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Watchtree Amphibian Survey 2007

Great Orton
Cumbria

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Abstract

As part of an ongoing study of population changes, a general amphibian presence/likely absence survey took place between early April and mid July 2007 at the Watchtree Nature Reserve, Great Orton. This is the fourth such survey conducted in consecutive years since 2004. As previously recorded, five of the six long recognised British amphibians were recorded as being present on site. These included common frog (*Rana temporaria*), common toad (*Bufo bufo*), palmate newt (*Lissotrition* (*Triturus*) *helveticus*), smooth newt (*L. (T.) Vulgaris*) and great crested newt (*Triturus. cristatus*). A maximum count of 15 great crested newt was made during survey 3 (15th May). This puts the population of great crested newt within the medium size class bracket for the first time (10-100). Eggs of great crested newt were noted in the 10's in pond 7 (constructed wetlands) and larvae were noted in the low 10's in the ditch at the south of pond 6. Once again great crested newt were not detected at the only established waterbody on site (8a) which is considered to be the source of the species on site. A significant increase in the number of smooth newt was recorded in the ditch between pond 6 and 5a and in similar numbers to previous counts in the pond at 8a. As in previous surveys, palmate newt were present in good numbers particularly in the pond at 8a which is consistent with previous surveys. A small number (n=3) of unidentified small newts were noted in the margins of pond 7 and a male palmate newt was noted in the margins of pond 7a which is the first record of a newt in this pond. Small newt larvae were detected in the 10's in ponds 8a and in the ditch mentioned above. Common frog and common toad were both frequent throughout the site with large numbers of common toad tadpoles recorded particularly in 8a.

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.

1.2
An amphibian survey methodology was prepared in 2004 with the intention of producing results which would be directly comparable with surveys conducted in subsequent years. During 2007, a general amphibian survey was conducted on five nights during the amphibian survey season which is based on timings prescribed in the great crested newt mitigation guidelines. The intention of the survey is to provide a comprehensive understanding of amphibian presence on site, to monitor changes to that amphibian presence over time and to assist with the process of restoring and managing the nature reserve. These surveys took place on the evenings and nights of 4th and 16th April, 15th May, 5th June and 23rd July 2007. The emphasis of the later survey is on larvae counts to establish ponds with breeding success primarily for newt species. Ponds surveyed included the established pond in the woodland 8a 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, pond 7 known as the constructed wetlands in the south of the site and pond 7a (also referred to as 7 west). (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 and palmate newt is notoriously difficult when making a torch count. There is a slight size difference (smooth newts being slightly larger (*up to 110mm*) than palmate newt (*up to 90mm*) (Arnold/Ovenden)) but the overlap is significant which seriously weakens positive identification with this method. The only way to distinguish between the two with confidence is in the hand as, along with other slight differences, female smooth newts usually have spots under the chin while female palmate newts are usually immaculate. (When being considered collectively, palmate and smooth newts are referred to as small newts in the text). Of all small newts positively identified during the whole survey period (n=239), 70% were identified as palmate newt with the remaining 30% as smooth newt. This is a similar split to 2006 although there are approximately two times as many small newts counted. The difference in 2005 was 90% palmate newt 10% smooth newt. There were also 57 unidentified small newts recorded of which 53% were at pond 8a. All small newts which were not positively identified during torch counts have been included in the *Tv/Th* row in the data tables. In previous surveys, the number of palmate newt recorded has far outweighed the number of smooth newt. This meant that an assumption was made that the majority of unidentified small newts, eggs and larvae were considered to be those of palmate. This is still considered to be the case in pond 8a where counts of smooth newt are still small, but can no longer be assumed to be the case at pond 6 were the maximum count for smooth newt outweighed the maximum for palmate newt for the first time. The eggs, larvae and eft stages of smooth and palmate newts have also been combined in the tables. This is also because accurate identification between the two species is not possible at these developmental stages even when “in the hand”.

Photograph 1. Refuge search

3 Methods

3.1
Five surveys were programmed for each pond identified to take place between mid April and mid July.

3.2
When possible, 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. As usual, this proved difficult at Watchtree as the site is open, exposed and usually windy. As a result, open ponds such as pond 6 and 7a were frequently affected by the wind. Nights when the temperature was likely to drop below 5ºC were also avoided as such a drop may significantly reduce amphibian activity and reduce the count accordingly. Hourly temperatures, pressure trends, precipitation and wind speeds were recorded on the sites weather stations. Time of sunset was recorded on site using a Garmin *etrex* Summit Global Positioning System (GPS) receiver. Acidity and surface water temperature were measured using a pHep4 pH and temperature meter (Hanna instruments).

