

Survey of ponds at Furze Allotment, Great Hockham



A

report for the Freshwater Habitats Trust

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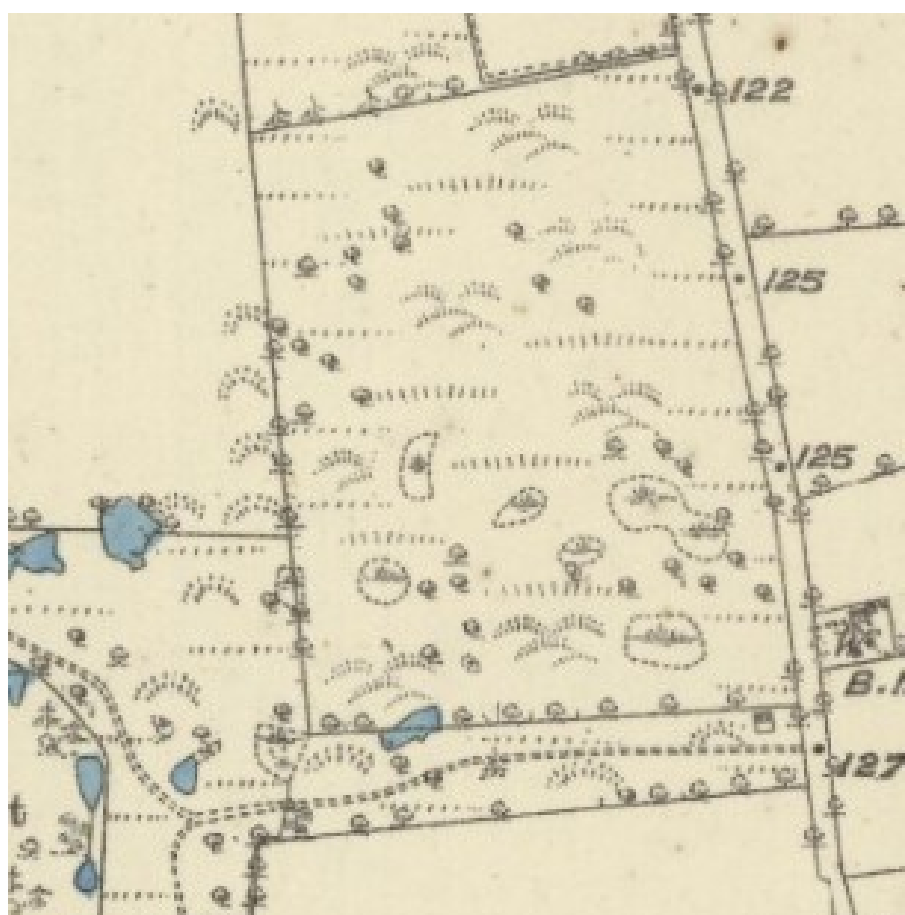
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1. Introduction

Furze Allotment is an area of around 4 hectares to the west of the Forestry Commission's Fox Covert/Frost's Plantation woodland at Great Hockham. Bisected by the A1075, it is predominantly secondary birch woodland but with a scattering of old oak trees. The herb flora is characterised by species of acidic, peaty or sandy soils such as Purple Moor-grass and Wavy Hair-grass.

Furze Allotment is managed by the Fuel and Furze Trustees. It is one of several Breckland 'allotments' set aside at the time of the Enclosures to provide gorse (furze) as fuel for the poorer inhabitants of the Parish. The Allotment contains two permanent ponds on each side of the A1075 as well as several other seasonally or intermittently wet hollows. These have been listed as "presumed peri-glacial ground-ice depressions"¹, commonly known as pingos but referred to more technically as palsa-scars or lithopalsas. These are marked as vegetation-filled wet hollows on the first edition 25" Ordnance Survey map of 1885 (excerpt below).



This survey was undertaken on behalf of the Freshwater Habitats Trust, with kind permission of the Trustees, to provide information on the ecological value of ponds on the site.

¹ A. Walmsley (2008). *The Norfolk 'pingo' mapping project, 2007-2008*. Norfolk Wildlife Trust report.

2. Survey methods

General surveys of aquatic invertebrates were undertaken in five ponds to the west of the A1075 and two ponds to the east on 24th April 2018. On 14th May 2018, Ponds C & D were re-surveyed using PSYM, the standard methodology for assessing the ecological quality of ponds and small lakes (see Appendix 1 for details).

