A guide to the methods of the National Pond Survey

Pond Action
Acknowledgements

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A guide to the methods of the National Pond Survey

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Contents

1. Introduction to the National Pond Survey Methodology 6
   1.1 About the guide and the National Pond Survey 6
   1.2 Changes to the National Pond Survey field recording sheet 6
   1.3 Background to the National Pond Survey 6

2. Summary of pond survey procedure 7
   2.1 Ponds included in the National Pond Survey 7
   2.2 Information gathered for the National Pond Survey 7

3. Pond survey procedure - detailed description 9
   3.1 Completing the field recording sheet 9
   3.2 Defining the pond outline 9
   3.3 Mapping the pond 9
   3.4 Recording plant species and vegetation abundance 9
   3.5 Sampling aquatic macroinvertebrates 12
   3.6 Sorting and identifying macroinvertebrate samples 13

Appendices
   A1 Identification guides used for National Pond Survey work 15
   A2 Blank copy of National Pond Survey field recording sheet 17

Tables
   1. Summary of the full National Pond Survey methodology 8
   2. Equipment needed for National Pond Survey work 10
   3. Macroinvertebrate groups recorded for the National Pond Survey 14

Figures
   1. Conventions for mapping wetland vegetation 11
1. **Introduction to the National Pond Survey methodology**

1.1 **About the guide and the National Pond Survey**

This booklet describes a standard survey methodology which can be used to gather physical, chemical and biological data for ponds.

The method was originally developed for the National Pond Survey (NPS) initiated by Pond Action in 1989. It has subsequently been used as the basis for many other regional and national surveys, including the DETR\(^1\) Lowland Pond Survey 1996\(^2\), and Pond Action’s national survey of degraded ponds which was undertaken during 1995-1998 with funding from the Natural Environment Research Council (NERC).

The aim of the survey method is to ensure consistent collection of biological and environmental data from ponds, thus:

- providing a checklist of environmental factors which can be important in describing pond types or explaining biological quality;
- enabling biological and physico-chemical data to be directly compared with the results of other regional and national surveys;
- enabling the biological *quality* of ponds to be assessed using Pond Action’s assessment methods based on the plant and/or animal communities recorded from the pond; and
- providing data for the new National Pond Database collected using compatible methods.

1.2 **Changes to the National Pond Survey field recording sheet**

The original National Pond Survey field sheet, developed in 1989, has been progressively updated and modified over the last 9 years. Most changes have related to (i) additional areas of interest to pond recorders (such as amenity and leisure use), and (ii) measures which recent research suggests are important in determining the biological quality of ponds. The latter include factors such as ‘isolation from other wetland habitats’ and ‘overall pollution rating’.

1.3 **Background to the National Pond Survey**

Ponds provide an important habitat for aquatic plants and animals in Britain: the protection of existing ponds and the construction of new ones are both believed to make a significant contribution to the conservation of freshwater communities\(^2\).

The National Pond Survey was initiated by Pond Action in 1989, with the support of WWF-UK. The Survey has four main objectives:

(i) to develop a classification of ponds in Britain based on the composition of their plant and macroinvertebrate communities;

(ii) to investigate the principal biotic and abiotic factors influencing the composition of pond communities;

(iii) to provide a descriptive basis for future studies of pond ecology (particularly those concerned with the management of ponds for wildlife conservation);

(iv) to use the classification, with species distribution data, to develop a system for assessing the importance of individual ponds for nature conservation.

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1 DETR: Department of the Environment, Transport and the Regions.
2. Summary of pond survey procedure

2.1 Ponds included in the National Pond Survey

The definition of ‘pond’ which was used for the National Pond Survey is:

'A body of water, of man-made or natural origin, between 1m$^2$ and 2ha, which usually holds water for at least four months of the year'.

This definition is a broad one and potentially includes ponds of many different origins, such as: marl pits, quarry pools, heathland ponds, moats, small ornamental lakes, oxbow ponds and peat pools, together with temporary ponds like many pingo and dune slack pools.

2.2 Information gathered for the National Pond Survey

For a full National Pond Survey assessment, ponds are surveyed in three seasons: spring, summer and autumn. Only invertebrates and some water chemistry and environmental parameters need to be surveyed on all three visits: the following list gives a broad outline of the information gathered at each pond.

