Headington Hill Park

Baseline survey and Report

For Oxford City Council

March 2022

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Headington Hill Park showing trees in autumn colour 30.10.2021

Aim

To provide a baseline botanical survey of the site, with what fungi and animals (birds, invertebrates) are identifiable on the two site visit sessions. All photos included are my own.

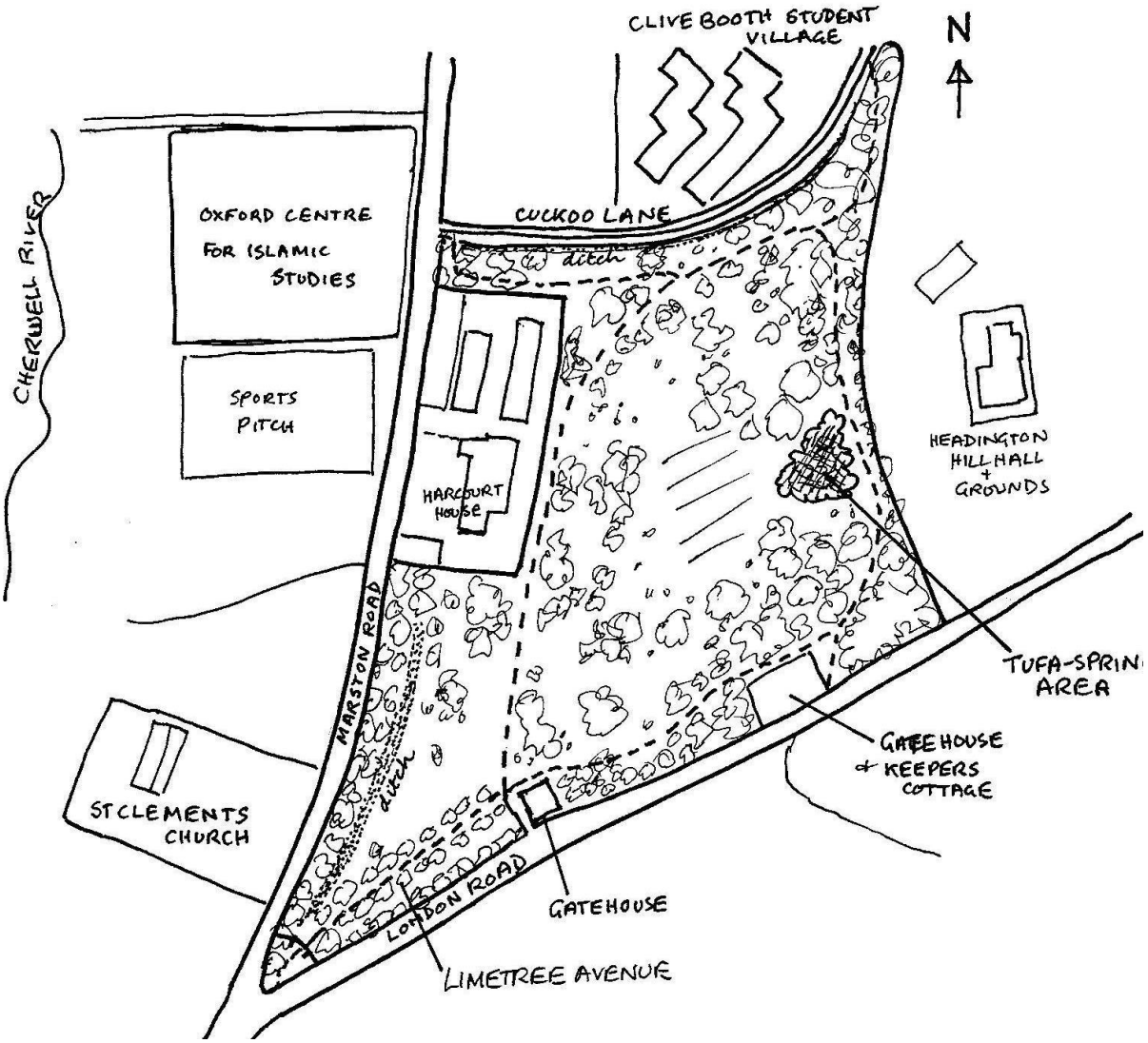
Site Location, Size. Access

This is a small, undulating, semi-wooded park at the junction of two roads. Marston Road being the western boundary and London Road/Headington Road the southern boundary; separating the site from the large South Park. To the west is the Harcourt House site next to Marston Road. To the north the boundary is Cuckoo Lane with Clive Booth Student Village beyond that. To the east and upslope are

the grounds of Headington Hill Hall and the rest of the Oxford Brookes University site. There is foot access from Marston Road, Cuckoo Lane and the London Road, where there is a gatehouse near the main entrance.

Size: approx 8 hectares,

Site Central grid Reference of the whole park: SP 530 064



Sketch map of Headington Hill Park to show the main areas of interest. Tree cover indicative only.

Visits, methods, limitations

Site surveys were carried out on: 30th October 2021 and 24th March 2022. Time spent during the two visits was 2 hours each visit (4 hours total) enabling thorough searching for all visible plant species. A summer and spring visit are considered sufficient to capture the vast majority of all vascular plants that are present, but inadequate for a full survey of animals such as invertebrates, birds and mammals. The survey method used was first a walk around the perimeter studying hedges; then spaced transects across the site were walked, stopping at intervals of every 10m to examine the flora in detail. Invertebrates such as butterflies, bees etc. were noted in passing but no specific collection methods

such as sweep netting were used. If there had been time for such surveys, undoubtedly the invertebrate species list would be more comprehensive and is expected to be very long due to the combination of the variety of trees, much deadwood and springs and seepages onsite.

