

Rawcliffe Meadows pond survey



A report for Friends of Rawcliffe Meadows

Funded by the Freshwater Habitats Trust as part of the People, Ponds and Water Project

August 2015

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1. Introduction

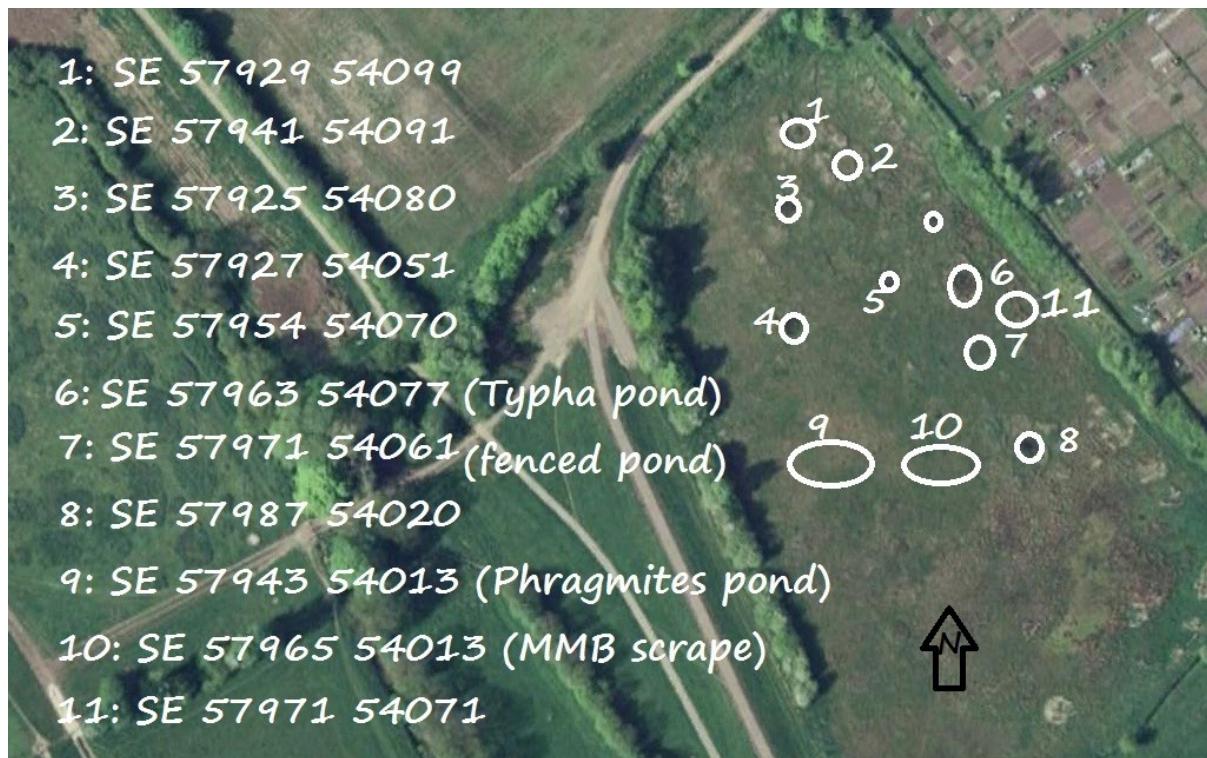
The Flood Basin at Rawcliffe Meadows is a two hectare man-made wetland, created about 35 years ago when the Clifton Washland flood defences were upgraded. Adjoining the River Ouse floodplain on the northern outskirts of York, the basin provided spoil for construction of the adjoining barrier bank, exposing the underlying laminated glacial clay. This is an ideal substrate for pond creation, and Friends of Rawcliffe Meadows have overseen the excavation of over 15 ponds and pools between the early 1990s and 2013. Although the larger scrapes have been excavated by machine, most of ponds have been hand-dug by volunteers.

The Flood Basin ponds are situated within a mosaic of wet grassland and fen with fringing scrub. Along with the adjoining hay meadows, the basin is grazed by cattle between August and early November with a brief period of spring grazing in some years. It is managed as part of a Higher Level Stewardship agreement, with the option for maintaining high-value ponds requiring that aquatic habitats are kept in favourable ecological condition.

The flora of the Flood Basin ponds is reasonably well-recorded, with large stands of Tubular Water-dropwort *Oenanthe fistulosa* being an important feature. Other interesting wetland plants include one of the few populations of Lesser Marshwort *Apium inundatum* in lowland Yorkshire and herbs associated with the surrounding fen and wet grassland such as Yellow Loosestrife *Lysimachia vulgaris*, Meadow-rue *Thalictrum flavum* and Ragged Robin *Silene flos-cuculi*. Also of note is the abundance of Common Stonewort *Chara vulgaris* in some ponds, this alga often dominating younger water bodies. The invertebrate fauna of the ponds has also been well-studied but many records are now rather dated and the evidence suggests a very dynamic process of colonisation with new species being recorded every year but others apparently disappearing. Moreover, there has been no attempt to assess the ecological condition of individual ponds, which makes it difficult to identify when and where management might be appropriate.

Because of its importance as a cluster of wildlife-rich ponds, and the opportunities it affords for public engagement and volunteer training, the Flood Basin has been identified as a Flagship Pond site by the Freshwater Habitats Trust (FWHT). Funding through the Trust's *People, Ponds and Water* project has provided the opportunity to carry out this baseline survey in order to allow us to monitor the ecological quality of individual ponds, and to guide future management.

Eleven ponds were surveyed using PSYM (**P**redictive **S**ystem for **M**ultimetrics), the nationally-recognised methodology for assessing the ecological quality of still-water habitats developed by the Environment Agency and Pond Conservation (now FWHT). Fieldwork was undertaken on 12 June 2015. The locations of the ponds are indicated in Map 1 below. The larger South (or Main) Pond at the opposite end of Rawcliffe Meadows, which was excavated in 1991, was surveyed on 16th July 2015.



Map 1: Location of the Flood Basin ponds

PSYM uses six ‘metrics’ (measurements) representing important indicators of ecological quality. The three botanical metrics are:

- diversity of emergent and submerged plant species
- the number of uncommon wetland plants
- Trophic Ranking Score (TRS, an indication of nutrient status based on key plant species)

The three invertebrate metrics are based on a timed sample which involves netting each of the ‘meso-habitats’ present in a pond (e.g. emergent vegetation, open water, floating vegetation). Although PSYM requires identification of aquatic macro-invertebrates to family level only, during this survey material was identified to species level wherever possible to add value to the data.

The invertebrate metrics are:

- Average Score Per Taxon (ASPT, an estimation of biological water quality based on the sensitivity of different invertebrate families to organic pollution)
- diversity of Odonata (dragonfly & damselfly) and alderfly families
- diversity of water beetle families

Environmental data are also obtained for the pond (e.g. surface area, altitude, geographical location, water pH, substrate type, degree of shade and amount of emergent vegetation). The data are then input into a computer model which compares them with a large reference dataset of ‘unimpaired’ ponds, i.e. ponds which have not been adversely impacted by human activities such as pollution, intensive farming or road run-off. The model predicts how a high quality pond with similar attributes *should* score for each metric, and compares the predictions with the survey results. The scores for each metric are combined to produce an Index of Biotic Integrity (IBI) which provides a holistic

assessment of the ecological quality of the pond. This can be categorised as Very Poor, Poor, Medium and Good. Good quality ponds are those which have an Index of over 75% and represent the best 20% of ponds in England and Wales.

The PSYM data and results for each of the 12 ponds assessed are summarised in Appendix 1. Invertebrate species data are provided in Appendix 2 and wetland plant lists are provided in Appendix 3.

2. The ponds



Pond 1 is located in the north-east corner of the Flood Basin. It is semi-permanent with moderate cover of Greater Reedmace *Typha latifolia*. About 30 cm of soft, dark sediment covers the pond bed. Although there was a considerable amount of algal scum, Common Stonewort is locally-abundant beneath the surface. Twenty-five invertebrate species were recorded in the sample including two larvae of the scarce Flecked General soldierfly *Stratiomys singularior*. Fourteen wetland plant species included Tubular Water-dropwort, which occurs locally in the draw-down zone fringing the pond. Vertebrates included stickleback fry and a single Common Frog metamorph ('froglet').

This pond produced an Index of Biotic Integrity of 78%, representing **Good** ecological quality. It scored well for wetland plant diversity and very well for representation of less common plants but very poorly for Trophic Ranking Score. It rated well for beetles and ASPT (biological water quality), and moderately for Odonata.



