



Watchtree Amphibian Survey

Great Orton
Cumbria

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Abstract

A general amphibian presence/likely absence survey took place over the course of the late spring of 2004 at the Watchtree Nature Reserve, Great Orton. Four of the six British amphibians which are considered to be native were recorded as being present on site. These included common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt (*Triturus helveticus*) and great crested newt (*Triturus cristatus*). Great crested newt were recorded in extremely small numbers. Smooth newt (*Triturus vulgaris*) were not recorded although presence is still considered a possibility despite the level of survey effort. As expected, the coastal natterjack toad (*Bufo calamita*) was not recorded on site and is considered to be absent.



1 Introduction

1.1

During the 2001 foot and mouth crisis, Watchtree airfield at Great Orton, Cumbria was selected as a mass culling and disposal site for infected animals. (OS GR NY 310538). Approximately 50 ha of land within the 83 ha site was used for the burial of carcasses. Once the foot and mouth situation was resolved and no further burial space was required, the decision was taken to restore the site as a nature reserve with the aim of providing significant, positive, residual long-term impacts to the surrounding environment and landscape. A specific objective included the creation of ponds and wetlands as part of a diverse matrix of habitat types designed to enhance the richness and diversity of species, and to encourage the establishment within the site of a variety of wildlife in accordance with the Cumbria Biodiversity Action Plan objectives.



Photograph 1. Torch survey

1.2

A general amphibian survey was conducted on five nights to provide a comprehensive understanding of amphibian presence on site to assist with the process of restoring and managing the nature reserve. These surveys took place on the evenings and nights of 27th May and 3rd, 9th, 17th and 23rd June 2004. Ponds surveyed included the established pond 8a in woodland at the north of the site, pond 6 and the associated channel 5a in the centre of the site, ditch 8b in the north east and pond 7 known as the constructed wetlands in the south of the site. (See map in annexes). Survey methods varied and included egg search, refuge search, net survey, general visual observations, torch survey and bottle trapping.



2 Limitations

2.1

Due to general similarities in appearance, distinguishing between the females of smooth newt (*Triturus vulgaris*) and palmate newt (*Triturus helveticus*) is notoriously difficult when making a torch count. Other methods used during the course of the survey did not produce any smooth newts on site. As this was the case, all small female newts which were not positively identified (as either smooth newt or palmate newt) during torch counts have been assumed to be female palmate newts. In the data tables and summary tables, the eggs, larvae and eft stages of smooth and palmate newts have been combined. This is also because accurate identification between the two species is not possible at these developmental stages even when "in the hand". However, due to the fact that no adult smooth newts were recorded during the survey, it is considered to be highly likely that eggs, larvae and efts noted were those of palmate newt.



Photograph 2. Newt larvae assumed to be palmate newt



3 Methods

3.1

Five surveys were programmed for each pond identified to take place between mid May and the end of June.

3.2

Nights were chosen when conditions were most appropriate for surveying. This meant avoiding wet and windy nights which disrupt the water surface and increase counting difficulty when torching. This proved difficult at Watchtree as the exposed site is rarely windless and open ponds such as pond 6 were constantly affected by the wind. Nights when the temperature was likely to drop below 5°C were also avoided as such a drop may reduce newt activity and reduce the chances of detecting presence. Cloud cover, precipitation and an estimate of wind speed were recorded on the sites weather stations. Time of sunset was recorded on site using a Garmin *etrex* Summit Global Positioning System (GPS) receiver.

3.3

Two surveyors worked together for all elements of the survey program. Surveyors wore thigh waders and self inflating life jackets. Wading staffs were also carried. Surveyors present were Ash Bennett and Richard Graham. For health and safety reasons, the surveyors remained within sight and earshot of each other at all times.

3.4 Egg search

This method involves a slow and meticulous examination of the leaves of submerged vegetation for newt egg folds. The eggs of great crested newt are readily distinguished from the eggs of smooth newt or palmate newt. Where possible, the egg type was identified without opening the fold fully to reduce the number of eggs exposed to predation. Also, if a number of eggs exist in close proximity to each other on one plant, only two or three folds only were opened to identify the species. Eggs clustered in this way are usually all the same species and opening further egg folds merely exposes more eggs to predation.

3.5 Refuge search

This method involves lifting material and debris which amphibians may be using as a place of shelter and recording animals discovered beneath. Any upturned material was returned to its original position as amphibians have a high fidelity for such refuges. Sheet material from a redundant chick rearing pen had already been placed in areas around pond 8a to form such refuges and had been allowed to "settle in" over time.