Background, Site History, Geology, Current Management

Headington Hill Park is a park on a gentle slope on Headington Hill in the east of Oxford. The open park is part of the previous grounds of Headington Hill Hall, previously owned by the Morrell brewing family (hall built for them in 1824). The Hall and its gardens were bought by Oxford City Council in 1953 and Hall leased to Oxford Brookes University since 1992. The lower area of the original garden is now the publically accessible Headington Hill Park. As it was once a private garden, it has a frequency of remarkable exotic non-native trees uncommon in state-owned parks. It is more an arboretum than any other type of park. Whilst it has native trees such as oaks and beeches, 62 special and rare trees are present. Notable examples of the exotic trees are: Pocket Handkerchief Tree, or Dove Tree, *Davidia* - originally from China. Butternut *Juglans cinera* Bhutan Pine (*Pinus wallichiana*) Mongolian lime *Tilia mongolica*, Magnolias, Judas Tree (*Cercis siliquastrum*). Before conversion to a garden and subsequently a park, the area was farmland. It is not known if this area was permanent pasture or haymeadow or arable. Parallel undulations in the site centre, noted on the site walkovers, are reminiscent of relic ridge and furrow; which indicate past arable cultivation strips. Aerial photos (current Google aerial view) show these parallel ridges clearly picked out by white flowers.

The Friends of Headington Hill Park state they have placed 12 bird boxes scattered about the site on trees and their observations reveal 23 species of bird use the site including species such as Green Woodpecker , Greater Spotted Woodpecker, Nuthatch and Tree-creeper. Most information above from the Friends of Headington Hill Park (FOHHP) Facebook page (1).

Public use of the park seems focused on walking through for quiet appreciation of nature combined with picnicking or just sitting under the trees.

The geology of the site is interestingly variable and influences the flora. The eastern upslope region of the park is on Jurassic deposits of the permeable Beckley Sand Member; whereas the lower western part of the site is on the impermeable West Walton formation mudstone of the Oxford Clay. The junction between these two strata runs north south through the middle of the park and at that junction a number of wet spring/seepages occur. The upper transition zone to the more permeable beds of the Corallian gives rise to a series of springs at approximately 75-80m AOD. This spring line is responsible for a number of minor springs around Headington Hill including Dunstan Park, Boundary Brook, South Park and Lye Valley. The permeable Corallian beds making up a series of minor and perched aquifers including Beckley Sands and Wheatley Limestone. The rainwater catchment of these springs/seepages in the Headington Hill Park will be the Beckley Sands and Wheatley Limestone hillside above the limits of the public park, encompassing grounds of Headington Hill Hall and gardens of buildings above this.

Current management of the site appears to be occasional mowing to a reasonably short sward all over the site except for some scrubby areas associated with groups of trees.

There are two dug ditches (presumably for drainage from the spring areas on site) – one ditch a few metres in and parallel to Marston Road in the south west corner and one parallel and close to the fence to Cuckoo Lane in the north. Both held some water in March.

Survey Results and Observations

The park is full of native and exotic non-native trees. In some cases the ornamental trees are just varieties of native species e.g. a copper beech is still a native beech *Fagus sylvatica*, but with deep maroon leaves that supports all the invertebrates a non-maroon beech would. Whilst not required to do so in this survey, I have included what native and non-native tree species I could identify, as they are important food sources for invertebrates, birds and mammals plus may have interesting associated native fungi (which I have recorded). The tree list is not exhaustive but I presume there is a separate record of all plantings of exotic trees.

As to the plants and fungi identified the totals are: 58 species of herbaceous plants and climbers, 55 species of trees and shrubs, 9 mosses and one liverwort. Fungi found totalled 45 species plus 2 lichens (which are part fungus).

Ground Flora

Autumn and spring surveys revealed a ground flora not under tree shade dominated by relatively few species of common grasses, with only very few common obvious flower species – numerous common daisies, celandines, three species of buttercups, self-heal, germander speedwell and abundant cow parsley; the last especially under light shade of trees. This lack of useful native species could be connected with a history of arable cultivation hundreds of years ago. Similar ridge and furrows (and arable history) are clearly visible on the sward of South Park in the current Google aerial view.

The importance of common flowers to our declining pollinators is often overlooked. Spring dandelions are key nectar and pollen species for early bees and butterflies, but there was a paucity of them - the only good clump of those was on a very disturbed area just inside the main entrance gate at the south-west corner.

The only dandelion patch on disturbed soil at the south-west entrance gate 24.03.2022

The spring survey visit revealed large numbers of planted bulbs in flower: sheets of lilac crocuses, snowdrops and winter aconite which are followed by spring squills, various daffodils (*Narcissus* sp) anemones and bluebells plus snake's-head fritillaries. The snake's-head fritillary is of course a native flower of our local floodplain meadows, but this is not its natural habitat, here planted. Whilst these all can be considered exotic garden additions to any native flora present,

the pollen and nectar source they present to spring bumble bees, honey bees and wild solitary bees and flies must be very large so they are very important in support of the biodiversity of pollinators visiting this site (queen buff-tailed and common carder bumble bees and solitary bees were seen to be visitors in March 2022). Pollen and nectar available from early spring is essential for queen bumble bees and the females of solitary bees to provision their nest cells to feed bee larvae. Early flies and butterflies also benefit from these planted flowers. Anemones are classic 'pollen flowers' producing very little nectar, which may explain why they had no insect visitors. There is a surprising lack of primroses and cowslips, which would be beneficial additions.

