



# Survey of the Ponds of Bedfordshire

November 2007

Sundon Pit  
Photo by Heather Webb



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## 1. Aim of Survey

The aim of the survey was to:

1. Repeat the 1976 and the 1996 pond survey that covered 44 one km squares, roughly 4% of the county.
2. Assess selected ponds in detail

## 2. Introduction

Previous Bedfordshire Pond Surveys were carried out in 1976 and 1991, an interval of 15 years. The 1976 and 1991 surveys have established a base line of ponds across the county, from which to assess change.

The 1976 and 1991 surveys covered 44 one kilometre squares, roughly 4% of the county, in which all the ponds present were identified.

During the 1991 survey the location of the original 1976 pond sites was checked and a number of omissions in the 1976 survey were found. These were confirmed by reference to the original 1976 aerial photographs and site investigation. Where their existence was confirmed they were included in the 1991 survey. Phantom ponds (recorded but none existent) and double plots were also corrected. The original classifications of ponds: remaining, overgrown and lost was retained in the 1991 survey and a further category included of new ponds.

In the original 1976 survey, woodland ponds, garden ponds, flooded pits, effluent lagoons, moated sites and parkland lakes were excluded from the survey. Changes in boundaries between 1976 and 1991 brought some of the originally recorded ponds into categories initially excluded from the original survey. Such ponds were included in the 1991 survey.

An anomaly within the 1976 survey was the inclusion of a site square in the Whipsnade Wild Animal Park. The site contains numerous new ponds, duck ponds, flamingo ponds and drinking pools. For the purpose of the 1991 survey the data from Whipsnade was recorded separately.

The 1991 survey revised the 1976 data and found that of the 138 ponds present in 1976, 38 ponds had been lost by 1991, a rate of loss of 27%. County wide this approximates to the loss of 944 ponds within the 74 year survey period or 12.75 ponds per year.

The 1991 survey found that not only had the number of ponds declined in the 15 years since the 1976 survey but that the condition of the surviving ponds had deteriorated. In 1976 of the 100 existing ponds 38% were in an over grown condition, 62% open and accessible but by 1991 the situation had reversed. Of the 103 ponds recorded in 1991, 57% were overgrown and 43% open and accessible.

The 1991 survey also reported that between 1976 and 1991 33 or 24% of the ponds had changed category in a downward direction, either from an open pond to an overgrown pond or from an over grown pond to a lost pond. Only seven or 5% of the ponds had changed category in an upward direction and five of these were due to mis-categorisation in the 1976 survey. The 1991 figures were revised and corrected in 2007.

The land categorisation of the ponds surveyed in 1991 and their loss and condition is shown in table 1.

**Table 1 Land categorisation of ponds and their loss and condition in the 1991 survey**

Land categorisation	Percentage of ponds in 1991	Loss 1976-1991 As a percentage of all ponds	Percentage in good condition (open and accessible)	Percentage in very poor state (densely overgrown and inaccessible)
Agricultural	56.4	68.2	56.2	6.25
Within village boundaries	23.5	22.7	71.4	0
Roadsides	2.3	4.5		0
Other	17.16	4.5		0

### 3. Method

#### 3.1 Pond definition

The following Pond Conservation Trust definition of a pond was adopted for all three surveys:

“A pond is a body of water, seasonal or permanent, between 0.0001 ha (i.e. 1m by 1m) and 2 ha in area. Water is usually present for at least 4 months of the year during which time it may be of any depth.”

#### 3.2 Identification of ponds categories

Using the 2002 aerial photographs and Google Earth all the ponds in the site squares were located, named and classified as remaining, obscured, lost or new. The results of the 1991 report were examined in detail and problems identified.

#### 3.3 Field survey

Ponds were checked in the field using the following categories remaining, over grown, lost or new. Field notes were made on general state of each pond and some were photographed.

#### 3.4 Detailed pond survey

The aim of the detailed survey was to assess a sample of ponds throughout the county using the National Pond Monitoring Network's PSYM system.

Using the aerial photographs, results and photographs from the field survey it was decided to carry out a detailed botanical survey of the following ponds.

- Upper Sundon (TL048276)
- Upper Sundon Village Pond (TL045277)
- Harlington Village Pond (TL038305)
- Milton Bryan Village Green (SP974300)
- Mount Pleasant, Stagsden (SP976508)

The Bedfordshire Natural History Society Recorders for Dragonflies and Bugs recorders were asked if they had any information on the above ponds.

## 4. Results

The Google Earth layer showing all the ponds is given in appendix 1.

