

Amphibians on Hampstead Heath and their conservation

The survey

The United Kingdom's amphibian fauna is limited to 6 native species: common frog, common toad, natterjack toad, smooth newt, palmate newt and great crested newt. Other non-native amphibian species such as marsh frog and alpine newt have established populations in localised areas.

Annual counts of frog and toad spawn had been made on the Heath from 1997 to 2000, taking the form of visual pond survey and spawn counts during March and April. This type of monitoring is only useful for frog and toad populations and other methods such as torching (shining a torch into the water at night) are required to monitor newts. The survey was reinstated in 2007 using the same methodology, so we are now in a position to assess trends in the Heath's amphibian populations which span a decade.

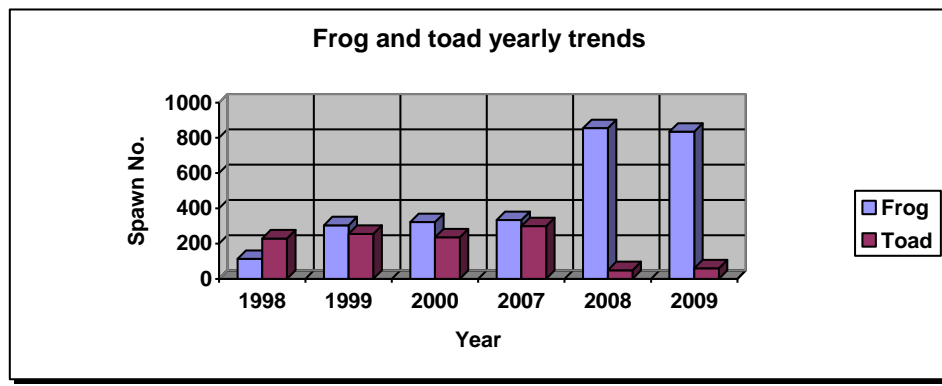
Newt populations are the most difficult to establish. Until 2008 only casual records were available. In 2008 and 2009 some specific newt monitoring began, but it not yet considered to give a comprehensive overview of newt assemblages.

Frog populations are generally the easiest to monitor as the spawn is highly visible and it is generally thought to be acceptable to assume that one clump equals one breeding female. However it should also be noted that not all females breed every year. Toad populations are slightly more difficult to assess, purely due to the less visible nature of the spawn. The spawn is laid in double beads and usually at greater depths than frogspawn, and is there harder especially if water quality is poor. Adult counts can be made, but as females are only in the water for a small amount of time, this can also be unreliable as timing the survey becomes difficult. It is possible to count adult toads during migration or congregating in the water at night. However as surveys previous to 2000 surveys had all been completed during the day, the same methodology was used for comparative purposes. Night survey work was undertaken in 2009 and will be repeated in 2010 to compare day to night recording.

Overall Results

The 11 main ponds on Hampstead Heath - Stock, Ladies, Bird Sanctuary, Boating, Men's, Highgate No.1, Hampstead No.1, Hampstead No.2, Mixed, Viaduct and Vale of Health - were all surveyed for frogs and toads according to a consistent survey methodology in the years of 1998, 1999, 2000, 2007, 2008 and 2009. The bar chart below shows the yearly trends for these 11 ponds and allows for a comparison of data and reveal a gradual increase in frog spawn and a decrease in toad spawn.

Graph 1. Yearly frog and toad trends for 11 main Heath ponds.



Frogs

The majority of Heath frogs are common frogs, although a colony of non-native marsh frogs exists in a localised area on the Heath Extension. Common frogs are 'explosive' breeders with usually 1-3 communal spawn sites within a pond. These sites tend to be in warm shallow water close to the shoreline and often on a south facing side. The spawn is also usually attached to or amongst emergent vegetation. Factors such as tree shading and fish predation can have significant impacts on frog populations.

The graph above indicates a considerable population increase although it does not take into account variables such as recording timing. However it is believed that population numbers have increased overall on the Heath, but only in localised areas, such as the Stock Pond and Highgate no.1 Pond. Despite this overall increase, the Men's Pond has suffered a dramatic decline in spawn numbers no spawn recorded in 2007, 2008 or 2009. It is thought improvement in management has contributed to the increase on certain ponds and a subsequent lack of management has caused declines on others.

Toads

Toads, like frogs, are explosive breeders and will converge onto a breeding site for a few days in spring. All of the toad recordings on the Heath are of the common toad. There is very little likelihood of natterjack toad records on the Heath due to its requirements for open low growing vegetation and ephemeral ponds. It is believed that toad numbers are likely to be significantly under-recorded on the Heath due to the difficulty in observing spawn, particularly as the ponds are often susceptible to low water clarity.