Despite all those spring flower plantings, I noted on the March survey that early bees (hairy-footed flower bee) a brimstone butterfly and several dark-edged bee flies were concentrating on the one patch of flowering native early dog violet *Viola reichenbachiana* under a tree and also visiting sparse flowers of native celandines. Also used in semi-shade was native ground ivy *Glechoma hederacea.*

Planted spring flowers Anemone blanda and daffodils Narcissus sp. important for bees near the lime tree avenue and road 24.03.2022

Dark-edged beefly Bombylius major, nectaring on native early dog-violet flower, 24.03.2022

A couple of plants of alexanders had flowers well used by insects, especially flies, on the north park side, such umbellifer plants have very valuable flowers for pollinators of all sorts. The abundant umbellifer cow parsley on site will be a very important nectar and pollen source in later spring. However after the spring bulb and cow parsley flower flush, the ground flora in the park is notably deficient in species providing nectar and pollen resources for pollinating insects throughout late spring and summer. The August survey showed no ground flora nectar and pollen sources.

Small amounts of garlic mustard should later support caterpillars of orange tip butterflies.

A clump of alexanders in flower provides much nectar and pollen for insects, especially flies 24.03.2022

Scrub

There is little scrub on site except for patches of mostly bramble associated with some trees. Therefore there is limited bird-nesting potential and nectar source from bramble flowers. Patches such as this bramble might be used.

Bramble patch with bird-nesting potential 24.03.2022

The cherry laurel hedge to the north to the student village should provide nectar and pollen rich flowers in late spring. Exotic shrubs such as Oregon grape *Mahonia* provide a winter-early spring flower food source for queen bumble bees that may emerge on mild sunny days.

Springs/Seepages

Water emerges at the geological junction mentioned at several sites in the park, making soil wet underfoot. This is merely a slight inconvenience in most seepages, but the main large calcareous tufa-forming spring in a central position around 80 AOD is interesting and important as a rare wetland habitat type. Located at SP53075 06501, the spring area is some 20m in extent with the wet area shaded by trees (sycamore and dawn redwood). Water emerges from the ground, runs over the surface for some metres in a couple of channels then seems to disappear into the ground again in a hollow. Much of this small spring-fed wetland is occupied by unmanaged bramble scrub with dense ground-running ivy and tall wetland herbs such as great willow herb, nettle and pendulous sedge. Small amounts of wavy bittercress and Pellia liverwort are actually in the running water and the peaty associated area. No other special or uncommon wetland plants are present due to much shading, but creeping jenny was noted on the mown margin outside the scrub, indicating part of the previous wetland flora that would have occupied the site in the agricultural past, when light grazing might have operated before conversion to a garden.

Calcareous tufa- and peat-forming spring area in the centre of the park, dawn redwood and sycamore trees on the margin of the wetland 24.03.2022

Peat was seen in the centre of the spring area but no estimation of peat depth was possible. The peat formed may represent a considerable carbon store as springs and seepages are ancient features that may have been building up peat for thousands of years. The depth of this peat in seepage areas needs further investigation for this reason. A layer of wet peat only 30cm deep has been shown to store more carbon than a rainforest of the same area (2) This central spring must be alkaline and have calcium-rich water as considerable tufa (calcite) formation was seen (calcium carbonate encrustation, like lime-scale). The biggest tufa- forming site nearby is Lye Valley fen SSSI, a very important habitat with rare wetland species. If the park spring historically had any of the range of rare plants in Lye Valley SSSI they are now lost due to shading from trees and scrub produced by no management. It is possible desirable wetland species could return from the seed bank with clearance and regular management of the bramble/nettle/willow-herb vegetation.

Spring area under the trees showing tufa (lime encrustation) on twigs and fallen deadwood lying in the water. 24.03.2022

Dead wood from the nearby trees had fallen into the shallow spring running water and could be seen to be encrusted with tufa. Wood in such a situation is a valuable microhabitat. Turning over such encrusted logs and branches revealed freshwater shrimps (likely *Gammarus* sp.) cased caddis-fly larvae, water snails and *Elodes* sp. (Scirtidae) marsh beetle larvae. All these noted are likely to be common, but waterlogged deadwood in such alkaline, tufa-forming spring situations may be a habitat for larvae of rarer invertebrates such as specific craneflies (including Red data listed and BAP/Section 41 species) and other scarce invertebrates recorded in nearby Lye Valley fen SSSI fen (3).

Water-logged deadwood in the spring turned over revealing freshwater shrimps and larvae of Elodes sp. marsh beetles. One larva shown on the right, identified by M. Hammond 24.03.2022

Despite lack of management, the shaded spring/seepage in this park may still provide a breeding site for scarce to rare flies or beetles that exist in nearby Lye Valley fen SSSI. Further survey of this seepage for rare invertebrates is needed by trapping or rearing to fully judge its biodiversity importance.

Ecohydrologist Curt Lamberth, in a 2007 report for Oxford City Council (4) presented water quality data from a number of springs around Headington Hill and quotes 5ppm nitrate for this Headington Hill Park spring, which is a moderately nitrate-polluted situation but that was a number of years ago and the water quality needs re-testing. Nitrate enrichment of groundwater in this situation would likely be a result of leakage of sewage to groundwater due to ageing of sewage infrastructure in the upslope water catchment. A very low nitrate concentration below 0.5ppm nitrate is ideal for an alkaline, tufa-forming spring.

Trees and Species Supported

Some of the exotic trees have flowers which may provide nectar and pollen for native pollinating insects, notably the horse chestnuts flowers in late spring which are known key food sources and also the single flowered cherries and cherry-plums present. Double flowered versions are not useful,

producing no nectar and pollen. However most trees on site are wind-pollinated (oaks, beeches, hornbeams, plane, conifers like yew, sequoia, pines) the most important deciduous trees providing nectar and pollen for pollinators are the hybrid lime trees (*Tilia europaea*) of the avenue on the south side which flower with abundant nectar in June-July when there are very little other flowers out.

