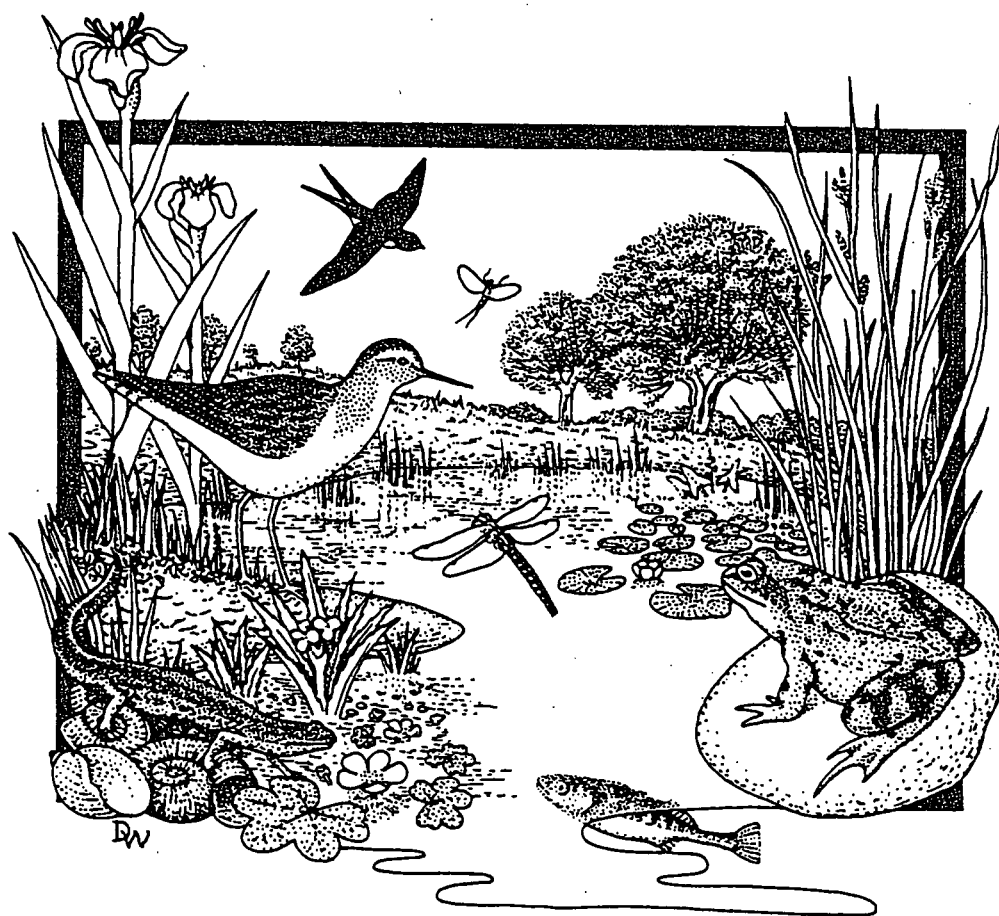


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AN ECOLOGICAL SURVEY OF BADER WAY LAKE AND ITS SURROUNDINGS,
DINTON PASTURES COUNTRY PARK

A REPORT FOR WOKINGHAM DISTRICT COUNCIL



POND ACTION
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CONTENTS

	Page
1. INTRODUCTION AND AIMS OF THE STUDY	1
1.1 Aims	1
1.2 Layout of the report	1
2. SITE DESCRIPTION	2
2.1 General description of the site	2
2.2 Physical features of the Bader Way lake	2
3 BADER WAY LAKE: PLANT COMMUNITIES	4
3.1 General description of the plant communities	4
3.2 Detailed descriptions of the plant communities	5
3.3 Rare and local plant species native to the site	9
4 BADER WAY LAKE: MACROINVERTEBRATE COMMUNITIES	11
4.1 General description of the macroinvertebrate community	11
4.2 The fauna of the microhabitats	11
5 PLANT COMMUNITIES OF THE LAND SURROUNDING BADER WAY LAKE	13
5.1 Descriptions	13
6 BIRDS	18
6.1 Results	
7 CONSERVATION VALUE OF THE PLANT AND ANIMAL COMMUNITIES OF BADER WAY LAKE SURROUNDINGS	20
7.1 Plant and macroinvertebrate communities of the lake	20
7.2 Plant communities of the surroundings of the lake	22
7.3 Bird communities of the lake and its surroundings	22
8 MANAGEMENT RECOMMENDATIONS	23
8.1 Management of Bader Way Lake	23
8.2 Management of the surrounding woodland, grassland and scrub	27
8.3 Management of plant species of particular interest	29
8.4 Management of the bird communities	29

APPENDICES

APPENDIX 1	METHODS USED TO SURVEY THE BADER WAY LAKE	30
1.1	Describing the physical features of the site	31
1.2	Recording terrestrial and aquatic plant communities	31
1.3	Macroinvertebrates sampling and identification from the lake	33
1.4	Recording birds	35
1.5	Assessment of the conservation value of the lake	36
APPENDIX 2.	SPECIES LISTS AND DISTRIBUTION OF RARE AND LOCAL SPECIES	38
2.1	Total list of plants recorded at the site	39
2.2	List of wetland plants recorded at the Bader Way lake	44
2.3	Species of aquatic macroinvertebrate recorded from microhabitats in the Bader way lake	46
2.4	Contacts with birds at each sample point on the Bader Way site	50
2.5	Total number of contacts made with each bird species	53
2.6	Local plant species recorded on the site	54
2.7	Local and uncommon species of macroinvertebrate recorded from the lake.	56

TABLES

1	Association of local and uncommon macroinvertebate species with different microhabitats in the lake	12
2	Provisional system for assessing the nature conservation value of wetland plant and macroinvertebrate communities	21

APPENDIX TABLES

1	National Pond Survey wetland plant list	32
2	Macroinvertebrate taxa collected in Bader Way lake	34
3	Terminology used to describe habitat/growth form of wetland plants and the distribution of plants and macroinvertebrates	37

FIGURES

1	Sediment depths recorded from the Bader Way lake	3
2	Wetland plant communities of the Bader Way lake	11
3	Bader Way lake and surroundings: plant communities	17
4	Number of bird species recorded during surveys of the lake	19

1. INTRODUCTION AND AIMS OF THE STUDY

1.1 AIMS

This report describes a survey of Bader Way lake and its surroundings undertaken for Dinton Pastures Country Park/Wokingham District Council.

The survey had four main aims:

- (i) To describe the plant and aquatic macroinvertebrate communities of Bader Way Lake and to use this information to assess the nature conservation value of the lake.
- (ii) To describe, and assess the nature conservation value of, the plant communities of the woodland, grassland and scrub adjacent to the lake.
- (iii) To make a preliminary description of the breeding bird community of Bader Way Lake and its surroundings.
- (iv) To recommend management to maintain and enhance the nature conservation value of Bader Way Lake and its surroundings.

1.2 LAYOUT OF THE REPORT

The report is arranged in the following sections:

Section 1 gives a general summary of the physical features of the site.

Sections 2 to 5 describe the plant and animal communities present, focussing on the plant and aquatic macroinvertebrate communities of the wetland areas.

Sections 6 and 7 assess the conservation value of the site and give recommendations for future management.

Appendix 1 includes detailed descriptions of the survey methods used to undertake the work. Appendix 2 gives full species lists and notes on the occurrence of rare or local plants and animals recorded on the site.

2. SITE DESCRIPTION

2.1 GENERAL DESCRIPTION OF THE SITE

The site surveyed for this report occupies an area of approximately 8.8ha, lying between Bader Way and the Woodley housing estate (SU770711). It includes areas of open water and marshland as well as surrounding woodland, grassland and scrub.

The main feature of the site is Bader Way lake, a 4.4ha shallow waterbody which occupies the western half of the site. The western edge of the lake lies directly adjacent to the gardens of houses on the Woodley estate (houses on the east side of Colemansmoor Road). The eastern margin of the lake grades into an area of marsh, wet scrub and damp woodland. The remainder of the site, between the lake and Bader Way, consists of secondary woodland, scrub, grassland habitats and disturbed ground.

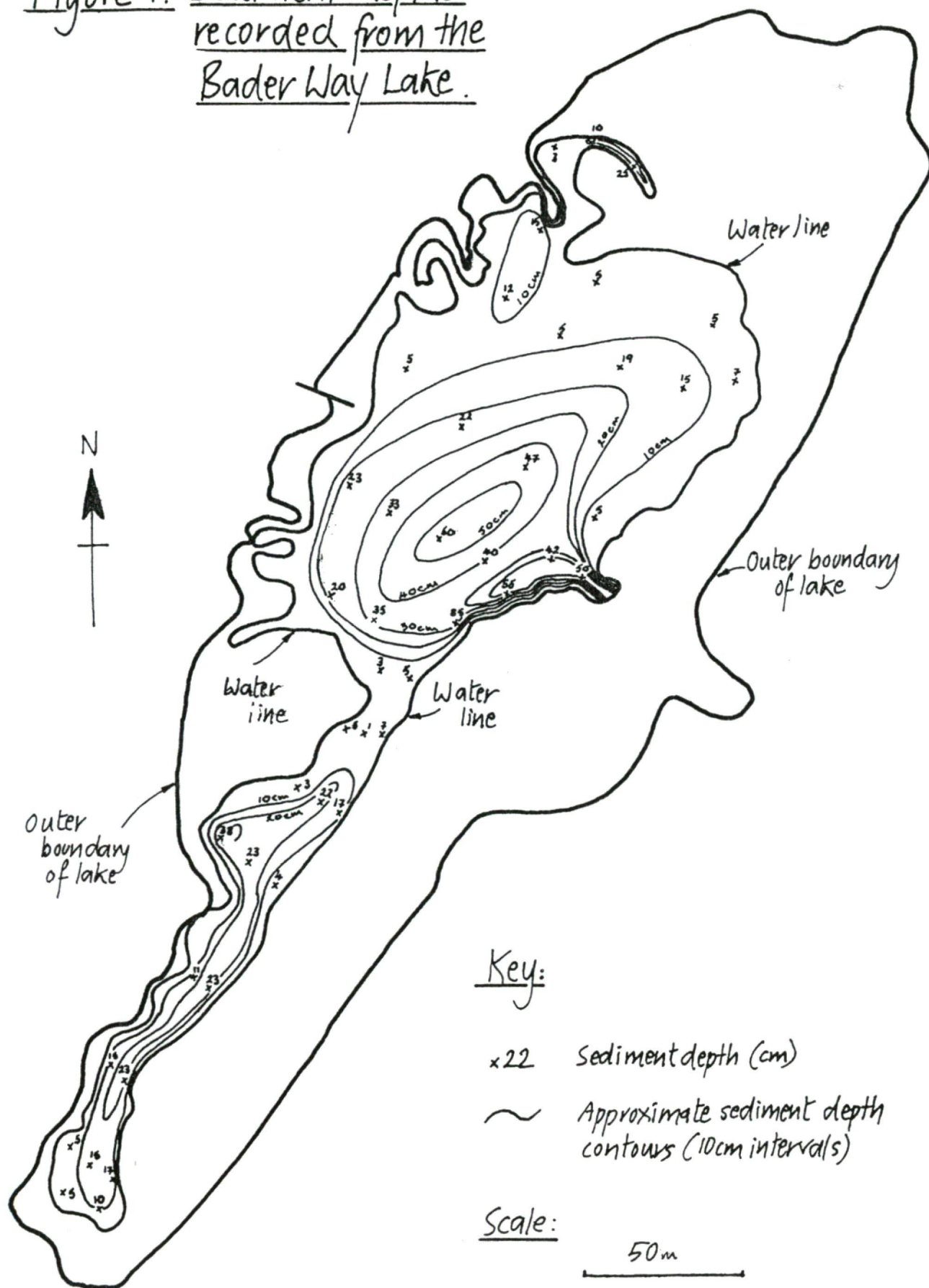
2.2 PHYSICAL FEATURES OF BADER WAY LAKE

The total area of Bader Way Lake is about 4.4ha (1.8ha water and 2.6ha wetland plant communities), with a maximum total depth (water plus silt) of 1.5m (average 70cm). The maximum water depth is about 85cm, with an average of about 51cm.

The lake is probably fed by a combination of groundwater and small stream inflows. The streams have brought in considerable volumes of silt and built up two large delta areas (at the north-east end of the lake and mid-way down the western margin) which have been colonised by marsh vegetation. Although the lake is apparently very silty, the maximum silt depth is only 85cm with an average depth of 20cm (sediment depths are shown in Figure 1).

The lake is reported usually to hold water all year, but a combination of dry weather and sediment infilling caused the lake to dry down to bare mud in 1989 and 1990.

Figure 1. Sediment depths recorded from the Bader Way Lake.



3. BADER WAY LAKE: PLANT COMMUNITIES

3.1 GENERAL DESCRIPTION OF THE PLANT COMMUNITIES OF THE LAKE

3.1.1 Species-richness and composition of the flora

62 wetland plant species (excluding trees and shrubs) were recorded from the lake (see Appendix 2.1). 50 of these were marginal or emergent species and 13 were aquatic (floating-leaved/submerged) species.

The lake's aquatic (floating-leaved and submerged) plant community was classified using the Nature Conservancy Council (NCC) lake classification (NCC, 1989). The lake classified as a 'Type 10 Lake', indicating a plant community typical of eutrophic, lowland water bodies, rich in calcium.

Although the number of aquatic plants recorded in Bader Way Lake was above average for 'Type 10' lakes, several of the native species recorded were clearly garden centre introductions (eg bogbean). In addition, several exotic species, including the highly invasive New Zealand swamp stonecrop, were found.

Marginal vegetation was most diverse in unshaded areas along the northern and eastern margins of the lake. In these areas the very gently sloping banks allowed the development of extensive stands of marginal and emergent vegetation, with a variety of species present.

The western edge of the lake, backing onto the gardens of houses in Colemansmoor Lane, had generally steeper banks. This restricted the development of marginal vegetation to a thin, discontinuous fringe. However, the variety of bank heights, profiles, substrates and management (mainly due to people 'gardening' the edge of the lake) created a variety of microhabitats which increased plant species richness in the lake as a whole.

Although 13 aquatic plant species were recorded, there were no extensive stands of aquatic plants, submerged species being particularly sparse. This was probably due to the combined effects of sediment depth and contamination (from urban runoff and waterfowl) and grazing by waterfowl, all of which tend to reduce the abundance of aquatic plants.

3.2 DETAILED DESCRIPTIONS OF THE PLANT COMMUNITIES OF THE LAKE

The lake and surrounding marsh, wet woodland and wet scrub were sub-divided into 6 vegetation zones, shown in Figure 2 and described below. Local species have been highlighted in bold type.

