Important Areas for Ponds (IAPs) in the Environment Agency Southern Region

Helen Keeble, Penny Williams, Jeremy Biggs and Mike Athanson

Report prepared by:
Pond Conservation
c/o Oxford Brookes University
Gipsy Lane, Headington
Oxford, OX3 0BP

Report produced for:
Environment Agency
Southern Regional Office
Guildbourne House
Chatsworth Road, Worthing
Sussex, BN11 1LD

Acknowledgements

We would like to thank all those who took time to send pond data and pictures or other information for this assessment. In particular: Adam Fulton, Alex Lockton, Alice Hiley, Alison Cross, Alistair Kirk, Amanda Bassett, Andrew Lawson, Anne Marston, Becky Collybeer, Beth Newman, Bradley Jamieson, Catherine Fuller, Chris Catling, Daniel Piec, David Holyoak, David Rumble, Debbie Miller, Debbie Tann, Dominic Price, Dorothy Wright, Ed Jarzembowski, Garf Williams, Garth Foster, Georgina Terry, Guy Hagg, Hannah Cook, Henri Brocklebank, Ian Boyd, Jackie Kelly, Jane Frostick, Jay Doyle, Jo Thornton, Joe Stevens, John Durnell, Jonty Denton, Katharine Parkes, Kevin Walker, Kirsten Wright, Laurie Jackson, Lee Brady, Lizzy Peat, Martin Rand, Mary Campling, Matt Shardlow, Mike Phillips, Naomi Ewald, Natalie Rogers, Nic Ferriday, Nick Stewart, Nicky Court, Nicola Barnfather, Oli Grafton, Pauline Morrow, Penny Green, Pete Thompson, Phil Buckley, Philip Sansum, Rachael Hunter, Richard Grogan, Richard Moyse, Richard Osmond, Rufus Sage, Russell Wright, Sarah Jane Chimbwandira, Sheila Brooke, Simon Weymouth, Steph Ames, Terry Langford, Tom Butterworth, Tom Reid, Vicky Kindemba.

Cover photograph: Low Weald Pond, Lee Brady

Report production: February 2009
Consultation: March 2009

SUMMARY

Ponds are an important freshwater habitat and play a key role in maintaining biodiversity at the landscape level. However, they are vulnerable to environmental degradation and there is evidence that, at a national level, pond quality is declining.

Until recently, ponds have received relatively little statutory protection. This changed in 2007, when high quality ponds (Priority Ponds) were added to the list of UK Biodiversity Action Plan (BAP) Priority Habitats.

The Important Areas for Ponds (IAPs) project was set up to identify the location of Priority Ponds and the geographic areas in which Priority Ponds are concentrated.

Once identified, IAPs provide a generic resource which can be used to protect ponds and to further the aims of the new Pond Habitat Action Plan. In particular, IAPs raise awareness of the location of pond clusters that support freshwater species or assemblages of regional, national or international significance. They also provide a focus in which to target conservation effort to monitor, manage and create appropriate pond types.

This report covers the areas in the South-east of England that fall within the EA Southern Region (Kent, Sussex, the Isle of Wight, and parts of Hampshire and Surrey), and was developed with funding from the Environment Agency. Within this area, Priority Ponds were identified using a standard set of biological criteria, using available data held by a wide range of pond stakeholders. Individual ponds within each IAP were further classified as being of either European or National Importance depending on the species or assemblages they supported.

Within the Environment Agency Southern Region, twelve areas were identified for IAP status:

- The New Forest and Avon Valley IAP
- Thorney Island IAP
- Woolmer IAP
- Western Rother Valley IAP
- Sussex Heaths IAP
- Ashdown IAP
- Newhaven IAP
- Pevensey IAP
- Winchelsea IAP
- Dungeness IAP
- Ashford District IAP
- North Kent Marshes IAP

Another, larger, IAP covering the central Wealden area was identified for its high concentrations of Great Crested Newts. This GCN IAP spans parts of four counties: Kent, East Sussex, West Sussex, and Surrey:

- Wealden Great Crested Newt IAP

Overall, the assessment of IAPs in the Environment Agency Southern Region highlights the importance of the pond resource, and provides a framework in which to deliver the Pond Habitat Action Plan through practical ‘on the ground’ conservation action that will help to protect the UK’s freshwater biodiversity.

TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Ponds and their protection 1
1.2 The Important Areas for Ponds (IAP) concept 2
1.3 The National Pond Monitoring Network (NPMN) 3

2 PONDS AND SOUTHERN ENGLAND 4
2.1 Background to the study area 4
2.2 The pond resource in Southern England 4
2.3 Biodiversity importance of ponds in Southern England 5
2.4 Ponds in a wider context 6
2.5 Threats and opportunities 7
2.6 Pond protection 9

3 SELECTION OF IMPORTANT AREAS FOR PONDS (IAPS) IN THE ENVIRONMENT AGENCY SOUTHERN REGION 10
3.1 Definitions 10
3.2 Overview of IAP selection process 11
3.3 Priority Ponds selection criteria 12
3.4 Data collection 15
3.5 Identification of Important Areas for Ponds (IAP) 16
3.6 Data limitation and gaps 17

4 OVERVIEW 19
4.1 Important Areas for Ponds (IAPs) 19

5 IMPORTANT AREAS FOR PONDS (IAPS) IN SOUTHERN ENGLAND 24
5.1 The New Forest and Avon Valley IAP 24
5.2 Thorney Island IAP 34
5.3 Woolmer IAP 39
5.4 Western Rother Valley IAP 44
5.5 Sussex Heaths IAP 48
5.6 Ashdown IAP 52
5.7 Newhaven IAP 56
5.8 Pevensey IAP 60
5.9 Winchelsea IAP 65
5.10 Dungeness IAP 69
5.11 Ashford District IAP 73
5.12 North Kent Marshes IAP 77

6 WEALDEN GREAT CRESTED NEWT IAP 81
6.1 Wealden GCN IAP 81

7 CONCLUSIONS AND RECOMMENDATIONS 88
7.1 Conclusions 88
7.2 Recommendations 89

8 REFERENCES 92
Appendix 1 List of protected species associated with ponds in Southern England 95
Appendix 2 Revised Pond Priority Habitat Proposal December 2006 96
Appendix 3 List of contacts 99
Appendix 4. Overview of datasets collated for the IAP assessment 101
Appendix 5. Post 1987 10 x 10 km square records for the Small Red Damselfly, Downy Emerald and Hairy Dragonfly 102

1 Introduction

1.1 Ponds and their protection

Ponds are increasingly recognised as important freshwater habitats that play a significant role in maintaining freshwater biodiversity at a landscape level. Individually, countryside ponds have, on average, lower species richness at a site level than rivers or lakes, and this has often led to the general assumption that they are less important than these larger habitats. However, the value of ponds lies in the varied network of habitats that they provide, and at a regional level ponds are often more important in maintaining regional freshwater biodiversity than other more extensive freshwater habitats (Williams *et al.*, 2004; Davies *et al.*, 2008). This pattern holds true at national level, where ponds have been shown to support more uncommon species than either rivers or lakes (Natural England unpublished data).