Example of single flowered cherry species, useful to pollinating insects in spring. 23.03.2022

It was encouraging to see a number of trees (especially one silver maple) colonised by mistletoe, a partial parasite which trees seem to tolerate. Single plants of mistletoe were also seen on lime, sycamore and rowan trees. Berries of this plant are used by missel-thrushes.

Mistletoe has extensively colonised one silver maple Acer saccharum. 24.03.2022

Many insects will be using the leaves and branches of trees on site, even though most are non-native. The best trees for wildlife here are the native pedunculate oaks, beeches, hollies, limes and willows.

Even some of the exotic trees can support invertebrates. Extensive pale brown mines (line ending in blotch) were noted on leaves of non-native holm oaks (*Quercus ilex*) in the park. These are produced by the small caterpillars of a micromoth, the holm oak linear leaf miner, *Ectoedemia heringiella*. This is mainly in south-eastern England, where it was first discovered in 2002. Holm oaks tolerate the

damage and continue to grow, even when most leaves are affected. The appearance improves in early summer, when new foliage develops and some of the old mined leaves are shed. Leaf miners are part of a natural food web. In some areas birds such as blue tits have learnt to open the mines to feed on the caterpillar within (information from the RHS website), so benefiting a native species.

Leaf mines of the caterpillars of the holm oak linear miner micromoth, 24.03.2022

The numerous conifers on site provide no resource for pollinators, being wind-pollinated, but will provide many resources for birds which favour conifers for foraging such as goldcrest, firecrest, tree-creeper and nuthatch. Dense evergreen conifer foliage is good shelter and often used for roosting by many types of bird. Such dense evergreen foliage may also be habitat for bats. Standing dead monoliths of horse-chestnut trees have much loose bark and so present just the sort of key habitat that could be used by bats that like to roost in the crack just under the peeling bark. Numerous beetles, flies and some moths breed in deadwood or fungi on deadwood. Rare species may be present and all these invertebrates are food for insectivorous birds. Leaving standing dead monoliths of dying trees and dead fallen trees is one of the best features for biodiversity and an example of excellent management of deadwood found in the park.


Two standing dead monoliths of what were horsechestnut trees. Good habitats for woodpeckers and bats plus the right hand tree is extensively colonised by woody bracket fungi – the southern bracket Ganoderma australe. 24.03.2022 and 30.10.2022.

Fallen dead horse chestnut tree trunk left where it fell, a good habitat for deadwood fungi. 30.10.2022

Fungi

The October 2021 visit was perfect timing for recording fungi. At that visit 28 species of fungi were found. Years ago I led a number of Fungal Forays for the then New Marston Wildlife Group in October 2006, 2007 and 2009 to the park. The records from these forays have been added to my

recent fungal records in the species tables, giving 45species so far. Many more fungi are to be expected with fuller surveying. This fungal diversity is mainly due to the abundance of trees which may be expected to have numerous species of mycorrhizal fungi associated with their roots and the abundance of standing dead and lying deadwood, providing an excellent food source for specialist and generalist deadwood fungi. It should be noted that recording of fungi is due to the recognition of only the reproductive, spore-producing fruiting bodies (toadstools, mushrooms, brackets) and that fruiting is very erratic, depending much on rainfall and temperature in each year. Drought autumns show few fungi. Species, even in ideal wet conditions, may not fruit every year and the interval between fruiting may be annual or up to more than 10 years. It takes more than 20 years regular surveying to get anywhere near a full fungal list for any site. A great many invertebrates feed on fungal fruiting bodies and underground mycelium, so they add much to total biodiversity. Some photographs of the range of fungi noted are in Appendix II.

Rather few fungi species were noted associated with the grassland, overwhelmingly the ones seen were associated with trees. Visible mycorrhizal fungi fruiting bodies (toadstools) are not found with roots of all tree species (but **all tree species actually depend on mycorrhizal fungi** to help them absorb nutrients, it is just that many of these fungi do not form visible above-ground fruiting bodies). The ones most likely to have such fungal associates visible as toadstools (ectomycorrhizal species) at this site are: limes, birches, beeches, pines, oaks, cedars, alders, willows. Good examples of typical mycorrhizal species seen in the park on these surveys are the brittlegills such as the Purple Brittlegill *Russula atropurpurea* and the webcaps *Cortinarius* species (identification within this genus is extremely difficult) and the deathcaps *Amanita phalloides* found fruiting under the southern beeches *Nothofagus* sp. (see photographs of fungi in Appendix II). The deathcaps are the most notable fungal species found in my autumn survey as they are the most toxic/lethal of all fungi when eaten by accident. Not rare in Oxon, this species is found normally in small numbers in mixed woodlands. For a simple account of the species see https://www.woodlandtrust.org.uk/trees-woods-and-wildlife/fungi-and-lichens/deathcap/

In contrast the Honey Fungus *Armillaria mellea* found fruiting on some stumps or deadwood is a parasitic fungus that kills trees/shrubs and is then able to grow on the deadwood after the tree is dead. Typical black ‘bootlace’ hyphae of this species were seen under the peeling bark of fallen dead trees. The loss of mature trees to this fungus or to other pathogens in this park is regrettable, but not necessarily bad for biodiversity – there is life after death in the deadwood, see below. New trees should not be planted close to where a tree has been killed by honey fungus previously.

Insects

Very few of the large diversity of insects that must be present were recorded because the timing of visits was not optimal; however it is worth noting the presence of numerous leaf mines of the horse chestnut leaf miner micromoth *Cameraria ohridella* which has extensively colonised the UK since shortly after the year 2000. The large numbers of mines on horse chestnut leaves lead to early leaf death and stress the horse chestnut trees. This, combined with other tree diseases, hasten the death of horse chestnuts in this area, including ones seen in this park. Fungus-associated flies such as fungus gnats and Platypezid (flat-footed flies) were noted flying around smoky bracket fungi on a dead horsechestnut stump, but could not be captured. The diversity of insect species using the fungi on site could be considerable and much of the biodiversity on site might be such invertebrates. Insects breeding in fungi are of course excellent food sources for small birds using the site such as wrens,

robins, dunnocks and warblers. A few common spring bees, flies and butterflies are noted in the species tables.