3.6 Torch survey

Torch surveys commence approximately half an hour after dusk or when it is deemed dark enough to begin. The surveyors walked slowly around the margins of each pond checking for newts in the torch beam. Particular attention was paid to areas of marginal vegetation and potential display areas. Head torches with relatively dim halogen bulbs were used for walking around the pond edges while 500,000 candle power Clulite CB1 lamps with separate battery packs were used to search for newts taking care not to disturb the newts if possible. The same power lamps were used on each visit to ensure consistency. Newts observed were recorded on digital voice recorders.

3.7 Bottle traps

Bottle traps were set at ponds 8a and 6 only. It was felt that the ponds within area 7 (constructed wetlands) could be adequately covered using other methods. On two of the five nights, bottle traps were set just prior to dusk at an approximate density of one trap for every 2m of shoreline where conditions allowed and within certain areas only. This was for a



number of reasons. The function of the amphibian survey was to assess presence/ likely absence only rather than to attempt a population size class assessment. The perimeter of pond 6 is extensive and a full bottle trap survey of the entire perimeter was considered logistically and practically unsuitable. A density based method was considered more appropriate. A total of 30 bottle traps were set at pond 8a and 30 along the southern bank of pond 6. Each trap was set in the shallow margins of the ponds and set at an angle to allow the retention of an air reservoir in each one. The traps were staked into the bed of the pond and marked with a red tag and a cork float marker to enable easy retrieval. All traps were retrieved the following morning after an average of 12 hours. The contents were recorded and any trapped animals released immediately. All traps were then counted to ensure none were inadvertently left set.

3.8 Net survey

Strong nets with threaded extension handles and 300mm deep amphibian net bags made with 2mm mesh were used for net surveys. Surveyors waded a transect through a safe section of pond and took a wide sweep sample approximately every 2m. Net surveys were standardised by surveying for approximately 15 minutes per 50 m of accessible pond shoreline. Attempts were made to avoid areas where torch surveys were to be conducted later that day to avoid creating excessive turbidity. Although netting was used at all ponds, this method was only felt to be useful at pond 8a and along the channel between 5a and pond 6 as the other ponds could be effectively surveyed using other methods. A thick layer of blanket weed (*Cladophora sp.*) was present along the channel between 5a and pond 6, while pond 8a was heavily vegetated making this an effective method here. Netting was noted to be highly disruptive at pond 8a as some of the finer silt which became stirred up as a result of the process was noted to be still in suspension in places during the subsequent surveys.

3.9 General visual observation

Notes on general amphibian activity such as tadpole numbers or emerging froglets etc were recorded during the course of the surveys.



Photograph 3. Bottle traps. Pond 6

4 Survey results.



4.1 Pond 8a

4.1.1

Pond 8a is an established pond situated within approximately 2 ha of existing woodland. As with many ponds in the region, pond 8a and the surrounding wood was probably created to encourage wildfowl for shooting purposes. The pond is formed of three parallel linear ponds with central islands probably formed by the material excavated during the original construction. A steep bank also exists to the north which is also likely to be a result of the excavation. At the time of survey, the ponds were generally between approximately 200mm and 1m deep. The substrate varied between a firm bed and thick silt. Bankside vegetation is dense and appears to be relatively young as the species are associated with early pioneers. Species include abundant alder (*Alnus glutinosa*) and willow (*Salix* sp.) with occasional silver birch (*Betula pendula*) and gorse (*Ulex* sp.) scrub. Submerged and floating vegetation in the pond itself includes abundant broad-leaved pondweed (*Potamogeton natans*) and a fine-leaved pondweed considered likely to be small pondweed (*P. berchtoldii*). There is also locally frequent water starwort (*Callitriche* spp.) and ivy-leaved duckweed (*Lemna trisulca*). Emergents include abundant branched bur-reed (*Sparganium erectum*) with frequent water forget me not (*Myosotis scorpioides*), water mint (*Mentha aquatica*), large bitter-cress (*Cardamine amara*) and occasional reed mace (*Typha latifolia*). There are also locally frequent stands of spike rush (*Eleocharis* sp.), sedges (*Carex* sp.) and soft rush (*Juncus effusus*).



Photograph 4. Pond 8a from the south east

4.1.2

Wading was only possible in certain areas of the pond. The whole of the southern bank and both ends of the southern pond were accessible in this way. Only the north western and north eastern corners of the central pond were accessible. Most of the northern pond was accessible although the soft nature of the bed and the dense overhanging vegetation at the western end made access quite difficult. Torch surveying is normally conducted from the bank. However, as the bankside vegetation surrounding pond 8a was extremely dense, the majority of the torching was done whilst wading.

