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DOE LOWLAND POND SURVEY 1996

HANDBOOK

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LOWLAND POND SURVEY 1996 HANDBOOK

1. INTRODUCTION

1.1 AIMS OF THE HANDBOOK AND THE SURVEY

The overall aim of Lowland Pond Survey 1996 is to monitor the number and quality of lowland ponds in Great Britain.

This booklet describes the methods used to gather physical, chemical, biological and use related data for the DOE Pond Survey.

The data collected in Lowland Pond Survey 1996 need to be compatible with pond information derived from two, more general, countryside surveys: the 1984 Institute of Terrestrial Ecology (ITE) survey of rural Britain and the 1990 Countryside Survey. In all both field surveys, a sample unit of 1 x 1 km square was used. Specific pond data collected will also, as far as possible, be compatable with methods used for the National Pond Survey (Pond Action).

1.2 BACKGROUND

Recent surveys investigating trends in the number of Britain's ponds have given somewhat contradictory results. In their 1989 report on amphibian communities, Swan and Oldham estimated that pond loss since the Second World War was in the order of 38%. ITE's analysis of Countryside Survey results for DOE suggested similar rates of loss (ca. -1% per annum) in the period 1984 to 1990 (Barr *et al* 1990). In contrast, the 1985 Ministry of Agriculture Fisheries and Food (MAFF) Survey of Environmental Topics on Farms, investigating trends during the period 1980 to 1985, concluded that there had been a net *increase* in ponds in England and Wales of approximately 3% (ca.+0.5% per annum) (MAFF 1985).

Concomitant with interest in the *number* of Britain's ponds, conservation organisations have expressed concern that ponds may be facing threats through a decline in their *quality*. With their small areas and volumes, ponds are likely to be especially vulnerable to nutrient enrichment, acidification and agricultural xenobiotics (Pond Conservation Group, 1994). If climate change follows predicted patterns this may result in additional impacts to pond plant and animal communities.

In recent years, changes to the Common Agricultural Policy and the introduction of environmental management schemes (such as Countryside Stewardship), may have brought some benefits to ponds, particularly those located on agricultural lands. However the effect of these policies on pond numbers or quality are, as yet, unknown.

The aim of Lowland Pond Survey 1996 is to build on previous data collected for the Countryside Surveys to provide more detailed information which will in particular:

- clarify trends in pond numbers,
- provide information about the reasons for any losses or gains, and
- provide a baseline from which trends in the quality of ponds can be assessed.

1.3 APPROACH TO THE 1996 POND SURVEY AND CONSTRAINTS FROM PREVIOUS SURVEYS

An important consideration for development of the sampling strategy for Lowland Pond Survey 1996 is that the results from this survey must be compatible with the earlier 1984 and 1990 data sets. Compatibility is particularly important for data relating to *pond numbers* and to a lesser extent *pond area*, where comparisons with earlier results will enable long term trends in pond gains and losses to be evaluated.

It is currently intended that Countryside Surveys will be carried out every decade, with more specialised thematic surveys (e.g. ponds, hedgerows) between. As a thematic survey, Pond Survey 1996 must conform to the essential Countryside Survey rationale, so as to provide compatible data. However, there is some scope to include additional elements where appropriate.

The structure, methods and outputs of previous Countryside Surveys are important in Lowland Pond Survey 1996. A brief summary of the 1984 and 1990 survey methods and results is therefore given in Appendix 1.

An important lesson that has been learned from previous ITE surveys is that variation in field recording is a major contributory factor when assessing the statistical accuracy of change data. It is therefore important that every attempt is made to standardise recording between observers and, during the 1993 survey, every effort will be made to maintain consistancy of approach. A thorough knowledge of a clear and informative Field Handbook is a vital prerequisite.

The purpose of this Handbook is to define the set of guidelines to be used during survey. Inevitably circumstances will arise which are not fully covered here; it is important that field recording should be as consistent as possible. An accompanying set of definitions is provided but, again, not every interpretation of a data item can be covered. Where atypical or doubtful categories arise, the surveyor is asked to qualify or comment on his/her choice of recording.

PLANNING SITE VISITS

The sample squares have been split up into six groups (see Figure 1) each of which will be surveyed by a pair of surveyors; each pair has about 20 squares to survey.

