

BBOWT Wild Oxford Project

Rivermead Nature Park

Report on the second year 2015 – 2016

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View of Rivermead fen, 24.10.2015

Tall herb vegetation has replaced collapsed crack willows and dewberry scrub.

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General introduction and aims of the Wild Oxford Project

The Wild Oxford Project is a collaborative initiative of BBOWT and Oxford City Council (OCC) grant-funded by the Trust for Oxfordshire's Environment (TOE2) and the Heritage Lottery Fund (HLF).

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

All photographs in the account which follows are my own, except where otherwise indicated.

Introduction and background to the second year of work for the BBOWT Wild Oxford Project at Rivermead Nature Park

Rivermead Nature Park, Rose Hill, Iffley, is owned by the University of Oxford and has been leased and managed by Oxford City Council (OCC) since 1st December 1990.

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.

The 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. These 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 report on the first year of the project, 2014-2015. That report also includes an Appendix listing all species recorded up to 20 April 2015.
- **A full table of records of the species** found at Rivermead Nature Park during surveying between April 2015 and August 2016 is presented in Appendix 2 (*separate document*).
- **An extra invertebrate survey for the site** is detailed in an additional document by John and Barbara Ismay in Appendix 3 (*separate document*).

BBOWT Wild Oxford Project

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 identified 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.

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 abundant resource of this in the northern section of the site, outside the City Council management area.

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 BAP priority habitat.

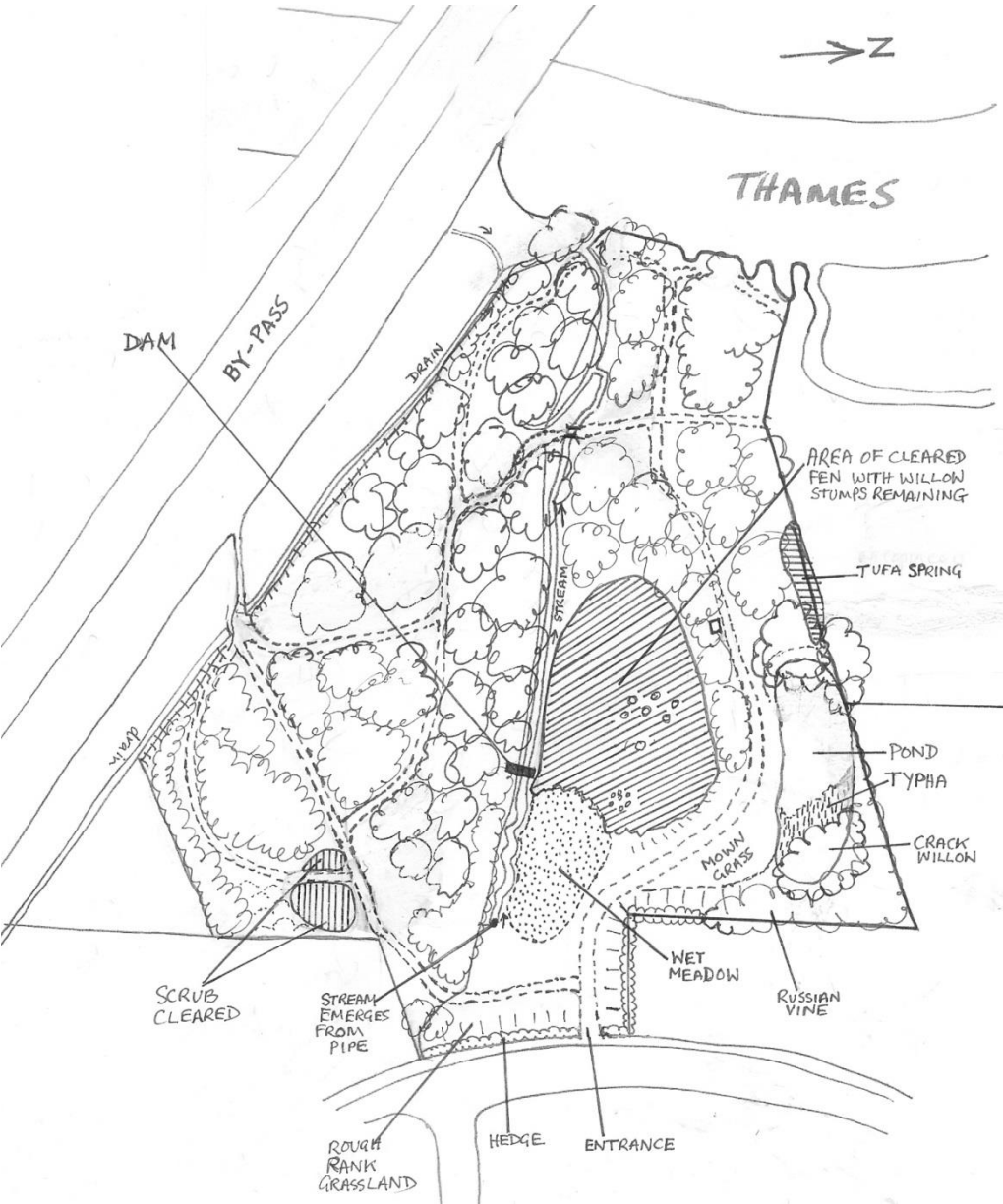
C. Glade creation and path widening - woodland and scrub biodiversity enhancement

