

An Ecological Survey of the pond at Little Coxwell, near  
Faringdon, Oxfordshire



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**Pond Action**

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# An ecological survey of the pond at Little Coxwell, near Faringdon, Oxfordshire.

## 1. Summary

An ecological survey of the village pond at Little Coxwell, Oxfordshire, was undertaken on 6 March 1997.

The site supports species characteristic of temporary ponds and is of high conservation interest (on a four point national scale: low, moderate, high, very high) for its aquatic invertebrate community.

In its current state the pond is a valuable wildlife site providing habitats for a good assemblage of plants and animals characteristic of shallow, seasonal pools. The pond is of unusually high nature conservation interest for a village pond.

Recommendations are made for increasing the aesthetic appeal of the pond, by creating more open water, whilst maintaining the nature conservation interest.

## 2. Introduction

This report describes the results of an ecological survey of the pond at Little Coxwell, Oxfordshire, undertaken on 6th March 1997.

Invertebrate, wetland plant, water chemistry and environmental data were collected in order to assess the conservation value of the pond. The results of the survey are used to make recommendations about the management of the site to maintain its nature conservation interest and improve its aesthetic value.

## 3. Site description

The pond site lies on the edge of the village of Little Coxwell, adjacent to a minor road providing access to the village. The total area of the pond is approximately 300m<sup>2</sup>, although at the time of the survey water levels were low, probably because of the current drought, and the water area of the pond was only 210m<sup>2</sup>. The water level was approximately 0.4 m below the normal winter maximum.

The maximum depth of the pond at the time of the survey was 0.5 m (average depth 0.2 m). The pond contained a large amount of decomposing leaf litter, organic ooze and debris.

Examination of the 1:50,000 scale British Geological Survey map of the area shows that the pond is located on the Lower Cretaceous Faringdon Sponge Gravels which, in this area, overlie thick strata of Kimmeridge Clay. Map interpretation by Pond Action's hydro-geologist suggests that the pond is likely to be fed by groundwater from a local aquifer within the Faringdon Sponge Gravels. Since the Sponge Gravels are generally homogeneous, with few clay horizons, it seems likely that the base of the aquifer lies at the top of the Kimmeridge Clay. Surface water draining from the surrounds will also contribute water to the pond, but is unlikely to significantly influence pond water levels. Silt on the bed of the pond may, however, help to retain water in the pond at levels slightly above surrounding groundwater levels in summer.

The pond is dominated by aquatic grasses which covered 80% of the pond at the time of survey. The centre and perimeter of the pond have also been colonised by willows (*Salix spp.*) which are about 5-10 years old. Hawthorn (*Crataegus monogyna*), Ash (*Fraxinus excelsior*) and elms (*Ulmus sp.*) are also present around the pond.

## 4. Methods

The technical details of the methods used to survey the pond are described in the Appendices 1 to 4.

## 5. Results

### 5.1 Invertebrates

#### 5.1.1 Species recorded in the pond

25 species of aquatic invertebrate were recorded. Four uncommon species were found - one 'local'<sup>1</sup> and two Nationally Notable B<sup>2</sup> water beetles (*Helophorus granularis*, *Helophorus nanus* and *Helophorus strigifrons*) and one local caddis fly (*Limnephilus binotatus*).

Other species recorded included: two species of pea mussel, three species of water snail, one species of alderfly, three species of caddis fly and 12 water beetle species. Overall, the invertebrate assemblage was a good example of a temporary pond fauna. Empty cases resembling those of the uncommon temporary water caddis fly *Limnephilus bipunctatus* were also found amongst the bankside willow stands and pond margins. This species has not been included in the species list for the site, however, because living larvae would be required to confirm its presence.

### Box 1 Notes on uncommon invertebrate species recorded at Little Coxwell

*Limnephilus binotatus*. A caddis fly. Local.

Fairly common in Staffordshire and the Fens, but uncommon elsewhere. Found in areas which dry up or considerably diminish in summer (Wallace, 1991).

*Limnephilus bipunctatus*. A caddis fly. (Cases only found) Local.

This caddis fly, which makes distinctive cases, appears to be distributed throughout Britain; however, larvae are 'only known from a few sites' and are described as 'enigmatic'; it is also unusual to record more than one individual at a site. Most of the small number of sites at which the species has been recorded have been temporary in nature; e.g. 'a trackside ditch in deciduous woodland which dried up in summer', 'wheel ruts which dried up in summer', etc. (Wallace, 1991).

