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Wetland SSSI conservation objectives

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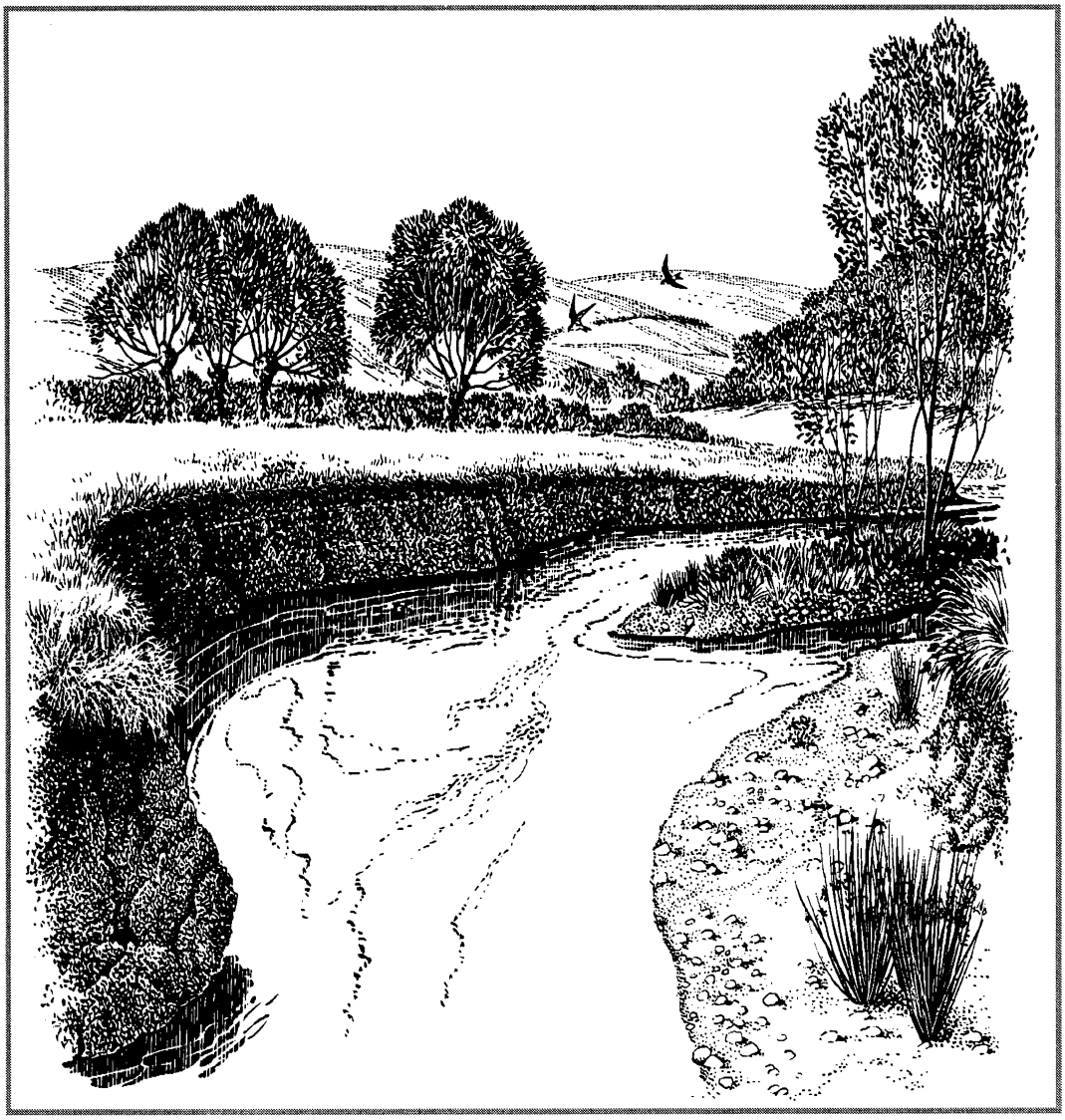

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English Nature Research Report
Number 423

Wetland SSSI Conservation Objectives

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WETLAND SSSI CONSERVATION OBJECTIVES

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1. INTRODUCTION

English Nature is in the process of setting conservation objectives for habitat and species features on SSSIs to achieve favourable status. This process has now largely been completed for wetland features listed on the Habitats Directive. However these SAC features are very specialised, include very few communities (floating *Ranunculus* communities) and only 14 riverine species. This leaves a large number of other important features to identify and for which conservation objectives need to be set.

Humphries Rowell Associates (HRA) were engaged by English Nature to undertake a project to identify the habitats and species which are the responsibility of the Freshwater Section that will require conservation objectives.

2. OBJECTIVES OF BRIEF

There were four specific objectives in the brief: -

i) To produce a comprehensive list of habitats and associated species present in wetland SSSIs and to provide a copy in electronic form.

ii) To rationalise these habitats and associated species into natural groupings and to compare these with monitoring units already being used by testing against a number of sample SSSIs.

iii) To assign summary groupings back to the individual wetland SSSIs.

iv) To produce a draft reporting form for condition assessment of wetland SSSIs.

3. PRESENTATION OF RESULTS

The results are presented in three parts: -

Part 1. Identification of Habitats and Species Groups

Part 2. Assessment of Suitability of Existing Monitoring Units against Identified Wetland Features

Part 3. A Draft Reporting Form for Condition Assessment of Wetland SSSIs

PART 1 IDENTIFICATION OF HABITAT & SPECIES GROUPS

4. INTRODUCTION

This part of the report is concerned with identifying those features that qualify for SSSI notification (Joint Nature Conservation Committee, 1996) as freshwater and wetland sites in England, excluding those listed by the Habitats Directive. The conservation objectives themselves are to be written by appropriate English Nature specialists and do not form part of this report.

5. APPROACH

At an initial meeting between members of the Freshwater Section of English Nature's Environmental Impacts Team led by David Withrington and HRA, the range and level of detail required was discussed, as were the main sources of information. Inputs by other members of the Freshwater Section (eg Chris Newbold, Chris Mainstone) are referenced in the body of this report.

5.1 Sources of Information

An indication of the level of detail available in the English Nature databases was provided in English Nature Research Report No. 204 (Gardiner, 1996) which presented a summary of wetland SSSIs by Natural Area. In this report, information obtained from SSSI schedules and the wetland database varied from broad categories (eg. wet grassland) through to NVC community type (eg. MG4). The summaries also included lists of nationally rare and scarce plant species but other species were often listed as "invertebrates associated with reedbeds" or "breeding waders".

Electronic data has a potential benefit over paper sources, because if the entry of features and species is consistent then sorting and ordering can be very quick. However, difficulties arise if entry from the SSSI citation sheets has not been consistent or critical features missed. Thus it was agreed that an important part of the process was to 'proof' the accuracy of the data by referencing a percentage of sites to the original paper citations.

The electronic data sources available were ENSIS, the corporate SSSI database and the Wetland SSSI database, a listing of some 1300 wetland sites held by the Freshwater Section. Additionally copies of all SSSI citations are held at EN headquarters.

5.2 Habitats & Species_

Many of the wetland SSSIs contain a wide range of habitats and species, not all of which are the responsibility of the Freshwater Section. Habitat groups covered by other specialists and teams at EN include grasslands, upland habitats, woodlands, sand dunes and salt marshes. Species groups largely covered by other English Nature Team specialists include birds, invertebrates, mammals, amphibians and non-aquatic plants.

The approach taken was to find out what habitat and species information was contained in the databases and to sort and select those required from the lists produced.

6. INTERROGATION OF DATABASES

6.1 Wetland Database

The Wetland database has been compiled by the Freshwater Team. The database is comprised of a spreadsheet with each SSSI occupying one row of the spreadsheet and the data entered in separate columns. This spreadsheet information can be interrogated using a database program (ACCESS, PARADOX etc) and records called-up or reports produced.

The first three columns are identifying codes for SSSI name, county and English Nature local team; the fourth column is a further identification code. The next four columns are status identifiers eg SAC, RAMSAR etc followed by three columns providing for grid reference, size of SSSI and area of open water. These are followed by three columns that provide a listing of the main habitat features (wet grassland, river etc.), the nutrient status and dominant habitat type. These habitat groupings are quite broad and often very general (e.g. grassland, wet grassland, meadow). The remaining columns deal with pollution and effects, water level and effects, recreation and effects, comments, Schedule 8 species, natural area number and finally water abstraction. Table 1 lists the column headings and provides an example SSSI (Boxford Water Meadows, Berkshire).

The database contains general information on habitat type and lists the dominant type but the only species information is for Schedule 8 species. Table 2 lists the output from the Schedule 8 column. Species are listed for only 60 of the 1692 listed SSSIs (the information reproduced in Tables 1 and 2 is as entered on the database). A number of errors and inconsistencies were apparent in the database. Not all species listed under the Schedule 8 column were wetland plant species and not all are plants.

Following this review it was decided that this database did not contain the required information for the project other than providing the list of SSSIs regarded as wetlands.

6.2 ENSIS

ENSIS is English Nature's corporate database. It is held centrally and can be accessed but not altered by the English Nature teams.

The database is comprised of spreadsheet(s) with each SSSI represented by a variable number of rows depending on the number of features identified. Features within each SSSI at various levels of detail are listed in columns. Other information, contained in the database but not reproduced here, provides information on monitoring units and landowners.

Table 3 shows an ENSIS listing for two SSSIs. For convenience, three columns found in ENSIS have not been reproduced in the table, a site ID number, size of the SSSI and the Level 1 natural feature code.

The first two columns list the County and SSSI name. This is followed by a column headed the 'Level 1 natural feature' which is equivalent to the habitat classification in the 'Handbook for Phase 1 Habitat Survey' (Joint Nature Conservation Committee, 1993). This classification has a hierarchy of up to four levels of detail e.g.

Phase 1 Habitat Type (Level 1 Natural Feature in ENSIS)			
L 1	L 2	L 3	L 4
Open water	Standing water	Mesotrophic	Small ponds
Woodland & scrub	Woodland	Broadleaved	Semi-natural

In the database the different levels in the hierarchy appear to be separated by a colon within the same column headed Level 1 feature.

The next column lists an operational feature name for the listed habitats e.g. ditch or river. The use of this column did not appear consistent and it was subsequently not used in this analysis. The next two columns list the Level 2 feature code and Level 2 feature description. The Level 2 feature code is 0 for species and the NVC code for community type. The feature description column then provides the species or NVC community type name and each is listed on a separate line. The final column provides either the binomial or common name of the species listed in the feature description column.

Very usefully there is an L1 entry for every L2 feature and each L2 feature is entered on a separate line.

A copy of the ENSIS spreadsheet file was provided by English Nature. The first stage of the interrogation process was to separate the wetland SSSIs from the rest of the database; the sites being those listed on the Wetlands database. Once this sub-set had been obtained a number of further sorting procedures were undertaken. Additionally, a check was made of the remaining ENSIS data (ie non-wetland SSSIs) for wetland features by sorting by Level 1 feature.

The number of sites on the Wetland database was 1692. However a number of these were not listed on ENSIS and a number of sites not on the Wetland database were identified as containing wetland features from sorting of the rest of ENSIS. This disparity was usually a consequence of a change to the name or boundary of an SSSI or separate listings when an SSSI was in more than one County. The sub-set from ENSIS eventually comprised 1645 sites.

These 1645 sites were first sorted by L1 feature. This resulted in 790 SSSIs being identified as being designated either solely on geological grounds or sites that did not contain any features for which the Freshwater Section are responsible. This left 855 sites comprising the 'wetland' ENSIS database, which was then sub-divided into separate files based on the L1 feature description. A number of these SSSIs were subsequently found to have been designated solely as a result of their bird assemblage.

Information on river SSSIs relating to River Type (i - xii) (Joint Nature Conservation Committee, 1996) was obtained from a separate file listing provided by the Freshwater Section and added to the database as Level 1 feature 'open water-running water' with the appropriate River Type listed as a Level 2 feature. This information has not yet been entered onto the ENSIS database.

7. HABITAT GROUPINGS & SPECIES

Separate files were created for broad features based on Level 1 habitat features. These are: -

i) mires

ii) fens

iii) pits

iv) swamps

v) sand dunes

vi) rivers/streams, springs

vii) lakes and pools

viii) canals

ix) reservoirs

x) ditches

xi) brackish water

xii) miscellaneous (non-wetland features)

These were created by feature, and so an SSSI can appear in more than one file if it contains more than one major L1 feature.

Within each file the same features are presented together. Thus, in the lakes and pools file, there are seventeen sub-categories of open water depending on the Phase 1 hierarchy level that has been entered into the database. Each of these categories has then been further sorted by L2 feature code with all species listed first followed by community types. In this way, the features that need to be considered by the Freshwater Section could be easily identified and separated.

A paper copy of each of the outputs for each of the twelve groups has been provided under separate cover. Each paper output contains: a full print out ordered by species and then habitat for each Level 1 feature; a list by county of each SSSI; a summary list of communities and species for which the Freshwater Section are likely to have to provide conservation objectives. It should be noted that SSSIs classified as pits, lakes and ponds and reservoirs were sorted by site name, as the Level 1 feature for many listed 'open water' with no indication of origin. However, more detailed analysis of a number of these SSSIs revealed that the site name did not always reflect the type of water body. Examples are Swanhole Lakes SSSI in Lincolnshire, which are a series of old gravel pits and Coate Water in Wiltshire, which is a former reservoir. Further information would be required to properly divide all these open water dominated SSSIs into the above categories.

A copy of the 'wetland' ENSIS database, the listing of wetland geological SSSIs, the listing of wetland SSSIs solely containing features outwith the responsibility of the Freshwater Section and each of the listings of the twelve groupings are provided in electronic form as separate spreadsheet files, but do not form part of this report.

Table 4 lists the species and communities for the total data set which are considered to require conservation objectives to be written.

8. CONSISTENCY & ACCURACY OF DATA WITHIN ENSIS

When the results of the interrogation of ENSIS were presented and discussed with the Freshwater Section, members were surprised at the omission of a number of species and also apparent inconsistencies in the Level 1 and Level 2 feature descriptions. These included features that may not meet SSSI criteria and omitted others that did. Thus, it was agreed that a sample of SSSI entries on ENSIS would be cross-referenced against the corresponding SSSI citation.

A total of ninety-one SSSIs from across the twelve major groupings were used in the comparison.

Table 5 shows features noted on the citation but not entered into ENSIS for the selected SSSIs. Not all the features are necessarily relevant to the Freshwater Section, but it shows that important species (e.g. freshwater crayfish, fish) and communities (water crowfoot beds) have not always been entered onto ENSIS.

Further inconsistencies within ENSIS came to light when a check was made of the miscellaneous features file. This file contains non-wetland Level 1 features found within wetland SSSIs. The list is largely comprised of grasslands, woodlands and coastal habitats. This file was sorted by L2 feature to identify whether any wetland community or species was contained within this list. Table 6 provides a list of the Level 2 species identified within this file. In the table, non-wetland L1 features that have an associated wetland species are shown shaded and SSSIs where the wetland species noted is not found listed under any wetland L1 feature associated with that SSSI are starred. No species not already listed in Table 4 were found. Similarly, Level 2 NVC wetland communities were found. These have not been cross-referenced against individual SSSIs but none of the communities were new.

