

**ANALYSIS & REPORTING TEAM
THAMES AREA
BIOLOGICAL REPORT**



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**An Ecological Assessment of Hinksey Pond North and
Hinksey Pond South in Oxford**

SUMMARY

1. The Hinksey Ponds were surveyed to assess their ecology quality. This was as part of the Environmental Impact Assessment for the Oxford Flood Alleviation Scheme.
2. Each pond was surveyed for macroinvertebrates (small animals) and macrophytes (plants), following the PSYM methodology developed by the Freshwater Habitats Trust.
3. The lakes were both found to have fairly diverse invertebrate communities which indicated moderate to good water quality, though the south lake community showed signs of nutrient enrichment and perhaps slightly worse water quality. The marginal plant communities were quite diverse, but the open water plant communities were poor.
4. The PSYM assessment classified the ponds as *Poor* and *Moderate*. This means neither pond is considered a 'Priority Pond' in the UK Biodiversity Action Plan on the basis of its PSYM classification.
5. No protected species were discovered during the surveys. However two uncommon invertebrate species were recorded (one from each lake) representing a new locality for these species, and a plant classed as *Near Threatened* in England was found sporadically along much of the east bank.
6. Non-native species were amongst the most dominant invertebrate species of both lakes, particularly the southern lake, and the most common submerged plant was non-native.

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1. INTRODUCTION

The Hinksey Ponds were surveyed to assess their ecology quality. This was as part of the Environmental Impact Assessment for the Oxford Flood Alleviation Scheme.

The Hinksey Ponds are a pair of artificial lakes, linked by a small outfall from the northern lake into the southern lake. The lakes are very long (over 1.1km in total) but relatively narrow. They run alongside Hinksey Railway Yard and so were probably created to provide material for the railway embankment. Hinksey Stream, which is a fairly large stream, runs into the southern pond and exits on the opposite bank 400m downstream.

The Hinksey Ponds do not have any formal conservation designation, though there is a wildlife information board installed between the two lakes. The lakes are used for angling and some of the bank top vegetation is cleared annually to maintain access.

2. METHODS

2.1. Survey methodology

Each pond was surveyed for macroinvertebrates (small animals) and macrophytes (plants), following the PSYM methodology developed by the Freshwater Habitats Trust, previously known as Pond Conservation.

Plant species within the maximum wetted zone are identified in the field. The methodology is only based on biodiversity so no abundance data is required.

Macroinvertebrates were collected by with a long-handled pond net and identified at a later date back in the laboratory. These are only required to be identified to family level for the PSYM methodology, but were actually identified to species level where possible to determine whether any unusual species were present. The full method is available on the Freshwater Habitats Trust website.

2.2. Survey locations

Table 1: Pond national grid references

<u>Waterbody</u>	<u>Top Grid Reference</u>	<u>Bottom Grid Reference</u>
Hinksey Pond North	SP51085 04832	SP 51225 04532
Hinksey Pond South	SP 51229 04529	SP 51656 03839

The whole of Hinksey Pond North was surveyed. For Hinksey Pond South, the northern tip of the pond down to where Hinksey Stream exits (SP 51522 04093) was surveyed. The southern section, south of where the stream exits, was not surveyed due to time constraints. Therefore approximately two thirds to three quarters of the pond was surveyed, which will have been enough to gain an understanding of the pond ecology.

Map 1: Location of ponds



Photograph 1: Hinksey Pond North – looking north from southern end



Photograph 2: Hinksey Pond South – looking south from northern end



Photograph 3: Hinksey Pond South – midpoint



2.3. Data Analysis

Field and laboratory data were sent off to the Freshwater Habitats Trust where they ran the physical variables recorded in the field through their PSYM model. This provided a predicted invertebrate and plant community which was then compared to the communities actually found. The degree of difference between the predicted and actual results was used to classify the ponds into one of four PSYM quality categories (Good, Moderate, Poor, Very Poor). Ponds classed as Good are automatically considered 'Priority Ponds' in the UK Biodiversity Action Plan.

3. RESULTS/DISCUSSION

The plant and invertebrate species recorded from the surveys are included in Appendix A, and the detailed PSYM analysis results are in Appendix B.

3.1 Hinksey Pond North - Macroinvertebrates

The invertebrate community was fairly diverse with a good mix of different groups found. The presence of pollution sensitive caddisflies and damselflies indicate that the water quality was at least of moderate quality, and probably of good quality. The community was instead reflective of the habitat and so was dominated by species which live in silt, on aquatic vegetation, or swim in still water.