Ponds are also a very vulnerable habitat. They experience all of the impacts that affect other freshwaters, and additional local pressures specific to small waterbodies. For example, ponds near to urban areas are particularly exposed to the introduction of invasive non-native species (Copp *et al.*, 2005); ponds are more likely to be damaged than larger waterbodies by the artificial feeding of waterfowl. Even ponds on nature reserves with public access may be seriously damaged by the apparently trivial pressures of dogs swimming in them, constantly disturbing sediments. More generally, ponds are especially vulnerable to pollution stresses because their small size gives them limited buffering capacity compared to rivers or larger lakes. As a result of widespread destruction, pond numbers are now probably close to an all time low across Europe (Hull, 1997). In Britain, although numbers are now rising slightly, recent evidence suggests that ponds may still be declining in *quality* at a national level (Williams *et al.*, 1998) with a combination of pollution and isolation the most likely causes (Carey *et al.*, 2008).

Together, the fact that the biodiversity interest of ponds can be widely geographically distributed and the exceptional range of threats they face, makes pond protection a challenge for policy makers and managers. Ponds are generally too small to fit the standard model of site-based protection (e.g. SSSIs) and they do not fit the standard model of consent-based protection designed to protect waterbodies like lakes and rivers from industrial discharges. Despite much interest in the management of catchments, effective protection of ponds through landscape wide measures is rarely achieved. For example, small waterbodies have been largely omitted from proposals to protect surface waters under the Water Framework Directive. For all these reasons, new models of protection are required if we are to maintain the biodiversity value of these small, vulnerable freshwater habitats.

1.2 The Important Areas for Ponds (IAP) concept

The Important Areas for Ponds (IAP) concept was proposed and developed by Pond Conservation to raise awareness of geographic regions that support ponds of national or international biodiversity importance. The project was successfully piloted in Wales (Nicolet et al. 2007) prior to ponds being added to the UK list of BAP Priority Habitats in 2007.

Conceptually, IAPs are similar to initiatives developed by other organisations:

- Birdlife International's *Important Bird Areas* (IBAs): Heath *et a*l. 2000
- Plantlife International's *Important Plant Areas* (IPAs): Anderson, 2002; and *Important Stonewort Areas* (ISAs): Stewart, 2004

The aim of IAPs is to identify networks of the most important ponds and their biodiversity. These areas can then be used to help focus strategies for pond monitoring, protection and appropriate management and creation.

Specifically, knowledge of IAPs will:

- **Highlight IAPs for practitioners (including conservation agencies, local authorities, Defra and non-governmental organisations), creating a better understanding and recognition of the Priority Pond resource**

- **Increase awareness of the importance of special and often overlooked pond types (e.g. temporary ponds), and the species they protect**

- **Help in the development and delivery of the Pond Habitat Action Plan (HAP) for example, informing site identification for pond creation initiatives like the Million Ponds Project (http://www.pondconservation.org.uk/millionponds/), and assisting in the choice of flagship pond sites**

- **Help to protect pond networks and prevent fragmentation of freshwater resources**

- **Inform the planning system of areas where ponds should be given particular protection**

1.3 The National Pond Monitoring Network (NPMN)

The National Pond Monitoring Network (NPMN) was established in 2002 by Pond Conservation and the Environment Agency to obtain the data needed to protect and enhance the UK's ponds.

The aim of the NPMN is to create a focus for UK pond data collection and analysis, bringing together all organisations involved in pond conservation by:

- collating available pond survey data on an internet accessible database (www.pondnetwork.org.uk), including a UK pond inventory
- promoting pond survey work, the use of standard methods and development of new NPMN projects
- raising awareness and sharing survey findings through newsletters and reports

As an ongoing initiative with wide partner support the NPMN is now being developed as the data infrastructure for developing and reporting on the new Pond HAP. It aims to provide a suitable structure for taking forward future data gathering and other work focused on IAPs.

2 Ponds and Southern England

2.1 Background to the study area

The Environment Agency Southern Region covers an area of approximately 11,500km^2 mainly covering the counties of Kent, East and West Sussex and Hamphire and the Isle of Wight.

The region is dominated by three geological features: the trough-like syncline of the London Basin, the eroded dome of the Wealden anticline, and the Hampshire Basin to the west. The distribution of semi-natural, cultivated and developed habitats within the region broadly reflect the area's topography and geology. The region is approximately 60% agricultural land, with the remainder roughly evenly divided between woodland and urban/suburban landuse (Environment Agency, 2005).

The main centres of population lie around the coast and along the M20/26 corridor in the east of the region. Large conurbations lying along the south coast include Southampton, Portsmouth, Worthing, Brighton and Hove. Along the North Kent coast the main urban centres are Gravesend, Chatham/ Gillingham and Whitstable. Inland, Maidstone, Tunbridge Wells, Ashford and Canterbury are the main clusters of urban landuse.

Around 20% of land use can be classified as semi-natural habitat. The area is nationally significant for the following semi-natural habitats:

Table 1. Semi-natural habitat in the south-east of England

Habitat	*% of UK resource*
Lowland Heathland	37
Unimproved neutral and acid grassland	20
Ancient semi-natural woodland	22
Unimproved neutral and acid grassland	20
Vegetated shingle	68
Coastal Lagoons	36
Standing Open Water	*No data available*

Adapted from Wildlife Trusts and RSPB Report, 1998.

2.2 The pond resource in Southern England

Reliable data on pond numbers in the Environment Agency Southern Region are not currently available and mapped counts (based on Ordnance Survey data) are unreliable because of the irregularity with which maps are updated. If we assume that the Countryside Survey average density for Great Britain (c. 1.75 ponds/km^2) is applicable in the region this suggests that there around 20,000 ponds in the study area. However, the Weald has long been known to support a relatively high density of ponds, so the figure could be up to 25% higher.

Some impression of the relative density of waterbodies across the south-east region can be derived from the UK Lakes database (Hughes *et al.*, 2004). This database shows all the waterbodies mapped on 1:50,000 scale OS maps, including many quite small ponds. Pond occurrences must be interpreted with care as the total number of sites in the database is only about 10% of the known resource. However, it is likely that there is a reasonably good correspondence between areas with high densities of ponds and the water bodies contained in this database (Figure 1).

Within Southern England ponds have been created by many processes. The coastal plains, Lower Weald and Hampshire Lowlands are dotted with farm ponds. Other ponds were formed accidentally, through past human activity such as mining or mineral extraction. In the Wealden Greensand and High Weald ancient 'hammer ponds' are common, originating from the Wealden iron industry. More recently, gravel extraction has created pond and lake complexes around Chichester, Dungeness and in the Avon Valley. Isolated examples of naturally formed ponds can still be seen in the region: ponds created as cutoff meanders, floodplain undulations, naturally wet hollows and natural tree-fall pools. Though, as in other parts of the landscape, these are now in a minority. Some hilltop 'meres' (such as that in the village of Stanmer – 'stony mere'- near Brighton) may be natural features.