3. The ponds surveyed

Pond A (West) TL 94870 93413



This large, permanent pond is on the boundary between the Furze Allotment and the Forestry Commission's Fox Covert woodland. By early summer, duckweed covers much of the open water surface but there are grass mats and rush tussocks in the margins. A water sample collected on 24th April gave a pH reading of 6.34 with electrical conductivity of 990 $\mu\text{S}/\text{cm}^{-1}$. The latter is a very high reading and suggests pollution from road or agricultural run-off.

Thirty aquatic macro-invertebrate taxa² were recorded on 24th April. Amongst these were the Near Threatened³ water beetles *Hydrochus crenatus*, *Enochrus nigrinus* and *Limnebius aluta* and the Nationally Scarce *Hydroporus neglectus* and *Helochaeres punctatus*.

² A *taxon* (plural *taxa*) is an organism identified to species or other level (e.g. most fly larvae were only identified to Family level in this survey).

³ Conservation designations are explained in the relevant reviews: Foster (2010) for water beetles; Dauget *et al* (2008) for damselflies and dragonflies and Wallace (2016) for caddisflies. In brief, Near Threatened species are

Pond B (West) TL 94905 93433

This is a shallow, seasonal, grassy hollow in birch - Purple Moor-grass woodland. A water sample collected on 24th April gave a pH reading of 4.24 with electrical conductivity of 330 $\mu\text{S}/\text{cm}^{-1}$. Eleven aquatic invertebrate taxa were found on 24th April including the Nationally Scarce water beetles *Hydroporus neglectus* and *Helophorus strigifrons*.



Pond C (West) TL 94854 93480

This large, permanent pond is surrounded by a 'rampart' of raised ground characteristic of pingos (cover photo). It has varied vegetation structure including Tufted Sedge *Carex elata* tussocks, a small stand of Greater Reedmace *Typha latifolia*, grass mats and low emergent vegetation, stands of Broad-leaved Pondweed *Potamogeton natans* and beds of Water Violet *Hottonia palustris*. A water sample collected on 24th April gave a pH reading of 6.55 with electrical conductivity of 190 $\mu\text{S}/\text{cm}^{-1}$. A second sample collected on 14th May gave a pH of 6.68 with electrical conductivity again of 190 $\mu\text{S}/\text{cm}^{-1}$.

A remarkable 65 aquatic invertebrate taxa were recorded from Pond C over the two visits (38 taxa were identified from the PSYM sample collected on 14th May). These included the Near Threatened water beetles *Agabus uliginosus*, *Enochrus nigritus*, *Hydraena palustris* and *Limnebius aluta*; the Nationally Scarce water beetles *Hydaticus seminiger*, *Hydroporus neglectus* and *Helochaeres punctatus*; and the Nationally Scarce caddisfly *Trichostegia minor*.

not currently in danger but are close to qualifying for threatened status. These are usually species with very limited distributions, species associated with vulnerable habitats or those believed to be in serious decline. Nationally Scarce species are very localised in Great Britain and are believed to occur in 100 or fewer hectads (10 km grid squares).

PSYM assessment produced an overall quality score (known as the Index of Biotic Integrity) of 89%, placing this pond in the top (**Good**) category for ecological quality. It scored highly for diversity of submerged and emergent plants and representation of uncommon wetland plants. It scored moderately for trophic status because the flora suggested more nutrient-rich conditions than predicted for an undegraded pond with similar characteristics. Scores for biological water quality and diversity of water beetle families were good but representation of damselfly and dragonfly families was only moderate.

Pond D (West) TL 95067 93797



This is another fairly large, permanent pingo but has more abrupt edges than Pond C. There are patchy grass mats in the shallow margins, floating duckweed vegetation (including the aquatic liverwort *Riccia fluitans*) but only small amounts of Water Violet. A water sample collected on 24th April gave a pH reading of 6.62 with electrical conductivity of 210 $\mu\text{S}/\text{cm}^{-1}$. A second sample collected on 14th May gave a pH of 6.60 with electrical conductivity of 250 $\mu\text{S}/\text{cm}$.

A total of 45 aquatic invertebrate taxa were recorded from Pond D during the two visits (30 in the PSYM sample collected on 14th May). Amongst these were a larva of the Near Threatened Variable Damselfly *Coenagrion pulchellum*; the Near Threatened water beetles *Hydrochus crenatus* and *Limnebius aluta*; and the Nationally Scarce water beetles *Hydaticus seminiger*, *Hydroporus neglectus*, *Clemnius decoratus*, *Helochares punctatus* and *Contacyphon pubescens*.

