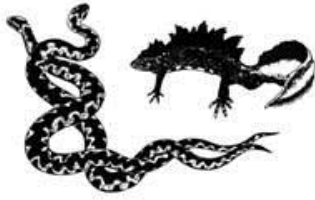


Appendix 1

London Essex and Hertfordshire Amphibian and Reptile Trust



(Registered Charity Number: 1089466)

Reptile Survey of Hampstead Heath

2008 - 2009



Grass Snake on Hampstead Heath

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Executive Summary

A survey was carried out by the London Essex and Hertfordshire Amphibian and Reptile Trust (LEHART) for the City of London for reptile species (excluding terrapins) on Hampstead Heath from summer 2008 to spring 2009.

A preliminary desk study of existing records suggested that the only species of native reptile remaining on the Heath was the grass snake *Natrix natrix helvetica*, which was the subject of a re-introduction in the mid 1980s.

Techniques in the field consisted of direct observation by experienced field herpetologists, the placement of artificial refugia (mainly in areas away from public access) and casual records from City of London staff. The current survey found no species of native reptile, except for grass snakes, on the Heath. The presence of slowworm *Anguis fragilis* cannot be ruled out as their cryptic nature makes relict populations hard to detect.

Grass snakes were found to be widespread on the main Heath and all life stages with the exception of newly hatched individuals were found. However they were not found in isolated compartments such as the Heath Extension, Vale of Health or Hill Garden. The population extends from the Kenwood Nursery through the main chain of the Highgate Ponds to the Bird Sanctuary and west to the Viaduct Pond, with foci in the fenced areas that are subject to less disturbance than the rest of the Heath.

The population is estimated to be of low status, with only 20 different individuals being recorded by LEHART during the course of the survey, and on average only 2 snakes being recorded per visit. The main reasons for the low status include the human pressure on the Heath with the consequent restriction of core snake areas to fenced compartments, a lack of small ponds for the main grass snake prey items (frogs and newts) to breed in (although there are plenty of toads which use the lakes and which are also prey to grass snakes), and a lack of on-site egg laying sites (snakes are presumed mainly to use adjacent gardens and allotments for egg laying in heaps of decomposing vegetation).

Management recommendations for grass snakes therefore centre around the provision of new small ponds to boost amphibian numbers and the construction of vegetation piles for egg laying. In addition, branches which shade banks should be cut back to allow additional basking near the ponds. Grass and scrub cutting should be done at the end of October, or, where this conflicts with essential management of grasslands, on hot days when reptiles are likely to be in retreat underground or warm enough to evade the blades of cutting machinery.

The opportunities for establishing native reptile species other than the grass snake are limited but, should a donor population become available, it may be possible to establish a population of slowworms on the improved heathland site adjacent to Hill Garden where they could also spread into the adjacent open woodland compartment.

Finally, recording and training which has been undertaken during the course of this survey should continue as part of the regular work of the staff based on the Heath.

1 Introduction

In 2008 the London Essex and Hertfordshire Amphibian and Reptile Trust (LEHART) was commissioned by the City of London to undertake a reptile survey (excluding terrapin species) on Hampstead Heath. The survey was in two Phases, the first in the summer and autumn of 2008 and the second in spring and early summer 2009. Hence it would be possible to survey the Heath at all times in the reptiles' active season.

2 Methodology

The survey was preceded by a desk study of existing historical and contemporary records, to allow resources to be targeted at the most likely areas for reptile presence on the Heath. The results of the desk study, as well as the records which were obtained by LEHART and the City of London, are presented as Appendix 1 at the end of this report and also separately on a spreadsheet. The spreadsheet will permit further records to be added as recording continues in the future.

Historical records of reptiles on the Heath are few but they suggest the following points: first, there is no confirmed evidence that the Heath once supported the rare species such as sand lizard *Lacerta agilis* or the smooth snake *Coronella austriaca* which are today restricted to sandy habitats such as heath and dune (though of course the lack of documentary evidence does not prove that they were not present). As Hampstead Heath has altered from a true heathland habitat to the current mix of parkland, grassland, woodland and wetland habitats, so its suitability for reptiles in general will have decreased and records for the more widespread native reptile species are few or non-existent for most of the twentieth century. It is thought that the adder *Vipera berus* disappeared from the Heath at the turn of the twentieth century, probably through persecution and habitat loss, and that even the common or viviparous lizard *Zootoca vivipara* was last recorded in 1912 (Fitter, 1949). Increasing public pressure, 'edge effects' such as predation by domestic cats, as well as habitat loss and fragmentation are all factors which would have helped to eliminate reptile species from the Heath.