*Helophorus granularis*. A water beetle. Local.

A very small beetle, typical of grassy ponds. Its distribution covers most of Britain, but it is uncommon everywhere it occurs (Friday, 1988).

*Helophorus nanus*. A water beetle. Nationally Notable B.

*Helophorus strigifrons*. A water beetle. Nationally Notable B.

These two species belong to the same family as the previous species; both are considerably bigger, however. *H. nanus* is distributed sparsely over England and Wales, being slightly more common in the east, and is in general a species of acid water and fens. *H. strigifrons*' range extends to cover Scotland also, but it is scarce everywhere it occurs. Its main habitat is temporary waters, often with rushes or sedges (Friday, 1988).

<sup>1</sup> Species which, whilst not rare, are restricted in occurrence.

<sup>2</sup> Recorded in 31-100 10 km x 10 km grid squares in Britain.

It should be noted that as invertebrates were surveyed in only one season, 30-50% more species might be recorded if surveys were repeated later in the year (following standard National Pond Survey practice).

### 5.1.2 Habitats for invertebrates in the pond

Five habitat types for invertebrates were identified within the pond. These were:

- (i) bankside willows
- (ii) central willows
- (iii) submerged grass/moss
- (iv) shallow grass/Creeping Buttercup
- (v) pond margins.

Between 14 and 16 species were found in each microhabitat (see Appendix 1). The areas of the pond that were of most importance for invertebrates were the shallow grass/Creeping Buttercup area and the pond margins. Three out of the four uncommon species were found exclusively in these habitats. Only one specimen of the Nationally Notable B beetle *Helophorus nanus* was found and this was within the submerged grass/moss area which dominates the pond.

### 5.2 Wetland plants

The present survey did not deal specifically with wetland plants as it was too early in the year for a full wetland plant survey (such work should be carried out during summer or early autumn). However, brief notes were made about the wetland plants that were observed.

The pond was dominated by the wetland grasses Creeping Bent (*Agrostis stolonifera*) and sweet-grass (*Glyceria* spp. - flowering material was not available to determine the species present). Common Marsh-bedstraw (*Galium palustre*), Great Willow-herb (*Epilobium hirsutum*), an undetermined *Cardamine* sp. and a water-cress, *Rorippa* sp., (either Common Water-cress or Green Water-cress) were also recorded.

Creeping Buttercup (*Ranunculus repens*), which is not technically a wetland species, covered a significant proportion of the pond adjacent to the road.

### 5.3 Amphibians

No amphibians were noted (a specific study of amphibians was not part of the survey). However, newts have been observed by a local resident although it is not known whether these were Common, Palmate or Great Crested Newts.

### 5.4 Conservation assessment

The number of uncommon invertebrate species present indicates that the pond is of high conservation value on a four point national scale: low, moderate, high, very high (see Appendix 4).

Note that because a detailed survey of the flora of the pond was not possible a conservation score for the plants assemblage has not been calculated.

## 5.5 Water depth

Inspection of the geology map suggests that the pond is most likely to have been dug into porous substrata and that its level depends on the level in the underlying aquifer. It is probably neither lined with clay artificially, or maintained by a natural lens of clay, although more detailed investigation would be required to confirm this.

At present we do not know how far below the pond bottom water levels drop to during the summer. However, as the aquifer is likely to be quite small, seasonal fluctuations in water level may be quite large.

The implication of this is that deepening the pond (as opposed simply to removing wetland plants and sediment) might not lead to it holding water for much longer in the year. In addition, because the pond is quite small, deepening would lead to the margins becoming significantly steeper. This would alter the ecology of the site and might reduce site safety, which could be an important consideration bearing in mind its proximity to a public highway.

## 6. Recommendations

### 6.1 Aims

We recommend that the main aims for management of the pond should be:

1. to maintain the populations of local and Nationally Notable B invertebrate species present in the pond,
2. to maintain the number of plant species present,
3. to achieve a balance between the visual amenity of the pond and its conservation value.

In its current state the pond is a valuable wildlife site providing habitats for a good assemblage of plants and animals characteristic of shallow, seasonal pools. The pond is of unusually high nature conservation interest for a village pond. It should be noted that ponds with extensive stands of vegetation, including ponds which are 100% vegetated, usually support a greater number of plant species than ponds with little aquatic vegetation.