The above graph appears to show a dramatic decrease in toad spawn between 1998 and 2009. It is however difficult to assess if this is a true reflection due to the very poor water visibility during recording in 2008. Spawn numbers picked up slightly in 2009, and were probably underestimated. Nevertheless it is believed that there may have been a real decrease in numbers of toads between 1998 and 2009 due to habitat loss. A lack of aquatic and emergent vegetation is thought to restrict toad numbers on Hampstead Heath. This appears evident as on a number of ponds the toads have resorted to entwining their spawn around ivy and willow stems and roots growing into the water.

Newts

As yet newts have not been recorded using a systematic method and recording has relied largely on casual records. The limited available records are not thought to provide a good overview of the Heaths newt population and as such newts are thought to be under recorded on the Heath. In 2008 an attempt was made to record newts using a netting technique, but this proved to be largely unsuccessful, due to the size and nature of the ponds concerned. In 2009 a number of ponds were surveyed using a night-time torch technique and this technique along with refuge searches produced some new records.

All the records to date have been of smooth newts. The palmate newt has a preference for heathland and moorland with low fertility and low soil pH. All newt species larvae are susceptible to fish predation. A lack of aquatic and emergent vegetation is thought to be a further restricting factor for newts on Hampstead Heath. The ponds which are currently believed to have a breeding smooth newt population are the Orchard, Sandy Heath main pond, Hampstead no.1, Springetts Wood, the 'Secret' Garden pond, the Bird Sanctuary and the Hill Garden. However as mentioned this is unlikely to be a comprehensive list and ponds such as that in Springetts Wood and the Orchard have not been monitored for newts in recent times. That said, in 2009 the Stock, Ladies and Highgate No.1 ponds were all monitored using a night time torch technique and produced no newt records. A number of Alpine newts are present in a man-made 'secure' pond within Kenwood yard.

Individual Pond Trends

Each pond has been assessed individually with regards to its amphibian assemblage. A scoring system taken directly from the Nature Conservancy Council (NCC) publication (1989) 'Herpetofauna Workers Manual' has been used to assess population levels. This scoring method is primarily concerned with SSSI sites, but it provides a good baseline to assess amphibian assemblages. It should be noted that some scores can be considered to be artificially low due to the lack of effective newt monitoring. Due to the urban nature and disturbance of the Heath's ponds, a low population is to be expected on a number of ponds, but does not reduce the Heath's overall importance for amphibians.

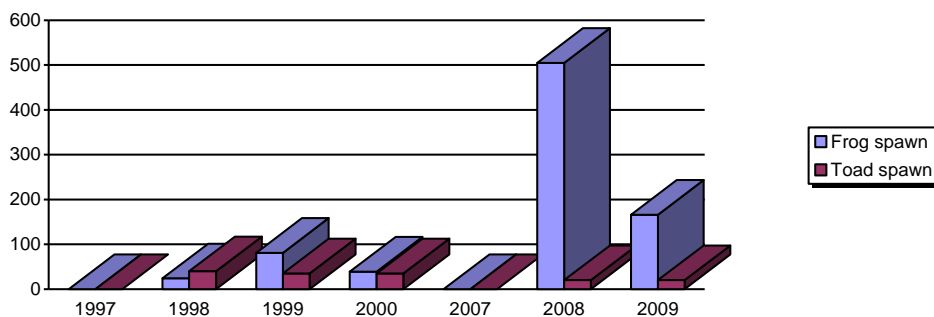
Table 5 Scoring System for Amphibian Assemblages (NCC 1989/EN 2001)

		'low'/'small' * population score 1	'good'/'medium'* population score 2	'exceptional'/'large'* population score 3
Great crested newt	Netted/seen daytime	<5	6 - 50	> 50
	Torched/bottled	< 10	11 - 100	> 100
Smooth newt	Counted day/night	< 10	11 - 100	> 100
Palmate newt	Counted day/night	< 10	11 - 100	> 100
Toad	Estimated	< 500	501 - 5000	> 5000
	Counted	< 100	101 - 1000	> 1000
Frog	Spawn - clumps counted	< 50	51 - 500	> 500

For the purpose of the scoring system the highest record from the last 3 years was used. The higher the figure the better the pond is considered to be with regards to amphibian populations.

Stock Pond

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NCC score 2007-2009: 4

The Stock Pond is considered to have an exceptional frog population and a low toad population. No newt population has officially been recorded here. The population of frogs appears to have increased greatly since 1998 whereas toad spawn has declined. No amphibians were found in 1997 or 2007, which given the good numbers in 2000 is highly likely to be a result of the recording time being too early rather than lack of amphibians. The Stock Pond has more frogspawn clumps recorded than any of the other ponds.