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 included Ash Bennett, Richard Graham and David Willis. 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. During survey 5, a greater emphasis was placed on this method over torch survey and bottle trap due to the lateness of the survey during the season.

3.6 Torch survey
Torch surveys commence approximately half an hour after dusk or when it is deemed dark enough to begin. Surveyors walk slowly around the margins of each pond checking for newts in the torch beam. Particular attention is paid to areas of marginal vegetation and potential display areas. Head torches with relatively dim halogen bulbs are used for walking around the pond edges while 500,000 candle power Clulite CB1 lamps with separate battery packs are 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, 6 and in the ditch between 6 and area 5a. It was felt that the other ponds on site could be adequately covered using other methods and is consistent with previous

surveys. On three 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 level of effort would be consistent with previous surveys and was felt to provide sufficient coverage. The perimeter of pond 6 is extensive and a full bottle trap survey of the entire perimeter was considered logistically and practically unsuitable. A sample/density based method was considered more appropriate. (A total of 30 bottle traps were set at pond 8a and 40 along the southern bank of pond 6, 20 of which were in the ditch leading to 5a as traps set in the main water body of pond 6 have not trapped a single newt since the survey began. Traps will be repositioned once the vegetation in pond 6 suggests trapping effort may reveal results. In the meantime it is felt that torching offers the best coverage for the main pond). 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 being set for an average of 12 hours. The contents were recorded and any trapped animals released immediately. (Belly patterns of great crested newt were recorded at this stage). All traps were then counted to ensure none were inadvertently left set.

3.8 Net survey

This is considered to be a supplementary method as torching and bottle traps usually produce better data and are less disruptive. This method was only used on survey 1 at ditch 8b and on survey 5 at ponds 8a, pond 6 and the constructed wetlands (CW7) for a number of reasons. 1. It is felt the majority of ponds can be most effectively surveyed using other less disturbing methods. 2. Netting at this level of effort would be consistent with previous surveys. 3. Survey 5 was conducted late during the season. This is because a greater emphasis on netting would be more productive than torch counting or bottle trapping as many adult newts will have left the pond by this stage and there was greater chance of netting newt larvae. Strong nets with threaded extension handles and 300mm deep amphibian net bags made with 2mm mesh were used for net surveys. Surveyors waded a tansect 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. When using this method, attempts were made to avoid areas where torch surveys were to be conducted later that day to avoid creating excessive turbidity. Again this method was consistent with the surveys conducted in 2004 - 06. A thick layer of blanket weed (*Cladophora sp*.) was present along the channel between 5a and pond 6 and throughout the whole of pond 6 itself, while pond 8a was heavily vegetated making this an effective supplementary 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.

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 assumed to have been 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 400mm and 1m deep. Water levels seemed to remain fairly constant through the 2007 survey season. The substrate varied between a firm bed and thick silt. Bankside vegetation was been altered during the winter of 2005/06. Scrub and trees have been removed from the south bank and along the full length of the southern promontory. This has had the effect of opening up the banks and allowing more sunlight through to the water itself. On the north promontory and north bank, the scrubby, dense vegetation has been left. By spring 2007, alder (*Alnus glutinosa*) and willow (*Salix* sp.) scrub has begun to re-grow and with dense herbaceous vegetation also forming along the previously cleared banks. In general, the woodland surrounding the pond is relatively young as the species are associated with early pioneers. Species include abundant alder and willow 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*). During 2006, the finer aquatic vegetation such as the water starwort was absent at the start of the survey season but grew vigorously and became quite dense by July. The stands of reed mace are still expanding rapidly and may need to be controlled in future if the expansion continues.

Photograph 2. Pond 8a.

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 in the northern half. 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. For most amphibian surveys, torch surveying is normally conducted from the bank. However, despite the clearance of some bankside scrub as described in 4.1.1, the remaining vegetation surrounding pond 8a was extremely dense. The banks where scrub was cleared are steep and are approximately 2m high from the bank toe to the bank top meaning torch survey from these areas was also quite difficult. For these reasons, the majority of the torching was done whilst wading with some torching conducted from the top of the southern promontory. The majority of newts were encountered between surveys 1 and 4.

