



Pond A at The Snook

PSYM survey
of
two ponds at

The Snook,
Lindisfarne

A report for
Freshwater Habitats
Trust

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Summary

Two ponds at The Snook, Lindisfarne were surveyed using the PSYM survey method in June 2017. In addition invertebrates were recorded to species level where possible and all plants were recorded to species level.

Both ponds can be considered as Priority Ponds as both scored in the **Good** category for ecological quality. Both ponds could also be considered as EU Habitats Directive Annex 1 habitat due to the shoreweed vegetation.

38 plants and 37 invertebrates were recorded in total including several noteworthy species.

1. Introduction

This survey was undertaken to assess the biodiversity value of two ponds at The Snook, part of Lindisfarne National Nature Reserve. Ptyxis Ecology was commissioned by the Freshwater Habitats Trust as part of the Flagship Ponds project to undertake the work. Fieldwork was undertaken by John O'Reilly (botanical survey) and Martin Hammond (invertebrates) on 15th June 2017.

2. Survey methods

The ponds were surveyed and assessed using PSYM (**P**redictive **S**ystem for **M**ultimetrics), the standard methodology for evaluating the ecological quality of ponds and small lakes (Environment Agency, 2002). PSYM survey involves:

- Obtaining environmental data such as pond area, altitude, grid reference, substrate composition, cover of emergent vegetation, degree of shade, accessibility to livestock and water pH;
- Collecting a sample of aquatic macro-invertebrates using a standard protocol (three minutes' netting divided equally between each 'meso-habitat' within the pond basin, plus one minute searching the water surface and submerged debris);
- Recording wetland plants.

PSYM generates 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 plant species;
- Trophic Ranking Score (TRS, an estimation of nutrient status based on plant indicators).

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.

The results were analysed using software which compared 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. Ponds are then categorised as Very Poor, Poor, Medium or Good.

Whilst PSYM required only family-level identification of invertebrates, material was identified to species level wherever possible. Also, the botanical survey aspect of PSYM only requires identification of a list of wetland indicator species. However in this survey we recorded all plants, including charophytes and bryophytes to species level.

PSYM data and analysis are presented in Appendix 1.

3. The ponds surveyed

Pond A (NU 102 435)

This was the large, shallow pond covering around 1390 m², located 300 metres north-west of the Snook car park. It had sparse but extensive submerged vegetation dominated by shoreweed *Littorella lacustris* with small amounts of the stonewort *Chara vulgaris*. Patches of common sedge *Carex nigra* and common spike-rush *Eleocharis palustris* were abundant amongst diverse marginal vegetation. Tall emergents such as grey club-rush *Schoenoplectus tabernaemontani* and sea club-rush *Bolboschoenus maritimus* formed only small patches.

Pond A was embedded within a large tract of dune-slack fen dominated by black bog-rush *Schoenus nigricans*, making it difficult to define its southern edge. These ill-defined edges often had short bare areas or a carpet of spongy vegetation with mixtures of shoreweed, marsh pennywort *Hydrocotyle vulgaris*, brookweed *Samolus valerandi* and the moss *Drepanocladus aduncus*. Other areas around the edges were dominated by the grass creeping bent *Agrostis stolonifera*.

A water sample produced a pH reading of 7.66 with electrical conductivity (a measure of solute content) of 890 $\mu\text{S}/\text{cm}^{-1}$.

Twenty-seven aquatic macro-invertebrate taxa were identified from the PSYM sample with water bugs (33%) and water beetles (48%) making up most of the taxa. Lesser water-boatmen (Corixidae) were diverse and abundant. The Nationally Scarce long-toed water beetle *Dryops similis* was present in good numbers around the edge of the pond, as it had been in August 2016. Five additional aquatic invertebrate species were collected from Pond A on a visit in August 2016 (see Appendix 4).

