

BBOWT Wild Oxford Project Rivermead Nature Park

Report on the fourth and fifth years 2018–2019

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Wild Oxford volunteer group during tea break at Rivermead in rain on 15.12.2018

Photo Andy Gunn

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Appendix 1 (*separate document*):

Rivermead Nature Park, Full Species Record – data from 7 April 2018 to 30 August 2018, J A Webb

All photographs in the report that follows are my own, except where indicated.

Aims of the Wild Oxford Project

The Wild Oxford Project is a collaborative initiative of BBOWT and Oxford City Council (OCC) grant-funded by a local Charitable Trust.

Its aims are to

- Introduce local people to the wildlife on their doorstep
- Enable local people to take an active role in enhancing and protecting the sites
- Deliver improvements to the fen and other key habitats.

Introduction to Rivermead Nature Park

Since 1st December 1990, Rivermead Nature Park, Rose Hill, Iffley, has been leased by its owner, the University of Oxford, to Oxford City Council (OCC), which undertakes its management.

It is a mosaic of lowland mixed deciduous woodland with elements of calcareous alkaline fen, wet woodland, a stream, drains, rough grassland, scrub and a pond, all on a gentle slope down to the eastern margin of the Thames. A housing estate is on higher ground to the east and the ring road passes close by on the south-west side.

The original area managed by OCC was 8 ha. It included an area of Thames-side wet woodland, springs and flushes to the north of the current southern management area known as Rivermead Nature Park (only 3.3 ha).

These two areas combined have been designated a SLINC (Site of Local Importance for Nature Conservation) by Thames Valley Environmental Records Centre (TVERC).

The current Rivermead Nature Park is compartment 2 on the 1996-2001 management plan (supplied by C. Whitehead of OCC). This southern portion (site centre grid ref. SP526032) is thus the only part of the SLINC to benefit from the Wild Oxford Project work.

This whole SLINC was assessed for potential upgrading to Local Wildlife Site status in 2013 but was rejected for this designation in early 2014.

The higher ground to the east of the Rose Hill estate is the rainwater catchment for the stream/canalised drain that runs through the site to the river. The estate is also the catchment for the springs that emerge at the base of a bank within the park.

The River Thames forms the western boundary of the site, and the level ground adjacent to the river is within the Thames floodplain.

The stream emerges from an outflow pipe at the east side of the site and now runs in a deeply-eroded channel westwards to the Thames. It is presumed that this stream has a large input of road-surface run-off from urban development (the estate to the east) and that the erosion is the result of flash-flooding.

Oxford City Council covenanted to keep the land as a nature reserve and to manage it in accordance with the objectives specified in a draft management plan. The objectives were as follows:

1. To increase the educational use of the site
2. To investigate enhancing the nature conservation value of the communities present on site.

(Source: Rivermead Management Plan document 1996-2001, Oxford City Council)

The BBOWT Wild Oxford Project is currently of great assistance to the City Council in the fulfilment of these aims.

- **For full further background information** on the site, including its history, habitats (present and past) and current management, please see my reports, with species lists in appendices, on previous years of the project: 2014-2015, 2015-2016 and 2016-2017.
- **A full table of records of the species** found at Rivermead Nature Park during surveying in 2018 is appended to this report (*separate document*).

BBOWT Wild Oxford Project at Rivermead Nature Park

At Rivermead the potential for the following possible habitat enhancements by the project work was identified as follows:

A. Alkaline fen restoration



In view of the importance of the alkaline tufa-springs and peat area it was felt that biodiversity would benefit, if the large crack willows currently shading the area could be reduced by pollarding or coppicing to let more light in and allow the suppressed wetland ground flora to recover. This would also allow warmth to the peat, which would be beneficial to the life cycles of any rare invertebrates still present, such as larvae of soldierflies.

Tufa encrustation on twigs in a spring area

Cutting and raking-off invading bramble, dewberry and common reed in the areas without willow would be desirable for the same reasons. This would not eliminate all the shaded, peaty, wet woodland habitat in this SLINC, as there is an abundance of this in the northern section of the site, outside the City Council's current management area.



Main fen area invisible, as covered by fallen willow trunks 25.10.2014

B. Pond restoration and access improvement



A reduction in the shade created by tall willows around the pond, as well as the removal of willows that have actually fallen in, would benefit aquatic plant diversity and consequently aquatic invertebrate diversity and toad-breeding success.

Educational pond dipping for children would be facilitated by a safe platform.

The pond is an important breeding site for a sizeable population of common toads *Bufo bufo* in the spring. **It is thus a UK BAP priority habitat.**