In March 1995 the London Amphibian and Reptile Group (a predecessor of LEHART) received more recent reptile records from I. Greenwood at the Parliament Hill Fields Conservation Unit. The most important record is of the release / reintroduction of grass snakes *Natrix natrix helvetica* to the Heath, mainly in one batch of approximately fifty adult snakes released in 1985 to the Bird Sanctuary pond. It is the descendents of these animals which remain extant on the Heath today. The geographical origin of these snakes is not known but the records state that they were released by T. Langton of the Fauna and Flora Preservation Society (FFPS).

Following the desk study, a combination of direct observation by experienced surveyors and the provision of artificial refugia (bituminized roofing sheets approx 1m by 0.5m) were used to detect reptiles in the field. All reptiles will bask under (or on) the refugia in order to gain heat by conduction and minimize exposure to predators when concealed under them.

Six visits were made in optimal weather conditions to detect grass snakes and any other reptile species in each of the two phases of the survey. A total of 135 refugia were placed in various parts of the Heath and these were checked by LEHART during the course of each of the six survey visits as well as on an *ad hoc* basis by staff from the City of London. This resulted in a minimum of 815 'refugia efforts' for each phase of the survey. Placement of refugia was constrained by the possibility of public disturbance, hence they were located only in areas within fenced compartments which were off-limits to the public. However the core grass snake populations are similarly located mainly in the off-limits areas (see results section) and so this was not thought to be a major constraint.

In Phase 1 the refugia were placed in the Orchard, Kenwood Nursery, Ecofield, Harry's Compartment, Stock Pond, Bird Sanctuary, Catch Pit, Viaduct Pond and Heath Extension.

In Phase 2 the refugia were placed in the Orchard, Kenwood Nursery, Ecofield, Harry's Compartment, Stock Pond, Bird Sanctuary, Vale of Health and Hill Garden (Heathland area).

The justification for placement of refugia in Phase 2 was as follows: Refugia were left in key areas confirmed as grass snake core areas ('foci') to try to detect hatchling snakes and hence breeding sites and to build up population status data for those foci. Other areas, where no snakes had been detected at all, had their refugia removed and these were redeployed to other parts of the Heath where records or habitat suggested that reptiles might be present.

3 Constraints

The start of the survey in July 2008 was delayed due to unseasonably cool and wet conditions; the refugia were placed mainly within fenced compartments, which may have reduced the ability to detect vagrant animals which were moving from one area of the Heath to another, or even populations of animals such as slowworms which could conceivably remain undetected in small numbers on the Heath in publicly accessible areas. Those refugia which were placed in public areas, such as the Vale of Health, were sometimes subject to disturbance and removal.

4 Results

Records collected during the course of the survey by LEHART and the City of London are presented in detail in Appendix 1 and on the separate spreadsheet.

4.1 Summary of results

The survey did not find any native species of reptile on the Heath except for grass snakes. This result is thought to reflect a genuine absence of adder, which have not been recorded on the Heath for the best part of a century. It is also thought to reflect a genuine absence of the common lizard, which is liable to local extinction through public pressure, collection, predation by domestic cats and rats etc once its habitat becomes sufficiently fragmented or degraded. In addition, common lizards are fairly easy to detect in their habitat and it is likely that City of

London staff or members of the public would have identified any extant population on the Heath. Slowworms *Anguis fragilis* are a cryptic species of legless lizard and, with their preference for concealed basking in dense ground cover, they can persist in fairly urban environments and remain hard to detect. It is therefore possible that one or more small populations of slowworm may remain on the Heath (or in adjacent habitats, such as gardens or allotments). The restricted nature of refugia placement in those areas generally off-limits to the public will have reduced the likelihood of such a small slowworm population from being detected.

During the course of the survey a non-native wall lizard *Podarcis muralis* was found basking on the Bothy wall in the Kenwood Nursery and the discovery of a dead 'constrictor-type' snake on the Heath was reported to LEHART. These records, in addition to the known presence of feral terrapins, illustrate the high probability of non-native species of reptile being regularly found on the Heath as a result of deliberate or accidental release in an area bounded by such a high human population. Caution should be exercised in capturing any snake whose identity is uncertain due to the possibility of a venomous species being released on the Heath.