### 4.1 Re-interpretation of the 1991 survey report table

The following anomalies were identified in the 1991 report:

1. Table 1 in the 1991 report was inconsistent in the way the Whipsnade Wild Animal Park, site number 43, was included, and the way the new ponds were counted.
2. Site 4, pond 7 was categorised as not a pond
3. Site 4, pond 9 was ambiguously marked as being both overgrown and lost, with a comment of being silted-up and in woodland

In view of the above it was decided that :

Site number 43 (Whipsnade Wild Animal Park) would be excluded from the survey,

Site 4, pond 7 would be excluded

Site 4, pond 9 would be assumed lost

The following revised numbers are shown in table 2.

**Table 2 Revised pond categories including new ponds**

	1976 revised	1991 revised
Km squares sampled	43	? <sup>1</sup>
Km squares with ponds	32	31
Total number of ponds examined	138	117 <sup>2</sup>
Total number of ponds found to exist	100	95
Ponds removed since a prior survey	38	22 <sup>2</sup>
Total number of ponds lost 1976 to 1991		58 <sup>2</sup>
Ponds overgrown	39	46
Ponds retained	61	34
New ponds since prior survey		4

<sup>1</sup>Unclear if the 11 other one km squares were reviewed in 1991. The list of these squares is lost. Pond 21:11 was reported as resurrected in 1991 but was found to have been lost in 2007. It was wrongly located in 1991 and had actually been lost throughout.

<sup>2</sup>Two ponds (32:2 and 31:7) were found to still be present, having been classified as lost between 1976 and 1991

### 4.2 Field survey

The field survey results are in Appendix 2 and mapped in Appendix 3. Photographs of the ponds are in Appendix 6. A synopsis of the field survey results is shown in table 3

Following the identification of 22 ponds in 2007 not previously reported, 11 were found to be in existence in 1991 when the 1991 aerial photographs were re-

examined. The 1991 data in table 3 have been adjusted to reflect their revised 1991 state. An estimate is given as to whether they were new in 1991 or mature (either obscured or remaining). An attempt has been made to revise the 1976 figures in respect of the four ponds found to have been obscured in 1991 and thus potentially present in 1976.

**Table 3. A Synopsis of the 2007 results using 2002 aerial photographs and 2007 fieldwork**

	2007
Km squares sampled	31
Km squares with ponds	31
Number of ponds examined	109 <sup>1</sup>
Total number of ponds existing	96
Ponds overgrown	48
Ponds retained	37
New ponds from 1976 to 1991	11
New ponds from 1991 to 2007	11
Total new ponds since 1976	22

<sup>1</sup> 95 existing ponds from original 1991 survey plus 3 resurrected ponds and 11 new ponds

### 4.3 Detailed pond surveys

The results of the Odonata desk top study are given in appendix 7.

The full results of the detailed survey of Milton Bryan Village Green (SP974300) Harlington Village Pond (TL038305), Mount Pleasant, Stagsden (SP976508), Upper Sundon (TL048276) and Upper Sundon Village Pond (TL045277) are given in appendix 4.

A synopsis of the results is given in table 4. The method of calculating the results can be obtained from the “National Pond Monitoring network - a strategy for pond monitoring, surveillance and inventory development, 2003 and “A Guide to monitoring the ecological quality of ponds and canals using PSYM.”

The Plant rarity Score and Trophic Ranking Score are obtained from the plant recording sheet in Appendix 5. The Species Rarity Index is calculated by adding the rarity score of all the plant species present to give a total rarity score. The species rarity index is calculated by dividing the total rarity score by the number of species present on the site.

**Table 4 Synopsis of detailed pond surveys**

Pond	Map reference	No of wetland plant species	Number of emergent and submerged species	No of uncommon species (with a rarity score >1)	Trophic ranking Score	Species Rarity Index
Upper Sundon Village Green Pond	TL045277	7	6	1	8.67	1.14
Upper Sundon Pond	TL048276	10	9	1	9.33	1.1
Harlington Village Pond	TL038305	24	21	2	9.17	1.04
Milton Bryon Village Pond	SP974300	14	12	1	9.28	1.07
Mount Pleasant, Stagsden Pond	SP976508	7	5	0	9.67	1.0

**4.3.1 Upper Sundon Village Pond**



*Upper Sundon Village Pond from the northeast*

Upper Sundon Village Pond is of low to moderate value using the number of wetland plants and Species Rarity Index (SRI) (see table 4). It did not meet County Wildlife Site criteria due to its small size (less than 0.05ha) and only five wetland indicators were recorded (six are needed for CWS status) and likely introduced origin of the flowering rush.