Discussion and Conclusions

The ground flora of the grassy areas showed not much botanical diversity, being dominated by common species of grasses and flowers like common daisy and cow parsley. Planted garden spring bulbs and other flowers provide early nectar and pollen, but there is a dearth of floral resources for pollinators after this spring flush.

The biggest contributor to biodiversity in the park are the many trees, either exotic non-native or native, in living or in dead state as monoliths or lying deadwood. These will support many insects and thus birds. Their roots and deadwood will support numbers of fungi, the species listed here of fungi will be just the tip of the iceberg of fungal diversity.

The council is to be congratulated on maintaining dying and dead trees standing upright as long as possible to favour all wildlife that depends on deadwood. Also when trees fall or have to be felled, the trunks have been left to decay on site rather than being cleared away. This practice has undoubtedly contributed greatly to overall biodiversity of invertebrates and fungi and provided lots of insect food to support the birds on site (and presumably bats).

A calcareous spring is discovered in the centre of the park with extensive tufa-formation and much peat formed. Springs are ancient features that have run for thousands of years and this central wetland should be recognised for its importance as a potential invertebrate biodiversity hot spot and site for significant underground carbon storage. Further investigation of invertebrates and peat resource is needed and some appropriate management to preserve both instated. From the point of view of biodiversity of native wildlife, this is by far the most important area within the park.

Despite roads, the nearness of a network of other green open areas (St Clements Church graveyard and nearby fields, Headington Hill Hall grounds) will mean good connectivity for mobile species of birds, mammals and insects moving to and from the park, meaning more secure populations.

With present and accelerating Climate Change to hotter and drier summers the shade of the trees in this park will become increasingly important to the public accessing this site. This site counters urban heat island effect - heating effect of buildings and tarmac.

The Friends of Headington Hill Park may appreciate seeing the list of fungi found as I note a request for a fungal survey posted on their Facebook page.

Recommendations

- The grassland area could be enhanced for later spring and summer pollinator insects by addition of good numbers of native species such as: primrose, cowslip, meadow cranesbill, red clover, birds-foot trefoil, oxeye daisy, but others are also suitable.
- Grass cutting management currently is not optimal for plant species diversity in the ground flora. If enhanced sown flower-rich areas are planted away from tree shade, these could be given hay meadow management with a cut and collect regime. For choice of species see help sheets available on my website (5)

- Even continually short mown areas could be seeded to much enhance provision for pollinators; with, for example: clovers, self-heal, celandines, bird's foot trefoil. These species take regular close mowing but are still useful nectar and pollen sources.
- Further investigation of the central calcareous spring/seepage area is needed. Estimation of peat depth and volume will give an idea of carbon storage. Trapping or rearing of specialist wetland invertebrates from the waterlogged tufa and Pellia liverwort mats may reveal scarce or notable beetles and flies which will be important components of total site biodiversity.
- If such scarce invertebrates are found breeding on site, management of the spring/seepage to favour them could be carried out. This might involve a degree of scrub reduction and tall herb vegetation cutting annually to let more light into the wetland surface, but maintain partial shade from trees. Such activity may stimulate wetland plant species to recur from any seed bank, increasing biodiversity.
- If it is desired to introduce further trees to the park, consideration should be made as to their water needs in view of the current and coming unpredictability of Climate Change to hotter and drier summers. Drought resistant species would be best.

References

1. Facebook page of the Friends of Headington Hill Park consulted on 20.03.2022:

https://www.facebook.com/HeadingtonHillPark/

2. Lindsay, R., Ifo, A., Cole, L., Montanarella, L. and Nuutinen, M (2019) *'Peatlands: the challenge of mapping the world's invisible stores of carbon and water'* Unasylva:An international journal of forestry and forest industries 70 pp46-57. https://repository.uel.ac.uk/download/5406a696f749d690ef6047d1845349033cbe4545807f9e3dd21143a387be5bde/1231427/ca6842en.pdf
3. Webb, J. A. (2007-2008 & 2008-2009) '*Botanical and Invertebrate Surveys on the Lye Valley SSSI units'* Unpublished Reports to Oxford City Council

4. Lamberth, C. (2007) '*Investigation of the possible hydrological effects on the Lye Valley Sites of Special Scientific Interest and the riparian zones of the Lye and Boundary Brooks as a result of development on Southfield Golf Course'*. Unpublished report to Oxford City Council available at:

https://drive.google.com/file/d/0B73oYRm5m97oYTdDV3YyTTd2Nk0/view?resourcekey=0-K8-fAFmDrnpC80Kt2NFF8Q

5. **Judith Webb website** section 'Pollinators, 'Flowery meadows' at: https://judithwebb.weebly.com/pollinators.html)