4.1.3

Maximum counts for 8a across all survey dates are summarised in the table below. Usually, maximum counts are the most animals counted on one particular night using a particular method. Adults which are counted using the torch method and those counted using bottle traps are not summed to avoid double counting. However, those which are counted using methods which could not conflict in such a way have been summed. For example, an adult toad found under a refuge may be summed with those counted using a visual search in a completely different place 10 minutes later as there is no possibility of a double count. Maximum counts in the table below did not necessarily take place on the same night.

Pond 8a	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
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Watchtree
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Tc	0	0	0	0	0
Tv	0	0			
Th	19	0	1	10	10
Rt	0	0	10	100	0
Bb	1	2	10	10000	0

Table 1. Pond 8a. (Entries in the three right hand columns are by order of magnitude. E.g. numbers estimated in the ones, tens, hundreds etc.)

4.1.4

A maximum count of adult palmate newt was recorded on 3rd June (n = 19) using the torch method. Palmate/smooth newt eggs were recorded in the tens on the first two surveys. (See limitations). Eggs were relatively well spaced around the margins of the pond. Numerous old egg folds from hatched or predated newt eggs were also discovered on the first survey. It is not possible to tell the species of newt from old egg folds but it indicates a higher level of breeding activity at the pond prior to the survey commencing. The larvae of palmate/smooth newt were recorded in the tens on 23rd June using the net method (n = 66).

4.1.5

A single adult common toad was recorded on 27th May under one of the sheet refuges. A subadult at 41mm was recorded the same sheet on 3rd June. Tadpoles of common toad were estimated in the tens of thousands and metamorph toadlets were recorded emerging from the pond in the tens during the later surveys.

4.1.6

Tadpoles of common frog were recorded in the hundreds. Many of these had already developed legs at the start of the survey and metamorph froglets were recorded emerging in the tens during the later surveys.

4.1.7

Greater diving beetle (*Dytiscus marginalis*), which are known to be voracious predators of amphibians at all life stages, were noted in this pond. Azure damselfly (*Coenagrion puella*) were also observed within the surrounding terrestrial habitat.

4.2 Ditch 8b

4.2.1

This ditch was dry at the beginning of the survey. The ditch was not surveyed subsequently.

4.3 Pond 6

4.3.1

Pond 6 is a large, exposed, newly created pond with a shallow profile and shallow sloping banks. The surrounding vegetation has been sown with a species rich pasture mix. Specific botanical surveys have been conducted in the grasslands which will provide detail of the plant communities present and the relative abundance of species. The pond itself has been planted with a number of aquatic species. Planted species include water forget-me-not, yellow iris (*Iris pseudacorus*), marsh-marigold (*Caltha palustris*), great willowherb (*Epilobium hirsutum*), common reed (*Phragmites australis*), common water starwort (*Callitriche stagnalis*) and curled pondweed (*Potamogeton crispus*). Despite the extensive planting program, the margins remain sparsely vegetated and the pond is largely clear, open water. This made the pond especially good for torching surveys.



Photograph 5. Pond 6 from the west

4.3.2

Maximum counts for pond 6 are summarised in the table below.

Pond 6	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
Tc	2	0	0	0	10
Tv	0	0			
Th	1	0	0	0	0
Rt	1	0	1	1	0
Bb	15	0	0	10	0

Table 2. Pond 6.

4.3.3

Two adult great crested newt males were recorded using the bottle trap and net methods on 3rd June. Both males were approximately 110mm long and were in full breeding condition. Belly patterns were photographed for future reference. Both were caught in the channel at the south western corner between the main pond and the area known as 5a. The eggs of great crested newt were recorded in the mid tens during the earlier surveys. All these eggs were found on the leaves of water forget-me-not near the south western corner close to the channel linking the pond with area 5a. A small number of old egg folds were also discovered on water forget-me-not near the centre of the northern shore. Towards the end of the survey program, all eggs had all disappeared but it was not possible to tell if this was due to hatching and dispersal or to predation. No great crested newt larvae were observed during the later surveys, although the small number of eggs would have produced only a few larvae which could easily have gone uncounted in the large expanse of the pond. Occasional predatory invertebrates were noted but these were in quite small numbers.

4.3.4

A single unsexed palmate newt was observed using the torch method on 27th May.

4.3.5

A single adult common frog was observed by torch on 9th June. Tadpoles were recorded in the ones by torch on the 3rd June, and froglets recorded in the ones on 17th June.

4.3.6

15 adult common toad were observed along the channel leading to 5a on 27th May and tadpoles were observed in the tens on 3rd June.