- A description of the main physical features of the pond and its surroundings, together with notes about its age, history and management (see enclosed field sheet).
- Water chemistry. The sheet shows the minimum data to be collected; normally laboratory analysis of a range of chemical determinands will be made e.g. pH, conductivity, potassium, chloride, alkalinity, suspended solids, ammonia, total nitrogen, total oxidised nitrogen, total phosphorus, soluble reactive phosphorus.
- A list of the wetland plant species found within the outer boundary of the pond, with estimates of abundance for vegetation stands occupying more than 5% of the pond.
- Lists of the aquatic macroinvertebrate species recorded from the pond, ideally for three seasons of the year: spring (March-May), summer (June-August) and autumn (September-November) with estimates of their abundance.
- Notes on the presence and approximate abundance of amphibians, water birds and fish.
- Desk study information describing the pond's location (grid reference), geology etc.
**Table 1. Summary of the full National Pond Survey methodology**

**On-site survey of the pond in the first season**

The basic procedure for surveying ponds is outlined below.

(i) The pond perimeter is walked: the field recording sheet is filled in where appropriate, and macroinvertebrate microhabitats are chosen for sampling. Photographs are taken.

(ii) It is also useful to draw a sketch map of the pond using a tape and compass. Alternatively, a large scale OS map of the site may be used as a base (although it is important to check the scale and accuracy of the outline, which may have changed since the map was drawn).

(iii) Before disturbing the water:
   (a) water chemistry measurements are made or water samples collected.
   (b) a list of the wetland plants in and around the pond is compiled (see survey sheet). If the pond is large and/or deep, the plant survey can be combined with the collection of the macroinvertebrate sample.

(iv) During the summer or autumn survey the extent of major vegetation stands is recorded.

(v) Water and sediment depths are measured and the Field Recording Sheet is completed for that season.

(vi) A 3-minute macroinvertebrate sample is collected and a quick additional search made for species such as whirligig beetles and leeches.

**Laboratory analysis of invertebrate samples**

(i) Macroinvertebrate samples are sorted live, as soon as possible after collection. Samples which cannot be sorted immediately are kept in a refrigerator or refrigerated cold room and sorted within three days after collection. Samples are not frozen or preserved.

(ii) The whole sample is sorted, with selective subsampling if necessary to estimate the abundance of extremely numerous taxa.

(iii) Invertebrates are preserved in alcohol for subsequent identification, except for leeches and flatworms which are identified immediately from live material.

**Second and third season of the survey**

In both the second and the third season:

(i) New plant species observed at the pond are added to the wetland checklist. Water chemistry parameters are measured and other seasonally variable environmental data collected (e.g. inflow information). Further 3-minute macroinvertebrate samples are collected.

(ii) The laboratory procedure is repeated.
3. **Pond survey procedure: detailed description**

3.1 **Completing the field recording sheet**

The field recording sheet provides a standard format on which to record basic physical and chemical data about the pond and its surrounds. A blank copy for photocopying is provided in Appendix 2.

3.2 **Defining the pond outline**

Identifying the ‘outer edge’ of the pond is important for many of the survey measurements including pond area, percentage drawdown, and wetland plant cover. For the National Pond Survey, the definition of ‘outer edge’ is ‘the upper level at which water stands in winter’.

In practice, this line is usually readily discernible from the distribution and/or morphology of wetland plants. For example, it may be marked by a fringe of soft rush (*Juncus effusus*) or by thick bundles of fine, pink roots growing out of the trunks of willows etc., apparently several feet above water level but in fact fully submerged when the pond is at its deepest.

Alternatively, the line can often be seen as a ‘water mark’ on surrounding trees or walls and is sometimes evident as a break of slope. The outer boundary of the pond will usually, of course, be dry at the time of the survey.

3.3 **Mapping the pond**

Many measurements such as pond size and percentage of tree cover, are easier to estimate if a scale sketch map of the pond is made. For small or simply shaped ponds, compass and tape measurements alone are adequate for mapping the pond outline. For larger ponds, useful outlines can often be obtained from Ordnance Survey maps (1:10,000 scale enlarged on a photocopier): note, however, that the accuracy of these maps still needs to be checked in the field with a tape measure and compass.

3.4 **Recording plant species and vegetation abundance**

The aims of plant recording are:

- to make a complete list of wetland plants present within the outer boundary of the pond,
- to record the extent of emergent, floating-leaved and submerged plant stands, together with the approximate abundance of dominant species.