As with Pond C, PSYM assessment produced an Index of Biotic Integrity of 89%, placing this water body in the top (**Good**) category for ecological quality. It scored highly for diversity of submerged and emergent plants, representation of uncommon wetland plants and trophic status. Scores for biological water quality and diversity of water beetle families were good but representation of damselfly and dragonfly families was poor.

Pond E (West) TL 94921 93580

A seasonal pool amongst birch and willow woodland with rush tussocks, floating grass mats and a few plants of Tufted Sedge. A water sample collected on 24th April gave a pH reading of 4.38 with electrical conductivity of 110 $\mu\text{S}/\text{cm}^{-1}$. Eleven aquatic invertebrate taxa were recorded on that date, including the Near Threatened diving beetle *Agabus uliginosus*.

Pond F (East) TL 94996 93453

This pond is part-shaded by a collapsed willow. Marginal vegetation includes Soft Rush, Greater Reedmace, Greater Yellowcress *Rorippa amphibia* and the invasive Himalayan Balsam *Impatiens glandulifera*. Water Violet is present in deeper water. A water sample collected on 24th April gave a pH reading of 6.12 with electrical conductivity of 120 $\mu\text{S}/\text{cm}^{-1}$.

This pond produced 28 aquatic macro-invertebrate taxa on 24th April. These included the Near Threatened scavenger water beetles *Hydrochus crenatus* and *Enochrus nigrinus* and the Nationally Scarce water beetles *Cleminius decoratus*, *Hydaticus seminiger*, *Helophorus strigifrons* and *Helochares punctatus*.



Pond G (East) TL 95020 93507

This steep-sided pond was difficult to access on 24th April; due to the wet spring, the water line was up amongst terrestrial vegetation. Marginal species include Greater Reedmace, Woody Nightshade *Solanum dulcamara*, Greater Yellow cress and Himalayan Balsam; submerged vegetation is present but could not be seen properly. A water sample collected on 24th April gave a pH reading of 7.58 with electrical conductivity of 790 $\mu\text{S}/\text{cm}^{-1}$. The latter reading is higher than expected and, as with Pond A, may suggest pollution.

As a result of limited access, only ten aquatic macro-invertebrate taxa were recorded. These included the Near Threatened scavenger water beetle *Enochrus nigrinus*.

4. Results

4.1 Water chemistry

Water pH ranged from 4.24 (Pond B) to 7.58 (Pond G). Shallow, seasonal pools (Ponds B and E) were markedly acidic, reflecting the soil conditions on the site. The larger, more permanent ponds are only marginally acidic with the relatively high pH reading for Pond G possibly associated with pollution rather than natural conditions.

Electrical conductivity (a measure of the concentration of dissolved substances) ranged from 110 $\mu\text{S}/\text{cm}^{-1}$ in Pond E to 990 $\mu\text{S}/\text{cm}^{-1}$ in Pond A. Most readings were relatively low and probably reflect more-or-less natural water chemistry. The much higher readings obtained for Ponds A and G are unlikely to be natural.

4.2 Aquatic invertebrates

Eighty aquatic invertebrate taxa were recorded over the two visits (Appendix 2). Species categorised as Near Threatened included Variable Damselfly and the water beetles *Agabus uliginosus*, *Hydrochus crenatus*, *Enochrus nigrinus*, *Hydraena palustris* and *Limnebius aluta*. Nationally Scarce species included the caddisfly *Trichostegia minor* and the water beetles *Hydaticus seminiger*, *Hydroporus neglectus*, *Clemnius decoratus*, *Helophorus strigifrons*, *Helochaeres punctatus* and *Contacyphon pubescens*. Several other localised and uncommon species were found such as the diving beetles *Agabus unguicularis*, the scavenger water beetle *Cercyon sternalis* and the soldierfly *Odontomyia tigrina*.

Furze Allotment apparently lacks the very rare *Hydroporus* and *Dryops* species found on the highest quality pingo sites such as Thompson Common, the absence of mossy pond edges perhaps being a limiting factor. Nonetheless, this site is of exceptional value for wetland invertebrates including several species confined to ancient fens.

4.3 Vertebrates

Amphibian records from 24th April records are given in Table 1.