3.2.1 Marginal woodland and seasonally flooded scrub

A belt of woodland and scrub bordered the lake along its eastern and northern margins, forming part of a mosaic of wetland habitats around this part of the lake. The scrub areas were dominated by Salix species, in particular Salix viminalis (osier), S. fragilis (crack willow) and S. cinerea (rusty willow). Ground flora was generally poor, with abundant Urtica dioica (nettle), Rubus fruticosus (bramble), Galium aparine (cleavers) and occasional Humulus lupulus (hop).

It is likely that this scrub/woodland area developed from an old hedge line or copse, since its outer edge was composed of species typical of mixed woodland and hedgerows including Ulmus (probably procera) (English elm), Quercus robur (pedunculate oak), Fraxinus excelsior (ash), Prunus spinosa (blackthorn), Crataegus monogyna (hawthorn) and Alnus glutinosa (alder). The oaks included trees 15-20m tall at the south-west end of this area. The ground flora in these boundary areas also suggested a hedge/woodland origin since it included occasional plants of Stellaria holostea (greater stitchwort), Elymus repens (common couch) and Hyacinthoides non-scripta (bluebell).

The scrub and woodland graded into (and was encroaching on) the marsh communities of the lake. At the boundary of these two zones the ground flora was dominated by wetland species such as Agrostis stolonifera (creeping bent), Epilobium hirsutum (great willow-herb), Urtica dioica (stinging nettle) and Glyceria maxima (reed sweet-grass).

3.2.2 Marsh dominated by tall emergent plants

In unshaded areas the margins of the lake had developed marsh communities dominated by stands of emergent stand-forming species. This zone was particularly well-developed along the eastern and northern edges of the lake where stands of emergent species up to 50m wide, dominated by Glyceria maxima (reed sweet-grass), had developed.

Distinctive stand types of tall emergent plants could be recognised in five areas of the lake (see Figure 2). These were:

(i) North-east and south-east margins of the lake

A zone up to 35m wide, characterised by a monodominant stand of Glyceria maxima (reed sweet-grass) with only occasional scattered plants of Solanum dulcamara (bittersweet), Impatiens capensis (orange balsam), Lycopus europaeus (gipsywort), occasional Sparganium erectum (branched bur-reed), Carex riparia (greater pond-sedge), Iris pseudacorus (yellow flag), Myosotis scorpioides (water forget-me-not) and Polgonum amphibium (amphibious bistort). Along the lake margin the Glyceria stand was frequently fringed by plants of Typha latifolia (bulrush), which in turn merged into the herb dominated community (see Section 3.2.3 below).

(ii) Northern margin of the lake

The most extensive area of marsh occupied the northern margin of the lake. It was again dominated by Glyceria maxima (reed sweet-grass) but included an unusually high proportion of herb species. The most common were Epilobium hirsutum (great willowherb), Lythrum salicaria (purple-loosestrife) and Phalaris arundinacea (reed canary-grass). The abundance of Scutellaria gallericulata (skullcap) and, in the south-western part of the community, the local species Epilobium obscurum (hoary willowherb) was particularly notable.

(iii) Inflow area/delta area on the west bank

Emergent vegetation had colonised a sediment delta which was building up where a small stream (presumably draining run-off from the surrounding estate) entered the lake. The flora consisted of co-dominant stands of Glyceria maxima (reed sweet-grass) and Typha latifolia (bulrush) with occasional plants of Impatiens (balsam) spp.

(iv) Inflow area on the eastern bank

Relatively small mono-dominant stands of Carex riparia (greater pond-sedge) were colonising the stream edge and lake margins immediately north of the area where the stream entered the lake (see Figure 2).

(v) Western margin of the lake, abutting gardens

A thin (<2m) and frequently discontinuous fringe of tall emergent species bordered most of the western edge of the lake where it abutted private gardens. The development of more extensive stands of emergent plants was clearly inhibited by the steepness of the banks above water level. The tall-emergent species colonising this area were varied, and included Iris pseudacorus (yellow flag), Sparganium erectum (branched bur-reed), Typha latifolia (bulrush), Carex riparia (greater pond-sedge), Glyceria maxima (reed sweet-grass) and Phalaris arundinacea (reed

canary-grass). None of these species formed extensive stands, and individual stands were frequently inter-mixed with herb species or merged into herb dominated marsh (see below).

3.2.3 Herb dominated marsh

Herb-dominated communities generally occupied a relatively small area of the lake and its surrounding wetlands, but contributed considerably to the diversity of the site. These communities were generally found in unshaded areas which were flooded in winter and spring and, perhaps more importantly, where the tall emergent species could not out-compete them (eg along the inner edge of emergent stands or on steep or stepped bank sections). Thus the herb-dominated communities generally formed narrow fringes at the water's edge.

The species typical of these communities were Lythrum salicaria (purple-loosestrife), Epilobium hirsutum (great willowherb), Rorippa amphibia (great yellowcress), Bidens cernua (nodding bur-marigold), Rorippa palustris (marsh yellowcress), Mentha aquatica (water mint) and Solanum dulcamara (bittersweet). Young saplings of Salix spp. were also found to be colonising this area.

3 main types of herb-dominated marsh were identified:

(i) **Communities on the south-west and north-west margins of the lake**

Very gently sloping mud banks supported herb-dominated communities occupying a fringe (generally 3-15m wide) between the tall emergents and areas of open water or sparsely colonised mud. The community was composed of typical species (listed above) with occasional Lotus uliginosus (greater birds-foot trefoil) and Myosotis scorpioides (water forget-me-not).

(ii) **Communities on the north margin of the lake**

Gently sloping muddy banks along the northern margin of the lake supported a community similar to community (i) (above) in structure and species composition. However, this community occupied a rather more extensive area and included species such as Rumex hydrolapathum (water dock) and Ranunculus sceleratus (celery-leaved buttercup). The lower growing herbs at the water or mud edge were notable for the abundance of Polygonum spp. (eg. P. persicaria (redshank), P. amphibium (amphibious bistort), P. lapathifolium (pale persicaria).

(iii) **North-western bank, abutting private gardens**

Management of this area by local householders had ensured a much more variable structure on this part of the bank, creating a wide variety of natural and artificial habitats. Although the generally steep banks restricted the area available for colonisation by wetland plants, the

diversity of habitats made this one of the richest areas for marginal herbs. As well as the typical herb community, this area also supported a number of additional species including Eleocharis palustris (common spike-rush), Hypericum tetrapterum (square-stemmed St John's wort), Rumex hydrolapathum (water dock), Alisma plantago-aquatica (water plantain) Ranunculus sceleratus (celery-leaved buttercup) and Ranunculus flammula (lesser spearwort).

3.2.4 Species colonising newly exposed mud

At the time of the full vegetation survey in July, extensive areas of recently exposed mud were present around the edge of the lake. The outer edges of this habitat had been sparsely colonised by a variety of rapidly colonising annuals including Ranunculus sceleratus (celery-leaved buttercup), Polygonum persicaria (redshank) and a variety of terrestrial weeds such as Chenopodium rubrum (red goosefoot) and Stellaria media (common chickweed).

It is unlikely that this very rapidly established community would be present in wetter years when areas of mud were not exposed.

3.2.5 Aquatic plant community: floating-leaved and submerged vegetation

The most abundant floating-leaved species was Nuphar lutea (white water-lily) which occurred as approximately 25 small stands up to 3m diameter. Most stands were concentrated near the southern end of the lake or around the small islands along the western bank.

Other species were much less abundant. Notes on the occurrence of these are given below:

- (i) Callitriche sp. (water-starwort): small numbers of plants were growing at the base of the bank at the southern end of the lake.
- (ii) Menyanthes trifoliata (bogbean) and Nymphoides peltata (yellow-fringed waterlily). Introduced to the site, planted in a small embayment at the end of a private garden midway along the western bank.
- (iii) Crassula helmsii (New Zealand swamp-stonecrop). A single patch of this plant was recorded growing terrestrially at the base of the bank at the southern end of the lake in late spring. There was no evidence of it when the site was surveyed in summer, when water levels were much lower, though a specific search was made. Although C. helmsii may no longer be present, the site should be re-examined for this species in following years, and measures taken to try to eradicate it if it is re-discovered (see Section 7).
- (iv) Zannichellia palustris (horned pondweed) and Potamogeton pusillus (lesser pondweed) were recorded in low abundance growing at water depths between 1cm-10cm at the southern and northern ends of Lake in late spring. However there was no

evidence of these species when the lake was surveyed in July under much drier conditions.

- (v) Elodea nuttallii (Nuttall's waterweed) and Ceratophyllum demersum (rigid hornwort). A small number of individual stems of these two species were recorded, washed up along the margins of the lake in early summer. No submerged stands were recorded from the lake.
- (vi) Myriophyllum aquaticum (parrots feathers). An exotic species introduced into Britain via garden centres. It was found along the eastern margin of the lake near the inflow and under partial shade.
- (vii) Lemna minor (common duckweed) and Lemna trisulca (ivy-leaved duckweed) were found occasionally around the edge of the lake. Both were typically growing in partial shade, especially at the southern end and near the eastern inflow.

The occurrence of submerged and floating-leaved plants is summarised in Appendix 2.1).

3.3 RARE AND LOCAL SPECIES (NATIVE TO SITE)

10 local or locally common species (6 marginal, 2 submerged and 2 floating-leaved) were recorded (see Appendix 2.1). However the two local floating-leaved species (bogbean and yellow-fringed water-lily had clearly been introduced to the site as garden plants. No nationally rare wetland plants were recorded from the lake.

The on-site and national distribution of local wetland plants recorded from the lake is given in Appendix 2.5

FIGURE 2. WETLAND PLANT COMMUNITIES OF THE BADER WAY LAKE

Figure 2. Wetland plant communities of the Bader Way Lake.

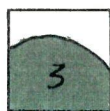
Key:



Marginal woodland and seasonally flooded scrub.



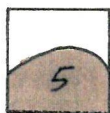
Marsh dominated by tall emergents.



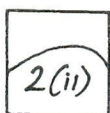
Herb dominated marsh.



Species colonising newly exposed mud.



Floating-leaved vegetation.



Stand type number (see Section 3 of text)



Vegetation / community boundary.

Scale:

② Nodding bur-marigold, purple loosestrife, redshank, great yellow-cress, amphibious bistort, water mint, pale persicaria, soft rush, celery-leaved buttercup, Occasional willows.

③ Dominant: bulrush with balsam species, short-fruited willowherb, bittersweet, purple loosestrife; Occasional: branched bur-reed, water dock, nodding bur-marigold, amphibious bistort.

④ Dominant: reed sweet-grass; Common: skullcap; Occasional: amphibious bistort, nodding bur-marigold, water dock, bittersweet, balsam species, purple loosestrife, great willowherb, short-fruited willowherb.

Rusty willow, occasional osier and crack willow

Gardens. Very variable bank profile, locally re-inforced.

50cm - 1m.

① Irregular, diverse, mixed fringe of tall emergent marginal species with:

Occasional: branched bur-reed, bulrush, reed sweet-grass, greater pond-sedge, amphibious bistort, nodding bur-marigold, celery-leaved crowfoot, skullcap, gipsywort, water mint, short-fruited willowherb, marsh yellow-cress, water dock, water figwort, soft rush, redshank, water forget-me-not, great yellow-cress, greater birds-foot-trefoil, square-stemmed St John's wort, lesser spearwort

Rusty willow

Stand dominated by reed sweet-grass, mixed with locally frequent bulrush, orange balsam, bittersweet, gipsywort.

① Celery-leaved buttercup, Redshank.

① Sparse: Willowherbs, amphibious bistort, purple loosestrife, Occasional: celery-leaved buttercup, marsh yellow-cress

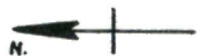
② Locally dominant: Water mint, red goosefoot, nodding bur-marigold, bulrush, marsh yellow-cress, purple loosestrife, young willows, great willowherb, greater birds-foot trefoil; Occasional: bittersweet.

③ Dominant: Reedsweet-grass Bulrush (especially at margin). Occasional: bittersweet, orange balsam, gipsywort, branched bur-reed, yellow iris.

① Bulrush, greater pond sedge, reed sweet-grass, branched bur-reed, occasional yellow iris

② Occasional sparse: purple loosestrife, bittersweet, marsh yellow-cress, water starwort, nodding bur-marigold, celery-leaved buttercup, water plantain, water-mint.

occasional horned pondweed
white water-lily



4. BADER WAY LAKE: AQUATIC MACROINVERTEBRATE COMMUNITIES

4.1 GENERAL DESCRIPTION OF THE MACROINVERTEBRATE COMMUNITY

A list of the aquatic macroinvertebrate species recorded from the lake, with their relative abundances, is given in Appendix 2.3. Information on the national distributions of local and uncommon species of macroinvertebrate is given in Appendix 2.6.

68 species of aquatic macroinvertebrate were recorded in Bader Way Lake, including 9 local species (see Table 1 below). For one 3-minute sample this is an unusually large number of species (Pond Action, unpublished results), suggesting that the lake supports a rich invertebrate community.

The fauna was dominated numerically by the water slater Asellus aquaticus. Other notably abundant species included the Coiled Ramshorn Snail (Bathymphalus contortus) and the Bladder Snail (Physa acuta (agg)), the freshwater shrimp Crangonys pseudogracilis, the leech Helobdella stagnalis and the diving beetle Noterus clavicornis.

As the occurrence of some species of macroinvertebrates is quite seasonal further survey work done in other seasons (see the National Pond Survey Methods Booklet prepared by Pond Action) would probably lead to the collecting of 25%-50% more species.

4.2 THE FAUNA OF THE MICROHABITATS

Macroinvertebrate samples from each microhabitat (eg stands of lilies, gravel bank, bare muddy shore) were analysed separately to describe more accurately the communities of different areas of the lake. 8 microhabitats were identified and sampled. These were mixed emergent plant stands, water lilies, Sparganium erectum (branched bur-reed), inlets, gravel bank, unvegetated areas, Potamogeton/Callitriche and mixed stands of low-growing marginal plants.

The structure of the macroinvertebrate communities in the various microhabitats was broadly similar. However, there were variations in the total number of species, and the number of local species, recorded in each microhabitat.

The richest microhabitat was the stands of mixed emergent plants from which 33 species of macroinvertebrate were recorded. The lilies, the Sparganium erectum (branched bur-reed) and the inlet also supported a wide variety of species with 28, 29 and 28 species respectively. The microhabitat supporting fewest species was the gravel bank, with only 12 species recorded.

