ST1782	ST1783	ST1878	ST1881
ST1882	ST1883	ST1887	ST1976	ST1979	ST2080
ST2081	ST2082	ST2179	ST2182	ST2280	

Squares with Low Index of Occurrence

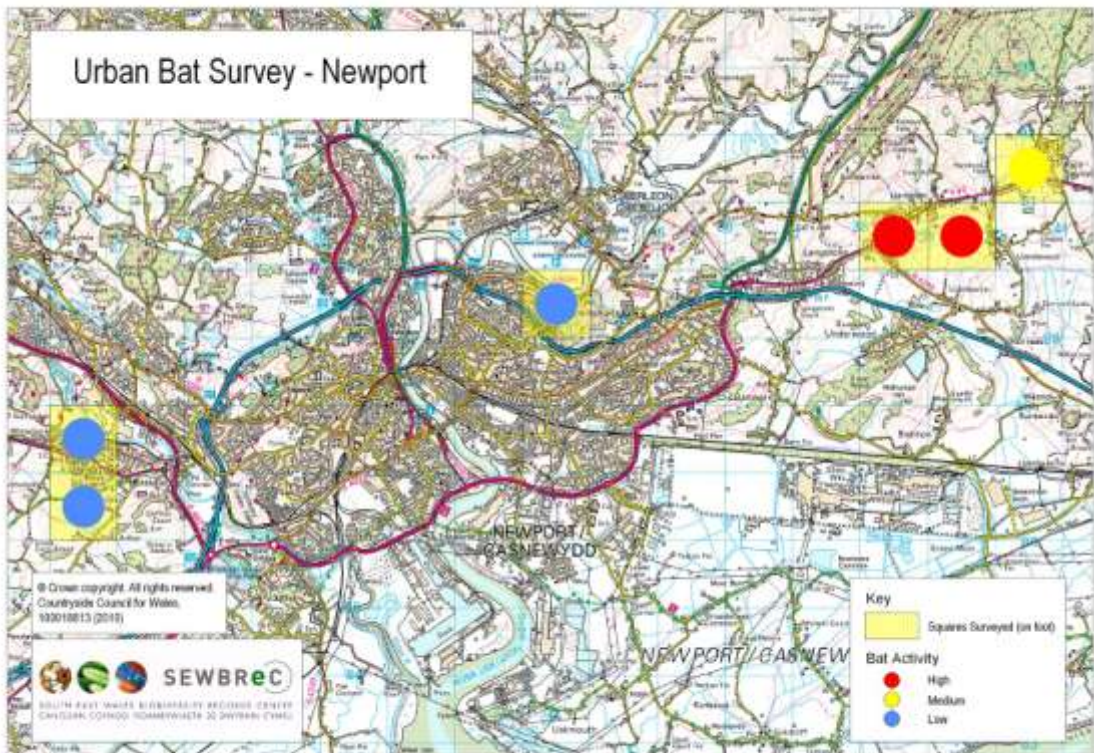
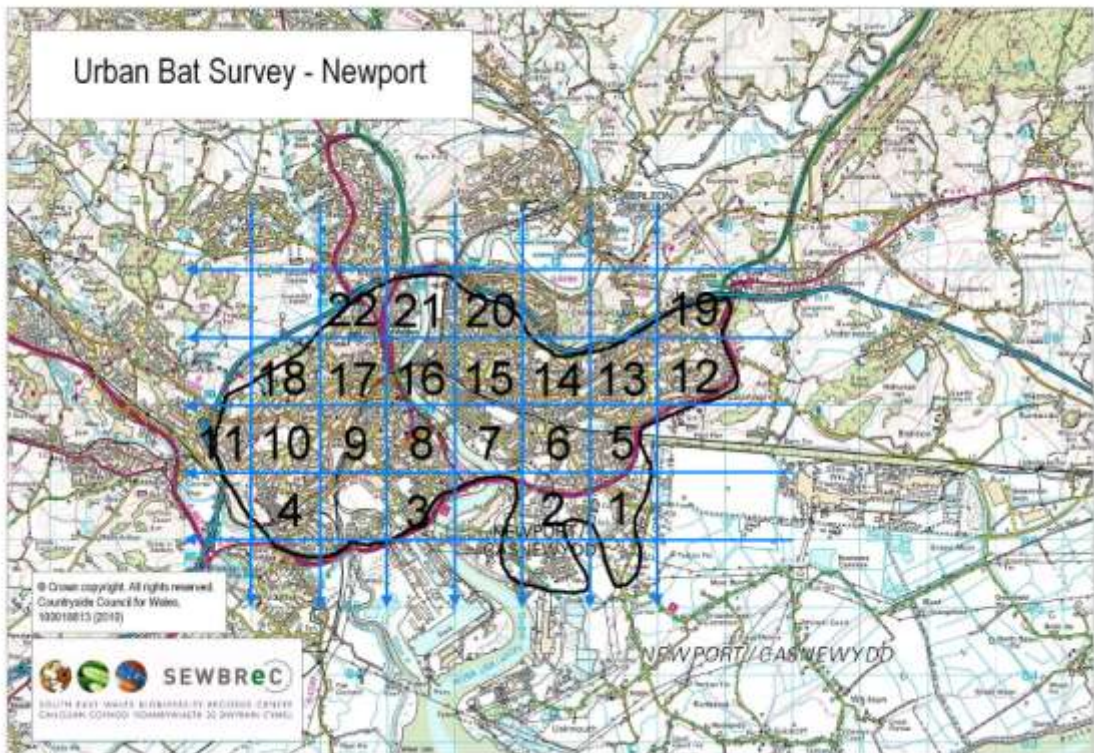
ST1281	ST1376	ST1477	ST1576	ST1580	ST1679
ST1776	ST1876	ST1877	ST1880	ST1980	ST2076
ST2281	ST2178	ST1175	ST1577	ST1974	