Before any work was done, the only areas with light-loving ground flora like celandines, ground ivy and violets, were on the 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.

Figure 1:

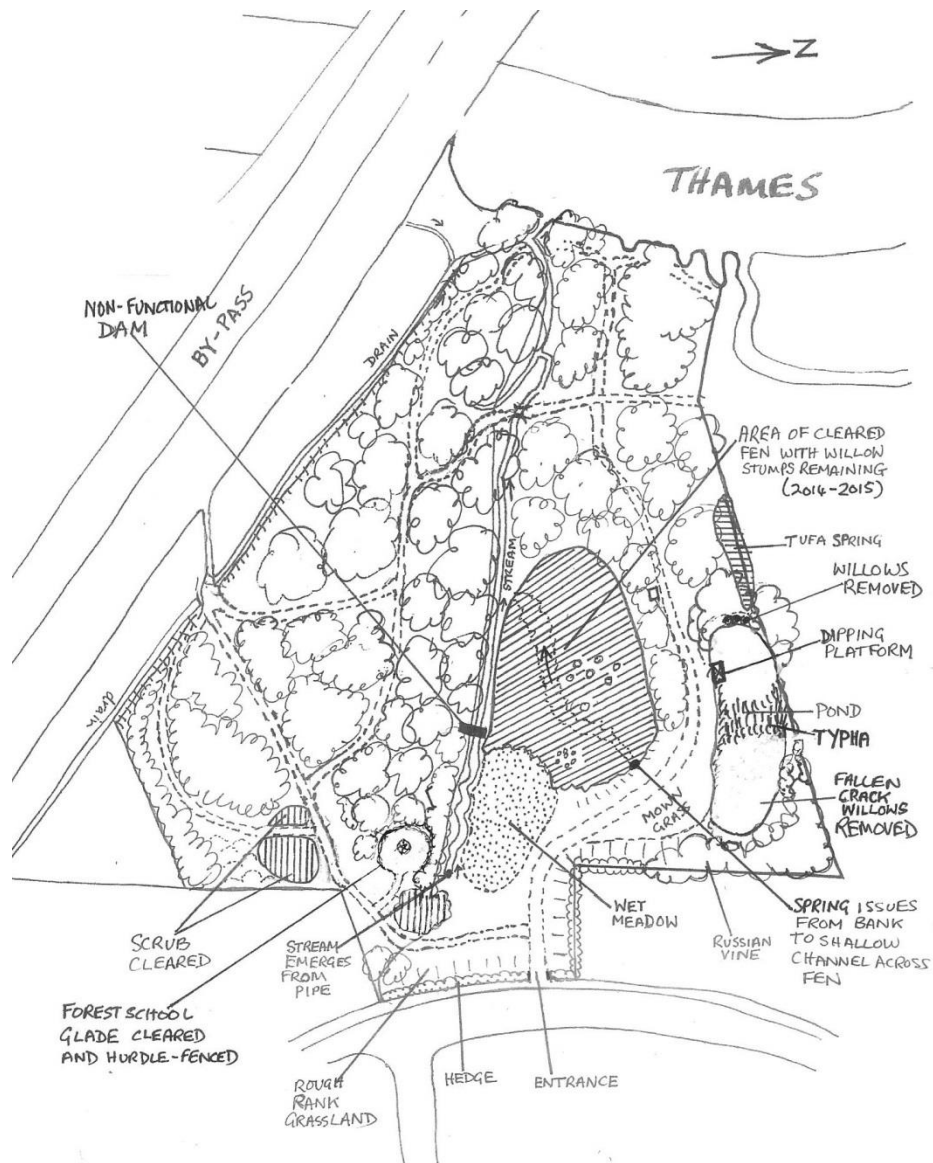
Sketch map of Rivermead vegetation changes **after the first year** of the Wild Oxford Project, 2014-2015.