3.4.1 **Recording wetland plants**

Wetland plants growing within the outer boundary of the pond are noted on the field recording sheet. This gives a definitive list of the plant species regarded here as ‘wetland’. In deep ponds aquatic plants are surveyed using a grapnel and/or boat. Terrestrial plants and wetland plants growing outside the pond boundary are not used in the analysis. Most wetland plants are readily identifiable using a hand lens. However, with a few species (especially fine-leaved *Potamogeton* and *Callitriche* spp.) it may be necessary to remove a small amount of plant material for later microscopic examination and confirmation.

Standard botanical texts such as Stace (1997) are adequate for most wetland plant identification. However, a number of additional guides are useful for specific groups and a list of these has been included in Appendix 1.
Table 2. Equipment needed for National Pond Survey work

<table>
<thead>
<tr>
<th>General</th>
<th>Sediment and water depths</th>
<th>Macroinvertebrate sampling</th>
<th>Sorting and identification of macroinvertebrate samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Chest waders or boat as appropriate</td>
<td>• Draining rods (or equivalent)</td>
<td>• Long-handled pond-net (1 mm mesh)</td>
<td>• Large sieve (0.5 mm mesh)</td>
</tr>
<tr>
<td>• Life jackets for use with chest waders or boat</td>
<td>• Life jackets for use with chest waders or boat</td>
<td>• Bucket (10 litre) with watertight lid</td>
<td>• White sorting tray (about 40 x 40 cm)</td>
</tr>
<tr>
<td>• Camera and film</td>
<td>• Pencils and waterproof pens</td>
<td>• Stopwatch (for companion)</td>
<td>• Fine 'watchmaker's' forceps (curved and straight)</td>
</tr>
<tr>
<td>• Labels</td>
<td>• Labels</td>
<td>• Label for bucket</td>
<td>• Small bottles for preserving samples</td>
</tr>
<tr>
<td>• Copy of the field recording sheet (if possible, on waterproof paper)</td>
<td>• Copy of the field recording sheet (if possible, on waterproof paper)</td>
<td>• Labels (made from waterproof paper if necessary)</td>
<td>• Industrial methylated spirits (IMS) (70%)</td>
</tr>
<tr>
<td>Mapping the pond</td>
<td>Mapping the pond</td>
<td>Chemical survey</td>
<td>Petri dishes, microscope slides and cover slips</td>
</tr>
<tr>
<td>• Compass</td>
<td>• Compass</td>
<td>• Chemical test kits/meters</td>
<td>• High power microscope (x100-400)</td>
</tr>
<tr>
<td>• Tape (30m or 50m)</td>
<td>• Tape (30m or 50m)</td>
<td>• Sample bottles and filtering equipment</td>
<td>• Invertebrate identification keys</td>
</tr>
<tr>
<td>• Copy of large-scale OS map of the pond</td>
<td>• Copy of large-scale OS map of the pond</td>
<td>• Grapnel</td>
<td></td>
</tr>
<tr>
<td>Plant survey</td>
<td>Plant survey</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Grapnel</td>
<td>• Graphnel</td>
<td>• Plastic bags and labels</td>
<td></td>
</tr>
<tr>
<td>• Plastic bags and labels</td>
<td>• Plastic bags and labels</td>
<td>• Plant identification guides</td>
<td></td>
</tr>
<tr>
<td>• Plant identification guides</td>
<td>• Plant identification guides</td>
<td>• Plant identification guides</td>
<td></td>
</tr>
</tbody>
</table>

3.4.2 Mapping stands of wetland vegetation

During the summer or autumn survey, major stands of emergent, floating-leaved and submerged plants are either noted on the field recording sheet or drawn on to the base map using the conventions shown in Figure 1. On the base map, sparse stands of vegetation are noted as a mixture of plants and open water or mud (e.g. 20% floating cover, 80% open water). Where individual species occupy a total of more than 5% of the pond then these are also noted on the base map.

Estimates of the plant cover are only required to an accuracy of about 5%, so it is not necessary to mark the exact position or size of every small plant stand.
3.5 Sampling aquatic macroinvertebrates

3.5.1 Aims of invertebrate surveys

- To obtain, within the available sampling time (3 minutes in each of 3 seasons), as complete a species list as possible for the pond.
- To obtain information on the abundance of each species recorded.

3.5.2 Survey periods

Invertebrate surveys are undertaken in three seasons: spring (March, April or May), summer (June, July or August) and autumn (September, October or November). Surveys in adjacent seasons should ideally be two to three months apart.