There are 18 squares that showed hotspots of activity. One was outside the target area. Squares ST1478, ST1581, ST1677, and ST1773 had hotspot activity throughout all three survey windows. In some square such ST1478 and ST 1773, the activity appears to have shifted along the transect from one survey to another whilst in others, ST 1782 and ST1783, the focus of activity remained more or less constant.

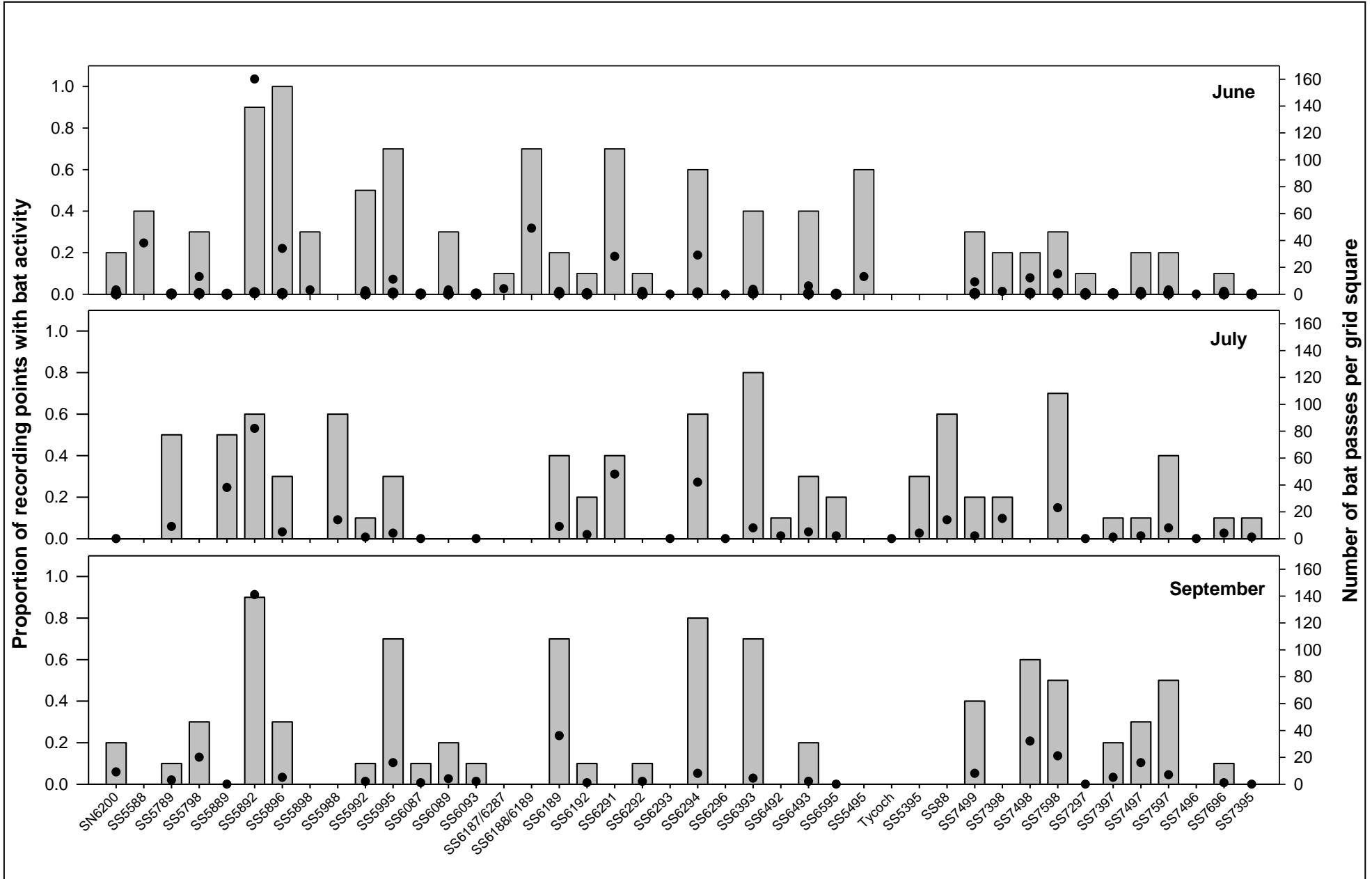
5.3.4 Newport

The survey area of Newport is readily definable but regrettably not enough surveyors could be recruited to cover this area adequately. Although not all data has been received at the time or preparing this report, this does demonstrate what can be achieved and it is hoped that Newport can be surveyed in more depth in 2010.