The Stock Pond is surrounded by trees on all sides and apart from a reed bed planted at the north end in 2006 has very little emergent or aquatic vegetation. Despite this the frog population is particularly good and spawning sites appear to be widely dispersed along the east bank of the pond. Frogs prefer to spawn in relatively shallow water either attached or amongst emergent vegetation or directly on the bottom if shallow enough. As the Stock Pond is heavily silted, the edges of the pond are shallow (although deep in silt) with much branch debris and limbs in the water onto which the spawn can be fastened.

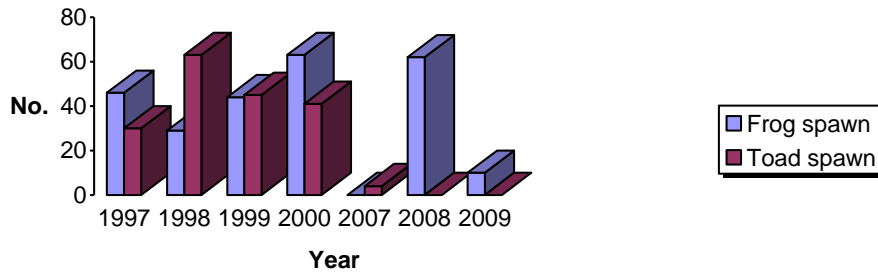
One possible reason for the increasing population is that as the pond becomes more silted there is an increase in suitable spawning sites, coupled with more hiding places for tadpoles amongst bank side debris. This may also account for the slight decrease in toad population, due to a reduction in deeper bank side water. As the pond is also entirely fenced off, there is a good deal of terrestrial habitat for the amphibians.

As with other ponds the spawn is not found in the heavily shaded areas of the pond and a reduction in

bankside trees would be beneficial. Some management work was undertaken in the winter of 2009, which involved coppicing of bankside trees and subsequent marginal planting in the summer. Further work is programmed for winter 2009/2010.

Ladies Pond

Graph 3. Ladies pond amphibian assemblages



NCC score 2007-2009: 3

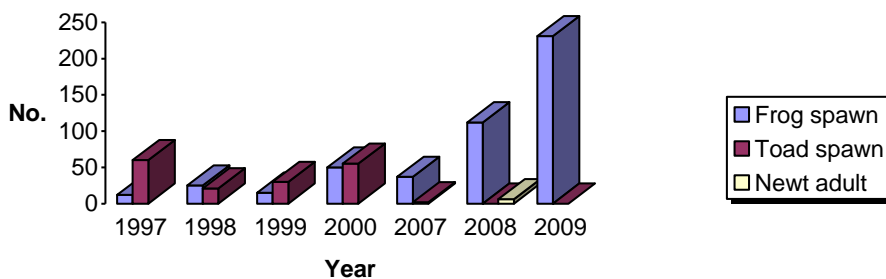
The Ladies pond is considered to have a good frog population and a low toad population. No newt presence has been recorded here.

The population of frogs appears to have declined between 1997 and 2000 and 2007 and 2009. This decrease is not thought to be significant as 62 clumps were recorded in 2008, with an early recording time in 2007 possibly biasing the results. The population of toads appears to have decreased dramatically. However, 20 adults were seen in the water in 2009 with a number of them already paired. This would indicate that a later recording time is required in the future.

The Ladies Pond has a good amount of emergent vegetation on the east bank, but has a shaded tree lined west bank. The pond also suffers from disturbance as it is used as a bathing pond. Possible reasons for the drop in toad numbers may simply be down to poor visibility (thus recording error), but it is also likely that the increasing limb overhang from the west side trees will have a detrimental effect on amphibian numbers. An increase in silt levels will also reduce the suitable spawning habitat for toads with a reduction in bank side depth. Habitat management work was undertaken in 2009 to coppice bankside trees and plant in emergent vegetation.

Bird Sanctuary

Graph 4. Bird Sanctuary amphibian assemblages



NCC score 2007-2009: 4

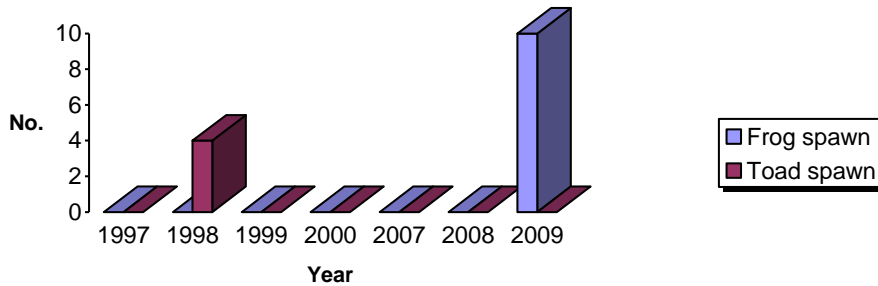
The Bird Sanctuary is considered to have a good frog population and a low toad population. The pond also has a low population of smooth newts.