C. Glade creation and path widening - woodland and scrub biodiversity enhancement



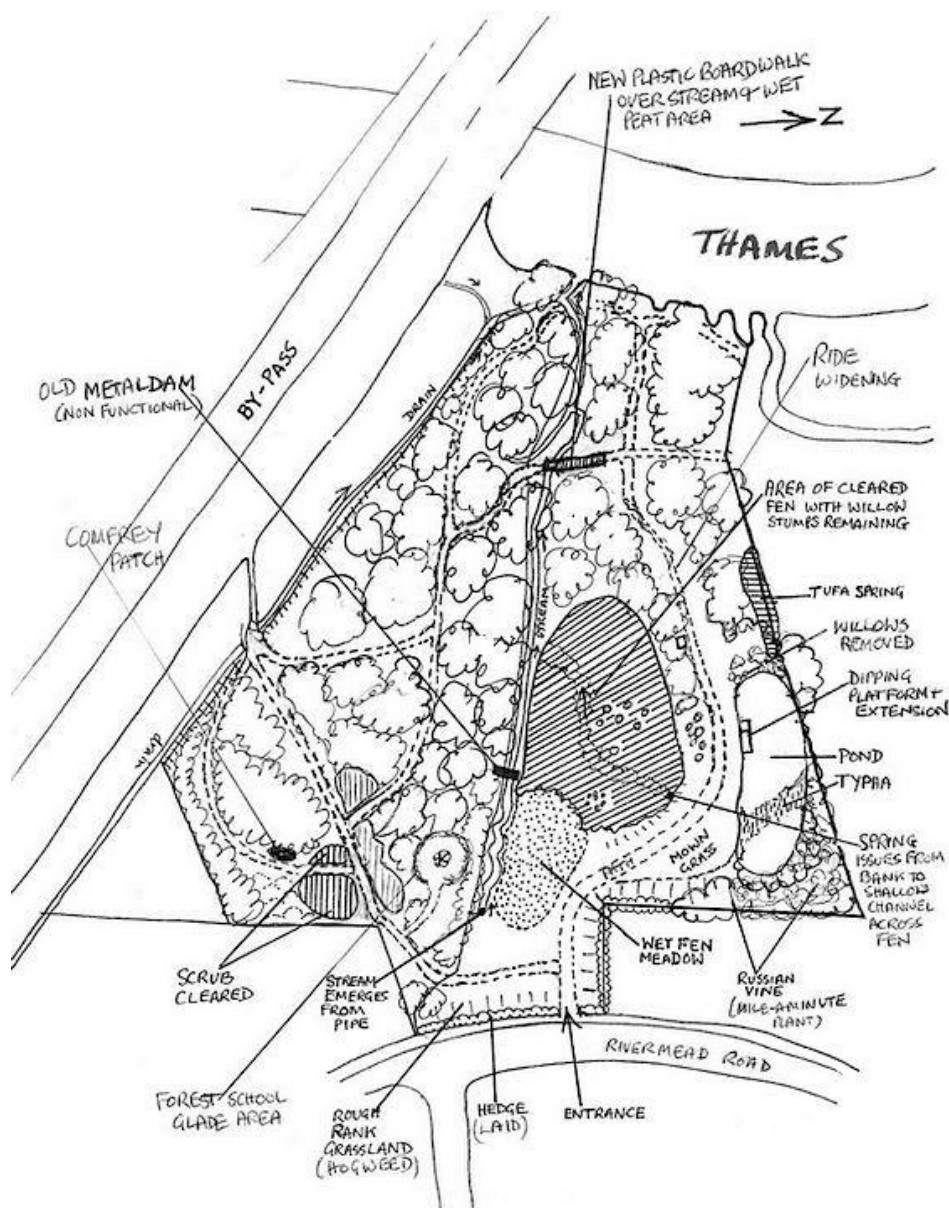
Before any work was done, the only areas with light-loving ground flora, like celandines, ground ivy and violets, were on the narrow edges of mown paths. Thus there was a limited resource for nectar and pollen-feeding insects, such as bees, butterflies and flies.

Glade creation and path widening in the drier secondary woodland and scrub areas on site would enable the spread (or germination from buried seed) of a more diverse flora of greater benefit to insects, and make the whole site a more pleasant walk.

Ride before widening, no flowers beside path 10.04.2015

Figure 1:

Sketch map of Rivermead Nature Park habitats showing areas of Wild Oxford Project work



Northern section of the wet woodland habitat that abuts the reserve

Not shown in the sketch map (Figure 1) above is the northern section of the wet woodland habitat that abuts the reserve. This northern wet-woodland section gives important support to the Nature Reserve, in that it provides an adjacent, greater, area of similar habitats, which serves as a wildlife corridor facilitating species movements to and from the reserve. In fact, it links Rivermead to the whole eastern-bank wetland corridor habitat along the Thames to the north (see my previous reports for more detail).

The current Rivermead Nature Reserve is very small at 3.3ha and already enclosed/isolated on two sides by housing and a busy road. If it were isolated from the northern wetland river margin habitats, the actual reserve would be far less rich in species.

Results of the fourth and fifth years of BBOWT Wild Oxford Project work, 2018-2019

Time and volunteer input to the project

Volunteers under the leadership of Andy Gunn contributed to remedial work on the relic fen, the secondary woodland and the pond.

The project averages seven work days a year on Saturdays with each session lasting for 5 hours. Additional occasional evening sessions from 6 to 8 pm in the summer months enabled people to volunteer after work, making good use of long days.

Oxford City Council's Parks and Open Spaces staff provided valuable additional help with large crack willow tree felling and removal. Some Thursday work sessions by a team of Parks and Open Spaces Volunteers have assisted with scrub and tree removal and pond vegetation raking.

Monitoring of progress happened either during the sessions or by separate visits after work sessions.