Each square is reckoned to take one day to survey, on average. The day-to-day working arrangements should be guided by the following principles:

a. The survey teams are expected to be reasonably flexible in their working arrangements and, similarly, the Survey Leader will be sympathetic to requests for leave of absence for special occasions, when possible.

b. Travelling time is expensive both in terms of overall project time and finance - every attempt should be made to avoid returning to a site more often than is necessary, even if this involves some evening work. There will be no overtime payments, in the first instance, but any large accumulations of overtime will be compensated by 'time off in lieu'. Surveyors should keep a record of their actual working hours.

Table 1. CHECKLIST OF EQUIPMENT REQUIRED FOR THE SURVEY

General field and safety equipment
Chest waders
Boat (plus oars and pump)
Life jackets for use with chest waders or boat.
Waterproof cloathing and hood/hat*
Rucksack
First aid kit
Bivy bag
Whistle
Rubber gloves (x 2)

Recording field data
Recording sheets (on waterproof paper)
Maps of the site (1:10,000) (on waterproof paper)
Clipboard (x 2)
Pencils (soft - eg 3b)
Pencil sharpner and rubber
Waterproof marker pen (broad tip)
Stapler
Camera (plus print films)

Mapping the pond
Compass
Tape (30m)

Sediment and water depths
Ranging Poles
Plumb line

Chemical survey
Chemical test kits/meters
Small bucket/large bottle (for collecting water)
Plastic bottles and lables (as a back-up in case metres temporarily fail)

Plant survey
Plant ID guides (Haslam, Stace etc.)
Hand lens*
Grapnel
Plastic bags and labels.

Additional materials
OS-based road atlas
Small bottles (filled with 70% industrial methylated spirits) for preserving plant specimins (eg Charas)
Labled envelopes and postage stamps (for returning field sheets and plant specimins for checking).
Handouts (explaining project

GENERAL FIELD SURVEY PROCEDURE

How a square is surveyed will depend on a number of factors including the type of land, and the degree of access. However there is a recommended procedure which includes the following points:

a. On arrival at the square, surveyors should have a quick look round (where access permits), assess likely problems and generally acquaint themselves with the area.

b. Having assessed the nature of the square, the surveyors should attempt to gain permission for access to the whole square, before commencing survey (see below).

c. A suitable route should be chosen which will allow a full and detailed examination of the whole square.

d. Having completed recording, surveyors should allow time to read through the records they have made, checking for omissions and ensuring full coverage and clear presentation.

PERMISSIONS

There are several reasons why permissions to survey should be sought. The most obvious is to gain legal access to all parts of the square. It is also important to ensure the goodwill of the farmer/landowner, not only to avoid an embarrassing confrontation, but to gain useful background information (see Farmer/landowner Information Sheet) and to assist data recording. In no circumstances should on-the-site survey be carried out where access has not been agreed.

A list of known names and addresses from previous surveys is available, and surveyors should update and supplement this list on the new (blank) ownership data sheet. Details of problems, or special requirements, concerning access to land are noted on the accompanying information sheet.

All of the sites were visited in 1990, so the farmers/landowners should be aware of ITE's work. No contact has been made with them this year so they will not know about this hedgerow survey. Surveyors must seek access permission from each owner/manager, before starting survey work. Copies of a handout explaining the purpose of this survey, will be available to all survey teams for distribution where appropriate. Surveyors should always carry their ITE identity card.

If permission is not obtained for more than half of the square, then the square should be abandoned, and the Survey Leader notified.

DATA RECORDING (Filling in the fieldsheets)

The Hedgerow Survey 1993 is concerned solely with mapping and describing boundary features and ponds (inland water bodies).

Mapping

Surveyors are asked to annotate a series of enlarged 6" (1:10,000) maps with a variety of information. Wherever possible, this information should be formatted according to the list of options available, but rarely it may be necessary to add other categories to the list.

In order to give as much information as possible about each boundary feature or pond, combinations of data codes should be used to annotate each category on the map

Boundaries shown on thedigitised map which no longer exist on the ground should be annotated with an alpha code representing code 999 (no longer present). When annotating different boundary types then each length should be clearly defined at each end with a short line drawn perpendicular to the line of the boundary (except where a boundary junction serves to demarcate the end of a unit).

