Improvement Programme for England's Natura 2000 Sites (IPENS) – Planning for the Future IPENS067

Surface water catchment mapping for Natura 2000 Diffuse Water Pollution Plans

Covers multiple Natura 2000 sites within England

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Foreword

The **Improvement Programme for England's Natura 2000 sites (IPENS)**, supported by European Union LIFE+ funding, is a new strategic approach to managing England's Natura 2000 sites. It is enabling Natural England, the Environment Agency, and other key partners to plan what, how, where and when they will target their efforts on Natura 2000 sites and areas surrounding them.

As part of the IPENS programme, we are identifying gaps in our knowledge and, where possible, addressing these through a range of evidence projects. The project findings are being used to help develop our Theme Plans and Site Improvement Plans. This report is one of the evidence project studies we commissioned.

Diffuse Water Pollution (DWP) is a significant contributor to the unfavourable condition of a large number of water dependent Natura 2000 sites. DWP plans have been identified to provide a catchment-based approach to target and deliver reductions in DWP at impacted Natura 2000 sites. Accurate surface water catchment information is required for sites where DWP is an issue in order to understand the potential catchment area contributing diffuse pollution to the site.

This project looked to identify the contributing surface water catchment boundaries for 50 individual Natura 2000 sites throughout England. This report briefly details the methodology used to delineate these catchments and outlines the project output, which is an ESRI Shapefile detailing all of the surface water contributing catchments for the impacted Natura 2000 sites.

This information will allow Natural England to delimit the search area of diffuse pollution risk and improve targeting of mitigation measures.

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1 INTRODUCTION

Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are collectively known as Natura 2000 sites and are protected under European legislation for their important wildlife and habitats. In England there are 337 Natura 2000 sites covering 2,077,276 hectares. The IPENS programme is a strategic approach to managing England's Natura 2000 (N2K) sites and is financially supported by the European Community.

Natural England believe that Diffuse Water Pollution (DWP) is a significant contributor to the unfavourable condition of a large number of water dependent N2K sites (leading to failure to meet Protected Area requirements under the Water Framework Directive). DWP plans have been identified by Natural England and the Environment Agency to provide a catchment-based approach to target and deliver reductions in DWP at impacted N2K sites. In order to deliver such catchment-based improvements requires an accurate surface water catchment where DWP is an issue in order to understand the potential catchment area contributing diffuse pollution to the N2K site. Possessing such information will allow Natural England to delimit the search area of diffuse pollution risk and improve targeting of mitigation measures.

Cascade have been tasked with identifying the contributing surface water catchment boundaries (groundwater is not considered) for 50 individual N2K sites throughout England, with a total of 129 underpinning SSSIs. This report briefly details the methodology used to delineate these catchments and outlines the project output, which is an ESRI Shapefile detailing all of the surface water contributing catchments for the impacted N2K sites. This shapefile is known as *N2K_DWP_SurfaceWaterCatchments_Dec2014.shp* (hereafter known as the surface water catchment shapefile). The surface water catchment shapefile also contains summaries of all key points collected during conversations with Natural England N2K site officers.

2 METHODOLOGY

Given the area covered by the 50 N2K sites (and underpinning SSSIs) a simple methodology was chosen to allow identification of surface water catchments using freely available data and established geoprocessing techniques.

2.1 DATA SOURCES AND SOFTWARE

In order to identify surface water catchments a range of spatial data was used. Each of the datasets used, their sources and a description of each are detailed in Table 2.1.

Table 2.1 Data used during completion of the project

Data	Provider	Source	Description
Special Areas of Conservation (England)	Natural England	Environment Agency Geostore (http://www.geostore.com/environment-agency/)	Vector shapefile.
Special Protection Areas (England)	Natural England	Environment Agency Geostore (http://www.geostore.com/environment-agency/)	Vector shapefile.
Sites of Special Scientific Interest (England)	Natural England	Environment Agency Geostore (http://www.geostore.com/environment-agency/)	Vector shapefile.
Sites of Special Scientific Interest Unit (England)	Natural England	Environment Agency Geostore (http://www.geostore.com/environment-agency/)	Splits SSSI into individual management units. Vector shapefile.
WFD - River Waterbodies Cycle 2 (Draft)	Environment Agency	Environment Agency Geostore (http://www.geostore.com/environment-agency/)	Shapefile illustrating WFD River Waterbodies from Cycle 2 Draft (used as a visual aid to identify watercourses during GIS mapping).
OS Terrain 50	Ordnance Survey	OS OpenData (https://www.ordnancesurvey.co.uk/opendatadownload)	50m Digital Elevation Model (DEM) files for the entire UK saved as ASCII grid format. Version: 07/2014.
Strategi	Ordnance Survey	OS OpenData (https://www.ordnancesurvey.co.uk/opendatadownload)	A small scale-vector mapping product. The coastline layer was used in this project. Version: 01/2014.