9. CONCLUSIONS

Interrogation of the Wetland database and ENSIS has revealed a number of errors and inconsistencies in data entry and interpretation. The Wetland database in particular is lacking in a substantial amount of information about habitats and species and that would require a considerable amount of work to input.

Whilst the corporate ENSIS database cannot be substantially altered, this project has used a copy of ENSIS to produce a new 'wetland' ENSIS database and a number of other files containing sub-sets of this database which can be used by the Freshwater Section. This database can be used as a large spreadsheet or interrogated using a database program (eg PARADOX, ACCESS) to produce records. The spreadsheet format allows for extra columns to be added and for data to be sorted by any column. New SSSIs can be added and information on existing SSSIs altered or added to. One of the most important points is to ensure that the information provided for each SSSI is consistent at each level. The information presented as a Level 1 feature should ideally be the most detailed Phase 1 habitat data possible, eg. open water; standing water; mesotrophic, rather than just open water. If detailed sorting is required, it would also be useful if each hierarchical level was entered as a separate column on the spreadsheet.

A list of wetland habitats and species requiring conservation objectives has been produced from the database. Once these are written, it would be relatively easy to attach a code to each, which can be entered into the database. If codes can also be provided for the non-wetland habitats within the wetland SSSIs, then a list of conservation objectives required for each wetland SSSI could be easily assembled.

PART 2 ASSESSMENT OF SUITABILITY OF EXISTING MONITORING UNITS AGAINST IDENTIFIED WETLAND FEATURES

10. APPROACH

This part of the report assesses the suitability of the monitoring units already in use by English Nature for condition monitoring of wetland SSSIs.

10.1 Selection of Sample SSSIs

Following consultation with the Freshwater Section, a number of SSSIs were selected for detailed analysis of the suitability of existing monitoring units against identified wetland features. They were not selected randomly but were chosen to represent as wide a range of the types of wetland site as possible. These included examples of five broad but distinct wetland types: rivers, canals, ditches, lakes and fens. Sixteen sites were analysed. One site, Woodwalton Fen, was selected for analysis of both ditch and fen features. A number of the other selected SSSIs also included more than one wetland feature. In these cases, only the main feature was analysed in detail, the others being regarded as secondary.

The sites were chosen to cover the areas of as many Local Teams as possible, as it was thought the approach to identifying monitoring units and Level 1 and Level 2 features might differ between teams. The choice of site was however limited by the areas of the country where English Nature's Cartographic Team had produced digitised maps of the unit boundaries. At the time of the study, this covered a broad band across the centre of England and also an area in the north. In the event of digital maps being unavailable, hand-annotated maps were obtained from the relevant Local Team instead.

10.2 Analysis of the Monitoring Units

The location and extent of the monitoring units covering wetland features were identified for each of the selected sites. The Level 1 and 2 wetland features had been identified from the ENSIS database for all wetland SSSIs as described in Part 1 of this report. Further information, which linked each of the wetland features identified for each of the selected SSSIs to specific monitoring units, was then also extracted from ENSIS.

The study then considered whether these units were likely to be appropriate for monitoring the condition of the features that they contained.

The monitoring units that were judged likely to represent the best fit were those based on a single Level 1 feature. Where this feature was extensive, such as a river or ditch system, the size of the unit needed to encompass enough of the feature to adequately assess its condition was also considered. Condition monitoring of ditch systems presents particular problems, in that such systems are subjected to regular maintenance. This maintenance, if carried out sympathetically to the ecological value of the ditches, is essential to maintain the system in overall favourable condition. In devising a condition monitoring programme, allowance will need to be made for the changing pattern of vegetation which will occur between maintenance operations, and the size of monitoring unit will need to reflect this.

Monitoring units which include two or more Level 1 features, but which are based on a clear ecological unit, are also likely to prove adaptable to condition monitoring. Those that are based on ownership alone, with no reference to an ecological unit, are unlikely to be suitable for condition monitoring. Monitoring units based on ownership may also involve dividing the ecological feature into many sections. Use of ownership-based units, therefore, increases the likelihood that a single monitoring unit will be too small to reflect adequately the condition of the feature overall.

This is in line with advice issued to English Nature Local Teams by the Freshwater Section on 19 February 2001, which states that "units with open water habitats should not be divided according to site ownership. They need to encompass either the whole water body (lakes, reservoirs, pits, ponds) or stretches of river and canal which reflect different characteristics (eg headwater, chalk stretch, clay stretch etc.)".

10.3 Attributes for Condition Monitoring of Features

The selection of the attributes necessary to assess whether a feature is in favourable condition lies outside the scope of this report. Where the Level 2 features listed on ENSIS for an SSSI include a recognised National Vegetation Classification (NVC) type or a key species, then is has been assumed that attributes can be devised to allow assessment of the feature's condition to be made.

Comments regarding whether the habitats and species listed appear to meet the criteria for SSSI notification are based on the publication "Criteria for the Selection of Biological SSSIs" (Joint Nature Conservation Committee, 1996).

It was noted during the analysis of the information on Woodwalton Fen that an open water feature had not been given a separate monitoring unit number (mixed fen, situated within Monitoring Unit 2). This is understood to be because the feature does not qualify as SSSI in its own right (T Barfield pers. comm.). In addition, several small ponds within the grass heath unit are known to support a population of the great crested newt, which is a potential candidate species for notification but are not listed as features.

11. RESULTS

Results of the study are presented below for each of the five broad wetland types. The basic information collected including the number of monitoring units, and Level 1 and 2 wetland features are given for each SSSI in Table 7. Site plans showing the extent and location of the existing monitoring units for each of the SSSIs discussed are provided as Maps 1 – 17 (under separate cover).

11.1 Rivers

11.1.1 Number of Monitoring Units Related to Level 1 Wetland Features

Three riverine SSSIs were selected for analysis: the River Derwent, North Yorkshire; the River Ise and Meadows, Northants; and the River Nar, Norfolk. The most extensive site is the River Derwent with 46 monitoring units, 33 of them included a running water feature. The River Nar has 42 units, four of them running water while the River Ise and Meadows has 4 units, one of them running water.

The ENSIS database identified open water (running) as the Level 1 feature for both the River Ise and River Nar. The same feature for the River Derwent is given as open water (running eutrophic).

Both the Rivers Derwent and Nar also include other wetland features. These were considered secondary and are not considered in detail in this report.

11.1.2 Level 2 Wetland Features

Neither the River Derwent nor River Nar have Level 2 features listed on ENSIS. Two species are listed as Level 2 features for the River Ise. Neither meets the criteria for SSSI notification in their own right. The information on River Types provided by the Freshwater Section included data for the River Derwent and River Nar but not the River Ise.

11.1.3 Monitoring Units

The monitoring units identified for the River Ise and River Nar are based on the river feature itself and in both sites involve significant lengths of river. The River Derwent, where a significantly longer SSSI is involved, has been divided into 33 units, based on ownership. Small areas of adjacent habitat have been included in separate units, but it is not clear whether this is because the habitat or ownership is different from the adjacent river.

11.1.4 Assessment

It is noted that two different Level 1 wetland features have been used to describe the same feature within these three sites.

No Level 2 features have been identified for two of the rivers while those for the River Ise are not notifiable features. Few conclusions can therefore be drawn regarding the fit between features and units. Because of the number of units identified for the River Derwent, none is likely to be long enough for conclusive condition monitoring to be carried out which ever feature is chosen.

A report by Mainstone (2000) states that monitoring units for Rivers should be based on the River Ecosystem Class used by the Environment Agency.

11.2 **Canals**

11.2.1 Number of Monitoring Units Related to Level 1 Wetland Features

Three canal SSSIs were selected for analysis: Coombe Hill Canal, Gloucestershire; the Grantham Canal, Leicestershire; and Prees Branch Canal, Shropshire. They have been dived into 2, 7 and 1 monitoring units respectively. The ENSIS database identifies open water: canal as the Level 1 feature for both the Coombe Hill Canal and Grantham Canal. The same feature for the Prees Branch Canal is given as open water: standing eutrophic.

Coombe Hill Canal also includes a fen feature that is not considered in detail in this report.

11.2.2 Level 2 Features

The Level 2 features listed on ENSIS for the Grantham and Prees Branch Canals involve swamp and open water NVC communities. Those for the Coombe Hill Canal refer to invertebrate and higher plant communities. The species listed for this SSSI and one for the Grantham Canal do not meet the criteria for SSSI notification in their own right.

11.2.3 Monitoring Units

The canal feature of both the Coombe Hill and Prees Branch Canal has been allocated its own monitoring unit. The Grantham Canal has been divided into seven units. It is not known whether this division is based on ecological, geographical, ownership or other considerations. The same suite of Level 2 wetland features is listed on ENSIS for each of the seven units.

11.2.4 Assessment

It is noted that two different Level 1 wetland features have been used to describe the same feature within these three sites.

It is probable that suitable indicators of the condition of the NVC communities and other Level 2 features could be identified for all three sites. The seven units on the Grantham Canal are likely to need review. If the same Level 2 features are really present in each unit then the number of units could be reduced for condition monitoring purposes.

11.3 Ditches

11.3.1 Monitoring Units & Level 1 Features

Four SSSIs that included ditch systems were selected for analysis, two of which include brackish systems: Halvergate Marshes, Norfolk; Crouch and Roach Estuaries, Essex; Upper Severn Estuary, Gloucestershire; and Woodwalton Fen, Cambridgeshire.

Halvergate Marshes includes up to 47 units, 42 of which contain either a eutrophic, mesotrophic or brackish open water feature. The Crouch and Roach Estuaries includes 57 units, 2 of which contain an open water feature, one of them brackish. Upper Severn Estuary includes 57 units, including one that contains a Level 2 open water feature while Woodwalton Fen includes 5 units of which one includes an open water feature.

The ENSIS database identified open water: standing as the Level 1 feature for the Crouch & Roach Estuaries. For other sites, non-brackish open water features are listed as open water: standing eutrophic, except for the Upper Severn Estuary where the same feature appears under the marshy grassland level 1 feature.

In all sites with brackish open water, the feature is described as open water: standing brackish.

Both Halvergate Marshes and Woodwalton Fen include a fen feature. That at Halvergate is not considered in detail in this report but the more extensive fen at Woodwalton is considered separately under fen (see para. 11.5).

11.3.2 Level 2 Features

No clear distinction could be identified for the Level 2 features identified for eutrophic (fresh) and brackish water ditches respectively. At Halvergate Marshes, where both types are identified along with one mesotrophic ditch, the same suite of Level 2 features are listed on ENSIS for all three types. At Crouch & Roach Estuaries, higher plant assemblage is listed as a Level 2 feature for both types of ditch, while invertebrate assemblage is listed for both. As the composition of these assemblages is not given, it is not possible to determine whether they are influenced by the water chemistry.

No Level 2 features are listed for the ditches at Woodwalton Fen.

11.3.3 Monitoring Units

The ditch systems at Halvergate Marshes are contained within more extensive monitoring units that include both grassland and ditch features. The Level 1 feature of each of these units is listed on ENSIS as open water: standing, although the Local Team has pointed out that they consider the operational feature to be grazing marsh and ditches (G. Hinton pers.com). The status of these "operational features" in relation to the other Level 1 and 2 features is not clear. The monitoring units have been identified on the basis of land ownership.

The unit containing the freshwater ditches within the Upper Severn Estuary also contains both marshy grassland and ditch features, although here the unit appears to have been drawn on ecological grounds.

At the Crouch & Roach Estuaries two units identify the areas with fresh and brackish ditch respectively. The units appear to have been drawn on ecological grounds.

At Woodwalton Fen all ditches have been placed in one ecologically based unit.

11.3.4 Assessment

Apart from Woodwalton Fen, where no Level 2 features are listed, it is probable that suitable indicators of the condition of the NVC communities and other Level 2 features can identified for these sites. However details of the higher plant and invertebrate assemblages at Crouch & Roach Estuary are required and indicators should be selected that reflect the ecological status of the ditch concerned (i.e. fresh or brackish water).

While a comprehensive list of Level 2 features are listed for Halvergate Marshes, these are applied to both freshwater and brackish ditch types. It is unlikely that all these species occur in both fresh and brackish water habitats. As one aspect of condition monitoring might be a change from fresh to brackish water, or vice versa, reliable indicators of both conditions need to be identified and monitored.

As stated previously, the monitoring of ditch systems raises particular problems due to the dynamic nature of the system. None of the units identified for the above sites reflect this dynamic state. If all ditches are included within one unit (Woodwalton) or within one ownership (Halvergate), it may be difficult to accommodate ecological differences within the system which may all be in favourable condition.

11.4 Lakes (including Pits & Reservoirs)

11.4.1 Monitoring Units & Level 1 Features

As described in Part 1, it was not possible from the site data obtained from ENSIS to separate all 'open water: standing' sites into natural lakes, pits and reservoirs. They are, therefore, considered together here. The feature monitoring of these different categories of open water are in any case likely to be similar, whatever the origin of the open water feature.

Three SSSIs were selected for analysis: Hesledon Moors West, Durham; Houghton Regis Marl Lakes, Bedfordshire; and Swanholme Lakes, Lincolnshire. They have been divided into 3, 2 and 2 units respectively. Hesledon Moors West and Houghton Regis Marl Lakes both have 2 units for standing open water features.

The Level 1 feature for all three sites is described as open water: standing.

11.4.2 Level 2 Features

The Level 2 features listed on ENSIS for Hesledon Moors and Houghton Regis include NVC swamp communities. Those for the Swanholme Lakes list the higher plant community and a number of dragonfly species.

Most of the species of plant and animal listed for these SSSIs do not meet the criteria for SSSI notification in their own right. An exception may be great crested newt, depending on the significance of the population.

11.4.3 Monitoring Units

The units for all three sites appear to have been drawn on an ecological basis and appear suitable for condition monitoring.

11.4.4 Assessment

It is noted that the same Level 1 wetland feature (open water: standing) has been used to describe the same feature within these three sites. The trophic quality of the water, eg. eutrophic, mesotrophic etc., has not been identified for any of the sites.

It is probable that suitable indicators of the condition of the NVC communities and other Level 2 features could be identified for all three sites.

11.5 **Fens**

11.5.1 Monitoring Units & Level 1 Features

Although only examples of sites with wetland fen features have been included in this study it is considered that the conclusions are also likely to apply to bog features.

Four SSSIs that include fen features were selected for analysis: Arger Fen, Suffolk; Ashleworth Ham, Gloucestershire; Scotton and Laughton Forest and Ponds, Lincolnshire; and Woodwalton Fen, Cambridgeshire.

Arger Fen includes 15 monitoring units two contain fen features. Ashleworth Ham includes 3 monitoring units one of which is a fen feature. Scotton and Laughton Forest and Ponds is comprised of just one unit, although the SSSI is in three sections. Woodwalton Fen includes 5 units, of which 2 include fen features.

The Level 1 fen feature at Arger Fen is described on ENSIS as "fen: valley mire", those for the other sites as "fen". A separate unit at Woodwalton is listed as "swamp".

11.5.2 Level 2 Features

The Level 2 features listed on ENSIS for these sites are predominantly NVC swamp communities, although a mire community (M5) is listed for Scotton & Laughton Forest and Ponds. Level 2 features for this latter site also include a number of locally occurring sphagnum moss species. The higher plant community is also listed as a Level 2 feature for Ashleworth Ham.