Pond 2 is also in the north-east corner of the basin. A central area of shallow open water is fringed by low-emergent vegetation such as Flote-grass *Glyceria fluitans*, Common Spike-rush *Eleocharis palustris*, Jointed Rush *Juncus articulatus*, Tubular Water-dropwort and Knieff's Hook-moss *Drepanocladus aduncus*. Twenty wetland plant species were recorded: in addition to Tubular Water-dropwort, Ragged Robin is notable as this is categorised as Near Threatened in England. Some 33 invertebrate species were identified in the sample, the localised Duckweed Weevil *Tanysphyrus lemnae* being abundant. Vertebrates included 14 Smooth Newt tadpoles and a single immature stickleback.

Pond 2 produced an Index of Biotic Integrity of 72%: this is within the **Moderate** category of ecological quality but just below the threshold for Good quality. It rated well for wetland plant

diversity, moderately for uncommon plants and very poorly for Trophic Ranking. It scored well for beetles and ASPT but only moderately for Odonata.

Pond 3 is a semi-permanent pool with moderate cover of Greater Reedmace in the centre and a fringe of mixed low-emergent vegetation around its edge. Fifteen common wetland plant species and 29 invertebrates were recorded. Six Smooth Newt tadpoles were netted but no fish.

This pond produced an Index of Biotic Integrity of 67%, representing **Moderate** ecological quality. It rated well for wetland plant diversity but poorly for representation of uncommon plants and very poorly for TRS. It scored well for beetles and ASPT, and moderately for Odonata.

Pond 4 is situated towards the north-western edge of the Flood Basin. It has a narrow emergent fringe dominated by Common Spike-rush around a pool of dark open water with floating Common Duckweed *Lemna minor*. A deep layer of decaying organic matter covers the pond bed. The invertebrate fauna was impoverished with only 18 common species identified in the sample. Likewise, only eight common wetland plants were found. A single Smooth Newt tadpole was netted.

Pond 4 produced an Index of Biotic Integrity of 33%, representing **Poor** ecological quality. It rated poorly for wetland plant diversity and very poorly for botanical quality and Trophic Ranking. It scored well for water beetles but produced a null score for Odonata while ASPT was moderate.



Pond 5 is similar to Pond 4. It dries out annually and contains much rotting grass and anoxic, black sediment. There is much floating algal scum and only a narrow emergent fringe, though this does include patches of Tubular Water Dropwort around the eastern half of its perimeter. Thirteen wetland plant species were recorded along with thirteen common aquatic invertebrates. With an IBI of 44%, this pond was classed as being of **Poor** ecological quality.

Wetland plant diversity was good, representation of less common plants was poor and Trophic Ranking very poor. Scores for water beetle families and ASPT were moderate with a null score for Odonata.

Pond 6 is situated near the eastern edge of the basin. It was dug in 1995 and is considerably larger than Ponds 1 to 5. This is a botanically-diverse pond with 27 wetland plant species. Although it may appear ‘overgrown’ with Greater Reedmace, it has varied vegetation structure with emergent fen around the cattle-poached margin featuring species such as Brown Sedge *Carex disticha*, Yellow Loosestrife and extensive patches of Tubular Water-dropwort.



Thirty-six aquatic invertebrate taxa were identified in the sample, making this the richest pond in the survey. These included the localised reed-beetle *Donacia vulgaris* and a larva of the Flecked General soldierfly. No fish or amphibians were found.

Pond 6 produced an IBI of 72% (**Moderate** but just below the threshold for Good). Wetland plant diversity and botanical quality were very good but as with the other ponds, Trophic Ranking was very poor. Scores for ASPT and Odonata were moderate but good for water beetles.

Pond 7 was hand-dug in the mid-1990s and was fenced-off to allow tall-emergent vegetation to develop for the benefit of species such as Reed Bunting and Harvest Mouse. It contains a tiny island used by nesting Moorhens. Emergent vegetation cover is around 70% including Branched Bur-reed *Sparganium erectum*, Slender Tufted Sedge *Carex acuta*, Yellow Loosestrife and Purple Loosestrife *Lythrum salicaria*. Seventeen wetland plant species were recorded, including Bladder Sedge *Carex vesicaria*, which is listed as Near Threatened in England. Thirty aquatic invertebrate species were identified in the sample. Many Three-spined and Ten-spined Sticklebacks are present.

This pond produced an IBI of 78%, representing **Good** ecological quality. Wetland plant diversity and botanical quality were very good but TRS was very poor. Scores for ASPT and Coleoptera were good with a moderate rating for Odonata.



Pond 8 is situated just north of the marsh area near Blue Beck. It contains a small amount of Greater Reedmace with abundant Ivy-leaved Duckweed *Lemna trisulca* in the water. A fringe of low emergent vegetation includes Flote-grass, Jointed Rush, Common Spike-rush and False Fox Sedge *Carex otrubae*. Seventeen wetland plant species were recorded.

Twenty-eight aquatic invertebrate species were identified in the sample. An adult

Common Frog, many frog tadpoles and a pair of adult Smooth Newts were found.

Pond 8 had an IBI score of 72% (**Moderate** but very close to Good). It had a good diversity of wetland plants with a modest proportion of less common species and very poor TRS. ASPT and representation of water beetles was good with a moderate score for Odonata.

Pond 9 was excavated in 2009. It was fenced and planted with Common Reed *Phragmites australis*, with the aim of creating habitat for Reed Buntings. It is overwhelmingly dominated by *Phragmites*, (though patches of this had been cut in winter 2014/15) with only 13 wetland plant species recorded. Notably, however, Lesser Marshwort has been present since 2010 and remains abundant.

Thirty-one aquatic invertebrate taxa were identified from the sample. The deep carpet of moss which fringes the pond is particularly good habitat for water beetles.

Water Vole feeding stations were observed in this pond in autumn 2014 and a survey by the Yorkshire Mammal Group using tethered rafts yielded an exceptionally large territorial latrine in July

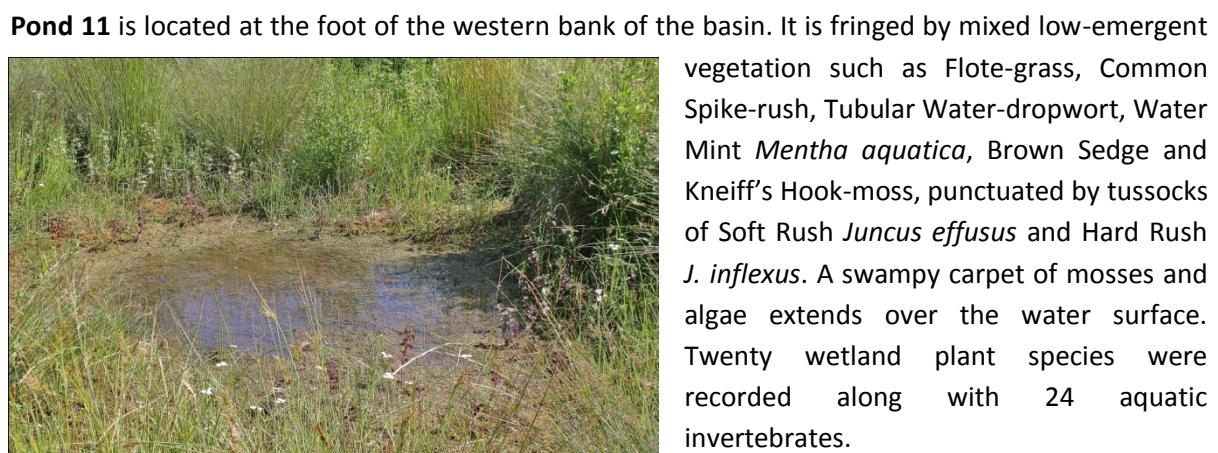
2015, confirming an established population of this threatened wetland mammal. Stickleback fry were present but no amphibians were found during the PSYM survey.

The PSYM data for Pond 9 produced an IBI of 50% and this water body was classed as being of **Moderate** ecological quality. This relatively low score reflects the fact that it is dominated by Common Reed, which inevitably limits plant diversity. ASPT was moderate and representation of Odonata was poor but it scored well for Coleoptera families.

Pond 10 was excavated by Yorkshire Water contractors MMB in summer 2013. It is thus in a relatively early-sucessional stage with only fragmentary emergent vegetation. This pond is used by cattle for drinking, so has poached margins. Open water is dominated by submerged beds of Common Stonewort though Curled Pondweed *Potamogeton crispus* has increased during 2015. Lesser Reedmace *Typha angustifolia* is a locally-rare plant which has recently appeared in this pond. Fifteen wetland plant species were recorded.