3.5.3 Selecting mesohabitats for invertebrate surveys

All the main mesohabitats in the pond are sampled so that as many species are collected from the site as possible. Examples of typical mesohabitats are: stands of Carex (sedge); gravel- or muddy-bottomed shallows; areas overhung by willows, including water-bound tree-roots; stands of Elodea, or other submerged aquatics; flooded marginal grasses; and inflow areas. (As a rough guide, the average pond might contain 5-10 mesohabitats, depending on its size and variety.) It is important that vegetation structure, as well as plant species composition, is considered when selecting mesohabitats: it is better to identify habitats consisting of e.g. soft floating leaves, stiff emergent stems, etc. than to make each different plant species a separate habitat.

Mesohabitats are identified during the initial walk around the pond examining vegetation stands and other relevant features (this can be combined with the initial plant survey stage).

3.5.4 Method

Key

| Callitriche | Callitriche hamulata | Limit of plant stands |
| Glyceria | Glyceria fluviatilis | - - - - - - |
| Myriophyllum | Myriophyllum spicatum | Overhanging trees/shrubs |
| Sparganium | Sparganium erectum | Outer pond margin |
| | | Current standing water line |

Figure 1. Conventions for mapping wetland vegetation
The three-minute sampling time is divided equally between the number of mesohabitats recorded: e.g. for six mesohabitats, each will be sampled for 30 seconds. Where a mesohabitat is extensive or covers several widely-separated areas of the pond, the sampling time allotted to that mesohabitat is further divided in order to represent it adequately (e.g. into 6 x 5 second sub-samples).

Each mesohabitat is netted vigorously to collect macroinvertebrates. Stony or sandy substrates are lightly 'kick-sampled' to disturb and capture macroinvertebrate inhabitants. N.B. deep accumulations of soft sediment are avoided, since this makes later sorting extremely difficult: the netted sample should be as clean and silt-free as possible. Similarly, large accumulations of plant material, root masses, and the like should not be taken away in the sample: the idea is to dislodge and capture the animals without collecting an unmanageable sample.

The sample is placed in the labelled bucket for later sorting in the laboratory. (The three-minute sampling time refers solely to 'net-in-the-water' time, and does not include time moving between adjacent netting areas.)

Amphibians or fish caught whilst sampling are noted on the field recording sheet and returned to the pond. (It is worth making a quick search through the net and removing these: dead fish, tadpoles etc. in the sample make for a very unpleasant sorting session in the laboratory later!)

### Additional invertebrate sampling

A further 1 minute (total time, not net-in-the-water time) is spent searching for animals which may otherwise be missed in the 3-minute sample. Areas which might be searched include the water surface (for whirligig beetles, pond skaters etc.), and under stones and logs (for limpets, snails, leeches, flatworms etc.). Additional species found are added to the main 3-minute sample. Note: the 1 minute search should ideally be undertaken before the hand-net sample (i.e. before you disturb the water) to improve the chance of catching species.

### Storage of invertebrate samples prior to sorting

Samples are sorted as soon as possible after collection since they deteriorate quickly, and animals which have died in the bucket are (a) harder to spot and therefore more likely to be missed, and (b) likely to quickly begin rotting, and so be more difficult to identify. In addition, predators in the sample may eat their way through many of your other captured specimens. If the sample cannot be sorted immediately upon return from the field it must be kept in cold storage in a refrigerator or a refrigerated cold room. It is important that all samples are dealt with within three days of collection.
3.6 Sorting and identifying macroinvertebrate samples

Samples are not frozen or preserved prior to sorting since this reduces the potential recovery and identification of some invertebrate species. All samples are sorted fresh and ‘live’.

3.6.1 Preparing the sample for sorting

The sample is washed gently in a fine sieve (0.5mm mesh or less), removing as much mud and fine detritus as possible whilst ensuring the retention of delicate bodied invertebrates such as mayflies. A white sieve is preferable.

3.6.2 Sorting the sample

A small amount (less than a handful) of material to be sorted is placed in a white tray with approximately 3-5mm depth of water. This material is sorted gradually and carefully using forceps. (Fine, curved forceps, as described in Table 2, will make the sorting - and subsequent identification - very much faster and easier.) Individual animals recorded for the survey are removed and placed in a labelled bottle of 70% Industrial Methylated Spirits (‘70% alcohol’) for later identification. The exceptions are leeches and flatworms, which are not readily identifiable after preservation in IMS: these should be placed in water in a covered petri dish to be identified alive. A list of invertebrate groups included in the NPS analysis is given in Table 3 (below).