11.5.3 Monitoring Units

The units for three of the four sites appear to have been drawn on an ecological basis and appear potentially suitable for condition monitoring.

The inclusion of three separate sections of the SSSI at Scotton & Laughton Forest and Ponds may, however, need to addressed.

11.5.4 Assessment

It is noted that different Level 1 features have been used to describe the fen feature within these sites. In one case the fen type is listed while in the others the feature is simply described as "fen". A consistent approach is required to describing the fen or bog type present as a Level 1 feature. However, in all sites a Level 1 feature is represented within single monitoring units. The single unit covering the three separate sections of the SSSI at Scotton & Laughton Forest and Ponds may be too large to assess the condition of each. It is also not clear whether the fen features here are only associated with the ponds or occur elsewhere. The monitoring units will need to reflect this.

It is probable that suitable indicators of the condition of the NVC communities and other Level 2 features could be identified for all four sites.

12. CONCLUSIONS

12.1 Features

In conclusion, it appears from the wetland SSSIs examined that a considerable amount of work is required before the Level 2 features listed on ENSIS can be monitored within the existing monitoring units. The main limitations are considered to be the quality and consistency of both Level 1 and 2 features identified for each unit. These aspects have already been pointed out following the analysis of these features in Part 1 of this report. This lack of quality and consistency of features is considered to be as great a problem as the current identification of monitoring units.

Level 1 features need to be identified consistently, with as high a level of detail as possible. For instance, if open water, then its condition and trophic status (open water: standing water: eutrophic), should also be included as standard. If fen is the main habitat then the type should be added (fen: valley mire).

Similarly, the Level 2 features listed should include the NVC type along with any species which qualify for notification under the current criteria. It is understood that many of the open water NVC units are considered unsuitable for use in condition monitoring (C. Newbold, pers. com.). Similarly, reservations were expressed (C. Newbold, pers. com.) about the classification of ditches included in the publication "Criteria for the Selection of Biological SSSIs" (Joint Nature Conservation Committee, 1996). This may account for the limited use of NVC in the open water sites analysed, particularly rivers. In the absence of suitable NVC communities, alternatives need to be produced as a matter of urgency. Although outside the scope of the present project, a list of positive and negative aquatic plant indicators for open water ditch systems has been produced by C. Newbold. This is attached as Appendix 1.

When Level 1 & 2 features have been produced to a constant standard, then appropriate attributes can be identified to determine the condition of the feature.

12.2 Monitoring Units

It appears from the SSSIs examined that Local Teams have either identified monitoring units using ecological or ownership considerations. In most cases where the units are ecologically based, they are likely to be suitable for condition monitoring, whereas those based on ownership need careful appraisal before they are judged suitable for condition monitoring.

The level of ecological detail included within each monitoring unit varied in several cases. At Scotton & Laughton Forest Ponds, for instance, the whole SSSI has been included in one unit involving a number of habitat types. In contrast, at Houghton Regis Marl Lakes, three distinct habitats have been allotted individual units. The one unit at the former site is unlikely to be sufficient for condition monitoring without modification, whilst those at Houghton Regis are likely to be suitable as they stand.

The monitoring of ditches involves particular problems. In a number of cases the ditches are included within larger monitoring units that include another habitat e.g. grazing marsh or marshy grassland. The situation is further complicated in sites such as Halvergate Marshes, where the units are owner-based rather than ecological, involving the division of each feature into many different units.

Condition monitoring of ditches is further complicated by the fact that due to regular, potentially beneficial, management, different ecological states may still represent favourable condition. This aspect of ditch condition monitoring requires further thought before a sustainable system for condition monitoring of ditches can be adopted.

PART 3 DRAFT REPORTING FORM FOR CONDITION ASSESSMENT OF WETLAND SSSIs

13. CONDITION MONITORING OF WETLAND SITES

Condition assessment monitoring is being developed by English Nature to determine if the nature conservation feature (or features) for which a Site of Special Scientific Interest (SSSI) is notified is in favourable condition. For terrestrial sites, the methodology is designed to allow English Nature's local conservation officers to complete a form during a normal site visit. This monitoring is intended to be supported by more detailed monitoring of sites where appropriate.

English Nature specialists have made considerable progress in developing the approach for terrestrial habitats. In particular a detailed methodology has been developed for all main NVC grassland types (Robertson & Jefferson, 2000).

This part of the report identifies the following components in assessment monitoring: feature, attribute, target and condition. A definition of these is given below:

Features: A feature is one aspect of the scientific interest for which the site was notified – normally a semi-natural habitat or rare species.

Attribute: An attribute is a material aspect of the feature, from which its condition can be deduced. For instance, the composition of an aquatic plant community which forms one site feature is likely to be dependent on the quality and/or quantity of water present. If the quality and/or quantity of water change significantly, then so will the composition of the assemblage of plant species making up the community. Thus in this example, a change in the feature will therefore be apparent by monitoring either the attribute of water quality/quantity or the biological attribute of changing species composition.

Target: A target is required for the attribute that specifies the thresholds beyond which change is considered to be of concern. These targets need to reflect the fact that some changes are due to natural fluctuations e.g. rise and fall in water levels or are due to a traditional management system e.g. rotational ditch management. In these cases differences in state of the attribute with time may not indicate unfavourable condition.

Condition: The framework defines seven standard terms for assessing the condition of interest features: favourable maintained/favourable recovered/ unfavourable recovering/unfavourable no changes/unfavourable declining/partially destroyed/destroyed.

A number of limitations in adopting the rapid approach to the monitoring of wetland sites have been identified by the Freshwater Section on the monitoring of designated rivers in relation to their conservation (Mainstone, 2000). This paper envisages that an "overall approach to wetland SSSI conservation objectives will be to define environmental conditions for the system as a whole, within which all interest features can thrive". This approach has already been adopted by English Nature for condition monitoring of raised bog (intact and degraded) systems.

Mainstone (2000) goes on to state that "Rivers (and other open water sites) are complex systems that are identified by a multitude of external factors. Rivers are not amenable to survey and the contribution that conservation officers in the field can make to data collection is, therefore, limited. In essence, site visits by conservation officers have to be based on visual indicators that are largely observable from the bank side. Factors such as water turbidity and colour, presence/extent of filamentous algae, sewerage fungus and key higher plant species, the extent and quality of specific habitat features or overall habitat structure and perhaps substrate conditions can all potentially be addressed by this approach, at least as cross-checks on condition".

He considers that other information will need to be identified and monitoring appropriate to condition assessment agreed with the Environment Agency. The conservation officer's role here will mainly be to collate relevant information. Three ways in which data can be generated on designated sites to inform the assessment of favourable condition were identified:

i) Through routine but infrequent (6-yearly?) visits to sites by conservation officers, as per common standards monitoring – the rapid method.

ii) Through the monitoring programme of the Environment Agency.

iii) Through surveys undertaken by specialists monitoring teams or contracted out to consultants.

14. DEVELOPMENT OF DRAFT FORM

14.1 Scope of Form

Prior to producing a draft recording form a series of discussions was held with members of the Freshwater Section. It was emphasised by them that the reporting form should aim at meeting the requirements of all wetland sites: running water, open water (including lakes, reservoirs and pits, canals and ditches) fens and bogs.

The form is to apply to all wetland SSSIs. That is all land notified under S.28 of the Wildlife and Countryside Act 1981 (as amended). Certain SSSIs or parts of SSSIs may also be Special Protection Areas (SPAs) or candidate Special Areas of Conservation (cSAC). These are protected under EU Directives and are, therefore, of European significance. There is a European obligation to monitor the condition of both SPAs and cSACs. As a result, English Nature has given them priority in terms of identifying attributes and targets for condition monitoring.

The form does not cater for wet grasslands/fen meadows or wet heath habitats, as monitoring of these is being developed elsewhere in English Nature. Similarly, ornithological and invertebrate specialists within English Nature are developing monitoring of birds and invertebrates.

14.2 Identifying Features to be Covered

The priority features to be monitored using the draft form were identified as aquatic plant communities, including all those for running and open water, and those swamp, fen and bog communities not falling under the definition of fen meadow or wet heath. The communities are defined in the relevant volumes of the National Vegetation Classification (NVC) (Rodwell 1991 & 1995).

The form is also to cover populations of rare plant and animal species (those meeting the criteria for SSSI notification in their own right (Joint Nature Conservation Committee, 1996). Examples of the latter include fish, such as Atlantic salmon and invertebrates, such as crayfish.

14.3 Identifying Key Attributes

Mainstone (2000) discusses attributes by which the condition of an identified feature within a river system can be assessed. The attributes are: water quality, river flows, river substrate, habitat structure, access (ie barriers to fish movement), biological disturbance, plant community, population attributes (Table 1, Mainstone 2000). These attributes were taken as a starting point and then considered against the other types of wetland site to see whether they were also applicable.

Specialists in the Freshwater Section have already produced lists of attributes for a range of features occurring in other types of wetland site, particularly in relation to cSAC features. Targets for assessing whether the attribute is being maintained has also been produced. These include targets for 'floating formations of *Ranunculus* spp. of plain and sub-mountainous rivers' and for 'oligotrophic waters containing very few minerals of Atlantic sandy plains with amphibious vegetation: *Lobelia, Littorella* or *Isoetes'*. Detailed attributes with targets have also been produced for cSAC fens and bogs.

Attributes for SAC animal species have been developed for Atlantic salmon, bullhead and brook and sea lamprey.

Although not a cSAC habitat, attributes and targets have also been produced for canals (C. Newbold. pers com.); these are presented in Appendix 2.

The attributes identified for the cSAC features and species were checked against those that were listed by Mainstone (2000) and any omissions noted. In addition, the recording forms already developed for other habitats were examined to note the types of attribute used to assess the condition of the habitat. Additional attributes listed on these forms, particular those relating to management operations, were adapted for open water habitats and added to those on the draft reporting form.

15. FORM DESIGN

As stated above, examples of recording forms already developed for other habitats were examined and their layout noted. In particular, rapid reporting forms for all main NVC grassland types have been produced and tested in the field with groups of local team conservation officers (Robertson & Jefferson, 2000). In addition, a form derived from these is being developed for wet heathland (I Alonso, pers com.).

An example of a grassland form currently in use and the draft wet heathland form are attached as Appendices 3 & 4. The latter was considered potentially relevant to the reporting of fens and bogs, which share a number of key plant species.

However, a number of limitations in adopting this rapid approach to the monitoring of wetland sites have been identified. Mainstone (2000) has already identified ecological aspects of monitoring of wetland sites that either do not apply or apply less to terrestrial SSSIs.

Further practical problems in using the rapid method on wetland sites have been identified during discussion with wetland specialists. These include difficulty of access. Both

grassland and heathland methodologies involve a walk over survey, along a fixed transect, noting the composition of the flora at regular intervals (Robertson & Jefferson, 2000). It is obviously not possible to carry out transects to monitor vegetation communities on most open water sites without the use of a boat. This raises issues of availability of a boat and training in its safe use and operation. Even visits to open water sites which involve wading from the shore have health and safety implications. However, detailed consideration of methodologies for condition monitoring is outside the scope of the current contract.

It was, therefore, agreed that the draft form should comprise the following:

i) A list of relevant attributes.

ii) Indicators of the condition of the attributes, both positive and negative.

iii) Targets which these indicators needed to meet before the feature could be considered to be in favourable condition.

It was not part of the contract to identify specific indicators and targets, although possible examples relevant to running water sites are included in the draft.

In addition, it was considered by specialists in the Freshwater Section that a separate form should be completed if two or more features were present within one unit e.g. a plant community such as *Ranunculus* beds and a species population such as Atlantic salmon. The draft form was therefore adapted for monitoring both habitats/communities and populations of key species.

16. DRAFT FORM

Two early drafts of the form were produced and submitted to the Freshwater Section for comment. Following discussion with the specialists concerned a third and final draft was produced. In addition a request was made to produce a summary form on which the condition of the feature over a series of monitoring visits could be recorded.

A set of the draft forms comprising the summary sheet (Appendix 5) and a copy of the reporting form (Appendix 6) is attached. In addition, a further copy of the form which includes a hypothetical worked example for a running water site is included (Appendix 7).

Although not specifically requested, a cover sheet, giving some background and advice regarding condition monitoring, has also been produced (Appendix 8).

17. REFERENCES

Gardiner, A.J. (1996) *Freshwater Wetlands in England: A Natural Areas Approach.* English Nature Research Report No. 204. English Nature, Peterborough.

Joint Nature Conservation Committee (1993) *Handbook for Phase 1 Habitat Survey - a technique for environmental audit.* Joint Nature Conservation Committee, Peterborough.

Joint Nature Conservation Committee (1996) *Guidelines for the Selection of Biological SSSIs.* Joint Nature Conservation Committee, Peterborough.

Mainstone, C. (2000) *Monitoring designated rivers in relation to conservation objectives.* Unpublished internal discussion paper, English Nature. Peterborough.

Robertson, H.J. & Jefferson, R.G. (2000) *Monitoring the condition of lowland grassland SSSIs. Part 1 - English Nature's rapid assessment method.* English Nature Research Report no. 315, English Nature. Peterborough.

Rodwell, J.S. (ed) (1991) *British Plant Communities, Vol 2: Mires and Heaths.* University Press, Cambridge.

Rodwell, J.S. (ed) (1995) *British Plant Communities, Vol 5: Aquatic communities, swamps and tall-herb fens.* University Press, Cambridge.