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
Tc	0	0	0	0	0
Lv	5	0	0	0	0
Lh	33	0	0	0	0
Lv/Lh	12	0	0	120	10
Rt	0	0	10	10	0
Bb	11	1	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 small newts was recorded on 4th April (n = 62) using the torch method (See limitations). (Previous counts have been:- 2004 (n=19), 2005 (n=67), 2006 (n=44)). As for the 2005 and 2006 survey, numerous palmate newt (max n=33) and a small number of smooth newt (max n=5) were recorded in this pond but great crested newt have yet to be found here. The majority of unidentified small newts are likely to be palmate newt. Small newt eggs were recorded in the tens during surveys 1 and 2 and then in 1's during surveys 3 and 4. Eggs were relatively well spaced around the margins of the pond. Old egg folds from hatched or predated newt eggs were also observed on various occasions. It is not possible to tell the species of newt from old egg folds but it indicates a higher level of breeding activity. The larvae of small newt were recorded during the last survey with a net count of 120 made on 23rd July which is an increase of 36%. No great crested newt at any life stage were recorded in pond 8a. Even if great crested newt were now found in pond 8a, it would not necessarily mean that they had been here prior to the first survey conducted in 2004 as they have migrated in from one of the new ponds. There have now been 20 nights survey effort conducted at pond 8a with no great crested newts observed.

4.1.5

A maximum of 11 adult common toad were recorded under refugia on survey 3. Adults and juveniles were frequently recorded underneath the sheets of corrugated metal. Approximately 10 common toad spawn strings were noted in survey 1 along with 3 dead adults. It is thought the dead toads were either caught in a severe temperature drop or died during a period of spawning activity. Common toad tadpoles in the 10,000's were observed during survey 3 with metamorph toadlets in the 10's observed in the pond margins by the final survey.

4.1.6
Common frog tadpoles were noted in the 10's on survey 4 by bottle trap and torch. Froglets were emerging in the 10's by the final survey. As has been noted before, adult and juvenile frogs were not seen at pond 8a during any of the surveys.

4.1.7
By survey 3, the aquatic vegetation was becoming extremely dense which will have reduced the effectiveness of the torch survey. Acidity readings were taken on all surveys. pH averaged 7.74 which is similar to readings taken in 2005 and 2006.

4.2 Ditch 8b

4.2.1
As has been noted in previous surveys, the ditch at 8b was thick with algae and other suspended solids on each of the survey nights. The water was also heavily coloured despite persistent rainfall through the survey season. Frog tadpoles in the one's only were noted when the pond was netted during survey 2. In terms of aquatic habitat on site, the ditch at 8b does not appear to be that productive. Survey effort was concentrated at other ponds subsequently although further visits were made without netting.

4.3 Pond 6

4.3.1
Pond 6 is a large, exposed 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. Works had been carried out in the winters of 2004/2005 and 2005/2006 to remove plastic netting from the banks. This may have resulted in damage to some of the plants as aquatic plant numbers during the surveys conducted in 2005, 06 and 07 seemed to be less than during the 2004 survey. Aquatic plants are beginning to take hold and become established in areas, particularly the ditch between pond 6 and area 5a. A pondweed species thought to be broad leaved pondweed (*P. natans*) is apparent in the main waterbody of pond 6 although in general terms, very few aquatic plants with suitable egg laying vegetation were visible in the main pond. Algae was dense and extensive once again which considerably hindered the survey effort. Algae seemed to be concentrated over areas where plastic mesh remains. Removal of plastic mesh has not affected the aquatic vegetation in the ditch between pond 6 and area 5a. Virtually all amphibian activity was recorded in the ditch although three smooth newt were observed in the main pond during survey 4. Pairs of great crested newt and smooth newt were observed in engaged in courtship displays and a female great crested newt was noted laying eggs. Greater numbers of all amphibian species were noted here than in previous surveys.

Photograph 3. Juvenile common toad.

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	15	1	0	14	0
Lv	40	0	0	0	0
Lh	20	0	0	0	0
Lv/Lh	11	0	0	15	0
Rt	6	2	0	1000	1
Bb	16	2	0	10000	1

Table 2. Pond 6.

4.3.3
The maximum counts for newt species observed in this waterbody continues to grow with a maximum count of 15 adult great crested newt made during survey 3 using the torch method. This places the population in the medium size class bracket for the first time. The maximum count of 40 adult smooth newts was made during survey 1 which is three times greater than any previous maximum count. (previously 13). The maximum count for palmate was similarly much greater at 20 adults as opposed to the previous largest count of 4. Nearly all newts were observed within the ditch between pond and 5(a) although three adult smooth newts were noted in the main pond during survey 4 which is unusual. Newt activity was spread out along the entire length of the ditch presumably due to the more extensive cover offered by the expanding aquatic vegetation. The belly patterns of all great crested newts trapped were photographed for future reference and comparison with previous records. Eggs of great crested newt were not noted during this survey but larvae noted in the low 10's during survey 5 confirms breeding success once again. Larvae of small newt species were also noted in the low 10's. When captured in bottle traps, great crested newts can be photographed and identified using belly pattern analysis techniques. The following table provides information on all newts captured and identified to date. There have been 20 individuals identified to date including 11 males, 6 females and 3 juveniles which will be renamed as a sequential male or female if recaptured in future. See photograph index sheets in appendices.