No rare species were found but of note was the presence of a bug known as a water treader (*Mesovelgia furcata*). This is nationally widespread but uncommon, and had only been recorded from three localities in Oxfordshire before. This was the first record from Oxford.

Several non-native invertebrate species were found. This included a high abundance of the very common New Zealand mudsnail (*Potamopyrgus antipodarum*), and an unusually high number of the less common Wautier's Limpet (*Ferrissia wautieri*). Both species of freshwater shrimp found were non-native, and a non-native mysid shrimp was also present. The mysid shrimp (*Hemimysis anomola*) and one of the freshwater shrimp species (*Dikerogammarus haemobaphes*) both appeared in the River Thames around 2012, and would have been present in the Oxford watercourses including Hinksey Stream shortly afterwards. The presence of these species in this lake shows that they have been introduced into here, probably by contaminated angling equipment carried from the neighbouring south pond.

3.2 Hinksey Pond North - Macrophytes

The marginal and emergent plant community was fairly diverse with a mix of common species that can be found in still and flowing waters, the most widespread of which was great pond-sedge (*Carex riparia*). However the lake became deep a short distance from the edge so the vegetation did not extend far out into the pond.

A notable plant species, common valerian (*Valeriana officinalis*) was widespread on the east bank top, with some present on the bank side within the PSYM recording zone. Despite its name, common valerian is classed within the Red List published by the Botanical Society of Britain and Ireland as *Near Threatened* in England, which means it has suffered a reduction in population since 1930 and should be regarded as a conservation priority in England.

The open water plant community was poor, comprising of two lily species, a non-native submerged plant and small amounts of a slimy blanketweed alga. Of these the most notable was white water-lily (*Nymphaea alba*). This is a native species but is also widely sold in a number of varieties in garden centres. As the Hinksey Ponds are artificial this species will have been introduced into here, probably to help provide cover for fish.

Two non-native plant species were recorded in the survey. Himalayan balsam (*Impatiens glandulifera*) was present on the east bank, though not abundant. Nuttall's waterweed (*Elodea nuttallii*) was the only submerged macrophyte present in the lake. This is an invasive species from South America, sold as oxygenating weed for aquariums, and is very common in the area.

3.3 Hinksey Pond North – PSYM Classification

The PSYM classification for Hinksey Pond North was calculated as being *Poor (bordering Moderate)*. The pond is therefore not considered a 'Priority Pond' in the UK Biodiversity Action Plan on the basis of its PSYM classification.

3.4 Hinksey Pond South - Macroinvertebrates

The invertebrate community was fairly diverse with a good mix of different groups found. Very high numbers of damselflies were present, though the highly pollution sensitive caddisflies found in the north lake were missing here. This indicates that the water quality was at least of moderate quality but probably slightly worse than the northern lake.

A much higher abundance of invertebrates were found in this lake compared to the northern lake (three times as many) suggesting that the southern lake is more productive, probably due to increased nutrient enrichment from the inflow of Hinksey Stream.

The community was reflective of the habitat and so was dominated by species which live in silt, on aquatic vegetation, or swim in still water.

No rare species were found but of note was the presence of larvae from a species of meniscus midge (*Dixella autumnalis*). This is nationally widespread but uncommon, and had only been recorded from one locality in Oxfordshire before (near Farmoor reservoir).

Several non-native invertebrate species were found, and three of the top four most abundant groups were non-native. This included a high abundance of a freshwater shrimp (*Crangonyx pseudogracilis*), acute bladder snail (*Physella sp.*), and New Zealand mudsnail (*Potamopyrgus antipodarum*), and again an unusually high number of Wautier's Limpet (*Ferrissia wautieri*).

Both species of freshwater shrimp found were non-native, and a non-native mysid shrimp was also present.

3.5 Hinksey Pond South - Macrophytes

The marginal and emergent plant community was fairly diverse with a mix of common species that can be found in still and flowing waters. The northern end had a similar habitat to Hinksey Pond North, with deep water restricting the emergent vegetation to a narrow strip along the bank. However further down, below where Hinksey Stream entered, the lake became narrower and the banks became less steep. At points the bank side was flat and at the level of the water creating areas of marsh dominated by reeds.

A notable plant species, common valerian (*Valeriana officinalis*) was widespread on the east bank top (but outside of the PSYM recording zone). Despite its name, common valerian is classed within the Red List published by the Botanical Society of Britain and Ireland as *Near Threatened* in England, which means it has suffered a reduction in population since 1930 and should be regarded as a conservation priority in England.