TABLE 1

Column Data Entered in Wetland Database with Example SSSI

Column Headings	Boxford Water Meadows
WetKey	194
CountyKey	3 (Berkshire)
LocalTeamKey	CN
Code	12WZH
ESA	
SAC	cSAC
SPA	
RAM	
NCR	
NNR	
LNR	
Grid Ref	SU 428719
Area (ha)	14
OW Area	
Ecosystem	Wet Grassland: Flood Meadow, Flood Plain Fen, River
Nutrient_Status	Mesotrophic, Lowland Chalk
Dominant	Grassland
Pollution	No
P.Effect	-
Water Levels	Not affected by West Berkshire groundwater scheme
W.Effect	-
Recreation	Unknown
R.Effect	-
Comments	
Schedule_8_Species	Freshwater crayfish
OldNatural Area	37
1999AbstractionReview	Not Significantly Affected By Abstraction

TABLE 2

Species Noted on Wetland Database

SSSI	Species
Port Meadow with Wolvercote Common	Apium repens
Bincknoll Dip Woods	Barbula glauca
Orton Pit	Chara canescens
Cock Marsh	Cyperus fuscus
Smallburgh Fen	Drepanocladus vernicosus
Thorne Crowle & Goole Moors	Epipactis dunensis, Rhinanthus angustifolius
Beltingham River Shingle	Epipactis dunensis?
Settlingstones Mine	Epipactis yoanyiana?
Ash to Brookwood Heaths	Eruphorium gracile
Boxford Water Meadows	Freshwater crayfish
Appleby Fells	Gentiana verna
Moorhouse & Cross Fell	Gentiana verna
Salisbury Plain	Gentianella angelica, Salvia pratensis
Taynton Quarries	Gentianella anglica
Holton and Sandford Heaths	Gnaphalium luteoalbum
Sidlings Copse & College Pond	Himantoglossum hircinum
Walland Marsh	Hirudo medicinalis
Dungeness	Hirudo medicinalis, T Cristatus
Whitchurch Down	Irish Ladies Tresses
Dozmary Pool	Jamesiniella undulifolia
Danes Moss	Ledum palustre
Broad Fen Dilham	Liparis loeselii (Introduced)
Ant Broads & Marshes	Liparis loeselii, Drepanocladus vernicosus
Brown Moss	Luronium natans
Cannock Extension Canal	Luronium natans
Leeds-Liverpool Canal	Luronium natans
Montgomery Canal, Aston Locks - Keepers Bridge	Luronium natans
Bray Penny Royal Field	Mentha pulegium
Esthwaite Water	Najas hexalis
Upper Thurne Broads & Marshes	Najas marina
Upton Broads & Marshes	Najas marina, Liparis loeselii
Bure Broads & Marshes	Najas marina, Liparis loeselii (Introduced)
East Keswick Fitts	Orobanche reticulata
Stodmarsh	Otter
Carrine Common & Penwethers	Plymouth Pear
Belshaw	Rhinanthus angustifolius
Baulk Head To Mullion	Rumex rupestris
Penhale Dunes	Rumex rupestris
Moorhouse & Cross Fell (Biosphere)	Saxifrage hirculus
Swanpool	Schedule 5
Brothers Water	Schelly
Holborough - Burham Marshes	Scirpus triquestris
Tamar-Tavy Estuary	Screniplectra triqueta
Chippenham Fen & Snailwell Poor's Fen	Selinum carvifolia
Sawston Hall Meadows	Selinum carvifolia
Snailwell Meadows	Selinum carvifolia
Cam Washes	Senecio paludosus
Delph Bridge Drain	Senecio paludosus
Wicken Fen	Senecio paludosus, Viola persicifolia

TABLE 2 contd

SSSI	Species
Woodwalton Fen	Senecio paludosus, Viola persicifolia
Trevose Head & Constantine Bay	Shore duck
Stallode Marsh, Lakenheath	Teucrium scordium
Upware North Pit	Teucrium scordium
Cressbrook Dale	Thamnobryum angustifolium
St Nectan's Glen	Trichomanes speciosum
Peters Pit	Tritarus cristatus
Fens Pool	Triturus cristatus
Haydon Meadow	Triturus cristatus
Otmoor	Viola persicifolia
Ripon Parks	Yes

TABLE 3

Example of Two SSSI Entries on ENSIS

County name	Site name	L1 nat feat desc	Operational feat name	L2 nat feat code	L2 nat feat popular descr	L2 nat feat second descr
HAMPSHIRE	RIVER ITCHEN	WOODLAND: BROADLEAVED	WET WOODLAND			
		GRASSLAND: MARSHY, LOWLAND	WATER MEADOWS WITH DITCHES (SAC)			
		GRASSLAND: MARSHY, LOWLAND	WATER MEADOWS WITH DITCHES (SSSI)	0	COENAGRION MERCURIALE	SOUTHERN DAMSELFLY
		OPEN: WATER	CHALK RIVER AND MARGINS (SAC)			
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	0	ATLANTIC SALMON	SALMO SALAR
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	0	BROOK LAMPREY	LAMPETRA PLANERI
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	0	BULLHEAD	COTTUS GOBIO
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	0	COENAGRION MERCURIALE	SOUTHERN DAMSELFLY
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	0	FRESHWATER CRAYFISH	AUSTROPOTAM OBIUS PALLIPES
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	0	INVERTEBRATE ASSEMBLAGE	
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	0	OTTER	LUTRA LUTRA
		OPEN WATER: RUNNING WATER	CHALK RIVER (SSSI)	A17	RANUNCULUS PENICILLATUS SSP. PSEUDOFLUITANS COMMUNITY	

TABLE 3 contd

County name	Site name	L1 nat feat desc	Operational feat name	L2 nat feat code	L2 nat feat popular descr	L2 nat feat second descr
HUMBERSIDE	HUMBER FLATS & MARSHES: BARTON & BARROW CLAY PITS	SWAMP, MARGINAL AND INUNDATION	FRESHWATER WETLANDS (1)	0	REED WARBLER	ACROCEPHALUS SCIRPACEUS
		SWAMP, MARGINAL AND INUNDATION	FRESHWATER WETLANDS (1)	A16	CALLITRICHE STAGNALIS COMMUNITY	
		SWAMP, MARGINAL AND INUNDATION	FRESHWATER WETLANDS (1)	MG12	FESTUCA ARUNDINACEA GRASSLAND	
		SWAMP, MARGINAL AND INUNDATION	FRESHWATER WETLANDS (1)	MG3	ANTHOXANTHUM ODORATUM-GERANIUM SYLVATICUM GRASSLAND	
		SWAMP, MARGINAL AND INUNDATION	FRESHWATER WETLANDS (1)	MG4	ALOPECURUS PRATENSIS-SANGUISORBA OFFICINALIS GRASSLAND	
		SWAMP, MARGINAL AND INUNDATION	FRESHWATER WETLANDS (1)	MG9	HOLCUS LANATUS-DESCHAMPSIA CESPITOSA GRASSLAND	
		SWAMP, MARGINAL AND INUNDATION	FRESHWATER WETLANDS (1)	S4	PHRAGMITES AUSTRALIS SWAMP AND REEDBEDS	
		OPEN WATER: RUNNING WATER	DITCHES	0	REED WARBLER	ACROCEPHALUS SCIRPACEUS
		OPEN WATER: RUNNING WATER	DITCHES	A16	CALLITRICHE STAGNALIS COMMUNITY	
		OPEN WATER: RUNNING WATER	DITCHES	S4	PHRAGMITES AUSTRALIS SWAMP AND REEDBEDS	
		COASTLAND: INTERTIDAL, MUD/SAND	ESTUARINE MUD AND FORESHORE	S4	PHRAGMITES AUSTRALIS SWAMP AND REEDBEDS	
		COASTLAND: INTERTIDAL, MUD/SAND	ESTUARINE MUD AND FORESHORE	SM5	SPARTINA ALTERNIFLORA SALTMARSH	
		COASTLAND: INTERTIDAL, MUD/SAND	ESTUARINE MUD AND FORESHORE	SM6	SPARTINA ANGLICA SALTMARSH	

TABLE 4

List of Species & NVC Communities Likely to Require Conservation Objectives

ALLIS SHAD	ALOSA ALOSA
ATLANTIC SALMON	SALMO SALAR
BROOK LAMPREY	LAMPETRA PLANERI
BULLHEAD	COTTUS GOBIO
CHIROCEPHALUS DIAPHANUS	FAIRY SHRIMP
FRESHWATER CRAYFISH	AUSTROPOTAMOBIUS PALLIPES
GAMMARUS INSENSIBILIS	LAGOON SAND SHRIMP
GRAYLING (FISH)	THYMALLUS THYMALLUS
GWYNIAD	COREGONUS LAVERATUS
MARGARITIFERA MARGARITIFERA	MARGARITIFERA MARGARITIFERA
SEA LAMPREY	PETROMYZON MARINUS
SPINED LOACH	COBITIS TAENIA
TWAITE SHAD	ALOSA FALLAX
ALISMA GRAMINEUM	RIBBON-LEAVED WATER-PLANTAIN
APIUM REPENS	CREEPING MARSHWORT
ATRIPLEX LONGIPES	LONG-STALKED ORACHE
CALLITRICHE HERMAPHRODITICA	ANNUAL WATER-STARWORT
CALLITRICHE TRUNCATA	SHORT-LEAVED WATER-STARWORT
CARDAMINE IMPATIENS	NARROW-LEAVED BITTER-CRESS
CAREX APPROPINQUATA	FIBROUS TUSSOCK-SEDGE
CAREX AQUATILIS	WATER SEDGE
CAREX DIANDRA	LESSER TUSSOCK-SEDGE
CAREX DIVISA	DIVIDED SEDGE
CAREX ELONGATA	ELONGATED SEDGE
CAREX FLAVA	LARGE YELLOW-SEDGE
CENTAURIUM TENUIFLORUM	CHANNEL CENTAURY
CHARA CANESCENS	BEARDED STONEWORT
CORRIGIOLA LITORALIS	STRAPWORT
CREPIS FOETIDA	SOUTHERN HAWKSBEARD
CYPERUS FUSCUS	BLACK CYPERUS
DAMASONIUM ALISMA	STARFRUIT
DREPANOCLADUS VERNICOSUS	SLENDER GREEN FEATHER-MOSS
ELEOCHARIS AUSTRIACA	NORTHERN SPIKE-RUSH
ELEOCHARIS PARVULA	DWARF SPIKE-RUSH
EPIPACTIS LEPTOCHILA VAR. DUNENSIS	DUNE HELLEBORINE
ERIOPHORUM GRACILE	SLENDER COTTONGRASS
HERNIARIA CILIOLATA	FRINGED RUPTURE-WORT
ISOETES HISTRIX	LAND QUILLWORT
JAMESONIELLA UNDULIFOLIA	MARSH EARWORT
JUNCUS CAPITATUS	DWARF RUSH
JUNCUS FILIFORMIS	LAKESIDE RUSH
JUNCUS PYGMAEUS	PIGMY RUSH
JUNCUS SUBULATUS	SOMERSET RUSH
LIPARIS LOESELII	FEN ORCHID
LURONIUM NATANS	FLOATING WATER-PLANTAIN
MATTHIOLA SINUATA	GREAT SEA STOCK
MENTHA PULEGIUM	PENNYROYAL
NAJAS FLEXILIS	SLENDER NAIAD
NAJAS MARINA	HOLLY-LEAVED NAIAD
PILULARIA GLOBULIFERA	PILLWORT
POTAMOGETON COLORATUS	PLANTAIN-LEAVED PONDWEED
POTAMOGETON COMPRESSUS	WRACK-LIKE PONDWEED
POTAMOGETON FRIESII	FLAT-STALKED PONDWEED
POTAMOGETON NODOSUS	LODDON PONDWEED
POTAMOGETON PRAELONGUS	LONG-STALKED PONDWEED
POTAMOGETON TRICHOIDES	HAIRLIKE PONDWEED
RANUNCULUS BAUDOTII	BRACKISH WATER-CROWFOOT
RANUNCULUS OPHIOGLOSSIFOLIUS	ADDER'S-TONGUE SPEARWORT
RANUNCULUS TRIPARTITUS	THREE-LOBED CROWFOOT
RHYNCHOSPORA FUSCA	BROWN BEAK-SEDGE
RICCIA BIFURCA	LIZARD CRYSTALWORT
RUMEX MARITIMUS	GOLDEN DOCK
RUMEX PALUSTRIS	MARSH DOCK
RUMEX RUPESTRIS	SHORE DOCK
RUPPIA CIRRHOSA	SPIRAL TASSELWEED
SAXIFRAGA HIRCULUS	MARSH SAXIFRAGE

SCHOENOPLECTUS TRIQUETER	TRIANGULAR BULRUSH
SCROPHULARIA SCORODONIA	BALM-LEAVED FIGWORT
SELINUM CARVIFOLIA	CAMBRIDGE MILK-PARSLEY
SENECIO PALUDOSUS	FEN RAGWORT
SIUM LATIFOLIUM	GREAT WATER-PARSNIP
SONCHUS PALUSTRIS	MARSH SOW-THISTLE
SPHAGNUM CUSPIDATUM	
SPHAGNUM GIRGENSOHNII	
SPHAGNUM IMBRICATUM	
SPHAGNUM MAGELLANICUM	
SPHAGNUM MOLLE	
SPHAGNUM PULCHRUM	
SPHAGNUM PULCHRUM	
SPHAGNUM RECURVUM	
SPHAGNUM RECURVUM VAR. AMBLYPHYLLUM	
SPHAGNUM SQUARROSUM	
SPHAGNUM SUBNITENS	
STRATIOTES ALOIDES	WATER-SOLDIER
TEUCRIUM SCORDIUM	WATER GERMANDER
TOLYPELLA NIDIFICA	BIRD'S-NEST STONEWORT
VIOLA PERSICIFOLIA	FEN VIOLET
WOLFFIA ARRHIZA	ROOTLESS DUCKWEED

WETLAND TEAM LIST OF ASSOCIATED HABITATS

A1	LEMNA GIBBA COMMUNITY
A2	LEMNA MINOR COMMUNITY
A2A	LEMNA MINOR COMMUNITY: TYPICAL SUBCOMMUNITY
A2B	LEMNA MINOR COMMUNITY: LEMNA TRISULCA SUBCOMMUNITY
A3	SPIRODELA POLYRHIZA-HYDROCHARIS MORSUS-RANAE COMMUNITY
A4	HYDROCHARIS MORSUS-RANAE-STRATIOTES ALOIDES COMMUNITY
A5	CERATOPHYLLUM DEMERSUM COMMUNITY
A5A	CERATOPHYLLUM DEMERSUM COMMUNITY: RANUNCULUS CIRCINATUS SUBC
A5B	CERATOPHYLLUM DEMERSUM COMMUNITY: LEMNA MINOR SUBCOMMUNITY
A7	NYMPHAEA ALBA COMMUNITY
A7A	NYMPHAEA ALBA COMMUNITY: SPECIES-POOR SUBCOMMUNITY
A8	NUPHAR LUTEA COMMUNITY
A8A	NUPHAR LUTEA COMMUNITY: SPECIES-POOR SUBCOMMUNITY
A8A	NUPHAR LUTEA COMMUNITY: SPECIES-POOR SUBCOMMUNITY
A8C	NUPHAR LUTEA COMMUNITY: NYMPHAEA ALBA SUBCOMMUNITY
A9	POTAMOGETON NATANS COMMUNITY
A10	POLYGONUM AMPHIBIUM COMMUNITY
A11	POTAMOGETON PECTINATUS-MYRIOPHYLLUM SPICATUM COMMUNITY
A11A	POTAMOGETON PECTINATUS-MYRIOPHYLLUM SPICATUM COMMUNITY: POTA
A11B	POTAMOGETON PECTINATUS-MYRIOPHYLLUM SPICATUM COMMUNITY: ELOD
A12	POTAMOGETON PECTINATUS COMMUNITY
A13	POTAMOGETON PERFOLIATUS-MYRIOPHYLLUM ALTERNIFLORUM COMMUNITY
A13A	POTAMOGETON,PERFOLIATUS-MYRIOPHYLLUM ALTERNIFLORUM COMMUNITY
A14	MYRIOPHYLLUM ALTERNIFLORUM COMMUNITY
A15	ELODEA CANADENSIS COMMUNITY
A16	CALLITRICHE STAGNALIS COMMUNITY
A16A	CALLITRICHE STAGNALIS COMMUNITY: CALLITRICHE SPP. SUBCOMMUNI
A17	RANUNCULUS PENICILLATUS SSP. PSEUDOFLUITANS COMMUNITY
A18	RANUNCULUS FLUITANS COMMUNITY
A20	RANUNCULUS PELTATUS COMMUNITY
A21	RANUNCULUS BAUDOTII COMMUNITY
A22	LITTORELLA UNIFLORA-LOBELIA DORTMANNA COMMUNITY
A22A	LITTORELLA UNIFLORA-LOBELIA DORTMANNA COMMUNITY: LITTORELLA
A22B	LITTORELLA UNIFLORA-LOBELIA DORTMANNA COMMUNITY: MYRIOPHYLLU
A23	ISOETES LACUSTRIS/SETACEA COMMUNITY
A24	JUNCUS BULBOSUS COMMUNITY
A24A	JUNCUS BULBOSUS COMMUNITY: UTRICULARIA VULGARIS AGG. SUBCOMM
A24B	JUNCUS BULBOSUS COMMUNITY: SPHAGNUM AURICULATUM SUBCOMMUNITY
M11	CAREX DEMISSA-SAXIFRAGA AIZOIDES MIRE
M11B	CAREX DEMISSA-SAXIFRAGA AIZOIDES MIRE: CRATONEURON COMMUTATU
M28	IRIS PSEUDACORUS-FILIPENDULA ULMARIA MIRE
M28A	IRIS PSEUDACORUS-FILIPENDULA ULMARIA MIRE: JUNCUS EFFUSUS-J.
M32	PHILONOTIS FONTANA-SAXIFRAGA STELLARIS SPRING
M32B	PHILONOTIS FONTANA-SAXIFRAGA STELLARIS SPRING: MONTIA FONTAN
M35	RANUNCULUS OMIOPHYLLUS-MONTIA FONTANA RILL
S1	CAREX ELATA SWAMP