PSYM analysis produced an Index of Biotic Integrity of 78%, placing this pond in the top (Good) category for ecological quality. It scored highly for all three botanical metrics and for diversity of water beetle families. Representation of uncommon plant species was much better than the model predicted for a clean-water pond with similar attributes (9 species compared to the predicted 3.9). Biological water quality (BMWP) was only moderate, largely due to the absence of pollution-sensitive taxa such as dragonflies; this was probably a reflection of geographical location rather than any problem with water quality per se. There was a null score for representation of damselfly, dragonfly and alderfly families in the sample. While this reduced the overall rating of the pond, it was again more of a reflection of the location on an island than any indication of ecological impairment.

Pond B (NU 099 436)

This was a smaller pond located within a distinct hollow just west of the buildings. Shoreweed formed a submerged sward, with occasional emergent field horsetail *Equisetum arvense*. There were extensive areas of moss-fringe dominated by the uncommon species *Campyliadelphus elodes* along with marsh pennywort, field horsetail, common yellow-sedge *Carex demissa* and shoreweed. Bog pimpernel *Anagallis tenella* and small-fruited yellow-sedge *Carex oederi* also occurred in this short, spongy vegetation. There were occasional patches of taller vegetation on the edges with common sedge, marsh pennywort, creeping willow *Salix repens* and the moss *Drepanocladus aduncus*. Associated fen species included several orchids. A water sample produced a pH reading of 7.80 with electrical conductivity of 790 $\mu\text{S}/\text{cm}^{-1}$.



Thirty-two aquatic macro-invertebrate taxa were identified from the PSYM sample with water beetles (59%) and water bugs (28%) again making up most of the taxa. Water beetles associated with the moss-fringe habitat were well-represented. As in the first pond, the Nationally Scarce long-toed water beetle *Dryops similaris* was recorded. A single specimen of the great diving beetle *Dytiscus circumflexus* was also noteworthy as this represented the most northerly British record.

PSYM analysis produced an Index of Biotic Integrity of 89%, placing this pond in the top (Good) category for ecological quality. It scored highly for all three botanical metrics, for biological water quality and for diversity of water beetle families. It scored poorly for representation of Odonata and Megaloptera in the invertebrate sample. Representation of uncommon wetland plants was again exceptionally good (7 species compared to the predicted 3.8).

4. Species diversity

4.1 Wetland plants

Thirty-eight wetland vascular plant, charophyte and bryophyte species were recorded in total (Appendix 2).

4.2 Aquatic macro-invertebrates

A total of 37 aquatic macro-invertebrate taxa were recorded in the PSYM samples from the two ponds (Appendix 3). The poor representation of leeches (one species) and aquatic molluscs (two) and the absence of macro-crustaceans reflected the barriers to colonisation of island habitats by non-flying invertebrates which were presumably dependent on passive dispersal via other organisms. The scarcity of damselflies and dragonflies may also have reflected constraints on colonisation in the exposed coastal environment.

Corixid bugs were well represented including pioneer species such as *Arctocorisa germari*, *Paracorixa concinna*, *Sigara falleni* and *S. nigrolineata*, which prefer ponds with sparse, patchy vegetation.

Water beetles included several widespread generalists and a number of species associated with densely-vegetated, often mossy water margins. There was, however, no distinct fen element.

No brackish water specialists were recorded. The lesser water-boatman *Paracorixa concinna* prefers ponds of high ionic content, but can occur inland as well as in coastal locations.

5. Noteworthy species

5.1 Invertebrates

***Dytiscus circumflexus*, a great diving beetle (Dytiscidae)**

This large predatory diving beetle was formerly restricted to southern and eastern England as far north as the Humber, but began to expand northwards and inland during the 1980s (Foster & Friday, 2011). It began to appear in the eastern lowlands of County Durham in the early 2000s (M. Hammond, unpublished data), was first recorded in Scotland in 2004 and since then has been recorded from several locations bordering the Solway estuary (Foster & Bellstedt, 2005; Foster *et al*, 2016). A single female was collected from Pond B during this survey, representing the first record for the biological recording Vice-county of North Northumberland and the most northerly to date for Great Britain, Lindisfarne being considerably further north than the Scottish localities. Since *D. circumflexus* is a large and easily-recognised insect, this provides evidence of ongoing northwards range expansion.