The New Forest and other heathland areas support exceptional mosaics of permanent and temporary ponds, some of international importance.

2.3 Biodiversity importance of ponds in Southern England

In Southern England around 40 Biodiversity Action Plan (BAP) species are associated with ponds, including plants, invertebrates, amphibians, birds and mammals (Appendix 1). Species with a particular stronghold in South-east England include: Starfruit *Damasonium alisma*, Brown Galingale *Cyperus fuscus* and Great Crested Newt *Triturus cristatus*. Ponds are also used by other BAP species with more generalist requirements such as Water Vole *Arvicola terrestris* and Otter *Lutra lutra*, and as feeding grounds by bats and birds.

Recent studies at the landscape level in Southern England have shown that ponds contribute more to regional freshwater biodiversity than rivers, lakes, ditches or streams with around 70% of all freshwater species using pond habitats (Williams *et al.*, 2004) and a significant proportion unique to this habitat type (Oertli *et al*., 2005). Studies of this kind are few, but similar patterns have been found in other parts of Europe (Davies *et al*., 2008). Ponds are also important for many semi-aquatic invertebrates and plants that occupy 'ecotones', on the boundaries between land and water, and have a role as stepping-stones, increasing the connectivity between freshwater habitats: a fact recognised by the Habitats Directive (Article 10, Council Directive 92/43/EEC).

Both single sites and pond networks can be important for biodiversity. Single ponds can act as biodiversity 'hotspots' and refuges for both terrestrial and aquatic organisms, particularly within intensively farmed landscapes. Networks of ponds are a critical component of the habitat of amphibians, many wetland plant species, fish on river floodplains, and for wetland mammals and birds that range over large areas. Many

invertebrate species, including dragonflies, are thought to require networks of ponds to sustain their populations in the long term, although specific data documenting such freshwater invertebrate meta-populations are rare.

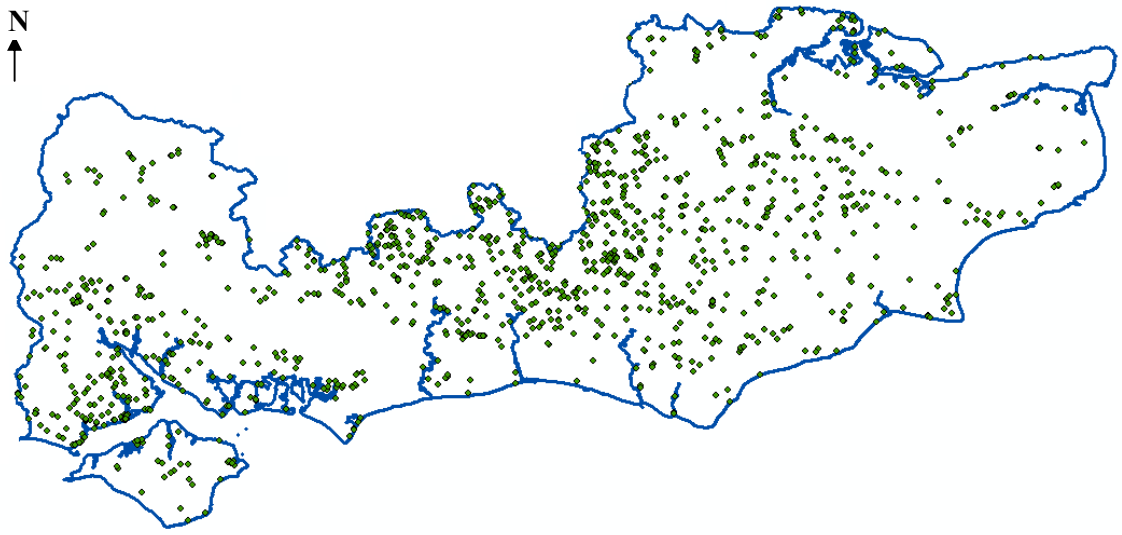


Figure 1. Ponds (waterbodies ≤2 ha.) in the Environment Agency Southern Region included in the UK lakes database[1]. Note this map shows only about 10% of all ponds and is intended only to indicate the main concentrations of ponds.

2.4 Ponds in a wider context

The small size of ponds means that these habitats can occur in all terrestrial environments, from the coast to hill tops. They are often particularly numerous in wetland environments where separating them from other habitat units can sometimes be difficult. For example, the pools in bog systems are, in effect, ponds of a natural origin, though they would not exist in the absence of the main habitat matrix. Similarly, river systems have many mechanisms from which ponds may be created; from meanders, to oxbows and cut-off channels on active braided rivers. Ponds are also created by succession in lake basins: the latter stages of many successions is a sequence of temporary ponds, and there is evidence that such habitats often outlive the life span of the original lake (Gray, 1988).

Technically, ponds can be separated from other more terrestrial habitats on grounds of hydrology or vegetation structure, although some of the boundaries are necessarily arbitrary. A pond clearly also has to be a basin which retains water, as opposed to a linear habitat with slope-based flow. For example, for the Countryside Survey the difference between a pond and a ditch is pragmatically defined as a waterbody which is

[1]The UK lakes database can be viewed at http://www.uklakes.net/. It has approximately 40,000 of the UK's half a million waterbodies. Depite its name about 90% of the 80% of the waterbodies listed are less than 2 ha in area.

15 times longer than wide; similarly an on-line pond is separated from a widening of a stream when the same ratio is approached.

Ponds also occur in many areas with high water tables: thus they can occur in any landscape which is relatively little drained where there is impervious geology or soils. Indeed many wetlands can be viewed as agglomerations of waterbodies of a variety of sizes. Almost inevitably, such areas which will be richest in the smallest of these waterbodies: ponds.

Although high quality ponds can occur in any habitat type including improved and urban environments, high quality examples are more likely to occur within blocks of semi-natural habitat, where human impacts are generally lower.

2.5 Threats and opportunities

2.5.1 Threats

Ponds are an exceptionally vulnerable habitat type and face many threats. Pond biodiversity is extensively impacted by urban development and agricultural intensification (e.g. drainage and eutrophication). Comparisons of ponds in semi-natural areas from the National Pond Survey and ponds in more intensive landuse from the Lowland Pond Survey show that, on average, ponds in the 'ordinary' countryside support only half of the expected number of wetland plant species found in un-degraded ponds (Williams *et al.*, 1998). In upland areas, ponds, in common with other waterbody types, are likely to be widely acidified both by atmospheric deposition and afforestation. However, specific studies of these impacts on ponds are scarce. Ponds may also be affected by agricultural fertilisers and pesticides including sheep dip and avermectins. Inappropriate management, and lack of management, can also lead to a loss of pond biodiversity. For example, unpublished data from studies carried out by Pond Conservation show that plant diversity can be affected by (i) an increase in shade in heathland ponds due to the lack of grazing, or (ii) the sudden removal of tree shade in lightly shaded ponds which can give a competitive advantage to invasive species, both native and alien (e.g. Bulrush *Typha latifolia*, New Zealand Pigmyweed *Crassula helmsii*). Most recently, the Countryside Survey has shown that the vast majorty of ponds - 80% - are in Bad or Poor condition (on a 4 point scale: Good, Moderate, Bad, Poor). Only 10% of ponds are in Good condition in England and Wales.