Sixteen aquatic invertebrate species were recorded. Subsequent searching produced larval galls of the scarce Pink Water-speedwell Weevil *Gymnetron villosum*. Adult Odonata present at the time of the survey included Black-tailed Skimmer *Orthetrum cancellatum*, Four-spotted Chaser *Libellula quadrimaculata*, Azure Damselfly *Coenagrion puella* and Blue-tailed Damselfly *Ischnura elegans*. No amphibians or fish were found. A few Water Vole droppings were found during the Yorkshire Mammal Group survey in July 2015.

This pond had an IBI of 78% and was therefore of **Good** ecological quality. It scored very well on the botanical metrics other than TRS. Biological water quality and Coleoptera were good with a moderate score for Odonata.



Pond 11 produced an IBI of 78%, representing **Good** ecological quality. It scored very well on the botanical metrics other than TRS. Biological water quality and Coleoptera were good with a moderate score for Odonata.



The Main Pond or **South Pond** is located at the southern end of Rawcliffe Meadows, away from the flood basin and on the river floodplain. It was excavated by Sustrans in 1991. This is a mid-sized pond, covering around 610 square metres, and tends to be flooded by river water once or twice each winter. Open water is completely dominated by Water Soldier *Stratiotes aloides*, a rare native plant which was illicitly introduced in the mid-1990s and

rapidly became invasive despite repeated attempts at control. The margins support a range of tall emergents including Common Reed, Reed Sweet-grass *Glyceria maxima*, Branched Bur-reed and Slender Tufted Sedge. Ivy-leaved Duckweed is abundant but no other submerged aquatics were found. A water sample produced a pH reading of 7.12 with electrical conductivity (a measure of solute content) of 530 µS/cm; these are within the typical range for nutrient-rich, clay/silt bedded ponds in the Vale of York.

The pond proved to be surprisingly productive for invertebrates, with 43 taxa identified in the PSYM sample. Flatworms, leeches and molluscs were more diverse than in the Flood Basin pools, reflecting the larger size and permanence of the South Pond. However, Odonata were represented by just a single damselfly nymph in the sample. The water beetle assemblage was rather modest but did include the uncommon diving beetle *Hydroporus figuratus*.

South Pond produced an IBI of 78%, representing **Good** ecological quality. It scored highly for all metrics apart from Trophic Ranking Score and Odonata families.

3. Interpreting the PSYM results

PSYM results are summarised above for the individual ponds. Overall there was a wide range of ecological quality with Indices of Biotic Integrity ranging from 33% to 78%. Five ponds were categorised as being of Good quality (Ponds 1, 7, 10 & 11 in the Flood Basin plus South Pond). Five were rated as Moderate but three of these (2, 6 & 7) scored 72% which can be considered borderline between Moderate and Good: because of the way the IBI is calculated, scores are ‘stepped’ so that these ponds only just failed to meet the Good threshold (75%).

Two ponds were classed as Poor (4 and 5). In both cases, lower botanical quality and lack of Odonata strongly influenced the PSYM metrics. In recent years, these ponds have undergone phases of becoming heavily carpeted by grass during dry periods which has then died-off during wet phases, so that a deep layer of decaying vegetation has covered the pond beds.

The botanical metrics indicate good wetland plant diversity in most of the ponds except those which have a deep accumulation of organic detritus. Ponds 2, 6 and 11 exceeded the number of wetland plant species predicted by PSYM: Pond 6 was predicted to produce 18.7 but 25 species were recorded, so this pond is particularly rich botanically. Representation of uncommon wetland plants varies, with Tubular Water-dropwort boosting the score for some small ponds.

Trophic Ranking Score is recognised as being the most problematic metric in PSYM. In my experience, lowland farmland or urban ponds in northern England tend to score poorly on this metric. This is because they invariably support indicators of high nutrient levels, such as Greater Reedmace and Common Duckweed, but lack species associated with nutrient-poor waters (which are often completely absent from the local flora). Some of the individual species scores for TRS also seem counter-intuitive in a regional context. Whilst there is undoubtedly a problem with eutrophication in the Rawcliffe Meadows Flood Basin due to flooding from the polluted Blue Beck, the persistence of the pollution-sensitive Lesser Marshwort in Pond 9 and the prolonged dominance of Common Stonewort in younger ponds implies that eutrophication is not such a controlling factor as these results suggest.

All but one of the basin ponds scored well for representation of water beetle families whilst biological water quality (ASPT) was consistently good or moderate. Representation of Odonata was moderate for all the permanent or semi-permanent ponds except Pond 9, which is dominated by *Phragmites* and therefore not a favourable habitat for dragonflies. In these ponds, both ‘blue’ damselflies (Coenagrionidae) and the darter family (Libellulidae) were represented but there were no hawker (Aeshnidae) larvae in the samples: there is always an element in chance with timed samples and two or three hawker species do breed regularly in the Flood Basin.

The PSYM results for the South Pond show that it is of high ecological quality despite the dominance of Water Soldier. It supports a diverse wetland flora though, as with the Flood Basin ponds, this consists predominantly of plants associated with high nutrient levels. It has good biological water quality (ASPT) but an impoverished assemblage of dragonflies, presumably because of the lack of submerged vegetation beneath the raft of Water Soldier. Some threatened dragonflies depend on Water Soldier in their larval stage - such as Norfolk Hawker in East Anglia and its congener *Aeshna viridis* in mainland Europe – but these are not present in the Vale of York!

4. Priority Pond Assessment

Priority Ponds are a *habitat of principal importance* as defined in Section 41 of the Natural Environment and Rural Communities Act 2006. All public authorities are obliged to consider the conservation of Habitats and Species of Principal Importance during the exercise of their duties. Priority ponds are considered to represent the best 20% of UK ponds in terms of nature conservation value. They are identified using a number of criteria¹. Nine of the 12 ponds surveyed qualify as Priority Ponds, as summarised in Table 1.

Qualifying criterion	Pond 1	Pond 2	Pond 5	Pond 6	Pond 7	Pond 9	Pond 10	Pond 11	South
Ponds with species of high conservation importance (UKBAP/Section)	✓ Tubular Water-dropwort	✓ Tubular Water-dropwort	✓ Tubular Water-dropwort	✓ Tubular Water-dropwort		✓ Water Vole		✓ Tubular Water-dropwort	

¹ See: http://www.pondconservation.org.uk/pond_hap/prioritypondcriteria

41 Priority Species, fully protected species, Red List species etc)								
Ponds of high ecological quality, classified as being of Good quality using PSYM.	✓ IBI = 78%				✓ IBI = 78%	✓ IBI = 78%	✓ IBI = 78%	✓ IBI = 78%

Table 1: Priority Pond assessment for ponds at Rawcliffe Meadows

5. Notable species

Tubular Water-dropwort



This wetland umbellifer is categorised as Vulnerable in England (Stroh *et al*, 2014). It is also recognised as a Species of Principal Importance for conservation under Section 41 of the Natural Environment and Rural Communities Act 2006.

Tubular Water Dropwort is found in pond and ditch margins and in seasonal pools in fens and wet grassland. It favours grazed habitats where taller emergents are kept in check and is locally-abundant in the Flood Basin at Rawcliffe Meadows. During the present survey this

species was recorded from the margins of Ponds 1, 2, 5, 7 and 11. It continues to increase in the Flood Basin and has spread unassisted to new ponds. Nearby, it can be found in the Rawcliffe Ings drain as well as in former foot-drains and the central ditch at Clifton Ings.

Tubular Water-dropwort has undergone a 35% decline in distribution in England during the latter half of the 20th century (Stroh *et al*, 2014) due to land drainage and agricultural improvement (Preston *et al*, 2002). Its main distribution is in the lowland river valleys of England, and it is rare in Scotland and Wales.



Lesser Marshwort

A small aquatic umbellifer with finely-divided underwater leaves and slightly more robust aerial shoots, which produce tiny ‘umbrellas’ of white flowers in June. Lesser Marshwort has been recorded in Pond 9 (the ‘reedbed’ pond) since 2010.

During the second half of the 20th century, this plant has declined by 37% in terms of its

recorded distribution in England (its ‘Area Of Occupancy’) with a 49% reduction in range (‘Extent Of Occupancy’) (Stroh *et al*, 2014). It is therefore classed as Vulnerable in an English context. Lesser Marshwort is an uncompetitive plant which is vulnerable to both drainage and nutrient-enrichment. It is mostly associated with nutrient- and mineral- poor (though not necessarily acidic) waters and has become particularly scarce in the agricultural lowlands of eastern England. The nearest known location is a pond on Skipwith Common, though it has been found at Askham Bog and on Strensall Common in the distant past.