Management recommendations- the pond would benefit from some of the reedmace being removed to create areas of open water.

#### **4.3.2 Upper Sundon Pond**



*Upper Sundon Pond from the south west*

Upper Sundon Village Pond is of moderate value using the number of wetland plants and SRI (see table 4). Although there are seven indicator species present there are no strong indicator species and three of the indicator species are at a low frequency. Also the pond is less than 0.05 ha. Six indicator species are needed for a site to be of County Wildlife Status and the water body must be more than 0.05 ha. The pond does not therefore fulfil the CWS criteria. It is possible that the pond may dry out at times but it is not affected by shading and is surrounded by rough grassland that provides good cover for amphibians.

Management recommendations – no extensive management is required though reducing the extent of the reedmace and branched bur-weed to create more open water may be desirable.

### 4.3.3 Harlington Village Pond



*Harlington Village Pond from the east*

The pond comes out as being of moderate-high value using the number of wetland plants and the SRI.

The pond easily meets the CWS selection guidelines as a water body greater than 0.05 ha in size supporting at least 18 wetland indicators including two strong indicators (Cyperus sedge and Greater spearwort) though the Greater spearwort may have originally been introduced. The water clarity is good. The water originates from springs at the southern end of the pond. The pond is surrounded by dense ruderal vegetation and mature scrub and trees that provide good cover around the pond for amphibians and other species.

It is recommended that the pond is identified as a CWS. No extensive management is required to maintain the pond though reducing the extent of the Jointed rush may be desirable to create more open water as well as taking the edge off the dense reedmace where it meets the centre of the pond. It may also be worth reducing the extent of the water lily. The dense ruderal vegetation on the banks surrounding the pond should remain undisturbed.

This pond was surveyed by S. Brooke for water bugs. The results are shown in table 5. The *Hesperocorixa* prefers water with high nitrogen content and the other species are found pretty much everywhere.

**Table 5 Results of the Bug Survey**

<b>Date</b>	25 Sep 2007	<b>GridRef</b>	TL038305	<b>VC</b>	30	Bedfordshire	<b>Recorder</b>	SEB
							with	-
<b>Site</b>	Harlington, village pond		<b>Habitat</b>	Corner of recreation ground. Little access. Typha ++		<b>Visit notes</b>	12.15-12.45. Sunny. looked at 3 places where there was some access.	
<b>Parish</b>	Harlington							
	<b>Species</b>		<b>UK</b>	<b>V</b>	<b>Specimen</b>	<b>Notes</b>		
1	<i>Hesperocorixa sahlbergi</i>		C+	√	m	1 m in shallow open area on E side.		
2	<i>Sigara dorsalis</i>		C+			1 m in more open part on N side		
3	<i>Notonecta glauca</i>		C+			2 a amongst typha on W side		
4	<i>Gerris lacustris</i>		C+			1 f examined but a few present, probably G. lacustris among Typha on W side		

#### 4.3.4 Milton Bryan Village Pond



*Milton Bryan Village Pond from the southwest*

The pond comes out as being of moderate value using the number of wetland plants and the SRI.

When compared against the CWS selection guidelines the pond supports at least eight wetland indicators including one strong indicator. The pond does appear to meet the selection guidelines as a water body greater than 0.05 ha in size as it contains a good population of a strong indicator (White water lily), though this plant has probably been introduced and it may not be of pure native origin. It also meets the guidelines from the number of general indicators, though at least three of these species are at low frequency. The pond also has predominantly artificial banks, is probably overstocked with carp and the number of ducks is also excessive for its

size. The presence of Carp and ducks can both cause problems of excessive eutrophication. A lot of silt was removed in 2001. The terrestrial habitat surrounding the pond is also unsuitable for amphibians and invertebrates consisting of close mown amenity grassland.

The pond is probably of borderline value in its present condition and may not be worth identifying as a CWS at the present time. Ideally the population of fish needs to be reduced as well as the number of ducks on the pond.

#### **4.3.5 Mount Pleasant, Stagsden Pond**



*Mount Pleasant, Stagsden Pond from the south*

The pond comes out as being of low value using the number of wetland plants and the SRI (see table 4)

The pond does not meet the CWS selection guidelines as a water body as it less than 0.05 ha in size and supports only four wetland indicators and no strong indicators. The abundance of blanketweed and high Trophic Ranking Score suggests eutrophication.

