Amphibian survey – Evanton Community Woods

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Summary

- This is the second formal amphibian survey of Evanton Woods, following on from an earlier survey in 2013.
- Three species of breeding amphibians were found: common frog, common toad and palmate newt.
- Numbers of palmate newt have increased markedly since 2013.
- Unlike the previous survey, no paedomorphic palmate newts were found – an unusual condition whereby an adult retains its juvenile form – however we believe that simple habitat work could create a habitat conducive to paedomorphic newts and this could be of educational value.
- The terrestrial habitat in the wood remains of high quality for amphibians with suitable feeding areas and potential hibernation sites.
- Habitat management work in line with the original report's recommendations appears to have greatly improved the value of one of the breeding ponds for amphibians, with a 10-fold increase in observed newts.
- The ponds have shown themselves to be a great educational resource, bringing people of a variety of ages and backgrounds into contact with nature.
- The site would be ideally suited to a medium-term citizen science monitoring programme such as OPAL or NARRS.

Introduction

From Harry Potter's chocolate frogs to Macbeth's newts, amphibians are an important part of our culture. They also play a vital role in healthy ecosystems, functioning as both predators and prey. In some Highland areas, they may even form the dominant wild vertebrate species in terms of both numbers and biomass (total weight of organisms in a given area). As their lifecycle encompasses two media – water and land – they also offer us clues as to the condition of our environment.

Unfortunately, globally and nationally amphibians are not faring well. The main threats are disease, non-native species, over-exploitation, climate change, pollution and habitat loss. To date, the Highlands have been largely immune to many of these malevolent influences. We lack the intensive agriculture and extensive development of many other parts of Europe and, as yet, none of the diseases associated with mass mortality have been found in northern Scotland. Although it may seem counter-intuitive, recent research suggests that the most effective places to intervene to support threatened species is actually where they appear to be doing well. In addition, the large, relatively unfragmented amphibian habitats of the Highlands are proving to be a fertile area for

study by scientists looking to unlock the keys to resistance and susceptibility to disease and to how animals respond to climate change. Evanton woods can have an important part to play in these studies.

Amphibians have a further important role. As they are relatively insensitive to disturbance, they are ideal subjects for public events. They can be studied with little or no equipment, and have fascinating life histories. As a result, they are ideal animals to help people connect, or reconnect, with nature.

Species found

Common Frog *Rana temporaria*

The common frog remains the country's most widespread amphibian, ranging from sea level to over 1 100m in the Cairngorms. It is also quick to colonise suitable breeding ponds, even shallow sites such as wheel ruts. Common frogs bred in all the ponds surveyed in 2016 with greater, or equal, numbers of spawn clumps to 2013.

Common Toad *Bufo bufo*

Common toads generally prefer larger water bodies than our other native amphibians, which may explain why they have only been recorded from the main pond. However, if numbers build up, it is entirely possible that they may colonise the stream pond: toads are more tolerant of running water than common frog.

Palmate Newt *Lissotriton helveticus*

Palmate newt were found in all the ponds surveyed. In the main dipping pond, we recorded 224 adults in an evening of torching (30 April 2016), a remarkably high count. Whilst numbers of this species fluctuate for reasons that are not properly understood, the most likely explanation in this case would be the habitat improvement work that has been carried out.

The ponds

There are three ponds or groups of ponds within Evanton Woods, as well as a number of wet areas which harboured amphibians during our survey. For each pond, we took readings of the water chemistry to find how acidic they were (pH 7 being neutral) and their conductivity, which is used to give an idea of how rich a pond is in dissolved ions such as Calcium (Ca^{2+}). These details allow the Evanton ponds to be compared with other sites and may help guide habitat management. The values will change depending on factors including water temperature, recent rainfall and time of year, so temperature and date of sampling are recorded for each pond.

For each pond, we also noted the main plant species present. As well as being interesting in its own right, knowing which plants can be found in a pond can also give a better understanding of its ecology. As newts use pond plants to lay their eggs upon, the presence of suitable pond plants can be important in maintaining high populations.

The pond names used are simply for orientation and do not reflect local names for the ponds.

Wheel ruts near the covered spring (NH59953 66395)

2013 (left), 2016 (right)

Species found: Common frog, palmate newt.

Pond chemistry: pH 4.6 – 5.4, oxygen saturation 73-97%, electrical conductivity 130-225 µS at 8.6°C (2013 values: pH 6.9, electrical conductivity 146 µS at 7.6°C 5th May 2013).