Lesser Marshwort was probably accidentally introduced to Pond 9 in 2009, when a small amount of Bogbean *Menyanthes trifoliata* was transplanted from a moorland-fringe site in lower Nidderdale where this species also occurs. Nonetheless, it has thrived and now forms a dense mass of submerged foliage in spring as well as growing within the moss carpet at the edges of the pond. It appears to have benefitted from cutting some of the reed in winter 2014-15, which should be continued on a rotational basis.



Bladder Sedge

This tall sedge occurs in various water-margin habitats and is characteristic of botanically-rich ditches in floodplain meadows in the Vale of York. It underwent a 34% decline in distribution in England during the second half of the 20th century and is classed as Vulnerable in an English context (Stroh *et al*, 2014). It grows vigorously in Pond 7, where a small amount was transplanted from Rawcliffe Ings when the pond was dug about 20 years ago. However, Bladder Sedge seems to have disappeared from South Pond.

Ragged Robin

Although widespread in agriculturally-improved wet grassland, Ragged Robin is classed as Near Threatened in England due to a 25% decline in distribution. It occurs in several parts of the Flood Basin, including the margin of Pond 2. A few plants occur also on the banks of South Pond.

Water Vole

During the 1990s, Water Voles were well-known along Blue Beck as it runs through the Flood Basin, and from the Ings Dyke which separates Rawcliffe Meadows from Clifton Ings. Following severe engineering works in 2002 (which included the illegal destruction of burrows during bank re-profiling), the local population disappeared. The identification of territorial latrines in Pond 10 during the recent Yorkshire Mammal Group survey follows the discovery of suspected Water Vole feeding stations in Pond 10 and in the Flood Basin marsh in autumn 2014. This confirms the re-colonisation of the Flood Basin by this nationally-threatened wetland mammal.

Water Voles have declined severely as a result of intense predation by feral American Mink combined with unsympathetic watercourse management. Populations on rivers and becks remain

scattered, fragmented and vulnerable but Water Voles appear to survive better in off-stream pond complexes and fens.

***Hydroporus figuratus*, a small diving beetle**

This is an uncommon water beetle found in shallow water amongst tall emergent vegetation or in the shade of trees. Several specimens were found in South Pond. This is one of two species formerly known as *Suphrodytes dorsalis* but now recognised as separate and distinct. It has not been recorded previously from Rawcliffe Meadows.

Pink Water-speedwell Weevil, *Gymnetron villosulum*



Larval galls of this weevil were found on seed-pods of Pink Water-speedwell *Veronica catenata* around the edges of Pond 11. The larvae develop within the seed-pod, which becomes characteristically distended (photo, left). Adults were also found in pupal cells within seed-pods in one of the seasonal pools during August. Pink Water-speedwell appears to be the sole host plant of this beetle (Philp, 2009). Although *Gymnetron villosulum* is listed as

Nationally Scarce (Hyman & Parsons, 1992), it has probably been overlooked in the past and there are now 19 Yorkshire records. It has recently been found as far north as Teesside.

Flecked General soldierfly, *Stratiomys singularior*



The soldierflies of the family Stratiomyidae take their name from the bands of colour on their bodies, which bring-to-mind historic military uniforms. Many species have aquatic larvae and these are indicative of high quality wetlands, with soldierflies being useful indicator species in habitats such as fens, seepages and grazing-marsh ditches.

Larvae of the Flecked General were first discovered in the Flood Basin ponds in 2013 and were found in Ponds 1 and 6 during the current survey. This species occurs locally in coastal grazing-marsh ditches from the south coast north to the Tees along with a few base-rich inland sites. Although it is currently listed as Nationally Scarce, the national conservation status of this species may be downgraded in a forthcoming review of the soldier flies and allies.

The Common Green Colonel *Oplodontha viridula* is one of the most widespread aquatic soldier-flies in Britain but “is nonetheless local in occurrence” (Stubbs & Drake, 2001), being found mainly in

southern England in fens, grazing levels and coastal wetlands. It is associated with open, sunny wetlands on clay or alluvial soils, the larvae developing in water or wet mud and the adults visiting flowers. Larvae of this insect are frequent in ponds and pools in the Flood Basin: during the present survey they were found in Ponds 3, 7, 8, 9 and 11.

6. Implications for pond management

Early work by Pond Conservation (now FWHT) showed that the most biodiverse ponds were often very different from common perceptions about what an ‘ideal’ pond should look like. Importantly, ponds which were often considered ‘overgrown’ and in need of active management were frequently much more valuable for wildlife than those which had been ‘restored’ to open water. These findings have encouraged a more cautious approach to pond management.

The Flood Basin ponds at Rawcliffe Meadows support a range of habitats varying from open water with submerged stonewort beds through to dense emergent vegetation. Ponds of high ecological quality include both the relatively new Pond 10, which as yet contains little emergent vegetation, and Pond 7, which is over 20 years and has >70% vegetation cover. PSYM assessment has shown that a number of ponds containing extensive growth of reedmace are either of Good ecological quality or very close to achieving this status. Analysis of the data demonstrates that diversity of aquatic invertebrate species is positively correlated with the extent of emergent vegetation cover in these ponds (Pearson’s rank correlation $r = 0.64$). This suggests that we need not worry about ponds becoming overgrown, although at least one or two ‘young’ ponds with submerged stonewort beds should be maintained within the basin. This would be best achieved by periodically excavating new ponds in areas of species-poor grassland.

Despite the generally healthy condition of the ponds, it is clear that Ponds 4 & 5 are poor habitats for wildlife. In recent years, these pools have undergone prolonged periods of drying-out followed by inundation. During the dry phase, grasses such as Rough Meadow-grass *Poa trivialis* and Creeping Bent *Agrostis stolonifera* have formed dense mats over the pond bed. When the ponds re-fill for several months, the vegetation dies off, forming a thick deposit of decaying debris. As a result these water bodies tend to have very anoxic conditions. There are several grassy, seasonal pools in the Flood Basin which provide valuable habitats for wetland invertebrates, including specialities such as the Near Threatened diving beetle *Agabus uliginosus*: Ponds 4 & 5 are the only ones to accumulate a deep layer of anoxic sediment, perhaps because they alternate unpredictably between ‘seasonal’ and ‘semi-permanent’ periodicity. Since these ponds have similar dimensions to several more stable ones, it may be that they have relatively porous substrates.

On balance, the wildlife value of these ponds could be enhanced by:

- removing the accumulated detritus
- deepening the pond base by a further 20 or 30 cm by digging into the underlying clay, and
- puddling the exposed substrate to improve water retention

The aim should be to prolong the ‘wet’ phase so that there is a more regular and predictable cycle of wetting and drying-out. Care must be taken to remove sediment well away from the margins of Pond 5, in order to avoid smothering Tubular Water-dropwort.

Recent confirmation of a re-established Water Vole population in Pond 9 is great news since this threatened mammal had not been recorded at Rawcliffe Meadows for 13 years. It is unlikely to be able to breed in the other Flood Basin ponds (except perhaps Pond 7) since these have cattle-trampled margins which are unsuitable for either burrowing or above-ground nesting in tussocky vegetation. Fencing-off of the adjacent Pond 10 (MMB scrape) would expand Water Vole habitat and hopefully allow a more robust population to establish. American Mink predation is unlikely to be a threat in this location as there has been only a single record from Rawcliffe Meadows during the past 25 years. Fencing would allow Water Voles to establish burrows or to nest above-ground in dense vegetation, and would also encourage natural regeneration of tall emergent vegetation such as Common Reed, Greater Reedmace and Lesser Reedmace, which provides food and shelter from predators for Water Voles. In this case, it would be advisable to control the larger and more invasive Greater Reedmace but allow its smaller and scarcer relative to form a mosaic with Common Reed.

Fencing of Pond 9 would, however, entail the loss of high quality open-water habitat with submerged stonewort and Curled Pondweed beds, as well as small emergent plants requiring disturbance such as Pink Water-speedwell. The ideal solution might be to fence Pond 9 but to dig an extension or a new pond nearby. This would need to provide permanent water with a depth of approximately 1 metre to encourage submerged plants.

A minor enhancement to the Flood Basin ponds would be the addition of a few pieces of solid debris such as concrete posts or untreated timber. Lack of firm substrates limits opportunities for invertebrates such as caddisflies of the family Leptoceridae which would otherwise be able to colonise these ponds.