S2	CLADIUM MARISCUS SWAMP AND SEDGE BEDS
S7	CAREX ACUTIFORMIS SWAMP
S14	SPARGANIUM ERECTUM SWAMP
S14A	SPARGANIUM ERECTUM SWAMP: SPARGANIUM ERECTUM SUBCOMMUNITY
S14B	SPARGANIUM ERECTUM SWAMP: ALISMA PLANTAGO-AQUATICA SUBCOMMUN
S14C	SPARGANIUM ERECTUM SWAMP: MENTHA AQUATICA SUBCOMMUNITY
S14D	SPARGANIUM ERECTUM SWAMP: PHALARIS ARUNDINACEA SUBCOMMUNITY
S16	SAGITTARIA SAGITTIFOLIA SWAMP
S17	CAREX PSEUDOCYPERUS SWAMP
S18	CAREX OTRUBAE SWAMP
S18A	CAREX OTRUBAE SWAMP: CAREX OTRUBAE SUBCOMMUNITY
S20	SCIRPUS LACUSTRIS SSP TABERNAEMONTANI SWAMP
S20A	SCIRPUS LACUSTRIS SSP TABERNAEMONTANI SWAMP: SCIRPUS LACUSTR
S20B	SCIRPUS LACUSTRIS SSP TABERNAEMONTANI SWAMP: AGROSTIS STOLON
S21	SCIRPUS MARITIMUS SWAMP
S21A	SCIRPUS MARITIMUS SWAMP: SCIRPUS MARITIMUS SUBCOMMUNITY
S21C	SCIRPUS MARITIMUS SWAMP: AGROSTIS STOLONIFERA SUBCOMMUNITY
S22	GLYCERIA FLUITANS WATER-MARGIN VEGETATION
S22A	GLYCERIA FLUITANS WATER-MARGIN VEGETATION: GLYCERIA FLUITANS
S22C	GLYCERIA FLUITANS WATER-MARGIN VEGETATION: ALOPECURUS GENICU
S23	OTHER WATER MARGIN VEGETATION
S26	PHRAGMITES AUSTRALIS-URTICA DIOICA TALL-HERB FEN
S26A	PHRAGMITES AUSTRALIS-URTICA DIOICA TALL-HERB FEN: FILIPENDUL
S26B	PHRAGMITES AUSTRALIS-URTICA DIOICA TALL-HERB FEN: ARRHENATHE
S26C	PHRAGMITES AUSTRALIS-URTICA DIOICA TALL-HERB FEN: OENANTHE C
S26D	PHRAGMITES AUSTRALIS-URTICA DIOICA TALL-HERB FEN: EPILOBIUM
S28	PHALARIS ARUNDINACEA TALL-HERB FEN
S28A	PHALARIS ARUNDINACEA TALL-HERB FEN: PHALARIS ARUNDINACEA SUB
S28B	PHALARIS ARUNDINACEA TALL-HERB FEN: EPILOBIUM HIRSUTUM-URTIC

ALL ASSOCIATED RIVER TYPES

RIVER I	CHALK FED LOWLAND RIVERS WITH MINIMAL GRADIENTS
RIVER Ib	
RIVER Ic	
RIVER II	CLAY RIVERS
RIVER IIa	
RIVER IIb	
RIVER IIc	
RIVER IIIa	
RIVER IIIb	
RIVER IVa	
RIVER IVc	
RIVER Va	
RIVER Vb	
RIVER Vc	
RIVER Vd	
RIVER Ve	
RIVER VI	MESOTROPHIC RIVERS ON SANDSTONE MUDSTONE AND HARD LIMESTONE
RIVER VIa	
RIVER VIb	
RIVER VIc	
RIVER VId	
RIVER VIe	
RIVER VII	MESOTROPHIC RIVERS DOWNSTREAM FROM NUTRIENT POOR CATCHMENTS
RIVER VIIa	
RIVER VIIb	
RIVER VIId	
RIVER VIII	OLIGO- MESOTROPHIC RIVERS - PREDOMINANTLY UPLAND
RIVER VIIIa	
RIVER VIIIb	
RIVER VIIId	
RIVER VIIIe	
RIVER Ix	OLIGOTROPHIC RIVERS OF MOUNTAINS AND MOORLANDS
RIVER Ixa	
RIVER Xa	
RIVER Xc	
RIVER Xe	

ALL ASSOCIATED LAKE TYPES

LAKE-II	SMALL OLIGOTROPHIC BASE POOR LAKES (PH5 - 7.5)
LAKE-III	LARGER OLIGOTROPHIC LAKES (PH GENERALLY < 7)

TABLE 5

Summary of Features Found on SSSI Citation but not Entered in ENSIS

PREDOMINANT FEATURE TYPE	SSSI NAME	INFORMATION EXTRACTED FROM CITATION NOT INCLUDED WITHIN THE ENSIS DATABASE () for those features not of interest to wetlands team
RIVER	RIVER ITCHEN	Brown trout (upstream), sea trout (downstream)
	RIVER WENSUM	Freshwater crayfish population, brown trout
	RIVER WYE	Ranunculus vegetation, water crowfoot beds
	RIVER AVON SYSTEM	
	RIVER LUGG	Lower plant assemblage - bryophytes & liverworts (incl. Pellia epiphylla & Solenostema triste) Brown trout
	RIVER TEME	Sea lamprey, brook lamprey, salmon, bullhead, grayling
	RIVER TEST	Brown trout, (invertebrate assemblage), River water dropwort - Oenanthe fluviatilis
CANAL	LEEDS - LIVERPOOL CANAL (W. Yorks)	Potamogeton trichoides, flowering rush (Butomus umbellatus), sweet flag (Acorus calamus), freshwater sponge population & (horseleach spp. population)
	GRANTHAM CANAL (Leics)	(Breeding bird community)
	HOLLINWOOD BRANCH CANAL (Gr. Manch)	
LAKES & POOLS	TARN HOWS (Cumbria)	
	SLAPTON LEY (Devon)	Lower plant assemblage - lichens (> 250 spp. recorded), fungi (> 500 spp. recorded)

Table 5 Cont'd

	GROBY POOL & WOODS (Leics)	
	GORMINE (N. Yorks)	
	SEMERWATER (N. Yorks)	(Mayfly spp. incl. Baetis rhodanis & Habrophlebia fusca)
	BRIDGWATER BAY (Somerset)	
	GAIT BURROWS (Lancashire)	
	BUCHAN HILL PONDS (W. Sussex)	
	STONES ROAD POND (Surrey)	
	WASING WOOD PONDS (Berkshire)	
	BAR MERE (Cheshire)	
	COMBE POOL (Warwickshire)	
	MAER POOL (Staffs)	(Water bug population - Hemiptera & Snail population)
	SHRAWARDINE POOL (Shropshire)	
	SUTTON PARK (W. Mid)	Bryophytes - Philonotis spp. in particular
	COATE WATER (Wiltshire)	
	CHEW VALLEY LAKE (Avon)	
	BIG WATERS (Tyne & Wear)	(Wintering wildfowl)

Table 5 Cont'd

	JOE'S POND (Tyne & Wear)	(Common toad)
	BRASSIDE POND (Durham)	Aquatic moss - Drepanocladus aduncus
ARTIFICIAL STANDING WATER BODIES (Inc. mineral pit lagoons & reservoirs)	BRENT RESERVOIR (G. London)	(Common spotted orchid - Dactylorhiza fuschii) & Greater spearwort
	ECCUP RESERVOIR (W. Yorks)	Bladder sedge - Carex vesicaria
	ATTENBOROUGH GRAVEL PITS (Notts)	
	BLACKBROOK RESERVOIR (Leics)	Austropotamobius pallipes population (imp. as isolated from American crayfish) Trout
	THORPE PARK NO. 1 GRAVEL PIT (Surrey)	
	GRIMLEY BRICK PITS (Hereford & Worcester)	(Odonata community inc. red eyed damselfly - Erythoma najus)
	BLAGDON LAKE (Avon)	(Ruddy darter dragonfly - Sympetrum sanguinem) Brown trout, spined stickleback & Gudgeon
	FRAMPTON POOLS (Glos)	(Odonata communites)
DITCHES	DELPH BRIDGE DRAIN (Cambs)	
	EAST RUSTON COMMON (Norfolk)	(Acanthophyma gomerenses - spider)
	WALLAND MARSH (Kent)	Marsh mallow (Althea officinalis)
	SHALLAM DYKE MARSHES (Norfolk)	Flowering rush - Butomus umbellatus (locally uncommon)

Table 5 Cont'd

	UPPER THURNE BROADS & MARSHES (Norfolk) BASTON & THURLBY FENS (Lincs) LANGMEAD & WESTON LEVEL (Somerset) WALTHAM BROOKS (W. Sussex)	
MIRES	HOLME FEN (Cambs) SALTA MOSS (Cumbria) UNITY BOG (Cumbria) RETIRE COMMON (Cornwall) EAT WALTON COMMON & ADCOCK'S COMMON (Norfolk) HESLEY MOSS (N. Yorks) SWARTH MOOR (N. Yorks) FALLOWLEES FLUSH (Northum) LEEK MOORS (Derbys/Staffs/Cheshire) WOOLHAYES FARMS (Somerset) TUCKMILL MEADOWS (Oxfordshire)	(Adder) (Green hairstreak butterfly - Callophry rubri) Lower plant assemblage - Marsh Clubmoss (Lycopodium inudatum), mosses incl. Hookeria lucens, Acrocladium sarmentosum & Liverworts incl. Riccardia latifrons, Cladopodiella francisci Drepanocladus vervicosus - moss & (Desmoulin's snail) Sphagnum papillosum, S. recurvum, S. cuspidatum, S. teres, S. subnitens & S. capillifolium Bullhead - Cottus gobio, Stone loach - Neomacheilus barbatulus, (Water Vole & Badger)

TABLE 5 contd

MIRES	CLAREPOOL MOSS (Shropshire)	
	LINMER MOSS (Cheshire)	
	BLACK FIRS & CRANBERRY BOG (Staffs)	
	STUBBERS GREEN BOG (W. Mid)	
	BLACK MOUNTAINS (Hereford & Worcester)	
	JONE'S MILL (Wiltshire)	(Breeding bird community > 50 spp.)
	YANAL BOG (Avon)	
	HART BOG (Cleveland)	Great Spearwort - Ranunculus lingua
FEN	FROME ST QUINTIN (Dorset)	(Lady's Mantle - Alchemilla vulgaris)
	BRANSBURY COMMON (Hampshire)	
	COSTON FEN (Norfolk)	
	HOLT LOWES (Norfolk)	(Bog brush cricket - Metroptera brachyptera & Keeled skimmer dragonfly - Orthetrum caerulescens)
	SMALLBURGH FEN (Norfolk)	Brachythecium mildeanum - moss
	BREARY MARSH (W. Yorks)	(Invertebrate population)
	LAKENHEATH POORS FEN (Suffolk)	(Marsh pea - Lathyrus palustris)
	CHICHESTER HARBOUR (W. Sussex)	
	SPARTUM FEN (Oxfordshire)	(Notable invertebrate population)

Table 5 Cont'd

	LOOSEHANGER COPSE & MEADOWS (Wiltshire)	(Adder)
	BOYNTON WILLOW GARTH (Humberside)	(Breeding Birds)
	POCKERLEY FARM POND (Tyne & Wear)	(Important site for spawning frogs and toads as well as site for smooth, palmate & great crested newts)
BRACKISH	MORECAMBE BAY (Cumbria)	(Wintering birds) & (Cehebius marinus - water beetle)
	MINSMERE-WALBERSWICK HEATHS & MARSHES (Suffolk)	(Shingle plant assemblage incl. Sea pea Lathyrus japonicus) & (Odontomyia ornata - soldier fly)
	SANDBACH FLASHES (Cheshire)	(Brackish water invertebrates)
SAND DUNES	NORTHAM BURROWS (Devon)	(Invertebrate community)
	SOUTHPORT SAND DUNES & FORESHORE (Merseyside)	(Dune helleborine - Epipactus dunesis) & (Lepidoptera assemblage)
SWAMP	LODMOOR (Dorset)	(Lesser marsh grasshopper - Chorthippus albomarginatus)
	PRESTON MARSHES (Kent)	Sharp-leaved pondweed - Potamageton acutifolius, opposite leaved pondweed - Groelandia densa
	THETFORD GOLF COURSE & MARSH (Norfolk)	
	SANDALL BEAT (S. Yorks)	Horned pondweed - Zannichellia palustris
	SIZEWELL MARSHES (Suffolk)	Soft hornwort - Ceratophyllum submersum
	PETT LEVEL (E. Sussex)	(Invertebrate population)
	ADUR ESTUARY (W. Sussex)	
	BRANDON MARSH (Warwickshire)	
	ABRAM FLASHES (Gr. Manchester)	