The Bird Sanctuary is large fenced pond, but is heavily wooded on its perimeter. There is a substantial amount of reed bed extending mostly around the western edge and a small amount of iris emerging in places. The pond also benefits from two damp meadows to the east and west. The west meadow contains a number of seasonal pools which began to dry out in 2007. The reed bed and the area to the west of the pond appear to be the primary spawning areas. Large areas of the west bank are thought to be unsuitable due to the tree shade and lack of emergent vegetation. Crayfish and terrapins may also have a detrimental effect on amphibians.

The creation of new pools, along with the removal of scrub areas in and around the reedbed, have improved habitat conditions for amphibians over the last few years. It is hoped that the lower toad records are down to the difficulty in observing spawn. An adult count and torch survey will be attempted in 2010. Further pool creation and coppicing and lifting of bank side trees is likely to have a beneficial effect on amphibian numbers.

Boating Pond

Graph 5. Boating Pond amphibian assemblages

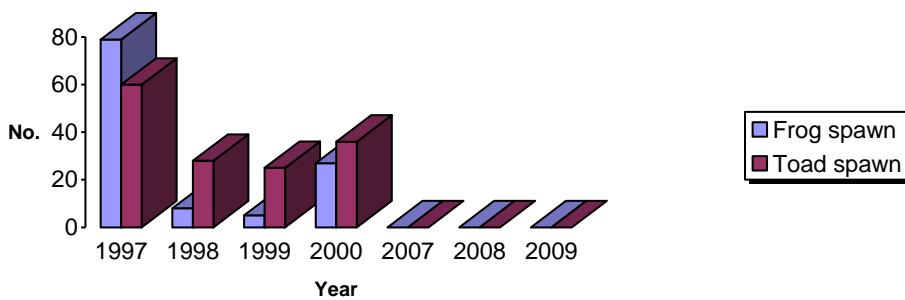


NCC score 2007-2009: 1

The Boating pond is largely unsuited to amphibians, with steep corrugated bank sides and emergent vegetation only in 2 recently planted reedbeds. These 2 reedbeds offer the potential for spawn sites, but due to the steep banks it is very difficult for amphibians to exit the pond. Unless reconstruction work and further planting takes place, very little opportunity exists for amphibians in the Boating pond. Fish predation on frog spawn and tadpoles is also likely to be a significantly detrimental factor with a lack of aquatic and marginal vegetation to shelter in.

Men's Pond

Graph 6. Mens Pond amphibian assemblages



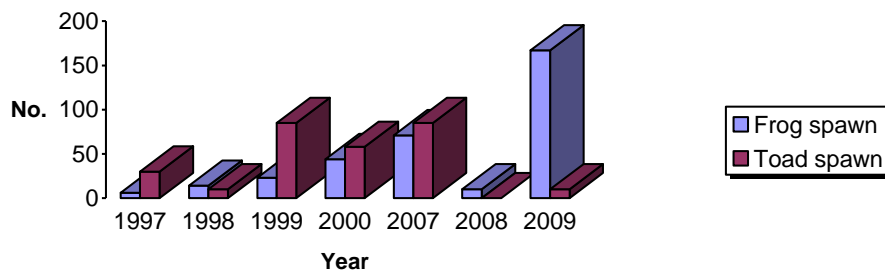
NCC score 2007-2009: 0

The Men's pond is considered to have no frog or toad breeding population. No newts have been recorded here.

The populations of frogs and toads appear to have declined dramatically from 1997 to none in 2007, 2008 or 2009. The Men's Pond is currently largely unsuited to amphibian populations with large areas of corrugated bank side, deep un-vegetated water and much shading tree overhang. The possible reason for the degradation in habitat from previous years is increased tree overhang which may have shaded out previous spawning sites. The planting of a large amount of tree and scrub vegetation on the west bank in the 1990's has also caused the loss of some emergent vegetation. Coppicing and lifting of this scrub cover would be beneficial, along with subsequent replanting of emergents. A large number of red swamp crayfish also reside in the pond and some predation of spawn and tadpoles would be likely.