Appendix I

Table of species recorded in Headington Hill Park

Headington Hill Park						
J A Webb	map ref SP 530 064					
Scientific name	**Common name**	**Group**	**Date**	**Abund./Nos/Sexes**	**comment**	**stage**
HERBACEOUS PLANTS						
Aegopodium podagraria	ground elder	flowering plant	30.10.2021	rare		
Agrostis stolonifera	creeping bent	flowering plant	30.10.2021	frequent		
Anemone blanda	a blue anemone	flowering plant	24.03.2022	locally frequent	planted	
Anthriscus sylvestris	cow parsley	flowering plant	30.10.2021	frequent		
Arctium sp	a burdock	flowering plant	30.10.2021	rare		
Aster sp.	Michaelmas daisy	flowering plant	30.10.2021	rare		
Bellis perennis	common daisy	flowering plant	30.10.2021	frequent		
Cardamine flexuosa	wavy bittercress	flowering plant	24.03.2022	rare	in spring in site centre	
Carex pendula	pendulous sedge	flowering plant	30.10.2021	rare	in spring in site centre	
Carex sylvatica	wood sedge	flowering plant	30.10.2021	rare		
Cirsium arvense	creeping thistle	flowering plant	30.10.2021	rare		
Cirsium vulgare	spear thistle	flowering plant	30.10.2021	rare		
Conyza canadensis	Canadian fleabane	flowering plant	30.10.2021	rare		
Crocus sp.	crocus	flowering plant	24.03.2022	locally frequent	planted	
Cyclamen sp.	cyclamen	flowering plant	30.10.2021	rare	planted	
Dactylis glomerata	cock's foot grass	flowering plant	30.10.2021	occasional		
Epilobium hirsutum	great willow-herb	flowering plant	30.10.2021	locally frequent	in spring in site centre	
Eranthis hyemalis	winter aconite	flowering plant	24.03.2022	locally frequent	planted	
Fragaria sp.	a strawberry	flowering plant	30.10.2021	rare		
Fritillaria meleagris	snake's head fritillary	flowering plant	24.03.2022	rare	planted	
Galanthus nivalis	snowdrop	flowering plant	24.03.2022	occasional	planted	
Galium aparine	cleavers	flowering plant	30.10.2021	rare		
Geranium robertianum	herb robert	flowering plant	30.10.2021	occasional		
Geum urbanum	wood avens	flowering plant	30.10.2021	occasional		
Glechoma hederacea	ground ivy	flowering plant	30.10.2021	occasional		
Glyceria notata	plicate sweet-grass	flowering plant	30.10.2021	rare	in wet seepage area	
Holcus lanatus	yorkshire fog	flowering plant	30.10.2021	frequent		
Hyacinthoides sp.	bluebells	flowering plant	24.03.2022	rare	planted	
Hyacinthus sp	hyacinth	flowering plant	24.03.2022	rare	planted	
Iris foetidissima	gladdon	flowering plant	30.10.2021	rare		
Jacobaea vulgaris	common ragwort	flowering plant	30.10.2021	rare		
Lolium perenne	perennial rye grass	flowering plant	30.10.2021	frequent		
Lysimachia nummularia	creeping jenny	flowering plant	24.03.2022	rare	damp areas nr spring	
Narcissus sp	cultivated daffodil	flowering plant	24.03.2022	locally frequent	planted	
Pentaglottis sempervirens	green alkanet	flowering plant	30.10.2021	rare		
Plantago lanceolata	ribwort plantain	flowering plant	30.10.2021	occasional		
Plantago major	greater plantain	flowering plant	30.10.2021	rare		
Prunella vulgaris	self-heal	flowering plant	30.10.2021	occasional		
Ranunculus acris	meadow buttercup	flowering plant	30.10.2021	occasional		
Ranunculus bulbosus	bulbous buttercup	flowering plant	30.10.2021	occasional		
Ranunculus repens	creeping buttercup	flowering plant	30.10.2021	locally frequent		
Rumex sanguineus	wood dock	flowering plant	24.03.2022	occasional		
Schedonorus arundinaceus	tall fescue	flowering plant	30.10.2021	rare		
Scilla sp	squill sp.	flowering plant	24.03.2022	locally frequent	planted	
Smyrnium olusatrum	alexanders	flowering plant	24.03.2022	rare		
Solanum dulcamara	bittersweet	flowering plant	30.10.2021	rare		
Stachys sylvatica	hedge woundwort	flowering plant	30.10.2021	rare		
Stellaria media	chickweed	flowering plant	24.03.2022	rare	at main entrance	
Symphytum orientale	white comfrey	flowering plant	24.03.2022	rare		
Taraxacum sp.	dandelions	flowering plant	30.10.2021	rare	at main entrance	
Trifolium repens	white clover	flowering plant	30.10.2021	occasional		
Urtica dioica	common nettle	flowering plant	30.10.2021	occasional		
Veronica chamaedrys	germander speedwell	flowering plant	30.10.2021	occasional		
Veronica filiformis	slender speedwell	flowering plant	30.10.2021	rare		
Veronica serpyllifolia	thyme-leaved speedwell	flowering plant	30.10.2021	rare		
Viola reichenbachiana	early dog-violet	flowering plant	24.03.2022	occasional	under trees	