In general, the aim of sorting the sample is to remove and identify all individual invertebrates. In samples where one or two species are present in large numbers (i.e. thousands of specimens), specimens of these species are counted in a subsample and numbers then extrapolated to the whole sample. All specimens of species which cannot be reliably identified in the sorting tray should be removed from the sample with the following exceptions: Baetidae, Caenidae, Leptophlebiidae, Nemouridae, Gammaridae and Asellidae. In the case of these families, it is adequate to remove about 100 individuals since this provides a reasonable chance of all the species likely to be present being removed. Take particular care with pairs of species which are similar and perhaps not distinguishable by eye, where small numbers of one species often occur amongst very large numbers of the other species (e.g. *Asellus meridianus* with *A. aquaticus*, *Cloeon similile* with *C. dipterum*, *Anisus leucostoma* with *A. vortex*, *Lymnaea auricularia* with *L. peregra*, *Sigara falleni* with *S. distincta* and so on).

3.6.3 Identification of invertebrates

Some species, particularly those which are large and distinctive, are immediately identifiable whilst sorting, and are noted on a temporary “sorting list” (e.g. *Ilyocoris cimicoides*, *Nepa cinerea* and many snails). Most others require use of biological keys and a microscope with a magnification of at least x30. Relevant keys are listed in Appendix 1. Many species (especially the larval stages of insects) cannot be identified below certain sizes. Appropriate sizes are given in identification keys.
Table 3. Macroinvertebrate groups recorded for the National Pond Survey

<table>
<thead>
<tr>
<th>Group</th>
<th>English name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tricladida</td>
<td>Flatworms</td>
<td>Identified live</td>
</tr>
<tr>
<td>Gastropoda</td>
<td>Water snails</td>
<td></td>
</tr>
<tr>
<td>Bivalvia (except <em>Pisidium</em> spp.)</td>
<td>Freshwater cockles and mussels</td>
<td></td>
</tr>
<tr>
<td>Hirudinea</td>
<td>Leeches</td>
<td>Identified live</td>
</tr>
<tr>
<td>Araneae</td>
<td>The Water Spider</td>
<td></td>
</tr>
<tr>
<td>Malacostraca, Anostraca, Notostraca</td>
<td>Shrimps, slaters, crayfish</td>
<td></td>
</tr>
<tr>
<td>Ephemeroptera (larvae)</td>
<td>Mayflies</td>
<td></td>
</tr>
<tr>
<td>Plecoptera (larvae)</td>
<td>Stoneflies</td>
<td></td>
</tr>
<tr>
<td>Odonata (larvae)</td>
<td>Dragonflies and damselflies</td>
<td></td>
</tr>
<tr>
<td>Megaloptera &amp; Neuroptera (larvae)</td>
<td>Alderflies and spongeflies</td>
<td></td>
</tr>
<tr>
<td>Coleoptera (adults)*</td>
<td>Water beetles</td>
<td>*As defined by Friday 1988.</td>
</tr>
<tr>
<td>Hemiptera (adults)</td>
<td>Water bugs</td>
<td></td>
</tr>
<tr>
<td>Trichoptera (larvae)</td>
<td>Caddis flies</td>
<td></td>
</tr>
</tbody>
</table>

Others

Diptera (including Chironomidae) (flies) are identified to family level but may also be retained for identification at a higher taxonomic level, if necessary, at a later stage.

Oligochaetes (segmented worms) are identified to Class level but may also be retained for identification at a higher taxonomic level, if necessary, at a later stage.

Small bivalves not identified to species level (i.e. *Pisidium* spp.) may be retained for identification at a later stage.