TABLE 6

List of Species Found Within Non-Wetland L1 Features

	County name	Site name	L1 nat feat desc	Operational feat name	L2 nat feat popular descr
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	ALLIS SHAD
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	ALLIS SHAD
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	ALLIS SHAD
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	ATLANTIC SALMON
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	ATLANTIC SALMON
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	ATLANTIC SALMON
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	LAMPERN
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	LAMPERN
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	LAMPERN
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	SEA LAMPREY
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	SEA LAMPREY
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	SEA LAMPREY
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	TWAITE SHAD
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	TWAITE SHAD
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	TWAITE SHAD
	AVON	SEVERN ESTUARY	COASTLAND: INTERTIDAL	MARSHY GRASSLAND	FRESHWATER CRAYFISH
•	BERKSHIRE	BOXFORD WATER MEADOWS	GRASSLAND: MARSH/MARSHY GRASSLAND	with relict ponds	CYPERUS FUSCUS
•	BERKSHIRE	COCK MARSH	GRASSLAND: CALCAREOUS, UNIMPROVED	Alongside River	POTAMOGETON NODOSUS
	BERKSHIRE	STANFORD END MILL AND RIVER LODDON	GRASSLAND: NEUTRAL, UNIMPROVED	HEATH WITH PONDS	DAMASONIUM ALISMA
	BUCKINGHAMSHIRE	BLACK PARK	HEATHLAND: DRY DWARF SHRUB HEATH	WOODED COMMON WITH HEATH/PONDS	DAMASONIUM ALISMA
•	BUCKINGHAMSHIRE	LITTLEWORTH COMMON	WOODLAND: BROADLEAVED, SEMI-NATURAL	WOODED COMMON WITH HEATH/PONDS	PULICARIA VULGARIS
	BUCKINGHAMSHIRE	LITTLEWORTH COMMON	WOODLAND: BROADLEAVED, SEMI-NATURAL	MARSHY GRASSLAND	ALISMA GRAMINEUM
•	CAMBRIDGESHIRE	OUSE WASHES	GRASSLAND: MARSH/MARSHY GRASSLAND	MARSHY GRASSLAND	SPINED LOACH
•	CAMBRIDGESHIRE	OUSE WASHES	GRASSLAND: MARSH/MARSHY GRASSLAND	SEASONALLY FLOODED HOLLOWS IN ARABLE FIELDS	CHIROCEPHALUS DIAPHANUS
•	CAMBRIDGESHIRE	WHITTLESFORD - THRIPLOW HUMMOCKY FIELDS	CULTIVATED/DISTURBED LAND: ARABLE	MARITIME GRASSLAND/SANDUNE AND VEGETATION SEACLIFF	RUMEX RUPESTRIS
	CORNWALL	BAULK HEAD TO MULLION	COASTLAND: MARITIME CLIFF AND SLOPE	MARSHY GRASSLAND	PILULARIA GLOBULIFERA
•	CORNWALL	CHYENHAL MOOR	GRASSLAND: MARSH/MARSHY GRASSLAND	WET DWARF SHRUB HEATH	RANUNCULUS TRIPARTITUS
•	CORNWALL	CHYENHAL MOOR	HEATHLAND: WET DWARF SHRUB HEATH	SAND DUNE, DUNE GRASSLAND AND DUNE SLACK MOSAIC	RUMEX RUPESTRIS
	CORNWALL	PENHALE DUNES	COASTLAND: SAND DUNE	A BL, SN WOODLAND & ASSOC HABITATS	ATLANTIC SALMON
	CORNWALL	RIVER CAMEL VALLEY AND TRIBUTARIES	WOODLAND: BROADLEAVED, SEMI-NATURAL	C BL, SN WOODLAND WITH RIVER, MARGINAL VEGETAT	ATLANTIC SALMON
	CORNWALL	RIVER CAMEL VALLEY AND TRIBUTARIES	WOODLAND: BROADLEAVED, SEMI-NATURAL	A BL, SN WOODLAND & ASSOC HABITATS	BULLHEAD
	CORNWALL	RIVER CAMEL VALLEY AND TRIBUTARIES	WOODLAND: BROADLEAVED, SEMI-NATURAL	C BL, SN WOODLAND WITH RIVER, MARGINAL VEGETAT	BULLHEAD
	CORNWALL	RIVER CAMEL VALLEY AND TRIBUTARIES	WOODLAND: BROADLEAVED, SEMI-NATURAL	A BL, SN WOODLAND & ASSOC HABITATS	SEA LAMPREY
	CORNWALL	RIVER CAMEL VALLEY AND TRIBUTARIES	WOODLAND: BROADLEAVED, SEMI-NATURAL	C BL, SN WOODLAND WITH RIVER, MARGINAL VEGETAT	SEA LAMPREY
	CORNWALL	TAMAR - TAVY ESTUARY	COASTLAND: INTERTIDAL	SALTMARSH AND TIDAL FLATS	RUPPIA CIRRHOSA
•	CORNWALL	TRELOW DOWNS	HEATHLAND: DRY DWARF SHRUB HEATH	HEATHLAND, VALLEY MIRE, SCRUB AND POOLS	PILULARIA GLOBULIFERA
	CORNWALL	TREVOSE HEAD AND CONSTANTINE BAY	COASTLAND: SAND DUNE	SAND DUNES	RUMEX RUPESTRIS
	DEVON	BRAUNTON BURROWS	COASTLAND: SAND DUNE	MOSAIC OF SAND DUNES	TEUCRIUM SCORDIUM
	DEVON	ERME ESTUARY	COASTLAND: MARITIME CLIFF AND SLOPE	COASTAL CLIFFS, GRASSLAND & SCRUB, & ROCKY SHORE	RUMEX RUPESTRIS
	DEVON	NORTHAM BURROWS	COASTLAND: DUNE SLACK	DUNE SLACKS & GRASSLAND	TEUCRIUM SCORDIUM
	DEVON	TAW-TORRIDGE ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	SAND AND MUD FLATS	TWAITE SHAD
	DEVON	TAW-TORRIDGE ESTUARY	COASTLAND: SALTMARSH	SALTMARSH	TWAITE SHAD
	DEVON	THORNE AND DOVES MOORS	GRASSLAND: MARSH/MARSHY GRASSLAND	Culm Grassland	CHIROCEPHALUS DIAPHANUS
	DORSET	AVON VALLEY (BICKTON TO CHRISTCHURCH)	GRASSLAND: MARSH/MARSHY GRASSLAND	ACID GRASSLAND/HEATHLAND	CYPERUS FUSCUS
	DORSET	AVON VALLEY (BICKTON TO CHRISTCHURCH)	GRASSLAND: NEUTRAL	WET NEUTRAL GRASSLAND	PULICARIA VULGARIS
	DORSET	CHRISTCHURCH HARBOUR	GRASSLAND: ACID	ACID GRASSLAND	ELEOCHARIS PARVULA
	DORSET	CHRISTCHURCH HARBOUR	GRASSLAND: NEUTRAL	GRAZING MARSH	ELEOCHARIS PARVULA
	DORSET	CHRISTCHURCH HARBOUR	COASTLAND: INTERTIDAL	ESTUARINE HABITATS	ELEOCHARIS PARVULA
	DORSET	CHRISTCHURCH HARBOUR	COASTLAND: SALTMARSH	SALTMARSH / REEDBED / GRASSLAND	ELEOCHARIS PARVULA
	DORSET	CHRISTCHURCH HARBOUR	COASTLAND: SALTMARSH	SALTMARSH AND REEDBED	RUPPIA CIRRHOSA
	DORSET	POOLE HARBOUR	COASTLAND: SALTMARSH	SALTMARSH	LEERSIA ORYZOIDES
	DORSET	WAREHAM MEADOWS	GRASSLAND: MARSH/MARSHY GRASSLAND	MARSHY GRASSLAND	RUPPIA CIRRHOSA
	ESSEX	BLACKWATER ESTUARY	GRASSLAND: NEUTRAL	SEMI-IMPROVED /IMPROVED GRASSLAND	RUPPIA CIRRHOSA
	ESSEX	BLACKWATER ESTUARY	GRASSLAND: NEUTRAL, SEMI-IMPROVED	SEMI-IMPROVED GRAZING MARSH	RUPPIA CIRRHOSA
	ESSEX	BLACKWATER ESTUARY	COASTLAND: INTERTIDAL	INTERTIDAL MUD AND SALTMARSH	RUPPIA CIRRHOSA
	ESSEX	BLACKWATER ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD WITH SHINGLE AND SAND	RUPPIA CIRRHOSA
	ESSEX	BLACKWATER ESTUARY	COASTLAND: INTERTIDAL, SHINGLE/COBBLES	SAND SHINGLE, INTERTIDAL MUD AND SALTMARSH	RUPPIA CIRRHOSA
	ESSEX	BLACKWATER ESTUARY	COASTLAND: SALTMARSH	SALTMARSH	RUPPIA CIRRHOSA
	ESSEX	COLNE ESTUARY	COASTLAND: SALTMARSH	SALTMARSH AND SHINGLE	RUPPIA CIRRHOSA
	ESSEX	COLNE ESTUARY	WOODLAND: BROADLEAVED	MOSAIC - WOODLAND/HEATH/SCRUB/ACID GRASS/OPENWATER	RUPPIA CIRRHOSA
			GRASSLAND: NEUTRAL	GRAZING MARSH	

TABLE 6 contd

ESSEX	COLNE ESTUARY	COASTLAND: INTERTIDAL	TIDAL INNER ESTUARINE + SEA WALL	RUPPIA CIRRHOSA
ESSEX	COLNE ESTUARY	COASTAL LAGOONS	COASTAL LAGOON WITH REEDS	RUPPIA CIRRHOSA
ESSEX	DENGIE	COASTLAND: SALTMARSH	SALTMARSH+INTERTIDAL MUD, SEAWALL & BORROWDYKE	RANUNCULUS BAUDOTII
ESSEX	DENGIE	COASTLAND: SALTMARSH	SALTMARSH+INTERTIDAL MUD, SEAWALL & BORROWDYKE	RUMEX MARITIMUS
ESSEX	HANNINGFIELD RESERVOIR	GRASSLAND: NEUTRAL	IMPROVED NEUTRAL GRASSLAND	RUMEX MARITIMUS
ESSEX	HANNINGFIELD RESERVOIR	GRASSLAND: NEUTRAL	IMPROVED NEUTRAL GRASSLAND	RUMEX PALUSTRIS
• ESSEX	HOLLAND HAVEN MARSHES	COASTLAND: COASTAL GRASSLAND	COASTAL GRASSLAND	RANUNCULUS BAUDOTII
GLOUCESTERSHIRE	PENNSYLVANIA FIELDS, SEDBURY	COASTLAND: SALTMARSH	UNIMPROVED SALINE GRASSLAND	RANUNCULUS BAUDOTII
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	ALLIS SHAD
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	ALLIS SHAD
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	ALLIS SHAD
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	ATLANTIC SALMON
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	ATLANTIC SALMON
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	ATLANTIC SALMON
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	LAMPERN
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	LAMPERN
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	LAMPERN
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	SEA LAMPREY
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	SEA LAMPREY
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	SEA LAMPREY
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	ESTUARINE HABITAT	TWAITE SHAD
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL	SUB-ESTUARY	TWAITE SHAD
GLOUCESTERSHIRE	SEVERN ESTUARY	COASTLAND: INTERTIDAL, MUD/SAND	INTERTIDAL MUD AND SAND AND SUBTIDAL SANDBANKS	TWAITE SHAD
HAMPSHIRE	AVON VALLEY (BICKTON TO CHRISTCHURCH)	GRASSLAND: MARSH/MARSHY GRASSLAND	ACID GRASSLAND/HEATHLAND	CYPERUS FUSCUS
HAMPSHIRE	AVON VALLEY (BICKTON TO CHRISTCHURCH)	GRASSLAND: NEUTRAL	WET NEUTRAL GRASSLAND	PULICARIA VULGARIS
HAMPSHIRE	THE MOORS, BISHOP'S WALTHAM	GRASSLAND: NEUTRAL, SEMI-IMPROVED	SEMI-IMPROVED NEUTRAL GRASSLAND	POTAMOGETON COLORATUS
HERTFORDSHIRE	TRING WOODLANDS	WOODLAND: BROADLEAVED, SEMI-NATURAL	BROADLEAVED SEMI NATURAL WOODLAND	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
HUMBERSIDE	MESSINGHAM SAND QUARRY	WOODLAND: CONIFEROUS, PLANTATION	CONIFEROUS PLANTATION	PILULARIA GLOBULIFERA
ISLE OF WIGHT	BRADING MARSHES TO ST. HELEN'S LEDGES	COASTAL LAGOONS	BRACKISH LAGOON (SAC/SPA/RAMSAR)	LAMPROTHAMNIUM PAPULOSUM
• ISLE OF WIGHT	BRADING MARSHES TO ST. HELEN'S LEDGES	WOODLAND: BROADLEAVED, SEMI-NATURAL	BRACKISH MARSHY WOODLAND (SPA/RAMSAR)	RANUNCULUS BAUDOTII
• ISLE OF WIGHT	BRADING MARSHES TO ST. HELEN'S LEDGES	GRASSLAND: MARSH/MARSHY GRASSLAND	GRAZING MARSH WITH FEN & SCRUB(SPA/RAMSAR)	RANUNCULUS BAUDOTII
ISLE OF WIGHT	NEWTOWN HARBOUR	COASTAL LAGOONS	BRACKISH LAGOON (SAC/SPA/RAMSAR)	GAMMARUS INSENSIBILIS
LANCASHIRE	LYTHAM ST. ANNE'S DUNES	COASTLAND: SAND DUNE	SAND DUNES	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
LEICESTERSHIRE	BUDDON WOOD AND SWITHLAND RESERVOIR	WOODLAND: BROADLEAVED, SEMI-NATURAL	BROADLEAVED SEMI-NATURAL WOODLAND	RUMEX MARITIMUS
• LINCOLNSHIRE	SALTFLEETBY - THEDDLETHORPE DUNES	COASTLAND: SAND DUNE	SAND DUNE	SIUM LATIFOLIUM
LINCOLNSHIRE	SURFLEET LOWS	GRASSLAND: NEUTRAL, UNIMPROVED	UNIMPROVED NEUTRAL GRASSLAND + TALL FEN VEGETATION	RUMEX MARITIMUS
MERSEYSIDE	ALTCAR SAND DUNES AND FORESHORE	COASTLAND: INTERTIDAL, MUD/SAND	SAND AND MUD FLATS	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
MERSEYSIDE	ALTCAR SAND DUNES AND FORESHORE	COASTLAND: SAND DUNE	SAND DUNES	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
• NORFOLK	CALTHORPE BROAD	GRASSLAND: ACID, UNIMPROVED	ACID GRASSLAND	STRATIOTES ALOIDES
NORFOLK	EAST WALTON AND ADCOCK'S COMMON	GRASSLAND: CALCAREOUS, UNIMPROVED	GRASSLAND SCRUB MOSAIC	CAREX DIANDRA
NORFOLK	LUDHAM - POTTER HEIGHAM MARSHES	WOODLAND: BROADLEAVED, SEMI-NATURAL	WOODLAND	CAREX APPROPINQUATA
NORFOLK	LUDHAM - POTTER HEIGHAM MARSHES	WOODLAND: BROADLEAVED, SEMI-NATURAL	WOODLAND	POTAMOGETON COLORATUS
NORFOLK	LUDHAM - POTTER HEIGHAM MARSHES	WOODLAND: BROADLEAVED, SEMI-NATURAL	WOODLAND	STRATIOTES ALOIDES
• NORTH YORKSHIRE	SKIPWITH COMMON	HEATHLAND: WET HEATH/ACID GRASSLAND MOSAIC, LOWLAND	DRY/WET HEATH, MIRE, OPEN WATER, SCRUB WOOD MOSAIC	PILULARIA GLOBULIFERA
• NORTH YORKSHIRE	STRENSALL COMMON	HEATHLAND: WET HEATH/ACID GRASSLAND MOSAIC	DRY, WET ACID HEATH, MIRE, OPEN WATER/SCRUB MOSAIC	PILULARIA GLOBULIFERA
NORTHAMPTONSHIRE	BOSWORTH MILL MEADOW	GRASSLAND: NEUTRAL, UNIMPROVED	AGRICULTURALLY UNIMPROVED OLD GRASSLAND	RANUNCULUS OPHIOGLOSSIFOLIUS
NORTHUMBERLAND	BELTINGHAM RIVER SHINGLE	OTHER HABITAT	METALLIFEROUS RIVER SHINGLE	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
NORTHUMBERLAND	BURNFOOT RIVER SHINGLE AND WYDON NABB	OTHER HABITAT	METALLIFEROUS RIVER SHINGLE	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
NORTHUMBERLAND	LAMBLEY RIVER SHINGLES	OTHER HABITAT	METALLIFEROUS RIVER SHINGLE	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
NORTHUMBERLAND	WHARMLEY RIVERSIDE	OTHER HABITAT	METALLIFEROUS RIVER SHINGLE	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
NORTHUMBERLAND	WILLIAMSTON RIVER SHINGLE	OTHER HABITAT	METALLIFEROUS RIVER SHINGLE	EPIPACTIS LEPTOCHILA VAR. DUNENSIS
OXFORDSHIRE	PORT MEADOW WITH WOLVERCOTE COMMON & GREEN	GRASSLAND: NEUTRAL, UNIMPROVED	UNIMPROVED NEUTRAL GRASSLAND	APIUM REPENS
SUFFOLK	SPRAT'S WATER AND MARSHES, CARLTON COLVILLE	GRASSLAND: MARSH/MARSHY GRASSLAND	MARSHY GRASSLAND WITH STANDING WATER	STRATIOTES ALOIDES
SURREY	BASINGSTOKE CANAL	HEATHLAND: WET DWARF SHRUB HEATH LOWLAND	WET HEATHLAND	MACROPIS EUROPAEA
SURREY	ESHER COMMONS	HEATHLAND: DRY DWARF SHRUB HEATH	LOWLAND HEATHLAND	DAMASONIUM ALISMA
SURREY	ESHER COMMONS	HEATHLAND: DRY DWARF SHRUB HEATH	LOWLAND HEATHLAND	PULICARIA VULGARIS
• SURREY	MOLE GAP TO REIGATE ESCARPMENT	WOODLAND: BROADLEAVED, SEMI-NATURAL	B-L S-N WOODLAND, HEATHLAND + GRASSLNAD MOSAIC	DAMASONIUM ALISMA
SURREY	OCKHAM AND WISLEY COMMONS	HEATHLAND: WET DWARF SHRUB HEATH LOWLAND	LOWLAND HEATHLAND WITH SCRUB & WOODLAND (SPA)	PILULARIA GLOBULIFERA
SURREY	STAINES MOOR	GRASSLAND: NEUTRAL	NEUTRAL WET GRASSLAND	CYPERUS FUSCUS
WILTSHIRE	SALISBURY PLAIN	GRASSLAND: CALCAREOUS, UNIMPROVED, LOWLAND	CALCAREOUS GRASSLAND WITH JUNIPER SCRUB	CHIROCEPHALUS DIAPHANUS
WILTSHIRE	SALISBURY PLAIN	GRASSLAND: CALCAREOUS, UNIMPROVED, LOWLAND	CALCAREOUS LOWLAND GRASSLAND	CHIROCEPHALUS DIAPHANUS