All the microhabitats had local species associated with them. The mixed emergent plants and the Potamogeton/Callitriche microhabitat supported the most local species, with 3 recorded in each. The most notable local species recorded (the water beetle Peltodytes caesus) was taken from the gravel bank. The least valuable microhabitat appeared to be the unvegetated bank with only 17 species including one local species which was present in larger numbers in other microhabitats.

TABLE 1. THE ASSOCIATION OF LOCAL AND UNCOMMON MACROINVERTEBRATE SPECIES WITH DIFFERENT MICROHABITATS IN THE BADER WAY LAKE

L = Water lilies
 I = Inlet
 S = Sparganium erectum
 GR = Gravel bank
 T = Total number of individuals

PC = Potamogeton/Callitriche
 ME = Mixed emergent plants
 LM = Low-growing marginal plants
 U = Unvegetated bank

The table shows the number of individuals found of each species.

	L	I	S	GR	PC	ME	LM	U	T
<i>Aeshna mixta</i>	8	-	-	-	-	-	1	-	9
<i>Ranatra linearis</i>	-	-	-	-	-	1	-	-	1
<i>Sigara concinna</i>	-	4	-	-	3	-	-	1	8
<i>Enochrus testaceus</i>	1	-	1	-	-	2	-	-	4
<i>Helochares lividus</i>	-	-	-	-	-	1	-	-	1
<i>Hygrobia hermanni</i> (larva)	-	-	1	1	1	-	-	-	3
<i>Peltodytes caesus</i>	-	-	-	1	-	-	-	-	1
<i>Rhantus exsoletus</i>	-	-	-	-	1	-	-	-	1
<i>Scirtes hemisphaericus</i>	-	-	-	-	-	1	-	-	1
TOTAL NUMBER OF SPECIES	2	1	2	2	3	4	1	1	

5. PLANT COMMUNITIES OF THE LAND SURROUNDING BADER WAY LAKE

5.1 DESCRIPTIONS

Four main plant communities were recorded on the site: wetland, grassland, waste ground and woodland/scrub. The location and extent of these communities is shown in Figure 3.

In the descriptions that follow local or rare species are highlighted in bold type.

5.1.1 Wetland communities

The communities associated with the lake, (including a mosaic of scrub, woodland, marsh and aquatic plant species) were described in Section 3. Other wetland habitats present on the site are outlined below:

(i) Marsh

A small area of marsh vegetation was recorded almost surrounded by scrub close to Bader Way. This area was dominated by Glyceria maxima (reed sweet-grass) and Polygonum amphibium (amphibious bistort) with Impatiens parviflora (small balsam) common along the edge and occasional Iris pseudacorus (yellow flag).

(ii) Ditches

Two short stretches of ditch-and-bank were present on the site:

The northern ditch lies close to the road and was probably dug to prevent vehicle access to the site.

This ditch has been colonised by a variety of wetland species including Typha latifolia (bulrush), Lythrum salicaria (purple-loosestrife), Glyceria spp (sweet-grass), Lycopus europaeus (gipsywort), Agrostis stolonifera (creeping bent) and rushes (Juncus spp.). It is likely that the ditch holds water in winter.

The adjacent rubble bank has been colonised by weeds such as Crepis vesicaria (beaked hawk's-beard), Equisetum arvense (field horsetail), Lactuca serriola (prickly lettuce), Rumex obtusifolius (broad-leaved dock) and Cirsium arvense (creeping thistle).

The southern Ditch was much drier and its origin is unknown. The ditch community was dominated by tall herbs particularly Artemisia vulgaris (mugwort), Cirsium arvense (creeping thistle) and Phalaris arundinacea (reed canary-grass). The most notable species present was a single plant of the rare hybrid Rorippa x erythraea which is present on the adjacent bank. This is only the 4th site in Britain in which this hybrid has been recorded in the last 5 years and the 7th since 1950.

5.1.2 Grassland communities

The site supported five distinctive grassland communities. These were legume grassland, dry grassland, tall rough grassland, southern grassland and road bank grassland.

(i) Legume grassland

The legume grassland was an open community of relatively recent origin. It was dominated by species 30-40cms tall particularly Festuca rubra (meadow fescue) and Elymus repens (common couch). Some areas were locally dominated by Cirsium arvense (creeping thistle) (see Figure 3) and Lolium perenne (rye-grass). L.perenne tolerates trampling well and was characteristic of the paths.

The community was notable for the abundance of legume species including Lathyrus nissolia (grass vetchling), Vicia hirsuta (hairy tare), V.tetrasperma (smooth tare), V.Segetalis (common vetch), V.cracca (tufted vetch), Trifolium dubium (lesser trefoil), T.hybridum (alsike clover), T.pratense (red clover) and Medicago lupulina (black medick). Also locally prominent were Geranium dissectum (cut-leaved crane's-bill), Tussilago farfara (colt's-foot), several species of dock (Rumex spp.), Deschampsia cespitosa (tufted hair-grass), Daucus carota (wild carrot), Festuca arundinacea (tall fescue), Achillea millefolium (yarrow) and stands of the local sedge Carex acuta (slender tufted-sedge).

(ii) Dry grassland

This was a community of shorter drier grassland with vegetation up to 25cm in height. It was dominated by Festuca rubra (meadow fescue), Holcus lanatus (Yorkshire fog) and Agrostis stolonifera (creeping bent). Legume species were generally less abundant than in the Legume Grassland, although Vicia segetalis (common vetch) occurred occasionally. Patches of weed species such as Rumex spp. (docks), Plantago lanceolata (ribwort plantain) and Cirsium arvense (creeping thistle) were locally dominant. Young willows were regenerating in places.

(iii) Tall rough grassland

The tall rough grassland was composed of vegetation up to c.100cm high and had a closed structure. Its composition suggested an older grassland, probably damper and more stable than grassland communities (i) and (ii), and was possibly a remnant of original pasture.

The community was locally dominated by Arrhenatherum elatius (false oat-grass) and Elmus repens (common couch) with Juncus inflexus (hard rush) more common in the east. Other common or frequent species included Cirsium arvense (creeping thistle), Festuca rubra (meadow fescue), Dactylis glomerata (cock's-foot), Filipendula ulmaria (meadowsweet), Epilobium hirsutum (great willow-herb), Leucanthemum vulgare (ox-eye daisy), Centaurea nigra (common knapweed), Vicia cracca (tufted vetch), Anthriscus sylvestris (cow parsley), Chamerion

angustifolium (rosebay willow-herb) and the very local species Lathyrus pratensis (meadow vetchling). Two stands of the local sedge species Carex muricata Sub-species lamprocarpa (small-fruited prickly-sedge) were recorded near the western boundary of the community (see Figure 3). Some willow invasion was beginning to occur.

Scrub was beginning to develop along the southern boundary and, along the northern edge, gardens are being extended into the grassland.

(iv) Southern grassland

This was a small area of grassland lying in the southern part of the site (between Bader Way and the lakeside woodland) and was probably also a relict of original pasture. At its northern end the community was dominated by a mixture of Agrostis capillaris (common bent), Vicia cracca (tufted vetch), Achillea millefolium (yarrow), Centurea nigra (common knapweed), heracleum spondylium (hogweed) and Dactylis glomerata (cock's-foot), with Elymus repens (common couch) and Holcus lanatus (Yorkshire-fog) dominant on the southeast side of the path, nearest the road.

In the central and southern areas the community was dominated by Juncus inflexus (hard rush) and Agrostis capillaris (common bent). Lolium perenne (rye-grass) dominated the paths.

(v) Road bank grassland

The southern part of the steep embankment bordering Bader Way had also been colonised by a grassland community. This was dominated by Festuca rubra (meadow fescue), Arrhenatherum elatius (false oat-grass), Dactylis glomerata, (cock's-foot) and Elmus repens (common couch) with abundant Heracleum spondylium (hogweed), Urtica dioica (common nettle) and Senecio jacobea (common ragwort). Scrub species including hawthorn, bramble and Reynoutria japonica (Japanese knotweed) were beginning to invade the grassland community.

5.1.3 Waste ground

This was an area of disturbed ground with poor vegetation cover. The dry open soils supported Vulpia myuros (rat's-tail fescue), Trifolium arvense (hair's-foot clover) and Festuca rubra (meadow fescue). Other areas were locally dominated by Agrostis stolonifera (creeping bent), Elymus repens (common couch) and Artemisia vulgaris (mugwort) with occasional Malva moschata (musk mallow), Daucus carota (wild carrot) as well as dock and clover species.

Piles of gravel deposited in this area had been colonised by Vulpia myuros (rat's-tail fescue), Tussilago farfara (colt's-foot) and Trifolium arvense (hare's-foot clover).

5.1.4 Woodland/Scrub

(i) **Secondary woodland**

This was an area of dense secondary woodland, the southern part of which may be developing over old gravel pits.

The community was dominated by Salix fragilis (crack willow), Salix viminalis (osier), Salix cinerea (rusty willow) and Alnus glutinosa (alder) with occasional Quercus robur (pedunculate oak) and Fraxinus excelsior (ash). Prunus spinosa (blackthorn) was locally dominant along the western edge.

The herb layer was relatively poor but regenerating well. It was dominated by Urtica dioica (common nettle), Heracleum sphondylium (hogweed), Hedera helix (ivy) and Galium aparine, (cleavers). Species such as Epilobium hirsutum (great willowherb), Carex riparia, (greater pond sedge) and Carex otrubae (false fox-sedge) were locally common, probably in areas which are wet in winter.

(ii) **Alder Wood**

This alder wood was a well-developed stand of tall alder (15-20m high). The ground flora was poor with abundant Rubus fruticosus (bramble), Hedera helix (ivy), Heracleum sphondylium (hogweed), Galium aparine, (cleavers) Rumex sanguineus (blood-veined dock) and Myosotis (forget-me-not) spp.

(iii) **Shelter Belt**

A shelter belt had been recently planted by the road with plants currently 3-5m high. Trees which have been planted included Cornus sanguinea (dogwood), Populus albus (white poplar), Crataegus monogyna (hawthorn), Acer campestre, (field maple) Fraxinus excelsior (ash), Prunus spinosa (blackthorn) and Corylus avellana (hazel). The local species Geranium columbinum (long-stalked crane's-bill) was recorded along the northern edge of this community (see Figure 3).

6. BIRDS

6.1 RESULTS

6.1.1 Composition of the community

44 bird species were recorded from the site, of which 24 were known or likely to be breeding. The rate at which new likely breeding species were encountered on the site, in relation to the time spent on the site, is shown in Figure 4. This suggests that, because the site was relatively small, most of the breeding species on and around Bader Way Lake had been encountered after a total of 2 hours of systematic recording. Species which occasionally visited the site from other areas were still being added to the species list, although at a slow rate.

All the likely breeding species recorded on the site were common and widespread but two of the species recorded on the site (green woodpecker, turtle dove) have shown recent declines in abundance in Britain (Marchant et al, 1990). Green woodpeckers require grassland for feeding so the Bader Way site may provide some suitable feeding areas, although short, grazed turf is preferred to rank grassland. Turtle doves also feed in grassland, probably preferring areas where seeds of 'weed' species are available. The occurrence of weedy grassland at Bader Way may make the site quite favourable for turtle doves.

6.1.2 Relative abundance of birds on the site

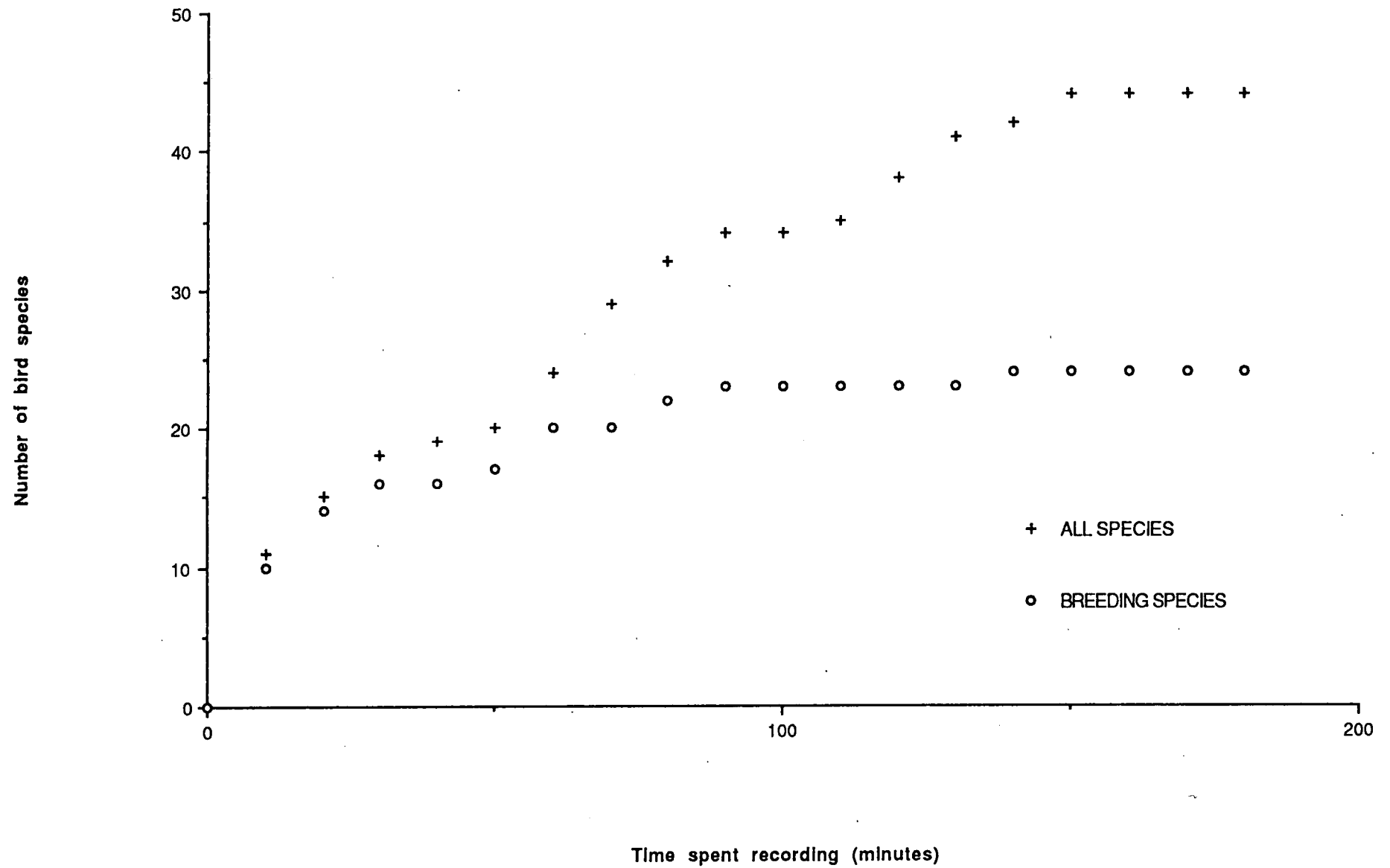
Using total number of contacts as a rough index of the relative abundance of species on the site, the most abundant species were starling, mallard, woodpigeon, house martin, carrion crow and wren (see Appendix 2.4).