In the future, climate change may also exacerbate these threats. Inland, changes in site hydrology may lead to temporary ponds drying out completely and to more permanent ponds becoming shallower, perhaps reducing dilution of pollutants. Rising sea levels may flood coastal dune slack systems. It is possible that losses of seasonal ponds may be balanced by the shallowing of existing deeper sites; whether such a process will occur, and if it does, whether the 'new' temporary ponds will be good habitats for rare and highly scattered obligate temporary pond species such as the Fairy Shrimp *Chirocephalus diaphanus*, is unclear. Certainly, given the large number of shallow ponds in the countryside (c. 40% of ponds in the Lowland Pond Survey 1996 that contained water in summer were 10 cm or less deep (Williams *et al.*, 1998)), there is the potential for a very large-scale loss of shallow water habitat. Increasing air and water temperatures may well benefit some thermophiles like dragonflies. However, it

is equally possible that dragonflies may follow the pattern shown by butterflies in which widespread habitat generalists are spreading under climate change influences, whereas habitat specialists are declining under the effects of continued unsuitable habitat management, irrespective of the general warming (Warren *et al.*, 2001). Long-term monitoring is needed to assess these changes.

At a national level it is estimated that pond numbers in Britain dropped by around 60% during the 20th Centrury (Rackham, 1986; Biggs *et al.*, 2005). Numbers probably reached an all time low in the 1980s, but stabilised in the 1990s (Haines-Young *et al.*, 2000). The latest data suggest that, pond numbers are now increasing, with around 0.5 million ponds across Britain as a whole.

2.5.2 Opportunities

Ponds are widely threatened but they are also potentially the most easily protected of all freshwater habitats. The creation of new ponds, in particular, provides an important opportunity for landscape level protection both of ponds and also of aquatic biodiversity more generally.

It is clear that new ponds, when well-designed and protected from surface water pollution, can be exceptionally rich and valuable habitats. A pond complex created at Pinkhill Meadow in Oxfordshire in the early 1990s, quickly became as rich as the top 5% of sites in the National Pond Survey database of high quality minimally impaired sites (Williams *et al.*, 2008).

At present, however, little is known of the value of many new ponds that are created, and there are strong indications that design and usage is often sub-optimal for biodiversity. For example, a high proportion of new ponds are fed by ditches or streams that are likely to be polluted, and anecdotal evidence suggests that large numbers of new ponds are stocked with fish.

Despite such shortcomings, the relatively small size of ponds and our understanding of the techniques of good pond creation mean that they can be easily created at low cost and, using simple design principles, can rapidly attract a wide range of freshwater wildlife, including species of conservation concern. In addition, because pond catchments tend to be relatively small, and can be more readily protected than lake, river or stream catchments, it is quite feasible to create new ponds with entirely semi-natural catchments that will prevent a large component of surface water pollution impacts in the long-term (Davies, 2005).

The low cost of creation and protection, and high biodiversity value of ponds, means that they have the potential to play a valuable role in enhancing aquatic biodiversity at a landscape scale. Overall, the reduction in pond density is technically straightforward to reverse. In addition, new ponds can be strategically sited to create links, or stepping stones, between existing aquatic habitats, both still and running. Conversely, ponds can be sited in more remote areas, providing habitats that encourage colonisation by a different range of aquatic communities, and adding to regional diversity.

2.6 Pond protection

2.6.1 European legislation

Two pieces of European legislation are particularly relevant to ponds: the Habitats Directive (92/43/EEC) and the Water Framework Directive (2000/60/EC). Under the Habitats Directive, the UK has international obligations for a range of species found in ponds (Appendix 1). Annex 1 of the Directive also lists eight "habitats of high conservation importance" that either partly or wholly include ponds (see Table 2, in Section 3.3). In addition, ponds are noted in Article 10 as stepping-stone habitats, which member states need to consider in their planning policies to encourage ecological coherence of the Natura 2000 network. In practice, however, most Special Areas for Conservation (SACs) focus on larger waterbodies, so the implementation of the Habitats Directive within UK policy or legislation has, so far, had relatively little direct impact on pond protection. Most protection is likely to have come indirectly, through protection of more extensive Natura sites that include ponds within their boundaries.

The Water Framework Directive (WFD) is intended to protect the ecological quality of *all* waters in a catchment context. However, the UK, like most other national administrations, has adopted the 50 ha lower size limit of the WFD System A for the identification of standing waterbodies to which WFD will apply. Waterbodies in protected areas above 1 ha in area will also be included although this will only affect about 250 sites across England and Wales. Therefore Europe's most powerful piece of water legislation, as currently being implemented, is likely to bring relatively little additional protection for important ponds.

2.6.2 UK national legislation

At a UK level some high quality ponds occur within sites designated as Sites of Special Scientific Interest (SSSIs). However, SSSI site selection criteria tend to favour sites with individually high alpha diversity (e.g. using criteria such as plant richness or dragonfly richness, or groups such as birds and otters which require extensive habitats). This inevitably tends to bias the sample against all but the very richest individual ponds. With the exception of recently designated Great Crested Newt SACs, this means that ponds are typically not the main reason for site designation. Thus, their creation, management and protection tends to be incidental and not a specific requirement for the maintenance of site condition. A range of ponds within the study area are indirectly protected under the UK BAP through (i) the species they support (e.g. Great Crested Newt, some stoneworts), (ii) freshwater habitats which are already designated as Priority Habitats (e.g. lake HAPs) and (iii) Local Biodiversity Action Plans.

In part because of the many shortcomings of the existing protection system, ponds have recently been identified as a new UK BAP Priority Habitat. A first step in the development of the Habitat Action Plan (HAP) for ponds is to obtain information on the most important pond sites and areas across the UK. The current IAP project will provide this for the area covered by the Environment Agency Southern Region.

At a more local level ponds potentially also receive some protection through the planning process, and through agri-environment schemes, although the effectiveness of these policies has been little evaluated and lack of data make assessment difficult.