The extensive stands of aquatic vegetation have, however, reduced the visual attractiveness of the pond. Creating more open water should improve the aesthetic value of the pond, although it is unlikely to improve the nature conservation value of the site (and could potentially reduce it).

The main requirements of management are therefore to:

- (i) maintain areas of each of the existing habitats for invertebrates (bankside willows, willows growing in shallow water, submerged grass/moss, shallow grass/Creeping Buttercup and pond margins).
- (ii) avoid completely eliminating any native aquatic plant species from the pond during management (e.g. aquatic grasses)
- (iii) create an area of open water (perhaps half of the pond) to improve its visual appeal. Open water should, ideally, be located nearer the front edge of the pond (where it is mainly viewed from) allowing existing habitats to be maintained in other parts of the pond.

- (iv) avoid deepening the pond, which would alter its biological characteristics, and would not necessarily lead to it holding water for much longer during the year.

## **6.2 Management Plan**

We recommend that work is undertaken in two phases so that changes are not made too rapidly to the pond. These are outlined below.

**Year 1:** remove one quarter of the vegetation and leaf litter in the central area of the pond. This will provide an area of open, deeper water during the wet period of the year. The amount of leaf litter entering the pond could be reduced by cutting back any overhanging vegetation.

Vegetation nearest the road is currently low growing. It will be advisable to ensure that this vegetation is kept low in order to maintain a clear view of the pond from the vantage point of the road. Marginal vegetation in other areas of the pond can be maintained in the current state.

**Year 2:** remove another quarter of the vegetation including the central willow stands whilst maintaining marginal willow stands. It may be possible to replant the willows around the perimeter of the pond. These can provide valuable cover for amphibians and birds.

## **6.3 Post-management monitoring**

Ideally the pond should be monitored after management to ensure that the changes desired have occurred and to modify the management plan if required.

## 7. References

Friday, L.E. (1988). A key to the adults of British water beetles (AIDGAP Key). *Field Studies Council Publication 189*.

Pond Action (1994). The National Pond Survey: 1989-1993. Interim Report to the World Wide Fund for Nature. *Pond Action Report No. 94/4*.

Wallace, I.D. (1991). A review of the Trichoptera of Great Britain. *Research and survey in nature conservation 32*. Nature Conservancy Council.

**APPENDICES: SURVEY METHODS**



## Appendix 1. Aquatic Invertebrates

Aquatic invertebrates were sampled using the standard, time-limited, method developed by Pond Action for the National Pond Survey. A three minute period was divided equally between the 5 micro-habitats observed in the pond (bankside Willows, central Willows, submerged grass/moss, shallow grass/*Ranunculus*, pond margins). Within each habitat invertebrates were collected by making vigorous sweeps with a 1mm square mesh pond net. Samples collected from each habitat were kept separate and returned to the laboratory for sorting and identification.

The following invertebrate groups were identified to species level:

Tricladida	(Flatworms)
Hirudinea	(Leeches)
Gastropoda	(Snails)
Bivalvia	(Freshwater mussels)
Malacostraca	(Shrimps and Slaters)
Arachnida	(Spiders)
Ephemeroptera	(Mayflies)
Odonata	(Dragonflies and Damselflies)
Plecoptera	(Stoneflies)
Heteroptera	(Water Bugs)
Coleoptera	(Water Beetles)
Megaloptera	(Alderflies)
Trichoptera	(Caddis flies)

**Table 1. Invertebrate species list for Little Coxwell (Oxfordshire) village pond: 6 March 1997**

Notes: Nnb = Nationally Notable B; L = Local. Microhabitats: 1 = Bankside Willows; 2 = Central Willows; 3 = Submerged grass/moss; 4 = Shallow grass/Creeping Buttercup; 5 = Pond margins