4.2 Grass snakes

Almost twenty five years after the main release of grass snakes, they continue to be present on the Heath. The status of the population is considered to be widespread but low on the main Heath and this is discussed further in the next section. The population is considered to be well structured, with refugia and direct observation showing gender parity and young as well as adult animals, ranging from approximately 20cm to around 1m. However no immediately hatched snakes were found in the survey, nor were their breeding sites detected. This is further discussed in the section called 'breeding opportunities' below. A total of approximately 20 different snakes were detected by LEHART during the course of the survey, with photographic records being used to identify individuals.

There is no existing methodology for estimating the total number of individuals of reptile species in an area but it would seem reasonable to suggest that several tens of adult grass snakes at least are present in the core areas of the Heath today. Given that around 50 snakes were introduced in the 1980s, it would be fair to say that the population appears to have maintained itself and spread during this time although numbers have not dramatically increased.

4.3 Widespread status

The survey failed to detect grass snakes on the outlying parts of the Heath, especially those isolated by main roads such as the Heath Extension and the Hill Garden compartments. It is likely that snakes have either not yet dispersed to these areas, or that they would be killed in crossing the roads, or both.

Within the main area of the Heath, snakes were found to be widely dispersed, from the Kenwood Nursery / Ecofield through the Orchard, Harry's Compartment, Stock Pond, Ladies Pond and Bird Sanctuary, with a single record from a member of the public to the south of the Bird Sanctuary of a snake crossing the path at the Men's Pond. Snakes were also found further west on the Heath at the Viaduct Pond. Assuming that the snakes were all released in the Bird

Sanctuary, as the record suggests, this would mean the population has spread northwards and westwards by at least several hundred metres, though its spread southwards has been limited by the nature of the habitat in the Ponds further south (e.g. revetments, exposed banks, overhanging, and hence shading, vegetation reducing basking opportunities etc). Eastward dispersal would result in snakes entering private gardens and an allotment, which may well have occurred but investigation of this was outside the remit of this study.

4.4 Low status

The conclusion regarding the low status of the population is derived from the relatively few snakes detected on each of the survey visits through both Phases of the project. An average of 2 snakes was found by LEHART during each visit (refugia and direct observation combined), with a range of 0 to 4 individuals. At another large site in northwest London, where the status of grass snakes is considered high, it is not unusual to detect upwards of a dozen snakes per visit in optimal conditions.

4.5 Foci

Particularly good areas for grass snakes ('foci') are considered to be as follows (with reasons for their suitability stated):

Kenwood Nursery and Ecofield – due to lack of disturbance by the public, presence of small ponds for amphibian prey and possible egg laying sites in the form of compost heaps and leaf mould in the Nursery.

Harry's Compartment (especially the currently open grassy meadow at the northern end) – due to lack of public pressure, proximity to a traditionally managed large garden at Athlone House which may have been an egg-laying site for grass snakes.

Bird Sanctuary – due to being the original point of release in the 1980s, the presence of suitable basking areas / feeding opportunities and being off-limits to the public.

Hedge and ditch line (including new ponds between Orchard and drinking fountain) adjacent to Harry's Compartment – due to suitable ecotone for basking and provision of cover for snakes, proximity to core areas such as Harry's Compartment and also presence of new small ponds in ditch-line which will increase the availability of amphibian prey especially frogs and newts.

4.6 Reasons for low status

Although grass snakes continue to be present on the Heath, they are negatively affected by the public pressure on the Heath and restricted mainly to the less disturbed areas such as the fenced 'off limits' areas of the Heath. As such, they are less likely to build up core populations outside these areas although being the most vagile of native reptiles, individuals can successfully use areas outside the fenced compartments and especially corridors such as ditch-lines and hedgerows to facilitate dispersal from one fenced area to another. On these occasions they are most likely to be seen by members of the public.

Although the high public usage of the Heath cannot be reduced, there are thought to be two other factors which limit snake numbers and which can be addressed through conservation management. These are the need to improve both feeding and egg laying opportunities for the snakes. Each of these is discussed separately below:

Feeding opportunities

Grass snakes are amphibian specialists. Their status on the Heath is therefore intimately linked with its amphibian population. Annual amphibian surveys are recommended, therefore, not only for the species themselves and their key role as indicators of the aquatic and terrestrial health of the Heath, but also as inputs into assessing the status of the grass snake population.