The South Pond has been dominated by Water Soldier for many years and various attempts at control have been unsuccessful, although transplanting of Common Reed from the Ings Dyke has allowed the establishment of a small but expanding reedbed. Since this pond is on the river floodplain, it is naturally-fertile and has, in the past, supported short-lived populations of coarse fish swept in by flooding. Its public location also means that it has been subject to repeated, unauthorised introductions of non-native water plants as well as Goldfish.

Beds of Water Soldier are well-known as providing an important habitat for aquatic invertebrates (Suuarti *et al*, 2009; Tarkowska-Kukuryk, 2006; Higler, 1978). A number of rare species are largely or exclusively dependent on this plant including, in Britain, the Norfolk Hawker dragonfly and two weevils belonging to the genus *Bagous*. However, none of these are likely to occur in Yorkshire.

The survey demonstrates that South Pond continues to support a diverse aquatic invertebrate fauna even if this includes few 'clean water' indicators such as dragonflies. There would probably be little benefit from further attempts to control Water Soldier, which in the past have had negligible effect and have created problems when piles of decaying vegetation have been left nearby. As suggested previously, planting of Yellow Water-lily *Nuphar lutea* rhizomes from a locally-native source might provide a more diverse mixture of floating-leaved vegetation since this species *may* be able to compete with Water Soldier.

7. References

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Appendix 1: PSYM data

PSYM PARAMETER SUMMARY						
Site details	Rawcliffe Meadows					
Pond number	1	2	3	4	5	6
Survey date	12-Jun-15	12-Jun-15	12-Jun-15	12-Jun-12	12-Jun-15	12-Jun-15
Grid reference	SE57929540 99	SE57941540 91	SE57925540 80	SE57927540 51	SE57954540 70	SE57963540 77
Plant metrics						
No. of submerged + marginal plant species (not including floating leaved)	13	17	14	7	13	25
Number of uncommon plant species	4	2	1	0	1	5
Trophic Ranking Score (TRS)	8.8285714	9.2142857	8.75	9	8.5	9.025
Invertebrates metrics						
ASPT	4.6666667	4.4285714	4.818182	4.3333333	4.3333333	4.285714
Odonata + Megaloptera (OM) families	2	2	2	0	0	2
Coleoptera families	3	3	3	3	2	3
Environmental variables						
Altitude (m)	10	9	9	9	9	9
Easting	4579	4579	4579	4579	4579	4579
Northing	4540	4540	4540	4540	4540	4540
Shade (%)	0	0	0	0	0	0
Inflow (0/1)	0	0	0	0	0	0
Grazing (%)	100	100	100	100	100	100
pH	7.2	7.2	7.2	7.2	7.2	7.2
Emergent plant cover (%)	20	25	30	25	25	65
Base clay (1-3)	3	3	3	3	3	3
Area (m ²)	30	50	38	30	30	600
Results						
Submerged + marginal plant species						
Predicted (SM)	16.1	16.4	16.3	16.1	16.1	18.7
Actual (SM)	13	17	14	7	13	25
EQI (SM)	0.81	1.03	0.86	0.43	0.81	1.34
IBI (SM)	3	3	3	1	3	3
Uncommon plant species						
Predicted (U)	3.3	3.3	3.3	3.3	3.3	3.6

Actual (U)	4	2	1	0	1	5
EQI (U)	1.22	0.60	0.30	0.00	0.31	1.38
IBI (U)	3	2	1	0	1	3
Trophic Ranking Score (TRS)						
Predicted (TRS)	6.68	6.76	6.72	6.68	6.68	7.12
Actual (TRS)	8.83	9.21	8.75	9.00	8.50	9.03
EQI (TRS)	1.32	1.36	1.30	1.35	1.27	1.27
IBI (TRS)	0	0	0	0	0	0
ASPT						
Predicted (ASPT)	5.11	5.11	5.11	5.11	5.11	5.10
Actual (ASPT)	4.67	4.43	4.82	4.33	4.33	4.29
EQI (ASPT)	0.91	0.87	0.94	0.85	0.85	0.84
IBI (ASPT)	3	3	3	2	2	2
Odonata + Megaloptera (OM) families						
Predicted (OM)	3.39	3.38	3.40	3.41	3.41	3.30
Actual (OM)	2	2	2	0	0	2
EQI (OM)	0.59	0.59	0.59	0.00	0.00	0.61
IBI (OM)	2	2	2	0	0	2
Coleoptera families						
Predicted (CO)	3.75	3.75	3.75	3.75	3.75	3.75
Actual (CO)	3	3	3	3	2	3
EQI (CO)	0.80	0.80	0.80	0.80	0.53	0.80
IBI (CO)	3	3	3	3	2	3
Sum of Individual Metrics	14	13	12	6	8	13
Index of Biotic Integrity (%)	78%	72%	67%	33%	44%	72%
PSYM quality category (IBI >75% = Good, 51-75% = Moderate, 25-50% = Poor, <25% = V Poor)	Good	Moderate	Moderate	Poor	Poor	Moderate
Is this a Priority Pond? (Good quality category)	Yes	No	No	No	No	No

Pond number	7	8	9	10	11
Survey date	12-Jun-15	12-Jun-15	12-Jun-15	12-Jun-15	12-Jun-15
Grid reference	SE5797154061	SE5798754020	SE5794354013	SE5796554013	SE 57971 54071
<i>Plant metrics</i>					
No. of submerged + marginal plant species	15	15	11	15	19
Number of uncommon plant species	3	2	1	4	3
Trophic Ranking Score (TRS)	8.685714	8.916667	8.35	9.0125	8.757143
<i>Invertebrates metrics</i>					
ASPT	4.769231	4.615385	4.153846	4.769231	4.5
Odonata + Megaloptera (OM) families	2	2	1	2	2
Coleoptera families	3	3	3	4	3
<i>Environmental variables</i>					
Altitude (m)	9	9	9	9	9
Easting	4579	4579	4579	4579	4579
Northing	4540	4540	4540	4540	4540
Shade (%)	1	0	0	0	0
Inflow (0/1)	0	0	0	0	0
Grazing (%)	0	100	0	100	100
pH	7.2	7.2	7.2	7.2	7.2
Emergent plant cover (%)	65	30	80	7	30
Base clay (1-3)	3	3	3	3	3
Area (m ²)	100	45	105	120	30
<i>Results</i>					
Submerged + marginal plant species					
Predicted (SM)	16.8	16.4	17.0	17.1	16.1
Actual (SM)	15	15	11	15	19
EQI (SM)	0.89	0.92	0.65	0.88	1.18
IBI (SM)	3	3	2	3	3
Uncommon plant species					
Predicted (U)	3.3	3.3	3.4	3.4	3.3
Actual (U)	3	2	1	4	3
EQI (U)	0.90	0.60	0.30	1.18	0.92
IBI (U)	3	2	1	3	3

Trophic Ranking Score (TRS)					
Predicted (TRS)	6.90	6.74	6.86	6.88	6.68
Actual (TRS)	8.69	8.92	8.35	9.01	8.76
EQI (TRS)	1.26	1.32	1.22	1.31	1.31
IBI (TRS)	0	0	0	0	0
ASPT					
Predicted (ASPT)	5.10	5.11	5.11	5.09	5.11
Actual (ASPT)	4.77	4.62	4.15	4.77	4.50
EQI (ASPT)	0.93	0.90	0.81	0.94	0.88
IBI (ASPT)	3	3	2	3	3
Odonata + Megaloptera (OM) families					
Predicted (OM)	3.31	3.40	3.34	3.26	3.41
Actual (OM)	2	2	1	2	2
EQI (OM)	0.60	0.59	0.30	0.61	0.59
IBI (OM)	2	2	1	2	2
Coleoptera families					
Predicted (CO)	3.75	3.75	3.75	3.74	3.75
Actual (CO)	3	3	3	4	3
EQI (CO)	0.80	0.80	0.80	1.07	0.80
IBI (CO)	3	3	3	3	3
Sum of Individual Metrics	14	13	9	14	14
Index of Biotic Integrity (%)	78%	72%	50%	78%	78%
PSYM quality category (IBI >75% = Good, 51-75% = Moderate, 25-50% = Poor, <25% = V Poor)	Good	Moderate	Moderate	Good	Good
Is this a Priority Pond? (Good quality category)	Yes	No	No	Yes	Yes

SOUTH POND	
Survey date	16-Jul-15
Grid reference	SE 584 532
Plant metrics	
No. of submerged + marginal plant species	20
Number of uncommon plant species	3
Trophic Ranking Score (TRS)	8.85
Invertebrates metrics	
ASPT	4.428571
Odonata + Megaloptera (OM) families	1
Coleoptera families	3
Environmental variables	
Altitude (m)	7
Shade (%)	1
Inflow (0/1)	0
Grazing (%)	0
pH	7.5
Emergent plant cover (%)	15
Base clay (1-3)	3
Area (m²)	610