Total number of individual	Numbered individuals	Date 1st capture	Date 2nd capture	Date 3rd capture	Date 4th capture

newts captured					
1	M001	4/6/04			
2	M002	4/6/04			
3	M003	26/4/06	21/6/06	5/4/07	5/6/07
4	M004	12/8/06			
5	M005	5/4/07			
6	M006	5/4/07			
7	M007	5/4/07			
8	M008	5/4/07			
9	M009	5/4/07	15/5/07	5/6/07	
10	M010	15/5/07			
11	M011	5/6/07			
12	F001	6/6/05			
13	F002	5/4/07			
14	F003	5/4/07			
15	F004	15/5/07			
16	F005	15/5/07			
17	F006	15/5/07			
18	J001	5/4/07			
19	J002	15/5/07			
20	J003	5/6/07			

Table 3. Individual great crested newts and dates trapped from all surveys since 2004.

4.3.4
A maximum count of 6 common frog was made during surveys 3 and 4. This is significantly less than the count of 68 recorded in 2006 but is not considered to indicate any change in population size as the previous large count illustrates how the species react to a combination of appropriate weather conditions at specific times of year. Tadpoles were noted in the 1,000's but no morphs were observed emerging.

4.3.5
As for previous surveys, good numbers of adult common toad were recorded with a maximum count of 16 adults also made during survey 1. This is slightly less than the previous maximum of 23 recorded in 2006 and more than the 11 adults from 2005. The majority of adults were noted along the channel although small numbers were encountered on the banks of the main pond itself. Approximately 8 spawn strings were counted on survey 1 and tadpoles were observed in the 10,000's. Toadlets were not observed emerging from this pond.

4.3.6
Large numbers of great pond snail (*Lymnaea stagnalis*) were noted once again particularly in the channel. pH was still high at an average of 9.07 which is 0.44 down on the 2006 average and 0.66 down on 2005.

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 planting has taken well and marginal aquatic plants are becoming well established particularly in the northern pond.

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	10
Lv	0	0	0	0	0
Lh	0	0	0	0	0
Lv/Lh	2	1	0	2	0
Rt	2	0	0	0	1
Bb	11	0	0	10	1

Table 4. Constructed wetlands (area 7)

4.4.3
Amphibian activity was limited in this pond although it is still slowly showing signs of increasing. Great crested newt eggs were noted for the second year in this pond although no adults were seen. A maximum count of 2 small newts was made during survey 2 and single animals noted during surveys 3 and 4. Small numbers of small newt larvae were also noted during the final survey. This is the first record for small newts in this set of ponds. The excellent egg laying aquatic vegetation is continuing to expand and will be contributing toward this spread of amphibians across the site. 11 adult common toad were recorded during survey 1 along with a maximum count of 2 common frog. Small numbers of common toad tadpoles were noted during survey 3.

4.4.4
The average pH was recorded at 8.07 which is down 0.27 on the 2006 reading and down 1.01 from the 2005 average. Once again, very little invertebrate activity was noted although occasional diving beetles were seen.

4.5 Pond 7 west

4.5.1
This pond is located to the west of the reedbeds. It is exposed and roughly square and is steep sided on the north bank. The banks have been covered in the same plastic mesh as pond 6 and the constructed wetlands. There is still a lack of marginal vegetation suitable for egg laying although there are signs of broad leaved pondweed beginning to become established in deeper water.

7 West	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
Tc	0	0	0	0	0
Lv	0	0	0	0	0
Lh	1	0	0	0	0
Lv/Lh	0	0	0	0	0
Rt	1	0	0	0	0
Bb	5	1	0	10000	0

Table 5. Pond 7 west

4.5.2
Although numbers of amphibians are still extremely small, the results are a significant increase on maximum counts made in the past. 5 common toad were recorded during survey 1 which seems to have been a relatively busy night for the species across the site as a whole. One common frog and one male palmate were noted for the first time in this pond.