The number of sample points at which species were recorded gives an indication of how widespread each species was on the site. On this basis most widespread species were wren, starling, woodpigeon, blackbird, blackcap and song thrush.

6.1.3 Autumn and winter migrants

A number of species not recorded during this breeding season survey, could make use of the site in autumn and winter. These are likely to include redwing and fieldfare, snipe, teal and other waterfowl and wading birds.

FIGURE 4. NUMBERS OF BIRD SPECIES RECORDED



7. CONSERVATION VALUE OF THE PLANT AND ANIMAL COMMUNITIES OF BADER WAY LAKE AND SURROUNDINGS

7.1 PLANT AND MACROINVERTEBRATE COMMUNITIES OF THE LAKE

Criteria for assessing the nature conservation value of lake plant and invertebrate communities are given in Table 1.

7.1.1 Wetland plants

The aquatic and wetland plant communities were of high nature conservation value.

13 species of aquatic (submerged and floating-leaved) plant were recorded in Bader Way Lake; above average for a NCC Type 10 lake. However the abundance of most species was very low. Four of the aquatic species recorded were local or locally common in their national distribution however two of these species had been introduced as garden plants.

The extensive stands of marginal and emergent plants around the lake (which included a large number of species for the size of site), also added to the value of the community. Although no nationally rare marginal species were found, 6 local species were recorded (see Appendix 2.6).

7.1.2 Aquatic macroinvertebrates

The aquatic macroinvertebrate community was of high to very high nature conservation value (see Table 2 for criteria).

The macroinvertebrate community was relatively rich in species, with 1 nationally rare species (the water beetle Peltodytes caesus) and 8 local species (see Table 1 and Appendix 2.7). The variety of species probably reflected the fact that the site included a large number of habitat types, with an the extensive area of marsh around the pond.

TABLE 2. PROVISIONAL SYSTEM FOR ASSESSING THE NATURE CONSERVATION VALUE OF WETLAND PLANT AND AQUATIC MACROINVERTEBRATE COMMUNITIES

CONSERVATION VALUE	DESCRIPTION OF TYPE OF COMMUNITY
<u>WETLAND PLANT COMMUNITIES OF LAKES</u>	
VERY HIGH	Above average numbers of aquatic species for the community type present (Nature Conservancy Council, 1989). Rare and local species present.
HIGH	Above average numbers of aquatic species for the community type present (Nature Conservancy Council, 1989). Generally more than three or four local species present. No rare species.
INTERMEDIATE	Average numbers of aquatic species for the community type present (Nature Conservancy Council, 1989). Few or no local species present. No rare species.
LOW	Below average numbers of aquatic species for the community type present (Nature Conservancy Council, 1989). No rare or local species.

AQUATIC MACROINVERTEBRATES

VERY HIGH	Supporting a rich community of macroinvertebrate species, including local and rare species. Note that some sites with rare species may be relatively species-poor.
HIGH	Supporting a rich community of common macroinvertebrate species. Generally more than three or four local species recorded. No rare species.
INTERMEDIATE	Supporting a moderately rich community of common macroinvertebrate species. Generally up to three local species recorded, but no rare species.
LOW	Supporting a species-poor community of common macroinvertebrates. No rare or local species.

NOTE: When making an assessment of the species-richness of sites, account must be taken of the tendency for acid or base-poor sites to support fewer species of macroinvertebrates than neutral, alkaline or base-rich sites.

7.2 PLANT COMMUNITIES OF THE SURROUNDINGS OF BADER WAY LAKE

The plant communities on the remainder of the site should be regarded as being of local nature conservation value.

The site supported a very large number of species for its size, reflecting the variety of habitats present in a small area and the disturbance of some areas (presumably the after-effects of road construction).

Although the site was rich in species none of the communities recorded away from the lake was of national or regional nature conservation importance; all were either disturbed or degraded and could be recreated. However, because of the variety of species present the site should be regarded as being of local value and worthy of protection and management for wildlife.

Eleven local species were recorded, of which the least common was Lathyrus nissolia (see Appendix 2.6). Management should be designed to perpetuate populations of this, and other, local species (see Section 6).

7.3 BIRD COMMUNITIES OF BADER WAY LAKE AND SURROUNDINGS

The bird community of the site is of local nature conservation value.

The breeding bird community consisted of widespread and common species. The community did not include populations of species of regional or national importance.

8. MANAGEMENT RECOMMENDATIONS

In this section general recommendations about the management of the Bader Way lake and the other areas of the site are made. The information given is not meant to constitute a detailed management plan.

The general aim of management of all the areas is to retain the presence of the highest value species or communities, and improve other communities where possible.

8.1 MANAGEMENT OF BADER WAY LAKE

8.1.1 Aims

This section focuses on the management of the lake's sediment and water depths. At the time of the commissioning of this survey it was felt that the silting-up of the lake would have greatly reduced its value for wildlife. As the survey results show this is not the case. In fact the main threat to the site is probably pollution from the adjacent urban area.

8.1.2 Water depths

Bader Way Lake is naturally shallow with a maximum water depth (assuming all sediment was removed) of up to 1.5m (the average is only 70cm). The unusually dry weather of 1989 and 1990, combined with the continued sediment input from the streams feeding the lake, caused water levels to drop sufficiently in summer 1989 (as reported to us by local resident) and 1990, to leave only bare, wet mud.

The importance of the streams as sources of the sediment can be judged by comparing the 1:10,000 Ordnance Survey with the survey results presented here. This clearly shows an increase in the area of marshland present around the stream inlets at the western and northern edges of the lake, developed upon sediment deltas created by the streams. The stream draining into the western side of the lake is presumably draining from the Woodley estate but the origin of the northern stream is unknown.

8.1.3 Water quality

It is very likely that urban runoff entering the lake through the stream(s) is carrying sediments polluted by nutrients (especially nitrogen and phosphorus), heavy metals, oils and perhaps biocides and PCB's.

8.1.4 Management of water and sediment depths: impacts on the plant and invertebrate communities of the lake

(i) Plants

The most valuable plant communities associated with the lake were the often extensive stands of wetland marginal species. Sediment buildup has encouraged the development of these communities by providing new areas for colonisation.

In contrast aquatic plant species were present in very low abundance, with even the pollution tolerant Zannichellia palustris (horned pondweed) forming only small stands.

This lack of submerged plants suggests the presence of polluted sediment and/or water in the lake (see 8.1.3 above).

Overall it appears that although the aquatic plant community has become impoverished as a result of poor water/sediment quality the marsh communities have been less seriously affected.

(ii) Invertebrates

The majority of invertebrate species recorded were associated with the margins, especially where this was bordered by dense stands of vegetation. There was very little submerged vegetation present so permanent open water areas did not provide a good habitat for macroinvertebrates.

Periodic drying out is a natural and regular occurrence in shallow ponds, lakes and wetlands and many invertebrates have strategies for tolerating dry periods. So, although the low water levels in 1989/90 may have reduced populations of some invertebrate species, it is unlikely that this will be permanently damaging. In fact the elimination of fish during these drying periods is likely to lead to an increase in the abundance or diversity of species in some groups (eg water beetles, dragonflies).

(iii) Amphibians

The very gently shelving banks, extensive areas of marginal plants and abundance of scrub and woodland for overwintering adults should ensure that the area is attractive for amphibians. As with invertebrates, the lack of fish may lead to an increase in frog and newt populations. Toads, if they are present, are less likely to be affected by the elimination of fish as they are more able to co-exist.

(iv) Water birds

The lake is probably too disturbed by human pressure at the moment to be of great importance for wetland birds other than common and adaptable species (eg mallard, moorhen, coot, heron, canada goose). It is likely that dabbling ducks and waders are likely to make occasional use of the site in autumn and winter, particularly if shallow mud is regularly exposed. Diving ducks are unlikely to be a very important component of the bird community because of the shallow depth of the lake and (for some species) the absence of stands of submerged plants. As bird survey work has so far been limited to the breeding season we would recommend that further work is done during wader passage (spring and autumn) and winter to gain a better impression of the use of the site by water birds.

The lake could be managed to encourage a wider variety of species but it would be essential to reduce disturbance from

human activity. This would require increasing the screening of the lake (either artificially or by encouraging the natural development of marshland plants or scrub) and preventing access to some of the eastern margins. Some measures would also be needed to screen parts of the site from the western (housing estate) side as well. As local residents presumably feel a certain right of access to the site, consultation would almost certainly be required if measures to reduce disturbance to birds were to be effective.

As there are stream inflows to the lake it is possible that a shallow 'scrape' area could be included in any plans to renovate the site. This could provide additional feeding habitats for common migrant and overwintering waders and waterfowl (eg common sandpiper, green sandpiper, snipe, ringed plover, redshank, teal, shoveler). However, a scrape would probably dry out in summer and would need a lot of management to retain bare mud. It is also possible that the site would be too enclosed for a scrape to be successful. The success of a scrape would also depend on providing an area where access was completely restricted. In the north-east corner of the lake, which is already quite secluded, this would probably not be too difficult.

(v) Conclusions

The accumulation of polluted sediment has probably led to open water plant and invertebrate (and possibly also bird) communities becoming impoverished, reducing the conservation value of this area of the lake. However, the marginal and marsh communities, which have developed on deposits of stream-borne sediment, contribute significantly to the conservation value of the site. Marginal plant and invertebrate communities are of greatest value but these areas are probably also of value for amphibians and birds.

If sediment inputs via the streams continue to build up the lake will eventually become completely dominated by tall emergent vegetation. Provided that some areas of open water were maintained this would be unlikely to reduce the value of the site for wetland plants. Amphibians might also remain unaffected. However, existing aquatic invertebrate diversity could be reduced if silting-up reduced the length of the lake existing margin/open water interface. In addition water birds which require open water or bare mud (eg coot, canada goose, mute swan, dabbling ducks, migrant waders) might be excluded. However the development of dense, mixed stands of emergent plants could encourage other bird species to use the site (eg water rail, reed warbler, sedge warbler).

8.1.5 Silt management and removal

The options and cost/benefits for management or removal of silt from the lake are outlined below.

(i) Extensive dredging of the lake

Removal of large quantities of silt from the lake might be

beneficial in removing nutrients and other pollutants held in the sediments, giving an improvement in water quality. This could potentially lead to an increase in the abundance (and possibly also the number of species) of aquatic plants, in turn providing a wider range of habitats for invertebrates and more food for diving and dabbling waterfowl.

Extensive dredging has several disadvantages.

- a) It may not be effective unless all sediment is removed since there could still be a considerable quantity of nutrients and other pollutants held in the remaining sediment.
- b) Any benefits might be short-lived since the lake would still be receiving inputs of polluted surface water and sediment from neighbouring urban areas. Well-maintained sediment traps could, to some extent, reduce the inputs of polluted sediments. However, if complete dredging was seriously considered the water quality of all surface inputs should be investigated and lake turnover time estimated in order to assess the degree of water pollution.
- c) It is likely to be very expensive because of the quantities of material that would need to be removed. The cost of dredging large areas of Bader Way lake using an independent contractor would probably be in the region of £20,000-£50,000.

(ii) Partial dredging

The dredging of small areas of the lake would be unlikely to significantly improve water quality. However, local removal of sediment and some of the underlying gravels, would increase habitat diversity and might maintain small areas of permanent water in very dry years.

(iii) Silt traps

If it is felt desirable that a large open body of water should be retained on the site for as long as possible (eg see 8.1.4 (v) Conclusions above) we recommended that silt traps are installed and maintained on the main stream inflows. If well-maintained these will greatly reduce the rate at which the lake silts up.

(iv) Disposing of spoil

Finding large areas on the site suitable for the disposal of large volumes of sediment (from extensive dredging) might prove difficult without causing damage to some of the higher quality marshland communities (eg the mixed tall marsh community along the northern bank). However, smaller volumes of sediment could probably be dumped (with little damage) in areas of lower quality marsh, such as monodominant Glyceria maxima stands or where woodland or scrub lie adjacent to the lake edge (eg along parts of the eastern shore).

8.1.6 Vegetation management

Some vegetation management is required to maintain the conservation value of the lake and its marshland surrounds. In particular further encroachment on marshland areas, and on the lake edge, by willow scrub should be prevented. The most time effective work would probably be to focus on cutting or pulling young willow shoots which are growing up in parts of the marginal herb communities.

Some attempts should also be made to search out any plants of Crassula helmsii (New Zealand swamp-stonecrop) particularly along the southern bank where it was seen in early summer 1990 (but not in mid summer) and to prevent it from spreading. The most effective way of controlling this plant is thought to be shading it out with black plastic sheeting. Digging it out and removing it risks (a) leaving small fragments which can easily root again (b) spreading it to other areas in the process of removing it from the original site.

8.1.7 Creating groundwater-fed ponds

Creating groundwater-fed ponds in the fen/marsh would almost certainly increase the value of the lake site for aquatic invertebrates. Groundwater is likely to be less polluted than surface water and the smaller pools would probably provide habitats for species not found in the main lake. Before any small ponds were created trial holes should be dug check water levels.

8.1.8 Community involvement

Local residents could be encouraged to take an active (and informed) part in the management of the lake.

8.2 MANAGEMENT OF THE SURROUNDING WOODLAND, GRASSLAND AND SCRUB

8.2.1 Introduction

Overall this area forms an interesting contrast to the mown parkland on the other side of Bader Way. It should be managed in order to maintain its existing conservation value.

Much of the existing interest of the site (ie the wide variety of species recorded and the occurrence of local species and colourful communities) is a product of a combination of disturbance and neglect. Because of this the site is likely to go on changing fairly rapidly as scrub continues to invade and rank vegetation spreads. Management is therefore essential in order to preserve and enhance the current diversity and to retain local species of interest.

The following sections give specific management recommendations for each of the main habitat types on the site.

8.2.2 Woodlands

The woodland areas are generally of little current interest because of the dense undergrowth, but are best left to develop naturally with little further intervention.

8.2.3 Tall rough grassland

This grassland is probably semi-stable and currently only requires occasional scrub management to retain its interest. Management should aim particularly to prevent encroachment by bramble but blackthorn and elm, which are likely to invade clonally along the edges, should also be controlled. Mowing and removal of vegetation once every 3-5 years will help with long term maintainance.

