

1510	<i>Verrucaria nigrescens f. nigrescens</i>
2514	<i>Verrucaria nigrescens f. tectorum</i>
1511	<i>Verrucaria ochrostoma</i>
1526	<i>Xanthoria calcicola</i>
#N/A	<i>Pronectria sp.</i>

A cumulative list of Mepal lichens is available on the Nature in Cambridgeshire web site at www.natureincambridgeshire.org.uk/volumes/vol-59.htm

Reference

Hornsey, I.S. & Fletcher, A. (1986). The Lichen Flora of the Parish of Mepal. *Nature in Cambridgeshire* **28**: 40-49.

Cambridgeshire Amphibian Survey Report 2015

Steven J. R. Allain & Mark J. Goodman

Introduction

The Cambridgeshire Amphibian Survey 2015 was a continuation of studies carried out at a number of sites during 2013 and 2014; see Allain & Goodman (2015) for more information. In addition to survey sites we had previously visited in earlier years, three new sites were surveyed in 2015. These were Barnwell East Local Nature Reserve, Regatta Court (off Stanley Road) and Wandlebury Country Park. The survey sites all contain bodies of freshwater which were surveyed at night for signs of amphibians. From the 2014 study, we ascertained that five of the sites were suitable for further study; four of these five as well as the three new sites were surveyed throughout the spring and into early summer 2015. The new survey sites were discovered and subsequently surveyed by following up reports of amphibian sightings we had received from colleagues. Due to other commitments, Stow-Cum-Quy Fen was not surveyed in the 2015 season. Other potential new sites were also put on hold for the same reason.

This frequency of weekly site surveys helped create a more extensive synopsis of the populations of amphibian species inhabiting the various locations. On evenings when it was extremely windy or there was heavy rain, surveying did not take place because of the chance of causing disturbance to the amphibians and because of the potential risks to our volunteer surveyors. Our volunteers were all members of the Cambridgeshire and Peterborough Amphibian and Reptile Group (CPARG) and had been trained by the authors to locate and identify amphibians within ponds. Most of this training was completed in the field, as it is our preferred method of preparing volunteers.

The species focused on in this study were the most common of the native amphibian species found in Cambridgeshire, the Common Frog (*Rana temporaria*), the Common Toad (*Bufo bufo*), the Smooth Newt (*Lissotriton vulgaris*) and the Great Crested Newt (*Triturus cristatus*). Seven sites (Figure 1) were surveyed by torchlight and the presence of amphibian species was recorded, along with the occurrence of fish and the size of spawn clump numbers (Common Frog) and spawn strand numbers (Common Toad).

Survey locations and descriptions (see Figure 1)

Site 1: Barnwell East Local Nature Reserve (TL47935831)

Barnwell East is a local nature reserve (LNR) near Cambridge Airport; it has one body of water which is a reasonably sized pond. This pond has a decking platform allowing access to one area, which is where most of the surveying was concentrated. Accessible areas around the pond were also surveyed but the entire pond was not accessible due to overgrown vegetation. The rest of the site consists of a mixture of woodland, scrubland and open grassland. Due to the location of the pond it is susceptible to eutrophication which increases the amount of algae available for amphibian larvae.

Site 2: Cambridge City Crematorium (TL39906258)

The City Crematorium has a total of six ponds, of which we surveyed four on a regular basis. The four surveyed were the same as those which we have been surveying since 2013. These four ponds are concrete lined, two of which are 3 x 4 metres and the other two being 4 x 4 metres. Although they are all concrete lined with small areas of refugia in the corners, they support a high diversity of pond life. The drainage ditches that surround the main area of the crematorium were also surveyed as these tend to trap some amphibians on their migration back to their breeding ponds. The four ponds surveyed are also free of fish and are exposed to the elements due to a lack of tree cover.

Site 3: Cherry Hinton Brook (TL47715728)

Cherry Hinton Brook, as its name suggests, runs through Cherry Hinton, behind Cherry Hinton Hall. We focused mainly on the stretch between Burnside Road and the allotments just past St. Bede's Secondary School. This section is commonly known as 'Snakey Path'. The site had been surveyed in the previous two years, when toads and frogs were found in low numbers. Despite this we continued to survey the site due to the high numbers of toads present in historic records and from anecdotal reports. The brook is highly shaded by tree cover and an embankment, the latter of which is used by amphibians as a refuge.