General comments on species recording to 2019

Surveys reveal a steadily increasing number of records for fungi and invertebrates for the whole site. New species to the lists are regularly found. This is normal for these two groups; biodiversity will be vast and that found already will be only the tip of the iceberg.

The increasing number of ageing and felled trees at Rivermead provide a very good habitat for all species dependent on dead wood. The increase in flowery open areas in the Nature Park is producing a corresponding steady increase in pollen and nectar sources. Four species of bumble bee are regularly found, along with solitary bees.

Mammal, bird and reptile records



Recording so far has focused on plants, fungi, invertebrates, amphibians and reptiles. Mammal tracks present another way of recording secretive and mostly nocturnal species. This year a defined trackway and a number of characteristic footprints revealed a good deal of usage of the site by badgers *Meles meles*.

Badger footprint in fen peat



The use of reptile mats on site by staff from Rose Hill Primary School in previous years revealed the presence of grass snakes (2015).

Now that the pond is more open and sunny, it is attractive to many more species, e.g. a kingfisher was spotted hunting over it in November 2018 by Ed Munday.

Grass snake

Photo by Andy Gunn, from Chilswell 24.03.2018

Details of volunteer work carried out on specific areas, 2018-2019

Alkaline fen work

Fen restoration at this site was started in 2012 by Oxford City Council Countryside Service* Volunteers (*now Parks and Open Spaces) supervised by Ranger Carl Whitehead. The fen habitat had almost disappeared and was really at the stage of being a 'ghost fen' before the Wild Oxford project work started in 2014. Relic herbaceous flora was present but deeply shaded by tall crack willow trees and extensive growth of dewberry, a species related to bramble. Of all the four Wild Oxford sites I report on, Rivermead fen was the farthest gone, being almost lost under a forest of fallen crack willow trunks and dense dewberry and other scrub at the very start of restoration work. Looking back it is difficult to remember how things were and what a challenge volunteers faced.



Volunteers start to uncover the main fen by slashing the dense growth of dewberry October 2014.

Further BBOWT Wild Oxford volunteer work was carried out in the fen during 2018-2019. Cutting (scything) and raking of the tall fen vegetation happened twice in 2018. This sequence of two cuts is very effectively reducing the height and vigour of taller plants, allowing smaller ones to grow more easily. The May cut avoided the very flower-rich areas dominated by buttercups on the drier margin to allow for insects feeding specifically on them, such as early bees, flies and butterflies. In October the final cut clears away all vegetation to habitat piles. This mimics the grazing by stock that would have previously kept the fen diverse before abandonment.



Volunteers at work scything and raking upper section of fen meadow on 07.04.2018

The following three photos show the results by May 2019 – open, shorter, sunny fen.





Compare the above three photos with those of the same fen area taken in 2014, shown on pages 3 and 6.

The small fen area of 0.25 hectares is completely free of trees and has been returned to tall herbaceous vegetation. It is, however, still shaded at the beginning and end of each day by tall crack willows and ash trees on adjacent, drier, land to either side. These should therefore be the target of future work for reduction in order to increase light levels in the fen.

Hemp agrimony and common fleabane are two of the most important plants to be favoured by fen cutting and raking. These provide abundant nectar for all sorts of insects.



Hemp agrimony Eupatorium cannabinum and common fleabane Pulicaria dysenterica flowering in the fen on 30.08.2018



One the rarest plant species in the Rivermead fen is common valerian *Valeriana officinalis* – a species now *not* common, and with conservation status, as it is on the England Red list¹ as ‘Near Threatened’.

The Rivermead population should be encouraged so that it has abundant seed. This could be shared with other fen sites that lack or have small populations.

Quantitative botanical recording in the fen

It has taken some years for the fen area to be clear enough of bramble and trees for easy access for detailed botanical recording. To demonstrate the increased biodiversity generated by all the cutting and raking management, a more detailed system of monitoring the fen vegetation was employed in the summer of 2018. As in the other Wild Oxford sites, this monitoring is designed as follows: an area of 20m x 20m (400m²) is marked out, within which 40 quadrats (actually circular wire frames), 28cm in diameter, are placed at random. Plant presence or absence is recorded in each randomly-placed quadrat and the result will be an overall percentage frequency of each plant species in the 400m² area. This has proved useful in vegetation monitoring at Cothill Fen SSSI (Snowdon 2017). Repeating this survey of the marked area annually will enable more accurate charting of how successful the progress of fen restoration has been in bringing back the characteristic, diverse, fen flora.

As the fen area at Rivermead is so small, it was not actually possible to mark out a 20m x 20m square. Instead, quadrats were placed randomly in all the oval accessible area of open fen, which approximates to just over 400m². For the results see Table 1.