Currently there are healthy populations of common toad *Bufo bufo*, which are centred around the large ponds / lakes in which they breed, with smaller numbers of common frog *Rana temporaria* and smooth newt *Lissotriton vulgaris* using the margins of the large water bodies for breeding as well as the relatively few small shallow ponds which these two species prefer. The grass snakes on the Heath are probably feeding mainly on toads but opportunities should be explored for enhancing the numbers of frogs and newts to augment the feeding opportunities for the snakes.

The small population of non-native marsh frogs *Pelophylax ridibundus* which is found on the Heath Extension does not coincide with the current range of the grass snake population. Pond creation is discussed in the section on management recommendations below.

Breeding opportunities

Grass snakes are an oviparous (egg laying) species which seek sources of non-solar warmth to improve the chances of successful development of their eggs. Typically these sources include decomposing organic matter, such as compost and manure heaps, leaf litter and naturally decaying marginal vegetation including reeds and rushes beside ponds.

In spite of intensive efforts throughout the survey to detect both egg laying sites and newly hatched snakes, neither were found. Small snakes approximately 20cm were found in Phase 2, suggesting that they had hatched the previous autumn from areas close to their detection. In most cases, these very small snakes were found in compartments adjacent to the large private gardens which adjoin the Heath (such as the former Athlone House mentioned above). It is therefore possible that females lay eggs in these areas and it is recommended that such areas are surveyed at some point in the future to ascertain whether they hold grass snake egg laying sites.

It is also possible that egg laying sites were not detected in the survey on the Heath. Possible sites might include dead marginal vegetation in the Bird Sanctuary compartment (where a small snake was found in summer 2009) and perhaps in Kenwood Nursery itself, where female snakes often appear at egg laying time in July (City of London staff, *pers. comm.*). In the case of the latter site, heaps of vegetation suited to egg laying may be prematurely disturbed, and clutches of eggs consequently destroyed. It is recommended that such areas are assessed regularly for their suitability as egg laying sites and if eggs are found that the heaps are left

undisturbed (or that eggs are translocated with care and without turning them if disturbance is unavoidable). The provision of additional egg laying sites within the Heath (especially given the loss of at least part of the Athlone House gardens) is considered an urgent management priority and is discussed further in the management recommendations below.

5 Management Recommendations

Management prescriptions in the form of specific snake-related management briefs for the various compartments are beyond the scope of this report. However it is possible to make some general recommendations and also to comment on specific micromanagement techniques which could benefit the snakes inhabiting certain compartments. Comments relating to grass snakes will also benefit other reptile species, such as slowworm, should they be reintroduced at some point in the future, or a relict population be extant.

5.1 General recommendations

Enhancing feeding opportunities

New small ponds, no more than 1m deep and with a total surface area of only a few tens of square metres maximum, should be created in areas adjacent to hedgerows and within fenced compartments close to the larger ponds wherever possible. It is a feature of the Heath that although it contains a large amount of wetland habitat, much of this is in the form of large ponds or lakes which provide limited opportunities for breeding amphibians except around the margins (the presence of fish is harmful to amphibian larvae with the exception of common toads, and incidentally therefore explains the lack of great crested newts *Triturus cristatus*) on the Heath today.

New ponds designed to hold water until late summer would boost the numbers of frogs and newts on the Heath and provide additional feeding opportunities for the grass snakes. Ponds spaced at regular intervals along ditch-lines and hedgerows would also encourage the spread of snakes away from their traditional core areas. New ponds have already been created in the mitigation works for the development of the adjacent Athlone House land and it is planned to create at least one smaller pond within the Bird Sanctuary area for frogs and newts.

Enhancing breeding opportunities

Provision of decomposing organic matter for egg laying is a conservation measure which should be easy to expedite. Such heaps should consist of at least several cubic metres (preferably more) of rotting vegetation, manure etc. For example, cut reeds in the Bird Sanctuary could easily be piled to make such a heap. A large heap of grass and scrub arisings could be established at the north end of the meadow in Harry's Compartment as a direct attempt to redress any loss of egg laying sites in the adjacent Athlone House area. Large compost heaps could also be established in the Ecofield next to the Kenwood Nursery.

Successful breeding could be detected by noting aggregations of gravid female snakes in the vicinity of these heaps in mid-summer and the presence of hatchlings in early autumn, although the heaps themselves should not be disturbed between mid-July and late September.

Key features of grass snake egg laying sites are that they should provide aerobic conditions for rapid decay by microorganisms of organic matter and consequently a thermal gradient within the heap, so that females can select the precise temperature and humidity they require for their eggs to develop. Heaps must also, of course, be present in areas which snakes can safely reach.