Results of the second year of the BBOWT Wild Oxford Project work, spring 2015 to spring 2016

Figure 2:

Sketch map of Rivermead vegetation changes **after the second** year of the Wild Oxford Project, 2015-2016



Time and volunteer input to the project

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

A total of 8 days' work at Rivermead was undertaken between March 2014 and March 2015, with an average of 12 volunteers at each session.

As each session lasted for 5 hours, about 480 volunteer hours were put in (pers. comm. Andy Gunn). Monitoring of progress happened either during the sessions or by separate visits after work sessions.

Oxford City Council Countryside Service staff provided additional help with large crack willow tree felling and removal. Some Thursday work sessions by the OCC Countryside Service Volunteers team assisted with scrub removal and fen raking.

Explanatory boards

Two explanatory boards were installed, one near the entrance and one, detailing the pond life, next to the pond. These now assist all visitors in understanding the importance of the wildlife on site and the reasons for conservation work.



At site entrance



Next to the pond

Details of work carried out on specific areas

Alkaline Fen work

Fen restoration at this site was started in 2012 by OCC Countryside Service Volunteers supervised by Ranger Carl Whitehead. Considerable progress was made in 2014-2015.



*Rivermead Fen **before work**, from path on northern bank on 05.09.2013. Tall herbs with common reed, hemp agrimony and nettle, over-shaded by adjacent crack willows and scrub.*

Most BBOWT Wild Oxford volunteer work happened in the fen during 2015-2016. Further progress was made in the clearing of very large, collapsed, crack willows from the fen area, followed by cutting (scything) and raking of the bramble/dewberry and tall fen vegetation. Now, at the end of the second year, the small fen area of 0.25 hectares is completely free of trees and returned to herbaceous vegetation. It is, however, shaded at the beginning and end of each day by tall crack willows and ash trees on adjacent drier land. These will therefore be the target of future work to increase light levels.



Rivermead fen, view from same position from path on northern bank on 24.08.2016. Willow trees and scrub gone, now tall herb fen in sun for most of the day



Scything fen vegetation in summer but avoiding hemp agrimony clumps to allow flowering, 26.08.2015.



Scything marginal wet grassland to fen, 03.02.2016

The fen is now all tall-herb vegetation, with a small amount of common reed *Phragmites australis* and hemp agrimony *Eupatorium cannabinum* prominent, mixed with great willow herb *Epilobium hirsutum* and water figwort *Scrophularia aquatica*, with some wild angelica *Angelica sylvestris* and small amounts of soft rush *Juncus effusus*. Common valerian *Valeriana officinalis* and meadowsweet *Filipendula ulmaria* used to be rare but have now increased.

The fen habitat had almost disappeared and was really at the stage of being a 'ghost fen' before the Wild Oxford work.