Watermites, zooplankton and other micro-arthropods are not included in the survey.
Appendix 1 Identification guides used for National Pond Survey work

Plants

General


Grasses and Sedges


Charophytes

Macroinvertebrates

General


Tricladida

Gastropoda


Bivalvia

Hirudinea

Crustacea

Ephemeroptera

Plecoptera
Odonata

Megaloptera and Neuroptera

Coleoptera

Hemiptera

Trichoptera

Diptera
Appendix 2

Blank copy of National Pond Survey field recording sheet
### National Pond Survey: field recording sheet (1 of 6)

<table>
<thead>
<tr>
<th>Site name</th>
<th>Code</th>
<th>County</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nearest town</td>
<td>Survey</td>
<td>Altitude (m)</td>
</tr>
<tr>
<td>Map type &amp; scale</td>
<td>100 km code</td>
<td>Grid reference</td>
</tr>
<tr>
<td>Plant survey date</td>
<td>Plant surveyor</td>
<td>Invert. survey date</td>
</tr>
<tr>
<td>Access/contact</td>
<td>Invert. surveyor</td>
<td></td>
</tr>
</tbody>
</table>

**Brief description of the pond**

**Pond size**

<table>
<thead>
<tr>
<th>Pond area</th>
<th>Water area</th>
<th>Maximum dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>m²</td>
<td>m²</td>
<td>x m</td>
</tr>
</tbody>
</table>

**Marginal complexity**

Rank the complexity of the margins on a scale of 1 to 10

1 = very simple i.e. circle, 2 = 10% greater length of margin (i.e. a square not a circle), 4 = length c. double bank length that pond would be if a circle, 7 = five times length of bank 10 = pool with an impossibly convoluted margin and/or many islands.

**Seasonal water level fluctuation and permanence**

<table>
<thead>
<tr>
<th>Drawdown height</th>
<th>The height difference between maximum and current water levels (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cm</td>
<td></td>
</tr>
</tbody>
</table>

**Permanence**

Pond dries: 1 = never, 2 = rarely, 3 = sometimes, 4 = annually

<table>
<thead>
<tr>
<th>If the pond dries, how much probably dries to a hard base?</th>
<th>How much dries to soft sediment?</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

**Overhanging trees & shrubs**

<table>
<thead>
<tr>
<th>Pond overhung</th>
<th>Water overhung</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total pond margin overhung</th>
<th>Water margin overhung</th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>%</td>
</tr>
</tbody>
</table>

**Sketch map of pond**
### National Pond Survey: field recording sheet (2 of 6)

#### Surrounding land-use

Estimate the percentage of surrounding land-use within the following zones.

<table>
<thead>
<tr>
<th>LAND-USE</th>
<th>&lt;5m</th>
<th>0-100m</th>
<th>Surfacewater catchment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deciduous trees &amp; woodland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coniferous trees &amp; woodland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scrub/hedge</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moor/lowland heath</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bog</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fen/marsh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rank vegetation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unimproved grassland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-improved grass</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved grassland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gardens and parks</td>
<td></td>
<td></td>
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<tr>
<td>Buildings and concrete</td>
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<tr>
<td>Roads</td>
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<tr>
<td>Paths and tracks</td>
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<tr>
<td>Rock, stone, gravel</td>
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<td></td>
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<tr>
<td>Ponds and lakes</td>
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<tr>
<td>Streams, ditches etc.</td>
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<td></td>
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<tr>
<td>Other ___________________________</td>
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</table>

#### SIZE OF SURFACEWATER CATCHMENT

- □ □ □ □ □ □ 5 = Very large catchment >100,000m² (>100m x 1000m)
- □ □ □ □ □ □ 4 = Large catchment 10,000m² - 100,000m² (<100m x 1000m)
- □ □ □ □ □ □ 3 = Moderate catchment 1,000m² - 10,000m² (<100m x 100m)
- □ □ □ □ □ □ 2 = Small catchment 100m² - 1,000m² (<10m x 100m)
- □ □ □ □ □ □ 1 = Tiny catchment <100m² (=10m x 10m)

Is the pond located in an area protected for nature conservation (e.g. reserve)?

Type: ____________________________

#### Other adjacent wetlands & water bodies

Are there any other wetlands within 1km distance from of the pond (i.e. a 1km radius circle centered on the pond)?

If yes, record (i) the number (ii) the percentage land cover (iii) the length of stream/ditch or river for the following zones:

<table>
<thead>
<tr>
<th>Wetland</th>
<th>0-5m (number)</th>
<th>0-5m (% area)</th>
<th>0-5m length (m)</th>
<th>0-100m (number)</th>
<th>0-100m (% area)</th>
<th>0-100m length (m)</th>
<th>0-1km (number)</th>
<th>0-1km (% area)</th>
<th>0-1km length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pond</td>
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<tr>
<td>Lake</td>
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<td></td>
<td></td>
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<tr>
<td>Ditch/stream</td>
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<td></td>
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<tr>
<td>River (&gt;4m wide)</td>
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<td></td>
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<tr>
<td>Spring/flush (&lt;25m long)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fen/marsh</td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>Bog</td>
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<td></td>
<td></td>
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<tr>
<td>Wet grassland</td>
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<td></td>
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<tr>
<td>Other ___________________________</td>
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</tbody>
</table>