Highgate No.1

Graph 7. Highgate No.1 amphibian assemblages



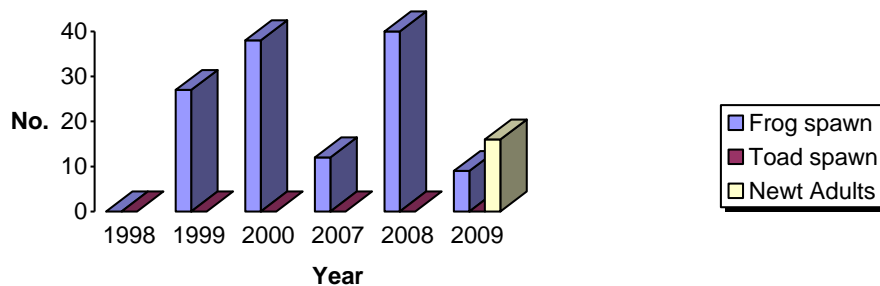
NCC score 2007-2009: 3

Highgate No.1 pond is considered to have a good frog population and a low toad population. No newt presence has been recorded here, despite a night torch survey.

A good deal of work has been carried out on Highgate No.1 pond since 2006 with fencing and replanting of emergent vegetation along the west bank. Although this work is likely to benefit frogs, the shallow nature of this pond margin will restrict the presence of toads. This positive pond management is thought to be the reason for the increase in frog spawn numbers in 2009. The toad spawning mostly takes place on the opposite, east, bank, with the spawn attached to ivy stems which hang into the water. Toads are only likely to keep spawning here if the bank side remains at least in partial sunlight. The available spawning area is therefore believed to be declining due to tree shading and some lifting would be beneficial, but some of the east bank is in private ownership and therefore outside the City's control.

Hampstead No.1

Graph 8. Hampstead No.1 amphibian assemblages



NCC score 2007-2009: 3

Hampstead No.1 Pond is considered to have a low frog population and no toad population. The pond is also considered to have a good smooth newt population.

There appears to be a large smooth newt population living in and around the pond. Sixteen smooth newts were recorded during a night time torch survey in April 2009 (Greg Carson) which would equate to a good population. However, a large valve chamber adjacent to the pond was discovered to contain well over 100 individuals of both juvenile and adult smooth newts during the winter 2008/09. After consulting with the regional amphibian recorder (Will Atkins) it is thought that this chamber, due to its depth (5ft), does not allow for amphibians to escape easily. A number of emaciated newts were discovered, along with adult and juvenile frogs which would have great difficulty in exiting.

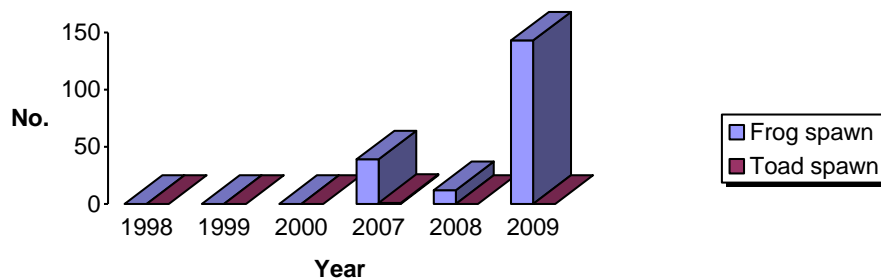
It is recommended that in the spring of 2010, all amphibians be removed and the chamber re-rendered at the top. An alternative to this is to provide opportunity for amphibians to exit through the use of ramps or pipes. This may not be possible as repairs to the drain cover and brickwork are required to make the chamber safe to access.

The pond's good newt population is helped by the extent of aquatic vegetation which includes hornwort and a great deal of filamentous algae. It is possible that toad spawn is also to be found on this vegetation which is too deep to be visible early in the growing season.

A section of the eroded west bank was planted with emergent and marginal vegetation in the spring of 2009 and it is hoped that this will provide a suitable spawning site. Further planting along the west bank is recommended.

Hampstead No.2

Graph 9. Hampstead No.2 amphibian assemblages



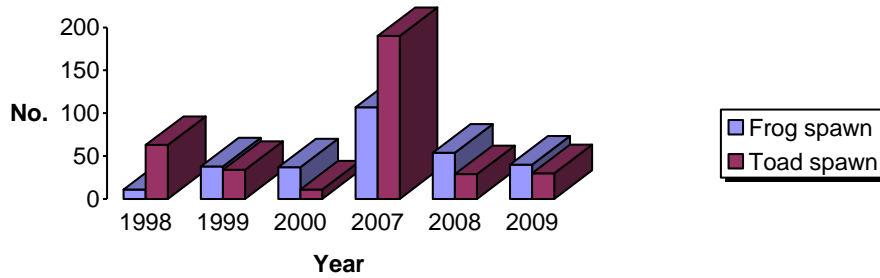
NCC score 2007-2009: 3

Hampstead No.2 pond is considered to have a good frog and low toad populations. A casual record for a smooth newt exists for the pond, but outside the main breeding season.