Site 4: Chesterton (TL46485957)

This site consists of a man-made waterway that has been built behind a recently constructed block of flats on the old Phillips/Simocco site. This site had also been surveyed in 2014 when we found an abundance of Smooth Newts, Common Frogs and Common Toads. The site is not too far from the River Cam

or Logan's Meadow LNR. There is a lack of tree cover at this site but there is a high proportion of emergent vegetation which can make surveying the site challenging.

Site 5: Cottenham Moat (TL44936807)

Cottenham Moat was investigated further after the survey in 2014. In 2015 we continued to survey the site for amphibians. The moat is a broken 'U' shape which contains no fish and is sometimes covered by a film of duckweed and quickly overgrows. During surveys in 2014 we found mainly Great Crested Newts.

Site 6: Regatta Court (TL46685951)

Regatta Court is a small managed housing complex located by the River Cam, off Newmarket Road. The site has a single large concrete lined pond which is home to fish as well as amphibians. The site was surveyed after we received reports of large numbers of toads in the area. The pond backs onto Stourbridge Common LNR meaning dispersal for amphibians is relatively easy. The area is also a registered toad crossing site and so some of our time was spent helping toads cross the roads to their breeding pond.

Site 7: Wandlebury Country Park (TL49405340)

Wandlebury Country Park is the site of an Iron Age hill fort and is maintained by Cambridge Past, Present & Future (PPF). Wandlebury contains two ponds one being the 'Cherry Pond' which is on the main path around the ring and the second is the 'Dew Pond' which is in the gardens of the residence. Our efforts were mainly focused on the 'Cherry Pond' although we did make occasional visits to the 'Dew Pond' when the Ecology Officer was present. The Cherry Pond is used by Cambridge PPF for educational purposes, such as pond dipping, because of its high abundance of aquatic invertebrate and other pond life. This was the perfect indicator that the pond was an ideal candidate for amphibian surveys.

Methods - Survey Protocol

The survey protocol outlined here is the same as that used in previous years. The amphibian surveys were designed to meet standardised guidance protocols (Griffiths *et al.*, 1996; Sewell *et al.*, 2013) and were carried out weekly (weather dependent) where possible. On arrival at the sites around dusk, we ran through the risks and subsequent risk assessment for each site with our volunteers. Once everyone was aware of the risks and knew what to look out for, one person among the group was elected to be the data recorder. They were given a clipboard with a data recording form and a pencil and from that point on they would be noting down any sightings other volunteers would be gently calling to them. When visiting a new site we visit in the daytime to assess the risks and identify areas where amphibians may be present. This aids us in helping to build a more comprehensive safety protocol for each site.

All of the sites were surveyed by shining strong torches (mainly 160 lumen torches) from the bank and into the water. The torches were directed to about 3m into the pond (if it was large enough) where they were used to detect amphibians at the water's surface. Closer to the bank, the torches cut much more deeply into the water and so more amphibians were likely to be detected below the water's surface. This method was reliable for detecting newts and other amphibians within ponds that had little vegetation or those that were shallow.

At sites where only a single body of water was present, these bodies were approached from a bottom corner closest to the point of entry, *e.g.* a footpath. From this corner, the perimeter of the body would be surveyed, including up to 3m away from the bank, in a clockwise direction. If not all of the bank was accessible, then all of the appropriate accessible areas were surveyed from the accessible points. At locations where there was more than one body of water, the ponds were surveyed so that the furthest ponds from the entrance were scanned first. This was to ensure we caused minimum disturbance to ponds which had not yet been surveyed. Any amphibians found within the 3m 'buffer zone' between ponds were also included in the counts.

At some sites where the vegetation grows close to the banks, or when the ponds are shallow due to evaporation, egg-searching was undertaken. This involves searching submerged vegetation for folded leaves which indicate the presence of newt eggs. Unfortunately no newt eggs were found despite surveys being spread over a long period. The eggs of Smooth and Great Crested Newts are easily distinguishable when examined. A 4 in 1 multifunctional environmental tester was used to gather water and air temperature data at the sites surveyed (when available).