Non-wetland habitats with wetland species

TABLE 7

Selected Wetland SSSIs Showing Number of Wetland Monitoring Units & Features

Name of sites with total number of units	Wetland units with L1 features	L2 wetland features excluding birds
Rivers		
River Derwent, North Yorkshire (46 units)	Open water (running eutrophic): units 1-3,5-9,11-14,16,18-20, 23,27-34,36-38,40-44. (33 units). River type: IVa and VId. Other wetland features: Open water (standing): units 45&46 Fen: unit 4	No L2 features listed for any unit
River Ise and Meadows, Northamptonshire (4 units)	Open water (running water): unit 3. River type not available	*Thymallus* sp. (Grayling) *Pisidium tenuilineatum*
River Nar, Norfolk (42 units)	Open water (running water): units 40 – 42. River type: Ic, IIIg, Iva & Vie Other wetland feature: Open water (standing): Unit 15	No L2 features listed for any unit
Canals		
Coombe Hill Canal, Gloucestershire (2 units)	Open water (canal): unit 1 Other wetland feature: Fen: unit 2	Unit 1. Invertebrate assemblage Higher plant assemblage: *Potomageton trichoides* *Rumex maritimus* Unit 2 Invertebrate assemblage Higher plant assemblage
Grantham Canal, Leicestershire (7 units)	Open water (canal): units 1-7	For all units: *Coenagrion pulchellum* S12: *T. latifolia* swamp S14: *S. erectum* swamp. S23: other water margin vegetation. S4: *P. australis* swamp and reed beds
Prees Branch Canal, Shropshire (1 unit)	Open water(standing eutrophic): unit 1	A8: *Nuphar lutea* com. A9: *P. natans* com. S5: *G. maxima* swamp.
Ditches (freshwater & brackish)		
Crouch & Roach Estuaries (Brackish), Essex (57 units)	Open water (standing brackish): unit 12. Open water (standing):	Invertebrate assemblage Higher plant assemblage Invertebrate assemblage

	Unit 51.	
Halvergate Marshes (Eutrophic, Mesotrophic & Brackish), Norfolk (approx. 47 units)	Open water (standing eutrophic): units 1-7,9,11-20,23,25,27-30, 32-35, 37,500. (30 units). Open water (standing mesotrophic): unit 26. Open water (standing brackish): units 24, 36, 38-45, 47. (11 units). Other wetland feature: Fen (flood plain basic): unit 22.	L2 features listed cover all open water units. Invertebrate assemblage: *Aeshna isosceles* *Brachyton pratense* *Coenagrion pulchellum* *Hydrophilus piceus* *Pelosia muscerda* *P. obtusa* *Photedes brevilinea* Higher plant assemblage: *Carex divisa* *Potamogeton coloratus* *P. trichoides* *Puccinella rupestris* *Sium latifolium* *Sonchus palustris* *Stratiotes aloides* A11: *P. pectinatus-M. spicatum* com. A4: *H. morsus-ranae-S. aloides* com. A9: *P. natans* com. No L2 features listed
Upper Severn Estuary, Gloucestershire (11 units)	Grassland (marshy): unit 11	S4: *P. australis* swamp and reedbeds.
Woodwalton Fen, Cambridgeshire (5 units)	Open water (standing eutrophic): unit 5. Other wetland feature: Fen: unit 2	No L2 features listed See below for fen features
Lakes (including pits & reservoirs)		
Hesledon Moors West, Durham (3 units)	Open water (standing): unit 2	*Colobaea bifasciella* S12: *T. latifolia* swamp.
Houghton Regis Marl Lakes, Bedfordshire (2 units)	Open water (standing): unit 2	*Triturus cristatus* *Ischnura pumilo* S19: *Eleocharis palustris* swamp com.
Swanholme Lakes, Lincolnshire (2 units)	Open water (standing): units 1 & 2	Both units: *Neomys fodiens* (water shrew) *Triturus cristatus* Odontata assemblage: *Anax imperator* *Lestes sponsa* *Coenagrion pulchellum* *Erromma najas* Higher plant assemblage *Pilularia globulifera* *Stratiotes aloides*

Fens/Bogs		
Arger Fen, Suffolk (15 units)	Fen (valley mire): units 9 & 13	Both units: M27B: *F. ulmaria-A. sylvestris* mire. S7: *C. acutiformis* swamp
Ashleworth Fen, Gloucestershire (3 units)	Fen: unit 1	Higher plant assemblage: S28: *P. arundinacea* fen com.
Scotton & Laughton Forest Ponds, Lincolnshire (1 unit)	Fen: unit 1	Sphagnum spp. M5: *C. rostrata- S. squarrosum* mire. S27: *C. rostrata-P.palustris* fen.
Woodwalton Fen, Cambridgeshire (5 units)	Swamp: unit 1/Fen: unit 2 Other wetland feature: Open water (standing eutrophic): unit 5.	Unit 1: S2A: *C. mariscus* swamp. S4: *P. australis* swamp. Unit 2: *Viola persicifolia* S24: *P. australis-P. palustris* tall herb fen . S25: *P. australis-E cannabinum* tall herb fen. S26: *P. australis-U. dioica* tall herb fen. For open water features see above.

APPENDIX 1

Aquatic species as positive and negative attributes of the condition of ditch types identified in "Criteria for the selection of biological SSSIs" (JNCC, 1996)

Identified by Dr Chris Newbold (Pers com.)

Ditch type IAa: Eutrophic

Positive Species	Negative Species
Potamogeton crispus	*Azolla filiculoides*
P. pectinatus (but not dominant)	*Elodea canadensis*
P. pusillus	*Zannichellia palustris*
Chara sp.	*Ceratophyllum demersum*
Myriophyllum verticillatum	
Ranunculus sp	
Polygonum amphibium	
Callitriche sp.	

Ditch type IAb: Eutrophic (but more than IAa – may indicate a more mature ditch.

Positive Species	Negative Species
Potamogeton berchtoldii	*Azolla filiculoides*
P. crispus	*Elodea canadensis*
P. pectinatus (but not dominant)	*Zannichellia palustris* (if dominant)
P. pusillus	*Ceratophyllum demersum*
Chara sp.	
Myriophyllum spicatum	
M. verticillatum	
Ranunculus sp	
Polygonum amphibium	
Callitriche sp.	
Hydrocharis morsus-ranae	
Hottonia palustris	
Stratiotes aloides	

Mesotrophic examples of ditch types IAa & IAb:

Species listed in criteria book all positive indicators plus:

Sparganium minimum
Potamogeton praelongus
P. acutifolius?

Brackish ditches: Species listed in criteria book all positive indicators provided Zanichellia and Ceratophylum are not dominant.

NB: Do not use emergent species to assess the condition of ditches unless fen relict species are present (C Newbold pers com). However, it would appear to the authors that emergent flora could be used to monitor the development of the ditch. The extent of emergents will increase as the ditch matures. An example involving the ratio of cover of aquatic: floating : emergent vegetation has been included as a habitat indicator in box 5 of the draft form (Part 3).

APPENDIX 2

Canals: Mesotrophic & Eutrophic Flora

Attributes	Target	Method of Assessment	Comment
Composition of macrophyte community	Maintain and restore where necessary characteristic species composition	Refer to	Canals with mesotrophic vegetation contain a diverse range of aquatic plants. Species seemingly naturally found in these canals are: *Potamogeton alpinus, gramineus, praelongus, perfoliatus, obtusifolius* and *berchtoldii*. Species such as *Ranunculus aquatilis* and *circinatus* may also be found. The presence of duckweeds and/or algae is an indication that the site is moving out of favourable condition. In more naturally eutrophic conditions the above *Potamogeton* spp. tend to be replaced by *P pusillus, trichoides, lucens, friesii* and *pectinatus*, other associates will be *Myriophyllum spicatum*, (rarely *verticillatum*), *Hydrocharis morsus-ranae, Nuphar lutea* and *Sagittaria sagittifolia*. As nutrients increase beyond eutrophic towards hypertrophic floras change and may become dominated by species such as Ceratophyllum demersum, *Elodea nuttallii, Myriophyllum spictatum, Potamogeton pectinatus* and *Zanichellia palustris*. The dominant presence of duckweeds and/or algae is an indication of unfavourable condition. Historic boat movements seem to have encouraged the spread of species such as *Sparganium minimum, Stratiotes aloides* and *Nymphoides peltata* from their natural geographic position in E England. Canals with mesotrophic vegetation may also contain two nationally scarce species; *Potamogeton compress*us and *Luronium natans*. One nationally rare species is also found in canals with mesotrophic vegetation - *Potamogeon epihydrus*. *Alisma gramineum* is found in one canal with eutrophic vegetation. Both are historic introductions.
Bankside vegetation	Maintain and, where necessary, restore characteristic terrestrial vegetation. No more than 5% of canal width to be encroached by bankside vegetation (over selected sections)	Refer to ..... Visual inspection (see river macrophyte survey for guidelines)	Bankside and emergent floras usually contain mixed assembleges of *Carex* spp. and *Phragmites australis*. With increasing trophic *status Schoenoplectus lacustris, Phalaris arundinacea* and *Glyceria maxima* tend to replace the above species.
Key species	Maintain, within acceptable variation, populations of key species		Species may include; *Luronium natans*, *Potamogeton compressus*, native crayfish, water vole, dragonfly species. bats, diptera, bird species etc. Refer to relevant tables for these species.
Water quality (flora)	Total P: maintain level characteristic to waterbody (typical range of 20 – 100		

	microG)		
Hydrology	Maintain canal water level within acceptable freeboard		Canals have small flows of water due to leakage and boat movements through locks. These flows can be essential elements in maintaining desired water quality. This also relates to maintaining other interest features
Sediment load	Maintain sediment level below the level of propeller contact with a minimum of 60cm clearance.	Water depth measurement to sediment interface	Sediment acretion can eutrophicate systems and change floras, boat traffic will also disturb sediments if left to accumulate, smothering floras. Regular maintenance by dredging is desirable.
Channel morphology	Banksides and channels should be managed sympathetically		Methods used should be in accordance with codes of practice set down by British Waterways.
Biological disturbance	exotics		

ENGLISH NATURE

Lowland grassland SSSI condition assessment (version date 31/3/00)

APPENDIX 3

Site Name: .....

NVC type: MG5

Date: .....

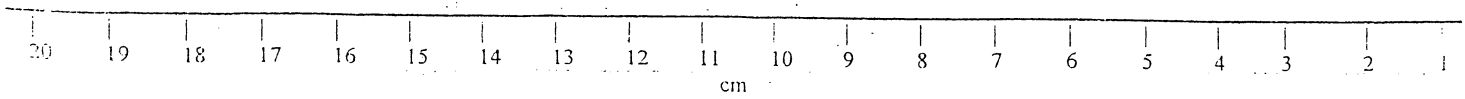
Condition: Favourable maintained/Favourable recovered /Unfavourable improving/ Unfavourable no change/Unfavourable declining/Partially destroyed/Destroyed

Recommended visiting period: mid May-end July (pastures), mid May-hay cut time (meadows)
Recommended frequency of visits: Annual.