The pond is however surrounded by dense ruderal vegetation and scattered scrub and trees that provide good cover for amphibians and other species though it is isolated in an intensive arable landscape.

It is recommended that the pond is not identified as CWS. No extensive management is required to maintain the pond though effort should be made to prevent run-off from the road and adjacent arable land from entering the pond to reduce eutrophication and pollution. The ruderal vegetation on the bank of the pond should be retained.

## 5 Discussion

Table 6 shows the comparison of the results from the three surveys. Inaccuracies in the previous surveys makes direct comparisons between the 1976 and 1991 statistics difficult.

**Table 6 Comparison of results of the three surveys**

	1976 revised	1991 revised	2007
Km squares sampled	43	? <sup>1</sup>	31
Km squares with ponds	32	31	31
Total number of ponds examined	142 <sup>7</sup>	117 <sup>2</sup>	109 <sup>3</sup>
Total number of ponds found to exist	100	95	96
Ponds removed since 1902	38		
Total number of ponds lost 1976 to 1991		22 <sup>4</sup>	
Total number of ponds lost from 1991 to 2007			14 <sup>5</sup>
Total number of ponds lost since original base line			69
Ponds overgrown	39	50 <sup>6</sup>	48
Ponds retained	61	34	37
New ponds since prior survey		11	11
Total new ponds since base line			22

<sup>1</sup> Unclear if the 11 other one km squares were reviewed in 1991. The list of these squares is lost

<sup>2</sup> 100 ponds from previous survey plus 2 found not to have been lost plus 11 new ponds found (4 in 1991 and 7 in 2007) plus 4 obscured but found in 1991).

<sup>3</sup> 95 existing ponds from previously plus 3 resurrected ponds and 11 new ponds

<sup>4</sup> 2 ponds (32:2 and 31:7) were found not to have been lost between 1976 and 1991

<sup>5</sup> 3 ponds (4:9, 9:2, and 42:3 ) were found to still be in existence having been previously classified as lost.

<sup>6</sup> 4 of the extra ponds found in 2007 (12:3, 16:8, 30:5 and 30:7) were judged to have been obscured in 1991)

<sup>7</sup> Revised figure from 2007 data

Table 7 shows some of the changes that have occurred.

**Table 7 Changes over the three surveys**

	1902	1976 revised	1991 revised	2007
Km squares sampled	43	43	?	31
Km squares with ponds	32	32	31	31
Total number of ponds examined on the ground			117 <sup>2</sup>	109 <sup>3</sup>
Total number of ponds found to exist	142	100	95	96
Ponds obscured		39 (39%)	50 (53%)	48 (50%)
Ponds retained		61 (61%)	34 (36%)	37 (39%)
Ponds lost		38	20 (accumulate to. 58)	10 (accumulate to 68)
New ponds since prior survey			11	11
Total new ponds since base line				22

<sup>2</sup> 100 ponds from previous survey plus 2 found not to have been lost plus 11 new ponds found (4 in 1991 and 7 in 2007) plus 4 obscured but found in 1991).

<sup>3</sup> 95 existing ponds from previously plus 3 resurrected ponds and 11 new ponds

It can be seen from table 7 that the number of ponds exist has actually increased by one since the 1991 survey.

The greatest loss of ponds occurred between 1902 and 1976 when 38 ponds were lost and no new ponds were located. Between 1976 and 1991 a further 20 ponds were lost giving an accumulated total of 58 ponds lost but this was offset by the location of 11 new ponds. Between 1991 and 2007 a further 10 ponds were lost but this was off set by a gain of 11 new ponds resulting in the overall gain of one pond since 1991.

Although the actual number of ponds known on the ground has changed little in the last 15 years, 10 of the 95 ponds present in 1991 were lost by 2007 (10.5%). The quality of the new ponds that have off set this loss may not be as good as the ones lost and biodiversity may have decreased. Also the condition of all the ponds needs to be considered. The more obscured a pond becomes the less light is available for plant growth both on the banks and in the water. The quality of the water deteriorates along with the biodiversity of the pond. The greatest loss of condition of the ponds came between 1902 and 1976 when the percentage of ponds that were obscured increased from 39% to 53% of the ponds found. The 2007 survey revealed a slight decrease in the loss of condition with 48% of the ponds being obscured.

Eleven new ponds were built between 1976 and 1991 and a further eleven new ponds were built between 1991 and 2007 resulting in an increase of one new pond on the ground between the 1991 and 2007 surveys.

Table 8 shows if the ponds surveyed in detail meet CWS criteria.