The good population of frogs appears to be restricted to the small Iris bed towards the south west of the pond. The expansion of this would be beneficial as would the restructure and subsequent replanting of the west bank.

Mixed Pond

Graph 10. Mixed Pond amphibian assemblages



NCC score 2007-2009: 4

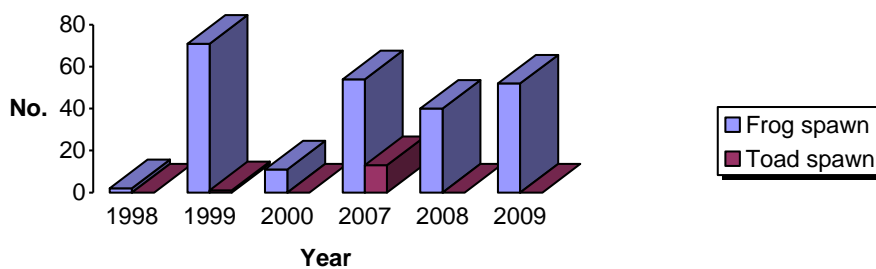
The Mixed Pond is considered to have good frog and good toad breeding populations. No newts have been recorded here.

The increase in frog and toad numbers over the 10 year period up to 2007 may have been the result of some major coppicing work in 2004. A possible reason for the reduction in spawn between 2007 and 2008 is that the coppice regrowth, as well as other scrub expansion, has once again shaded out previous spawning sites.

The Mixed Pond along with Highgate No.1 Pond appear to have good conditions for toad breeding, due to the water at the pond edge being relatively deep and the presence of ivy stems trailing into the water. Both ponds however, require, and would benefit from future management selectively to lift and rotationally coppice sections of the bankside trees and open up the relatively sheltered north end of the pond. As there is very little emergent vegetation, the majority of the toad spawn was found to be attached to ivy stems growing into the water. This should be noted with regards to any future management.

Viaduct Pond

Graph 11. Viaduct pond amphibian assemblages



NCC score 2007-2009: 3

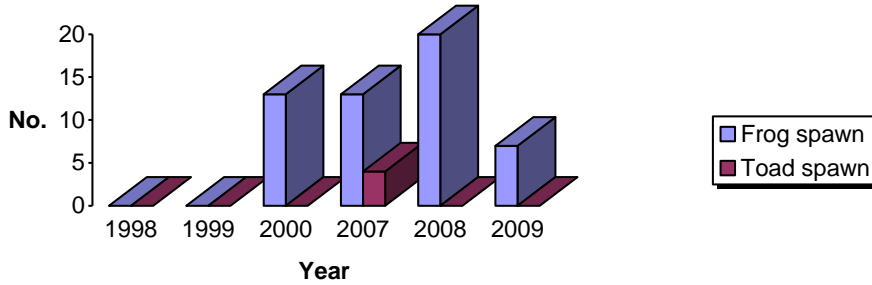
The Viaduct pond is considered to have a good frog population and a low toad population. No newts have been recorded here, but it is thought they may be present due to large amount of suitable aquatic vegetation.

Although the Viaduct pond has a large amount of submerged and floating aquatic vegetation it only has a small amount of emergent plants which are the preferred spawning sites for frogs. Also areas along the south and south west banks are reinforced with steep corrugated sheets and are used for fishing and dog swimming. Further shading along the west bank makes much of it unsuitable as is the heavily shaded northern section of the pond. The Viaduct suffers from low oxygen levels caused by floating aquatics such as azolla. This is likely to have a detrimental effect on tadpole survival rates.

The greatest potential for enhancement exists along the west and east banks, with further planting of emergent vegetation.

Vale of Health

Graph 12 Vale of Health amphibian assemblages



NCC score 2007-2009: 2

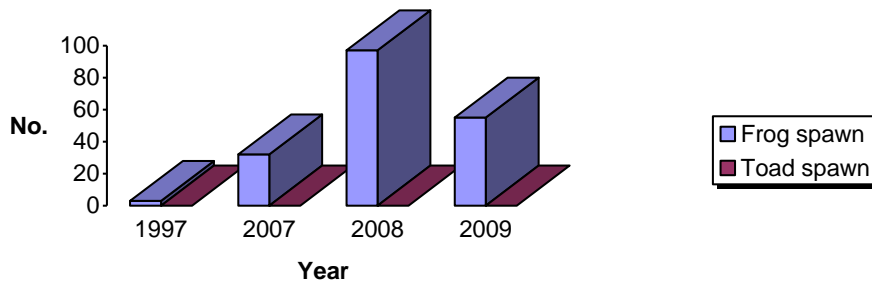
The Vale of Health is considered to have low frog and low toad populations. No newts have been recorded here.