Boundaries or ponds present in the field but not marked on the digital map should be drawn in as accurately as possible using existing features as reference and with the aid of compass and measuring tape. The aerial photograph interpretion (API) map provided may also be used as a location aid.

The minimum mappable area (mmu) is 1/25th ha (400m2). Ponds less than the mmu should be marked with a cross, rather than drawn as an area feature. The minimum mappable length is 20 m (1/50th km). A representation of 1ha is shown on the map.

The surveyor in the field is the best person to make decisions about data recording. It is not useful if a decision is deferred in the field and a decision is forced on the data-processor "in the lab". Decisions must be made on the spot and, in exceptional circumstances, may be accompanied by a qualifying note or comment.

Finally, it is important that the whole square is surveyed and that even the smallest field boundary, at the edge of a square, is coded.

PONDS INCLUDED IN THE NPS

The pond definition used for the DOE Pond Survey is:

'A body of water, of man-made or natural origin, **between 25m² 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: quarry pools, heathland ponds, moats, small ornamental lakes, oxbow ponds and peat pools together with temporary ponds like many pingos and dune slack pools.

INFORMATION GATHERED FOR THE DOE POND SURVEY

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 the age, history and management of the pond (see enclosed field sheet).
- Water chemistry using field meters and kits
- A list of the wetland plant species found within the outer boundary of the pond, together with estimates of the abundance of species or major vegetation stands
- Information about the amenity value of the pond

Filling in the FAB

For each square, the data recording forms, together with their 6" maps, have been combined into a booklet which, for historical reasons, is known as a Field Assessment Booklet (FAB). The order of the pages is not significant.

It is extremely important that the FABs are completed as neatly as possible. If information is not clearly interpretable by those undertaking analysis of data in due course, then effort has been wasted.

There are several general points about filling in the FAB's.

Where possible, a pencil should be used - mistakes can then be erased and waterproofing is enhanced.

There follows a page-by-page guide on how to complete the data sheets, including some definitions or notes on those data categories which are not self-explanatory.

TABLE 2. SUMMARY OF NATIONAL POND SURVEY METHODS

The basic procedure for surveying ponds is outlined below.

(i) Walk the pond perimeter noting features and estimating pond size using a tape and compass (and graph paper if necessary). Alternatively the exisitng map outline of the site may be used as a base - although it is important to check the scale and accuracy of the outline.

(ii) Before disturbing the water: take water chemistry measurements/samples .

(iii) Fill in the remainder of the Field Recording Sheet as appropriate.

(iv) List and estimate abundance for wetland plants species present within the outer boundary of the pond on the field recording sheet.

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INTRODUCTION TO POND SURVEY METHODS

Ponds included survey

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3. POND SURVEY PROCEDURE - DETAILED DESCRIPTION

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 is provided in the Appendix.

Mapping the pond

The aim of mapping the pond is to help you to obtain estimates of: (a) the area of the pond (b) the area of surface water during the summer visit.(c) the extent of woody vegetation shading the pond.

Mapping the pond outline

The outer edge of the pond is defined as the '**upper level at which water stands in winter**'. Sometimes this line is readily distinguishable as a break of slope. More usually it is evident from the distribution of wetland plants, for example it is often marked by a fringe of soft rush. The outer boundary of the pond will, of course, usually be dry at the time of the survey.

For small or simply shaped ponds compass and tape measurements alone are adequate for mapping the pond outline. At larger ponds, useful outlines can often be obtained from Ordnance Survey maps. However the accuracy of these maps still needs to be checked in the field with a tape measure and compass.

Recording plant species, vegetation abundance and shade

Aims:

- To make a complete list of wetland plants present within the outer boundary of the pond.
- To record the approximate cover of emergent, floating-leaved and submerged plants, together with the approximate cover of the
- To record the

Recording wetland plants

Wetland plants growing within the outer boundary of the pond are noted on Page 5 of the Field Recording Sheet. This gives a definitive list of the plant species regarded here as wetland (to reduce the length of the list some rare aquatic species are omitted but these should be noted in the space provided). 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 microscopic examination and confirmation.