Table 1: Percentage frequency of plant species in 40 random quadrat samples in the fen area at Rivermead on 30 August 2018

Scientific name	Common name	Presence/absence in 40 quadrats % frequency
<i>Aegopodium podagraria</i>	ground elder	5
<i>Agrostis stolonifera</i>	creeping bent	7.5
<i>Angelica sylvestris</i>	wild angelica	35.0
<i>Apium nodiflorum</i>	fool's watercress	2.5
<i>Arrhenatherum elatius</i>	false oat grass	2.5
<i>Brachypodium sylvaticum</i>	wood false brome	5.0
<i>Brachythecium rutabulum</i>	rough-stalked feather-moss	22.5
<i>Bromopsis ramosa</i>	hairy brome	2.5

¹ Botanical Society of Britain and Ireland, *A Vascular Plant Red List for England* (updated 18.11 2014). Available from: <https://bsbi.org/england>

Scientific name	Common name	Presence/absence in 40 quadrats % frequency
<i>Calliergonella cuspidata</i>	common spear moss	2.5
<i>Calystegia sp</i>	great bindweed	30.0
<i>Cardamine pratensis</i>	cuckoo flower	2.5
<i>Carex hirta</i>	hairy sedge	12.5
<i>Carex remota</i>	remote sedge	2.5
<i>Carex sp.</i>	sedges	2.5
<i>Cirsium arvense</i>	creeping thistle	7.5
<i>Cirsium palustre</i>	marsh thistle	2.5
<i>Cratoneuron filicinum</i>	fern-leaved hook moss	7.5
<i>Deschampsia cespitosa</i>	tufted hair grass	2.5
<i>Epilobium hirsutum</i>	great willow herb	5.0
<i>Epilobium parviflorum</i>	hoary willow herb	2.5
<i>Equisetum arvense</i>	field horsetail	22.5
<i>Eupatorium cannabinum</i>	hemp agrimony	27.5
<i>Festuca gigantea</i>	giant fescue	5.0
<i>Filipendula ulmaria</i>	meadowsweet	2.5
<i>Geranium robertianum</i>	herb robert	2.5
<i>Glechoma hederacea</i>	ground ivy	7.5
<i>Glyceria sp.</i>	sweet grasses	17.5
<i>Hedera helix</i>	ivy	10.0
<i>Heracleum sphondylium</i>	hogweed	7.5
<i>Holcus lanatus</i>	Yorkshire fog	25.0
<i>Hypericum tetrapterum</i>	square-stalked St John's wort	10.0
<i>Juncus articulatus</i>	jointed rush	2.5
<i>Juncus effusus</i>	soft rush	7.5
<i>Juncus inflexus</i>	hard rush	12.5
<i>Lathyrus pratensis</i>	meadow vetchling	7.5
<i>Lotus pedunculatus</i>	greater bird's foot trefoil	7.5
<i>Mentha aquatica</i>	water mint	2.5
<i>Nasturtium officinale</i>	watercress	2.5
<i>Pellia endiviifolia</i>	endive pellia liverwort	5.0
<i>Phragmites australis</i>	common reed	30.0
<i>Plagiomnium undulatum</i>	hart's tongue thyme moss	7.5
<i>Poa trivialis</i>	rough meadow grass	27.5
<i>Pulicaria dysenterica</i>	fleabane	5.0
<i>Ranunculus repens</i>	creeping buttercup	35.0
<i>Ranunculus acris</i>	meadow buttercup	2.5
<i>Rubus cespitosus</i>	dewberry	22.5
<i>Rubus fruticosus</i>	bramble	5.0
<i>Rumex sp</i>	docks	2.5
<i>Salix cinerea</i>	grey willow	2.5
<i>Scrophularia auriculata</i>	water figwort	25.0
<i>Senecio erucifolius</i>	hoary ragwort	5.0
<i>Solanum dulcamara</i>	bittersweet	5.0
<i>Stachys sylvatica</i>	hedge woundwort	15.0

Scientific name	Common name	Presence/absence in 40 quadrats % frequency
<i>Symphytum officinale</i>	comfrey	2.5
<i>Taraxacum sp</i>	dandelions	12.5
<i>Trifolium repens</i>	white clover	2.5
<i>Typha latifolia</i>	greater reed-mace	2.5
<i>Urtica dioica</i>	common nettle	2.5
<i>Valeriana officinalis</i>	common valerian	5.0
<i>Veronica beccabunga</i>	brooklime	5.0

The detailed assessment shows that, in the restored fen area, **plant diversity has increased to 60 species in total, of which 32 are wetland species** with the remainder being meadow species or woodland edge species.

Reed is still present at high frequency but what the table does not show is that its height and dominance are very much reduced – only a quarter of the height it was at the start. One of the most frequent herbaceous plants is creeping buttercup, common, but essential for many insects. As can be seen from the table, the fen is particularly rich in wild angelica, a very desirable species. Returning from the seed bank are increasing amounts of desirable plants such as water figwort, brooklime and square-stalked St John's wort. Good nectar source flowers like fleabane and marsh thistle are moving in via their windblown seed.

Rather undesirable species returning from the seed bank are hard rush and rough meadow grass, but experience shows that these will gradually decline with future cutting and raking, as will the remaining dewberry plants. An undesirable species that has moved in via wind-blown seed is greater reedmace *Typha latifolia*. This is abundant in the nearby pond. This is a very tall, dominant, plant, which would easily take over the fen, if not controlled/eliminated. Volunteers started the important job of pulling the tall reedmace stems in July 2018. This work will need to continue in the future, if important gains in the smaller herbaceous plant diversity are not to be lost to shading from invading greater reedmace.