**Table 8 County Wildlife Status of ponds surveyed in detail**

Pond	Map ref	CWS status	Reason for CWS	Reason against CWS	Value for amphibians
Milton Bryan Village Green	SP974300	No	8 wetland indicators	Over stocked with Carp, artificial banks, lots of ducks	Unsuitable-mown grass
Harlington Village Pond	TL038305	Yes	18 wetland indicators		Good dense ruderal vegetation
Mount Pleasant, Stagsden	SP976508	No		Only 4 indicator species, less than 0.05 ha	Good dense ruderal vegetation and scrub
Upper Sundon	TL048276	No	7 wetland indicators, no strong and 3 at low density	No strong indicators and 3 indicators at low density, less than 0.05 ha	Good rough grassland
Upper Sundon Village Pond	TL045277	No		5 wetland indicators, less than 0.05 ha	Unsuitable amenity grassland

Only one pond, Harlington Village Pond fulfilled the CWS guidelines for CWS status. When deciding on the ponds to be surveyed in detail it was difficult to find suitable

ponds that were large enough, not obscured, and that had owners who were happy to allow access.

The field survey did not include an invertebrate survey. If the invertebrate interest had also been surveyed the scores for these ponds would have been more accurate.

## **6. Conclusions**

It can be seen from table 7 that there has been little change between 1991 and 2007 in the number and state of the ponds in the one kilometre squares surveyed and the most dramatic changes occurred between 1902 and 1991.

The fact that there has been little change in the last 15 years should not lead to a state of complacency as many agricultural ponds are now surrounded by tall trees and filled with run off from the fertilised and pesticide sprayed fields leading to a high nitrogen content and resulting high algal growth leading to de-oxygenation and a resulting loss of any remaining life.

It is only a matter of time before these remaining obscured ponds become lost.

One pond that was surveyed in detail is eligible for CWS status and should be put forward to the County Wildlife Site Panel.

Appendix 5

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**Plant recording sheet** (score through each species present) RS = Rarity Score, TRS = Trophic Ranking Score

Plant recording sheet (score through each species present)