Below: *Dryops similaris*



Left: *Dytiscus circumflexus*, showing the distinctive black bands on its abdominal segments (not the Lindisfarne specimen)

***Dryops similaris*, a long-toed water beetle (Dryopidae)**

GB status: Nationally Scarce

Dryops are densely-hairy, amphibious beetles often associated with fluctuating water margins. Most of the eight British species are rare, including *D. similaris*. Sizeable populations of this species were present in both ponds at The Snook; it had previously been recorded from this area by Michael Jeffries in 2005 and dissected specimens were confirmed by Professor G.N. Foster

Dryops similaris is known from scattered locations in the Fens, East Anglia, southern England, the Welsh coast and one site in south-west Scotland. Whilst it is by no means restricted to dune-slacks, several of the British records do refer to shallow, base-rich coastal ponds. Interestingly, another rare *Dryops*, *D. nitidulus*, was

recorded from Lindisfarne in 2001 (Booth, 2002). This species has a closer affinity with coastal dune-slacks, but occurs also in exposed riverine sediments.

5.2 Plants

A number of nationally or regionally scarce or declining plants were recorded during the survey (Table 1).

Table 1: Noteworthy plants recorded during the survey

Species	English name	Status	Comments
<i>Campyliadelphus elodes</i>	a moss	Nationally Scarce and Regionally Scarce in North-east England	Only 5 hectad records for North-east England as a whole. Abundant in Pond B.
<i>Carex oederi</i>	Small Yellow Sedge	Scarce in North Northumberland	A mainly western species, recorded from only four locations in North Northumberland (Metherell, 2011). Small amounts in the margins of both ponds.
<i>Dactylorhiza incarnata</i> ssp. <i>incarnata</i>	Early Marsh Orchid	Scarce in North Northumberland	This subspecies of Early Marsh Orchid is widespread in dune slacks on Lindisfarne, though this is the only site in North Northumberland for which there are recent records (Metherell, 2011). Small amounts in the margins of both ponds.
<i>Epipactis palustris</i>	Marsh Helleborine	Near Threatened in England Scarce in North Northumberland	Local and declining in fens and dune slacks. In North Northumberland, Marsh Helleborine is known only from the Lindisfarne dune slacks and Newham Fen. Rare in the margin of Pond B though frequent in surrounding fen.
<i>Epipactis sancta</i>	Lindisfarne Helleborine	GB and England status: Endangered. Species of Principal Importance	Endemic to Lindisfarne. A plant at the edge of Pond B showed vegetative characteristics distinct from the locally-abundant Marsh Helleborine and was assumed to be this species.
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	Near Threatened in England	Widespread but declining in England. Frequent in both ponds.
<i>Littorella lacustris</i>	Shoreweed	Scarce in North Northumberland	Shoreweed is known from a number of water bodies on Lindisfarne but is rare elsewhere in North Northumberland (Metherell, 2011). Locally abundant in both ponds.
<i>Ranunculus flammula</i>	Lesser Spearwort	Vulnerable in England	Widespread but seriously declining in England. Frequent in the margins of Pond A, occasional in Pond B.
<i>Salix repens</i>	Creeping Willow	Near Threatened in England	Widespread but declining in England. Occasional in the margins of Pond A, more frequent

			in Pond B.
<i>Samolus valerandi</i>	Brookweed	Scarce in North Northumberland	Most records for North Northumberland are from the Lindisfarne dune slacks. Frequent in the margins of Pond A, rarer in Pond B.
<i>Schoenoplectus tabernaemontani</i>	Grey Club-rush	Scarce in North Northumberland	Very local and mainly coastal in North Northumberland. A small stand is present in Pond A.
<i>Scorpidium scorpioides</i>	a moss	Regionally Scarce in North-east England	Only 9 hectad records for North-east England as a whole. A small amount in the margin of Pond B.
<i>Triglochin palustris</i>	Marsh Arrow-grass	Near Threatened in England	Widespread but declining in England. A few plants in each pond.