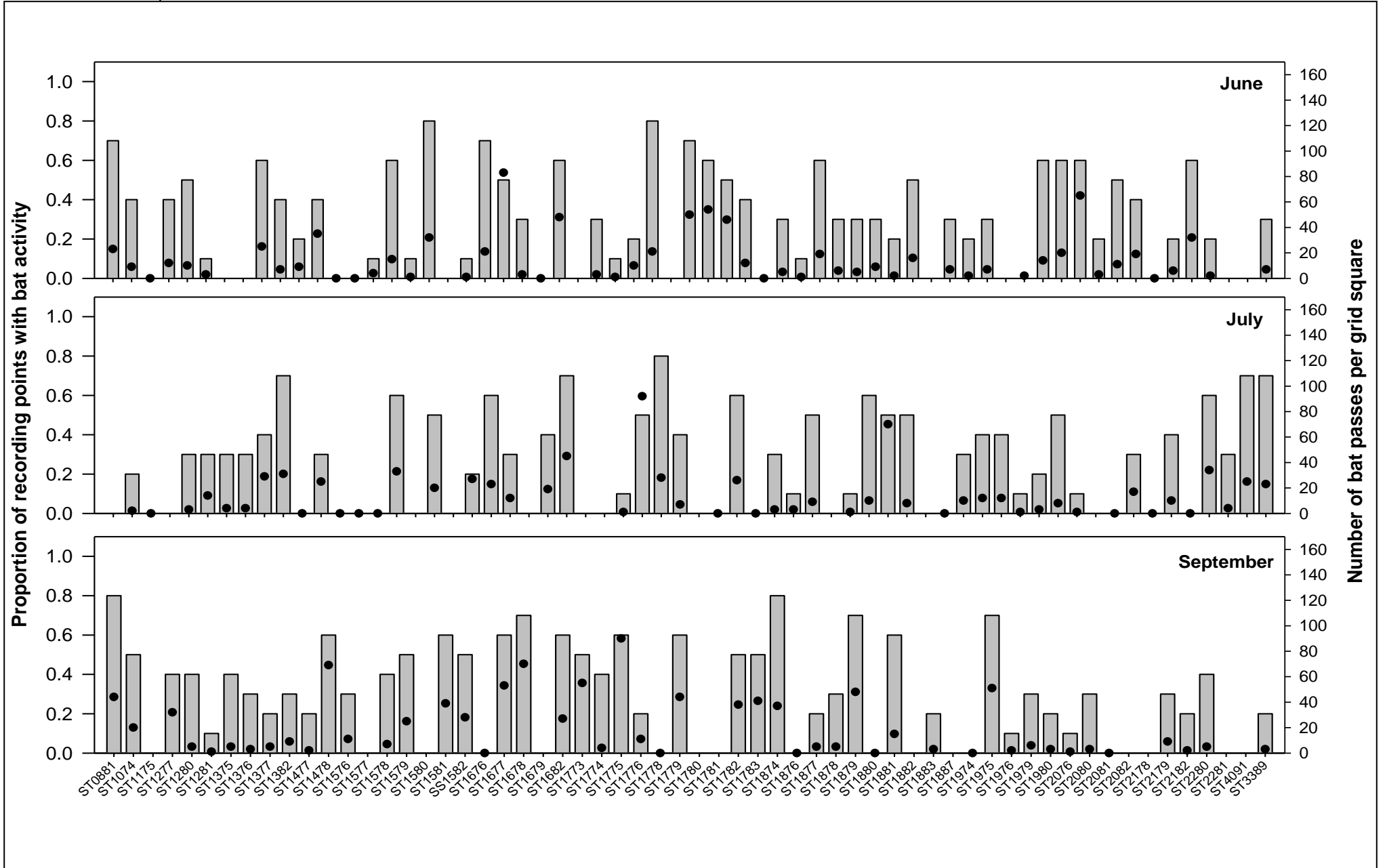


The following graphs showing the %age of points with activity and number of passes for each month. The monthly graphs are lined up so that the same grid square is in the same position along the x axis. If a square was not surveyed on a particular month then it will just be blank. If a square was surveyed but had no activity then there will be a black circle at zero for no activity as opposed to nothing at all if it was not surveyed.

Swansea and Neath



Cardiff and Newport



6 Conclusions

The project was successful in raising the profile of bats in the areas chosen and in generating interest among volunteers who have for the most part, not previously been involved in bat conservation. It is also hoped that the people who joined this project will continue to carry on with survey work, or do other bat conservation projects thereby fulfilling action under relevant biodiversity action plans for bats, and that they will go on to join their local bat group or maybe start new groups. It is also anticipated that publicity arising from this project will generate more interest – the project will be promoted on the Camelot web site, and it may feature in displays during 2010 which marks International Year of Biodiversity.

The strength of this project lies in the sum of all its parts. The project drew in over 228 volunteers who surveyed a total of 108 squares and gave over 950 hours of their time. The most striking observation is that a huge amount of data has been gathered and the results show what can be achieved. Whilst no formal feedback has yet been sought, comments received have shown that people had a really great time and enjoyed themselves.

However, caution must be exercised when trying to interpret this information as there are a number of limitations.

- Identifying bat calls. A number of surveyors reported some difficulty in identifying feeding buzzes especially when they first started surveying. Also some people requested clarification over what constituted a bat pass particularly when a bat was seen but no call was picked up on the detector. What was pleasing was that some surveyors noted different types of call and recorded these on their sheets
- Emergence times of bats. A few species of bat, pipistrelles and noctules emerge at or about sunset and depending on the size of the roost, they will continue to emerge after dark, where as other species such as brown long-eared and the myotis bats generally only emerge once it is clearly dark. This means that in order to be able survey for these later emerging species, it is necessary to ensure that survey time continues until about an hour after sunset.
- Survey start times. A number of surveyors questioned the start times and asked whether these had been incorrectly set. For this project, it was important to set certain parameters for the survey and one of these being the start time. Sunset times were taken from <http://www.good-stuff.co.uk/suntimes> and because this was the first time that most people were undertaking this work, the start time was set at

sunset. However, the exceptionally warm late spring and early summer resulted in very light evenings that extended past sunset times. This may have had delayed the emergence times of bats even for species such as pipistrelles and therefore there may have been an under recording of bat activity.