In summary, the positive vegetation changes noted in 2015-2016 are **increased abundance and flowering of the following species, which are now locally frequent:**

Common valerian *Valeriana officinalis*

Wild angelica *Angelica sylvestris*

Brooklime *Veronica beccabunga*

Hemp agrimony *Eupatorium cannabinum*

Water figwort *Scrophularia auriculata*

Fleabane *Pulicaria dysenterica*

Below: fen species showing increase. Photos taken 23.08.2016



Hemp agrimony



A sea of wild angelica flowers,



Figwort flowers



Fleabane flowers

The increase in wild angelica, hemp agrimony and fleabane in particular has made the area a much improved nectar and pollen source for local insects.

New species records – seen for the first time as a result of cutting, light and soil disturbance (i.e. recurred from the seed bank):

Celery leaved buttercup *Ranunculus sceleratus*

Bristle Club rush *Isolepis setacea*

Jointed Rush *Juncus articulatus*



Tiny bristle club rush Isolepis setacea recurred from the seed bank in the fen area after only one year of work, photos 27.08.2015. 33 clumps appeared.

The appearance of a considerable number of clumps of tiny bristle club rush *Isolepis setacea* was an exciting observation in summer 2015. This is a plant that is rare in the county today but probably somewhat under recorded because of its small size and the fact that it can be identified only when in flower. It is so short, at only 10-15cm tall, that it is unable to compete with bigger plants and is favoured by grazing/close-mowing of wet soil areas. Stock trampling is also useful in bringing buried seed to the surface for germination to be stimulated by light. Its recurrence in local abundance is good evidence that this fen area had a history of grazing, possibly as long as 100 years ago. Cessation of this extensive grazing would have allowed willow and ash scrub and tree growth. With extremely long-lived small seeds, bristle club rush as a species spends most of the time 'invisible' as living but dormant seed in the soil, just waiting for the opportunity presented by vegetation removal and soil disturbance to grow, flower and make a lot of seed before taller plants grow up around it and shade it out. In this respect it behaves just like poppies do in drier areas, such as arable fields.

The big flush of plants of brooklime *Veronica beccabunga* and water figwort *Scrophularia auriculata* in the newly-cleared areas are also signs of conservation work having stimulated their germination from a previously dormant large seed bank.

Another new site record was Common bladder moss *Physcomitrium pyriforme*, a species that likes bare wet peat and has numerous tiny pear-shaped spore capsules. Like the bristle club rush, this is a temporary feature and it will not persist into the mature fen vegetation maintained by annual cutting and raking.

The flora of the cleared areas of relic fen has shown fascinating change in the first proper year of growth in higher-light conditions. Further species changes are to be expected with regular cutting and raking of the vegetation for the next few years, most likely a decline of the species seen in the initial flush, with others assuming more prominence as species have time to invade and become established.

Eventually a different community will establish itself and persist in response to the likely long-term management regime of annual autumnal cut and rake-off. As the future management is unlikely to involve any grazing, species favoured by this (such as those of the early bare peat stage) will decline and disappear back into the seed bank. So it will be goodbye to the bristle club rush for the moment in the knowledge that it is not gone but merely 'asleep' in the peat. Intermittent peat disturbance (the trampling of volunteers during cutting and raking, for example) may bring it back now and again to have a seeding session to maintain its presence in the seed bank.



Common Bladder moss Physcomitrium pyriforme, a species that exploits temporary bare wet peat habitat. Clumps of it were common in the fen area in April 2016.

In the cleared wet fen area, fruiting bodies of the scarlet elf cup appeared on half-buried deadwood.



Scarlet elf cup fungus Sarcoscypha sp newly recorded in the fen, 03.02.2016

Removal of a particularly dense patch of scrub of the alien Wilson's honeysuckle *Lonicera nitida* on the bank to the fen resulted in a big flush of flowers of drier habitats, including spear thistle, common ragwort and hogweed. These had flowers very popular with insects in the sunny conditions but are not expected to persist under the new cutting and raking management regime.



