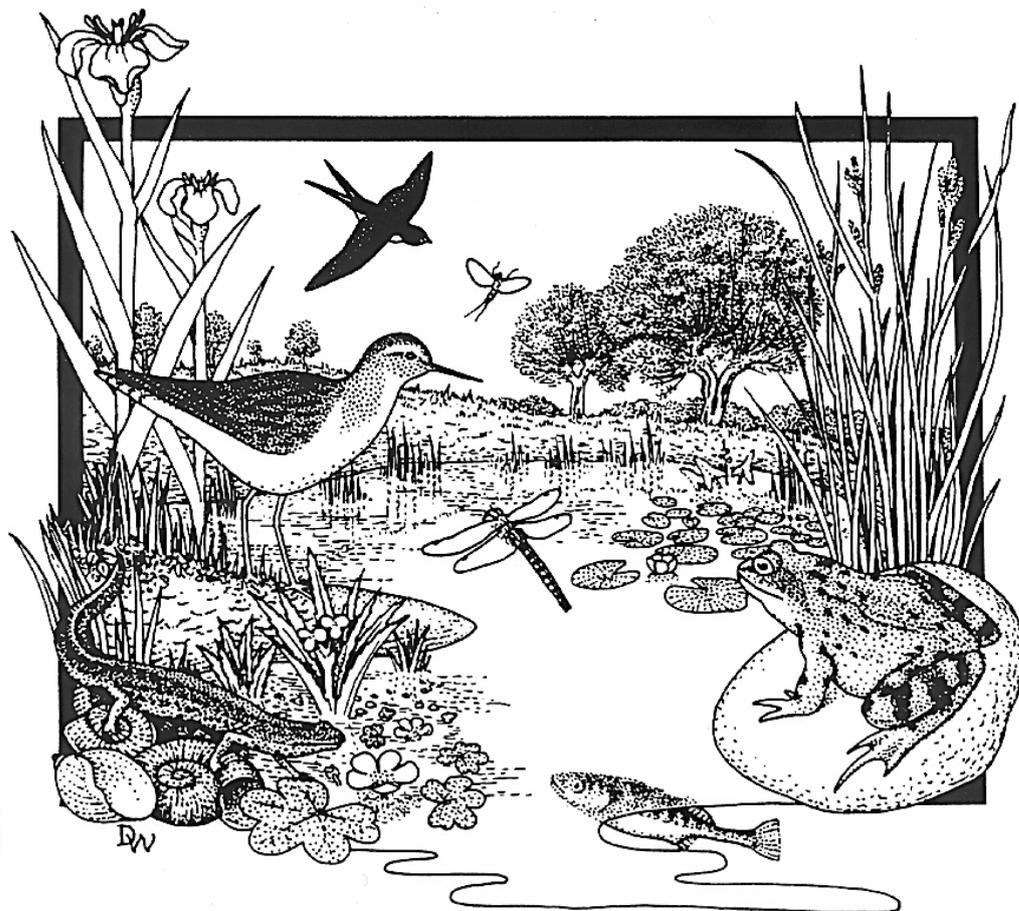


Ecological Survey of Eynsham Abbey Fish Ponds, Oxfordshire



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1. Aims and Objectives

This report describes the results of a wetland plant and aquatic invertebrate survey undertaken by Pond Conservation: Policy and Research at Eynsham Abbey Fish Ponds (Grid reference SP030 490), in Eynsham, Oxfordshire.

The work was commissioned by Eynsham Parish Council and Eynsham History Group in order to give information about the ecological value of the site. The recommendations given in this report should also feed into the management plans for the site as a whole.

2. Site description

Eynsham Abbey Fish Ponds were created in the 13th century by diverting the Chilbrook Stream. The Abbey buildings were completely destroyed after the Dissolution of the monasteries three centuries later. The original ponds have now almost completely filled in, and the pond basins are barely recognisable from the ground.

The site is about 25 ha. in area, rectangular in shape and extends west of Station Road to playing fields in the east (see map in Appendix 1). The Chilbrook Stream runs to the south, and a stone wall separates the site from grassland in the north. The main inputs of water to the site are (i) a spring which has its source in the grassland north of the Fish ponds, and (ii) seepages along a line running east to west at the northern boundary of the site. Overall, the site comprises a complex mosaic of interconnected wetlands interspersed with waterlogged or dryer ground, copses and shrub. The four main wetland areas are (see map in Appendix 1):

1. A spring-fed stream: this permanent stream meets the Chilbrook Stream at the south eastern corner of the site.
2. Narrow ditches: these semi-permanent ditches seem to be fed by seepages, and generally run southward.
3. A wide ditch: this stretch of permanent ditch is located at the eastern boundary of the site.
4. Sedge beds: areas of fen and semi-permanent standing waters are mostly located southwest of the spring-fed stream.