The open water community was again poor, comprising of two duckweed species (the dominant of which was non-native), two blanketweed algal species, a non-native submerged plant, and small amounts of starwort.

Three non-native plant species were recorded in the survey. Orange balsam (*Impatiens capensis*) is related to Himalayan balsam and similarly is found in damp areas such as that found by watercourses. Nuttall's waterweed (*Elodea nuttallii*) was very abundant in the lake, and the floating least duckweed (*Lemna minuta*) was also very abundant in places, particularly at the midpoint of the lake (see Photograph 3) where it covered the whole water surface.

3.6 Hinksey Pond South – PSYM Classification

The PSYM classification for Hinksey Pond South was calculated as being *Moderate*. The pond is therefore not considered a 'Priority Pond' in the UK Biodiversity Action Plan on the basis of its PSYM classification.

4. OVERALL ASSESSMENT

The lakes were both found to have fairly diverse invertebrate communities which indicated moderate to good water quality, though the south lake community showed signs of nutrient enrichment and perhaps slightly worse water quality. The marginal plant communities were quite diverse, but the open water plant communities were poor. The PSYM assessment classified the ponds as *Poor* and *Moderate*.

No protected species were discovered during the surveys. However two uncommon invertebrate species were recorded (one from each lake) representing a new locality for these species, and a plant classed as *Near Threatened* in England was found sporadically along much of the east bank.

Non-native species were amongst the most dominant invertebrate species of both lakes, particularly the southern lake, and the most common submerged plant was non-native.

Appendix A: Full survey results

Names in red are non-native species.

HINKSEY POND NORTH

Macroinvertebrates

HINKSEY POND NORTH - PSYM macroinvertebrate survey 2017		
COMMON NAME	SCIENTIFIC NAME	NUMBER FOUND OR ESTIMATED
WATERFLEA	Cladocera	200
NON-BITING MIDGE	Chironomini	200
SNAIL	<i>Potamopyrgus antipodarum</i>	200
LIMPET	<i>Ferrissia wautieri</i>	60
PEA MUSSEL	<i>Pisidium</i>	50
PEA MUSSEL	<i>Pisidium henslowanum</i>	30
PEA MUSSEL	<i>Pisidium subtruncatum</i>	30
WORM	Oligochaeta	30
WATER LOUSE	<i>Asellus aquaticus</i>	30
SNAIL	<i>Physella</i>	26
NON-BITING MIDGE	Chironomidae	20
FRESHWATER SHRIMP	<i>Dikerogammarus haemobaphes</i>	18
SNAIL	<i>Gyraulus albus</i>	16
FRESHWATER SHRIMP	<i>Crangonyx pseudogracilis</i>	14
MAYFLY	<i>Cloeon dipterum</i>	10
DAMSELFLY	Coenagrionidae	10
MAYFLY	<i>Caenis horaria</i>	8
DAMSELFLY	<i>Ischnura elegans</i>	8
NON-BITING MIDGE	Orthocladiinae	7
CADDISFLY	<i>Mystacides</i>	6
CADDISFLY	<i>Mystacides nigra</i>	4
BUG	<i>Mesovelia furcata</i>	3
BUG	Gerridae	3
BEETLE	<i>Noterus clavicornis</i>	3
LIMPET	<i>Acroloxus lacustris</i>	2
PEA MUSSEL	<i>Pisidium nitidum</i>	2
SNAIL	<i>Gyraulus crista</i>	2
MYSID SHRIMP	<i>Hemimysis anomala</i>	2
SNAIL	<i>Succinea</i>	1
SEED SHRIMP	Ostracoda	1
COPEPOD	Copepoda	1
DAMSELFLY	<i>Erythromma najas</i>	1
BUG	<i>Sigara lateralis</i>	1
CADDISFLY	<i>Oxyethira</i>	1
CADDISFLY	<i>Leptocerus tineiformis</i>	1
CRANEFLY	Tipulidae	1
CRANEFLY	<i>Helius</i>	1