Is the pond located on or near to a stream or river floodplain? Rank 0-3

Is the pond located in a traditionally watery or wetland area? Rank 0-3

How isolated is the waterbody? Rank 0-5

#### Water source

Estimate the importance of the following water sources (NB this is a very difficult estimation)

<table>
<thead>
<tr>
<th>Water source</th>
<th>%</th>
<th>Water source</th>
<th>%</th>
<th>Water source</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater/water table</td>
<td></td>
<td>Runoff &amp; near surface water</td>
<td></td>
<td>Direct precipitation</td>
<td></td>
</tr>
<tr>
<td>Spring (&lt;25m long)</td>
<td></td>
<td>Stream or ditch</td>
<td></td>
<td>Other e.g land drains (state)</td>
<td></td>
</tr>
<tr>
<td>Flood water</td>
<td></td>
<td>Flush</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## National Pond Survey: field recording sheet (3 of 6)

### Sediment and water depths

<table>
<thead>
<tr>
<th></th>
<th>Transect A (longest dimension)</th>
<th>Transect B (right angles to A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water depths (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silt depths (cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total depth (silt + water) (cm)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Geology

<table>
<thead>
<tr>
<th>Geology underlying pond</th>
<th>Rock type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geology of catchment</th>
<th>Rock types</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Nature of pond base

**Approximate % of the following**
- Clay/silt
- Butyl/synthetic
- Concrete
- Sand
- Gravel
- Pebbles and rocks
- Bed rock (specify)
- Peat
- Others

**Sediment**
- Decomposing leaves and twigs
- Coarse organic debris (c.0.05mm-10mm diam)
- Ooze (i.e. non-particulate)
- Sand (often stream-borne)
- Gravel (often stream-borne)
- Pebbles and rocks
- Others

### Inflows and outflows

Does the pond have any wet or dry: (i) inflows

If yes, estimate their average width and depth. Where possible note the flow rate. Where this is difficult, estimate the flow category:
- **1 = dry at time of survey**
- **2 = 0-10cm/sec**
- **3 = 11-50cm/sec**
- **4 = 51-200cm/sec**
- **5 = 201+cm/sec.**

<table>
<thead>
<tr>
<th>Inflows</th>
<th>Outflows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water width (cm) (if wet)</td>
<td>Water width (cm) (if wet)</td>
</tr>
<tr>
<td>Water depth</td>
<td>Water depth</td>
</tr>
<tr>
<td>Flow rate or flow category</td>
<td>Flow rate or flow category</td>
</tr>
</tbody>
</table>

### Banks type and naturalness

<table>
<thead>
<tr>
<th>Bank type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural earth etc.</td>
<td></td>
</tr>
<tr>
<td>Concrete</td>
<td></td>
</tr>
<tr>
<td>Bare ground: Upper banks</td>
<td>%</td>
</tr>
<tr>
<td>Bare ground: Drawdown area</td>
<td>%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Min. °</th>
<th>Max. °</th>
<th>Av. °</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. cm</td>
<td>Max. cm</td>
<td>Av. cm</td>
</tr>
</tbody>
</table>

Reason for bare ground:

---

(inflows) (ii) outflows
**National Pond Survey: field recording sheet (4 of 6)**

**Pond management.** Is there evidence that the pond has been recently managed? If yes, describe.  
Yes [□] No [□]  

<table>
<thead>
<tr>
<th>How much (% pond)</th>
<th>How recently?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Marginal trees cut back  
Pond dredged  
Emergent or submerged plants cut back  
Surrounding vegetation trimmed/cut  
Edges mowed  
Other

**Livestock grazing.** Is the pond grazed by livestock?  
Yes [□] No [□]

If yes, which animals graze the pond (tick)  
Cattle [□] Sheep [□] Horses [□] Other [□]

How much of the pond margin is grazed by livestock  
[□%] % of pond grazed [□%]

Rank the livestock grazing intensity for the pond as a whole  
1= Very light or periodic  2= Light  3= Moderate  4= Heavy  5= Very heavy

Duck and wildfowl grazing  
Is there evidence of duck or wildfowl?  
Yes [□] No [□]

Rank the duck and other wildfowl grazing intensity for the pond as a whole (tick)  
1= Very light or periodic  2= Light  3= Moderate  4= Heavy  5= Very heavy

Which duck/wildfowl graze the pond, and how many?  
Describe any evidence of nesting:

Other grazing  
Is the pond grazed by other animals (e.g. deer)?  
Yes [□] No [□]

If yes, what % of the pond?  
[□%] Intensity?