3. Methods

3.1 Wetland plants

Wetland plants were recorded at the site on two occasions, 11 May 2004 and 19 July 2004. Wetland plants¹ were surveyed by walking and wading the perimeter of each waterbody, noting the species present. Wetland plants were defined as those included in the standard list of the National Pond Survey (Pond Action, 1998).

3.2 Macroinvertebrates

Macroinvertebrates were sampled on 11 May 2004. Exhaustive searches were carried out at the following five sampling stations (Appendix 1):

- A. Shaded standing water area with no discernable flow, sparse vegetation.
- B. Open standing water area with 100% cover.
- C. Open flowing water area with 100% cover of emergent vegetation.
- D. Wide permanent ditch at the eastern end of the site.
- E. Open flowing water area downstream of C above, but with different vegetation type.

Other areas (such as the Chilbrook and areas of the narrow ditches) were searched less intensively for additional species.

Aquatic invertebrates were collected using a non-standardised, “rapid” method, using a hand net sample from the major habitats in the pond (stands of different wetland plants, distinctive substrates, tree roots etc.). The material collected was sorted in the field to remove pond animals from the debris collected. Most specimens were identified to species level in the field. More difficult taxa were preserved in alcohol and returned to the laboratory for identification using a binocular microscope. All major macroinvertebrate groups were recorded except for True Flies (Diptera), for which there is little information on species level identification and national distribution. True Flies were therefore recorded to family level. The invertebrate groups recorded were: Amphipoda (shrimps), Bivalvia (bivalves, excluding *Pisidium* sp. which were recorded at genus level), Coleoptera (water beetles), Ephemeroptera (mayflies), Gastropoda (snails), Hemiptera (water bugs), Hirudinea (leeches), Isopoda (slaters), Megaloptera (alderflies), Odonata (dragonflies and damselflies), Plecoptera (stoneflies), Trichoptera (caddisflies) and Tricladida (flatworms).

3.3 Conservation assessment

The conservation value of each waterbody was assessed on the basis of: (i) the total number of species recorded (species richness), and (ii) the number of uncommon species present (species rarity). Definitions of the conservation status of each species can be found in Appendix 2 and 3.

¹The term ‘wetland plant species’ refers to species defined as wetland plants on the National Pond Survey field recording sheet list. Terrestrial plant species are not recorded.

4. Eynsham Abbey Fish Ponds

4.1 Wetland plants results

The Eynsham Fish Ponds supported a relatively low wetland plant diversity, with a total of 23 species recorded during the present survey (Appendix 2). All the species recorded were emergent, except for Common Duckweed (*Lemna minor*), and all were common and widespread. Common Duckweed was recorded from a ditch fed by seepage in a northern area of the site.

The wetland plant community was dominated by a small number of emergent plant species which formed extensive stands. The upstream section of the spring-fed stream was dominated by Fool's Watercress (*Apium nodiflorum*), as were parts of the narrow ditches. Reed Sweet-grass (*Glyceria fluitans*) stands were most extensive in the downstream section of the spring-fed stream and in the wide permanent ditch at the eastern end of the site. The south western fen area was dominated by mixed stands of Lesser Pond Sedge (*Carex acutiformis*) and Great Pond Sedge (*Carex riparia*). Great Willowherb (*Epilobium hirsutum*) stands were ubiquitous throughout the site, and formed extensive stands along the northern section of the narrow ditch system.

Other wetland plant species were found in smaller patches or in mixed stands, and these included: Creeping Bent (*Agrostis stolonifera*), Wild Angelica (*Angelica sylvestris*), Marsh Marigold (*Caltha palustris*), Meadowsweet (*Filipendula ulmaria*), Soft Rush (*Juncus effusus*), Gipsywort (*Lycopus europaeus*), Water Mint (*Mentha aquatica*), Water Forget-me-not (*Myosotis scorpioides*), Water Chickweed (*Myosoton aquaticum*), Amphibious Bistort (*Persicaria amphibian*), Reed Sweet-grass (*Phalaris arundinacea*), Bittersweet (*Solanum dulcamara*), Marsh Woundwort (*Stachys palustris*), Common Comfrey (*Symphytum officinale*), Bulrush (*Typha latifolia*) and Brooklime (*Veronica beccabunga*).