4.6 Maximum counts for the site as a whole

4.6.1
Maximum counts for the site are summarised in the following table which compares with results for the 2006 and 2005 seasons. Maximum counts may have occurred on any of the dates cited in 1.2

Site	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
Tc	15	1	0	14	10
Lv	40	0	0	0	0
Lh	33	0	0	0	0
Lv/Lh	12	1	0	120	10
Rt	6	2	10	1000	1
Bb	16	2	10	10000	1

Table 6.1 Maximum site counts 2007.

Site	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
Tc	8	0	0	10	10
Tv	13	0	0	0	0
Th	26	0	0	0	0
Tv/Th	18	0	0	100	10
Rt	68	13	10	10000	1
Bb	21	6	100	1000	1

Table 6.2 Maximum site counts 2006.

Site	Adult Max	Juveniles Max	F'lets/T'lets/Efts max	Larv'/Tad's Max	Eggs max
Tc	3	0	0	0	0
Tv	6	0	0	0	0
Th	22	0	0	0	0
Tv/Th	45	0	0	1	10
Rt	2	0	1	100	0
Bb	11	0	0	10000	0

Table 6.3 Maximum site counts 2005.

Photograph 4. Small newt larvae and molluscs from pond 8a.

4.7 Site status assessment

4.7.1 Quantitative

The 2007 survey program was designed to follow the timing and level of effort suggested in the English Nature Great Crested Newt Mitigation Guidelines for a population size class assessment. This is to enable a direct comparison between past and future datasets which will hopefully indicate how amphibian populations are increasing over time as the aquatic habitats in the reserve mature and settle in. The only difference between the survey program and the suggested method in the guidelines is that five surveys were carried out rather than six. According to the guidelines, populations for great crested newt can be classed in one of three brackets

- 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 fifteen adult great crested newts of breeding age (seven males and five female observed by torch during survey 1 in pond 6). This is another annual increase of nearly 2 times the results from 2006 and places the population at the lower end of the medium size class bracket for the first time.

4.7.2

It is possible to assign a score for the site based on a 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	10-100 night count	2
Smooth newt	10-100	2
Palmate newt	10-100	2
Common toad	<100 (Counted)	1
Common frog spawn clumps	<50 (Estimated)	1
Number of species present	5	2
Total score		**10**

Table 7. Amphibian assemblage score.

This gives an amphibian assemblage score of 10 for the site as a whole which the highest score to date. A minimum score of 10 based on presence of at least four species is regarded as the qualifying score for site selection as SSSI. The score of 10 therefore indicates the site is achieving a high value in terms of nature conservation for amphibians. The survey results for 2004 produced a score of 6 while results from 2005 scored 8 and 2006 scored 9. The increase in numbers of smooth newt <10 to 10-100 has elevated the score by one point in 2006 while the increase in numbers of great crested newt has elevated the score by a further point in 2007. The maximum count of smooth newt from pond six (n = 40 on 4/4/07) is significantly higher than previously recorded and is considered to indicate a good population as does the maximum count of palmate newt from pond 8a (n = 33 also on 4/4/07). Counts for common toad and common frog are considered to be generally low populations. A maximum score of 17 is possible using this system but maximum counts are considered unlikely to achieve a further point in the near future as significant growth will need to recorded. (Herpetofauna Worker's Manual. JNCC).

4.7.3 Scores based on standardised methods.

4.7.3.1

A further means of assessing the relative abundance 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.

4.7.3.2
For **pond 8a**, the following calibration applies for a torch survey for newts other than great crested newt within murky or vegetated sites. A maximum of 42 small newts was recorded on 4th April

n=42/(100m/2) = 0.84

Average	0.49 ≤ 0.95
Above average	> 0.95 ≤ 1.28
Good	> 1.28 ≤ 1.65
Excellent	> 1.65

Table 8. Status of newt populations. (small newts/Torching murky or vegetated ponds)

This score of 0.84 ranks pond 8a in the "average" band. Scores achieved in previous years are 0.88 (average 2006), 1.4 (good 2005) and 0.38 (below average 2004).

4.7.3.3
The highest bottle trap score of 33 can also be treated in the same way using a set of criteria devised specifically for the method.

n=33/(60m/2) = 1.10 (small newts)

Average	> 0.64 ≤ 1.19
Above average	> 1.19 ≤ 1.56
Good	> 1.56 ≤ 1.96
Excellent	> 1.96

Table 9. Status of newt populations. (Smooth or palmate newts/Bottle trapping)

This assessment method places pond 8a in the "average" population band and is the highest score the pond has achieved with this system. Previous scores have always placed the pond as below average with scores of 0.23 (2006), 0.37 (2005) and 0.33 (2004).