8.2.4 Legume grassland and dry grassland

These areas are probably unstable and may therefore be susceptible to rapid change. This would be detrimental to the value and interest of the site since these areas support some of the most colourful species and the more unusual species. Regular cutting and removal of the vegetation will help to maintain the openness of the communities. Mowing should be done three times a year (once early in May and twice in late August or September) avoiding the legume flowering and fruiting seasons.

Specific measures to control Cirsium arvense (creeping thistle) are strongly recommended to prevent it from becoming dominant in this area. Control can be achieved by repeatably cutting plants through the season (avoiding legume flowering and fruiting times!).

Both areas might also benefit from some selective scrub removal.

8.2.5 Waste ground

This area is currently colourful and probably valuable for butterflies. The only management required is removal of scrub (but leave the buddleja!).

8.2.6 Road Bank Grassland

Hawthorn, bramble and Japanese knotweed are beginning to invade this grassland community and are likely to become dominant if not managed.

8.3 MANAGEMENT OF PLANT SPECIES OF PARTICULAR INTEREST

(i) Lathyris nissolia

This species can probably be retained by managing areas that support it as for the legume and dry grassland. Harrowing in some places could also help to maintain the open structure that will favour this species.

(ii) Rorippa x erythrocaulis

This rare hybrid probably grew up when the ditch was originally dug. Tall herbs are now beginning to take over the site and the Rorippa is perhaps unlikely to persist at this site without specific management to prevent out-competition. Specific cutting and removal of vegetation could be undertaken. The Rorippa could also be removed (transplanted) to a more open site nearer the pond.

(iii) Other local species

Cutting and scrub control recommended should be adequate to retain populations of other local species growing on the site.

8.4 MANAGEMENT OF THE BIRD COMMUNITIES

The management of vegetation recommended above should maintain the existing non-wetland bird communities on the site.

If lake dredging works are undertaken features outlined above (eg screening, construction of a scrape) could be designed into the scheme.

APPENDIX 1. METHODS USED TO SURVEY THE BADER WAY SITE

APPENDIX 1

1. METHODS USED TO SURVEY THE BADER WAY LAKE

1.1 DESCRIBING THE PHYSICAL FEATURES OF THE SITE

An outline of the site was prepared from the 1:10.000 Ordnance Survey map of the site. This map was redrawn, approximately to scale, to take account of recent changes in the shape of the lake. The area of the lake was calculated from the redrawn map.

Lake depths were measured by taking transects with depth poles. Results are presented as spot depths on the modified outline map of the lake. Major anomalies in depths are also shown where these do not coincide with transects. Spot depth were used to construct contours of sediment depths and these were used to calculate approximate quantities of sediment present in the lake. Data from the depth studies are presented in Figure 1.

1.2 RECORDING TERRESTRIAL AND AQUATIC PLANT COMMUNITIES

An initial list of wetland species within and around the lake was made by Pond Action in the course of macroinvertebrate sampling on 6 June 1990. This information was used as a supplement to the main aquatic plant survey, undertaken on 18 July 1990. Vegetation communities in terrestrial parts of the site (ie excluding the lake and its marginal wetland communities) were described and mapped on 7th July 1990 (by Tim Rich co-ordinator of the Botanical Society for the British Isles [BSBI], 1989 Monitoring Scheme).

The plant communities present on the site were identified, by 'walking the ground'. The communities which were identified were plotted onto the base map in the field. The main characteristics of each community were described and the occurrence and distribution of local species was noted.

Information about the species present in each community was used to produce a total species list for site. It was estimated that approximately 90% of plant species present at the site were recorded during this single season survey.

1.1.1 Plant communities within and around the lake

The wetland plant community within and around the lake was sub-divided in order to give greater detail for this area. 'Type cross-sections' were drawn, approximately to scale, to give a graphical representation of the vegetation composition and structure at selected points around the lake. A separate list of 'wetland plants' recorded in and around the lake was maintained to facilitate independent analysis. 'Wetland plants' are defined as the species listed on the National Pond Survey wetland plant species list (see Appendix Table 1).

Terms used to describe wetland plants throughout this report are given in Appendix Table 3.

APPENDIX FIG 1. NATIONAL POND SURVEY Wetland plant list

SUBMERGED AND FLOATING PLANTS

Apium inundatum
Aponogeton distachyos
Azolla filiculoides
Callitriche hamulata
Callitriche hermaphrodita
Callitriche obtusangula
Callitriche platycarpa
Callitriche stagnalis
Callitriche truncata
Callitriche sp. (undetermined)
Ceratophyllum demersum
Ceratophyllum submersum
Crassula helmsii
Elatine hexandra
Eleogiton fluitans
Elodea canadensis
Elodea nuttallii
Groenlandia densa
Hippuris vulgaris
Hottonia palustris
Hydrocharis morsus-ranae
Isaetes lacustris
Juncus bulbosus
Lagarosiphon major
Lemna gibba
Lemna minuscula
Lemna minor
Lemna polytriza
Lemna trisulca
Littorella uniflora
Lobelia dortmanna
Menyanthes trifoliata
Myriophyllum alterniflorum
Myriophyllum spicatum
Myriophyllum verticillatum
Nuphar lutea
Nymphaea alba
Nymphoides peltata
Oenanthe fluviatilis
Potamogeton alpinus
Potamogeton bertholdii
Potamogeton coloratus
Potamogeton crispus
Potamogeton friesii
Potamogeton gramineus
Potamogeton lucens
Potamogeton natans
Potamogeton obtusifolius
Potamogeton pectinatus
Potamogeton polygonifolius
Potamogeton praelongus
Potamogeton pusillus
Potamogeton trichoides
Potamogeton hybrid(s)
Ranunculus aquatilis
Ranunculus baudotii
Ranunculus circinatus
Ranunculus fluitans
Ranunculus hederaceus
Ranunculus omiophyllus
Ranunculus pellatus
Ranunculus penicillatus
Ranunculus trichophyllus
Sagittaria sagittifolia
Sparganium angustifolium
Sparganium emersum
Sparganium minimum
Stratiotes aloides
Subularia aquatica
Utricularia australis
Utricularia intermedia
Utricularia vulgaris
Wolffia ariza
Zannichellia palustris

Bryophytes:
Fontinalis antipyretica
Riccia fluitans
Ricciocarpus natans
Sphagnum sp.

Algae:
Chara sp.
Nitella sp.
Tolypella sp.

EMERGENT AND OTHER WETLAND PLANTS

Achillea ptarmica
Acorus calamus
Agrostis stolonifera
Alisma lanceolatum
Alisma plantago-aquatica
Alopecurus aequalis
Alopecurus geniculatus
Anagallis tenella
Andromeda polifolia
Angelica archangelica
Angelica sylvestris
Apium nodiflorum
Baldella ranunculoides
Barbarea intermedia
Barbarea stricta
Barbarea vulgaris
Berula erecta
Bidens cernua
Bidens tripartita
Blysmus compressus
Butomus umbellatus
Calamagrostis canescens
Calamagrostis epigejos
Caltha palustris
Cardamine amara
Cardamine pratensis
Carex acuta
Carex acutiformis
Carex curta
Carex demissa
Carex diandra
Carex disticha
Carex elata
Carex flacca
Carex hostiniana
Carex laevigata
Carex lasiocarpa
Carex lepidocarpa
Carex limosa
Carex nigra
Carex otrubae
Carex panicea
Carex paniculata
Carex pendula
Carex pseudocyperus
Carex pulicaris
Carex riparia
Carex rostrata
Carex spicata
Carex vesicaria
Catabrosa aquatica
Cicuta virosa
Cirsium dissectum
Cirsium palustre
Cladium mariscus
Conium maculatum
Crepis paludosa
Cyperus longulus
Dactylorhiza fuchsii
Dactylorhiza incarnata
Dactylorhiza majalis
 ssp. *praetermissa*
 ssp. *purpurella*
Deschampsia caespitosa
Orosera rotundifolia
Egeria densa
Eleocharis acicularis
Eleocharis multicaulis
Eleocharis palustris
Eleocharis quinqueflora
Eleocharis uniglumis
Equisetum fluviatile

Equisetum palustre
Epilobium adenocaulon
Epilobium hirsutum
Epilobium nerteroides
Epilobium obscurum
Epilobium palustre
Epilobium parviflorum
Epilobium tetragonum
Epipactis palustris
Erica tetralix
Eriophorum angustifolium
Eriophorum latifolium
Eriophorum vaginatum
Eupatorium cannabinum
Filipendula ulmaria
Gallium boreale
Gallium palustre
Gallium uliginosum
Geum rivale
Glyceria declinata
Glyceria fluitans
Glyceria maxima
Glyceria pilcata
Hydrocotyle vulgaris
Hypericum elodes
Hypericum tetrapterum
Impatiens capensis
Impatiens glandulifera
Impatiens noli-tangere
Iris pseudacorus
Isolepis cernua
Isolepis setacea
Juncus acutiflorus
Juncus articulatus
Juncus bulbosus agg.
Juncus compressus
Juncus conglomeratus
Juncus inflexus
Juncus subnodulosus
Juncus effusus
Lotus uliginosus
Lychnis flos-cuculi
Lycopus europaeus
Lysimachia nemorum
Lysimachia nummularia
Lysimachia vulgaris
Lythrum portula
Lythrum salicaria
Mentha aquatica
Mimulus guttatus
Mimulus luteus
Molinia caerulea
Montia fontana
Myosotis laxa
Myosotis scorpioides
Myosotis secunda
Myosoton aquaticum
Myrica gale
Narthecium ossifragum
Nasturtium microphyllum
Nasturtium officinale
Oenanthe aquatica
Oenanthe crocata
Oenanthe fistulosa
Oenanthe lachenalii
Osmunda regalis
Parnassia palustris
Pedicularis palustris
Petasites hybridus
Phalaris arundinacea
Phragmites australis
Ptilularia globulifera

Pinguicula vulgaris
Polygonum amphibium
Polygonum hydropiper
Polygonum lapathifolium
Polygonum persicaria
Potentilla erecta
Potentilla palustris
Pulcaria dysenterica
Ranunculus flammula
Ranunculus lingua
Ranunculus sceleratus
Rhynchospora alba
Rorippa amphibia
Rorippa palustris
Rorippa sylvestris
Rumex hydrolapathum
Rumex maritimus
Rumex palustris
Sagina procumbens
Sagittaria sagittifolia
Schoenoplectus lacustris
 ssp. *lacustris*
 ssp. *tabernaemontani*
Schoenus nigricans
Scrophularia auriculata
Scutellaria galericulata
Senecio aquaticus
Senecio fluviatilis
Sium latifolium
Solanum dulcamara
Sparganium erectum
Stachys palustris
Stellaria aisiene
Stellaria palustris
Symphytum officinale
Thalictrum flavum
Thelypteris palustris
Tofieldia pusilla
Tricophorum cespitosum
Triglochin palustris
Typha angustifolia
Typha latifolia
Urtica dioica
Valeriana dioica
Veronica anagallis-aquatica
Veronica beccabunga
Veronica catenata
Veronica scutellata
Viola palustris

Trees and shrubs:
Alnus glutinosa
Frangula alnus
Populus sp.
Salix sp.

Other Wetland species (eg rare species or hybrids)

1.3 MACROINVERTEBRATE SAMPLING AND IDENTIFICATION WITHIN THE LAKE

The aims of macroinvertebrate sampling were:

- a) To give semi-quantitative information about the species of macroinvertebrate present and their distribution within the lake.
- b) To use standard (National Pond Survey) methods to enable an assessment to be made of the conservation value of the lake.

Semi-quantitative samples of macroinvertebrates were collected by hand-netting from individual microhabitats within the lake. The lake was sampled for a total of three minutes with the sampling time equally divided between the microhabitats.

Microhabitats were chosen as areas of distinctively different substrates or plant stands (eg gravelly banks, stands of tall emergent plants or stands of floating plants). A list of the microhabitats sampled is given in the detailed descriptions of the invertebrate survey.

Microhabitats were sampled by vigorous sweeping with a standard pondnet (Freshwater Biological Association pattern, one millimetre square mesh). Samples were taken back to the laboratory for sorting, counting and identification. Samples were sorted 'live' (ie without preservation), in large white trays.

Macroinvertebrates were mainly identified to species level. Appendix Table 2 lists the taxa removed from the samples, and the taxonomic levels to which they were identified.

APPENDIX TABLE 2. MACROINVERTEBRATE TAXA COLLECTED IN BADER WAY LAKE AND THE TAXONOMIC LEVELS TO WHICH THEY WERE IDENTIFIED

GROUPS IDENTIFIED TO SPECIES LEVEL

Tricladida	(Flatworms)
Hirudinea	(Leeches)
Gastropoda	(Snails and limpets)
Bivalvia	(Bivalves) (except <u>Pisidium</u> sp.)
Malacostraca	(Shrimps and slaters)
Ephemeroptera	(Mayflies)
Odonata	(Dragonflies and damselflies)
Heteroptera	(Water bugs)
Megaloptera	(Alderflies)
*Trichoptera	(Caddis-flies)
**Coleoptera	(Water beetles)

*No reliable key exists to the Trichopteran family Hydroptilidae. Two species, however were identified confidently and two species tentatively. No Plecoptera were recorded in the survey.

**Adults from the following families of Coleoptera were identified: Dryopidae, Elmithidae, Gyrinidae, Hygrobiidae, Haliplidae, Noteridae, Dytiscidae, Hydraenidae, Hydrophilidae.

DIPTERA LARVAE IDENTIFIED TO FAMILY LEVEL

Ceratopogonidae	Chaoboridae
Chironomidae	Culicidae
Eristalinae	Muscidae
Psychodidae	Sciomyzidae
Simuliidae	Tabanidae
Tipulidae	Stratiomyidae

MISCELLANEOUS ADDITIONAL TAXA

Dixella autumnalis	(Diptera:Dixidae)
Cataclysta lemnata	(Lepidoptera:Pyralidae)
Gordiaceae	
Hydra sp.	
Micronecta nymphs	(Heteroptera:Corixidae)
Nymphula sp.	(Lepidoptera:Pyralidae)
Oligochaeta	
Paraponyx stratiotata	(Lepidoptera:Pyralidae)

Critical invertebrate specimens were determined by Dr Michael Kerney (Mollusca), Mr David Bilton (Coleoptera) and Dr Ian Wallace (Trichoptera).

1.4 RECORDING BIRDS

Birds were surveyed using a point count method with counts being made on two occasions (April and July 1990). Nine points were chosen, evenly distributed around the site. Counts were timed to coincide with the peak of bird activity in the morning, starting shortly after dawn and continuing to about 0800 hours.

10 minutes was spent at each point during which time all birds seen or heard whilst at the point were recorded. Maximum numbers of each species seen were also recorded. This survey method gives a rapid assessment of the birds using a site, breeding activity and distribution.