Pond	Smooth Newt	Common Frog
A	1 male, 1 female	
C	9	1
D	1 male	
F		several

Table 1: amphibian records

4.4 Wetland plants

A total of 28 wetland plants were recorded, mainly based on the PSYM surveys of Ponds C & D (Appendix 3). Uncommon or declining species included Tufted Sedge, Orange Foxtail *Alopecurus aequalis*, Water Violet, Fine-leaved Water-dropwort *Oenanthe aquatica* and Lesser Spearwort *Ranunculus flammula*.

5. Notable species

Variable Damselfly, *Coenagrion pulchella* (Coenagrionidae)

Conservation status: Near Threatened

This uncommon 'blue' damselfly has localised populations concentrated in: East Anglia; Fenland; the grazing levels of south-east England, Somerset and Gwent; the Cheshire Plain; and south-west Scotland. Variable Damselfly appears to have declined significantly in recent decades (Dauget *et al*, 2008). It is well-known species of Thompson Common, also recorded from Stow Bedon Fuel Allotment and Frosts's Common. A single larva was collected from Pond D on 14th May.

Agabus uliginosus, a diving beetle (family Dytiscidae)

Conservation status: Near Threatened

Agabus uliginosus is a mid-sized diving beetle found in seasonal pools and richly-vegetated pond margins, usually in long-established wetlands. Breckland is one of its main centres. At Furze Allotment, this species was found in Ponds C & E, both west of the A1075.

Hydaticus seminiger, a diving beetle (Dytiscidae)

Conservation status: Nationally Scarce

A fairly large diving beetle associated with densely-vegetated or shaded ponds, *H. seminiger* occurs locally in East Anglia, south-east England, the Somerset Levels and the Cheshire Plain. In Breckland, this species is often found in seasonal ponds overhung by bushes. At Furze Allotment it was found in Ponds C, D & F.

Hydroporus neglectus, a diving beetle (Dytiscidae)

Conservation status: Nationally Scarce

A tiny diving beetle found mainly in moss or leaf litter in shallow pools. It has a restricted and patchy distribution, mainly in eastern England. Found in Ponds A, B, C & D, all in the western part of the Allotment.

Clemnius decoratus, a diving beetle (Dytiscidae)

Conservation status: Nationally Scarce

Formerly known as *Hygrotus decoratus*, this small but attractively marked diving beetle has a similar distribution to *Hydroporus neglectus*. It was found in Pond F, east of the A1075.

Helophorus strigifrons, a scavenger water beetle (Hydrophilidae)

Conservation status: Nationally Scarce

A beetle found in seasonal pools which dry out in summer, in fens and floodplain swamps. Widespread but very local and usually associated with long-established wetlands. Single specimens were collected from Ponds B & F. There are nearby records from Oldhouse Yard Plantation and Thompson Common.

Hydrochus crenatus, a scavenger water beetle (Hydrochidae)

Conservation status: Near Threatened

A small water beetle found amongst emergent vegetation or plant debris at the edge of ponds or reedy ditches. *Hydrochus crenatus* has a very limited distribution centred on the Brecks and the Fens though it is not restricted to ancient wetlands. It is widespread and frequent in better quality pingos. Recorded from Ponds A, D & F.

Helochaeres punctatus, a scavenger water beetle (Hydrophilidae)

Conservation status: Nationally Scarce

Found in Ponds A, C, D & F, *H. punctatus* is common in pingos. It is a widespread but local beetle nationally.

Enochrus nigrinus, a scavenger water beetle (Hydrophilidae)

Conservation status: Near Threatened

This species occurs very locally in long-established wetlands in the southern half of England, though it is not as strictly confined to 'relict' habitats as some other water beetles. *Enochrus nigrinus* was collected in modest numbers from Ponds A, C, F and G. It is widespread on Frost's Common and Thompson Common.

Hydraena palustris, a small water beetle (Hydraenidae)

Conservation status: Near Threatened

This small beetle occurs amongst saturated plant litter in ancient fens and is restricted to a small number of locations in East Anglia and Cambridgeshire with an isolated site in East Yorkshire. There are nearby records from Thompson Common, Stow Bedon Common and STANTA but in my experience *Hydraena palustris* is rare even in high quality pingos. A single specimen was collected from Pond C.

Limnebius aluta, a small water beetle (Hydraenidae)

Conservation status: Near Threatened

A tiny beetle found in silt and plant litter at the edges of ponds and pools in fens. *Limnebius aluta* appears to be confined to ancient wetlands, though it may be able to fly short distances. Found in good numbers in Ponds A, C & D.