4.7.3.4
This is the first time the two methods have given the same result.

4.7.3.5
It is felt to be inappropriate to assign scores to pond 6 using the above methods as there is virtually no amphibian activity in the main pond which has a relatively long bank (approx 500m). The vast majority of amphibian activity was recorded in the ditch between the mouth of pond 6 and the drainage chamber to the west of area 5a. As this is a linear ditch and counts are made from one bank alone, the length of the ditch (approximately 250m) is used rather than the length of both sides which would effectively double the parameter. Water was often coloured or full of algae and is becoming more heavily vegetated each year which will affect direct comparisons. Criteria have been used for maximum number of great crested newts observed using torch method in murky or vegetated sites.

n = 15/(250m/2) = 0.12

Average	> 0.32 ≤ 0.74
Above average	> 0.74 ≤ 1.09

Good	> 1.09 ≤ 1.49
Excellent	> 1.49

Table 10. Status of newt populations. (Great crested newts/torching murky or vegetated sites)

This assessment places the ditch between pond 6 and 5a below the "average" bracket. Although this may not be a completely appropriate means of scoring the pond, it at least provides a score which can be compared with previous scores. Previous scores have been 0.06 (2006).

4.7.4 Charts

There is now four years worth of data on amphibian counts which can be plotted on charts in order to visualise annual changes providing an indication of population changes at a glance.

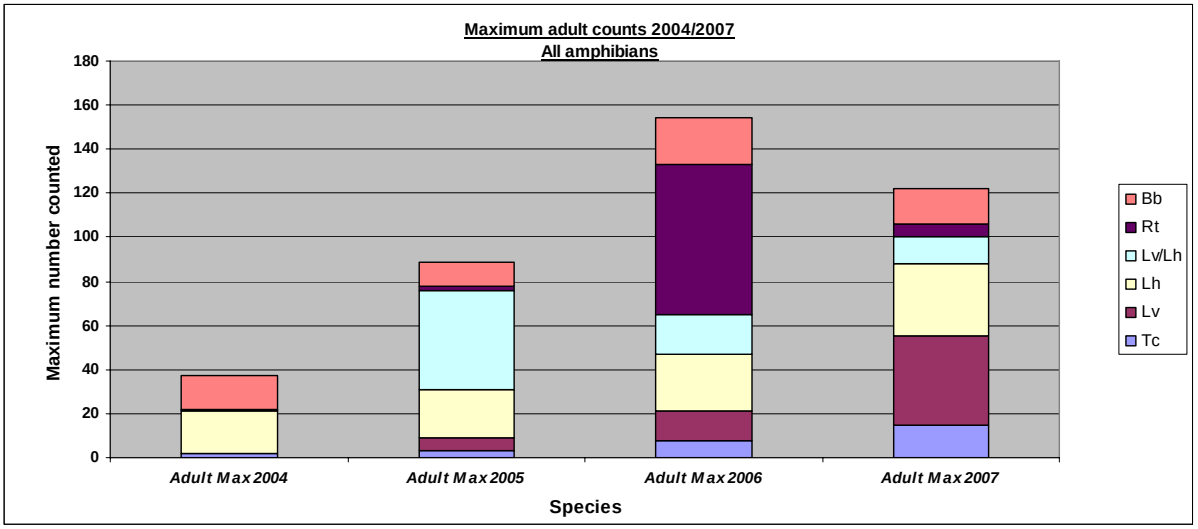

Chart 1. Sum adult max counts by year 2004 - 2007.