The Ordnance Survey data used is freely available for use on the condition that suitable attribution is provided (quoting the following on any outputs where the data is or has been used: *Contains Ordnance Survey data © Crown copyright and database right [year])*.

Spatial analysis and geoprocessing was undertaken using established open source software. QGIS (http://www.qgis.org) was used for spatial analysis, editing and creation of shapefiles while Whitebox Geospatial Analysis Tools (http://www.uoguelph.ca/~hydrogeo/Whitebox/) was used for raster processing of Digital Elevation Models (DEMs) to determine surface water catchments.

2.2 LIST OF IMPACTED SITES CONSIDERED

The project considers 50 impacted N2K sites identified in the original proposal tender document, and their underlying SSSIs. These sites are listed in Appendix 1. This list was used as the key starting point for discussions with Natural England staff.

The project output surface water catchment shapefile contains brief notes made during discussions with Natural England staff and represents the final list of sites.

2.3 DEFINING IMPACTED SITES

In order to understand how diffuse pollution impacted each of the selected N2K sites (Appendix 1), which of the underpinning SSSIs were affected by diffuse pollution and at what point diffuse pollution impacts ceased, direct communication with the Natural England staff responsible for each site was undertaken.

In order to obtain the required information to derive an accurate surface water catchment five detailed questions were drawn up and e-mailed to each member of Natural England staff responsible for each site. These questions were:

1) Within the SAC/SSSI which you manage, which parts are impacted by diffuse pollution?

2) In order for them to define the catchment area which influences an SSSI we require a point on the landscape. Can you specify the downstream point within the SSSI where diffuse pollution ceases to impact upon the SSSI. The point needs to be within the SSSI/N2K site. This may be the downstream point of the SSSI, if the most downstream end is impacted by DWP, but if the DWP impact limited to an area further upstream or only part of a site (e.g. lake within a larger site) you will need to identify the downstream point for that part of the sites or parts if there are several discrete areas impacted by DWP. If you could provide an NGR that would be extremely useful. If this is not straightforward, they will generate this from topography and other information following discussion with you.

3) Is the impacted part of the SAC connected (i.e. by a channel etc.) to any other impacted parts of the SAC? If so please can you let us know all the areas and how they are connected so we can determine if this forms one (catchment) area or more than one (catchment) area.

4) Are there any artificial influences on water flow within or upstream of the part of the SAC at risk. For example, there may be flow connections between lakes, catchwaters, or there may be pumped inflows from rivers/lakes. We don't need to know about STWs inputs, just inputs from other catchments where we might also need to control DWP issues.

5) If the part of the SAC at risk is particularly flat, are inflows predominantly groundwater? If so, from your experience, what do you consider the extent of potential area around the SSSI where overland diffuse pollution poses a risk?

Responses were collated and used to define the surface water catchment area which contributes to diffuse water pollution at each site.

Unfortunately, due to constraints on Natural England staff, responses for a number of sites were not received. These sites have been listed in Table 2.2.

Table 2.2 N2K sites where information was not provided

Natura 2000 sites with DWP issue	Underpinning SSSIs with DWP issue
Benacre to Eston Bavents Lagoons SAC	Pakefield to Easton Bavents
Fal & Helford SAC	Carricknath Point to Pothbean Beach Coverack to Porthoustock Cuckoo Rock to Turbout Point Gerrans Bay to Camels Cove Lower Fal & Helford Intertidal Malpas Estuary Meneage Coastal Section Merthen Wood Rosemullion Upper Fal Estuary & Woods
Leighton Moss SPA	Leighton Moss
Minsmere-Walberswick Heaths and Marshes SAC	Minsmere-Walberswick Heaths and Marshes
Morecambe Bay Pavements SAC	Hawes Water
Mottey Meadows SAC	Mottey Meadows
Ouse Washes SAC & SPA	Ouse Washes
River Eden SAC	River Eden
River Ehen SAC	River Ehen
River Wensum SAC	River Wensum
Solent Maritime SAC	Eling and Bury marshes Newtown Harbour
The Broads SAC	Ant Broads and Marshes Barnby Broad and marshes Bure Broads and Marshes Burgh Common and Muckfleet Marshes Geldeston Meadows Shallam Dyke Marshes Sprat's Water and Marshes (Carlton Colville) Stanley and Alder Carrs (Aldeby) Trinity Broads Upper Thurne Broads and Marshes Yare Broads and Marshes
West Dorset Alder Woods SAC	Aunt Mary's Bottom Eggardon Hill & Luccas Farm Frome St Quintin Mapperton & Porton Vales Powerstock Common & Wytherston Farm Toller Porcorum Whetley Meadows Woolcombe