These ruts appear to have been formed by timber extraction vehicles. Whilst not natural features of woodland, ruts like these mimic wild boar wallows which are an important breeding habitat for amphibians in mainland Europe. They have been colonised by aquatic plants suggesting that drying is infrequent. They appear to have held water all year in 2016 although in 2013 they dried out part way through the summer.

Main pond (NH59672 66544)

2013 (left), 2016 (right)

Species found: Common frog, common toad, palmate newt.

Pond chemistry: pH 5.6 oxygen saturation 70%, conductivity 162 µS at 14.7°C (2013 values: pH 6.9, 89 µS at 4.3°C 7th April 2013).

There have been extensive works at this pond including reprofiling, and removal of shade trees. Satellite ponds were also dug at this time. This is a sizeable woodland pond with good water quality, as shown by the wide variety of aquatic invertebrates found. It dried out in July 2013 but since the extensive work on this pond it would seem unlikely that this will occur in the future. As the photograph shows, dogs and pond dipping by school groups can make this pond quite turbid at times, though this does not appear to be having an adverse effect on the amphibians.

Common frog spawn was recorded at this site in 1986 and it is likely to have been an important local breeding site for some time.

Stream pond (NH59510 66486)

2013 (left), 2016 (right)

Species found: Common frog, Palmate newt

Pond chemistry: pH 6.5, oxygen saturation 119%, conductivity 203 µS at 11.3°C (pH 7.2, 360 µS at 4.2°C 7th April 2013)

This pond is in effect a slow-flowing wide section of the burn which later flows into the other large pond at the site and ultimately the Allt Graad. The pond is heavily disturbed by dogs and by the natural variation in water flows which churn up the silt and can make parts of it next to the path difficult for plants to become established. However, palmate newts were found egg-laying on brooklime (*Veronica beccabunga*) (not folded over) and floating sweet grass (*Glyceria fluitans*) away from the path on the vegetated south bank. Common frogs were recorded breeding here for the first time in 2016. Torching revealed two eels (*Anguilla anguilla*). Probably due to the inflow from the burn and its relatively greater depth, this pond does not appear to dry out completely, remaining wet even during the dry weather of July 2013, when most other ponds dried out. The high oxygen levels may reflect the pond's nature as part of a stream.

Ruts opposite hydro (NH599666)

2013 (left), 2016 (right)

Species found: Common frog, palmate newt

Pond chemistry: pH 5.6, oxygen saturation 126%, conductivity 101 µS at 11.4°C (pH 6.8, 161 µS at 8.7°C 7th April 2013)

Another series of ruts caused by timber extraction, in this case fed by water flowing down the bank. In 2013 these ruts held palmate larvae that had overwintered, including a rare paedomorphic newt. In relatively cold climates like Scotland's, larvae often over-winter and then metamorphose the following spring. Paedomorphs occur when larvae over-winter twice. They then attain sexual maturity while retaining larval form, including gills. This is very uncommon but is associated with colder ponds. Sadly, the ruts dried out in July 2013 and paedomorphic newts have not been found since.

Outdoor classroom ditches (NH603665)

Species found: Common frog,

Pond chemistry: pH 4.7, oxygen saturation 59%, conductivity 94 µS at 7.6°C (pH 7.6, 127 µS at 3.3°C 7th April 2013).

A ditch near the 'outdoor classroom' area on the banks of the Allt Graad. Despite having no vegetation and being heavily shaded, it is used as a breeding site by frogs in most years. The low oxygen levels reflect the lack of vegetation. As in previous years, the water temperature at this shaded site was much lower than other waterbodies in the wood.

Recommendations

The woodland is managed for multiple uses, principally for recreation, conservation and education. Any recommendations should be viewed from this perspective.

Overall the management of the wood is favourable to amphibian conservation, and to the conservation of other species. There is variation in the degree of canopy closure, for example, leading to a variety of light levels and ground cover. There are also numerous piles of logs and brash which provide cover and, in the case of the former, potential hibernation sites.

In addition, work carried out in conjunction with Froglife has clearly improved the site for amphibians and has almost certainly led to a marked increase in population levels, particularly of palmate newt. The main pond is likely to remain in good condition for years to come with only mild intervention required to prevent willows from becoming established and drying out the ponds, and to remove any marginal trees that are causing shade.

The only 'pond' where further intervention is recommended is the series of ruts opposite the hydro plant. It would be beneficial if some of these ruts were deepened to reduce the likelihood of their drying out. This work would not need any specialised equipment and could be done with ordinary spades. Leaving this area shaded will increase the likelihood of paedomorphic newts occurring in future. This will present an excellent educational resource: these animals are highly unusual and might be considered 'Scotland's axolotls'.