- Cold weather and its impact. All UK bats feed on insects and the availability of insects depends very much on temperature. The best nights for insects are warm, humid and little wind. The weather conditions during the survey season were generally conducive to insects and therefore bat activity.
- Survey area. Surveyors were asked, where possible to identify a circular transect of about a kilometre. A circular one kilometre route cannot represent the whole of a one Km square – it probably only represents about a quarter a square and therefore, depending on the level of urbanisation in that square, and the route chosen, the results may not be fully representative especially where a Low Index of Occurrence was recorded. Equally, there may still be other parts of the square, even in a square with a high Index that would also return useful information.

This report must be considered as a snapshot of activity in these areas at the time of survey. Only through repeated and more detailed surveys could a greater and improved understanding of bat activity be developed. Low activity must not therefore be interpreted as such at this stage and developers and planners should note that even in areas where low bat activity was recorded in 2009, specialist bat surveys might still be needed before planning applications can be determined.

7 Future

There are a number of options that are now open for further work:

- (a) Re-survey existing transects. This would have the advantage of building up a better picture of bat activity in that area and start to provide medium to long-term data to detect trends. These surveys could be done slightly later than was the case in 2009 so that other species may be detected.
- (b) Re-survey selected transects especially those squares that had medium or low Index of Occurrence. There is a maxim that says “absence of evidence is not evidence of absence” and given the possibility of late emergence times then we cannot discount a higher presence of bats in those squares.
- (c) For squares that showed hotspots of activity then there is the possibility of looking for roosts in the vicinity where the survey took place. Current legislation primarily protects the resting places of bats and therefore it is important to be able to locate these roosts.
- (d) Undertake more detailed surveys following further training in using heterodyne detectors, or the recording bat calls and then analysing the calls using bat sound analysis software packages.
- (e) Survey squares that have not been surveyed during 2009.
- (f) Survey those parts of the one Km squares that were not surveyed during 2009.
- (g) Look for specific areas to undertake BCTs National Bat Monitoring Programmes such as the Waterway Survey.
- (h) There may also be specific projects that the bat group or local biodiversity partnership would like to be addressed – this might include putting up and monitoring bat boxes as well as taking part in ‘biodiversity blitzes’.

8 Feedback from Volunteers

Of those who sent back their feedback forms, without exception everyone enjoyed themselves. When asked about what volunteers got out of this project, there was a wide range of responses including learning a lot about bats from the training, to finding a new hobby, finding out about their local area, the survey being a pleasurable and worth while study, and something that they found rewarding. But most of all, people seemed to enjoy the experience of hearing bats and discovering about the bats in their area.

This is extremely encouraging not least of all because this project should be the start of a new journey for people to get more involved in bat conservation and other related activities. The project itself is not an end point but it should be seen as an ongoing and evolving process in which people can choose what they learn, how fast they do it and what they get involved with. There is scope for much more work in each of the areas to get a better understanding of bat activity and this will which will greatly help to conserve bat populations.

9 Acknowledgements

I would like to thank everyone who took part. Without their enthusiasm and commitment this could never have been achieved.

Special thanks also go to the co-ordinators, Jo Mullet, Becky Sharp, and Cat Angele and also to Sue Price who took over at Newport, and to Sian Musgrave for alleviating me of the process of data extraction. I am also indebted to SEWBRc for the mapping and most grateful to Dr Kirsty Parks at Stirling University for producing the graphs.

This project was funded by Environment Wales, the Heritage Lottery Fund and the Countryside Council for Wales and without which, the project could not have happened.