In the case where no information was received the point where diffuse water pollution impacts were thought to cease was determined with reference to the existing river layer, DEM and other available information (e.g. designated site citations). The point

chosen represented the most downstream point of the SSSI.

2.4 DIGITAL ELEVATION MODEL CATCHMENT DELINEATION

The surface water catchments contributing diffuse pollution to each N2K site identified were derived using geoprocessing of DEMs and subsequent analysis within QGIS to produce the final output.

2.4.1 DEM Pre-processing and Pour Point identification

In order to delineate catchments the OS OpenData OS Terrain 50 50m resolution DEM of the UK was used. The standard product is split into multiple files which cover 100km^2 areas of the UK. For the purposes of this project these files were merged into a single DEM of the entire UK which was then clipped to exclude most of surrounding coastal environment and much of Scotland (excluding the section required to delineate the River Tweed catchment). This clipping created a smaller DEM which required less computational resources to process.

The resulting DEM was loaded into Whitebox GAT in order to perform a standard series of geoprocessing techniques to create the required raster outputs for delineating catchments. These steps are briefly detailed below in order of application:

Sink filling: The Planchon and Darboux depression filling algorithm was used to fill depressions and smooth flat areas contained in the DEM, creating a “hydrologically correct” DEM. This is a common and very important pre-processing step which removes depressions or flat areas which can impact on deriving river traces using flow-path analysis tools which require continuous flow paths between grid cells and a flow-path outlet.

Flow direction: After filling sinks, the DEM grid was processed using a D8 algorithm to derive the downslope flow directions per grid cell to facilitate flow-path analysis.

Flow accumulation: A D8 single direction flow accumulation algorithm was applied to the resulting D8 flow direction grid to determine the upslope contributing area for each cell in the DEM. This resulted in a grid of flow accumulation features resembling streams which were then extracted.

Stream extraction: Using the output from the D8 flow accumulation algorithm the stream extraction tool was applied to extract the likely stream cells using a catchment threshold of 25000 (i.e. 25000 or greater cells make up a catchment area which can initiate and maintain a channel). This value was chosen by experimentation on the filled DEM and represents a balance between the number of extracted streams and unrealistic catchment sizes, since too low a number results many streams and thin, hydrologically unrealistic catchments. This layer was also extracted as a vector shapefile to assist in positioning pour points.

Pour points: Using information derived from discussions with Natural England staff and responses to the five detailed questions, notably the downstream point where diffuse pollution ceases to impact the N2K site, pour points were created for each N2K site in QGIS. These pour points represent the point from which the upstream surface water catchment area will be delineated. In order to ensure that each pour point was associated with a stream grid cell (derived earlier) the Jenson Snap Pour Point algorithm was applied to the pour point shapefile.

Watershed: In order to delineate surface water catchments for each N2K site the snapped pour points derived in the previous step were used along with the D8 flow pointers to determine the upslope contributing area for each of the pour points. The generated surface water catchments for each pour point were converted from raster to vector polygons for use, and where necessary, editing, in QGIS.

2.4.2 Surface water catchment delineation

Since an N2K site may not be fed directly by a watercourse or may have significant artificial influence (e.g. from water management or drains) the delineated surface water catchments generated by the geoprocessing steps detailed above may not have been correct for a specific site. At such sites the catchment would require modification and manipulation. As such three methods of delineating catchments were considered to deal with this outcome:

- Automatic catchment delineation
- Automatic catchment delineation with manual corrections
- Manual catchment delineation

Each of these methods is discussed briefly below.

Automatic catchment delineation

This method is essentially the surface water catchment delineated using the steps detailed earlier, where no modification to the catchment was required. This method was commonly used for river sites (e.g. River Ehen, River Tweed, River Wye etc) and also sites which were outflows from lakes (e.g. Hornsea Mere).

Catchments which were automatically delineated are identified in the surface water catchment shapefile attribute table as "Automatic" (Table 3.1).