RS = Rarity Score, TRS = Trophic Ranking Score

RS	TRS	Emergent plants	RS	TRS		RS	TRS		RS	TRS	Submerged plants
1		<i>Achillea ptarmica</i>	1		<i>Epilobium hirsutum</i>	1	7.3	<i>Phragmites australis</i>	2	6.3	<i>Apium inundatum</i>
1		<i>Acorus calamus</i>	1		<i>Epilobium obscurum</i>	4	5.3	<i>Ptilularia globulifera</i>	1		<i>Aponogonon distachyos</i>
1		<i>Agrostis canina</i>	1		<i>Epilobium palustre</i>	2		<i>Pinguicula lusitanica</i>	1		<i>Callitriche caroliniana</i>
1	LP	<i>Agrostis stolonifera</i>	1		<i>Epilobium parviflorum</i>	1		<i>Pinguicula vulgaris</i>	2		<i>Callitriche brutia</i>
32		<i>Alisma arifolium</i>	2		<i>Epilobium tetragonum</i>	1		<i>Potentilla erecta</i>	1	6.3	<i>Callitriche lamellata</i>
2		<i>Alisma lanceolatum</i>	2		<i>Epipactis atrorubra</i>	1	5.3	<i>Potentilla palustris</i>	2	8.5	<i>Callitriche hermaphroditica</i>
1	9	<i>Alisma plantago-aquatica</i>	1	LP	<i>Equisetum flaviviale</i>	1		<i>Pulicaria dysenterica</i>	2		<i>Callitriche obtusangula</i>
2		<i>Alopecurus arvensis</i>	1		<i>Equisetum palustre</i>	16		<i>Pulicaria vulgaris</i>	2		<i>Callitriche platycarpa</i>
4		<i>Alopecurus borealis</i>	1		<i>Erica tetralix</i>	1		<i>Ranunculus ficaria</i>	1	7.3	<i>Callitriche stanialis</i>
1		<i>Alopecurus geniculatus</i>	1	2.5	<i>Eriophorum angustifolium</i>	1	LP	<i>Ranunculus flammula</i>	4		<i>Callitriche truncata</i>
2		<i>Anagallis tenella</i>	16		<i>Eriophorum gracile</i>	2	10	<i>Ranunculus hederaceus</i>	1		<i>C. stanialis/platycarpa agg.</i>
2		<i>Andromeda polifolia</i>	2		<i>Eriophorum latifolium</i>	2*		<i>Ranunculus linza</i>	1		<i>C. lamellata/brutia agg.</i>
1		<i>Anemone archangelica</i>	1		<i>Eriophorum vaginatum</i>	2		<i>Ranunculus omiophyllus</i>	1		<i>Callitriche sp. (undet.)</i>
1		<i>Anemone sylvestris</i>	1		<i>Eupatorium cannabinum</i>	32		<i>Ranunculus ophiostylifolius</i>	2	10	<i>Ceratophyllum demersum</i>
2		<i>Apium graveolens</i>	1		<i>Filipendula ulmaria</i>	32		<i>Ranunculus reptans</i>	2		<i>Ceratophyllum submersum</i>
1	10	<i>Apium nodiflorum</i>	2		<i>Galium boreale</i>	1	10	<i>Ranunculus sceleratus</i>	2	7.3	<i>Chara sp.</i>
32		<i>Apium repens</i>	8		<i>Galium constrictum</i>	2		<i>Rhynchospora alba</i>	1		<i>Egeria densa</i>
2		<i>Baldellia ranunculoides</i>	1		<i>Galium palustre</i>	4		<i>Rhynchospora fusca</i>	4	7	<i>Elatine hexandra</i>
2	10	<i>Berula erecta</i>	2		<i>Galium uliginosum</i>	2		<i>Rorippa amphibia</i>	4		<i>Elatine hypopiper</i>
2		<i>Bidens cernua</i>	1		<i>Geranium rivale</i>	8		<i>Rorippa islandica</i>	2		<i>Elodea canadensis</i>
1		<i>Bidens comata</i>	2		<i>Glyceria declinata</i>	2	10	<i>Rorippa microphylla</i>	1		<i>Elodea callitricoides</i>
1		<i>Bidens frondosa</i>	1	LP	<i>Glyceria fluitans</i>	1	10	<i>Rorippa nasturtium-aquaticum</i>	1	7.3	<i>Elodea canadensis</i>
2		<i>Bidens tripartita</i>	1	10	<i>Glyceria maxima</i>	1	10	<i>Rorippa (undet.)</i>	1	10	<i>Elodea nuttallii</i>
2		<i>Blymus compressus</i>	2		<i>Glyceria notata</i>	1		<i>Rorippa palustris</i>	8		<i>Eriocaulon aquaticum</i>
2		<i>Bobolioscius maritimus</i>	1		<i>Gnaphalium uliginosum</i>	2	10	<i>Rumex hydrocotyllum</i>	1	6.3	<i>Fontinalis antipretica</i>
2*		<i>Botanus umbellatus</i>	1	LP	<i>Hydrocotyle vulgaris</i>	2		<i>Rumex maritimus</i>	2		<i>Groenlandia densa</i>
2		<i>Callamaretis canescens</i>	2		<i>Hypericum elodes</i>	2		<i>Rumex palustris</i>	2	7.7	<i>Hippuris vulgaris</i>