Notes:

- Status of vascular plant species in North Northumberland (VC68) is based on Metherall (2011).
- England Red List status of vascular plants is based on Stroh *et al.* (2014).
- Species of Principle Importance for the conservation of biodiversity are listed in Section 41 of the Natural Environment and Rural communities Act 2006.
- Status of bryophytes in North-east England is based on O'Reilly (2011).

6. 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 criteria. Both ponds at The Snook qualify as Priority Ponds, as summarised in Table 2.

Table 2: Priority Pond assessment for ponds at The Snook

Qualifying criterion	Pond A	Pond B
Habitats of high conservation importance: Habitats Directive Annex 1 features	Shoreweed vegetation	Shoreweed vegetation (not as extensive as in Pond A)
Ponds with species of high conservation importance (UKBAP/Section 41 species, fully protected species, Red List species); ponds with 1 Nationally Scarce plant or 3 or more NS aquatic invertebrates.		Lindisfarne Helleborine (Red List & S41)
Ponds of high ecological quality, classified as being of Good quality using PSYM.	✓	✓
Important pond types: these are individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context e.g. pingos, duneslack ponds, machair ponds.	Dune slack	Dune slack

Both ponds represented examples of the EU Habitats Directive Annex 1 feature 3110, 'Oligotrophic waters with very few mineral nutrients of sandy plains - *Littorelletalia uniflorae*', i.e. nutrient-poor waters with Shoreweed vegetation.

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Appendix 1: PSYM data

Site name	The Snook Pond A	The Snook Pond B
Survey date	15-Jun-17	15-Jun-17
Grid reference	NU102435	NU099436
<i>Plant metrics</i>		
No. of submerged + marginal plant species (not including floating leaved)	24	18
Number of uncommon plant species	9	7
Trophic Ranking Score (TRS)	7.0833333	6.3333333
<i>Invertebrates metrics</i>		
ASPT	3.7777778	5.1
Odonata + Megaloptera (OM) families	0	1
Coleoptera families	3	4
<i>Environmental variables</i>		
Altitude (m)	2	5
Easting	4102	4099
Northing	6435	6436
Shade (%)	0	0
Inflow (0/1)	0	0
Grazing (%)	0	0
pH	7.66	7.8
Emergent plant cover (%)	60	40
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 (m ²)	1390	520
Results		
Submerged + marginal plant species		
Predicted (SM)	18.5	18.4
Actual (SM)	24	18
EQI (SM)	1.30	0.98
IBI (SM)	3	3
Uncommon plant species		
Predicted (U)	3.9	3.8
Actual (U)	9	7
EQI (U)	2.33	1.83
IBI (U)	3	3
Trophic Ranking Score (TRS)		
Predicted (TRS)	7.00	6.41
Actual (TRS)	7.08	6.33
EQI (TRS)	1.05	0.99
IBI (TRS)	3	3
ASPT		



Predicted (ASPT)	5.17	5.16
Actual (ASPT)	3.78	5.10
EQI (ASPT)	0.73	0.99
IBI (ASPT)	2	3
Odonata + Megaloptera (OM) families		
Predicted (OM)	3.27	3.25
Actual (OM)	0	1
EQI (OM)	0.00	0.31
IBI (OM)	0	1
Coleoptera families		
Predicted (CO)	3.83	3.82
Actual (CO)	3	4
EQI (CO)	0.78	1.05
IBI (CO)	3	3
Sum of Individual Metrics	14	16
Index of Biotic Integrity (%)	78%	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: Wetland plants recorded from the two ponds