A volunteer makes a start on pulling out the tall plants of reedmace, which has colonised the open fen via wind-blown seed from the pond margin 26.07.2018

Some desirable fen species populations are low and could be increased by specific seed collection and spreading: for example: marsh lousewort *Pedicularis palustris*, ragged robin *Silene flos cuculi*, greater bird's foot trefoil *Lotus pedunculatus*, tufted vetch *Vicia cracca* and purple loosestrife *Lythrum salicaria*. If insufficient seed is to be found on site at Rivermead, Lye Valley North Fen (another Wild Oxford site) should be a good source, as these species are frequent there. A greater population of marsh lousewort will be helpful in reducing other sedge, reed and rush fen vegetation due to its parasitic action, thus reducing the amount of cutting-back of vegetation necessary each year.



Marsh lousewort is a root hemi-parasite – its roots seek out roots of host species and remove water and nutrients via attachments called haustoria; this weakens the host plant, which is commonly rush, sedge or reed. Such weakening of potentially dominant plants allows small, less competitive, plants a better chance of survival and contributes to greater overall plant biodiversity. Marsh lousewort is currently abundant in Lye Valley fen, which can therefore be a source of seed every autumn for other sites. However, marsh lousewort requires high light levels and will do best if tree shading of the fen is further reduced. It also is an excellent source of food for bumble bees, so much so that it is worth increasing on any fen site for that reason alone, never mind its useful parasitic abilities.

Marsh lousewort Pedicularis palustris, with feeding bumble bee

Some species will never return from the seed bank because they have only short-lived seed, thus they will need re-introduction by seed from a donor site. Target plant species of calcareous fens for specific re-introduction by seed could be: blunt-flowered rush *Juncus subnodulosus*, devil's bit scabious *Succisa pratensis*, marsh valerian *Valeriana dioica* and parsley water dropwort *Oenanthe lachenalii*.



Devil's bit scabious Succisa pratensis and hoverfly – photograph from Lye Valley fen

Re-recording of the fen restoration area using this detailed assessment method in future years is recommended to chart the expected changes in floral diversity.

Fen invertebrates

The list of species found in the fen area by sweep netting is steadily increasing year on year. There is always something new to find.



The abundance of water figwort, which has returned to the Rivermead fen area, ensures there is always a large number of the comical-looking figwort weevils in the sweep net.

Figwort weevil, Cionus sp.



Two beetles new to the species list are the very local shiny black leaf beetle *Chrysolina oricalcia* (which feeds on cow parsley and hogweed) and the tortoise beetle *Cassida rubiginosa*.

Fen water quality

A diversity of fen vegetation is favoured by low soil nutrients. After years of cutting and raking-off (which lowers nutrients) most of the fen area appears suitably low-nutrient now (vegetation appears yellow-green rather than the bright dark green indicative of enrichment) with the exception of the narrow runnel from the small spring area, which carries water from the bank to the path just north-east of the fen. This runnel meanders and spreads out over the lower part of the fen before finally meeting the central stream.

It had been thought that damming this runnel at its lower end might allow water to spread out sideways over the fen and achieve beneficial re-wetting of dry peat areas. Although the spring water looked good, a suspicious amount of stimulation of growth, together with the dark green colour of watercress and sweet grass in the small channel from the spring, indicated a degree of nutrient enrichment was present.

Water quality testing using the simple colorimetric test kits from the **Freshwater Habitats Trust (FHT)**, carried out during 2016 and repeated in 2017, revealed that the water as it issues from this spring is indeed enriched with a high nitrate load. Therefore it would have been inadvisable to use it to re-wet dry fen areas, as it would only have encouraged rank growth and would have disadvantaged low-nutrient calcareous fen specialist plants. If this spring flow cannot be cleaned up before it emerges, it may be necessary to divert it away from the fen and direct it to the central drain. Might this spring emerging here actually be from a pipe from the pond, going under the path?

Fen re-wetting

Peaty fen areas nearest the stream/drain are drier than they should be, as flash flooding after rainstorms has caused erosion, lowering of the drain bed and consequently lowering of the water table in the peat nearest the stream, drying it out. The installation of dip wells on site should give more information on the hydrology. Various remedial actions to re-wet these dry peat areas are possible and would benefit the fen. Small bunds on the fen surface can restrict spring-water loss. High water-flow rate in the drain after rainstorms makes raising the water level by damming challenging.

Pond work and water quality

The original pond was dug in 1987 on the north-eastern side of the site and seems likely to have been extended later. It is spring-fed and was probably excavated in a peaty area (possibly previous fen). It had become deeply shaded by tall crack willows, some of which had collapsed into it.



Shaded pond before any work 24.10.2015

The pond is an important breeding site for a sizeable population of common toads *Bufo bufo* in the spring. **It is thus a BAP priority habitat.** It has water soldier *Stratiotes aloides* as an introduced submerged plant, as well as flag iris *Iris pseudacorus* around the margins. Greater reedmace *Typha latifolia* dominates a large section of the middle of the pond.

In 2017 a new extension to the previous dipping platform was installed to enable more school children from the local primary school to study the pond life.

Extensive work carried out to reduce the large crack willows shading the pond margin has ensured light reaches most of the pond; only a few tall trees remain for removal. Abundant flowering of the yellow flag iris resulted from the higher light level.

Also, the alien climber Russian vine (mile-a-minute plant) *Fallopia baldschuanica*, escaping from hedges of adjacent gardens, remains a problem to the east end of the pond, as it blankets the banks here, restricting access. This should be a target for future work.