4.2 Macroinvertebrate results

The Eynsham Fish Ponds supported a moderately poor invertebrate assemblage, with a total of 30 species recorded during the current survey for the site as a whole (see Appendix 3). Other taxa recorded included true flies from nine families and pea mussels (*Pisidium* spp.). All the species recorded were widespread and common. A summary of the number of taxa recorded in each of the taxonomic group surveyed is given in Table 2. In the present survey, no species of mayflies and dragonflies were recorded, probably due in part to the dense vegetation cover at the site.

Table 2 Number of invertebrate species recorded in each group

Group	Number of taxa
Flatworms	4
Leeches	3
Snails	6
Bivalves	1
Crustaceans	3
Stoneflies	2
Mayflies	0
Dragonflies and damselflies	0
Water bugs	2
Alderflies	1
Water beetles	7
Caddis flies	2
Diptera families	9

Most of the macroinvertebrate species recorded were generalists, i.e. species that can occur in a range of waterbody types. However, areas where water was flowing, particularly in the spring fed stream, were characterised by the presence of stoneflies (*Nemoura cinerea* and *Nemurella picteti*), the water shrimp *Gammarus pulex*, and the caddis fly *Plectrocnemia conspersa*.

During this survey, the most diverse habitat for macroinvertebrates was the sedge bed southwest of the spring fed stream, which supported animals adapted to fen conditions of low oxygen and high organic matter. This area was relatively rich in water beetles, with the assemblage dominated by scavenger water beetles (Hydrophilidae), which are generally poor flyers and thrive in shallow, often muddy water. The sedge beds also supported a relatively diverse snail assemblage of air-breathing species (as opposed to species with gills) which are adapted to low oxygen conditions. However, most of the areas surveyed contributed to the overall diversity of the site, as shown by the presence of unique species at each of the sampling station. The only exception was the open section of the spring-fed stream (Station C), which unsurprisingly was very similar to the shaded downstream section (Station A).

5. Conservation assessment and recommendations

5.1 Overall assessment

Overall, the wetland of the Eynsham Abbey Fish Ponds supported only a moderate wetland plant and aquatic macroinvertebrate community. This was surprising considering the large surface area of the site, and for macroinvertebrates, the apparent diversity of aquatic habitat, including both flowing and still waters.

The lack of disturbance may be a contributory factor to the low diversity at the site. For plants, low disturbance allows good competitors to spread and form monospecific stands, eliminating low-growing species. This has a knock-on effect on macroinvertebrates by creating homogenous stands, often with uniform underwater architecture. In addition, variables such as substrate type and water depth showed little variation between different areas of the site. Consequently, except for small differences in flow, macroinvertebrate habitats were relatively homogenous across the site as a whole.

5.2 Recommendations for management

Based on the present evaluation and subject to archaeological considerations, a number of recommendations can be made for the management and enhancement of the aquatic biodiversity of Eynsham Abbey Fish Ponds. Ideally, a management plan should be drawn up for the site as a whole before undertaking major management activities.

1. Habitat creation

It is likely that the diversity of the site as a whole could be substantially increased by creating other types of aquatic habitat which may attract a greater variety of wildlife, such as (i) a number of small, shallow, temporary or semi-temporary pools, or (ii) a larger area of open water. If this proposal is considered, the ecological value of potential sites for new pond creation should clearly be assessed, so that areas with high terrestrial diversity are not lost at the expense of the created aquatic habitats. If created, shallow pools should be designed to be (i) small (1-25 m²), (ii) semi-permanent or temporary, i.e. remain wet only part of the year or dry in some years, and (iii) to have no direct connection to flowing waterbodies to minimise nutrient enrichment. Ideally, a mosaic of pools with a range of surface areas and depths would be created.