2		<i>Callamaretis epacioides</i>	1		<i>Hypericum tetrapterum</i>	1		<i>Sagittaria procumbens</i>	2		<i>Hottonia palustris</i>
8		<i>Callamaretis purpurea</i>	4		<i>Hypericum undulatum</i>	1		<i>Sagittaria subulata</i>	4		<i>Isocetes echinospora</i>
2		<i>Callamaretis stricta</i>	2		<i>Imonites capensis</i>	2		<i>Sagittaria valesiana</i>	2	5	<i>Isocetes lacustris</i>
16		<i>Callamaretis scutellaria</i>	4		<i>Imonites alandulifera</i>	2	7.7	<i>Schoenoplectus lacustris</i>	1		<i>Leanostemon minor</i>
1		<i>Calla palustris</i>	4*		<i>Imonites noli-tangere</i>	32		<i>Schoenoplectus pungens</i>	2	6.7	<i>Littorella uniflora</i>
1	7	<i>Callitha palustris</i>	1	LP	<i>Iris pseudacorus</i>	2		<i>Schoenoplectus tabernaemontani</i>	2	5	<i>Lobelia dortmanna</i>
1		<i>Cardamine amara</i>	1		<i>Isoplepis setacea</i>	32		<i>Schoenoplectus triquetus</i>	8		<i>Ludwigia palustris</i>
1		<i>Cardaminis pratensis</i>	1		<i>Juncus acutiflorus</i>	16		<i>Schoenus ferocissimus</i>	1	6.7	<i>Myriophyllum alterniflorum</i>
2		<i>Carex acuta</i>	1		<i>Juncus articulatus</i>	2		<i>Schoenus naticum</i>	1		<i>Myriophyllum aquaticum</i>
1	10	<i>Carex acutiformis</i>	1		<i>Juncus bulbosus</i>	16		<i>Scorzonera humilis</i>	2	9	<i>Myriophyllum spicatum</i>
4		<i>Carex appropinquata</i>	1	5.3	<i>Juncus compressus</i>	1		<i>Scrophularia angulata</i>	4		<i>Myriophyllum verticillatum</i>
2		<i>Carex aquatilis</i>	2		<i>Juncus effusus</i>	1		<i>Scutellaria valenculata</i>	4		<i>Najas flexilis</i>
2		<i>Carex curta</i>	1		<i>Juncus coq-broncatus</i>	1		<i>Senecio aquaticus</i>	2	6.7	<i>Nitella sp.</i>
2		<i>Carex diandra</i>	1	LP	<i>Juncus foliosus</i>	32		<i>Senecio fluytiensis</i>	2		<i>Oenanthe fluytiensis</i>
1		<i>Carex disticha</i>	2		<i>Juncus inflexus</i>	4		<i>Senecio paludosus</i>	16		<i>Potamogeton acutifolius</i>
1		<i>Carex echinata</i>	1		<i>Juncus subnodulosus</i>	4		<i>Sium latifolium</i>	2	5.5	<i>Potamogeton alpinus</i>
2	10	<i>Carex elata</i>	32		<i>Lathyrus palustris</i>	1	10	<i>Solanum dulcamara</i>	2	7.3	<i>Potamogeton bechtoldii</i>
4		<i>Carex elongata</i>	2		<i>Leersia oryzoides</i>	1		<i>Sonchus palustris</i>	4		<i>Potamogeton coloratus</i>
1		<i>Carex flacca</i>	4		<i>Liparis loeselii</i>	1	8.5	<i>Spartanum erectum</i>	4		<i>Potamogeton compressus</i>
1		<i>Carex hostiana</i>	32		<i>Lotus pedunculatus</i>	1		<i>Stachys palustris</i>	1	10	<i>Potamogeton crispus</i>
2		<i>Carex laevigata</i>	32		<i>Luzula luzuloides</i>	2		<i>Stellaria palustris</i>	16		<i>Potamogeton ephedrus</i>
2	4	<i>Carex lasiocarpa</i>	1		<i>Luzula sylvatica</i>	1		<i>Stellaria uliginosa</i>	4	10	<i>Potamogeton filiformis</i>
2	4	<i>Carex limosa</i>	1		<i>Lycopus europaeus</i>	16		<i>Symphlytum officinale</i>	2	10	<i>Potamogeton friesii</i>
1	5	<i>Carex mira</i>	2		<i>Lysimachia thyrsiflora</i>	1		<i>Taraxacum officinale</i>	2	7	<i>Potamogeton germanicus</i>
1		<i>Carex oedocarpa</i>	1		<i>Lysimachia vulgaris</i>	2		<i>Thalictrum flavum</i>	2	10	<i>Potamogeton lucens</i>
1		<i>Carex otubae</i>	1		<i>Lythrum portula</i>	4		<i>Thelypteris palustris</i>	8		<i>Potamogeton nodosus</i>
1		<i>Carex panicea</i>	1		<i>Lythrum salicaria</i>	1		<i>Tofieldia pusilla</i>	2	8	<i>Potamogeton obtusifolius</i>
2	10	<i>Carex paniculata</i>	1		<i>Mentha aquatica</i>	1	7.3	<i>Trichopogon capitosum</i>	1	10	<i>Potamogeton pectinatus</i>
1		<i>Carex pendula</i>	4		<i>Mentha pulegioides</i>	16		<i>Trilochium palustre</i>	2	7.3	<i>Potamogeton perfoliatus</i>