The survey points are listed in Appendix 2.4.

1.5 ASSESSMENT OF THE CONSERVATION VALUE OF THE LAKE

1.5.1 Criteria used to assess the conservation nature conservation value of Bader Way lake

Plant communities were classified using the NCC aquatic vegetation classification (NCC, 1989) and by comparison with data gathered by Pond Action in lowland Britain.

Macroinvertebrate communities were assessed by comparison with other single season data gathered by Pond Action in lowland Britain.

The conservation value of the lake was assessed on the basis of criteria given in Table 3.

1.5.2 Criteria used to assess the nature conservation value of the bird community

The criteria devised by Fuller (1980) were used to assess the nature conservation value of the bird community.

Fuller, R.J. (1980). A method for assessing the ornithological interest of sites for conservation. Biological Conservation, 17, 229-239.

1.5.2 Definition of the termed 'local' as used in this report

See Appendix Table 3 (below).

APPENDIX TABLE 3.

TERMINOLOGY USED TO DESCRIBE HABITAT/GROWTH FORM
OF WETLAND PLANTS AND THE DISTRIBUTION OF PLANTS
AND MACROINVERTEBRATES.

Macrophyte	Vascular plants and macroscopic algae (eg chara sp).
Marginal plant	Wetland species mainly growing on damp or water-logged soils (eg great willowherb, hard rush, trifid bur-marigold).
Emergent plant	Stand-forming emergent species (eg bulrush, branched bur-reed).
Submerged plant	Plants growing mainly below the water surface (eg Nuttall's waterweed, horned pondweed)
Floating-leaved plant	Plants with leaves floating on the water surface (eg white water-lily, common duckweed).
Aquatic plant	Collective term for submerged and floating-leaved plants.
Rare plant species	Applied in this report to plants occurring in less than 100 10 x 10km squares in Britain.
Local plant species	Applied to plants generally described as very local, local or locally common. Information on the status of local species has been taken from Clapham, Tutin and Moore (1988) Flora of the British Isles and T.Rich (pers. comm.).
Rare macroinvertebrate species	Applied to species listed in the insect Red Data Book (Shirt 1987) or to be included in the non-insect invertebrate Red Data Book (Bratton, in press).
Local macroinvertebrate species	Applied to macroinvertebrate species which are generally described as local or locally common.
	The current status of all macroinvertebrate species regarded as rare or local was checked with NCC Invertebrate Site Register staff or individual authorities.

**APPENDIX 2. SPECIES LISTS AND DISTRIBUTION OF RARE AND LOCAL SPECIES
RECORDED FROM THE BADER WAY SITE**

APPENDIX 2.1 TOTAL LIST OF PLANTS RECORDED AT BADER WAY SITE

Species	Common name
<i>Acer campestre</i>	Field Maple
<i>Achillea millefolium</i>	Yarrow
<i>Agrimonia eupatoria</i>	Agrimony
<i>Agrostis capillaris</i>	Common Bent
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Alisma plantago-aquatica</i>	Water-plantain
<i>Alliaria petiolata</i>	Garlic Mustard
<i>Alnus glutinosa</i>	Alder
<i>Alopecurus geniculatus</i>	Marsh Foxtail
<i>Alopecurus pratense</i>	Meadow Foxtail
<i>Angelica sylvestris</i>	Wild Angelica
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass
<i>Anthriscus sylvestris</i>	Cow Parsley
<i>Apium nodiflorum</i>	Fool's Water-cress
<i>Arabidopsis thaliana</i>	Thale Cress
<i>Armoracia rusticana</i>	Horse-radish
<i>Arrhenatherum elatius</i>	False Oat-grass
<i>Artemisia vulgaris</i>	Mugwort
<i>Atriplex prostrata</i>	Spear-leaved Orache
<i>Avena fatua</i>	Wild-oat
<i>Ballota nigra</i>	Black Horehound
<i>Berula erecta</i>	Lesser Water-parsnip
<i>Betula pendula</i>	Silver Birch
<i>Bidens cernua</i>	Nodding Bur-marigold
<i>Bromus hordeaceus</i>	Soft Brome
<i>Bromus sterilis</i>	Barren Brome
<i>Bryonia dioica</i>	White Bryony
<i>Buddleja davidii</i>	Butterfly-bush
<i>Callitriche</i> sp.	Water-starwort
<i>Calystegia sepium</i> s.s.	Hedge Bindweed
<i>Calystegia silvaticum</i>	Large Bindweed
<i>Carex acuta</i>	Slender Tufted-sedge
<i>Carex hirta</i>	Hairy Sedge
<i>Carex muricata</i> subsp. <i>lamprocarpa</i>	Small-fruited Prickly-sedge
<i>Carex otrubae</i>	False Fox-sedge
<i>Carex remota</i>	Remote Sedge
<i>Carex riparia</i>	Greater Pond-sedge
<i>Centaurea nigra</i>	Common Knapweed
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Ceratophyllum demersum</i>	Rigid Hornwort
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Chenopodium album</i>	Fat-hen
<i>Cirsium arvense</i>	Creeping Thistle
<i>Cirsium palustre</i>	Marsh Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Convolvulus arvensis</i>	Field Bindweed
<i>Cornus sanguinea</i>	Dogwood
<i>Coronopus didymus</i>	Lesser Swine-cress
<i>Corylus avellana</i>	Hazel
<i>Crassula helmsii</i>	New Zealand Stonecrop
<i>Crataegus monogyna</i>	Hawthorn

APPENDIX 2.1 (continued)

Species	Common name
<i>Crepis capillaris</i>	Smooth Hawk's-beard
<i>Crepis vesicaria</i>	Beaked Hawk's-beard
<i>Cynosaurus cristatus</i>	Crested Dog's-tail
<i>Cytisus scoparius</i>	Broom
<i>Dactylis glomerata</i>	Cock's-foot
<i>Daucus carota</i>	Wild Carrot
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Digitalis purpurea</i>	Foxglove
<i>Dipsacus fullonum</i>	Teasel
<i>Dryopteris dilatata</i>	Broad Buckler-fern
<i>Dryopteris filix-mas</i>	Male-fern
<i>Elodea nuttallii</i>	Nuttall's Waterweed
<i>Elymus caninus</i>	Bearded Couch
<i>Elymus repens</i>	Common Couch
<i>Epilobium ciliatum</i>	American Willowherb
<i>Epilobium hirsutum</i>	Great Willowherb
<i>Epilobium montanum</i>	Broad-leaved Willowherb
<i>Epilobium obscurum</i>	Short-fruited Willowherb
<i>Epilobium parviflorum</i>	Hoary Willowherb
<i>Epilobium tetragonum</i>	Square-stalked Willowherb
<i>Equisetum arvense</i>	Field Horsetail
<i>Equisetum palustre</i>	Marsh Horsetail
<i>Erigeron canadensis</i>	Canadian Fleabane
<i>Festuca arundinacea</i>	Tall Fescue
<i>Festuca ovina</i>	Sheep's Fescue
<i>Festuca rubra</i>	Meadow Fescue
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fraxinus excelsior</i>	Ash
<i>Galium aparine</i>	Cleavers
<i>Galium palustre</i>	Common Marsh-bedstraw
<i>Geranium columbinum</i>	Long-stalked Crane's-bill
<i>Geranium dissectum</i>	Cut-leaved Crane's bill
<i>Geranium pusillum</i>	Small-flowered Crane's-bill
<i>Geranium pyrenaicum</i>	Hedgerow Crane's-bill
<i>Geranium robertianum</i>	Herb-Robert
<i>Geranium rotundifolium</i>	Round-leaved Crane's-bill
<i>Geum urbanum</i>	Wood Avens
<i>Glechoma hederacea</i>	Ground-ivy
<i>Glyceria fluitans</i>	Floating Sweet-grass
<i>Glyceria maxima</i>	Reed Sweet-grass
<i>Gnaphalium uliginosum</i>	Marsh Cudweed
<i>Hedera helix</i>	Ivy
<i>Heracleum sphondylium</i>	Hogweed
<i>Holcus lanatus</i>	Yorkshire-fog
<i>Holcus mollis</i>	Creeping Soft-grass
<i>Hordeum murinum</i>	Wall Barley
<i>Humulus lupulus</i>	Hop
<i>Hyacinthoides non-scripta</i>	Bluebell
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort
<i>Hypericum perforatum</i>	Perforate St John's-wort
<i>Hypochoeris radicata</i>	Cat's-ear
<i>Ilex aquifolium</i>	Holly

APPENDIX 2.1 (continued)

Species	Common name
<i>Impatiens capensis</i>	Orange Balsam
<i>Impatiens glandulifera</i>	Indian Balsam
<i>Impatiens parviflora</i>	Small Balsam
<i>Iris pseudocorus</i>	Yellow Iris
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus bufonis</i>	Toad Rush
<i>Juncus effusus</i>	Soft Rush
<i>Juncus inflexus</i>	Hard Rush
<i>Lactuca serriola</i>	Prickly Lettuce
<i>Lamium album</i>	White Dead-nettle
<i>Lapsana communis</i>	Nipplewort
<i>Lathyrus nissolia</i>	Grass Vetchling
<i>Lathyrus pratensis</i>	Meadow Vetchling
<i>Lemna minor</i>	Common Duckweed
<i>Lemna trisulca</i>	Ivy-leaved Duckweed
<i>Leontodon autumnalis</i>	Autumn Hawkbit
<i>Leontodon taraxacoides</i>	Lesser Hawkbit
<i>Leucanthemum vulgare</i>	Oxeye Daisy
<i>Linaria vulgaris</i>	Common Toadflax
<i>Lolium perenne</i>	Rye-grass
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lotus corniculatus</i>	Com. Bird's-foot-trefoil
<i>Lotus uliginosus</i>	Gtr. Bird's-foot-trefoil
<i>Lycopus europeus</i>	Gipsywort
<i>Lythrum salicaria</i>	Purple-loosestrife
<i>Malus sylvestris</i>	Crab Apple
<i>Malva moschata</i>	Musk Mallow
<i>Malva sylvestris</i>	Common Mallow
<i>Matricaria matricarioides</i>	Pineappleweed
<i>Matricaria recutita</i>	Scented Mayweed
<i>Medicago lupulina</i>	Black Medick
<i>Melilotus altissima</i>	Tall Melilot
<i>Mentha aquatica</i>	Water Mint
<i>Menyanthes trifoliata</i>	Bogbean
<i>Myosotis laxa</i>	Tufted Forget-me-not
<i>Myosotis scorpioides</i>	Water Forget-me-not
<i>Nymphaea alba</i>	White Water-lily
<i>Nymphoides peltata</i>	Fringed Water-lily
<i>Oenanthe crocata</i>	Hemlock Water-dropwort
<i>Papaver rhoeas</i>	Common Poppy
<i>Pentaglottis sempervirens</i>	Green Alkanet
<i>Phalaris arundinacea</i>	Reed Canary-grass
<i>Phleum pratense</i>	
subsp <i>pratense</i>	Timothy
<i>Plantago coronopus</i>	Buck's-horn Plantain
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Plantago major</i>	Greater Plantain
<i>Poa annua</i>	Annual Meadow-grass
<i>Poa pratensis</i> s.s.	Smooth Meadow-grass
<i>Poa trivialis</i>	Rough Meadow-grass
<i>Polygonum amphibium</i>	Amphibious Bistort
<i>Polygonum arenastrum</i>	Equal-leaved Knotgrass
<i>Polygonum aviculare</i> s.s.	Knotgrass
<i>Polygonum lapathifolium</i>	Pale Persicaria

APPENDIX 2.1 (continued)

Species	Common name
<i>Polygonum persicaria</i>	Redshank
<i>Populus alba</i>	White Poplar
<i>Populus x canescens</i>	Italian Poplar
<i>Potentilla reptans</i>	Creeping Cinquefoil
<i>Prunella vulgaris</i>	Selfheal
<i>Prunus spinosa</i>	Blackthorn
<i>Pulicaria dysenterica</i>	Common Fleabane
<i>Quercus robur</i>	Pedunculate Oak
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus bulbosus</i>	Bulbous Buttercup
<i>Ranunculus ficaria</i>	Lesser Celandine
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Ranunculus sceleratus</i>	Celery-leaved Buttercup
<i>Raphanus raphanistrum</i>	Wild Radish
<i>Reseda luteola</i>	Weld
<i>Reynoutria japonica</i>	Japanese Knotweed
<i>Ribes nigrum</i>	Black Current
<i>Ribes rubrum</i>	Red Current
<i>Rorippa amphibia</i>	Great Yellow-cress
<i>Rorippa palustris</i>	Marsh Yellow-cress
<i>Rorippa sylvestris</i>	Creeping Yellow-cress
<i>Rorippa x erythocaulis</i>	(amphibia x palustris)
<i>Rosa arvensis</i>	Field Rose
<i>Rosa canina</i>	Dog Rose
<i>Rubus fruticosus</i>	Bramble
<i>Rubus idaeus</i>	Raspberry
<i>Rumex acetosa</i>	Common Sorrel
<i>Rumex conglomeratus</i>	Clustered Dock
<i>Rumex crispus</i>	Curled Dock
<i>Rumex hydrolapathum</i>	Water Dock
<i>Rumex obtusifolius</i>	Broad-leaved Dock
<i>Rumex sanguinius</i>	Blood-veined dock
<i>Salix alba</i>	White Willow
<i>Salix caprea</i>	Goat Willow
<i>Salix cinerea</i>	
subsp <i>oleifolia</i>	Rusty willow
<i>Salix fragilis</i>	Crack Willow
<i>Salix viminalis</i>	Osier
<i>Sambucus nigra</i>	Elder
<i>Sanguisorba officinalis</i>	Great Burnet
<i>Scrophularia auriculata</i>	Water Figwort
<i>Scrophularia nodosa</i>	Common Figwort
<i>Scutellaria galericulata</i>	Skullcap
<i>Senecio erucifolius</i>	Hoary Ragwort
<i>Senecio jacobea</i>	Common Ragwort
<i>Senecio vulgaris</i>	Grousel
<i>Silaum silaus</i>	Pepper saxifrage
<i>Silene alba</i>	White Campion
<i>Sisymbrium officinale</i>	Hedge Mustard
<i>Solanum dulcamara</i>	Bittersweet
<i>Sonchus asper</i>	Prickly Sow-thistle

APPENDIX 2.1 (continued)

Species	Common name
<i>Soncus oleraceus</i>	Smooth Sow-thistle
<i>Sparganium erectum</i>	Branched Bur-reed
<i>Spergularia rubra</i>	Sand Spurrey
<i>Stachys palustris</i>	Marsh Woundwort
<i>Stachys sylvatica</i>	Hedge Woundwort
<i>Stellaria graminea</i>	lesser Stichwort
<i>Stellaria holostea</i>	Greater Stichwort
<i>Stellaria media</i> s.s.	Common Chickweed
<i>Tamus communis</i>	Black Bryony
<i>Tanacetum vulgare</i>	Tansey
<i>Taraxacum</i> sp.	Dandelion
<i>Taxus baccata</i>	Yew
<i>Trifolium arvense</i>	Hare's-foot Trefoil
<i>Trifolium campestre</i>	Hop Trefoil
<i>Trifolium dubium</i>	Lesser Trefoil
<i>Trifolium hybridum</i>	Alsike Clover
<i>Trifolium pratense</i>	Red Clover
<i>Trifolium repens</i>	White Clover
<i>Tripleurospermum inodorum</i>	Scentless Mayweed
<i>Triticum aestivum</i>	Wheat
<i>Tussilago farfarens</i>	Colt's-foot
<i>Typha latifolia</i>	Bulrush
<i>Ulmus</i> sp.	Elm
<i>Urtica dioica</i>	Common Nettle
<i>Valeriana officinalis</i>	Common Valerian
<i>Veronica persica</i>	Common Field-speedwell
<i>Vicia hirsuta</i>	Hairy Tare
<i>Vicia segetalis</i>	Common Vetch
<i>Vicia tetrasperma</i>	Smooth Tare
<i>Vulpia myuros</i>	Rat's-tail Fescue
<i>Zannichellia palustris</i>	Horned Pondweed

Latin and English equivalents from Dony et.al. (1986) ('The English names of wild flowers', BSBI (2nd ed)).