View into fen from bank to footpath, now cleared of scrub and with thistles and other ruderal species, 23.08.2016.

Now that the fen is clear of collapsed trees, it can be clearly seen that the peaty 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. Marginal areas of dry fen peat also exist nearest the very large crack willows adjacent to the path. Various remedial actions to re-wet these dry peat areas are possible.

Fen water quality

With the clearing and raking it was possible to identify features in the fen previously hidden below scrub and trees, one being a small spring that issues from the bank to the path just north east of the fen. The water from this spring travels in a small channel which meanders and spreads out over the fen lower down 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 of watercress and sweet grass in the small channel from the spring indicated a degree of nutrient enrichment was present. The zone of increased plant growth can be seen in the photo below taken in spring – the taller, darker green, grass in the line of the small channel to the left of the photo is obvious.



Cleared and cut short fen area in early spring. Note darker green, taller, sweetgrass in area of runnel leading from the spring issuing from the bank, indicating nutrient enrichment. Photo 18.04.2016.

Water quality testing using the simple colorimetric test kits from the Freshwater Habitats Trust and carried out during April 2016 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 calcareous fen specialists.

Pond Work

The original pond was dug in 1987 on the north-eastern side of the site and it seems likely to have been later extended. It is spring-fed and was probably excavated in a peaty (possibly previous fen) area.

Submerged plants seen in 2012 included water starwort *Callitriche* sp. and small quantities of stonewort *Chara* algae. The latter indicates that the water is neutral to alkaline (calcareous, lime-rich). Past aquatic species surveys have found a diverse invertebrate fauna (Pond Action survey results from 1991, listed here in **Appendix 1** and sourced from the management plan 1996-2001).

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.

Last year, as part of the project work, a new dipping platform was installed to enable school children from the local primary school to study the pond life.

Considerable progress has been made on the removal of willow trunks and branches that had fallen across and into the pond. Other material has also been removed, including overgrowth of reedmace and dumped bicycles. Lighter conditions now prevail over at least half of the pond. However, it remains deeply shaded by tall crack willows at the western end and these will be the target for future marginal improvement works.

The alien climber Russian vine *Fallopia baldschuanica*, an escape from hedges of adjacent gardens, has ramped away in the light conditions and is now blanketing the banks at the eastern end of the pond, needing some future reduction work.

Now that more light is reaching the pond water, a bloom of filamentous algae growth combined with the presence of lesser duckweed *Lemna minor* and least duckweed *Lemna minuta* is indicative of a degree of nutrient enrichment.

The water starwort and *Chara* algae found in 2012 seem to have disappeared.

Water quality testing using the simple colorimetric test kits from the Freshwater Habitats Trust and carried out during April 2016 revealed that the water was indeed enriched with a high nitrate load. The water was re-tested in August 2016 and whilst the nitrate level of the west end had declined to an unmeasurable amount (possibly because vegetation growth had removed it), the nitrate level of the east end was still moderate.



West end willow reduction work 03.02.2016



Crack willow reduction lets light in at east end of pond 17.03.2016



Raking out some reedmace 24.10.2015



East end of pond after some willow and reedmace removal and regrowth of vegetation extensive mats of filamentous algae visible, moderate nitrate still present, 23.08.2016.



Still-shaded west end of pond with water soldier rosettes centre, 23.08.2016

Despite the measured nitrate enrichment, toad and frog spawn were recorded early in 2016 and a dip-net survey in late August 2016 revealed that the pond also holds a breeding population of smooth newts (juveniles with external gills found); it thus supports three amphibian species.

The dip-net survey (a couple of standard 2-minute dips in amongst marginal vegetation and mats of filamentous algae) in August revealed low numbers and a low diversity of aquatic invertebrates, with numerous lesser water boatman adults and nymphs (*Corixa* sp.), some greater water boatman adults *Notonecta glauca*, water skaters, two species of large diving water beetles, two species of smaller diving water beetles, three species of pond snails, water slaters and freshwater shrimps. There was a notable absence of larval or nymphal stages of dragonflies, damselflies mayflies and caddisflies despite the observation of adult southern hawkers, brown hawkers and common darters flying around the pond in sunny conditions.