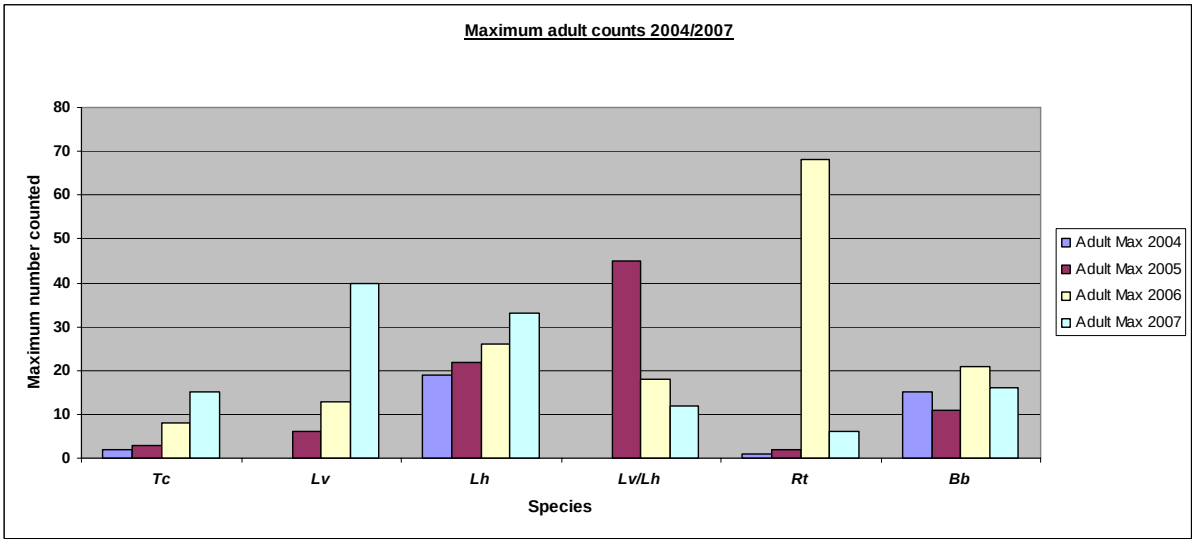

Chart 2. Adult max counts by species 2004 – 2006.

In chart 1, the adult max 2006 column is disproportionately high due to the high number of common frog adults encountered in a single night. If that single event is replaced with the next maximum score for that year, the chart would indicates a steady rise in the total number of adult amphibians recorded

(2004 - 37, 2005 – 89, 2006 – 101, 2007 – 122). Perhaps the most significant increase in chart 2 is the maximum count for smooth newt in 2007 which has reached 40 on one night. (None were recorded in 2004). The following charts illustrate changes in maximum counts for each pond since 2004. (NB note variation in scale on maximum count axis).