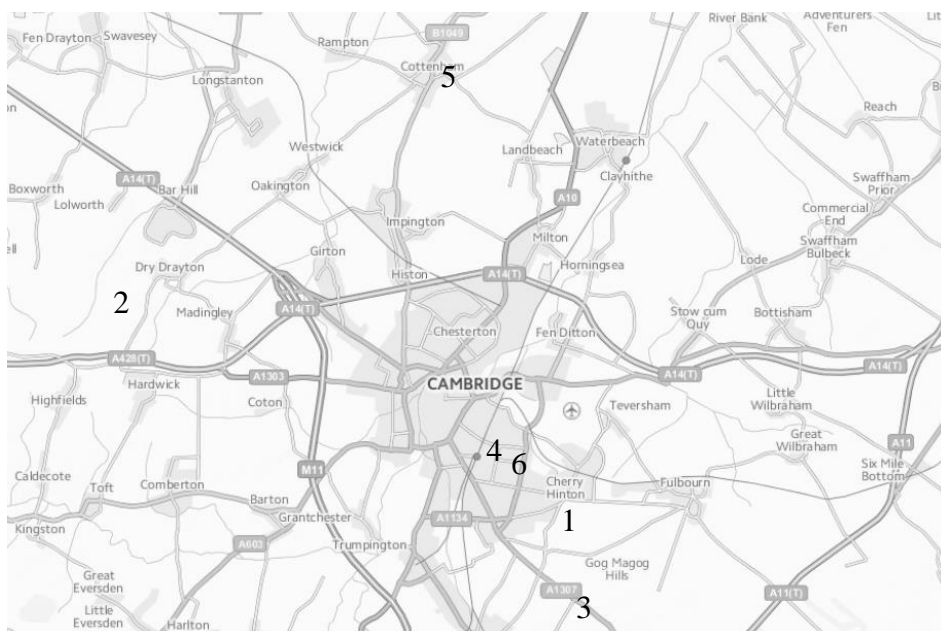


Figure 1. Map of Cambridge. Numbers indicate where the seven sites are located.

Results

Signs of amphibians were discovered at all seven of the survey sites in at least the form of adults. This was by either visual or auditory evidence of both frogs and toads, as well as visual evidence of newts. At some sites, spawn and larvae were also seen. Clumps of frog spawn were observed at Chesterton, Regatta Court, Wandlebury and Barnwell East LNR, with the clumps being in substantial numbers at Chesterton, Barnwell East LNR and Wandlebury. Unfortunately not enough environmental data were collected in order to see if there was any correlation between temperature and amphibian abundance. There was less frog spawn seen at Chesterton than in 2014 (roughly only 50% of the previous year's count). There were also fewer Great Crested Newts seen at Cambridge City Crematorium than in 2014. We saw more toads at Cherry Hinton Brook than in 2014, which helps to confirm our hypothesis that a large population of toads is still breeding at the site.

Peak Count Data

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
08/04/2015	Common Toad	19	N/A	N/A
30/04/2015	Smooth Newt	2	7.9	13.5

Table 1. Summary of data collected at Site 1, Barnwell East Local Nature Reserve.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
19/02/2015	Common Frog	2	N/A	N/A
	Common Toad	4		
	Great Crested Newt	36		
	Smooth Newt	30		

Table 2. Summary of data collected at Site 2, Cambridge City Crematorium.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
08/04/2015	Common Frog	1	N/A	N/A
08/04/2015	Common Toad	77	N/A	N/A

Table 3. Summary of data collected at Site 3, Cherry Hinton Brook.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
07/03/2015	Common Frog	29	N/A	N/A
30/04/2015	Smooth Newt	26	5.1	8.9

Table 4. Summary of data collected at Site 4, Chesterton.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
15/05/2015	Common Frog	2	12.9	14
	Great Crested Newt	14		
	Smooth Newt	12		

Table 5. Summary of data collected at Site 5, Cottenham Moat.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
08/03/2015	Common Frog	10	N/A	N/A
05/04/2015	Common Toad	119	N/A	N/A
30/04/2015	Smooth Newt	32	7.8	11.5

Table 6. Summary of data collected at Site 6, Regatta Court.

Date	Species	Peak Count	Air Temp (°C)	Water Temp (°C)
21/03/2015	Common Frog	14	N/A	N/A
21/03/2015	Common Toad	6	N/A	N/A
25/05/2015	Smooth Newt	33	11.6	15.8

Table 7. Summary of data collected at Site 7, Wandlebury Country Park.