Scientific name	Common name	Pond A	Pond B
<i>Agrostis canina</i>	Velvet bent	R	
<i>Agrostis stolonifera</i>	Creeping bent	F	R
<i>Anagallis tenella</i>	Bog pimpernel		O
<i>Bolboschoenus maritimus</i>	Sea club-rush	R	
<i>Calliergonella cuspidata</i>	a moss	R	O
<i>Campyliadelphus elodes</i>	a moss		A
<i>Cardamine pratensis</i>	Cuckooflower	R	R
<i>Carex arenaria</i>	Sand sedge	R	R
<i>Carex demissa</i>	Common yellow-sedge		O
<i>Carex nigra</i>	Common sedge	A	A
<i>Carex oederi</i>	Small-fruited yellow-sedge	R	R
<i>Carex panicea</i>	Carnation sedge	R	R
<i>Chara vulgaris</i> var. <i>papillata</i>	a charophyte	R	
<i>Chara vulgaris</i> var. <i>vulgaris</i>	a charophyte	O	R
<i>Dactylorhiza fuchsii</i>	Common spotted-orchid	R	R
<i>Dactylorhiza incarnata</i> ssp. <i>incarnata</i>	Early marsh-orchid	R	O
<i>Dactylorhiza purpurella</i>	Northern marsh-orchid	R	O
<i>Drepanocladus aduncus</i>	a moss	F	
<i>Eleocharis palustris</i> ssp. <i>vulgaris</i>	Common spike-rush	A	R
<i>Eleocharis quinqueflora</i>	Few-flowered spike-rush	R	R
<i>Epipactis palustris</i>	Marsh helleborine		R
<i>Epipactis sancta</i>	Lindesfarne helleborine		R
<i>Filipendula ulmaria</i>	Meadowsweet	R	R
<i>Galium palustre</i>	Common marsh-bedstraw	O	
<i>Hippuris vulgaris</i>	Mare's-tail	O	
<i>Hydrocotyle vulgaris</i>	Marsh pennywort	F	F
<i>Juncus articulatus</i>	Jointed rush	O	R
<i>Litorea uniflora</i>	Shoreweed	F	A
<i>Mentha aquatica</i>	Water mint	R	
<i>Potentilla anserina</i>	Silverweed	O	O
<i>Ranunculus flammula</i> ssp. <i>flammula</i>	Lesser spearwort	F	O
<i>Salix repens</i>	Creeping willow	O	F
<i>Samolus valerandi</i>	Brookweed	F	R
<i>Schoenoplectus tabernaemontani</i>	Grey club-rush	R	
<i>Schoenus nigricans</i>	Black bog-rush	O	
<i>Scorpidium scorpioides</i>	a moss		R
<i>Triglochin palustris</i>	Marsh arrowgrass	R	R
<i>Typha latifolia</i>	Bulrush	R	

Appendix 3: Combined invertebrate list, 15th June 2017

Species	English name	Family	Order
<i>Haemopsis sanguisuga</i>	Horse Leech	Haemopidae	Annelida
<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Agabus nebulosus</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Anacaena lutescens</i>	a scavenger water beetle	Hydrophilidae	Coleoptera
<i>Coelostoma orbiculare</i>	a scavenger water beetle	Hydrophilidae	Coleoptera
<i>Colymbetes fuscus</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Dryops similis</i>	a long-toed water beetle	Dryopidae	Coleoptera
<i>Dytiscus circumflexus</i>	a great diving beetle	Dytiscidae	Coleoptera
<i>Helophorus aequalis</i>	a scavenger water beetle	Helophoridae	Coleoptera
<i>Helophorus brevipalpis</i>	a scavenger water beetle	Helophoridae	Coleoptera
<i>Helophorus griseus</i>	a scavenger water beetle	Helophoridae	Coleoptera
<i>Helophorus obscurus</i>	a scavenger water beetle	Helophoridae	Coleoptera
<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae	Coleoptera
<i>Hydroporus erythrocephalus</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Hydroporus gyllenhalii</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Hydroporus nigrita</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Hydroporus planus</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Hydroporus pubescens</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae	Coleoptera
<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae	Coleoptera
Chironomidae indet	non-biting midge larvae	Chironomidae	Diptera
<i>Gyraulus crista</i>	Nautilus Ramshorn snail	Planorbidae	Gastropoda
<i>Radix balthica</i>	Wandering Snail	Lymnaeidae	Gastropoda
<i>Arctocorisa germari</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Callicorixa praeusta</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Corixa punctata</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Gerris</i> sp. (not caught)	a pond-skater	Gerridae	Hemiptera
<i>Notonecta</i> sp. (juvenile)	a backswimmer	Notonectidae	Hemiptera
<i>Paracorixa concinna</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Sigara distincta</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Sigara dorsalis</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Sigara falleni</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Sigara nigrolineata</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Sigara semistriata</i>	a lesser water-boatman	Corixidae	Hemiptera
<i>Sympetrum striolatum</i>	Common Darter larvae	Libellulidae	Odonata
Oligochaeta	a worm		Oligochaeta
<i>Limnephilus vittatus</i>	a caddis-fly	Limnephilidae	Trichoptera