3 Selection of Important Areas for Ponds (IAPs) in the Environment Agency Southern Region

3.1 Definitions

3.1.1 Pond definition

Since the beginning of freshwater biology as a science, people have been proposing definitions of ponds based on factors such as the occurrence of rooted wetland plants, light penetration and water depth (see Biggs *et al*., 2005 for a review). None of these definitions has proved entirely satisfactory in terms of practicality, reliability or ease of use. The main definition now used in the UK is based on waterbody surface area and has been used for all national surveys of pond plant and invertebrate assemblages undertaken in the UK over the last 10-15 years (e.g. National Pond Survey, Countryside Survey). This definition is:

'a body of standing water between 1 m^2 and 2 hectares in area, which [usually] holds water for at least four months of the year'

This is a broad and inclusive definition, incorporating both natural and man-made ponds. The definition also includes waterbodies across the hydrological gradient from temporary to permanent: the "at least four months of the year" period is the approximate time that water needs to remain in a depression for it to support wetland plants.

3.1.2 Important Area for Ponds (IAP) and Priority Ponds definitions

The definition of an Important Area for Ponds (IAP) used in this study is:

'*a geographical area that supports an important concentration of Priority Ponds*'

The criteria defining 'Priority Ponds' are given in Section 3.3, and include ponds that support species of conservation concern, rich assemblages, or important or distinctive pond types likely to support special freshwater plant and animal assemblages.

The definition is, like the pond definition above, purposely broad, so that it can be applied at a range of geographic scales, depending on the information available and the characteristics of the ponds within the IAP.

Figure 2. Pond and lake at Dungeness (© Copyright Martin Horsfall and licensed for reuse under a Creative Commons Licence).

3.2 Overview of IAP selection process

In summary, the process for identifying Important Areas for Ponds in the Environment Agency Southern Region included the following steps:

1. Priority Pond criteria were defined in line with the national BAP guidelines
2. A wide range of pond and freshwater specialists were contacted to provide biotic data and expert knowledge
3. Species and assemblage data held by Pond Conservation, Local Records Centres and others were collated
4. Data were evaluated against the Priority Pond criteria
5. Priority Ponds were grouped geographically to define Important Areas for Ponds (IAPs) based on geographical location, landscape and pond type, and the species or assemblage they supported

The IAP selection process is described in more detail in the following sections.

3.3 Priority Ponds selection criteria

The criteria used for selecting Priority Ponds have been defined at a national level (http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsfinalAllhabitats20081022.pdf#P) (Appendix 2). The full definitions of the five criteria are given in Table 2. In summary they are:

1. Habitats of high conservation importance
2. Species of high conservation importance
3. Exceptional assemblages of key biotic groups
4. Ponds of high ecological quality
5. Other important ponds

In practice, the nature of the data collated (see Section 3.4) meant that most Priority Ponds were identified on the basis of Criterion 2: using records of uncommon species provided by record centres, species experts and others.

To make best use of available data a coincidence mapping technique was used to link pond sites with species records that did not have associated habitat information. These records were encorporated by using a GIS overlay technique that mapped species records onto a water layer based on OS maps (more details in Section 3.6).

Data on which to assess ponds using Criterion 3 (exceptional assemblages) were more scarce, and largely based on survey data collected by Pond Conservation as part of national surveys and by others as part of local pond surveys (e.g. Kentish Stour Pond Survey).

A small number of ponds were identified on the basis of Criterion 4 (which uses PSYM - the Predictive SYstem for Multimetrics - to assess pond ecological quality), but the number of sites where PSYM could be used was constrained because it requires a specific set of environmental data to make site predictions.

Criteria 1 and 5 were applicable to only a small number of ponds, partly because these pond types are scarce, partly because of limited data.

Selected Priority Ponds were further divided into two categories according to their importance in a European and National context depending on the species they supported or their pond type. Sites of European importance were those which supported a pond type or species listed in Annex I or II of the Habitats Directive, respectively (see Appendix 1 for a list of species and Table 2 for a list of habitats).

Table 2. High Quality Pond (HQP) selection criteria

Criterion 1:

Habitats of high conservation importance. Ponds that meet criteria under Annex 1 of the Habitats Directive. Those relevant to ponds are:

Number	*Habitat type*
2190	Humid dune slacks
3110	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or the *Isoeto-Nanojuncetea*
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* species
3150	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation
3160	Natural dystrophic lakes and ponds
3170	Mediterranean temporary ponds
3180	Turloughs

Criterion 2:

Species of high conservation importance. Ponds supporting Red Data Book species, BAP species, species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a Nationally Scarce wetland plant species[1], or three Nationally Scarce aquatic invertebrate species (see Appendix 2).

Criterion 3:

Exceptional assemblages of key biotic groups: Ponds supporting exceptional populations or numbers of key species. Based on (i) criteria specified in guidelines for the selection of biological SSSIs (currently amphibians and dragonflies only), and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting ≥ 30 wetland plant species or ≥ 50 aquatic macroinvertebrate[2] species)[3].

Criterion 4:

Ponds of high ecological quality: Ponds classified in the top PSYM category ("high") for ecological quality (i.e. having a PSYM score ≥ 75%). PSYM (the Predictive SYstem for Multimetrics) is a method for assessing the biological quality of still waters in England and Wales. Plant species and / or invertebrate families are surveyed using a standard method. The PSYM model makes predictions for the site based on environmental data and using a minimally impaired waterbody dataset. Comparison of the prediction and observed data gives a percentage score for ponds quality.

Criterion 5:

Other important ponds: Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context e.g. pingos and dune slacks, machair ponds.

Notes:

[1]The term 'wetland plant' refers to species defined as wetland plants on the National Pond Survey field recording sheet list (Pond Action, 1998). Includes marginal, submerged and floating-leaved plant species.

[2]Macroinvertebrates in the following groups: flatworms, leeches, snails, crustaceans, alderflies, mayflies, stoneflies, water bugs, water beetles and caddis flies.

[3]Species richness thresholds are based on results of the National Pond Survey of un-degraded sites, which were surveyed using a standardised 3-minutes sample and laboratory sorting and identification.

3.3.1 Additional notes on selection criteria for Priority Ponds

General

Only data collected from 1988 onwards were used in the IAP analysis. This date was chosen on the basis that this was the year when the National Pond Survey began and Priority Pond compatible standards were established for pond surveying.

Any data collected from a pond in this period was potentially used to identify a Priority Pond. Negative results collected at a later date were not used to disqualify a pond from Priority status.

Synonyms were included in species lists to account for name changes and taxonomic splitting of species (e.g. *Schoenoplectus tabernaemontani / Scirpus tabernaemontani*).

Criterion 1: *Habitats of high conservation importance*

Sites already designated as SACs for a pond habitat type listed under Annex 1 of the Habitats Directive are listed in this section. Other sites, which support plant assemblages that appear to fit an Annex 1 type, but have not been officially recognised, are identified as *potential* Annex 1 Habitats. Note that for ponds there are currently some difficulties in reconciling the EU Habitats Directive Interpretation manual for Annex 1 habitat types with the Common Standards Monitoring criteria which define the identification of Annex 1 habitats in the UK.