TREES & SHRUBS						
Scientific name	**Common name**	**Group**	**Date**	**Abund./Nos/Sexes**	**comment**	**stage**
Acer griseum	paperbark maple	flowering plant	30.10.2021			
Acer platanoides	Norway maple	flowering plant	30.10.2021			
Acer pseudoplatanus	sycamore	flowering plant	30.10.2021			
Acer saccarinum	silver maple	flowering plant	30.10.2021			
Acer sp	japanese maples	flowering plant	30.10.2021			
Aesculus hippocastanum	horse chestnut	flowering plant	30.10.2021			
Alnus sp	a cut-leaved alder	flowering plant	30.10.2021			
Aucuba japonica	spotted laurel	flowering plant	24.03.2022	1 clump		
Betula alba	birch	flowering plant	30.10.2021			
Betula sp	chinese red-barked birch	flowering plant	24.03.2022			
Buxus sempervirens	box	flowering plant	24.03.2022			
Castanea sativa	sweet chestnut	flowering plant	30.10.2021			
Cedrus sp	cedar	flowering plant	30.10.2021			
Cercidophyllum japonicum	katsura	flowering plant	30.10.2021			
Chamaecyparis sp.	a cypress	flowering plant	30.10.2021			
Cornus sp	a dogwood	flowering plant	24.03.2022			
Corylus colurna	Turkish hazel	flowering plant	30.10.2021			
Cotoneaster sp.	cotoneaster	flowering plant	30.10.2021			
Fagus sylvatica	beech	flowering plant	30.10.2021			
Fraxinus excelsior	ash	flowering plant	30.10.2021			
Ginkgo biloba	ginkgo	flowering plant	30.10.2021			
Ilex aquifolium	holly	flowering plant	30.10.2021			
Juglans cinerea	butternut	flowering plant	30.10.2021			
Liriodendron tulipifera	tulip tree	flowering plant	24.03.2022			
Magnolia grandiflora	southern magnolia	flowering plant	30.10.2021			
Magnolia sp.	a magnolia	flowering plant	24.03.2022			
Mahonia sp	oregon grape	flowering plant	30.10.2021			
Metasequoia glyptostroboides	dawn redwood	conifer	30.10.2021		group of trees near central	spring
Nothofagus sp	a southern beech	flowering plant	30.10.2021			
Parrotia persica	Persian ironwood	flowering plant	30.10.2021			
Pawlonia tomentosa	foxglove tree	flowering plant	30.10.2021			
Philadelphus sp	a mock orange	flowering plant	30.10.2021			
Pinus sp	a pine	conifer	24.03.2022			
Pinus wallichiana	Bhutan pine	conifer	24.03.2022			
Platanus x hispanica	London plane tree	flowering plant	30.10.2021			
Prunus laurocerasus	cherry laurel	flowering plant	30.10.2021		hedges around	
Prunus sp	a cherry tree	flowering plant	30.10.2021			
Quercus cerris	turkey oak	flowering plant	30.10.2021			
Quercus ilex	holm oak	flowering plant	30.10.2021			
Quercus robor	pedunculate oak	flowering plant	30.10.2021			
Quercus rubra	red oak	flowering plant	30.10.2021			
Robinia pseudoacacia	false acacia	flowering plant	30.10.2021			
Rosa canina	dogrose	flowering plant	30.10.2021	rare		
Rubus cesius	dewberry	flowering plant	30.10.2021	rare		
Rubus fruticosus	bramble	flowering plant	30.10.2021	occasional		
Rumex obtusifolius	broad leaved dock	flowering plant	30.10.2021			
Salix fragilis	crack willow	flowering plant	30.10.2021			
Salix sp.	weeping willow	flowering plant	30.10.2021			
Sambucus nigra	elder	flowering plant	30.10.2021			
Sequoia sempervirens	coast redwood	conifer	30.10.2021			
Sorbus aria	whitebeam	flowering plant	30.10.2021			
Sorbus sp	white-berried rowan	flowering plant	30.10.2021			
Taxus baccata	yew	conifer	30.10.2021		hedges around	
Tilia sp	a lime	flowering plant	30.10.2021			
Tilia x europaea	common or hybrid lime	flowering plant	30.10.2021		avenue to SE side	
Viscum album	mistletoe	flowering plant	24.03.2022	numerous clumps		