Results	
Submerged + marginal plant species	
Predicted (SM)	18.9
Actual (SM)	20
EQI (SM)	1.06
IBI (SM)	3
Uncommon plant species	
Predicted (U)	3.5
Actual (U)	3
EQI (U)	0.87
IBI (U)	3
Trophic Ranking Score (TRS)	
Predicted (TRS)	7.63
Actual (TRS)	8.85
EQI (TRS)	1.16
IBI (TRS)	1
ASPT	
Predicted (ASPT)	5.13
Actual (ASPT)	4.43
EQI (ASPT)	0.86
IBI (ASPT)	3
Odonata + Megaloptera (OM) families	
Predicted (OM)	3.16
Actual (OM)	1
EQI (OM)	0.32
IBI (OM)	1
Coleoptera families	
Predicted (CO)	3.78
Actual (CO)	3
EQI (CO)	0.79
IBI (CO)	3
Sum of Individual Metrics	14
Index of Biotic Integrity (%)	78%
PSYM quality category (IBI >75% = Good, 51-75% = Moderate, 25-50% = Poor, <25% = V Poor)	Good
Is this a Priority Pond? (Good quality category)	Yes

Appendix 2: invertebrate data

POND	SPECIES	ENGLISH NAME	FAMILY	NOTES	ORDER
1	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
1	<i>Cyphodyta marginellus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
1	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
1	<i>Enochrus testaceus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
1	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
1	<i>Helophorus aequalis</i>	a scavenger water beetle	Helophoridae		Coleoptera
1	<i>Notonecta</i> sp. nymph	a backswimmer	Notonectidae		Hemiptera
1	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
1	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
1	<i>Hydroporus planus</i>	a diving beetle	Dytiscidae		Coleoptera
1	<i>Hygrotus inaequalis</i>	a diving beetle	Dytiscidae		Coleoptera
1	<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae		Coleoptera
1	<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae		Coleoptera
1	<i>Haliplus ruficollis</i>	an algivorous water beetle	Haliplidae		Coleoptera
1	<i>Stratiomys singularior</i>	a soldier fly	Stratiomyidae	2 larvae	Diptera
1	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
1	<i>Sympetrum striolatum</i>	Common Darter larvae	Libellulidae		Odonata
1	Chironomidae other	non-biting midge larvae	Chironomidae		Diptera
1	<i>Chironomus</i> sp.	non-biting midge larvae	Chironomidae		Diptera
1	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
1	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
1	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
1	Scirtidae larvae	marsh beetle larvae	Scirtidae		Coleoptera
1	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
1	<i>Coenagrion puella</i>	Azure Damselfly larvae	Coenagrionidae		Odonata
2	<i>Notonecta</i> sp. nymph	a backswimmer	Notonectidae		Hemiptera
2	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
2	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
2	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
2	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
2	<i>Coenagrion puella</i>	Azure Damselfly larvae	Coenagrionidae		Odonata
2	<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae		Coleoptera
2	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
2	<i>Hydroglyphus pusillus</i>	a diving beetle	Dytiscidae		Coleoptera
2	<i>Hygrotus inaequalis</i>	a diving beetle	Dytiscidae		Coleoptera
2	<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae		Coleoptera

2	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
2	<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae		Coleoptera
2	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
2	<i>Enochrus testaceus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
2	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
2	<i>Helophorus aequalis</i>	a scavenger water beetle	Helophoridae		Coleoptera
2	<i>Helophorus grandis</i>	a scavenger water beetle	Helophoridae		Coleoptera
2	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
2	<i>Cymbiodyta marginellus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
2	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
2	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
2	<i>Haliplus ruficollis</i>	an algivorous water beetle	Halipidae		Coleoptera
2	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
2	Colymbetes fuscus larva	a diving beetle	Dytiscidae		Coleoptera
2	Gerris sp. Immature	a pond-skater	Gerridae		Hemiptera
2	Culicidae	mosquito larvae	Culicidae		Diptera
2	<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae		Coleoptera
2	Scirtidae	a marsh beetle	Scirtidae		Coleoptera
2	<i>Tanysphyrus lemnae</i>	Duckweed Weevil	Erirhinidae	10+	Coleoptera
2	Lumbricidae	a worm	Lumbricidae		Oligochaeta
2	<i>Libellula quadrimaculata</i>	Four-spotted Chaser larva	Libellulidae	1	Odonata
2	Chaoboridae	phantom midge larvae	Chaoboridae		Diptera
3	<i>Oplodontha viridula</i>	a soldier fly	Stratiomyidae	1 larva	Diptera
3	<i>Tanysphyrus lemnae</i>	Duckweed Weevil	Erirhinidae	1	Coleoptera
3	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
3	<i>Coenagrion puella</i>	Azure Damselfly larvae	Coenagrionidae		Odonata
3	<i>Sympetrum striolatum</i>	Common Darter larvae	Libellulidae		Odonata
3	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
3	<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
3	<i>Rhantus suturalis</i>	a diving beetle	Dytiscidae		Coleoptera
3	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
3	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
3	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
3	<i>Gerris sp. Immature</i>	a pond-skater	Gerridae		Hemiptera
3	<i>Corixidae immature</i>	a lesser water-boatman	Corixidae		Hemiptera
3	<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae		Coleoptera
3	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
3	<i>Hydroporus planus</i>	a diving beetle	Dytiscidae		Coleoptera
3	<i>Cymbiodyta marginellus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
3	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera

3	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
3	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
3	<i>Haliplus ruficollis</i>	an algivorous water beetle	Haliplidae		Coleoptera
3	<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae		Coleoptera
3	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
3	<i>Agabus sturmii</i>	a diving beetle	Dytiscidae		Coleoptera
3	<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae		Coleoptera
3	Notonecta sp. nymph	a backswimmer	Notonectidae		Hemiptera
3	<i>Hydroporus palustris</i>	a diving beetle	Dytiscidae		Coleoptera
3	<i>Coccidula rufa</i>	a ladybird	Coccinellidae		Coleoptera
3	Chaoboridae	phantom midge larvae	Chaoboridae		Diptera
4	<i>Dytiscus marginalis</i>	Great Diving Beetle	Dytiscidae	1 ♀	Coleoptera
4	<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae		Coleoptera
4	<i>Haliplus ruficollis</i>	an algivorous water beetle	Haliplidae		Coleoptera
4	Gerris sp. Immature	a pond-skater	Gerridae		Hemiptera
4	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
4	<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
4	<i>Helophorus aequalis</i>	a scavenger water beetle	Helophoridae		Coleoptera
4	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
4	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
4	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
4	<i>Helophorus obscurus</i>	a scavenger water beetle	Helophoridae		Coleoptera
4	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
4	Culicidae	mosquito larvae	Culicidae		Diptera
4	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
4	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
4	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
4	<i>Laccophilus minutus</i>	a diving beetle	Dytiscidae		Coleoptera
4	<i>Hesperocorixa sahlbergi</i>	a lesser water-boatman	Corixidae		Hemiptera
5	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
5	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
5	<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
5	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
5	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
5	<i>Hydroporus palustris</i>	a diving beetle	Dytiscidae		Coleoptera
5	<i>Hydroporus planus</i>	a diving beetle	Dytiscidae		Coleoptera
5	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
5	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
5	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
5	<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae		Coleoptera

5	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
5	<i>Helophorus griseus</i>	a scavenger water beetle	Helophoridae	1 ♂	Coleoptera
6	<i>Dytiscus</i> sp larva	a great diving beetle larva	Dytiscidae		Coleoptera
6	<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae		Coleoptera
6	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
6	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
6	<i>Hydroporus planus</i>	a diving beetle	Dytiscidae		Coleoptera
6	<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
6	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
6	Scirtidae	a marsh beetle	Scirtidae		Coleoptera
6	<i>Anisosticta 19-punctata</i>	Water Ladybird	Coccinellidae		Coleoptera
6	<i>Cymbiodyta marginellus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
6	<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae		Coleoptera
6	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
6	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
6	Dixidae	meniscus midge larvae	Dixidae		Diptera
6	<i>Coenagrion puella</i>	Azure Damselfly larvae	Coenagrionidae		Odonata
6	<i>Stratiomys singularior</i>	a soldier fly	Stratiomyidae	1 larva	Diptera
6	<i>Haliplus ruficollis</i>	an algivorous water beetle	Halipidae		Coleoptera
6	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
6	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
6	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
6	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
6	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
6	<i>Sympetrum striolatum</i>	Common Darter larvae	Libellulidae		Odonata
6	<i>Donacia vulgaris</i>	a reed beetle	Chrysomelidae	1	Coleoptera
6	<i>Haemopis sanguisuga</i>	Horse Leech	Haemopidae		Hirudinea
6	<i>Erpobdella octoculata</i>	a leech	Erpobdellidae		Hirudinea
6	<i>Coccidula rufa</i>	a ladybird	Coccinellidae		Coleoptera
6	<i>Haliplus obliquus</i>	an algivorous water beetle	Halipidae		Coleoptera
6	<i>Hygrotus inaequalis</i>	a diving beetle	Dytiscidae		Coleoptera
6	<i>Helochares lividus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
6	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
6	<i>Ilybius ater</i>	a diving beetle	Dytiscidae		Coleoptera
6	<i>Scirtes hemisphaericus</i>	a marsh beetle	Scirtidae		Coleoptera
6	Eristalini	a rat-tailed maggot	Syrphidae		Diptera
6	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
6	<i>Pisidium</i> sp	a pea mussel	Sphaeriidae		Mollusca
7	<i>Planorbis planorbis</i>	Ramshorn Snail	Planorbidae		Mollusca
7	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca

7	<i>Gerris lacustris</i>	Common Pond-skater	Gerridae		Hemiptera
7	<i>Oplodontha viridula</i>	a soldier fly	Stratiomyidae		Diptera
7	<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae		Coleoptera
7	<i>Hesperocorixa sahlbergi</i>	a lesser water-boatman	Corixidae		Hemiptera
7	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
7	<i>Anacaena globulus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
7	Dixidae	meniscus midge larvae	Dixidae		Diptera
7	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
7	<i>Hygrotus inaequalis</i>	a diving beetle	Dytiscidae		Coleoptera
7	Scirtidae larvae	marsh beetle larvae	Scirtidae		Coleoptera
7	<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae		Coleoptera
7	<i>Hydroporus palustris</i>	a diving beetle	Dytiscidae		Coleoptera
7	Coenagrionidae larvae	damselfly larvae	Coenagrionidae	damaged	Odonata
7	<i>Sympetrum striolatum</i>	Common Darter larvae	Libellulidae		Odonata
7	<i>Cloeon dipterum</i>	Pond Olive larvae	Baetidae		Ephemeroptera
7	<i>Notonecta</i> sp. nymph	a backswimmer	Notonectidae		Hemiptera
7	<i>Donacia simplex</i>	a reed beetle	Chrysomelidae		Coleoptera
7	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
7	<i>Agabus sturmii</i>	a diving beetle	Dytiscidae		Coleoptera
7	<i>Colymbetes fuscus</i>	a diving beetle	Dytiscidae		Coleoptera
7	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
7	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
7	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
7	<i>Hydroporus palustris</i>	a diving beetle	Dytiscidae		Coleoptera
7	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
7	Limnephilidae	caddis cases	Limnephilidae	empty puparia	Trichoptera
7	<i>Haliplus ruficollis</i>	an algivorous water beetle	Haliplidae		Coleoptera
7	<i>Dytiscus</i> sp larva	a great diving beetle larva	Dytiscidae		Coleoptera
11	<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae		Coleoptera
11	<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae		Coleoptera
11	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
11	<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
11	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
11	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
11	<i>Cymbiodyta marginellus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
11	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
11	<i>Haliplus ruficollis</i>	an algivorous water beetle	Haliplidae		Coleoptera
11	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
11	<i>Libellula quadrimaculata</i>	Four-spotted Chaser	Libellulidae		Odonata

		larva			
11	<i>Ischnura elegans</i>	Blue-tailed Damselfly larva	Coenagrionidae		Odonata
11	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
11	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
11	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
11	<i>Coelostoma orbiculare</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
11	Scirtidae sp	a marsh beetle	Scirtidae		Coleoptera
11	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
11	<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae		Coleoptera
11	<i>Oplodontha viridula</i>	a soldier fly	Stratiomyidae		Diptera
11	<i>Helophorus brevipalpis</i>	a scavenger water beetle	Helophoridae		Coleoptera
11	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
11	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
11	<i>Erpobdella testacea</i>	a leech	Erpobdellidae		Hirudinea
8	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
8	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
8	Notonecta sp. nymph	backswimmer	Notonectidae		Hemiptera
8	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
8	<i>Sympetrum striolatum</i>	Common Darter larvae	Libellulidae		Odonata
8	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
8	<i>Anisosticta 19-punctata</i>	Water Ladybird	Coccinellidae		Coleoptera
8	<i>Helochares lividus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
8	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
8	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
8	<i>Cymbiodyta marginellus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
8	<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae		Coleoptera
8	<i>Coenagrion puella</i>	Azure Damselfly larvae	Coenagrionidae		Odonata
8	<i>Helophorus grandis</i>	a scavenger water beetle	Helophoridae		Coleoptera
8	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
8	<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
8	<i>Hesperocorixa linnaei</i>	a lesser water-boatman	Corixidae		Hemiptera
8	Scirtidae sp	a marsh beetle	Scirtidae		Coleoptera
8	<i>Agabus sturmii</i>	a diving beetle	Dytiscidae		Coleoptera
8	<i>Haliphus ruficollis</i>	an algivorous water beetle	Haliplidae		Coleoptera
8	<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae		Coleoptera
8	<i>Haemopis sanguisuga</i>	Horse Leech	Haemopidae		Hirudinea
8	<i>Ilybius ater</i>	a diving beetle	Dytiscidae		Coleoptera
8	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
8	<i>Hydrometra stagnorum</i>	Water Measurer	Hydrometridae		Coleoptera
8	Chironomus sp.	non-biting midge larvae	Chironomidae		Diptera
8	<i>Oplodontha viridula</i>	a soldier fly	Stratiomyidae		Diptera

8	? <i>Dugesia</i> sp	a flatworm	Dugesiidae		Turbellaria
9	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
9	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
9	Coenagrionidae larvae	damselfly larvae	Coenagrionidae		Odonata
9	<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae		Coleoptera
9	<i>Agabus sturmii</i>	a diving beetle	Dytiscidae		Coleoptera
9	<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae		Coleoptera
9	<i>Cymbiodyta marginellus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
9	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
9	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
9	<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae		Coleoptera
9	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
9	<i>Laccobius bipunctatus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
9	<i>Enochrus testaceus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
9	<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae		Coleoptera
9	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
9	<i>Hydroporus planus</i>	a diving beetle	Dytiscidae		Coleoptera
9	<i>Pisidium</i> sp	a pea mussel	Sphaeriidae		Mollusca
9	<i>Helophorus minutus</i>	a scavenger water beetle	Helophoridae		Coleoptera
9	<i>Haliplus ruficollis</i>	an algivorous water beetle	Halipidae		Coleoptera
9	Chironomidae	non-biting midge larvae	Chironomidae		Diptera
9	Scirtidae larvae	marsh beetle larvae	Scirtidae		Coleoptera
9	Oligochaeta	worms	Oligochaeta		Oligochaeta
9	<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae		Coleoptera
9	Dixidae	meniscus midge larvae	Dixidae		Diptera
9	Limnephilidae	caddis pupal cases	Limnephilidae		Trichoptera
9	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
9	Dytiscus sp larva	a great diving beetle larva	Dytiscidae		Coleoptera
9	<i>Hydroporus incognitus</i>	a diving beetle	Dytiscidae		Coleoptera
9	<i>Oplodontha viridula</i>	a soldier fly	Stratiomyidae		Diptera
9	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae		Amphipoda
10	<i>Anisus leucostoma</i>	White-lipped Ramshorn snail	Planorbidae		Mollusca
10	<i>Ischnura elegans</i>	Blue-tailed Damselfly larva	Coenagrionidae		Odonata
10	<i>Sympetrum striolatum</i>	Common Darter larvae	Libellulidae		Odonata
10	<i>Orthetrum cancellatum</i>	Black-tailed Skimmer	Libellulidae		Odonata
10	<i>Gyrinus substriatus</i>	Common Whirligig	Gyrinidae		Coleoptera
10	<i>Notonecta</i> sp. nymph	a backswimmer	Notonectidae		Hemiptera
10	Corixidae immature	a lesser water-boatman	Corixidae		Hemiptera
10	<i>Gerris</i> sp. Immature	a pond-skater	Gerridae		Hemiptera
10	<i>Laccophilus minutus</i>	a diving beetle	Dytiscidae		Coleoptera