2	10	<i>Carex pseudocyperus</i>	2		<i>Mentha sylvestris</i>	2	10	<i>Typha angustifolia</i>	2	8.5	<i>Potamogeton pectinatus</i>
1		<i>Carex pulicaris</i>	16		<i>Mimulus aurantiacus</i>	1	8.5	<i>Typha latifolia</i>	2	9	<i>Potamogeton pusillus</i>
1	10	<i>Carex riparia</i>	2		<i>Mimulus luteus</i>	1		<i>Valeriana dioica</i>	8		<i>Potamogeton rutilus</i>
1	5.3	<i>Carex rostrata</i>	1		<i>Molinia caerulea</i>	32		<i>Vallisneria spiralis</i>	4	10	<i>Potamogeton trichoides</i>
2		<i>Carex spicata</i>	1	7.3	<i>Molinia tenuis</i>	1		<i>Veronica anagallis-aquatica</i>	2	10	<i>Ranunculus acris</i>
2		<i>Carex vesicaria</i>	16		<i>Myosotis latifolia</i>	1	10	<i>Veronica beccabunga</i>	2	10	<i>Ranunculus bulbosus</i>
1		<i>Carex viridula</i>	1	5.3	<i>Myosotis secundiflora</i>	2		<i>Veronica catenata</i>	2		<i>Ranunculus circinatus</i>
16		<i>Carex vulpina</i>	1		<i>Najas flexilis</i>	1	5.5	<i>Veronica scutellata</i>	2		<i>Ranunculus fluitans</i>
1		<i>Carex sp.</i>	1		<i>Najas sp. (undet.)</i>	1		<i>Veronica sp. (undet.)</i>	2	7	<i>Ranunculus peltatus</i>
2		<i>Catabrosa aquatica</i>	16		<i>Najas sp. (undet.)</i>	1		<i>Viola palustris</i>	2	8.5	<i>Ranunculus pensilvanicus</i>
4		<i>Cicuta virescens</i>	1		<i>Najas sp. (undet.)</i>	32		<i>Viola persicifolia</i>	2	8.5	<i>Ranunculus trichophyllus</i>
2		<i>Cirsium dissectum</i>	1		<i>Najas sp. (undet.)</i>	1		<i>Urtica exotica</i>	16		<i>Ranunculus tripartitus</i>
1		<i>Cirsium palustre</i>	1	7.7	<i>Najas sp. (undet.)</i>	1			1		<i>Ranunculus sp. (undet.)</i>
2		<i>Cladium mariscus</i>	1	9					1		<i>Sagittaria latifolia</i>
1		<i>Contium maculatum</i>	1						1		<i>Sagittaria rivida</i>
1		<i>Crassula helmsii</i>	4						2		<i>Sagittaria sagittifolia</i>
1		<i>Crepis paludosa</i>	1						2	4	<i>Spartanum angustifolium</i>
16		<i>Cyperus fuscus</i>	2						1	10	<i>Spartanum emersum</i>
4*		<i>Cyperus longus</i>	1						2		<i>Spartanum natans</i>
2		<i>Dactylis glabra sp. (undet.)</i>	1						1	2.5	<i>Sphagnum sp.</i>
32		<i>Danthonia alisma</i>	2						4*		<i>Stratiotes aloides</i>
1		<i>Deschampsia cespitosa</i>	1						2	4	<i>Subularia aquatica</i>
2		<i>Drosera anglica</i>	2						1		<i>Talipellis sp.</i>
1		<i>Drosera binata</i>	2						2		<i>Utricularia australis</i>
1		<i>Drosera capensis</i>	2						2	4	<i>Utricularia intermedia</i>
2		<i>Drosera intermedia</i>	2						2	4	<i>Utricularia minor</i>
1		<i>Drosera rotundifolia</i>	4						2	5	<i>Utricularia vulgaris</i>
16		<i>Dryopteris cristata</i>	2						1		<i>Vallisneria spiralis</i>
2		<i>Eleocharis acicularis</i>	2						4*		<i>Nymphodes peltata</i>
8		<i>Eleocharis austriaca</i>	1						1	9	<i>Persicaria amphibia</i>
2		<i>Eleocharis multicaulis</i>	1	10					1	LP	<i>Potamogeton natans</i>
1	LP	<i>Eleocharis palustris</i>	1						1	5.7	<i>Potamogeton polyzonifolius</i>
2		<i>Eleocharis quinqueflora</i>	2						2		<i>Riccia fluitans</i>
2		<i>Eleocharis unguiculata</i>	4						2		<i>Ricciocarpos natans</i>
2		<i>Epilobium albatifolium</i>	1						2		<i>Spirodela polytricha</i>
2		<i>Epilobium angustifolium</i>	1						4		<i>Wolffia arifera</i>
1		<i>Epilobium binnense</i>	4								
1		<i>Epilobium ciliatum</i>	1	8.5							

\* = uncommon species often introduced to sites (see Preston et al. 2002 for details), if so score species as 1.

LP = species exhibiting little nutrient preference

Number of emergent & submerged species  
Number of uncommon species (with a rarity score of 2 or more)  
Trophic Ranking Score