Macrophytes

HINKSEY POND NORTH - PSYM plant survey 2017		
HABITAT	COMMON NAME	SPECIES NAME
Marginal (bank-side)	Wild angelica	<i>Angelica sylvestris</i>
	Remote sedge	<i>Carex remota</i>
	Great pond-sedge	<i>Carex riparia</i>
	Great willowherb	<i>Epilobium hirsutum</i>
	Hemp agrimony	<i>Eupatorium cannabinum</i>
	Feather-moss	<i>Eurhynchium sp.</i>
	Meadowsweet	<i>Filipendula ulmaria</i>
	Square-stemmed St John's wort	<i>Hypericum tetrapterum</i>
	Himalayan balsam	<i>Impatiens glandulifera</i>
	Kneiff's feather-moss	<i>Leptodictyum riparium</i>
	Gipsywort	<i>Lycopus europaeus</i>
	Purple loosestrife	<i>Lythrum salicaria</i>
	Water-mint	<i>Mentha aquatica</i>
	Water forget-me-not	<i>Myosotis scorpioides</i>
	Marsh cinquefoil	<i>Potentilla palustris</i>
	Lesser celandine	<i>Ranunculus ficaria</i>
	Common valerian	<i>Valeriana officinalis</i>
Emergent	Water plantain	<i>Alisma plantago-aquaticum</i>
	Lesser pond-sedge	<i>Carex acutiformis</i>
	Great pond-sedge	<i>Carex riparia</i>
	Reed sweet-grass	<i>Glyceria maxima</i>
	Yellow-flag iris	<i>Iris pseudacorus</i>
	Gipsywort	<i>Lycopus europaeus</i>
	Water mint	<i>Mentha aquatica</i>
	Water forget-me-not	<i>Myosotis scorpioides</i>
	Norfolk reed	<i>Phragmites australis</i>
	Common club-rush	<i>Schoenoplectus lacustris</i>
Floating	Branched bur-reed	<i>Sparganium erectum</i>
	Yellow water-lily	<i>Nuphar lutea</i>
Submerged	White water-lily	<i>Nymphaea alba</i>
	Nuttall's pondweed	<i>Elodea nuttallii</i>
	Slimy blanketweed	<i>Zygnematalean</i>

HINKSEY POND SOUTH

Macroinvertebrates

HINKSEY POND SOUTH - PSYM macroinvertebrate survey 2017		
COMMON NAME	SCIENTIFIC NAME	NUMBER FOUND OR ESTIMATED
FRESHWATER SHRIMP	<i>Crangonyx pseudogracilis</i>	600
WATERFLEA	Cladocera	500
SNAIL	<i>Physella</i>	500
SNAIL	<i>Potamopyrgus antipodarum</i>	300
SNAIL	<i>Gyraulus albus</i>	200
NON-BITING MIDGE	Chironomini	200
LIMPET	<i>Ferrissia wautieri</i>	90
WATER LOUSE	<i>Asellus aquaticus</i>	90
DAMSELFLY	<i>Ischnura elegans</i>	80
PEA MUSSEL	<i>Pisidium</i>	60
PEA MUSSEL	<i>Pisidium subtruncatum</i>	50
DAMSELFLY	<i>Erythromma najas</i>	40
FRESHWATER SHRIMP	<i>Dikerogammarus haemobaphes</i>	40
BUG	<i>Notonecta glauca</i>	25
PEA MUSSEL	<i>Pisidium casertanum</i>	20
NON-BITING MIDGE	Orthocladiinae	20
SNAIL	<i>Gyraulus crista</i>	20
MAYFLY	<i>Cloeon dipterum</i>	14
LIMPET	<i>Acroloxus lacustris</i>	10
PEA MUSSEL	<i>Pisidium nitidum</i>	10
WORM	Oligochaeta	10
NON-BITING MIDGE	Chironomidae	10
DAMSELFLY	Coenagrionidae	9
BUG	<i>Sigara distincta</i>	9
PEA MUSSEL	<i>Pisidium henslowanum</i>	7
PEA MUSSEL	<i>Pisidium moitessierianum</i>	7
NON-BITING MIDGE	Tanypodinae	6
NON-BITING MIDGE	Tanytarsini	6
BUG	Corixidae	5
CRANEFLY	<i>Helius</i>	5
MINISCUS MIDGE	Dixidae	5
MAYFLY	Baetidae	4
BEETLE	<i>Ilybius</i>	4
PEA MUSSEL	<i>Pisidium supinum</i>	3
SNAIL	<i>Planorbis planorbis</i>	2
SEED SHRIMP	Ostracoda	2
MINISCUS MIDGE	<i>Dixella autumnalis</i>	2
FLATWORM	<i>Dugesia tigrina</i>	2
SNAIL	<i>Valvata cristata</i>	1
SNAIL	<i>Bithynia tentaculata</i>	1
SNAIL	<i>Succinea</i>	1
MUSSEL	<i>Anodonta anatina</i>	1
FISH LEECH	<i>Piscicola geometra</i>	1
COPEPOD	Copepoda	1
BEETLE	<i>Noterus clavicornis</i>	1
ALDERFLY	<i>Sialis lutaria</i>	1
MYSID SHRIMP	<i>Hemimysis anomala</i>	1