10	<i>Cloeon dipterum</i>	Pond Olive larvae	Baetidae		Ephemeroptera
10	<i>Haliplus obliquus</i>	an algivorous water beetle	Haliplidae		Coleoptera
10	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
10	<i>Helochares lividus</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
10	<i>Rhantus suturalis</i>	a diving beetle	Dytiscidae		Coleoptera
10	<i>Dytiscus marginalis</i>	Great Diving Beetle	Dytiscidae	1 ♂	Coleoptera
10	<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae		Isopoda
S	<i>Dugesia</i> sp.	a flatworm	Dugesiidae		Turbellaria
S	<i>Polycelis nigra</i>	a flatworm	Planariidae		Turbellaria
S	<i>Dendrocoelum lacteum</i>	a flatworm	Dendrocoelidae		Turbellaria
S	<i>Theromyzon tessulatum</i>	Duck Leech	Glossiphoniidae		Hirudinea
S	<i>Erpobdella octoculata</i>	a leech	Erpobdellidae		Hirudinea
S	<i>Erpobdella testacea</i>	a leech	Erpobdellidae		Hirudinea
S	<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangoncytidae		Amphipoda
S	<i>Asellus aquaticus</i>	Water Houglouse	Asellidae		Isopoda
S	<i>Radix balthica</i>	Wandering Snail	Lymnaeidae		Mollusca
S	<i>Planorbarius corneus</i>	Greater Ramshorn	Planorbidae		Mollusca
S	<i>Bathyomphalus contortus</i>	Twisted Ramshorn	Planorbidae		Mollusca
S	<i>Anisus vortex</i>	Whirlpool Ramshorn	Planorbidae		Mollusca
S	<i>Gyraulus albus</i>	White Ramshorn	Planorbidae		Mollusca
S	<i>Sphaerium corneum</i>	Capped Orb Mussel	Sphaeriidae		Mollusca
S	<i>Cloeon dipterum</i>	Pond Olive	Baetidae		Ephemeroptera
S	<i>Coenagrionidae</i> sp.	'blue' damselfly larva	Coenagrionidae		Odonata
S	<i>Nepa cinerea</i>	Water Scorpion	Nepidae		Hemiptera
S	<i>Corixa punctata</i>	a lesser water-boatman	Corixidae		Hemiptera
S	<i>Hesperocorixa sahlbergi</i>	a lesser water-boatman	Corixidae		Hemiptera
S	<i>Notonecta glauca</i>	Common Backswimmer	Notonectidae		Hemiptera
S	<i>Ilyocoris cimicoides</i>	Saucer Bug	Naucoridae		Hemiptera
S	<i>Gerris</i> sp. immature	a pond-skater	Gerridae		Hemiptera
S	<i>Haliplus ruficollis</i>	an algivorous water beetle	Haliplidae		Coleoptera
S	<i>Agabus sturmii</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Colymbetes fuscus</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Hydroporus figuratus</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Hydroporus palustris</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Hyphydrus ovatus</i>	a diving beetle	Dytiscidae		Coleoptera
S	<i>Helophorus brevipalpis</i>	a scavenger water beetle	Helophoridae		Coleoptera
S	<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
S	<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae		Coleoptera
S	<i>Hydraena riparia</i>	a small water beetle	Hydraenidae		Coleoptera
S	<i>Contacyphon laevipennis</i>	a marsh beetle	Scirtidae		Coleoptera
S	<i>Scirtes hemisphaericus</i>	a marsh beetle	Scirtidae		Coleoptera
S	<i>Limnephilus</i> sp.	caddis pupal case	Limnephilidae		Trichoptera
S	<i>Chironomus</i> sp.	non-biting midge larvae	Chironomidae		Diptera
S	Chironomidae (other)	non-biting midge larvae	Chironomidae		Diptera
S	Culicidae	mosquito larvae	Culicidae		Diptera

S	<i>Chaoborus</i> sp.	phantom midge larvae	Chaoboridae		Diptera
S	Dixidae	meniscus midge larvae	Dixidae		Diptera
S	<i>Eristalini</i> sp.	hoverfly larvae	Syrphidae		Diptera

Appendix 3: wetland plant lists

Botanical name	English name	1	2	3	4	5	6	7	8	9	10	11	S
<i>Agrostis stolonifera</i>	Creeping Bent	✓		✓	✓	✓						✓	
<i>Alisma plantago-aquatica</i>	Common Water Plantain		✓	✓			✓		✓	✓	✓	✓	
<i>Alopecurus geniculatus</i>	Marsh Foxtail		✓	✓	✓	✓	✓				✓		
<i>Apium inundatum</i>	Lesser Marshwort										✓		
<i>Callitrichie</i> sp.	Water-starwort						✓						
<i>Cardamine pratensis</i>	Lady's Smock		✓		✓	✓	✓		✓	✓		✓	
<i>Carex acuta</i>	Slender Tufted Sedge							✓					
<i>Carex disticha</i>	Brown Sedge						✓	✓				✓	
<i>Carex otrubae</i>	False Fox Sedge	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
<i>Carex vesicaria</i>	Bladder Sedge							✓					
<i>Chara vulgaris</i>	Common Stonewort	✓										✓	
<i>Deschampsia cespitosa</i>	Tufted Hair-grass		✓	✓	✓	✓			✓	✓	✓		
<i>Eleocharis palustris</i>	Common Spike-rush		✓	✓	✓	✓	✓		✓			✓	
<i>Epilobium hirsutum</i>	Greater Willowherb							✓	✓	✓			✓
<i>Epilobium parviflorum</i>	Lesser Hairy Willowherb	✓	✓						✓	✓			
<i>Filipendula ulmaria</i>	Meadowsweet		✓		✓	✓	✓	✓	✓	✓		✓	✓
<i>Galium palustre</i>	Common Marsh Bedstraw			✓									
<i>Glyceria fluitans</i>	Flote-grass	✓	✓	✓		✓	✓		✓		✓	✓	
<i>Glyceria maxima</i>	Reed Sweet-grass												✓
<i>Impatiens glandulifera</i>	Himalayan Balsam												✓
<i>Iris pseudacorus</i>	Yellow Flag								✓				✓
<i>Juncus articulatus</i>	Jointed Rush	✓	✓	✓		✓	✓		✓		✓	✓	✓
<i>Juncus buffonius</i>	Toad Rush						✓						
<i>Juncus effusus</i>	Soft Rush			✓		✓	✓					✓	✓
<i>Juncus inflexus</i>	Hard Rush		✓	✓	✓	✓	✓	✓				✓	
<i>Lemna minor</i>	Common Duckweed	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
<i>Lemna trisulca</i>	Ivy-leaved Duckweed		✓					✓		✓			✓
<i>Lotus pedunculatus</i>	Greater Bird's-foot Trefoil						✓					✓	✓
<i>Lycopus europaeus</i>	Gipsywort												✓
<i>Lysimachia vulgaris</i>	Yellow Loosestrife							✓	✓			✓	✓
<i>Lythrum salicaria</i>	Purple Loosestrife								✓			✓	✓
<i>Mentha aquatica</i>	Water Mint							✓	✓			✓	
<i>Myosotis scorpioides</i>	Water Forget-me-not		✓				✓	✓				✓	✓
<i>Nasturtium officinale</i>	Water-cress	✓	✓				✓		✓			✓	
<i>Oenanthe fistulosa</i>	Tubular Water-dropwort	✓	✓			✓	✓					✓	
<i>Persicaria amphibia</i>	Amphibious Bistort		✓										
<i>Phalaris arundinacea</i>	Reed Canary Grass	✓	✓	✓		✓	✓	✓	✓				✓
<i>Phragmites australis</i>	Common Reed										✓	✓	✓
<i>Potamogeton crispus</i>	Curled Pondweed												
<i>Ranunculus aquatilis</i>	Common Water-crowfoot							✓				✓	
<i>Ranunculus sceleratus</i>	Celery-leaved Buttercup	✓						✓					
<i>Ranunculus trichophyllus</i>	Thread-leaved Water-crowfoot	✓						✓	✓			✓	
<i>Silene flos-cuculi</i>	Ragged Robin			✓									✓

<i>Sparganium erectum</i>	Branched Bur-reed						✓	✓				✓	✓
<i>Stratiotes aloides</i>	Water Soldier												✓
<i>Thalictrum flavum</i>	Meadow-rue		✓										
<i>Typha angustifolia</i>	Lesser Reedmace										✓		
<i>Typha latifolia</i>	Greater Reedmace	✓		✓			✓	✓	✓	✓	✓		✓
<i>Veronica beccabunga</i>	Brooklime					✓							
<i>Veronica catenata</i>	Pink Water Speedwell	✓		✓			✓	✓		✓			