The invertebrate assemblage nowhere near approaches the diversity recorded in the 1991 survey (**Appendix 1**), nor indeed does it come anywhere near to the diversity found in the Milham Ford Nature Park clean ponds dipped for the same length of time on the very next day.

At Rivermead the most notable feature of the pond dip samples in 2016 was the number of adult and juvenile three-spined sticklebacks *Gasterosteus aculeatus*. 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 is unfavourable for many aquatic invertebrate species.

Examples of some of the species found in the pond on 23.08.2016 in 2-minute dip sampling:



Juvenile smooth newt, Lissotriton vulgaris



Three-spined stickleback, Gasterosteus aculeatus



Ramshorn snail, Planorbis planorbis



Greater water boatman, Notonecta glauca



Diving water beetle, Colymbetes fuscus

The problem of nitrate enrichment of the fen and pond is most likely a result of leakage from the sewerage system crossing the site. 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.

Scrub, glade and path work

This clearance work has continued adjacent to the paths at the east end of the site, nearest the entrance. Arisings continue to be raked-off to log and habitat piles, and sunnier conditions are encouraging more flowering of herbaceous species. Further glades of this size are planned for other suitable areas of the site. A particular focus was the clearance of a glade for Forest School activity for a local primary school. For this a central hazel coppice stool was retained and a circular fence of woven hazel wands was created to enclose the area. Short log sections provide informal seating for children.



Scrub clearance near the entrance. St Clare's students, 18.04.2015



Glade creation and hazel-wand fencing for the Forest School, 05.12.2015



Hazel-wand fencing and seating for Forest School use. 05.12.2015

Mammals, Amphibians and Reptiles

Mammals previously noted, probably using all of the site, include moles, grey squirrels, muntjac deer, foxes, bank voles and wood mice. In the second year of this project, Longworth (live) trapping sessions carried out by Andy Gunn with local primary school children confirmed bank vole and revealed also the presence of common shrew. Reptile mats placed on site attracted a juvenile grass snake in May 2015. Workers cutting and raking in the fen have had constantly to carefully avoid numbers of juvenile toads, proving that toad breeding success continues in the pond, despite enrichment problems.



Juvenile toad 28.08.2016

Summary and Conclusions

The BBOWT Wild Oxford Project has continued to make a clear difference to the habitats in Rivermead Nature Park in the second year. With an average of 480 volunteer hours worked, the fen area vegetation is continuing to show positive change, with open, light, conditions now prevailing and the establishment of a wetland tall herb assemblage. The area is still shaded by tall trees, which limits some species and the full response of the vegetation, i.e. a return to flowery tall herb fen over all the peat area, will have to wait until these tall trees can be removed.

Achievements are:

- All of the previously cleared wet peaty area of the relic alkaline tufa-forming fen has had a second year of cutting and raking, resulting in a more diverse herbaceous flora. Two new plant species appeared from the seed bank, the more notable recurrence being the many clumps of the tiny **bristle club rush**, which is on the Oxfordshire Rare Plants Register. A big increase occurred in other valuable taller wetland plant species, such as common valerian, wild angelica, brooklime and water figwort.
- More scrub reduction and glade creation near to paths has been carried out. Sunny areas adjacent to the paths have increased, attracting more insects.
- Creation of an outdoor classroom glade specifically for Forest School activity of a local primary school.
- Work has progressed on the pond margins. All the crack willows that had fallen in have been removed and a good start has been made on removing those still standing and casting deep shade over a big proportion of the water area at the western end of the pond.
- The site now has attractive explanatory boards detailing the wildlife interest.