Criterion 2: *Species of high conservation importance*

- BAP species: The Natural England list of BAP species' habitat preferences (compiled by Jon Webb) was used as the basis of a list of wetland / freshwater BAP species
- Three Nationally Scarce aquatic invertebrates: Any three records collected since 1988 counted towards this total
- Water vole, grass snake and bat records were only included where records were habitat specific and 'pond' or similar appeared in the site name
- Bird records were excluded because there was insufficient habitat information to link records to specific ponds

Criterion 3: *Exceptional assemblages of key biotic groups*

Wetland plant species: Records at genus level were included e.g. *Carex sp*. – but were not double counted. (e.g. 2 records: *Carex sp*. and *Carex riparia* could only be counted once). Wetland plant species include the standard list used in the National Pond Survey (NPS).

The number '≥30 species' was calculated using the NPS methodology to define the wetland plants that could be counted. Qualifying data needed to have been collected within one year, but not necessarily on a single sampling occasion. This allowed for multiple sampling events to record early and late-growing species.

Aquatic macroinvertebrate species: were automatically included only where a *full* species name was present. Any pond with more than 45 aquatic macroinvertebrate species (approaching the 50 species threshold value) was manually checked to ensure

potentially high quality ponds with some genus level data were not missed. Aquatic macroinvertebrate species that were counted included only those groups used in the NPS (e.g. no Diptera, oligochaetes, or *Pisidium* spp).

The number '≥50spp' was calculated using samples collected using the NPS methodology in which a three-minute hand-net sample is collected in the field and subsequently exhaustively sorted in the laboratory. However, for the purposes of identifying Priority Ponds, data collected using other methods were accepted with the proviso that the data needed to have been collected on a single sampling occasion, and not collated over a survey season, for example. Data collected could be from any time of year.

Amphibian and dragonfly guidelines: Methods for assessing dragonfly assemblages are currently under review. The current IAP analysis included all Sites of Special Scientific Interest (SSSIs) that were designated for amphibian and dragonfly assemblages. This was a simple method and quickly flagged up important ponds sites for which there were no other supporting data.

3.4 Data collection

Pond data availability was assessed by contacting a wide range of pond and freshwater researchers, practitioners, species experts and biodiversity data providers, both in southern England and nationally (see Appendix 3 for a full list). Regional LBAP coordinators also circulated a project summary and a request for data to all BAP workers in the South-East. In total, 72 contacts were made, of which the majority were Environment Agency and Wildlife Trust staff. The organisations contacted included:

- The Environment Agency
- Natural England
- Biological record centres
- Wildlife Trusts
- Non-governmental organisations (e.g. Plantlife and the British Dragonfly Society)
- Local Authorities
- Voluntary organisations (e.g. The Botanical Society of the British Isles)
- Key individuals and national referees for specific groups (e.g. Garth Foster, Nick Stewart)

Pond data were gathered for wetland plants, invertebrates, amphibians, one reptile (the grass snake), fish, birds and mammals (Table 3, see Appendix 4 for more details). Most of the data collected were species records. Few data were available to describe biological assemblages, with the exception of Pond Conservation's national surveys and a few other detailed local studies. The lack of assemblage data limited the range of criteria that could be applied, as noted in the previous section.

Table 3. Summary of species data available for the IAP selection (see Appendix 4 for more details)

Biotic group	Data type
Wetland plants	Stonewort species
	Vascular plant records (emergent and aquatic species and assemblages)
Invertebrates	Dragonfly records (breeding activity, oviposition, larvae, emergents and exuviae only)
	Water beetle records/assemblages
	Macroinvertebrate assemblages
Fish	Fish records were collected but none were relevant to ponds
Amphibians	Great Crested Newt and Common Toad records
Reptiles	Grass Snake records
Birds	Data on pond-associated birds were collected but none could be used as the data could not be localised to specific waterbodies
Mammals	Water Vole records (bat records and otter records were also collected but have mostly not been used in the definitions because records could not be sufficiently localised)

3.5 Identification of Important Areas for Ponds (IAP)

The process of aggregating Priority Ponds to identify a smaller number of Important Areas for Ponds was based on identifying geographically located concentrations of Priority Ponds. To identify concentrations of ponds, GIS-based distribution maps of Priority Ponds were used in conjunction with Ordnance Survey maps to identify two types of areas:

- ***Important Areas for Ponds (IAPs)***, for which clear and unambiguous data was available (e.g. New Forest and Avon Valley IAP)
- ***Great Crested Newt IAPs***, where the area was known to support a high density of Great Crested Newt sites. This classification was applied because the south east of England is one of the UK strongholds of the Great Crested Newt

In total, twelve IAPs and one Great Crested Newt IAP were defined by this means. Within each IAP sites were then grouped in terms of their qualifying criteria and/or importance (either European or national) and, where possible, in terms of pond type (e.g. temporary ponds).

In the current assement, IAPs were identified 'by eye' rather than using a more sophisticated software-based approach. Although a GIS analysis might appear to provide an apparently more objective approach to the identification of clusters of important ponds, there are in reality several obstacles to such an analysis at the moment. These are:

- **Limitations in data quality** (see also below). Most objective methods assume that datasets are unbiased. If the datasets are biased (for example, areas where survey effort is high will appear to have higher numbers of Priority Ponds than areas where little data is available) then the results will likewise be biased. For this reason we do not consider the use of statistical methods appropriate at this stage.
- **Inadequate information on the most appropriate spatial scale for this type of analysis**. At present there is little information on the dispersal capabilities of many freshwater organisms, which means that a network of ponds for one species may function as a series of isolated patches for another. In order to identify valid networks of ponds, we need a much better understanding of the spatial scale of dispersal over which most freshwater organisms operate. Part of this work would require incorporating key landscape features such as topography, other wetland habitats and settlements.

A GIS analysis approach to identifying IAPs may be valid in the future, but extensive development of the methodology would be required to take into account data biases and inaccuracies.

3.6 Data limitation and gaps

The constraints of time, data type and availability meant that some relevant information could not be included in the current assessment.

- Water vole, grass snake and bat records were only included where 'pond' or similar appeared in the site name. This may have excluded records where these species were found in ponds, but where 'pond', 'pool', or 'pit' did not appear in the site name.
- The IAP assessment was carried out primarily using data in electronic format. Other data sources exist (e.g. held in notebooks or other paper-based formats), but the resources available to this project did not allow for this information to be extracted for the current assessment.
- Many species records from databases, such as the National Biodiversity Network Gateway, did not have associated habitat data to enable us to link the species to a pond. To make these records usable, species data were incorporated into the analysis using a GIS overlay technique that matched species records to water bodies on GIS water layers.

  Pond inventory GIS layers were made available to us for Kent, Sussex and the New Forest (Appendix 4). However, this did not cover the whole of the study area, so we used them in conjunction with the Ordanance Survey water layer, from which we extracted waterbodies with low length to width ratios, to exclude ditches and streams. This worked well in many cases, but also created a considerable number of anomolies, where river, streams or ditches were broken into shorter sections where transected by a bridge or road.