The Vale of Health remains largely unsuited to amphibian populations with areas of the east and south bank edge heavily eroded and used by anglers. Frogs are currently restricted to spawning in amongst the prostrate willow twigs and branches on the east side. The west bank edge is privately owned and has steep wooden sides. The gently shelving nature of other pond edges currently makes the pond unsuited to toad spawning, along with the subsequent lack of vegetation for frogs. A number of large fish are also present in this pond which will be detrimental to frog populations.

Some enhancement opportunities exist through the reduction in eroded areas and planting of emergent vegetation.

Leg of Mutton

Graph 13. Leg of Mutton amphibian assemblages



NCC score 2007-2009: 2

The Leg of Mutton pond is considered to have a good frog population and no breeding toad population. No newts have been recorded here.

The increase in frog spawn from 2007 to 2008 may have been the result of management works in the previous winter, involving bankside coppicing and lifting. The spawn is usually confined to a small area of the north/east bank (south facing) and occurs in the small patch of iris or in the shallows close to the bank. Further planting along this bank would be beneficial as would the continuation of the current programme of rotational coppicing. A heron is often present here and as herons prey on amphibians this will restrict the potential for amphibians whilst there is insufficient emergent cover.

Extension ponds

NCC score 2007-2009: 2

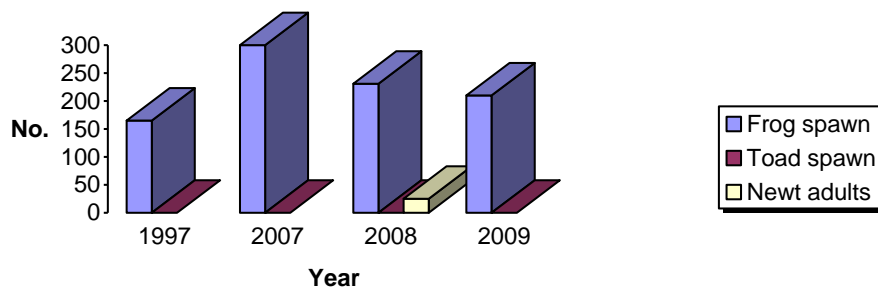
The Extension ponds are considered to have a good frog population and no toad population. Four marsh frog adults were also recorded in 2009. No newts have been recorded on the Extension ponds.

In approximately 2000 a small colony of the non native marsh frog was released illegally into the pond by a member of public. The frogs appeared to colonise rapidly and by 2005 up to 100 individuals could be observed along the bank edge of the No. 2 Extension Pond. Although they are thought to inhabit a slightly different ecological niche than common frogs, they are voracious predators and may impact significantly on native frog populations. The marsh frogs became less evident in 2006 and 2007, probably due to the complete drying out of their preferred No.2 pond. However the frogs are still present as they have been observed and heard in 2007, 2008 and 2009.

The Extension ponds are thought to offer good conditions for frog breeding due to the enclosed nature of some of them and the presence of large amounts of emergent vegetation. The habitat is thought to be in a better condition for breeding amphibians in recent years, due to the ongoing rotational coppicing of pond edge vegetation. The ponds are relatively small and suffer from seasonal drying out and the effects of succession. It would be advisable therefore to remove quantities of emergent vegetation to prevent permanent drying out and to ensure enough aquatic habitat is available. This is particularly true with regards to the No. 2 Pond. It is hoped that the marsh frog population is in decline and further study will be made in 2010 to establish the proportion and potential effects of their continued presence. Due to the heavily vegetated nature of the Extension ponds, it is not thought practical to attempt to remove the Marsh frogs at this current time.

Sandy Heath ponds

Graph 14. Sandy ponds amphibian assemblages



NCC score 2007-2009: 4

The Sandy Ponds are considered to have a good frog population and no toad population. The Sandy ponds are also considered to have a good smooth newt population.

The Sandy ponds are relatively well vegetated shallow pools and consist of four separate pools formed on an iron pan on normally sandy soils. Three of the ponds are ephemeral, with only the main larger pond keeping its water throughout the year. Despite this it is actually one of the ephemeral ponds which appears to have a large population of breeding frogs. This is because the pond keeps at least some water until the froglets should have vacated the water. This pond, being very shallow, has a large amount of soft rush emerging and later in the summer a good deal of bogbean is present. Much of the spawn is laid in and around the rush.

The ponds should be prevented from drying out and the practice of coppicing and removing fringe scrub continued. A reduction of emergent vegetation should be undertaken within the next 2-3 years to prevent succession. The pond appears to be suited to a good newt population, in part due to the lack of fish which predate on the larvae.