Automatic catchment delineation with manual corrections

This method took the delineated surface water catchment and, where necessary, manual corrections to the catchment boundary were applied in order to capture areas not covered by the automatic delineation. Manual correction of a delineated

catchment was generally applied where the following occurred:

- Artificial drainage influencing a site which is not represented on a DEM, e.g. Somerset Levels or The Broads.
- Inter-catchment areas where the catchment delineation omits areas of land surface between catchments where streams do not flow. This commonly occurs at the coast or in estuaries, e.g. Lindisfarne.
- Where no distinct rivers flow through a site, e.g. several of the Dorset Heaths sites.

Manual delineation at a site was achieved by using a combination of information, predominantly knowledge acquired during conversations with Natural England staff, river flow path data (existing and derived from DEM processing), topographical mapping and land surface contours.

Catchments which were automatically delineated with manual corrections applied are identified in the surface water catchment shapefile attribute table as "Automatic and manual" (Table 3.1).

Manual catchment delineation

Where it was not possible to automatically delineate a water surface catchment for a site using DEM geoprocessing, the catchment had to be manually delineated. This commonly occurred for coastal N2K sites or inland sites where rivers rarely flowed into these sites, e.g. Hastings Cliff SAC, Carricknath Point to Pothbean Beach SSSI (part of Fal and Helford SAC), Greendale Mires SSSI (Wast Water SAC) etc. or where sites were located in the upper areas of a catchment e.g. several of the Dorset Heaths SAC & SPA.

Manual delineation at a site was achieved by using a combination of information, predominantly knowledge acquired during conversations with Natural England staff, river flow path data (existing and derived from DEM processing), topographical mapping and land surface contours.

Additionally, surrounding catchments were used to assist in accurately defining a manual catchment. As such temporary catchments were commonly derived in order to assist with manual delineation and these ensured accurate representations, particularly for coastal N2K sites.

Catchments which were manually delineated are identified in the surface water catchment shapefile attribute table as "Manual" (Table 3.1).

2.4.3 Comparison of catchments with existing DWP catchments

As per the proposal a visual comparison between existing Natural England DWP catchments (layer provided by Chris Burgess at the EA dated Oct 2014) and the ones delineated in the project has been undertaken. The check identifies any significant differences between the catchments and explains the reasons for these. The notes of the check are stored in the attribute table (Table 3.1).

2.4.4 DEM caveats

There are several caveats with respect to the outputs from the project which should be highlighted and considered by the user of the project outputs.

- Where a catchment is delineated for an N2K site it does not by default always cover an entire N2K site. This is intentional as this project was to map the upstream surface water catchment for the part(s) of the site that is impacted by diffuse pollution and not to map the surface water catchment for the N2K site.

- Where two N2K sites identified in the site list occur within a single surface water catchment both have their catchments defined separately (for example the Fal and Helford SAC containing the Upper Fal Estuary and Woods SSSI and Malpas Estuary SSSI). Similarly a large surface water catchment may also cover several SAC or SSSI units not identified in the original project as being at risk of diffuse water pollution.

- The resolution of the DEM (50m) limits the precision of the surface water catchment boundaries, these generally being “jagged” due to the cell nature of the DEM. Despite this the spatial resolution is more than ample to define surface water catchment area and define management options to reduce impacts of diffuse pollution.

- The presence of artificial drainage channels which cannot be accurately represented on DEMs may lead to the boundaries of several water surface catchments not according exactly with reality. In these incidences the delineated catchments have been manually corrected using a range of information, including information from Natural England staff, and are assumed to represent the most appropriate boundary with the information available.

- Manually delineated catchments are, by definition, less accurate than those delineated automatically. However all available information has been used to provide the most appropriate surface water catchment boundary for the site.

However, none of these caveats have an impact on the use of the delineated surface water catchments.

3 PROJECT OUTPUTS

The final project output is 106 individual shapefiles containing vector polygons for each of the impacted N2K surface water catchments. These shapefiles are named individually under the format *N2K_DWP_SWC_name_month2015* (where *name* is the name of the N2K site and *month* is the short text name of the month in which the layer was saved). Due to the complexity of the coastal Fal and Helford SAC and Solent Maritime SAC these sites also have their own individual shapefiles to provide coverage of the numerous surface water catchments which drain into the SACs.

The shapefile format consists of a .shp, .shx, .dbf and .prj files (the standard ESRI shapefile format files). All of the output shapefiles are projected under EPSG 27700 – OSGB 1936 / British National Grid.