Standard botanical texts such as Stace (1991) and Haslam (1988) are adequate for most wetland plant identification. However, a number of new and additional guides are useful for specific groups and Recording plants

Within the 'outer pond boundary' (ie maximum winter water level):

1. Record all wetland plant species with an estimate of abundance
D Dominant
A Abundant
F Frequent
O Occasional
R Rare

Note the total % cover of: (i) submerged plant species (ii) floating plant species (iii) emergent plant species

Spieces that cannot be identified in the field

Plant Identification Guides used for botanical surveys

General

Stace, C. (1981). *New flora of the British Isles.* Cambridge University Press, Cambridge. (useful new data and key for *Callitriche* spp.).
Haslam, S., Sinker, C. and Wolseley, P. (1975). British Water Plants. *Field Studies* 4, 243-351.
Clapham, A.R., Tutin, T.G. and Moore, D.M. (1988). *Flora of the British Isles* (3rd ed.). Cambridge University Press, Cambridge.
Rich, T.C.G. and Rich, M.D.B. (1988). *The Plant Crib.* Botanical Society of the British Isles, London. (particularly useful for *Potamogeton, Ranunculus, Glyceria* spp. and crucifers).

Grasses and Sedges

Hubbard, C.E. (1968). *Grasses.* Penguin Books. Middlesex.
Jermy, A.C., Chater, A.O. and David, R.W. (1982). *Sedges of the British Isles.* Botanical Society of the British Isles, London.
Rose, F. (1989). *Colour identification guide to the grasses, sedges, rushes and ferns of the British Isles and north-western Europe.* Viking, London.

Charophytes

Moore, J.A. (1986). *Charophytes of Great Britian and Ireland.* Botanical Society of the British Isles, London.

PHOTOGRAPHY

A camera and print films will be provided for surveyors to take photographs of boundaries within a square for future reference.

PROCEDURES SUBSEQUENT TO SURVEY

At the end of a day's surveying, it is advisable to read through the data sheets and check that no feature has been omitted.

If absolutely essential, then the data may be transposed onto fresh maps and recording forms but this is inadvisable and should only be carried out in the event of damage or spoiling of the original map.

Arrangements should be made to transport FABs back to ITE Stations as soon as possible.

SAFETY

- Keep in pairs, and do not venture out of earshot.
- Remember that ponds can be dangerous places with deep unconsolidated sediment, deep water and unstable banks. Never enter the water or venture near the edge of a waterbody without a second pearson within eye and earshot.
- Wear a lifejacket at all times when using waders or in a boat.
- Never wear waders in a boat.
- Wash hands before eating, cover any cuts or grazes. If in any doubt about water quality, use the rubber gloves provided.

CONTACT ADRESSES AND TELEPHONE NOS.

Jeremy Biggs, Clive Cummins, Colin Barr, Tim Rich, Penny Williams, Morna Gillespie, Mericia Whitfield, Antony Corfield, Dave Walker, Gill Fox

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APPENDIX 1 SUMMARY OF PREVIOUS COUNTRYSIDE SURVEY METHODS AND RESULTS

The structure, methods and outputs of previous Countryside Surveys are important in Lowland Pond Survey 1996. A brief summary of the 1984 and 1990 survey methods is therefore given below.

1.4.1 Survey dates and rationales

ITE have undertaken two major countryside surveys of Britain, the first in 1984, the second in 1990. Following difficulties interpreting results of the 1990 waterbody data (there was a drought in southern England that year), waterbodies were also surveyed as part of a smaller, thematic survey of hedgerows in 1993.

1984 Survey of Rural Britain: In 1984, ITE completed a survey of 384 1 km squares. The survey formed a stratified random sample of Great Britain, based on the ITE Land Classification system (Bunce, Barr & Whittaker 1983). The survey was designed to answer questions on land use issues and so concentrated on land cover and landscape feature mapping. Records on waterbodies were made using combinations of attributes to define size and associated vegetation cover. The field methodology is given in Barr *et al* (1985).

Countryside Survey 1990: In 1990 DOE and the Natural Environmental Research Council (NERC), with support from the Nature Conservancy Council, funded a further field survey of Great Britain, carried out by ITE (Barr *et al* 1993). The sample number was increased, resulting in 508 rural 1 km squares being visited with an additional 25 urban squares surveyed as a separate survey. Waterbodies were mapped as part of the field survey.

Hedgerow Survey 1993: Inland waterbodies were recorded as part of Hedgerow Survey 1993 in England and Wales. This included a re-survey of 108 1 km squares of which 62 contained waterbodies.