Contacyphon pubescens, a marsh beetle (Scirtidae)

Conservation status: Nationally Scarce

Collected from Pond D, this beetle has aquatic larvae with the adults found amongst emergent vegetation. A lowland fen species with a thinly scattered distribution.

Trichostegia minor, a caddisfly (Phryganeidae)

Conservation status: Nationally Scarce

As a larva, this caddis makes its case from pieces of dead tree leaves and is associated with shaded, shallow water. It is localised and uncommon nationally but not infrequent in the Breckland pingo systems. A larva was collected from Pond C on 14th May.

6. References

Daguet, C.A., French, G.C. & Taylor, P. (2008). *The Odonata Red Data List for Great Britain. Species Status 11*: 1-34. Joint Nature Conservation Committee: Peterborough.

Foster, G.N. (2010). *A review of the scarce and threatened Coleoptera of Great Britain, Part 3: water beetles of Great Britain*. Joint Nature Conservation Committee: Peterborough.

Stroh, P.A., Leach, S.J., August, T.A., Walker, K.J., Pearman, D.A., Rumsey, F.J., Harrower, C.A., Fay, M.F., Martin, J.P., Pankhurst, T., Preston, C.D. & Taylor, I. (2014). *A vascular plant Red List for England*. Botanical Society of Britain and Ireland: Bristol.

Wallace, I.D. (2016). *A review of the status of the caddis flies (Trichoptera) of Great Britain*. Species Status No.27. Natural England Commissioned Reports, Number191.

Appendix 1:

Summary of PSYM methodology with data and output for Ponds C & D

PSYM (Predictive System for Multimetrics) is the standard methodology for monitoring the ecological quality of still waters, developed by the Environment Agency and Pond Conservation (now the Freshwater Habitats Trust) (Environment Agency, 2002). It uses six 'metrics' (measurements) representing important indicators of ecological quality. The botanical survey involves a careful examination of each pond to record wetland plants listed on the PSYM pro-forma. The three botanical metrics are:

- diversity of emergent and submerged plant species
- the number of uncommon wetland plant species
- Trophic Ranking Score (TRS, an indication of nutrient status based on selected 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 most material was identified to species level to add value to the data. Because pingos are known to support important populations of rare species, samples were sorted in a white polythene tray on the bankside, to avoid removing large numbers of individuals (normally PSYM samples are preserved in bulk and sorted in the laboratory). Material was either identified in the field or preserved for identification at a later date. The three invertebrate metrics are:

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

Environmental data obtained for each pond include surface area, altitude, grid reference, water pH, presence/absence of inflows, substrate composition, degree of shade, accessibility to livestock and cover of emergent vegetation.

The results are analysed using software which compares the observed data with values predicted from a large reference dataset of undegraded ponds. PSYM 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 an overall indication 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%.

<i>Site details</i>		
Site name	Furze Allotment Pond C	Furze Allotment Pond D
Survey date	14-May-18	14-May-18
Grid reference (e.g. SP123456 or higher precision)	TL948934	TL948935
<i>Plant metrics</i>		
No. of submerged + marginal plant species (not including floating leaved)	18	15
Number of uncommon plant species	8	6
Trophic Ranking Score (TRS)	9.375	9
<i>Invertebrates metrics</i>		
ASPT	4.933333333	4.8
Odonata + Megaloptera (OM) families	2	1
Coleoptera families	3	3
<i>Environmental variables</i>		
Altitude (m)	38	38
Easting	5948	5948
Northing	2934	2935
Shade (%)	10	10
Inflow (0/1)	0	0
Grazing (%)	0	0
pH	6.68	6.6
Emergent plant cover (%)	15	10
Base clay (1-3)	3	3
Base sand, gravel, cobbles (1-3)	1	1
Base peat (1-3)	1	1
Base rock (1-3)	1	1
Area (m²)	450	350
Results		
Submerged + marginal plant species		
Predicted (SM)	18.3	17.5
Actual (SM)	18	15
EQI (SM)	0.98	0.86
IBI (SM)	3	3
Uncommon plant species		
Predicted (U)	3.2	3.0
Actual (U)	8	6
EQI (U)	2.53	1.98
IBI (U)	3	3
Trophic Ranking Score (TRS)		
Predicted (TRS)	8.67	8.65
Actual (TRS)	9.38	9.00
EQI (TRS)	1.08	1.04
IBI (TRS)	2	3