Appendix 4: Invertebrate list for Pond A, 5th August 2016

Taxon	English name	Family	Order	Location	Grid ref	Notes
<i>Theromyzon tessulatum</i>	Duck Leech	Glosiphoniidae	Hirudinea	Pond A	NU102435	
<i>Radix balthica</i>	Wandering Snail	Lymnaeidae	Gastropoda	Pond A	NU102435	1 immature only!
<i>Sympetrum striolatum</i>	Common Darter	Libellulidae	Odanata	Pond A	NU102435	1 larva
<i>Ischnura elegans</i>	Blue-tailed Damselfly	Corixidae	Odanata	Pond A	NU102435	1 adult seen, no larvae
<i>Corixa punctata</i>	a lesser water-boatman	Corixidae	Hemiptera	Pond A	NU102435	
<i>Callicorixa praeusta</i>	a lesser water-boatman	Corixidae	Hemiptera	Pond A	NU102435	
<i>Arctocorisa germari</i>	a lesser water-boatman	Corixidae	Hemiptera	Pond A	NU102435	1 ♀
<i>Notonecta glauca</i>	Common Backswimmer	Notonectidae	Hemiptera	Pond A	NU102435	
<i>Gerris</i> sp. immature	a pond-skater	Gerridae	Hemiptera	Pond A	NU102435	
<i>Gyrinus substriatus</i>	Common Whirligig	Gyrinidae	Coleoptera	Pond A	NU102435	
<i>Agabus bipustulatus</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	
<i>Agabus nebulosus</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	
<i>Colymbetes fuscus</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	
<i>Dytiscus marginalis</i>	Great Diving Beetle	Dytiscidae	Coleoptera	Pond A	NU102435	1 ♂
<i>Hydroporus erythrocephalus</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	several incl. 1 matt ♀
<i>Hydroporus gyllenhalii</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	
<i>Hydroporus planus</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	
<i>Hydroporus pubescens</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	
<i>Hygrotus impressopunctatus</i>	a diving beetle	Dytiscidae	Coleoptera	Pond A	NU102435	
<i>Helophorus brevipalpis</i>	a scavenger water beetle	Helophoridae	Coleoptera	Pond A	NU102435	
<i>Hydrobius fuscipes</i>	a scavenger water beetle	Hydrophilidae	Coleoptera	Pond A	NU102435	sensu stricto
<i>Ochthebius minimus</i>	a small water beetle	Hydraenidae	Coleoptera	Pond A	NU102435	
<i>Dryops similis</i>	a long-toed water beetle	Dryopidae	Coleoptera	Pond A	NU102435	3 ♂, 1 ♀ collected

<i>Limnephilus</i> sp.	a caddis-fly	Limnephilidae	Trichoptera	Pond A	NU102435	adults seen, not in PSYM sample
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Appendix 4: Photographs



View over Pond A



Close-up of Pond A showing short marginal vegetation and patches of common spike-rush



Emergent mare's-tail and common spike-rush in Pond A



Short marginal vegetation in Pond A with marsh pennywort



Marginal vegetation around Pond A grading into black bog-rush fen in background



View over pond B



Close-up of Pond B



Shallow water in Pond B with shoreweed vegetation



Short marginal vegetation on the edge of Pond B on the left with taller common sedge vegetation on the right