West end of the pond with good light levels stimulating flowering of flag iris 07.06.2018

Water quality testing using the simple colorimetric test kits from the [Freshwater Habitats Trust](#) show continued raised nitrate levels in the pond. Ideal nitrate levels for maximum aquatic species diversity in any pond would be below 0.2ppm. In the past, the Rivermead pond has tested at a relatively high level of 2.0ppm nitrate in winter up to March but this has usually dropped by July, a normal pattern, as emergent and aquatic vegetation would have used up the nitrate in growth in the warmer months. Following this pattern, in July 2018 the FHT test kits recorded the lower level of 0.2 ppm nitrate. The large stand of greater reedmace *Typha latifolia* would almost certainly be responsible for lowering the nitrate levels in summer by their rampant growth.

Pond species diversity

In 2016 it was discovered that the pond also contains three-spined sticklebacks *Gasterosteus aculeatus*. These carnivorous fish limit the aquatic invertebrate diversity. The presence of these carnivorous fish goes some way to explaining the dearth of insect larvae and nymphs in the pond water – they will have been eaten; but the overall lack of invertebrate diversity must be accounted for by the nutrient enrichment, which has stimulated overgrowth of filamentous algae, eliminating other plants, and consequently the pond water is unfavourable for many aquatic invertebrate species.

The problem of nitrate enrichment of the fen and pond is most likely a result of leakage from the sewerage system, either from pipework crossing the site or in the housing estate upslope to the east. Nutrient enrichment and the presence of fish in the pond are both problems that will need some remedial action, if a healthy, clean, pond, full of a wide range of aquatic invertebrates is to be restored on site. Kingfishers hunting over the pond are a very good sign, however.

Despite less than ideal water quality, a good range of Odonata (dragonflies and damselflies) were seen hawking over the pond, including: broad-bodied chaser, emperor, brown hawkler, southern hawkler and common darter dragonflies, and blue-tailed damselflies. Proof of breeding in the pond is hard to achieve, but a southern hawkler female was noted attempting oviposition in a reed mace stem in 2018. The yellow flag iris flowers attracted many bumble bees of at least 3 species.



*Yellow flag irises have flowered more abundantly since willow tree removal around the pond.
Spot the bumble bee enjoying the iris flower 07.06.2018*



*Southern hawkler dragonfly female attempts to oviposit
into reedmace stem on pond edge 30.08.2018*

The pond supports three amphibian species: smooth newt, common frog and toad. Despite the measured nitrate enrichment, good amounts of toad and frog spawn were again recorded in 2018, followed by large numbers of tadpoles.



Large numbers of strings of toad spawn found in the edge of the pond on 07.04.2018



Juvenile toads are common all over the site 30.08.2018

Also, it is important to record that the pond retained a good water level throughout the drought in the summer of 2018, at a time when many other ponds in Oxford were dried down almost completely with only damp mud remaining. **This ability to survive drought makes it a valuable pond in view of accelerating climate change to hotter and drier summers.**

Both rigid hornwort *Ceratophyllum demersum* and curled pondweed *Potamogeton crispus* are newly-recorded species in the pond, along with the water soldier *Stratiotes aloides* found in previous years. Higher light levels following tree clearance may have stimulated the appearance of the first two species.



*Rigid hornwort and water soldier (top of photo)
abundant in the sunny pond zone on 30.08.2018*

The pond marginal zone could do with further annual cutting and raking to reduce the dominance of great willow herb and promote shorter vegetation; this would allow better views of the whole pond in summer and make room for the introduction of a greater variety of flowering plants to favour insects.

Examples of useful plants that could be introduced to the pond margin are meadowsweet, purple loosestrife, comfrey, yellow loosestrife, angelica and common valerian. Some of these, such as common valerian, comfrey and angelica, could be transplanted to the pond margins from the good population now in the restored fen areas.

Woodland, scrub, glade and path work and tree disease

Some trees, perhaps weakened by disease or fungi, have fallen naturally from wind throw. This provided the opportunity to clear them to useful deadwood habitat piles and create more glades. Sunnier conditions will favour the flowering of woodland-floor plant species such as violets.

Crack willows that have been felled in wetland areas will quickly re-sprout, grow tall and cast shade again, so volunteer work has also focused on re-coppicing the willow sprouts regularly.



A fallen tree provides a glade-creation opportunity 07.06.2018



Volunteers moving fallen tree 15.12.2018



Volunteer lopping back crack willow re-sprouts from a stump by the pond 15.12.2018

With Ash Dieback (Chalara) spreading rapidly all over Oxfordshire, thought should be given to the future management of the many very large ash trees on site at Rivermead and to appropriate replacement trees for any that will need removal for health and safety reasons. Already tree planting has started on site with a small number of whips of small-leaved lime and silver birch on the drier bank areas. This should continue, with young trees sourced from the UK so as to avoid potential introduction of any new tree diseases.



One of the lime trees planted in April 2018 - photo November 2018



Young lime (Tilia sp) have been planted along with some silver birches in the area backing onto housing - photo 07.04.2018

The healthy trees that are left are mostly still young enough not to have any holes, so installation of bird and bat boxes in future on any remaining undiseased tree would go some way towards providing breeding sites for these species.