**Fish**  
Are fish present in the pond?  
Yes [□] No [□] Don’t know [□]

If yes, rank the fish impact for the pond as a whole (tick)  
1= Very light  2= Light  3= Moderate  4= Heavy (stocked)  5= Very heavy (stocked)

If yes, list species and/or how many if known?  
__________________________________________

**Amphibians**  
Are amphibians present in the pond?  
Yes [□] No [□] Don’t know [□]

If yes, record the species and abundance

**Pond age and history**  
How old is the pond?  
(Rank if not sure: 1=0-10 years, 2=11-100 years, 3=101-1000 years, 4=1000+ years)

What is the origin of the pond  
__________________________________________
Assessing amenity value

Is there a view of the pond from rights of way?

If yes, score each on a five point scale (1 = view almost obscured; 5 = clearly visible)

Footpath_______ Bridle path_______ A road_______ B road_______ Minor road_______

Area of open public access_______ Other public access (please state) ______________________

Private track, path or other access (e.g. golf course) (please state) ______________________

Is the pond located in an area of open public access? _______

Is there any evidence of formal amenity use? _______ If yes, tick as appropriate:

Fishing (e.g. fishing platforms, pegs, swims, embayments) _______

Pond dipping and other wildlife interests (e.g. dipping platforms, bird hides) _______

Shooting (e.g. hides, blinds) _______

Boating and other water sports (e.g. boat, boathouse) _______

Ornamental fish (e.g. goldfish, Koi carp) _______

Model boating _______

Ornamental and other pinioned wildfowl (e.g. nesting boxes, feeders) _______

Other (please state) _______

Water quality

Conductivity (µs cm\(^{-1}\)) _______

Alkalinity (m mol\(^{-1}\)) _______

Calcium (mg l\(^{-1}\)) _______

pH _______

Temperature _______

Turbidity _______

Secchi depth cm _______

1 = Clear _______

2 = Moderately clear _______

3 = Moderately turbid _______

4 = Turbid _______

Water colour _______

Probable source of colour _______

Sources of pollution

Is there any evidence of rubbish or other pollutants (e.g. oils)? _______

If yes, estimate the % of the pond affected _______

Type of pollutants _______

Rank individual pollutant sources on a scale of 1-5 (1=little polluted or affected, 5=very polluted)

Farming land use quality _______

Stream quality _______

Stock _______

Urban areas _______

Ducks _______

Litter _______

Road runoff quality _______

Fish _______

Other _______

Give an overall rating of the extent to which the pond is likely to be polluted (from 0 = not polluted to 10 = as bad as it can get).

Describe pollutants _______

Describe any mitigating factors (e.g. buffering, groundwater inflows) _______

Photograph taken? _______
Floating-leaved plants

- Azolla filiculoides (I)
- Hydrocharis morsus-ranae
- Hydrocleys nymphoides (I)
- Lemna gibba
- Lemna minor
- Lemna minuta (I)
- Lemna trisulca
- Nostoc muscorum (NS)
- Nuphar advena (I)
- Nuphar lutea
- Nuphar pumila (NS)
- Nymphea alba
- Nymphea tetragona
- Potamogeton natans
- Potamogeton polygonifolius
- Potamogeton ramosissimus
- Potamogeton rufus (I)
- Potamogeton strictus (NS)
- Potamogeton trichoides
- Potamogeton trivialis (I)
- Potamogeton natans (I)
- Potamogiton spp.
- Ceratophyllum submersum
- Crassula aquatica
- Erica densa (I)
- Elatine hexandra (NS)
- Elatine hydropiper (NS)
- Eleocharis flavescens
- Eleocharis rostrata
- Elymus californicus
- Elymus arenarius
- Elymus canadensis (I)
- Elymus nuttallii (I)
- Elymus repens
- Elymus triticeus
- Elymus arenarius
- Elymus hystrix
- Elymus repens
- Elymus repens (I)
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