4.4 Constructed wetlands (pond 7)

4.4.1

This is an area of 4 successive ponds which filter and clean the water as it passes through the system. Each pond has steep sided banks and the water is relatively deep. These are also newly created ponds which have been the subject of similar planting schemes to pond 6. The marginal and bankside vegetation is still quite sparse. By survey 3 on 9th June, virtually all aquatic vegetation with egg laying potential was above the water line as the levels dropped.



Photograph 6. Constructed wetlands from the west

4.4.2

Maximum counts for pond 7 are summarised in the table below.

C W 7	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
Tc	0	0	0	0	0
Tv	0	0			
Th	0	0	0	0	0
Rt	1	0	0	0	0
Bb	4	0	0	1000	0

Table 3. Constructed wetlands (area 7)

4.4.3

Amphibian activity was limited in this pond. A single adult common frog was observed by torch on 17th June.

4.4.4

A maximum count of four adult common toads was recorded on 3rd June although two of these were dead. (The dead animals were not included in subsequent counts). Common toad tadpoles were recorded in the thousands during the earlier surveys. The majority of these were in the northern most pond. Tadpoles were noted in the ones only in the other ponds suggesting these had washed down through the system as greater numbers would have been present otherwise. The third pond down from the north had a thick layer of blanket weed present throughout. No toadlets were observed emerging despite tadpoles becoming much less frequent toward the end of the survey. This may be due to the plastic anti-erosion netting which, along with a coating of algae, will have provided immediate cover for emerging metamorphs.



4.5 Maximum counts for the site as a whole

4.5.1

Maximum counts for the site are summarised in the following table.

Site	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
Tc	2	0	0	0	10
Tv	0	0			
Th	19	0	1	10	10
Rt	1	0	10	100	0
Bb	15	2	10	10000	0

Table 4. Maximum site counts.



Photograph 7. Male great crested newt in bottle trap.



Photographs 8 and 9. Male great crested newt belly patterns



4.6 Site status assessment

4.6.1 Quantitative

Although the site was not surveyed following English Nature guidelines for great crested newt population size class assessment, it is still possible to apply a quantitative assessment based on the results obtained. Populations are classed in one of three brackets within the great crested newt mitigation guidelines

- Small for maximum counts up to 10,
- Medium for maximum counts between 11 and 100,
- Large for maximum counts over 100

The total site count could be concluded to be a minimum of three adult great crested newts of breeding age (this includes at least one female required to lay the eggs observed in pond 6). This places the site within the **small** population size class. A more accurate population size class could be obtained if surveyed on a minimum of 6 dates between mid March and mid June with at least 3 of these during mid April to mid May. These minimum standards are designed to assess populations which are the subject of development mitigation. The classification system can still be used at Watchtree even though development is not a concern.

4.6.2

The site was not surveyed with a view to forming an assessment of the amphibian assemblage. However, it is possible to assign a score for the site based on a scoring system devised by the NCC in 1989 for assessing sites for designation as SSSI. The species encountered can be given a score based on maximum numbers counted.

Species	Count	Score
Great crested newt	>5	1
Smooth newt	0	0
Palmate newt	10-100	2
Common toad	<100 (Estimated)	1
Common frog spawn clumps	<50 (Estimated)	1
Number of species present	4	1
Total score		6

Table 5. Amphibian assemblage score.

This gives an amphibian assemblage score of 6 for the site as a whole. A minimum score of 10 based on presence of at least four species is regarded as the qualifying score for site selection as SSSI. (Herpetofauna Worker's Manual. JNCC).



4.6.3 Scores based on standardised methods.

4.6.3.1

A further means of assessing the conservation status of newt populations is presented by Griffiths, Raper and Brady 1996. This calibrates methods for scoring populations that have been surveyed using standardised methods. Scores are based on calculating the average number of newts per 2m of shoreline observed using each method. A maximum score of the torch survey of pond 8a is obtained by converting the maximum number of newts counted by the number of 2m stretches surveyed. Scores are then placed in one of four bands - Average, Above average, Good and Excellent. For the purposes of this analysis, the amount of shoreline surveyed at pond 8a is taken to be approximately 100m for the torch survey and 60m for bottle trapping.

4.6.3.2

The following calibration applies for a torch survey for newts other than great crested newt within murky or vegetated sites.

$$n=19/(100m/2) = 0.38 \text{ (Palmate newts)}$$

Average	$0.49 \leq 0.95$
Above average	$> 0.95 \leq 1.28$
Good	$> 1.28 \leq 1.65$
Excellent	> 1.65

Table 6. Status of newt populations. (Smooth or palmate newts/Torching)

The score of 0.38 indicates pond 8a is below average when using this particular method.