APPENDIX 2.2 LIST OF WETLAND PLANTS RECORDED AT THE BADER WAY LAKE

AQUATIC PLANTS (submerged and floating-leaved species)

Species		Notes
Callitriche sp.	Starwort sp.	Native species
Ceratophyllum demersum	Rigid Hornwort	Local species
Crassula helmsii	New Zealand Sw-stonecrop	Naturalizing pest species
Elodea nuttallii	Nuttall's Waterweed	Naturalized exotic species
Lemna minor	Common Duckweed	Common species
Lemna trisulca	Ivy-leaved Duckweed	Common species
Menyanthes trifoliata	Bogbean	Locally common (introduced)
Myriophyllum aquatica	Parrot's Feathers	Naturalizing exotic species
Nymphaea alba	White Water-lily	Common species
Nymphoides peltata	Yellow-fringed W-lily	Local species (introduced)
Polygonum amphibium	Amphibious Bistort	Common species
Potamogeton pusilis	Lesser Pondweed	Common species
Zannichellia palustris	Horned Pondweed	Locally common species

WETLAND AND MARGINAL PLANTS

Species		Notes
Agrostis stolonifera	Creeping Bent	Common species
Alisma plantago-aquat.	Water-plantain	Common species
Alopecurus geniculatus	Marsh Foxtail	Common species
Angelica sylvestris	Wild Angelica	Common species
Apium nodiflorum	Fool's Water-cress	Common species
Berula erecta	Lesser Water-parsnip	Introduced to site
Bidens cernua	Nodding Bur-marigold	Locally common species
Carex otrubae	False Fox-sedge	Common species
Carex riparia	Greater Pond-sedge	Common species
Cirsium palustre	Marsh Thistle	Common species
Deschampsia cespitosa	Tufted Hair-grass	Common species
Epilobium hirsutum	Great Willowherb	Common species
Epilobium obscurum	Short-fruited W'herb.	Locally common species
Epilobium parviflorum	Hoary Willowherb	Common species
Epilobium tetragonum	Square-stalked W'herb	Locally common species
Equisetum palustre	Marsh Horsetail	Common species
Filipendula ulmaria	Meadowsweet	Common species
Galium palustre	Common Marsh-bedstraw	Common species
Glyceria maxima	Reed Sweet-grass	Common species
Impatiens capensis	Orange Balsam	Common species
Impatiens glandulifera	Indian Balsam	Common species
Impatiens parviflora	Small Balsam	Common species
Iris pseudocorus	Yellow Iris	Common species
Juncus articulatus	Jointed Rush	Common species
Juncus bufonis	Toad Rush	Common species
Juncus effusus	Soft Rush	Common species
Juncus inflexus	Hard Rush	Common species

APPENDIX 2.2 (continued)

Species	Notes
<i>Lotus uliginosus</i>	Gtr. Bird's-foot-trefoil Common species
<i>Lycopus europeaus</i>	Gipsywort Common species
<i>Lythrum salicaria</i>	Purple-loosestrife Common species
<i>Mentha aquatica</i>	Water Mint Common species
<i>Myosotis laxa</i>	Tufted Forget-me-not Common species
<i>Myosotis scorpioides</i>	Water Forget-me-not Common species
<i>Oenanthe crocata</i>	Hemlock Water-dropwort Locally common species
<i>Phalaris arundinacea</i>	Reed Canary-grass Common species
<i>Polygonum lapathifolium</i>	Pale Persicaria Common species
<i>Polygonum persicaria</i>	Redshank Common species
<i>Potamogeton pusillus</i>	lesser pondweed Not uncommon species
<i>Ranunculus flammula</i>	Lesser Spearwort Common species
<i>Ranunculus sceleratus</i>	Celery-leaved Buttercup Common species
<i>Rorippa amphibia</i>	Great Yellow-cress Locally frequent species
<i>Rorippa palustris</i>	Marsh Yellow-cress Common species
<i>Rumex hydrolapathum</i>	Water Dock Common species
<i>Scrophularia auriculata</i>	Water Figwort Common species
<i>Scutellaria galericul.</i>	Skullcap Common species
<i>Solanum dulcamara</i>	Bittersweet Common species
<i>Sparganium erectum</i>	Branched Bur-reed Common species
<i>Stachys palustris</i>	Marsh Woundwort Common species
<i>Typha latifolia</i>	Bulrush Common species
<i>Urtica dioica</i>	Common Nettle Common species

APPENDIX 2.3.1 SPECIES OF AQUATIC MACROINVERTEBRATE RECORDED FROM MICRO-HABITATS IN THE BADER WAY LAKE

L = Water lilies
 I = Inlet
 S = Sparganium erectum
 GR = Gravel bank
 T = Total
 PC = Potamogeton/Callitriche
 ME = Mixed emergent plants
 LM = Low-growing marginal plants
 U = unvegetated bank

The table shows the number of individuals found of each species.

	L	I	S	GR	PC	ME	LM	U	T
TRICLADIDA (flatworms)									
Dendrocoelum lacteum	-	-	1	-	-	-	-	-	1
Dugesia polychroa	-	-	-	-	-	1	-	-	1
Dugesia tigrina	-	-	1	-	-	-	-	-	1
Polycelis nigra	-	-	2	-	-	-	-	-	2
Polycelis tenuis	-	-	1	-	-	-	-	-	1
HIRUDINEA (leeches)									
Erpobdella testacea	1	12	8	8	1	4	-	1	35
Glossiphonia complanata	-	12	1	4	-	1	-	12	30
Helobdella stagnalis	152	20	7	28	4	4	2	16	233
Theromyzon tessulatum	8	-	-	8	-	-	-	-	16
GASTROPODA (snails)									
Anisus vortex	1	1	4	-	8	4	10	1	29
Armiger crista	1	-	8	-	-	-	-	-	9
Bathyomphalus contortus	16	8	264	9	64	252	41	64	718
Bithynia tentaculata	1	-	8	-	1	-	1	-	11
Gyraulus albus	54	20	1	4	4	12	3	12	110
Lymnaea palustris	1	-	-	-	-	-	2	-	3
Lymnaea peregra	1	1	-	1	5	-	-	-	8
Lymnaea stagnalis	24	1	8	-	1	4	2	1	41
Physa acuta agg.	152	8	54	12	92	12	8	8	346
Planorbarius corneus	8	1	54	-	1	12	-	1	77
Planorbis planorbis/carinatus	49	22	150	16	53	16	12	16	344
Potamopyrgus jenkinsi	-	-	7	-	-	-	-	-	7
BIVALVIA (bivalves)									
Sphaerium lacustre	-	-	-	-	-	3	-	-	3
MALACOSTRACA (shrimps & slaters)									
Asellus aquaticus	134	80	400	56	52	248	35	212	1,217
Crangonyx pseudogracilis	144	1	40	8	80	60	5	20	358
Gammarus pulex	-	-	-	-	-	1	-	-	1

APPENDIX 2.3.1 (continued)

	L	I	S	GR	PC	ME	LM	U	T
ODONATA (dragonflies)									
<i>Aeshna mixta</i>	8	-	-	-	-	-	1	-	9
<i>Ischnura elegans</i>	-	-	-	-	-	-	-	2	2
<i>Lestes sponsa</i>	1	-	-	-	-	-	-	-	1
HETEROPTERA (bugs)									
<i>Callicorixa praeusta</i>	-	1	-	-	2	-	-	8	11
<i>Corixa punctata</i>	32	4	8	-	-	-	1	-	45
<i>Hesperocorixa sahlbergi</i>	-	-	-	-	-	1	-	-	1
<i>Ilyocoris cimicoides</i>	-	-	1	-	-	-	-	-	1
<i>Notonecta glauca</i>	-	-	-	1	-	-	-	-	1
<i>Plea leachi</i>	-	-	-	-	-	1	-	1	2
<i>Ranatra linearis</i>	-	-	-	-	-	1	-	-	1
<i>Sigara concinna</i>	-	4	-	-	3	-	-	-	8
<i>Sigara dorsalis</i>	-	-	-	-	4	4	-	1	13
<i>Sigara falleni</i>	1	12	3	2	3	4	3	8	36
<i>Sigara lateralis</i>	-	14	8	-	32	16	13	36	119
MEGALOPTERA (alderflies)									
<i>Sialis lutaria</i>	-	-	8	10	-	-	-	-	18
TRICHOPTERA (caddis-flies)									
<i>Limnephilus flavicornis</i>	1	-	-	-	-	-	-	-	1
<i>Limnephilus lunatus</i>	-	-	-	-	-	-	2	-	2
COLEOPTERA (beetles)									
<i>Anacaena limbata</i>	-	1	-	-	-	-	1	-	2
<i>Colymbetes fuscus</i>	-	1	-	-	-	-	-	-	1
<i>Cymbiodyta marginella</i>	-	-	-	-	-	2	2	-	4
<i>Dytiscus marginalis</i>	1	-	-	-	-	-	-	-	1
<i>Enochrus testaceus</i>	1	-	1	-	-	2	-	-	4
<i>Halplus immaculatus</i>	-	-	-	-	1	-	-	-	1
<i>Halplus lineolatus</i>	-	-	-	-	-	1	-	-	1
<i>Halplus ruficollis</i>	-	-	-	-	-	1	-	-	1
<i>Helochares lividus</i>	-	-	-	-	-	1	-	-	1
<i>Helophorus brevipalpis</i>	8	16	1	-	-	4	-	-	29
<i>Helophorus grandis</i>	-	3	-	-	-	-	-	-	3
<i>Hydrobius fuscipes</i>	1	-	-	-	-	-	-	-	1

APPENDIX 2.3.1 (continued)

	L	I	S	GR	PC	ME	LM	U	T
COLEOPTERA (continued)									
Hydroporus incognitus	-	2	-	-	-	-	-	-	2
Hydroporus palustris	8	6	2	-	-	4	-	-	20
Hydroporus planus	-	1	-	-	-	2	-	-	3
Hygrobia hermanni (larva)	-	-	1	1	1	-	-	-	3
Hygrotus inaequalis	-	8	8	-	12	4	1	-	33
Hyphydrus ovatus	-	1	-	-	-	-	-	-	1
Ilybius ater	-	-	-	-	-	1	-	-	1
Laccophilus minutus	-	-	-	-	-	1	-	-	1
Noterus clavicornis	16	7	14	-	-	20	1	-	58
Peltodytes caesus	-	-	-	1	-	-	-	-	1
Rhantus exsoletus	-	-	-	-	1	-	-	-	1
Scirtes hemisphaericus	-	-	-	-	-	-	1	-	1
Suphrodytes dorsalis	-	2	-	-	-	-	-	-	2

APPENDIX 2.3.2

SUMMARY OF NUMBERS OF AQUATIC MACROINVERTEBRATE SPECIES IN
MAJOR TAXA IN THE MICROHABITATS AT THE BADER WAY LAKE

	L	I	S	GR	PC	GL ^{ME}	PE ^{ME}	U	T
TRICLIDIDA	0	0	4	0	0	1	0	0	5
HIRUDINEA	2	3	3	4	2	3	1	3	4
GASTROPODA	11	8	10	5	9	7	8	7	13
BIVALVIA	0	0	0	0	0	1	0	0	1
MALACOSTRACA	2	2	2	2	2	3	2	2	3
ODONATA	2	0	0	0	0	0	1	0	3
HETEROPTERA	2	5	4	2	5	6	3	5	11
MEGALOPTERA	0	0	1	1	0	0	0	0	1
TRICHOPTERA	1	0	0	0	0	0	1	0	2
COLEOPTERA	6	11	6	2	4	12	5	0	25
TOTAL	28 ^{hills}	28 ^{115 gr}	29 ^{4 pacy}	12 ^{9 pacy}	22 ^{Ad}	33 ^{mid}	19 ^{low}	17 ^{new way}	68
NUMBER OF LOCAL SPECIES	2	1	2	2	3	3	2	1	9

APPENDIX 2.4 CONTACTS WITH BIRDS AT EACH SAMPLE POINT ON THE BADER WAY SITE. Visit 1: 16 May 1990 (0500-0800). Visit 2: 9 July 1990 (0530-0800).

S = song heard (all refer to one bird unless otherwise stated). P = present on site (bird seen). Number indicates bird no.
 C = present on the site (calling, bird not seen). F = flying over the site or seen in flight off the site.
 TOTALS: (a) = total number of contacts; (b) = total number of sample points at which contacts were made with each species.

SAMPLE POINTS: 1 = northern end of rough grassland. 2 = middle of rough grassland. 3 = middle of road bank grassland.
 4 = southern end of road bank grassland. 5 = lake edge south of the alder woodland. 6 = lake edge at eastern stream inflow.
 7 = northwestern lake edge near the island. 8 = northern corner of legume grassland. 9 = marsh south of secondary woodland.