ASPT		
Predicted (ASPT)	5.09	5.08
Actual (ASPT)	4.93	4.80
EQI (ASPT)	0.97	0.94
IBI (ASPT)	3	3
Odonata + Megaloptera (OM) families		
Predicted (OM)	3.18	3.18
Actual (OM)	2	1
EQI (OM)	0.63	0.31
IBI (OM)	2	1
Coleoptera families		
Predicted (CO)	3.74	3.74
Actual (CO)	3	3
EQI (CO)	0.80	0.80
IBI (CO)	3	3
Sum of Individual Metrics	16	16
Index of Biotic Integrity (%)	89%	89%
PSYM quality category (IBI >75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)	Good	Good
Is this a Priority Pond? (Good quality category)	Yes	Yes

Appendix 2: Aquatic invertebrates recorded at Furze Allotment, April/May 2018

Species/Taxon	English name	Family	Order	GB status
Oligochaeta	worms	Oligochaeta	Oligochaeta	
<i>Erpobdella testacea</i>	a leech	Erpobdellidae	Hirudinea	
<i>Anisus leucostoma</i>	White-lipped Ram's-horn snail	Planorbidae	Gastropoda	
<i>Pisidium</i> sp.	a pea-mussel	Sphaeriidae	Bivalvia	
<i>Asellus aquaticus</i>	Water Hoglouse	Asellidae	Isopoda	
<i>Crangonyx pseudogracilis</i>	an amphipod shrimp	Crangonyctidae	Amphipoda	
<i>Coenagrion puella</i>	Azure Damselfly	Coenagrionidae	Odonata	
<i>Coenagrion pulchellum</i>	Variable Damselfly	Coenagrionidae	Odonata	Near Threatened
<i>Orthetrum cancellatum</i>	Black-tailed Skimmer	Libellulidae	Odonata	
<i>Nepa cinerea</i>	Water Scorpion	Nepidae	Hemiptera	
<i>Hesperocorixa sahlbergi</i>	a lesser water-boatman	Corixidae	Hemiptera	
<i>Notonecta glauca</i>	Common Backswimmer	Notonectidae	Hemiptera	
<i>Ilyocoris cimicoides</i>	Saucer Bug	Naucoridae	Hemiptera	
<i>Hydrometra stagnorum</i>	Water-measurer	Hydrometridae	Hemiptera	
<i>Gerris lacustris</i>	Common Pond-skater	Gerridae	Hemiptera	
<i>Gerris odontogaster</i>	Toothed Pond-skater	Gerridae	Hemiptera	
<i>Velia caprai</i>	Water Cricket	Veliidae	Hemiptera	
<i>Gyrinus substriatus</i>	Common Whirligig	Gyrinidae	Coleoptera	
<i>Haliphus lineatocollis</i>	an algivorous water beetle	Haliplidae	Coleoptera	
<i>Haliphus ruficollis</i>	an algivorous water beetle	Haliplidae	Coleoptera	
<i>Noterus clavicornis</i>	a burrowing water beetle	Noteridae	Coleoptera	
<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Agabus sturmii</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Agabus uliginosus</i>	a diving beetle	Dytiscidae	Coleoptera	Near Threatened
<i>Agabus unguicularis</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Ilybius ater</i>	a diving beetle	Dytiscidae	Coleoptera	

<i>Ilybius montanus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Liopterus haemorrhoidalis</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Nartus grapii</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Rhantus exsoletus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Colymbetes fuscus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydaticus seminiger</i>	a diving beetle	Dytiscidae	Coleoptera	Nationally Scarce
<i>Acilius sulcatus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Dytiscus</i> sp. (not <i>semisulcatus</i>)	great diving beetle larvae	Dytiscidae	Coleoptera	
<i>Hydroporus angustatus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydroporus erythrocephalus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydroporus gyllenhalii</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydroporus incognitus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydroporus memnonius</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydroporus neglectus</i>	a diving beetle	Dytiscidae	Coleoptera	Nationally Scarce
<i>Hydroporus palustris</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydroporus planus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hydroporus striola</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Porhydrus lineatus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Clemnius decoratus</i>	a diving beetle	Dytiscidae	Coleoptera	Nationally Scarce
<i>Hygrotus inaequalis</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Hyphydrus ovatus</i>	a diving beetle	Dytiscidae	Coleoptera	
<i>Helophorus flavipes/obscurus</i>	a scavenger water beetle	Helophoridae	Coleoptera	
<i>Helophorus grandis</i>	a scavenger water beetle	Helophoridae	Coleoptera	
<i>Helophorus strigifrons</i>	a scavenger water beetle	Helophoridae	Coleoptera	Nationally Scarce
<i>Hydrochus crenatus</i>	a scavenger water beetle	Hydrochidae	Coleoptera	Near Threatened
<i>Anacaena bipustulata</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Anacaena globulus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Anacaena limbata</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	