4.6.3.3

The highest bottle trap score of 10 can also be treated in the same way using a set of criteria devised specifically for the method.

$$(n=10/(60m/2) = 0.16 \text{ (Palmate newts)})$$

Average	$>0.64 \leq 1.19$
Above average	$> 1.19 \leq 1.56$
Good	$> 1.56 \leq 1.96$
Excellent	> 1.96

Table 7. Status of newt populations. (Smooth or palmate newts/Bottle trapping)

This assessment method also places the pond below the average population band. However, as stated in 4.6.1, a more accurate population size class for newts could be obtained if surveyed on a minimum of 6 dates between mid March and mid June with at least 3 of these during mid April to mid May.



5 Summary

5.1

Four species of British amphibian were recorded during the survey. All were recorded as actively breeding on site including great crested newt. This is the first record for great crested newt in the area. The nearest known populations are in excess of seven kilometres from Watchtree suggesting the population was unrecorded but already in existence at the site or unrecorded at a another unknown population nearby. Breeding success in the form of emerging metamorphs was recorded for palmate newt, common frog and common toad. Larvae of great crested newt were not recorded.

5.2

Pond 8a is the only established pond on site. The nature of the aquatic and surrounding terrestrial habitat is considered excellent for amphibian purposes. The pond is well vegetated but not choked. Occasionally there are small areas where aquatic vegetation is slightly thinner or absent creating potential courtship display areas. No great crested newts were discovered in this pond despite the high level of survey effort involved. A larger proportion of the entire survey effort was spent at pond 8a for a number of reasons. It was felt that this pond would produce the most accurate results in terms of reflecting the amphibian populations present on site as it is the only established waterbody. Also, a greater level of survey effort was required at pond 8a as the dense aquatic vegetation meant a more intensive survey program was necessary to ensure thorough coverage of the pond. As great crested newts were found at pond 6, the lack of great crested newt activity at Pond 8a is surprising as this well established pond has many features and characteristics which were expected to offer conditions favourable to great crested newt breeding activity. There may a number of factors contributing to the lack of great crested newts observed at this pond. Bankside vegetation offers an excellent terrestrial refuge. However, the density of the scrub and tress growing on southern slopes of the pond may be keeping water temperatures down through shading. Also, the dense nature of the submerged and floating aquatic vegetation may be having a similar effect. There may have been parts of the pond which, due to the depth, were inaccessible to the surveyors and which may have been the favoured grounds for great crested newt activity for the same reasons. This said, even if great crested newts are utilising pond 8a, the level of use is likely to be low as further signs would have been seen considering the level of survey effort undertaken.

5.3

The only great crested newt activity on site was recorded at Pond 6. This was in the form of 2 adult males in breeding condition and eggs in the 10's indicating the presence of adult females and confirming that breeding is taking place on site. This was surprising considering the brand new and rather raw state of the pond. As the density of aquatic vegetation increases throughout this pond, it is highly likely to become an increasingly successful habitat for amphibians by providing greater foraging and breeding opportunities for amphibian and invertebrate populations alike. However, this same effect may create an increase in wildfowl numbers as aquatic vegetation spreads. This may slow down the growth of newt populations as eggs are inadvertently taken by grazing wildfowl. Despite this effect, biodiversity of this nature should be encouraged. The ponds in the constructed wetlands (area 7) could be seen as offering similar future potential.

5.4

In general, the site has a diverse matrix of habitat types including species rich grasslands, hedgerows, established woodlands, newly planted woodlands, established and extensive newly created aquatic habitats. In combination, this offers potential to form a site with excellent opportunities for the existing amphibian populations to thrive and expand.



Abbreviations used in the tables

<i>Tc</i>	<i>Triturus cristatus</i>	Great crested newt
<i>Tv</i>	<i>Triturus vulgaris</i>	Smooth newt
<i>Th</i>	<i>Triturus helveticus</i>	Palmate newt
<i>Rt</i>	<i>Rana temporaria</i>	Common frog
<i>Bb</i>	<i>Bufo bufo</i>	Common toad
Juv's	Juveniles	Sub adult (non-breeding)
F'lets	Froglets	Emergent metamorph common frog
T'lets	Toadlets	Emergent metamorph common toad
Efts	Efts	Emergent metamorph newt
Larv'	Larvae	Fully aquatic post-hatch/pre-emergent newt
Tad's	Tadpoles	Fully aquatic post-hatch/pre-emergent frog/toad

Table 8. Abbreviations

6 References

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