Alien (non-native) plant species in the Reserve

Dumping of garden rubbish or deliberate planting in the past has introduced a number of alien plant species to Rivermead. These are invasive and, if allowed to spread unchecked, will reduce diversity of native species. Already progress has been made in reducing Japanese Knotweed *Fallopia japonica*, Wilson's honeysuckle *Lonicera nitida* and pheasant berry (also known as Himalayan honeysuckle) *Leycesteria formosa*. However, big patches of Himalayan balsam *Impatiens glandulifera*, a small patch of Virginia creeper *Parthenocissus quinquefolia* and big patches of snowberry *Symphoricarpos* sp. and Russian vine (mile-a-minute plant) *Fallopia baldschuanica* remain; the last threatens to engulf the east margin of the pond and certainly makes access for work on the willow trees there very difficult. It is an escape over the fence from a garden nearby. If Japanese knotweed is not controlled by digging, injection of herbicide into the rhizome is the only treatment that will eradicate it.

Invasive native species, such as patches of redcurrant *Ribes rubrum* and raspberry *Rubus idaeus* (both allotment/garden escapes with seed spread to the site by bird droppings), should also be targeted for future removal. Much of the blackberry on site is not the native bramble but the large and dominant garden/allotment variety known as 'Himalayan Giant', which aggressively spreads several metres a year. This should be heavily reduced by winter and summer cutting, if possible.



*Mile-a-minute plant still remains ramping over fence and up to pond margin 23.08.2016
(close-up of flowers at bottom left)*

Woodland, deadwood habitat and tree-felling

This is a site with abundant trees of a rather limited species range (mostly willows, ash, hazel and poplars). Many were mature and had fallen before the start of the project in 2014, resulting in a lot of rotting trunks and logs lying on the woodland floor. The abundant fallen wood has provided food for a rich diversity of deadwood-specific fungi and invertebrates. Not many invertebrates can actually feed on dead wood; the majority found associated with dead wood are actually feeding on the fungi that have colonised it. The list of fungi found at Rivermead increases year on year and new deadwood-dependent species found in 2018 include the black-headed Cardinal beetle *Pyrochroa coccinea* and the spectacular lesser stag beetle *Dorcus parallelipedus*.

A less spectacular find but nationally Notable was in summer 2018, when sweeping in the woodland on two occasions led to the discovery of the **brown tree ant *Lasius brunneus***, which had never been recorded before. **This is a nationally notable species**, which is known for constructing chewed wood 'carton' nests inside hollow trees. Whilst the ant is Notable A, the nests in hollow trees are known to be a habitat for a range of rarer invertebrates (specific flies and beetles).

The Thames valley seems to be a stronghold for this species and the ants mostly live by tending and feeding on aphids on tree leaves. A good supply of old trees for nesting and young trees for aphids is therefore needed. See https://www.antwiki.org/wiki/Lasius_brunneus or <http://www.bwars.com/ant/formicidae/formicinae/lasius-brunneus>



Black-headed cardinal beetle, *Pyrochroa coccinea*

Its larvae breed under the bark of dead wood, being carnivorous on other insects there.



Female lesser stag beetle
Dorcus parallelipedus
found on a log pile in the woodland area
07.06.2018

Larvae of this species breed in dead wood.

However, deadwood for larval stages is insufficient for completion of the life cycle for many deadwood insects. The adult stages may need to feed on nectar and pollen from flowers adjacent to the deadwood, hence enhancement of flower resources on the rides is important. Hogweed seed from areas near the hedge should be spread to areas near the log piles to provide a corridor of hogweed plants along the widened rides to provide more food for the saproxylic insects emerging from the wood. A good population of insects emerging from deadwood will encourage and support the population of insect-eating birds.



Deadwood piles adjacent to the wider rides 10.11.2018



Hogweed flowers favour all sorts of insects, as they provide abundant nectar and pollen

Litter and fly tipping

Unfortunately the Rivermead site continues to attract fly tipping. Regular visits and work by volunteers help to clear this quickly in liaison with OCC staff, who remove it. Keeping the site more open, tidier, attractive and more pleasant to walk around will hopefully encourage a more positive and appreciative attitude towards the site by the locals.

Summary and Conclusions

The BBOWT Wild Oxford Project has continued to make a clear difference to the habitats in Rivermead Nature Park in the fourth and fifth year.

The average number of Wild Oxford group work days per year is seven, each session lasting for 5 hours. Occasional evening sessions from 6-8pm in the summer have aided progress. Work has progressed with the assistance of Oxford City Council's Parks and Open Spaces staff and a volunteer team for major tree-felling and processing.

The whole nature park area is emerging slowly from dominance by tall, shading, trees to a more diverse mosaic of sunny and shady areas with attractive views of the open fen and wider rides. In addition to all the positive changes benefitting wildlife, the nature park is a far more pleasant experience for the walker.

Especially good progress has been made in the restoration of a more flowery, diverse, fen area, which is a good resource for insects, and the pond is well on the way to being fully open and sunny.