Macrophytes

HINKSEY POND SOUTH - PSYM plant survey 2017		
HABITAT	COMMON NAME	SPECIES NAME
Marginal (bank-side)	Remote sedge	<i>Carex remota</i>
	Great pond-sedge	<i>Carex riparia</i>
	Great willowherb	<i>Epilobium hirsutum</i>
	Willowherb	<i>Epilobium sp.</i>
	Meadowsweet	<i>Filipendula ulmaria</i>
	Orange balsam	<i>Impatiens capensis</i>
	Gipsywort	<i>Lycopus europaeus</i>
	Creeping jenny	<i>Lysimachia nummularia</i>
	Purple loosestrife	<i>Lythrum salicaria</i>
	Water-mint	<i>Mentha aquatica</i>
	Water forget-me-not	<i>Myosotis scorpioides</i>
	Creeping buttercup	<i>Ranunculus repens</i>
	Bittersweet	<i>Solanum dulcamara</i>
	Marsh woundwort	<i>Stachys palustris</i>
Emergent	Fool's watercress	<i>Apium nodiflorum</i>
	Great pond-sedge	<i>Carex riparia</i>
	Reed sweet-grass	<i>Glyceria maxima</i>
	Yellow-flag iris	<i>Iris pseudacorus</i>
	Water mint	<i>Mentha aquatica</i>
	Water forget-me-not	<i>Myosotis scorpioides</i>
	Norfolk reed	<i>Phragmites australis</i>
	Watercress	<i>Rorippa nasturtium-aquaticum agg.</i>
	Reedmace	<i>Typha latifolia</i>
	Water speedwell	<i>Veronica anagallis-aquatica/Veronica catenata</i>
Floating	Lesser duckweed	<i>Lemna minor</i>
	Least duckweed	<i>Lemna minuta</i>
Submerged	Starwort	<i>Callitriche sp.</i>
	Blanketweed	<i>Cladophora sp.</i>
	Nuttall's pondweed	<i>Elodea nuttallii</i>
	Blanketweed	<i>Vaucheria sp.</i>

Appendix B: Full PSYM analysis

Physical Variables

<i>Site details</i>		
Site name	Hinksey Pond North	Hinksey Pond South
Survey date	11-Aug-17	05-Sep-17
Grid reference (e.g. SP123456 or higher precision)	SP 51142 04692	SP 51363 04276
<i>Plant metrics</i>		
No. of submerged + marginal plant species (not including floating leaved)	21	20
Number of uncommon plant species	2	1
Trophic Ranking Score (TRS)	8.523076923	9.190909091
<i>Invertebrates metrics</i>		
ASPT	4.631578947	4.1
Odonata + Megaloptera (OM) families	1	2
Coleoptera families	1	1
<i>Environmental variables</i>		
Altitude (m)	55	55
Easting	4511	4513
Northing	2046	2042
Shade (%)	5	5
Inflow (0/1)	0	1
Grazing (%)	0	0
pH	7.3	7.3
Emergent plant cover (%)	1	1
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)	8865	9800

Results

Submerged + marginal plant species		
Predicted (SM)	30.8	31.4
Actual (SM)	21	20
EQI (SM)	0.68	0.64
IBI (SM)	2	2
Uncommon plant species		
Predicted (U)	5.2	5.3
Actual (U)	2	1
EQI (U)	0.39	0.19
IBI (U)	1	0
Trophic Ranking Score (TRS)		
Predicted (TRS)	8.63	8.63
Actual (TRS)	8.52	9.19
EQI (TRS)	0.99	1.07
IBI (TRS)	3	2
ASPT		
Predicted (ASPT)	5.09	5.18
Actual (ASPT)	4.63	4.10
EQI (ASPT)	0.91	0.79
IBI (ASPT)	3	2
Odonata + Megaloptera (OM) families		
Predicted (OM)	3.05	3.32
Actual (OM)	1	2
EQI (OM)	0.33	0.60
IBI (OM)	1	2
Coleoptera families		
Predicted (CO)	3.75	3.83
Actual (CO)	1	1
EQI (CO)	0.27	0.26
IBI (CO)	1	1
Sum of Individual Metrics		
	11	9
Index of Biotic Integrity (%)		
	61%	50%
PSYM quality category (IBI >75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)		
	Moderate	Poor (bordering Moderate)
Is this a Priority Pond? (Good quality category)		
	No	No