Swan Pond

NCC score 2007-2009: **1**

The Swan Pond currently has a very low frog population and no toad population. The Swan Pond is considered to be of low water quality with high phosphorus levels, low oxygen and poor water clarity. The pond also has a number of large carp present. There is currently no suitable location for frogs to spawn, with no emergent vegetation and deep bank sides. Due to the numbers of large carp and steep banks it would be difficult to establish emergent or submerged vegetation. Fish removal and bank regrading should be considered to improve the ecological status of the pond.

Water Garden

NCC score 2007-2009: **1**

The Water Garden has a very low frog population and no toad population. The Water Garden pond and its surrounds are managed as an ornamental garden. It is unclear why there is not a better amphibian fauna in the water garden as there is some emergent vegetation. It may suffer from over tidiness associated with ornamental areas.

Other Small, Shallow Ponds

The following three ponds have also been recorded on a number of occasions since 1997.

The **Ecofield** pond in Kenwood Yard had a small population (<17) of breeding frogs up until 2000. This is a man made pond and had been managed as an educational facility up until 2007. Smooth newts were also deliberately introduced here. The pond is now totally overgrown and leaking so is not currently suited to an amphibian population. Reinstatement of this pond is recommended.

The **Orchard** pond was recorded between 1997 and 2000 where 2 frog spawn clumps were found in 1999. The pond dries out frequently and is located in a wooded area, and thus was not recorded again until 2009. 17 frog spawn clumps were recorded in 2009, possibly helped by coppice work around the pond in recent years.

Springetts Wood pond was recorded in 1999 and 2000 and was found to have 6 and 1 clumps respectively. The pond was re-monitored in 2009 and was found to have no amphibian population. A patch of invasive New Zealand stonecrop was also present during recording in 2009.

'**Aarons**' pond in Kenwood Yard has a small smooth newt population and also has a population of the non native Italian or Alpine newt. Casual debris searches around Kenwood Yard have revealed several smooth newt juveniles.

The **Secret Garden** pond built as an educational resource is believed to have a good population of initially introduced smooth newts and a population of frogs.

The **Education Centre** pond did have newts introduced but it is unclear whether any remain.

The **Hill Garden** ornamental pond has never been systematically recorded, but is thought to have a good population of smooth newts. This pond also has low numbers (10-15) of frog spawn laid every year, but this is largely consumed by ducks. The pond is suited to a good newt population as it has a good deal of aquatic and emergent vegetation.

New Cohen's Field Ponds

Two new ponds were constructed in lower Cohen's field as a replacement for a pond lost during construction work in the recently acquired Athlone house parcel of land. In the first year after construction 3 frog spawn clumps were recorded, which increased to 44 clumps in 2009. This population shows both the importance of smaller ponds to amphibians and the ease at which suitable habitats will be exploited by amphibians. These smaller ponds have the benefit of being mostly fish free and will warm up quicker, due to their shallow nature.

General management recommendations

Recommendations have largely been made when discussing each individual pond's results. The following actions referred to in the above report are recommended in terms of amphibian monitoring and management.

- The amphibian survey should be repeated in 2010. A number of these monitoring sessions should be at night to observe toad adults and newt presence through 'Torching'. Due to the time consuming nature of the monitoring, recording help will be sought from volunteer bodies/individuals in 2010.
- A newt monitoring scheme should be standardised for ponds where no previous recording has taken place. The method for monitoring each pond may be different, but a repeatable format should be established.
- Monitoring of the marsh frog population on the Extension ponds should be continued to ensure that their presence is not detrimental to the native common frog.
- The Secret Garden Pond and Education Centre ponds should be monitored via the Education staff in 2009. This may take the form of a school project.
- General good management practices for amphibians mostly covered in the discussion section should be encouraged. These include coppicing and lifting of bank side trees, and planting of emergent/floating vegetation.
- Regrading sections of some ponds should be considered to allow for the planting of emergent vegetation.
- The Catch Pit pond should have several ramps put in place to allow for amphibians to exit the water.
- Vegetation should be removed from the Extension ponds to maintain some open water and prevent succession. Particular ponds of concern are Extension numbers 2 and 3 ponds.
- The Sandy Heath ponds, particularly the main frog spawning site nearest the gorse patch, should be monitored to assess water levels. It is important that this pond does not dry out in the period March through to the end of July. A reduction in emergent vegetation should be considered in the next 2-3 years or when water levels are too low to support tadpoles.
- The Men's Pond has suffered the most serious decline in amphibian numbers and should be considered a priority for lifting of bank side vegetation.
- Any management to be carried out should leave in place any ivy stems growing into the water.
- The practice of creating new small ponds should continue. Ideally they should also be fenced to prevent disturbance by dogs.

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January 2010