HSI Scores

The Habitat Suitability Index (HSI) is a scoring system that analyses 10 points of a habitat in order to establish whether or not that habitat is suitable for Great Crested Newts (Oldham *et al.*, 2000). The scoring system works by giving the 10 points listed below a number between 0.01 and 1. The mean of these is then calculated to give the HSI of the pond or water body being studied.

- SI1 = The pond's/water body's geographical location.
- SI2 = The surface area of the pond/water body.

- SI3 = The permanence of the pond/water body.
- SI4 = The water quality of the pond/water body.
- SI5 = The total area of shading on the pond/water body.
- SI6 = The number of waterfowl on the pond/water body.
- SI7 = The occurrence of fish in the pond/water body.
- SI8 = The density of ponds surrounding the one you are studying.
- SI9 = The proportion of newt friendly habitat surrounding the pond being studied.
- SI10 = The total macrophyte cover in the pond/water body.

The equation used to work out the HSI for a pond using these 10 points is:

$$\text{HSI} = (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10}$$

Location	Score	Rank
Barnwell East Nature Reserve	0.74	Good
Cambridge City Crematorium*	0.66	Above Average
Cherry Hinton Brook*	0.71	Good
Chesterton*	0.77	Good
Cottenham Moat*	0.81	Excellent
Regatta Court	0.70	Good
Wandlebury Country Park	0.88	Excellent

Table 8. Table showing the HSI scores and ranks of the seven locations surveyed. Scores were calculated using knowledge of the ecology and location of each pond. Locations labelled with an (*) indicates the HSI scores have been taken from the 2014 Cambridge Amphibian Report (Allain & Goodman, 2015). All figures have been rounded to two decimal places.

Discussion

2015 was a successful year in terms of our regular amphibian surveys. For example, we observed toad spawn *in-situ* for the first time since surveys began in 2013. The first location was Barnwell East LNR and it was later found at Regatta Court. Although no adult frogs were found at Barnwell East LNR we did find evidence for them in the form of frog spawn. The biggest surprise was to find amphibian larvae in the ‘Dew Pond’ at Wandlebury Country Park. The pond can be no more than two inches deep (due to a rip in the liner) yet common frog tadpoles were abundant. In the ‘Cherry Pond’ at Wandlebury Country Park, where survey efforts were focused, no toad spawn was seen but adults were observed in amplexus. Common Toad tadpoles were later observed in subsequent surveys and so it is likely the toads had concealed their spawn to protect it from predators and the harmful effects of UV radiation (Häkkinen *et al.*, 2001). Similarly no Smooth Newts were seen but the larvae and efts were found, and again it is likely that the newts concealed the eggs in thick submerged vegetation.

Despite an overall drop in Common Toad numbers nationwide, we observed indications of prolific breeding of the species at both Barnwell LNR and Regatta Court. No evidence of Common Toad or Common Frog breeding was observed at Cambridge City Crematorium, although the larvae of both Smooth and Great Crested Newts were found in small numbers. We hypothesise that the spawn from the anurans had become food for the newts before we began surveying. Amplexus of both Common Frogs and Common Toads has been observed on multiple occasions so breeding is taking place. If the spawn isn't becoming food for newts then the frogs and toads must be using an unknown body of water to safely deposit their spawn. This needs further investigation and will be the focus of our studies at the site in the years to come.

Although we recorded high numbers of toads at Cherry Hinton Brook, no spawn was observed. This may be because the majority of toads seen were male. Three Common Frog tadpoles were found in amongst the gravel of newly formed flow works even though we weren't able to detect any frogspawn, or pairs in amplexus. Frogspawn has been seen in the past at this site and there is no doubt that frogs successfully breed there, even with a high number of predatory fish present. Conversely no toads or toad spawn were seen at Chesterton although Common Frogs were present. A total of eighty-nine clumps of frog spawn were observed which is more than the number of frogs seen. Using this figure we can infer how many females have used the site, as they are limited to laying one clump of spawn per season (Reh & Seitz, 1990).