References and further reading

Amphibian & Reptile Conservation Trust - http://www.narrs.org.uk/survey.php - the most widely used survey method in Britain. The website also has downloadable identification guides.

Beebee, T.J.C. & Griffiths, R.A. (2000) Amphibians and Reptiles. Collins New Naturalist. An excellent overview of British amphibians and reptiles.

Highland Biological Recording Group - http://www.hbrg.org.uk

McInerny, C. & Minting, P. (2016) The Amphibians and Reptiles of Scotland. Glasgow Natural History Society. Available as a free download from the GNHS website. http://www.glasgownaturalhistory.org.uk/books.html

National Biodiversity Network - http://data.nbn.org.uk/ - a website showing the distribution of species across Britain and Ireland.

Annex 1 - Survey method

As recommended by Amphibian and Reptile Conservation and other organisations, we used a variety of methods to survey. We followed the protocol developed for the National Amphibian and Reptile Recording Scheme (NARRS) which is widely used across the UK. Using a standard method allows us to compare our results with those from other sites in the Highlands and beyond.

We surveyed for amphibians by visual search for eggs, larvae and adults during the daytime, netting during the day, funnel trapping and torching at night. We also surveyed the habitat using the modified Habitat Suitability Index (HSI). Comprehensive details of these techniques can be found at http://www.narrs.org.uk/survey.php.

The first survey was carried out on 31st March 2016. As well as ponds marked on the map, we surveyed the entire wood by walking over it, and thereby found several small water bodies which were not marked. None of these were found to support breeding amphibians, though they may well do so in wet years. Further survey visits were made on 28th April, 30th April (night), 1st to 2nd May (funnel traps), 11 May.

Annex 2 - Pond details

Counts after species names indicate maximum count, m =male, f = female. Figures for common frog are the number of spawn clumps. Plants refer to those growing in the water, whether they are true aquatics or not.

Wheel ruts near the covered spring (NH59953 66395)

Species found:

2016: Common frog (1 clump), palmate newt (6m, 13f + larvae)

2013: Common frog (1 clump), palmate newt (1m, 2f).

Pond chemistry: pH 4.6 – 5.4, oxygen saturation 73-97%, electrical conductivity 130-225 µS at 8.6°C (2013 values: pH 6.9, electrical conductivity 146 µS at 7.6°C 5th May 2013).

Plants: *Callitriche stagnalis.* Algae of species unknown.

Main pond (NH59672 66544)

Species found:

2016 Common frog (32 clumps, of which 22 in main pond), common toad, palmate newt (224 adults, also numerous larvae)

2013: Common frog (18 clumps), common toad, palmate newt (2m, 1f laying eggs on *Glyceria fluitans*).

Pond chemistry: pH 5.6 oxygen saturation 70%, conductivity 162 µS at 14.7°C (2013 values: pH 6.9, 89 µS at 4.3°C 7th April 2013).

Plants: *Glyceria fluitans, Myosotis sp., Calliergonella cuspidata, Galium palustre, Luzula sylvatica, Ranunculus repens, Lemna minor.*

Stream pond (NH59510 66486)

Species found:

2016: Common frog (8 clumps), palmate newt (4m, 4f + larvae)

2013: Palmate newt (5m, 2f)

Pond chemistry: pH 6.5, oxygen saturation 119%, conductivity 203 µS at 11.3°C (pH 7.2, 360 µS at 4.2°C 7th April 2013)

Plants: *Veronica beccabunga, Potamogeton natans, Filipendula ulmaria, Ranunculus repens, Myosotis sp, Juncus effusus, Mentha aquatica, Lemna minor, Chrysosplenium oppositifolium, Glyceria fluitans*

Ruts opposite hydro (NH599666)

Species found:

2016: Common frog (6 clumps), palmate newt (1m, 5f + larvae)

2013: Common frog (6 clumps), palmate newt (1m, 2f + larvae)

Pond chemistry: pH 5.6, oxygen saturation 126%, conductivity 101 µS at 11.4°C (pH 6.8, 161 µS at 8.7°C 7th April 2013)

Plants: *Callitriche stagnalis, Potamogeton sp., Veronica beccabunga, Ranunculus repens*

Outdoor classroom ditches (NH603665)

Species found:

2016: Common frog (4 clumps),

Common frog (1 clump),

Pond chemistry: pH 4.7, oxygen saturation 59%, conductivity 94 µS at 7.6°C (pH 7.6, 127 µS at 3.3°C 7th April 2013).

Plants: no vegetation.