2. Ditch management

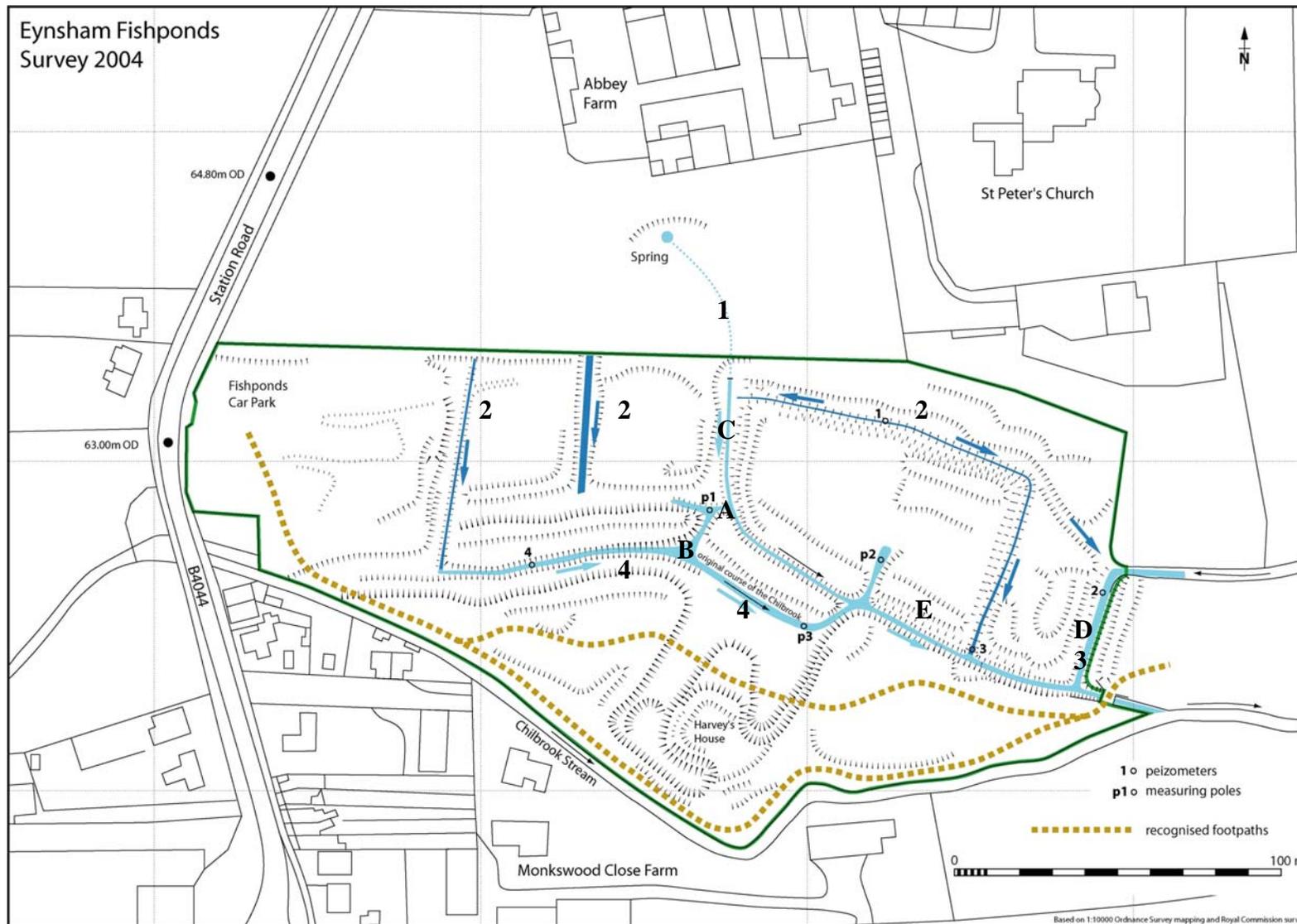
The ditch system may be enhanced for plants and animal by managing vegetation succession and shade. Ideally, management should take place in a piecemeal fashion to maintain (i) some of the existing habitat at all time, and (ii) different stages of vegetation succession. For example, silt may be removed in 15-20m length of ditch on a 5-10 year rotation. The frequency of management will depend on the rate of accumulation and on observation of the ecological results of de-silting, which should be monitored.

3. Increasing disturbance

The level of disturbance could be increased in patches throughout the wetland areas of the site in order to keep some of the tall emergent plants in check (e.g. Reed Sweetgrass and Great Willowherb), and to allow low growing plant species to establish. Greater plant diversity should, in turn, lead to greater invertebrate diversity. Care should be taken to maintain patches of the existing habitat for those animals already present at the site. In addition, the sedge beds in the southern area of the site (Site 4, see Appendix 1), which were the most diverse for macroinvertebrates, should also be maintained.

6. References

Pond Action (1998) *The National Pond Survey (NPS) methods*. The Ponds Conservation Trust, Oxford.



Appendix 1 Map showing the main types of waterbodies at the Eynsham Abbey Fish Ponds and the sampling locations for the aquatic macroinvertebrate survey (1-4: waterbody types, A-E: sampling stations, see text for details).