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CLIMBERS						
Hedera helix	common ivy	flowering plant	30.10.2021	locally frequent		
Hedera hibernica	Irish ivy	flowering plant	30.10.2021	locally frequent		
MOSSES & LIVERWORTS						
Platyhypnidium riparioides	long-beaked water feather-moss	moss	24.03.2022	rare	in ditch to the SW of site	
Thamnobryum alopecurum	fox-tail feather moss	moss	24.03.2022	rare	banks to ditch on SW side	
Kindbergia praelonga	common feather-moss	moss	24.03.2022	occasional	on soil under trees	
Oxyrrhynchium hians.	Schwartz's feather-moss	moss	24.03.2022	occasional	on soil under trees	
Pellia sp	pellia liverwort	liverwort	24.03.2022	rare	wet seepage in centre	
Brachythecium rutabulum	rough-stalked feather-moss	moss	24.03.2022	occasional	wet seepage in centre	
Rhynchostegium confertum	clustered feather-moss	moss	24.03.2022	rare	on tree bases and logs	
Hypnum cupressiforme	cypress-leaved plait moss	moss	30.10.2021	rare	on fallen trunks	
Pseudoscleropodium purum	neat feather-moss	moss	30.10.2021	occasional	in grassland	
Rhytidiadelphus squarrosus	springy turf-moss	moss	30.10.2021	frequent	in grassland	
FUNGI						
Abortiporus biennis	blushing rosette fungus	fungus	07.10.2007		on dead stump	
Amanita phalloides	deathcap	fungus	30.10.2021		in grass under southern beech trees	
Armillaria mellea	honey fungus	fungus	30.10.2021		at base of trees and on deadwood	
Bjerkandera adusta	smoky bracket	fungus	30.10.2021		on horse chestnut dead tree	
Clavaria cf cristata	crested coral fungus	fungus	27.10.2006		on soil under trees	
Clitocybe geotropa	trooping funnel toadstool	fungus	30.10.2021		in soil and grass under trees	
Coprinellus disseminatus	fairy inkcap	fungus	07.10.2007		on deadwood	
Coprinellus micaceus	glistening ink cap	fungus	30.10.2021		on deadwood	
Coprinopsis lagopus	hare's-foot inkcap	fungus	07.10.2007		on soil in grass	
Coprinus atramentarius	common inkcap	fungus	07.10.2007		on deadwood	
Coprinus comatus	lawyers wig	fungus	30.10.2021		on soil in grass	
Cortinarius sp cf C anomalus	a webcap toadstool	fungus	30.10.2021		on soil under beech trees	
Daldinia concentrica	cramp ball	fungus	30.10.2021		on dead ash wood	
Entoloma sericium	silky pink-gill	fungus	30.10.2021		in grassland	
Galerina sp	a bell toadstool	fungus	07.10.2007		on soil in grass	
Ganoderma australe	southern bracket fungus	fungus	30.10.2021		on deadwood	
Hebeloma sp.	a poison pie toadstool	fungus	30.10.2021		under oak tree	
Heterobasidion annosum	root rot fungus	fungus	07.10.2007		on dead stump	
Hymenochaete rubiginosa	oak curtain crust	fungus	07.10.2007		on fallen dead oak wood	
Hypholoma fasciculare	sulphur tuft	fungus	30.10.2021		on deadwood	
Inocybe geophylla var lilacina	lilac fibre-cap	fungus	07.10.2007		on soil in grass under trees	
Lepiota cristata	stinking dapperling	fungus	30.10.2021		on soil under	
Lycoperdon perlatum	common puffball	fungus	30.10.2021		on soil in grassland	
Lyophyllum decastes	a clustered toadstool	fungus	07.10.2007		on dead wood	
Lyophyllum decastes	a toadstool	fungus	30.10.2021		on deadwood	
Macrolepiota (chlorophyllum) r	shaggy parasol	fungus	30.10.2021		on soil in grassland	
Mycena galericulata	common bonnet	fungus	07.10.2007		on deadwood	
Parasola plicatilis	pleated inkcap	fungus	07.10.2007		on soil in grass	
Paxillus involutus	brown roll-rim	fungus	07.10.2007		in soil under birch	
Peniophora quercina	oak crust fungus	fungus	07.10.2007		on dead oak branch	
Perenniporia fraxinea?	giant ash bracket	fungus	30.10.2021		on deadwood	
Piptoporus betulinus	birch polypore	fungus	30.10.2021		on dead birch wood	
Pleurotus ostreatus	oyster mushroom	fungus	30.10.2021		on deadwood	
Polyporus squamosus	dryad's saddle	fungus	30.10.2021		on deadwood	
Psathyrella sp.	a brittlestem toadstool	fungus	07.10.2007		on deadwood	
Ramaria sp	a coral fungus	fungus	13.06.2009		in leaf litter under trees	
Rhytisma acerinum	tar spot fungus	fungus	30.10.2021		on sycamore leaves	
Russula atropurpurea	purple brittlegill	fungus	30.10.2021		on soil under beeches	
Russula sp.	a red capped brittle-gill	fungus	30.10.2021		on soil under trees	
Schizopora paradoxa	split porecrust	fungus	07.10.2007		on dead wood	
Scleroderma citrinum	common earthball	fungus	07.10.2007		in soil under pine	
Scleroderma verrucosum	scaly earthball	fungus	07.10.2007		in soil under oak	
Trametes versicolor	turkey tail	fungus	30.10.2021		on deadwood	
Tricholoma scalpuratum	yellowing knight	fungus	30.10.2021		on soil under beeches & oaks	
Tubaria sp	a toadstool	fungus	07.10.2007		soil under trees	
Xylaria polymorpha	deadman's fingers	fungus	24.03.2022		on dead horsechestnut tree base	
Xanthoria parietina	common orange lichen	lichen	24.03.2022		on fallen twigs	
Ramalina fastigiata	a branched grey lichen	lichen	24.03.2022		fallen off tree branches	

Scientific name	Common name	Group	Date	Abund./Nos/Sexes	comment	stage
ANIMALS						
Anthophora plumipes	hairy-footed flower bee	hymenoptera	24.03.2022	1m	visiting violet flowers	adult
Bombus pascuorum	common carder bumble bee	hymenoptera	24.03.2022	1 queen	flying	adult
Bombus terrestris	buff tailed bumble bee	hymenoptera	24.03.2022	2 queens	flying	adult
Bombylius major	dark-edged bee fly	fly	24.03.2022	3	visiting violet flowers	adult
Cameraria ohridella	horse chestnut micromoth	moth	30.10.2021	mines	on horse chestnut leaves	larva
Celastrina argiolus	holly blue butterfly	butterfly	24.03.2022	1	flying	adult
Ectoedemia heringiella	holm oak linear leaf miner	moth	24.03.2022	frequent	on holm oak leaves	larva
Elodes sp.	a scirtid marsh beetle	beetle	24.03.2022	4	under waterlogged dead w	larvae
Gonepteryx rhamni	brimstone butterfly	butterfly	24.03.2022	1m	flying	adult
Neuropterus quercusbaccarum	spangle galls	hymenoptera	30.10.2021	galls larva	on oak leaves	larva
Phytomyza ilicis	holly leaf miner fly	fly	30.10.2021	numerous	numerous larval mines on	larva
Platypezidae	a flat-footed fly	fly	30.10.2021	1	flying around dead tree	adult
Scathophaga sp	a yellow dung fly	fly	24.03.2022	4	on alexanders flowers	adult
Sciurus carolinensis	grey squirrel	mammal	30.10.2021	1	in trees	adult
Turdus merula	blackbird	bird	24.03.2022	1m		adult

Appendix II

Photographs of Fungi found fruiting in the Park

Three photos to show varied appearance of Death Cap toadstool Amanita phalloides, to aid recognition of this species. Pale brown-bronze to olive yellow-green cap top, white gills that remain white and never turn pink or brown, white ring and especially note the sheathing white volva base to the white stipe. Under Southern Beech, Nothofagus sp. in the park. 30.10.2021.

A brittlecap, a red topped *Russula* sp. under oaks 30.10.2021

Lawyers wig *Coprinus comatus* 30.10.2021

A webcap *Cortinarius* sp, cf . *C. anomalus* , with beech trees. The ‘webbing’ joining the young cap to the stipe is clear in this photo.

Numerous common sulphur tuft *Hypholoma fasciculare* toadstools on a rotting fallen trunk

Coral fungi, probably a *Ramaria* species. Growing on deep leaf litter. Collected by Joanna Dodsworth from the park in 2007.