<i>Cymbiodyta marginellus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Enochrus coarctatus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Enochrus nigritus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	Near Threatened
<i>Enochrus ochropterus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Helochares punctatus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	Nationally Scarce
<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Hydrobius rottenbergii</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Hydrobius subrotundus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Coelostoma orbiculare</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Cercyon convexiusculus</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Cercyon sternalis</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	
<i>Hydraena palustris</i>	a small water beetle	Hydraenidae	Coleoptera	Near Threatened
<i>Hydraena riparia</i>	a small water beetle	Hydraenidae	Coleoptera	
<i>Hydraena testacea</i>	a small water beetle	Hydraenidae	Coleoptera	
<i>Limnebius aluta</i>	a small water beetle	Hydraenidae	Coleoptera	Near Threatened
<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae	Coleoptera	
<i>Contacyphon pubescens</i>	a marsh beetle	Scirtidae	Coleoptera	Nationally Scarce
<i>Tanysphyrus lemnae</i>	Duckweed Weevil	Eirrhinidae	Coleoptera	
Chironomidae	non-biting midge larvae	Chironomidae	Diptera	
Culicidae	mosquito larvae	Culicidae	Diptera	
Dixidae	meniscus midge larvae	Dixidae	Diptera	
<i>Odontomyia tigrina</i>	a soldierfly	Stratiomyidae	Diptera	
<i>Trichostegia minor</i>	a caddisfly	Phryganeidae	Trichoptera	Nationally Scarce
<i>Limnephilus flavicornis</i>	a caddis fly	Limnephilidae	Trichoptera	
<i>Limnephilus stigma</i>	a caddisfly	Limnephilidae	Trichoptera	
<i>Limnephilus sp. (other)</i>	a caddisfly	Limnephilidae	Trichoptera	

Appendix 3: Wetland plants recorded from Furze Allotment

Species	English name	English status ⁴
<i>Agrostis canina</i>	Velvet Bent	
<i>Agrostis stolonifera</i>	Creeping Bent	
<i>Alopecurus aequalis</i>	Orange Foxtail	
<i>Calamagrostis epigejos</i>	Wood Small-reed	
<i>Callitriche</i> sp.	a water-starwort	
<i>Carex elata</i>	Tufted Sedge	Near Threatened
<i>Cirsium palustre</i>	Marsh Thistle	
<i>Epilobium</i> sp. (other)	a willowherb	
<i>Galium palustre</i>	Common Marsh Bedstraw	
<i>Glyceria fluitans</i>	Flote-grass	
<i>Hottonia palustris</i>	Water Violet	Near Threatened
<i>Impatiens glandulifera</i>	Himalayan Balsam ⁵	
<i>Iris pseudacorus</i>	Yellow Flag	
<i>Juncus effusus</i>	Soft Rush	
<i>Lemna minor</i>	Common Duckweed	
<i>Lemna minuta</i>	Least Duckweed	
<i>Lemna trisulca</i>	Ivy-leaved Duckweed	
<i>Lycopus europaeus</i>	Gipsywort	
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	
<i>Lythrum salicaria</i>	Purple Loosestrife	
<i>Molinia caerulea</i>	Purple Moor-grass	
<i>Oenanthe aquatica</i>	Fine-leaved Water-dropwort	
<i>Phalaris arundinacea</i>	Reed Canary-grass	
<i>Potamogeton natans</i>	Broad-leaved Pondweed	
<i>Ranunculus flammula</i>	Lesser Spearwort	Vulnerable
<i>Riccia fluitans</i>	Floating Crystalwort	
<i>Rorippa amphibia</i>	Greater Yellowcress	
<i>Stellaria uliginosa</i>	Bog Stitchwort	
<i>Typha latifolia</i>	Greater Reedmace	

⁴ See Stroh *et al* (2014)

⁵ This invasive alien was only noted east of the road