Recommendations for the future:

- Further removal of very large crack willow and ash trees currently still shading the fen. Without trees removing water, currently dry fen areas will wet-up more readily and higher light levels will encourage flowering of fen tall herb assemblage.
- Actions to retard water loss from the fen will aid wetting-up. These could include small bunds at the edge of the stream.
- Further aquatic invertebrate surveys alongside actions to decrease shading by tall trees and clean-up the water in the pond (reduce the nitrate levels). This is necessary to restore the pond's biodiversity to 1991 levels and make it an improved educational resource.
- Consider draining down the pond to get rid of sticklebacks at the time of year (autumn) when it is least likely to be used by amphibians. Without fish eating larval stages, a greater variety of aquatic invertebrates will be able to exist.
- Bat and moth surveys
- Soil investigation by coring (augering) to detect further areas of peat (relic fen) in the woodland that could be subsequently remediated by re-wetting to fen habitat.

Acknowledgements

I am grateful to Carl Whitehead of Oxford City Council for discussions and for access to documents held on the site in OCC archives and to Andy Gunn of BBOWT for discussions as the work progressed. Marilyn Cox gave invaluable editorial help with this report.

Reference

Rivermead Management Plan (1996-2001), Oxford City Council, from the archive held by the Countryside Service Rangers.

Wild Oxford Project

Rivermead Nature Park

Report on the second year 2015-2016

J A Webb, September 2016

APPENDIX 1:

Results of aquatic invertebrate survey in Rivermead Nature Park by Pond Action in November 1991, sourced from Oxford City Council's management plan 1996-2001.

Scientific Name	Group
<i>Sialis lutaria</i>	Alderfly
<i>Agabus bipustulatus</i>	Beetle
<i>Agabus sturmii</i>	Beetle
<i>Colymbetes fuscus</i>	Beetle
<i>Copelatus haemorrhoidalis</i>	Beetle
<i>Enochrus melanocephalus</i>	Beetle
<i>Enochrus testaceus</i>	Beetle
<i>Haliphus confinis</i>	Beetle
<i>Haliphus immaculatus</i>	Beetle
<i>Haliphus lineatocollis</i>	Beetle
<i>Haliphus obliquus</i>	Beetle
<i>Haliphus ruficollis</i>	Beetle
<i>Haliphus wehnckeii</i>	Beetle
<i>Helochares lividus</i>	Beetle
<i>Helophorus brevipalpis</i>	Beetle
<i>Hygrotus inaequalis</i>	Beetle
<i>Hyphydrus ovatus</i>	Beetle
<i>Ilybius ater</i>	Beetle
<i>Ilybius quadriguttatus</i>	Beetle
<i>Laccobius minutus</i>	Beetle
<i>Laccophilus minutus</i>	Beetle
<i>Potamonectes depressus</i>	Beetle

Scientific Name	Group
<i>Callicorixa praeusta</i>	Bug
<i>Corixa panzeri</i>	Bug
<i>Corixa punctata</i>	Bug
<i>Hesperocorixa sahlbergi</i>	Bug
<i>Microvelia reticulata</i>	Bug
<i>Nepa cinerea</i>	Bug
<i>Notonecta glauca</i>	Bug
<i>Notonecta marmorea</i>	Bug
<i>Plea leachi</i>	Bug
<i>Sigara dorsalis</i>	Bug
<i>Limnephilus lunatus</i>	Caddis fly
<i>Phryganea bipunctata</i>	Caddis fly
<i>Helobdella stagnalis</i>	Leech
<i>Theromyzon tessulatum</i>	Leech
<i>Cloeon dipterum</i>	Mayfly
<i>Bathynomphalus contortus</i>	Mollusc
<i>Lymnaea peregra</i>	Mollusc
<i>Physa acuta</i>	Mollusc
<i>Planorbis planorbis</i>	Mollusc
<i>Potamopyrgus jenkinsi</i>	Mollusc
<i>Aeshna cyanea</i>	Odonata
<i>Coenagrion puella</i>	Odonata
<i>Ischnura elegans</i>	Odonata
<i>Libellula depressa</i>	Odonata
<i>Sympetrum striolatum</i>	Odonata
<i>Asellus aquaticus</i>	Slater

APPENDICES 2 and 3 are separate documents.