For all project output shapefiles the shapefile attribute table contains the five standard headings required by Natural England. Additionally, since the shapefile is also acting as a container for the information gathered during the project, the attribute table also contains several additional columns which provide specific information, these include the answers provided to each of the five detailed questions (Section 2.3), where available. Information on each attribute table heading is provided in Table 3.1.

Table 3.1 N2K diffuse catchment area shapefile attribute table headings

Name	Data type	Description
Desig_Name	String (200)	Name of the Natura 2000 / SSSI site the catchment belongs to.
Desig_Ref	String (100)	Reference number of the Natura 2000 / SSSI site that the catchment belongs to.
SAC_Name	String (254)	Name of the SAC considered by surface water catchment.
Area_Ha	Real (10.2)	Area of the catchment polygon in hectares to two decimal places.
Createdate	Date	Date catchment polygon captured (dd/mm/yyyy).
Createdby	String (50)	Name of the individual capturing the data.
NEInfoRec	String (10)	Identifies if requested site information was received from appropriate Natural England staff during the project in order to accurately identify the downstream point of impact of diffuse pollution. If no information was received the diffuse catchment was defined using the most downstream point and any additional information on the designated area (e.g. from citations).
Delin_Type	String (200)	Identifies the type of catchment delineation used (see descriptions above). Can be either Automatic, Automatic with manual correction or Manual.
OthDesName	String (254)	Name of any additional Natura 2000 / SSSI site(s) which fall within the catchment.

Name	Data type	Description
OthDesRef	String (254)	Reference number of any additional Natura 2000 / SSSI site(s) which fall within the catchment.
DWPCtCheck	String (254)	This briefly details the results of a visual check of differences (if any) between the existing Natural England DWP catchments and the ones generated by this project.
AreaOfImp	String (254)	Area of SAC/SSSI impacted by diffuse pollution.
DiffPolEnd	String (254)	This defines the downstream most point within the SAC/SSSI where diffuse pollution ceases to impact upon the SAC/SSSI.
Connected	String (254)	Identifies if the impacted SAC/SSSI is connected to another SAC/SSSI (e.g. by a channel or drainage ditch).
FlowArtInf	String (254)	Identifies if there are any artificial influences on water flow within or upstream of the part of the SAC/SSSI at risk (e.g. drainage ditches, catchwaters etc.).
GWInflow	String (254)	Identifies if inflows to the SAC/SSSI at risk are predominantly from groundwater.
OthDesSite	String (254)	This identifies if the diffuse water pollution surface water catchment of an N2K site drains into any other SAC or SPA sites downstream, identifying and other impacted sites.
Point_x	Integer (10)	x coordinate (OSGB 1936) of the downstream most pour point used to define the diffuse water pollution surface water catchment.
Point_y	Integer (10)	y coordinate (OSGB 1936) of the downstream most pour point used to define the diffuse water pollution surface water catchment.

Emboldened text in Table 3.1 highlights that the attribute column names are Natural England standard attribute table headings which are required as a minimum.

Rows highlighted in grey in Table 3.1 indicate attribute table columns which contain the specific questions asked to all relevant Natural England staff in order to identify area of impact etc. for N2K site. The attribute table contains the results to these answers, where given.

Natural England GI Standards were followed during the creation of the surface water catchment shapefile. Editing of the shapefile was undertaken using specific options within QGIS which prevent the occurrence of topological errors, sliver polygons, overlapping polygons etc. This was further reinforced by visual checks of polygons to ensure compliance.