Achievements:

- **In the fen, all of the previously-cleared wet peaty area of the relic alkaline tufa-forming fen has undergone twice-yearly cutting and raking, resulting in a more diverse herbaceous flora.** Reed and dewberry are much reduced and new wetland species to add to the site list continue to recur from the seed bank in the peat. Other valuable wetland species originally present continue to increase, covering wider areas, with a greater abundance of flowering; they include common valerian, water figwort, wild angelica, brooklime, marsh thistle, marsh lousewort, square-stalked St John's-wort and blunt-flowered rush.
- A detailed botanical monitoring of the fen area via random quadrats has shown that herbaceous plant species diversity has increased to **60 species in the restored fen, with 32 of these being true wetland species.** This area in 2012 was invisible under fallen crack willow trunks and colonised by an extensive monoculture of dewberry.
- **Further scrub reduction, glade creation and further widening of the path margins** to sunny rides have been carried out. Sunny areas adjacent to the paths have increased, favouring flowering of herbaceous plants, and insects. The more open, sunny, paths make this an attractive place to walk.
- **Work has progressed on the pond margins** to let in more light. A lot of progress has been made in felling and clearing the tall crack willows that previously cast deep shade over the pond.
- Despite still having a higher nutrient level than is desirable, **the more open pond now has a higher diversity of submerged aquatic plant species** and continues to provide breeding opportunities for a large number of frogs, toads and smooth newts.

Recommendations for future management actions:

- **Further work on widening rides and glade creation.** The areas of glade will be dictated to some degree by where ash trees infected by the Ash Dieback (*Chalara*) will need felling as a health and safety priority action. All wood to remain in piles on site.
- **Further planting of young trees to replace mature trees lost to disease.** It is particularly important to maintain the thickness of the screen of trees between the site and the southern by-pass. This screen reduces the visual and noise impact of the road, whilst filtering out some of the air pollution.
- **Further removal of the remaining very large crack willow and ash trees marginal to the fen and pond.** They currently still shade these habitats in morning and evening. Without trees removing water, currently dry fen areas will wet-up more readily and higher light levels will encourage better flowering of the fen's tall herb assemblage. Higher light levels will encourage more growth of desirable aquatic plants, such as hornwort and curled pondweed, in the pond. These, in turn, will support a greater variety of aquatic invertebrates.
- **Remove greater reedmace** (by pulling rather than cutting) from the restored fen annually.
- **In the restored fen, actions to retard water loss to the deeply-incised drain will aid wetting-up of peat to the benefit of all fen flora and invertebrates.** These actions could include the introduction of small bunds at the edge of the fen adjacent to the stream. Also, re-wetting could include the insertion of woody-debris dams in the stream/drain itself to slow and partially hold up the water flow after a rainstorm. The water quality in this drain is not good, but maintaining a higher water level in the drain will re-wet the fen sideways, although care must be taken not to allow water to flood onto the fen. Such dams need to take account of the flashy peak flow of road run-off this drain receives.
- **Increase the fen restoration area.** Any area of the site with relic populations of hemp agrimony, common valerian, water-mint and meadowsweet is likely to be relic fen and such areas should be a priority for further removal of shading trees to allow higher light levels, with regular cutting and raking, to restore an open, tall-herb, fen.
- **Investigate the source of the water flowing into an enriched runnel** crossing the fen. If it is from a pipe, can it be diverted straight to the stream?
- **Remedial action to improve water quality in the pond by reducing nitrate levels to favour more diverse aquatic life.** A trial of making the eastern, most contaminated, end of the pond into a 'clean-up swamp' is suggested, with a permeable barrier between that and the less contaminated, open-water, dipping area at the west end.
- **An annual pond marginal zone cut-and-rake in autumn** will ensure greater diversity of herbaceous vegetation, giving more diversity for insects.
- **Once pond marginal vegetation is better managed, try the introduction of a greater variety of tall emergent wetland herbaceous plants around the pond,** featuring species with flowers good for insects and ones that are tolerant of, or actually require, a higher nitrate level; for example, purple loosestrife, yellow loosestrife, marsh marigold, lesser water parsnip.

- **Further control of invasive alien plants on site:** Himalayan balsam, Russian vine (mile-a-minute creeper), Virginia creeper, snowberry, buddleia. Also reduce the following invasive native species: redcurrant, raspberry.
- **Continue to collect seed from the abundant hogweed population** behind the hedge and spread it along the newly-widened rides to enhance nectar sources for insects.
- **Other plants to spread by seed** along rides could be red campion, greater stitchwort and violets. These will make the newly-opened areas of the site more attractive and benefit invertebrates. Continue adding seed (as available from local sources) to the meadow areas at the entrance to diversify the flora. Suggestions are: more yellow rattle, cowslip, knapweed, devil's bit scabious, oxeye daisy. Milham Ford Nature Park in Marston is a good source. Seed collection in late July.
- **Bat and moth surveys:** it is expected that such a diverse site with mature trees will be important to both groups.
- **Properly constructed and sited reptile refuges with monitoring mats adjacent to them** will be useful for monitoring the grass snakes on site. Once laid, the mats should not be moved, as they will become an important habitat for the reptiles.
- Some **bird boxes suitable for hole-nesting birds** could be placed on the trees that are to remain. This will increase nesting opportunities when many of the ash trees have to be removed as a result of ash dieback.

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References

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Appendix 1 *(separate document)*:

Species records for Rivermead Nature park for the period 7 April 2018 to 30 August 2018