SPECIES	SAMPLE POINT																		TOTALS	
	VISIT 1									VISIT 2										
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	(a)	(b)
Heron	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	P2,F1	-	-	3	(1)
Hobby	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F1	1	(10)
*Mallard	-	F1	-	-	P2	P1	P12	P2	-	F1	-	-	C	C	-	P17	-	-	38	(9)
Canada goose	-	-	-	C	C	-	P6	-	P2	-	-	-	-	C	-	P12	P10	-	10	(4)
*Coot	-	-	-	-	-	C	P2	P1	P3	-	-	C	C	C	C	P1	-	-	12	(9)
*Moorhen	-	-	-	-	-	-	-	-	P2	-	-	-	-	-	-	C	-	-	3	(2)
Mute swan	-	-	-	-	-	-	P1	-	-	-	-	-	-	-	P2	-	-	-	3	(2)
Common tern	F1	-	-	-	-	-	-	-	-	-	-	F1	F1	-	-	-	-	F1	4	(4)
Black-headed gull	-	-	-	-	-	-	-	-	-	-	-	-	-	F2	-	-	F1	-	3	(2)
*Woodpigeon	-	-	P1	S,P2	S	P5	P7	-	P1	P4	S	S	S,F1	S2	S	P2	P1	-	32	(14)
Collared dove	F1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	2	(2)
*Turtle dove	-	-	-	S	-	-	-	-	-	-	-	-	S	-	-	-	-	-	2	(2)
*Stock dove	-	-	-	-	P1	P1	-	-	-	-	-	-	-	-	-	-	-	F1	3	(3)

APPENDIX 2.4 Contacts with birds at each sample point on the Bader Way site. Visit 1: 16 May 1990 (0500-0800). Visit 2: 9 July 1990 (0530-0800).

SPECIES	SAMPLE POINT																		TOTALS	
	VISIT 1									VISIT 2										
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	(a)	(b)
Feral pigeon	-	-	-	-	-	P2	P2	-	-	-	-	-	-	-	-	-	-	F1	5	(3)
Swift	-	F1	-	-	-	-	-	-	-	-	F6	-	F1	F1	-	-	-	F1	10	(5)
Green woodpecker	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	-	P1	-	3	(3)
Great spotted woodpecker	-	-	F1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	(1)
House martin	F12	-	F1	-	-	-	-	-	-	F6	F6	F6	-	-	-	-	-	F1	32	(6)
Swallow	-	-	-	-	-	-	-	-	F1	-	-	-	-	-	-	-	-	-	1	(1)
Pied wagtail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	1	(1)
Grey wagtail	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F1	-	-	1	(1)
Treecreeper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	-	1	(1)
*Dunnock	-	S	-	-	-	S	P1	-	-	-	-	C	S	-	-	-	-	-	5	(5)
*Willow warbler	S	-	-	-	-	-	-	-	S	-	-	-	-	-	-	-	-	-	2	(2)
*Blackcap	-	P1,S	P1	S	-	-	-	S	-	S	S	S	S	S	-	S	S	S	13	(12)
*Chiffchaff	-	-	-	S	-	-	S	S	S	-	-	-	S2	-	S	-	-	-	7	(6)
*Common Whitethroat	-	-	S	S	-	P1,S	-	-	-	-	S	-	-	-	-	-	-	S	6	(5)
*Lesser whitethroat	-	-	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	(1)
Sedge warbler	-	-	-	-	-	-	-	-	-	-	-	-	-	-	S	-	-	-	1	(1)
*Robin	S	S	S	S	-	-	S	S	S	-	C	-	-	-	-	-	C	C	10	(10)
*Blackbird	F1	P1	F1	S	S	C	P3	C	-	S	-	C	-	C	-	P1	-	-	14	(12)
*Song thrush	S	S	S	S	S	S	P1	-	P1	S	C	-	S	S	-	-	-	-	12	(12)

APPENDIX 2.4 Contacts with birds at each sample point on the Bader Way site. Visit 1: 16 May 1990 (0500-0800). Visit 2: 9 (cont). July 1990 (0530-0800).

SPECIES	SAMPLE POINT																		TOTALS	
	-----VISIT 1-----									-----VISIT 2-----										
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	(a)	(b)
*Blue tit	—	P2	P1	—	—	—	—	—	—	—	P3	C	—	—	P1,C	—	—	C	10	(6)
Great tit	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	P2	2	(1)
*Long-tailed tit	—	—	—	—	—	—	—	—	P5	—	P6	C	—	—	—	—	—	—	12	(3)
*Wren	S	P1	S	S	S	S	P1	S	—	C	—	C	S	S	P2,S	S	S2	S2	20	(16)
Greenfinch	C	—	—	—	—	—	—	—	—	F1	—	—	P1,C	—	—	—	—	—	4	(3)
*Bullfinch	—	P1	—	—	—	—	—	—	—	—	—	—	C	—	—	—	—	—	2	(2)
*Chaffinch	—	—	—	—	—	—	—	S,P4	C	—	—	—	—	—	—	P1	—	P2	9	(4)
House sparrow	C	P2	C	—	—	—	—	—	—	C	—	C	—	—	—	—	—	C	7	(6)
*Starling	P17	P8	P8	—	P3	P7	P9	P4	P1	P1	F1	F1	P3	—	F5	F1	—	F2	71	(15)
*Carrion crow	F3	—	F1	P3	P7	—	P2	P1	C	—	—	—	P3	P1	—	—	—	P2	24	(10)
*Magpie	—	—	—	—	P3	C	—	—	P1	—	P1	C	C	C	C	P1	C	—	12	(10)
Jay	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	C	—	C	2	(2)

APPENDIX 2.5. TOTAL NUMBER OF CONTACTS MADE WITH EACH BIRD SPECIES ON THE
BADER WAY SITE AND THE NUMBER OF SAMPLE POINTS AT WHICH EACH
SPECIES WAS RECORDED

SPECIES	TOTAL NUMBER OF CONTACTS	NUMBER OF SAMPLE POINTS AT WHICH SPECIES RECORDED (MAXIMUM 18)
*Starling	71	(15)
*Mallard	38	(9)
*Woodpigeon	32	(14)
House martin	32	(6)
*Carrion crow	24	(10)
*Wren	20	(16)
*Blackbird	14	(12)
*Blackcap	13	(12)
*Coot	12	(9)
*Song thrush	12	(12)
*Long-tailed tit	12	(3)
*Magpie	12	(10)
*Robin	10	(10)
*Blue tit	10	(6)
Canada goose	10	(4)
Swift	10	(5)
*Chaffinch	9	(4)
*Chiffchaff	7	(6)
House sparrow	7	(6)
*Common Whitethroat	6	(5)
Feral pigeon	5	(3)
Dunnock	5	(5)
Common tern	4	(4)
Greenfinch	4	(3)
*Moorhen	3	(2)
Heron	3	(1)
Mute swan	3	(2)
Black-headed gull	3	(2)
*Stock dove	3	(3)
Green woodpecker	3	(3)
Collared dove	2	(2)
*Turtle dove	2	(2)
*Willow warbler	2	(2)
*Bullfinch	2	(2)
Jay	2	(2)
Great tit	2	(1)
Hobby	1	(1)
Great spotted woodpecker	1	(1)
Swallow	1	(1)
Pied wagtail	1	(1)
Grey wagtail	1	(1)
Treecreeper	1	(1)
*Lesser whitethroat	1	(1)
Sedge warbler	1	(1)

APPENDIX 2.6 LOCAL PLANT SPECIES RECORDED ON THE SITE

Bidens cernua
(Nodding Bur-marigold)

SITE LOCATION: Recorded as an occasional amongst open vegetation on exposed muddy sediments.
UK DISTRIBUTION: Locally common plant of lakes and streams and especially of places with standing water in winter but not during the growing season.

Carex acuta
(Slender Tufted-sedge)

SITE LOCATION: Good stands in the eastern part of the legume grassland community (see Figure 3).
UK DISTRIBUTION: Scattered. Beside water in wet grassy places.

Carex muricata
ssp. lamprocarpa
(Small-fruited Prickly-sedge)

SITE LOCATION: Two stands near the eastern edge of the tall rough grassland community (see Figure 3).
UK DISTRIBUTION: Local. Dry grassy places. Scattered throughout England and Wales.

Ceratophyllum demersum
(Rigid Hornwort)

SITE LOCATION: A single strand washed up on the eastern shore.
UK DISTRIBUTION: Local. In ponds and ditches.

Epilobium obscurum
(Short-fruited Willowherb)

SITE LOCATION: Locally abundant in the southwestern part of northern marsh dominated by tall emergents (See Section 3.2.2 ii).
UK DISTRIBUTION: Locally common. Marshes, streams, moist woods.

Epilobium tetragonum
(Square-stemmed Willowherb)

SITE LOCATION: Occasional in grassland communities.
UK DISTRIBUTION: Locally common in the south. Damp woodland clearings and hedgebanks, stream and ditch-sides etc., and cultivated ground.

Geranium columbinum

(Long-stalked Crane's-bill)

SITE LOCATION: Only one plant was seen in the new shelter belt (see Figure 3). Probably therefore a casual.
UK DISTRIBUTION: Rather local. Open habitats in dry grassland and scrub, mainly on basic soils.

Lathyrus nissolia
(Grass Vetchling)

SITE LOCATION: Present in abundance in the dry and legume grassland and a number of scattered plants elsewhere.
UK DISTRIBUTION: Now a scarce plant in Britain. Very local, in grassy and bushy places south of a line from the Humber to the Severn.

Oenanthe crocata
(Hemlock Water-dropwort)

SITE LOCATION: Occasional in marginal lake habitats.
UK DISTRIBUTION: In wet places, usually calcifuge. Listed by Palmer and Newbold (1983) as species recorded in greater than 100 10 x 10km squares in Great Britain but which needs protection in the southern part of the Thames catchment.

APPENDIX 2.6 (continued)

<u>Reseda luteola</u> (Weld)	SITE LOCATION: Occasional in grassland habitats. UK DISTRIBUTION: A locally common plant of roadsides and waste places, old quarries, gravel pits and brickyards, dry banks and old walls and sometimes in woodland clearings, partly fixed sand dunes and cultivated ground; sometimes but not exclusively on calcareous strata.
<u>Rorippa amphibia</u> . (Great Yellow-cress)	SITE LOCATION: Locally abundant amongst open to moderately dense vegetation on muddy sediments adjacent to the lake. UK DISTRIBUTION: Locally frequent by ponds, ditches and streams.
<u>Rorippa x erythrocaulis</u> (Marsh Yellow-cress x Great Yellow-cress)	SITE LOCATION: One clump, on the bank adjacent to the southern ditch, and probably present for a number of years. It is unlikely to persist for very many more years as the vegetation will close around it. T.Rich (BSBI referee for <u>Rorippa</u> spp.) sees little point in attempting to conserve it unless it is transplanted to the edge of the pond. It will need an open site. UK DISTRIBUTION: This hybrid of <u>Rorippa palustris</u> and <u>R.sylvestris</u> is only known in 5 other sites in Britain.
<u>Ribes rubrum</u> (Red Current)	SITE LOCATION: Occasional in the older woodland areas adjacent to the lake. UK DISTRIBUTION: Locally frequent. Woods and hedges and perhaps native by streams in woods.
<u>Senecio erucifolius</u> (Hoary ragwort)	SITE LOCATION: Occasional in grassland communities. UK DISTRIBUTION: Locally common. Roadsides, field-borders, shingle-banks, grassy slopes, etc., chiefly on lowland calcareous and heavy soils.
<u>Trifolium arvense</u> (Hare's-foot Trefoil)	SITE LOCATION: Occasional in dry grassland and legume communities. UK DISTRIBUTION: Scattered in rather open habitats on well drained soils.
<u>Vulpia myuros</u> (Rat's-tail Fescue)	SITE LOCATION: locally frequent in road bank and waste ground communities. UK DISTRIBUTION: Local. In sandy places and on walls.
<u>Zannichellia Palustris</u> (Horned Pondweed)	SITE LOCATION: Locally dominant growing on muds in very shallow water, at the northern and southern ends of the lake. UK DISTRIBUTION: Locally common. Rivers and streams, ditches and pools of fresh or brackish water.

APPENDIX 2.7. LOCAL AND UNCOMMON SPECIES OF MACROINVERTEBRATE RECORDED FROM THE BADER WAY LAKE

Aeshna mixta: (Aeshnidae: ODONATA). Migrant Hawker.

SITE LOCATION: Recorded from the lilies at the southern end of the lake and from mixed stands of marginal herb species.

UK DISTRIBUTION: Locally common in Southeast England. Favours larger bodies of water.

Ranatra linearis: (Nepidae: HETEROPTERA). Water Stick Insect.

SITE LOCATION: A single specimen recorded from stands of tall mixed emergent species around the northern and western margins of the site.

UK DISTRIBUTION: A local and scarce species which prefers slow flowing rivers and large bodies of water (J.Bratton, pers. comm).

Sigara concinna: (Corixidae: HETEROPTERA). A lesser water boatman.

SITE LOCATION: Recorded from the more open water areas of the inlets on the northern and eastern bank and from stands of submerged plants at the southern end of the lake.

UK DISTRIBUTION: A local and scarce species often associated with new or disturbed sites. (J.Bratton pers. comm.; Pond Action unpublished results).

Enochrus testaceus: (Hydrophilidae: COLEOPTERA). A water scavenger beetle.

SITE LOCATION: Recorded from the lilies in the southern part of the site, from stands of branched bur-reed as well as from stands of other mixed tall emergent species.

UK DISTRIBUTION: Locally common in southeast England. The species is Nationally Notable B.

Helochaeres lividus: (Hydrophilidae: COLEOPTERA). A water scavenger beetle.

SITE LOCATION: A single specimen recorded from the stands of mixed tall emergents.

UK DISTRIBUTION: Locally common in southeast England. The species is Nationally Notable B.

APPENDIX 2.7 (continued)

Hygrobia hermanni: (Hygrobiidae: COLEOPTERA). Screech Beetle.

SITE LOCATION: Recorded from a number of habitats in different parts of the lake.

UK DISTRIBUTION: Locally common in southeast England.

Rhantus exsoletus: (Dytiscidae: COLEOPTERA). A diving beetle.

SITE LOCATION: A single specimen recorded from stands of submerged plants in the southern part of the lake.

UK DISTRIBUTION: Common in sedge beds in southern Scotland but local elsewhere.

Scirtes hemisphaericus: (Helodidae: COLEOPTERA). A Helodid beetle.

SITE LOCATION: A single specimen recorded from the margins of the lake amongst stands of wetland herb species.

UK DISTRIBUTION: Widespread but local throughout England.

Peltodytes caesus: (Haliplidae: COLEOPTERA). A crawling water beetle.

SITE LOCATION: A single specimen recorded from the gravel bank habitat along the northwest margin of the lake.

UK DISTRIBUTION: A nationally rare species, now confined largely to fenland from Somerset to Kent, though colonies are found at Wicken Fen (Cambridgeshire) and on Otmoor (Oxfordshire).