Appendix 1

N2K sites and underpinning SSSIs identified and included in the project

No	Natura 2000 sites with DWP issue	Underpinning SSSIs with DWP issue
1	Benacre to Eston Bavents Lagoons SAC	Pakefield to Easton Bavents
2	Berwickshire & North Northumberland Coast SAC	Lindisfarne
3	Breckland SAC	Barnhamcross Common, Berner's Heath (Icklingham), Breakland Farmland, Breakland Forest, Bridgeham & Brettenham Heaths, Cavenham-Icklingham Heaths, Cranwich Camp, Deadman's Grave (Icklingham), East Wrentham Heath, Field Barn Heaths (Hilborough) Foxhole Heaths (Eriswell), Gooderstone Warren, Grime's Graves, Lakenheath Warren, RAF Lakenheath, Stanford Training Area, Thetford Golf Course & Marsh, Thetford Heath, Wangford Warren & Carr, Weather & Horn Heaths (Eriswell), Weeting Heath
4	Brown Moss SAC	Brown Moss
5	Chesil & Fleet SAC	Chesil & Fleet
6	Cothill Fen SAC	Cothill Fen
7	Craven Limestone Complex SAC	Malham-Arncliffe
8	Denby Grange Colliery Ponds SAC	Denby Grange Colliery Ponds
9	Dorset Heaths SAC & SPA	Bourne Valley, Canford Heath, Ebblake Bog, Holt and West Moors Heaths, Holton and Sandford Heaths, Horton Common, Lions Hill, Parley Common, Slop Bog and Uddens Heath, Stokeford Heaths, Turbary and Kinson Commons, Upton Heath
10	Fal & Helford SAC	Carricknath Point to Pothbean Beach, Coverack to Porthoustock, Cuckoo Rock to Turbout Point, Gerrans Bay to Camels Cove, Lower Fal & Helford Intertidal, Malpas Estuary, Meneage Coastal Section, Merthen Wood, Rosemullion, Upper Fal Estuary & Woods
11	Hastings Cliffs SAC	Hastings Cliffs
12	Hornsea Mere SPA	Horsea Mere
13	Kennet and Lambourn Floodplain SAC	Chilton Foliat Meadows
14	Leighton Moss SPA	Leighton Moss
15	Lindisfarne SPA	Lindisfarne
16	Marizion Marsh SPA	Marizion Marsh
17	Martin Mere SPA	Martin Mere (Burscough)
18	Minsmere-Walberswick Heaths and Marshes SAC	Minsmere-Walberswick Heaths and Marshes
19	Morecambe Bay Pavements SAC	Hawes Water
20	Mottey Meadows SAC	Mottey Meadows

21	Norfolk Valley Fens SAC	Potter & Scarning Fens
22	Oak Mere SAC	Oak Mere
23	Ouse Washes SAC & SPA	Ouse Washes
24	Peak District Dales SAC	The Wye Valley
25	Poole Harbour SPA	Poole Harbour
26	Portholme SAC	Portholme
27	Portsmouth Harbour SPA	Portsmouth Harbour
28	River Avon SAC	Avon Valley (Bickton to Christchurch), River Avon system, River Till
29	River Axe SAC	River Axe
30	River Camel SAC	River Camel
31	River Clun SAC	River Teme
32	River Dee and Bala Lake SAC	River Dee
33	River Derwent and Bassenthewaite Lake SAC	River Derwent and Tributaries, Bassenthwaite lake
34	River Derwent SAC	River Derwent (Yorkshire)
35	River Eden SAC	River Eden
36	River Ehen SAC	River Ehen
37	River Itchen SAC	River Itchen
38	River Kent SAC	River Kent and Tributaries
39	River Lambourn SAC	River Lambourn
40	River Mease SAC	River Mease
41	River Tweed SAC & Tweed Estuary SAC	Tweed Catchment Rivers – England:Lower Tweed and Whiteadder, Tweed catchment rivers – Till Catchment
42	River Wensum SAC	River Wensum
43	River Wye SAC	River Wye, River Lugg
44	Solent Maritime SAC	Eling and Bury marshes, Newtown Harbour, Chichester Harbour, Langstone Harbour, Lee-on-the-solent to Itchen Estuary, Lincegrove and Hacketts Marshes, Upper Hamble Estuary and Woods
45	Somerset Levels and Moors SPA	Catcott, Edington and Chilton Moors, Curry and Hay Moors, King's Sedgemoor, Moorlinch, Shapwick Heath, Southlake Moor, Tealham and Tadham Moors, West Sedgemoor, Westhay Heath, Westhay Moor, Wet Moor
46	Stodmarsh SPA	Stodmarsh
47	The Broads SAC	Ant Broads and Marshes, Bure Broads and Marshes, Burgh Common and Muckfleet Marshes, Trinity Broads, Shallam Dyke Marshes, Upper Thurne Broads and Marshes, Barnby Broad and marshes, Geldeston Meadows, Sprat's Water and Marshes (Carlton Colville), Stanely and Alder Carrs (Aldeby), Yare Broads and Marshes
48	Wast Water SAC	Greendale Mires, Wastdale Screes, Wast Water
49	West Dorset Alder Woods SAC	Aunt Mary's Bottom, Eggardon Hill & Luccas Farm, Frome St Quintin, Mapperton & Poorton Vales, Powerstock Common & Wytherston Farm, Toller Porcorum, Whetley Meadows, Woolcombe
50	West Midland Mosses SAC	Abbotts Moss, Wybunbury Moss