Species	Microhabitat				
	1	2	3	4	5
<b>Bivalvia (Freshwater Mussels)</b>					
<i>Pisidium casertanum</i>	Both species present in all habitats - but especially nearer middle of pond (numerous)				
<i>Pisidium personatum</i>					
<b>Gastropoda (Snails)</b>					
<i>Bathymphalus contortus</i>	1	1	-	1	-
<i>Hippeutis complanatus</i>	-	-	-	1	-
<i>Lymnaea truncatula</i>	10	7	24	11	17
<b>Trichoptera (Caddis flies)</b>					
<i>Glyptotaelius pellucidus</i>	40	42	4	-	4
<i>Limnephilus auricula</i>	400	12	496	224	256
<i>Limnephilus binotatus</i> (L)	-	-	-	16	-
<i>Limnephilus lunatus</i>	16	3	30	-	-
[NB: empty cases resembling those of the uncommon species <i>Limnephilus bipunctatus</i> were found in samples 1 and 5, but living larvae would be required for confirmation.]					
<b>Megaloptera (Alderflies)</b>					
<i>Sialis lutaria</i>	-	-	1	-	-
<b>Coleoptera (Beetles)</b>					
<i>Anacaena globulus</i>	4	8	-	-	8
<i>Anacaena limbata</i>	15	1	17	10	43
<i>Anacaena lutescens</i>	-	2	-	-	-
<i>Coelostoma orbiculare</i>	-	-	-	-	1
<i>Helophorus aequalis</i>	-	1	4	-	-
<i>Helophorus brevipalpis</i>	4	2	3	2	2
<i>Helophorus grandis</i>	2	3	13	2	1
<i>Helophorus granularis</i> (L)	-	-	-	3	4
<i>Helophorus minutus</i>	-	3	-	7	17
<i>Helophorus nanus</i> (Nnb)	-	-	1	-	-
<i>Helophorus obscurus</i>	36	16	9	8	54
<i>Helophorus strigifrons</i> (Nnb)	-	-	-	1	3
<i>Hydrobius fuscipes</i>	6	3	19	6	3
<i>Hydroporus memnonius</i>	1	-	-	-	1
<i>Ochthebius minimus</i>	-	-	-	1	-
<b>Total number of species in each habitat</b>	<b>14</b>	<b>16</b>	<b>14</b>	<b>16</b>	<b>16</b>

**Total number of species recorded = 25**

## Appendix 2. Wetland Plants

It was not possible to undertake a comprehensive survey of wetland plants because many plant species are not present until later in the year. Where possible plant species were identified in the field. Specimens which could not be immediately identified were returned to the laboratory for microscopic examination.

### List of plants recorded

<i>Agrostis stolonifera</i>	Creeping Bent
<i>Epilobium hirsutum</i>	Great Willow-herb
<i>Galium palustre</i>	Common Marsh-bedstraw
<i>Cardamine</i> sp.	Probably Lady's Smock
<i>Glyceria</i> sp. ( <i>fluitans</i> or <i>notata</i> )	Sweet-grasses
<i>Rorippa</i> sp.	Water-cress species

## Appendix 3. Water Quality

A sample of water was taken from the pond and analysed in the laboratory for pH, conductivity, alkalinity and calcium. Observations relating to the turbidity and colour of the water were taken in the field. The results are given below:

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**Table 2 Water quality in Little Coxwell (Oxfordshire) village pond**

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pH	6.6
Conductivity	318 $\mu\text{s cm}^{-1}$
Alkalinity	1.4 $\text{m mol}^{-1}$
Calcium	52 $\text{mg l}^{-1}$
Turbidity	Moderately clear
Water colour	Light brown
Probable source of colour	Tanins (from leaf litter)

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## Appendix 4. Methods of assessing conservation value

The conservation value of the pond was assessed on the basis of the number of local or rare species of macroinvertebrate recorded at the pond. All species present in the pond were given a numerical value depending on their national distribution. The values of all the species present were added to give a total Species Rarity Score. This score was divided by the number of species present to give the Species Rarity Index (SRI).

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**Table 3 Invertebrate conservation scores**

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<b>Description</b>	<b>Score</b>	<b>Invertebrates</b>
Common	1	Generally regarded as common
Local	2	Species which, whilst not rare, are restricted in occurrence
Nationally Notable B	4	Recorded from 31-100 10 x 10 km grid squares in Britain
Nationally Notable A	8	Recorded from 16-30 10 x 10 km grid squares in Britain
Red Data Book 3	16	Rare
Red Data Book 2	32	Vulnerable
Red Data Book 1	64	Endangered

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**Calculation of Species rarity Score and Index for Little Coxwell pond**

- Total number of species recorded = 25
- Species Rarity Score = 33
- Species Rarity Index =  $(33/25)$  1.32 ('High' Conservation Value)

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**Table 4. National rating of Species Rarity Index**

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<b>Conservation value of macroinvertebrate community</b>	<b>Species Rarity Index</b>
Very high	1.50
High	1.20 - 1.49
Moderate	1.01 - 1.19
Low	1.00

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