Key management activities affecting condition to discuss with manager:

Hay+aftermath grazing
FYM input
Other inputs
Drainage
Raising water levels
Scrub and weed control
Grazing intensity/stocking rate
Grazing period
Supplementary feeding
Stock type
Rolling and chain harrowing

Attribute (*= mandatory attribute. One failure among mandatory attributes = unfavourable condition)	***Target***	***Estimate for attribute***
*Extent of community (recoverable reduction = unfavourable; non-recoverable reduction = partially destroyed).	No loss without prior consent	(Describe and refer to map)
*Sward composition: grass/herb (ie non-Graminae) ratio	**40-90%** herbs	
*Sward composition: frequency of positive indicator species/taxa. *Agrimonia eupatoria* ( ), *Alchemilla* spp. ( ), *Anenome nemorosa* ( ), *Centaurea nigra* ( ), *Euphrasia* spp. ( ), *Filipendula ulmaria* ( ), *Filipendula vulgaris* ( ), *Galium verum* ( ), *Genista tinctoria* ( ), *Lathyrus linifolius (=montanus)* ( ), *Lathyrus pratensis* ( ), *Leontodon hispidus/L. saxatilis* ( ), *Leucanthemum vulgare* ( ), *Lotus corniculatus* ( ), *Pimpinella saxifraga* ( ), *Polygala* spp. ( ), *Potentilla erecta* ( ), *Primula veris* ( ), *Rhinanthus minor* ( ), *Sanguisorba minor* ( ), *Sanguisorba officinalis* ( ), *Serratula tinctoria* ( ), *Silaum silaus* ( ), *Stachys officinalis* ( ), *Succisa pratensis* ( ), *Tragopogon pratensis* ( ), small blue-green *Carex* spp. (leaves less than 5mm wide) (*C. flacca*) ( ).	At least two species/taxa **frequent** and four **occasional** throughout the sward	
*Sward composition: frequency of negative indicator species/taxa. *Anthriscus sylvestris* ( ), *Cirsium arvense* ( ), *Cirsium vulgare* ( ), *Galium aparine* ( ), *Plantago major* ( ), *Pteridium aquilinum* ( ), *Rumex crispus* ( ), *Rumex obtusifolius* ( ), *Senecio jacobaea* ( ), *Urtica dioica* ( ).	No species/taxa more than **occasional** throughout the sward or singly or together more than **5%** cover	



Attribute (= mandatory attribute. One failure among mandatory attributes = unfavourable condition)*	*Target*	*Estimate for attribute*
*Sward composition: indicators of waterlogging. Cover % of *Juncus* spp, *Deschampsia cespitosa*, large *Carex* spp. (leaves more than 5mm wide) eg *Carex acutiformis*, large grasses (leaves more than 10mm wide, stout stems) ie *Glyceria maxima, Phalaris arundinacea, Phragmites australis*. Record in period late May -early July, before hay cut, measured annually if possible. Note: Care is required on ridge-and-furrow fields where the furrows may support a different interest feature (eg wet grassland).	No species/taxa together or singly covering more than 10% of the sward	
*Sward composition: frequency and % cover of all scrub and tree species, considered together. NB If scrub/tree species in pastures are more than occasional throughout the sward but less than 5% cover, they are soon likely to become a problem if grazing levels are not sufficient or if scrub control is not being carried out.	No more than 5% cover	
Sward structure: average height. Upper target refers to pastures only.	5-15 cm	
Sward structure: litter in a more or less continuous layer, distributed either in patches or in one larger area.	Total extent no more than 25% of the sward	
Sward structure: extent of bare ground (not rock) distributed through the sward, visible without disturbing the vegetation.	No more than 5%	

Structured walk recording form
Frequencies: totals out of 20 stops. 1-4 = rare, 5-8 = occasional, 9+ = frequent or more

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total

APPENDIX 4 WET Lowland Heathland - Condition Assessment (version date 5/1/01)

Site Name: Grid reference (if known):
Assessed by: Date: Time:
Photographs taken - Film and Frame Nos. NVC type (if available)

Condition: Favourable maintained / Favourable recovered / Unfavourable improving / Unfavourable no change / Unfavourable declining / Partially destroyed / Destroyed

Recommended visiting period: May-October
Recommended frequency of visits: Every two years (site -specific decision?)

Key management activities affecting condition to discuss with manager:

Grazing intensity/stocking rate	Scrub and weed control
Stock type	Rolling and chain harrowing
Grazing period	Bracken management
Supplementary feeding	Other (specify)

Attribute (*= mandatory attribute. One failure among mandatory attributes = unfavourable condition)	Target	Estimate for attribute
***Extent of community, including associations** (recoverable reduction = unfavourable; non-recoverable reduction = partially destroyed)	Maintain existing area on its current sites	(Describe and refer to map)
***Bare ground (not rock)** % cover natural bare ground in intimate mosaic within vegetation	'Undisturbed' 1-10% 'Heavily disturbed' <1%	
***Vegetation structure (height)** Mean height of *Calluna vulgaris* in different stages of its life cycle and of ericaceous species and *Ulex* spp.	>25% of stand of **pioneer**, >50% of stand of **building/mature**, <25% of stand of **degenerate**	
***Vegetation structure (cover)** Record percentage cover of shrubs and herbaceous species Record percentage cover of *Molinia caerulea, Schoenus nigricans* and *Sphagnum* spp. tussocks. Record heather layering.	Mosaic with different stages of *Calluna vulgaris* and *Erica tetralix*. >20% **ericoids** and >20% **sphagnum** cover > 20% ***Schoenus*** tussocks Scattered (not dense) tussocks of ***Molinia caerulea*** but <50% cover <25% ***Ulex europaeus*** as occasional bushes	
***Vegetation composition – dwarf shrubs** % cover and frequency of any of the following species: *Calluna vulgaris, Erica ciliaris, Erica cinerea, Erica tetralix, Erica vagans, Ulex gallii, Ulex minor, Vaccinium* spp.	List to be tailored to each site At least 2 species at least **abundant**	
***Vegetation composition – graminoids** % cover and frequency of any of the following species: *Carex panicea, Carex pulicaris, Eleocharis* spp., *Eriophorum vaginatum, Juncus acutiflorus, Molinia caerulea, Rhynchospora alba, Schoenus nigricans, Scirpus cespitosus.*	List to be tailored to each site At least 1 species at least **frequent** and 2 species at least **occasional** throughout the sward	
***Vegetation composition – desirable forbs** % cover and frequency of any of the following species *Anagallis tenella, Drosera* spp., *Galium saxatile, Genista anglica, Myrica gale, Narthecium ossifragum, Pinguicula* spp., *Polygala serpyllifolia, Potentilla erecta, Serratula tinctoria, Succisa pratensis.*	List to be tailored to each site At least 2 species at least **occasional**	
***Vegetation composition – bryophytes and lichens** % cover and frequency of : *Sphagnum* spp	List to be tailored to each site >10% cover of Sphagna (except *S. papillosum* which indicates blanket bog)	
Vegetation composition – rare species Monitor and set targets according to species. *Cicendia filiformis, Gentiana pneumonanthe, Hammarbya paludosa, Lycopodiella inundata, Radiola linoides, Rhynchospora fusca.*	List and targets to be tailored to each site	
***Negative indicators - signs of disturbance** - Drains. - Obvious visual pollution. - Overgrazing. - Burning.	Artificial drainage channels which are adversely affecting hydrology are absent. No signs of silt or leachate. <1% of habitat with signs of overgrazing or accidental/high intensity fires <10-20 year rotation cycle of controlled burning.	

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

Attribute (*= mandatory attribute. One failure among mandatory attributes = unfavourable condition)	Target	Estimate for attribute
*Negative indicators (if over target threshold) - species % cover of any of the following species: *Rhododendron ponticum.* *Apium nodiflorum, Cirsium arvense, Digitalis purpurea, Epilobium* spp. (excl. *E. palustre), Glyceria fluitans, Juncus effusus, Oenanthe crocata, Phragmites spp., Ranunculus repens, Raenoutria japonica, Senecio jacobaea, Rumex obtusifolius, Thypha* spp., *Urtica* spp. *Alnus glutinosa, Betula* spp., *Pinus* spp., *Prunus spinosa, Quercus* spp., *Rubus* spp., *Salix* spp. *Pteridium aquilinum.*	List to be tailored to each site *Rhododendron* and exotic species preferably absent and no more than 1%. <1% undesirable herbaceous/forb spp. < 25% (10%??) trees, tree seedlings or other species of scrub. <25% *Pteridium aquilinum*	

Structured walk recording form - Frequencies: totals out of 20 stops. 1-4 = rare, 5-8 = occasional, 9+ = frequent or more

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Bare ground																					
Ericaceous/Ulex cover																					
height																					
C. vulgaris pioneer																					
building/mature																					
degenerate/dead																					
Graminoids																					
Forbs																					
Bryophytes																					

Comments (eg. indicator fauna species: eg. Curlew, Redshank, Snipe, Bog-bush cricket, etc.); number and extent of fires since last survey if known

19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0

APPENDIX 5 OPEN WATER SSSI CONDITION ASSESSMENT: SUMMARY TABLE OF CONDITION OF FEATURE

1. SITE: ..... 2. MONITORING UNIT: ..... 3. FEATURE: .....

4. WETLAND TYPE: .....

Date of visit	**Date of first visit:**	**Date of second visit:**	**Date of third visit:**	**Date of fourth visit:**	**Date of fifth visit:**
Attribute	**Target for attribute met/not met**	**Target for attribute met/not met**	**Target for attribute met/not met**	**Target for attribute met/not met**	**Target for attribute met/not met**
1. Water Quality					
2. Water Quantity					
3. Substrate					
4. Habitat Structure					
5. Habitat Composition.					
6. Population Attributes					
7. Barriers to movement					
8. Biological Disturbance					
9. Physical disturbance/ management.					
Condition of Feature					

APPENDIX 6

OPEN WATER SSSI CONDITION ASSESSMENT: RECORDING FORM (EXAMPLE FOR RIVER SSSIS)

1. SITE: ..... 2. MONITORING UNIT: ..... 3. FEATURE: .....

4. WETLAND TYPE: RIVER / OPEN WATER / CANAL / DITCH / FEN / BOG (Give type with NVC community where relevant) .....

Attribute	Attribute Indicators	Target	Target met/not met (Give % attribute not meeting target and show area on map)
1. Extent of feature			
2. Water Quality	Information to be provided by the EA?		
3. Water Quantity	Information to be provided by the EA?		
4. Substrate			
5. Habitat Structure (Including banksides)			
6. Habitat Composition / Plant Community (*see note below)			
7. Population Attributes (*see note below)			
8. Barriers to movement			

APPENDIX 6

OPEN WATER SSSI CONDITION ASSESSMENT: RECORDING FORM (EXAMPLE FOR RIVER SSSIS CONTINUED)

Attribute	Attribute Indicators	Target	Target met/not met (Give % attribute not meeting target and show area on map)
9. Biological Disturbance			
10. Physical Disturbance (including management) Identify appropriate operations from those listed as likely to damage the special interest			
Condition of Feature			

NB: * A separate form should normally be completed for each habitat and population feature within the Monitoring Unit. Attributes 5 and 6 should not be reported on the same form.

APPENDIX 7

OPEN WATER SSSI CONDITION ASSESSMENT: TABLE OF POTENTIAL ATTRIBUTES (EXAMPLE FOR RIVER SSSIS)

Attribute	**Attribute Indicators: (*Information on items shown in bold italics could potentially be provided by the EA*)**	**Target**	**Target met/not met (Give % attribute not meeting target & show area on map)**
1.Extent of Feature	Establish area of habitat or extent of population and show on site map.	To maintain whole feature in favourable condition.	
2. Water Quality	***Establish limits of suitable chemical indicators eg phosphorus, arranging analysis for first three years on a quarterly basis, then annually in July*** Monitor biological indicators (eg benthic algae) (see "Substrate" below).	Predetermine upper and lower concentrations likely to maintain condition of site.	
3. Water Quantity	***Check levels annually in July/August***	Set targets and maintain within levels.	
4. Substrate	Identify areas of pools/riffles/gravel beds etc. Assess ratio of vegetated to open substrate and quality of sediment (eg., size of particle).	Set targets and maintain sediment quality. (Assess proportion of cover at each visit. How is this changing?)	
5. Habitat Structure (Including banksides)	Ratio of aquatic vegetation and open water (Subdivided into floating and emergent).	Predetermine optimum ratio: eg: open water 50%: floating 30%: emergent 20%. (Assess proportion of cover at each visit. How is this changing?)	
6. Habitat Composition/ Plant Community **(*See note below)**	Positive: frequency of positive indicator species (submerged/ floating and emergent) – choose NVC constants not rarities (eg., *Ranunculus* spp.) Negative: frequency of negative indicator species (submerged/ floating and emergent) (eg., presence of undesirable species such as blanket weed).	Predetermine positive /negative indicators and their frequency (% cover?) in relation to condition (eg., blanket weed abundant - condition = unfavourable). (Assess % cover of positive/negative species at each visit. In which direction is this changing?)	
7. Population Attributes **(*See note below)**	cSAC/BAP or other key species: condition monitoring will not be practical for all key species. If key plant or animals are easily identified at particular times of year then population monitoring could be initiated.	Determine any key species suitable for inclusion in condition monitoring and set target for favourable condition	

APPENDIX 7 CONT'D.

OPEN WATER SSSI CONDITION ASSESSMENT: TABLE OF POTENTIAL ATTRIBUTES (EXAMPLE FOR RIVER SSSI)

Attribute	**Attribute Indicators: (*Information on items shown bold to be provided by the EA*)**	**Target**	**Target met/not met (Give % attribute not meeting target and show area on map)**
8. Barriers to movement	Identify and assess significance of all barriers within recording unit.	No artificial barriers significantly obstructing adults of target species reaching spawning grounds and/or young reaching sea.	
9. Biological Disturbance	***Stocking waters with designated species (eg non-native crayfish).***	No introduction of designated species.	
10. Physical disturbance (including management)	Identify appropriate operations from the list of those listed as likely to damage the special interest such as: Cutting of vegetation (aquatic/terrestrial (herbaceous or woody)) Use of aquicides (presence of quantities of dead plant material during normal growing season) Signs of recent land drainage Damage to terrestrial habitats (eg., due to creation of fishing stands etc). Damage to aquatic habitats (eg., due to creation of fishing stands or by passage of boats etc). Signs of litter or other pollution Other signs of human disturbance (eg., access into refuge areas/ noise from boats etc).	No activities without consents	Identify extent of activity

NB: *A separate form should normally be completed for each habitat and population feature within the monitoring Unit. Attributes 5 & 6 should not be reported on the same form

APPENDIX 8

OPEN WATER SSSI CONDITION ASSESSMENT: BASIC INFORMATION FOR CONDITION MONITORING OF WETLAND SITES

The following information should be recorded on the Condition Assessment Recording Form (example attached). The results from each visit should be summarised on the Summary Table of Condition of Feature (example attached).

1.1. SITE NAME

1.2. MONITORING UNIT NO.

1.3. WETLAND TYPE: identify whether a River/Open Water/Canal/Ditch/Fen/bog (Give type with NVC community where relevant).

1.4. FEATURE TO BE MONITORED: a feature is one aspect of the scientific interest for which the site was notified – normally a semi-natural habitat or rare species. One form should normally be completed for each feature within the Unit)

0.5. EXTENT OF THE FEATURE: give area of habitat or extent of population and show on site map.

1.6. ATTRIBUTES: select attributes (physical, chemical or biological indicator of condition) from the Table of Potential Attributes below. **Certain attributes may be considered mandatory** (eg., one failure among mandatory attributes = unfavourable condition).

1.7 CONDITION: select from the following options: favourable maintained/favourable recovered/ unfavourable improving/unfavourable no changes/unfavourable declining/destroyed. **Note that changes in condition (eg., improving, declining etc) can only be estimated on a second visit.** The extent of community (recoverable reduction = unfavourable; non-recoverable reduction = partially destroyed) should be mapped.

NB. Detailed methodologies should be developed for each type of wetland site in consultation with Conservation Officers and other specialists. Note also that condition assessment visits to river and open water sites have health and safety implications not applicable to dry habitats. For instance a boat may be required in some cases. Working methods including risk assessment should therefore be agreed with line managers before carrying out monitoring.