1.4.2 Methods used for surveying waterbodies in previous Countryside Surveys

The methodology used to survey ponds in the 1984 and 1990 Countryside Surveys is briefly outlined below.

- Summary of Countryside Survey 1990 Fieldwork: Fieldwork for Countryside Survey 1990 (CS1990) was undertaken from June to September. Prior to survey, letters giving details of the work of ITE and the aims of CS1990 were sent to land-owners in each square. On arrival at a square, surveyors visited land-owners to get permission to survey. This helped surveyors to gain local knowledge about accesses (using footpaths, gates or bridges). Each survey team consisted of two surveyors who worked together to ensure safety, as well as to maintain a quality check on field recording.
- Before starting to record information, the surveyors would examine the square using OS maps and aerial photographs to identify the most efficient way of walking the whole square. The land cover was mapped systematically starting at one edge of the square and working round each field or land parcel in turn. Recording land cover and landscape features for the whole square could take up to five days. Each cover area or feature was mapped on to one of five thematic maps (physiography, agriculture/semi-natural vegetation, boundaries, forestry/woodland/trees and built environment and recreation) and described using a variety of pre-determined codes. After mapping, a check was carried out to ensure that the five thematic maps were complete.

- After mapping the land cover, surveyors recorded information in up to 27 vegetation plots. Some of these plots were at previously visited points whilst others were randomly located in semi-natural habitats or along roads and streams.
- All mapped linework from field survey maps was digitised using an ARC/Info Geographical Information System and all descriptive data codes were entered into an ORACLE database.
- Areas of water were mapped, either as a point (if it measured less than 0.04 ha) or as an area, using OS 1:10,000 scale maps.
- In the 1984 survey, waterbodies were divided into ponds (< 1 ha) and lakes (>1 ha).

  In 1990 no distinction between ponds and lakes was made in the field. However, for analytical purposes, waterbodies were divided into five size categories. These categories are listed in Appendix 1.
- Areas not included in the surveys included:
  - areas of curtilage (i.e. land associated with buildings),
  - urban areas (1 km squares >75% built up).

  In essence, therefore, surveys would not have included waterbodies on golf courses, in school grounds, gardens, farm yards or in highly urban areas. In addition, smaller waterbodies were not consistently surveyed in areas of woodland.

1.4.3 Results of waterbody analyses from previous Countryside Surveys

Barr *et al* (1994) summarised the results of waterbody recording for the 1984,1990 and 1993 surveys. The main findings were:

1. A total of 760 waterbodies were recorded in the sample squares, during 1984 and/or 1990. Approximately 60% of the 1km squares surveyed had no waterbodies recorded.
2. Comparison of 1984 and 1990 waterbody numbers indicated a loss of between 4% and 11.5%. More precise figures could not be obtained because drought conditions in the south and east of Britain resulted in many ponds drying out in summer 1990. As a result it was not always possible to distinguish whether ponds without water were seasonally dry or permanently lost.
3. Most 'losses' in 1990 were of smaller waterbodies: 'losses' in the smallest size class represented some 20% of the 1984 total stock. There was no change in numbers in the largest two pond categories.
4. Surveys of waterbodies made during the 1993 hedgerow survey indicated that some of the small waterbodies which dried out in 1990 were reinstated by 1993. Overall, loss of waterbodies between 1984 and 1990 was estimated to lie within the range 4-9%.
5. Many 'dried up' waterbodies in 1990/93 were in parts of the country used mainly for arable agriculture (20% of the 1984 arable total were dry in 1990). This contrasted with pasture land where about 6% of the 1984 waterbodies were recorded as 'dried up' in 1990. This could have been due to the coincidence of arable land with the 1990 drought area. However, land use practices or other influences, such as more intensive land drainage in arable area, could also have influenced the 'loss' of waterbodies.
6. The 1993 survey recorded a large number of newly created waterbodies (at least 20% of waterbodies were recorded for the first time in 1993). This suggested very high turnover rates in small waterbodies with around a quarter of the total number being lost and replaced over a three year period.

7. Pond *area* data were not analysed in detail However, only a very few waterbodies, present in both 1984 and 1990, were recorded as having changed in size category. Of the sample of 760 waterbodies, two had increased in size and six decreased in size.