  Use of this technique also relies on the accuracy of the locational information associated with the data. For the purpose of this report we only used records which

were accurate to the 100m level, and set a threshold distance of within 100m of a pond type feature.

Although use of GIS overlay technique increased the number of records we could include, it involved considerable manual checking of the data with googlemaps/ satellite imagery to ensure that the records were not from other freshwater habitats (e.g. ditches, streams, lakes). This highlights the need for a single pond inventory, which can be used to identify and locate ponds at national level.

Data availability also varied geographically. Areas which were particularly poorly represented included the north-west corner of the region (around Andover and Stockbridge) and the Isle of Wight.

In addition, it is important to recognise that there are significant gaps in quantitative pond data for all areas of the UK. Within the current study area there are records from fewer than 1% of the total pond resource in the county, and more comprehensive survey data, covering a range of taxa, from only a handful of ponds.

This highlights the need for a structured pond survey programme throughout the UK using a standardised technique such as National Pond Survey or PSYM (Pond Conservation, 1998; Pond Conservation, 2002).

Priorities for further work are discussed in Section 7.2.

.

4 Overview

4.1 Important Areas for Ponds (IAPs)

A total of 12 IAPs were identified in the Environment Agency Southern Region where a high concentration of Priority Ponds occur (see Figs 3&4). These are:

- **The New Forest and Avon Valley IAP:** **European Importance**
  National Importance

The New Forest IAP is of European importance. The ponds support at least two habitat types listed under Annex 1 of the Habitats Directive. Great Crested Newts *Triturus cristatus* (protected under Annex II of the Habitat's Directive), are found in a small number of less acidic pools, particularly in the southern New Forest. Another Annex II species, Floating Water-Plantain *Luronium natans,* has recently been recorded from a single New Forest pool, but it is not known whether the species has been long established or is a recent introduction.

At a national level, the New Forest and Avon Valley areas support an outstanding range of Priority Ponds, many with nationally uncommon plant and invertebrate species. Some of these species, including Hampshire-purslane *Ludwigia palustris,* Bog Hair-grass *Deschampsia setacea* and the Tadpole Shrimp *Triops cancriformis* have national strongholds in New Forest ponds (in the case of *Triops* the New Forest is one of only two sites in the UK). Currently, due to lack of suitable data, only a small range of sites qualify as Priority Ponds on the basis of other criteria including assemblage richness and PSYM score.

- **Thorney IAP:** **National Importance**

Thorney Island is an IAP of national importance for its coastal ponds, lagoons and seasonal pools. Grass-poly *Lythrum hyssopifolia* (Status: Endangered) occurs in seasonal depressions on Thorney Island and the adjacent mainland at West Itchenor. Remnant coastal grazing marshes including Farlington Marshes and areas around Pagham Harbour and Thorney Island support assemblages of Nationally Scarce invertebrate species, and populations of Water Vole *Arvicola terrestris*, Common Toad *Bufo bufo* and Great Crested Newt *Triturus cristatus*.

- **Woolmer IAP:** **European Importance**
  National Importance

Woolmer IAP supports ponds attributable to the Habitat Directive Annex I habitat type: *Natural dystrophic lakes and ponds*, making this a site of European Importance. There are also small populations of the Annex II species Great Crested Newt *Triturus cristatus*.

At a national level, ponds and pools in the Woolmer area support nationally uncommon plant species including Coral-necklace *Illecebrum verticillatum* and Small Water-pepper *Polygonum minus.* Woolmer Forest is the last native heathland site for Natterjack Toad *Epidalea calamita.* The area is well known as only UK site for the Spangled Water Beetle *Graphoderus zonatus*, but ponds in Woolmer and adjacent

heathland SSSIs also support rich assemblages of dragonflies and uncommon water beetle assemblages.

- **Western Rother Valley IAP: National Importance**

Rother Valley ponds support a range of nationally uncommon plant species including Opposite-Leaved Pondweed *Groenlandia densa,* Frogbit *Hydrocharis morsus-ranae*, Round-Fruited Rush *Juncus compressus* and Tubular Water-dropwort *Oenanthe fistulosa.* There are also records of Water Vole *Arvicola terrestris*, Common Toad *Bufo bufo* and Great Crested Newt *Triturus cristatus*. A river cut-off pool in semi-natural grassland at Trotton Bridge qualifed as a Priority Pond on the basis of its high PSYM score.

- **Sussex Heaths IAP: National Importance**

This IAP is of National Importance for its pond margin and seasonal pool plant assemblages, often associated with areas of current or former heathland. This includes records (not all confirmed) of the BAP species: Pennyroyal *Mentha pulegium*, Water Germander *Teucrium scordium* and Tubular Water-dropwort *Oenanthe fistulosa*. Assemblages with three Nationally Scarce aquatic invertebrates have been recorded from Bolney Pond. Records of Great Crested Newt *Triturus cristatus* are scattered throughout the IAP, which forms a small part of the larger Wealden Great Crested Newt (GCN) IAP.

- **Ashdown IAP: National Importance**

Ashdown IAP is of National Importance. Its ponds and pools support a range of BAP species. There are (unconfirmed) records of Yellow Centaury *Cicendia filiformis* and Water Germander *Teucrium scordium*. Common Toad *Bufo bufo* and Grass Snake *Natrix natrix* are known from ponds in the area. Records of Great Crested Newt *Triturus cristatus* are also scattered across the forest. Ponds in the Colemans Hatch area are particularly important for their diverse plant and invertebrate assemblages which include a range of Nationally Scarce water beetles.

- **Newhaven IAP: National Importance**

Newhaven IAP is of National Importance for its grazing marsh ponds which support assemblages of uncommon water beetles. There are also recent records of Pennyroyal *Mentha pulegium* and Whorled Water-milfoil *Myriophyllum verticillatum* in areas around Brighton. Common Toad *Bufo bufo* and Grass Snake *Natrix natrix* have been recorded from a range of sites, and Great Crested Newt *Triturus cristatus* is widespread in both rural and urban ponds.

- **Pevensey IAP: National Importance**

Although the Pevensey Levels are well known for their rich ditch flora and fauna, for ponds the known Priority sites largely lie away from the Levels in the hillside areas around Pevensey, and in the Coombe Haven valley to the east. Ponds and seasonal pools in these areas support nationally uncommon plants including Frogbit *Hydrocharis morsus-ranae,* Opposite-leaved Pondweed *Groenlandia densa*, Three-lobed Water Crowfoot *Ranunculus tripartitus* and Coral-necklace *Illecebrum verticillatum*. There are a range of ponds with assemblages of uncommon

invertebrates. Others with Water Vole *Arvicola terrestris* and Grass Snake *Natrix natrix*. Records of Great Crested Newt *Triturus cristatus* are frequent in the area, which is encompassed in the larger Wealden GCN IAP.

