

Appendix 9.1
Survey Methodologies

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Habitats

Phase 1 Survey

A Phase 1 survey provides a basic inventory of habitats and was developed by the then Nature Conservancy Council (now the Joint Nature Conservancy Council or JNCC) in the 1970s as a method of rapid survey of semi-natural vegetation over large areas of countryside. The method is widely used for the initial ecological assessment of sites.

Habitats are assigned using a hierarchical classification based primarily on vegetation, but also augmented by reference to topography and soil characteristics. The method describes approximately 90 specific habitat types, supplemented by descriptive target notes, which record anything of particular interest in a given habitat.

An extended Phase 1 survey adds to this basic habitat inventory by including a representative species list (not required in the standard survey) and more detailed target notes on areas of interest that may need further study (e.g. specific species surveys or more detailed habitat survey). Also, more description of the habitats is given to better describe their interest.

PSYM survey

PSYM, the Predictive System for Multimetrics, has been developed to provide a method for assessing the biological quality of still waters in England and Wales (Howard, 2000). The method uses a number of aquatic plant and invertebrate measures (known as metrics), which are combined together to give a single value which represents the waterbody's overall quality status.

The survey involves the following steps:

- Simple environmental data are gathered for each waterbody from map or field evidence (area, grid reference, geology etc.);
- Biological surveys of the plant and animal communities are undertaken and net samples are processed;
- The biological and environmental data are entered into the PSYM computer programme which uses the environmental data to predict which plants and animals should be present in the waterbody if it is undegraded. It also takes the real plant and animal lists and calculates a number of metrics that can show how near the waterbody currently is to its ideal/undegraded state.

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River Corridor Survey

RCS is a standard methodology for recording the ecological value of a specific reach of watercourse. The RCS technique aims to:

- Identify and map important features, such as dominant vegetation, notable fauna and adjacent land use;
- Specify working recommendations, such as methods to protect the existing ecology; and
- Outline potential rehabilitation measures, such as vegetation management or bankside works to improve wildlife habitats.

The survey technique adopted follows the guidelines outlined by the National Rivers Authority (NRA, 1992).

The most abundant plant species were recorded on the banks and within the river. A note of species of particular interest, such as alien invasive species, was also made. Additionally, any fauna present during the survey was noted. In particular, evidence of, or potential for, protected species was recorded, including water vole *Arvicola terrestris*, otter *Lutra lutra* and white-clawed crayfish *Austropotamobius pallipes*.

The RCS survey was undertaken on 27th July 2004 by an experienced RCS surveyor.

Bats

The site was surveyed to assess its potential to support bats. The site supports few potential roost sites, which are limited to some of the more mature trees in the boundary hedgerows and treelines, particularly the eastern and southern boundaries.

The site was visited on three occasions during 2004 and 2007 using ultrasonic bat detectors to identify bat activity. Transects were walked across the site and the routes are shown on Figure 9.1.

The surveys were undertaken either side of sunset to record any emerging and/or commuting bats as well as those foraging. Since, bat activity is affected by weather conditions, the conditions at the time of the survey are noted, as summarised in the table below:

Date	Time	Weather Conditions
22/06/04	21:00 (start)	Air temperature 25°C, light wind, 4/8 cloud cover, dry.

	22:30 (finish)	Air temperature 20°C, light wind, 4/8 cloud cover, dry.
14/07/04	20:50 (start)	Air temperature 21°C, light wind, 7/8 cloud cover, dry.
	22:40 (finish)	Air temperature 20°C, light wind, 6/8 cloud cover, dry.
06/09/04	19:00 (start)	Air temperature 24°C, light wind, 3/8 cloud cover, dry.
	20:30 (finish)	Air temperature 21°C, light wind, 3/8 cloud cover, dry.

The 2007 surveys were undertaken either side of sunset to record any emerging and/or commuting bats as well as those foraging. Since, bat activity is affected by weather conditions, the conditions at the time of the survey are noted, as summarised in the table over the page:

Date	Time	Weather Conditions	Notes
11/07/07	21:20 (start)	Air temperature 23°C, still to light wind, 7/8 cloud cover, dry.	Sunset at 21:25. Internal inspection of dwelling, evening emergence from dwelling, activity on lakes.
	23:20 (finish)	Air temperature 20°C, still to light wind, 8/8 cloud cover, dry.	
01/08/07	20:45 (start)	Air temperature 22°C, light wind, 2/8 cloud cover, dry.	Sunset at 21:00. Activity on lakes.
	22:40 (finish)	Air temperature 20°C, light wind, 6/8 cloud cover, dry.	
29/08/07	19:55 (start)	Air temperature 14°C, still to light wind, 2/8 cloud cover, dry.	Sunset at 20:05. Emergence survey of dwelling and activity survey on lakes.
	22:05 (finish)	Air temperature 11°C, light wind, 3/8 cloud cover, dry.	

Birds

Breeding Survey

The site was surveyed for breeding birds on three occasions in 2004 (13th April, 13th May and 3rd June 2004) and in 2007 (18th May, 26th June and 17th July) using a territory mapping methodology (Bibby *et al.*, 2000; Gilbert *et al.*, 1998) during the breeding season (March to

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August, inclusive). The site was visited just after dawn and the identity and activity of all birds were recorded on maps of a suitable scale. The type of information recorded included:

- Adult visiting probable nest site;
- Nest building (including excavating nest hole);
- Distraction display or injury feigning;
- Used nest found;
- Recently fledged young;
- Adult carrying faecal sac or food;
- Adult entering or leaving nest site in circumstances indicating occupied nest;
- Nest with eggs found, or bird sitting but not disturbed, or eggshells found near nest;
and
- Nest with young.

The terms 'probable' and 'possible' territories are used, being defined as:

- Probable territory:
 - Adult bird recorded from the same area for at least 2 of the 3 visits;
 - Adult bird recorded carrying food in mouth to suspected nest site;
 - Adult bird seen with young;
 - Nest seen.
- Possible territory:
 - Adult bird carrying out territorial behaviour on at least one site visit.

The results of the survey are contained in a table in Appendix 8.

Winter Survey

The site was visited on a number of occasions in the 2003/2004 and 2004/2005 winter periods (October to March). The circumference of each lake was walked and any birds present recorded. Due to its size and the time taken to walk around it, Lake 104 was divided approximately into quadrants to assist in counting. The quadrants were drawn up based on lines radiating from the north-central island to identifiable points on the shoreline, whilst trying to remain roughly approximate in size (see Plan 1). The quadrants have the following approximate dimensions:

Quadrant	Area (ha)	Shoreline (m)
Northeast (NE)	6	740
Southeast (SE)	5.2	503

Southwest (SW)	4.7	462
Northwest (NW)	4.4	570

Birds do move around on the lakes, particularly the largest, Lake 104, and crossed back and forwards between quadrants. This was most pronounced in the middle of lake where the lines between quadrants were closest. Every effort was made to count quickly and accurately and avoid double counting due to bird movement.

Invertebrates

General invertebrate sampling was undertaken as part of the PSYM technique, which sampled a number of locations around the banks of the three waterbodies. The discovery of Signal Crayfish in Lake 103A and the anecdotal evidence of their presence in Lake 103, resulted in baited traps being placed along the shore of Lake 104 to see if the species was also present in the largest waterbody.

Otter and Water Vole

The watercourses on the site were surveyed for the potential presence of otters and water voles in 2004, 2007 and 2009. Surveys rely on the detection of signs such as feeding stations, latrines, faeces or spraints, etc, as well as from sightings of the animals themselves.