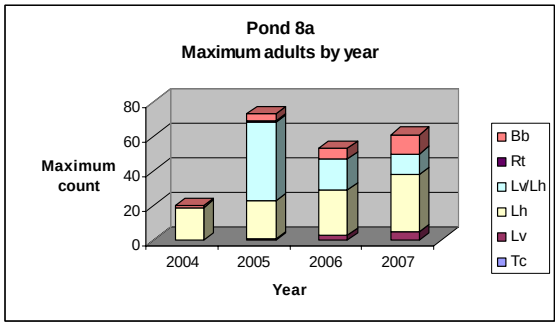

Chart 3. Pond 8a

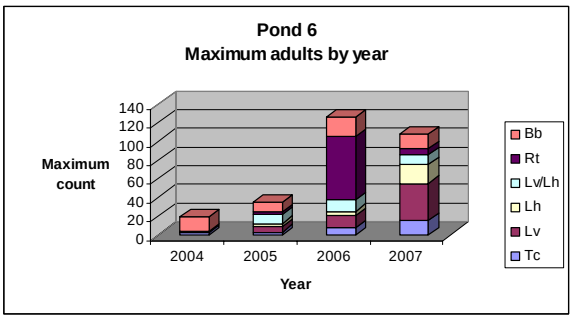

Chart 4. Pond 6

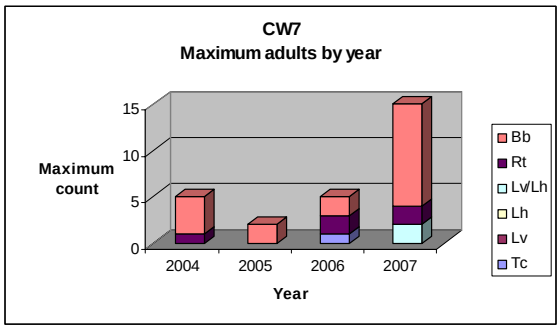

Chart 5. Constructed wetlands

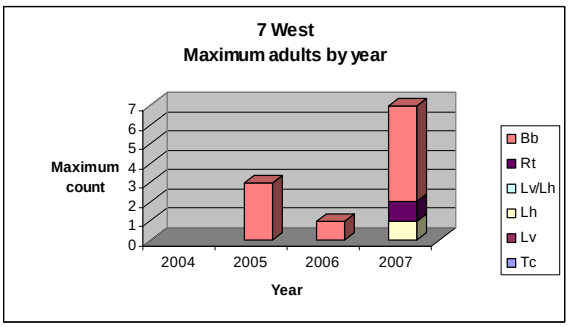

Chart 6. Pond 7 west

5 Summary

5.1
Five species of British amphibian were recorded during the survey. The great crested newt population can now be recorded as falling within the medium size class bracket due to the maximum site count of 15. (The identification of 20 separate individuals on site illustrates there are more newts on site but this figure should not be used to classify the population size class). Breeding success was confirmed once again by the presence of larvae in pond 6 and of eggs in the constructed wetlands. The numbers of smooth newt recorded in 2007 is a significant increase on the previous maximum. All amphibian species recorded on site are considered to be actively breeding and are expected to continue to expand as the aquatic habitats become more established over time. Along with population increases, the first records for small newts in the constructed wetlands (CW7) and in the pond to the west of that area (7 west) confirms that spatial expansion is still under way in the new ponds.

5.2
Great crested newts are still absent from pond 8a despite 20 surveys now being carried out. Originally, as the only established pond, pond 8a was considered to be the source pond for the species on site. The tree and scrub clearance undertaken on the south banks of pond 8a during the winter of 2005 and 2006 has opened up the aspect of the pond. This may have helped create more favourable conditions for amphibians by reducing shading and reducing the potential for eutrophic conditions as a result of leaf litter entering the waterbody. Clearing an area of aquatic vegetation may also be advantageous for this waterbody as the extensive cover allows virtually no areas of open water favoured by great crested newts. Pond 8a exhibits a complex structural plant mosaic with varying communities in different densities and varying conditions. In general terms, ponds which are completely covered in vegetation will support a more rich invertebrate community than ponds without. In terms of pond management, it is impossible to prescribe ideal amounts of plant cover for a pond as different plant species and different amounts of cover inevitably support a more diverse range of animal communities. However, great crested newts need areas of open water for purposes of breeding display. As any area of open water at pond 8a appears to be in those areas which are still completely shaded by surrounding trees, it may be advantageous to manually clear one or two smaller areas in the southern part of the pond to create an amount of open water habitat in an area which has been exposed to . If this is done, it should be undertaken by hand using muck rakes (“chromes”), grapnels, spades and forks and is best done in September or October. The use of a machine is not advised for this as it is too disruptive and may kill or injure any newts present. Clearing out of vegetation must be avoided altogether in the breeding season or summer when larvae are present. (Avoid between March and August inclusive). The clearing out of excessive plant growth must include the root systems of the plants concerned or the subsequent years growth will be just as vigorous. Disturbance to a pond may release a flush of nutrients into the water column. It is likely that this will result in a bloom of duckweed or algae which may appear unsightly. This management option is targeted at great crested newt and is not considered to be necessary for the “health” of the pond. If left alone, the pond is still an extremely valuable habitat for numerous other species. In terms of general biodiversity, leaving the pond alone may be considered to be the best option. However, the stand of reedmace at the north east of 8a is growing rapidly and should be monitored carefully. Although the species has its place in terms of biodiversity, its growth can be vigorous and can out compete other communities and eventually dominate a pond completely.

5.3
A suggestion has been made to reduce the steepness of the slope of the southern bank in the pond at 8a. In terms of the effect on wildlife, this is considered to be a valuable proposal although it will create some practical difficulties due to the level of disturbance and the presence of a European Protected Species on site. A shallow sloping bank which is periodically exposed as a pond dries out and re-fills throughout the course of a year is considered to be one of the most valuable and biologically rich attributes a pond can have. The area which is affected is known as the drawdown

zone and can provide an excellent habitat for a wide variety of plant, animal and invertebrate communities. The shallower the banks profile, the greater the drawdown zone. Ponds with exceptionally good margins often have undulating bank profiles which can create smaller temporary pools around the edge. If the decision is taken to proceed with this option, it will be necessary to secure a “conservation” licence from Natural England (NE) at Peterborough due to the presence of great crested newts and the level of disturbance such works will entail. It may also be necessary to surround the area with amphibian exclusion fencing and pitfall traps to ensure all great crested newts are removed from the area prior to works commencing. This would certainly be the case with a development licence issued from NE Bristol. It may also be necessary to fell a further area of trees to the south of the pond to ensure the margins remain in an area which is relatively unshaded.

Abbreviations used in the tables

Tc	*Triturus cristatus*	Great crested newt
Lv	*Lissotriton vulgaris* (formerly *Triturus vulgaris)*	Smooth newt
Lh	*L. helvetica* (formerly *T. helveticus*)	Palmate newt
Rt	*Rana temporaria*	Common frog
Bb	*Bufo bufo*	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 11. Abbreviations

6 References

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