Cottenham Moat was too overgrown and suffered too much from the effect of eutrophication for us to perform extensive surveys. We are proposing an annual management weekend where the local community helps to clear the plant debris and litter from the moat. This will have to be completed during the winter months in order to comply with legislation concerning Great Crested Newts. We found this to be quite successful at Cambridge City Crematorium in early January 2016. For 2016 the surveys of the crematorium ponds were suspended in order for the ponds to recolonise and grow, as extensive amounts of vegetation were removed. Finally, Regatta Court has an extremely healthy population of Common Toads, Common Frogs and Smooth Newts even though the pond has been stocked with ornamental fish. Toads in the area have been saved from the roads and further afield – including the play park on Stourbridge Common. As with Cambridge City Crematorium, action needs to be taken to help amphibians that have fallen in to drains – the most probable solution would be to install amphibian ladders. This is a solution we will look into in the future.

Although the Palmate Newt (*Lissotriton helveticus*) does occur in Cambridgeshire, it only occurs in isolated populations towards the north of the county. Surprisingly we also came across a Grass Snake (*Natrix natrix*) during the evening whilst surveying Wandlebury Country Park in June. The snake was seen during an active search for amphibians hiding between the liner of the pond and the underlying earth of the Dew Pond. The snake was sheltering in a

cavity, and its presence was perhaps due to the warm temperatures and abundance of prey.

Across the sites, amphibians were seen to be breeding earlier than in previous years, with frogs and toads breeding earlier than newts. This may be linked to climate change and the higher frequency of warmer winters the region has been experiencing in recent times (Reading, 1998). At the end of the project all records were submitted to the Cambridgeshire and Peterborough Environmental Records Centre (CPERC). In 2015 we were also able to confirm the existence of a Midwife Toad (*Alytes obstetricans*) population in central Cambridge (Plate 5, back cover). In the future we wish to carry out a population assessment of Midwife Toads and swab the toads for the presence of the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*). The fungus threatens amphibian species globally and so we wish to investigate whether or not the toads pose a risk to our native species as a disease vector.

Acknowledgments

The continued surveying and monitoring of amphibians at the sites mentioned in this report could not be done without the dedicated volunteers that have supported us regardless of weather conditions. We would like to thank them for their continued effort and professionalism when in the field. We would also like to thank Guy Belcher for giving us permission and access to the sites we have surveyed. We also thank Ed Wombwell, the Ecology Officer at Wandlebury Country Park for allowing us to conduct surveys there. Thanks must also be paid to Erik Paterson for his help in proof reading various drafts of this script.

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Introduced non-native amphibians and reptiles in Cambridgeshire 2010-2016

Steven J. R. Allain, Liam T. Smith & Gary J. Miller

Introduction

Non-native species threaten ecosystems globally (Vitousek *et al.*, 1996) with those on islands more vulnerable (Reaser *et al.*, 2007). This applies to areas such as Britain (Manchester & Bullock, 2000), where there is no natural method for repopulation or recolonisation if localised or national species extinctions occur (Green, 2003). These extinctions may occur through competition between native and introduced species, through disease spread by non-native species or through direct predation (Fritts & Rodda, 1998). Mainland areas of the Britain do not have the same level of extinction risk as its offshore islands but local extinctions can still occur especially if the habitat connectivity between the area of extinction and a source population is poor.

A number of non-native amphibian and reptile species have become established within the UK (Frazer, 1964; Lever, 2009). These mostly persist in small and isolated populations but climate change may enable some of these species to expand their ranges, requiring management plans to limit their dispersal. Two introductions thought to be attributable to accidental causes are the Aesculapian Snake (*Zamenis longissimus*) and the Common Wall Lizard (*Podarcis muralis*). Some non-native species have become established in the UK through deliberate introductions, including the Marsh Frog (*Pelophylax ridibundus*) (Zeisset & Beebee, 2003).

Cambridgeshire is not a heavily populated county with much of the landscape occupied by farmland. Despite this, several non-native reptiles and amphibians have been observed within the county. The records of these are reviewed here, together with a discussion of the probable sources of each introduction, and the threats that each might potentially pose to native wildlife.

As chairman of the Cambridgeshire and Peterborough Amphibian and Reptile Group (CPARG), SA has experience with surveying non-native species in Cambridgeshire. LS has been assisting SA with these surveys since 2013 and has other experience in this area too. In his last role, GM was manager of Cambridge Reptiles, Hardwick. During his time there GM kept detailed records of the non-native species which had been taken to him by concerned members of the public. Each of the species we have assessed had made their way into the Cambridge area, some of these were observed in the wild and others entered GM's care before this could happen. After entering the care of GM, each of the animals was successfully rehomed.