Appendix 2. Wetland plant species recorded at Eynsham Abbey Fish Ponds

Common name	Latin name	Conservation status
Floating-leaved species		
Common Duckweed	<i>Lemna minor</i>	Common
Emergent species		
Creeping Bent	<i>Agrostis stolonifera</i>	Common
Wild Angelica	<i>Angelica sylvestris</i>	Common
Fool's Watercress	<i>Apium nodiflorum</i>	Common
Marsh Marigold	<i>Caltha palustris</i>	Common
Lesser Pond Sedge	<i>Carex acutiformis</i>	Common
Great Pond Sedge	<i>Carex riparia</i>	Common
Great Willowherb	<i>Epilobium hirsutum</i>	Common
Meadowsweet	<i>Filipendula ulmaria</i>	Common
Reed Canary-grass	<i>Glyceria maxima</i>	Common
Soft Rush	<i>Juncus effusus</i>	Common
Gipsywort	<i>Lycopus europaeus</i>	Common
Water Mint	<i>Mentha aquatica</i>	Common
Water Forget-me-not	<i>Myosotis scorpioides</i>	Common
Water Chickweed	<i>Myosoton aquaticum</i>	Common
Amphibious Bistort	<i>Persicaria amphibia</i>	Common
Reed Sweet-grass	<i>Phalaris arundinacea</i>	Common
Bittersweet	<i>Solanum dulcamara</i>	Common
Marsh Woundwort	<i>Stachys palustris</i>	Common
Common Comfrey	<i>Symphytum officinale</i>	Common
Bulrush	<i>Typha latifolia</i>	Common
Brooklime	<i>Veronica beccabunga</i>	Common
Total	23 species	

Appendix 3. Aquatic macroinvertebrate species recorded at Eynsham Abbey Fish Ponds

Common name	Latin name	National status	Site A	Site B	Site C	Site D	Site E
Flatworms							
A flatworm	<i>Dendrocoelum lacteum</i>	Common		±			
A flatworm	<i>Dugesia polychroa</i>	Common		±			
A flatworm	<i>Polycelis felina</i>	Common				±	
A flatworm	<i>Polycelis tenuis</i>	Common	+	+	+	+	+
Leeches							
A leech	<i>Erpobdella octoculata</i>	Common	+	+	+	+	+
A leech	<i>Glossiphonia complanata</i>	Common		+	+		+
A leech	<i>Helobdella stagnalis</i>	Common		±			
Water snails							
Button Ram's-horn	<i>Anisus leucostoma</i>	Common	+	+			+
Whirlpool Ram's-horn	<i>Anisus vortex</i>	Common	±				
Twisted Ram's-horn	<i>Bathyomphalus contortus</i>	Common	+	+	+	+	
Wandering Snail	<i>Lymnaea peregra</i>	Common		+	+		
Marsh Snail	<i>Lymnaea palustris</i>	Common		+		+	+
Flat Valve Snail	<i>Valvata cristata</i>	Common				±	
Crustaceans							
A freshwater shrimp	<i>Crangonyx pseudogracilis</i>	Common		±			
A freshwater shrimp	<i>Gammarus pulex</i>	Common	+		+	+	+
A freshwater slater	<i>Asellus aquaticus</i>	Common	+	+	+	+	+
Stoneflies							
A stonefly	<i>Nemoura cinerea</i>	Common	+		+		+
A stonefly	<i>Nemurella picteti</i>	Common	+		+		+
Water bugs							
A water skater	<i>Gerris lacustris</i>	Common					±
A water cricket	<i>Velia caprai</i>	Common	+		+	+	
Alderflies							
An alderfly	<i>Sialis lutaria</i>	Common				±	
Water beetles							
A diving beetle	<i>Colymbetes fuscus</i>	Common		±			
A diving beetle	<i>Hydroporus angustatus</i>	Common		±			
A scavenger water beetle	<i>Anacaena globulus</i>	Common		±			
A scavenger water beetle	<i>Anacaena limbata</i>	Common		+	+		+
A scavenger water beetle	<i>Cercyon convexiusculus</i>	Common		±			
A scavenger water beetle	<i>Helophorus grandis</i>	Common		±			
A scavenger water beetle	<i>Helophorus obscurus</i>	Common		+	+		+
Caddis flies							
Cinnamon Sedge	<i>Limnephilus lunatus</i>	Common		+	+	+	+
A caddis fly	<i>Plectrocnemia conspersa</i>	Common	+		+		
Total number of macroinvertebrate species per site sampled:			10	20	14	11	13
Total macroinvertebrate species for the site as a whole:					30		