General habitat management

Reptiles, including grass snakes, require habitats which offer basking opportunities coupled with dense cover for protection from predators and the weather. Ecotones, which are graded boundaries between open grassy areas and denser scrub and woodland, are consequently valuable features to encourage along woodland edges, hedgerows etc. Grass cutting regimes should avoid clearing long grass until hibernation in late October; likewise the removal or trimming back of bramble edges should ideally be done at the same time of year. Where vegetation must be cut during the active season for reptiles, it should be done on very hot days, when reptiles will most likely be in retreat from the heat underground and also warm enough to outrun the blades of the cutting machinery if they are above ground.

Some of the ponds are unsuitable for grass snakes because they are surrounded by dense overhanging vegetation which does not allow for basking at the edges. Hence it is recommended that open clearings are made at regular intervals by cutting back this vegetation in winter, so that the sun can reach the banks the following spring.

Some areas such as the Orchard, which were well used by snakes, have become less suitable as the coppice has recovered and the ground has become more shaded. Any south-facing slopes (such as the one which is present in the Orchard next to Hampstead Lane) should be managed annually to maintain more open character for the snakes.

5.2 Specific micromanagement recommendations

The meadow area in Harry's Compartment will require annual management to prevent bramble and hawthorn scrub from completely removing the rough grass which characterizes the meadow. The development of this scrub will prevent snakes using it for basking.

The pond which is currently being re-dug in the Ecofield should be completed to enhance its status for amphibians.

The Orchard should be regularly managed to maintain the open sunny aspect of the south-facing slope in particular, and its ponds should be de-silted and overhanging tree branches removed to maintain their status as amphibian breeding sites.

For all other compartments, small ponds and vegetation heaps should be instated wherever possible as per the recommendations in the section above.

6 Possibility of reintroducing other native species of reptile

One of the aims of the project was to comment on the feasibility or otherwise of reintroduction of reptile species were they found to be extinct on the Heath. The only reptile species - other than grass snake - which it is considered could perhaps survive on today's Hampstead Heath is the slowworm. Indeed it may be that small populations remain, as explained previously, which were not detected by this survey.

Reintroduction of adders to sites which formerly held them is often very difficult for ecological and political reasons, given that this is a venomous species. They are sensitive to human disturbance and require large areas of suitable heathland or other scrubby habitat, such as that which is not present on Hampstead Heath today. They also require healthy numbers of common lizard to be present, as young lizards are the staple food of young adders. No lizards are present on the Heath and in turn it is not recommended that a reintroduction of this species is undertaken due to human pressure, presence of predators (such as domestic cats) and the lack of suitable heathy or scrubby habitat.

Slowworms are the most resilient reptile species in terms of coping with increased human pressure and the presence of predators associated with people, such as domestic cats. They can be found in inner London Boroughs and in back gardens, managing to survive through their cryptic nature and their limited ecological requirements which include slugs and other soft-bodied invertebrates as food. A suitable area for a reintroduction of slowworms is the restored heathland compartment next to Hill Garden. This area, whilst being too small to support adders for example, could provide a core for a slowworm population, which might reasonably be expected to colonise the adjacent open woodland habitat and perhaps Hill Garden itself. Should a donor population of slowworms become available, perhaps as a consequence of a nearby development of a brownfield site, a reasonable number of animals (perhaps between 50 and 100) could be introduced to this area, subject to best practice for reptile translocations.

7 Conclusions

The results of the reptile survey of Hampstead Heath are mixed; on the one hand, no native reptile species apart from grass snakes were found. However, Hampstead Heath continues to maintain a widespread population of grass snakes; as such it is probably the closest site to the centre of London with a significant breeding population of this charismatic species. The low current status of the population could easily be enhanced through the provision of additional feeding opportunities in the form of ponds, to encourage a greater range of amphibians especially frogs and newts, and breeding opportunities in the form of vegetation heaps, for egg laying.

Continued work on heathland restoration could also provide the opportunity to reintroduce slowworms elsewhere on the Heath at some point in the future.

It would also be beneficial in terms of producing a coherent conservation plan for the reptiles on the Heath to liaise with English Heritage staff at Kenwood and landowners, ploholders etc in adjacent houses and allotments.

Finally, it is hoped that the training and development of survey techniques and recording forms as part of the project will mean that reptile records continue to be made in the future now that this particular project is finished. Any records obtained should be forwarded annually to LEHART for inclusion into their County Herpetofauna Database.



Heath Staff attending reptile training day

Will Atkins LEHART