- **Winchelsea IAP: National Importance**

The Winchelsea IAP supports ponds with a range of Nationally Important species both on the coastal plain and in the more wooded hillside hinterland. Plants include Frogbit *Hydrocharis morsus-ranae*, Lesser Water-plantain *Baldellia ranunculoides* and Tubular Water-dropwort *Oenanthe fistulosa*. There are records of Water Vole *Arvicola terrestris*, Great Crested Newt *Triturus cristatus* and Common Toad *Bufo bufo*, and these species are likely to ocurr more commonly in ponds than the few specific records suggest. Ponds in the area also support rich assemblages of uncommon beetles and populations of Medicinal Leech *Hirudo medicinalis*.

- **Dungeness IAP: National Importance**

The Dungeness IAP is of National Importance for its invertebrate assemblages. Its small waterbodies support important populations of Medicinal Leech *Hirudo medicinalis* and ponds with rich assemblages of Nationally Scarce invertebrates. Great Crested Newt *Triturus cristatus* occur across the region. Uncommon plant species including Frogbit *Hydrocharis morsus-ranae* and Lesser Water-plantain *Baldellia ranunculoides* may occur in ponds, but most records are not localised.

- **Ashford District IAP: National Importance**

The Ashford District IAP is of National Importance for its plant, invertebrate and amphibian assemblages. Important plants include Three-lobed Water Crowfoot *Ranunculus tripartitus*, Fox Sedge *Carex vulpina*, Tubular Water-dropwort *Oenanthe fistulosa*, Frogbit *Hydrocharis morsus-ranae* and Clustered Stonewort *Tolypella glomerata*. Woodland ponds in the Orlestone Forest area have important invertebrate sites, and ponds with assemblages of 3 or more Nationally Scarce water beetles are scattered throughout the IAP. Common Toad *Bufo bufo* and Grass Snake *Natrix natrix* occur in a variety of areas; and there are five concentrations of Great Crested Newt *Triturus cristatus* ponds.

- **North Kent Marshes IAP: National Importance**

The North Kent Marshes IAP is of National Importance for its invertebrate and amphibian assemblages with Water Voles *Arvicola terrestris* found in some ponds. Ponds with assemblages of 3 or more Nationally Scarce water beetles are scattered throughout the IAP. There are a considerable number of Great Crested Newt *Triturus cristatus* records in the area (500), with three significant pond-associated clusters. Common Toad *Bufo bufo* is recorded at two pond sites.

- **Wealden GCN IAP: European Importance**

The Wealden GCN IAP is a substantially larger IAP covering the central Wealden area. It is identified for its high concentrations of Great Crested Newts *Triturus cristatus*. This area spans parts of four counties: Kent, East Sussex, West Sussex, and Surrey. It covers an area of roughly 4800 km² and is delimited in a large part by the geology of the area.

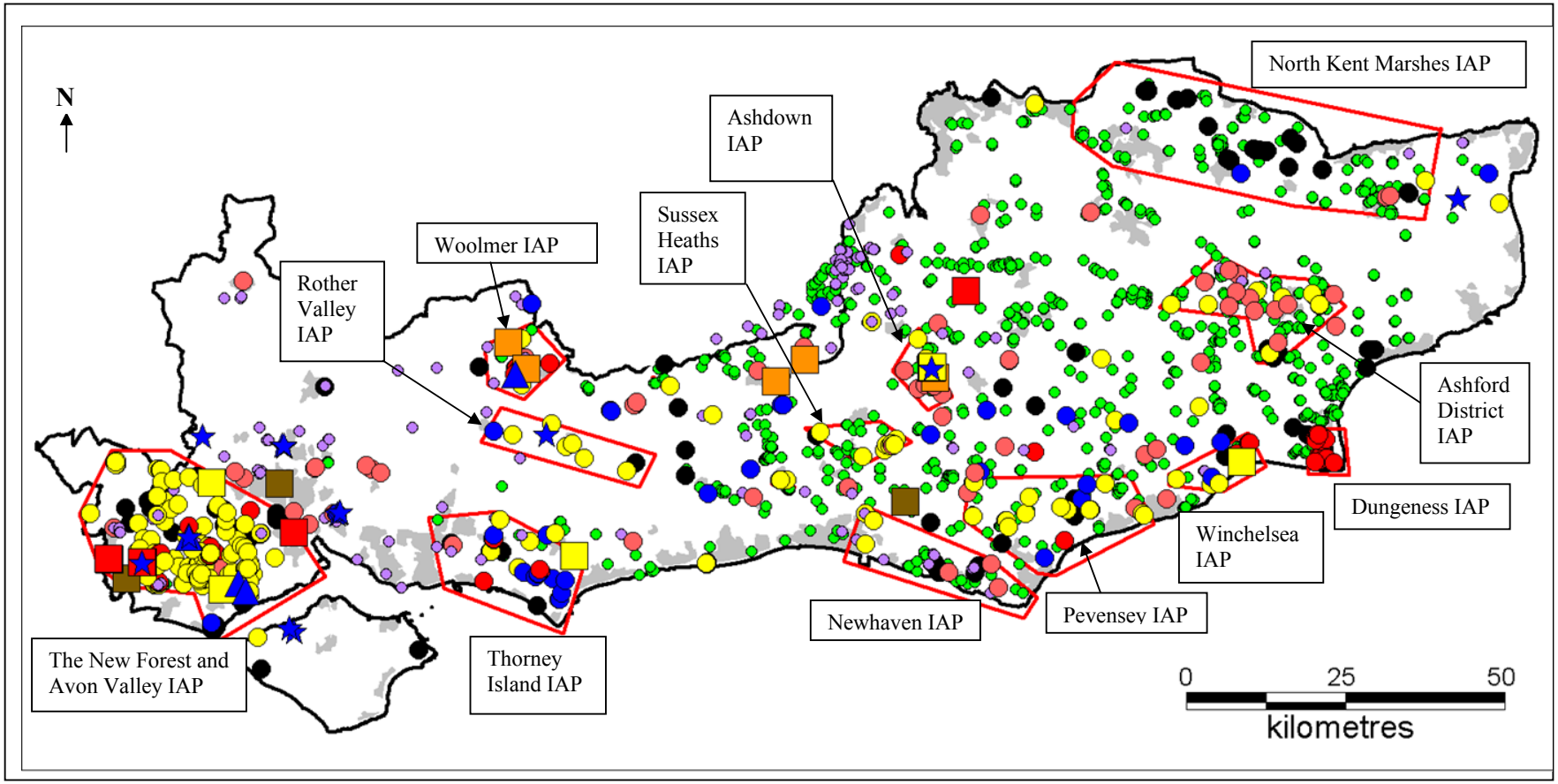


Figure 3. Overview of IAPs in Southern England (please refer to IAP accounts for more details)

LEGEND

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

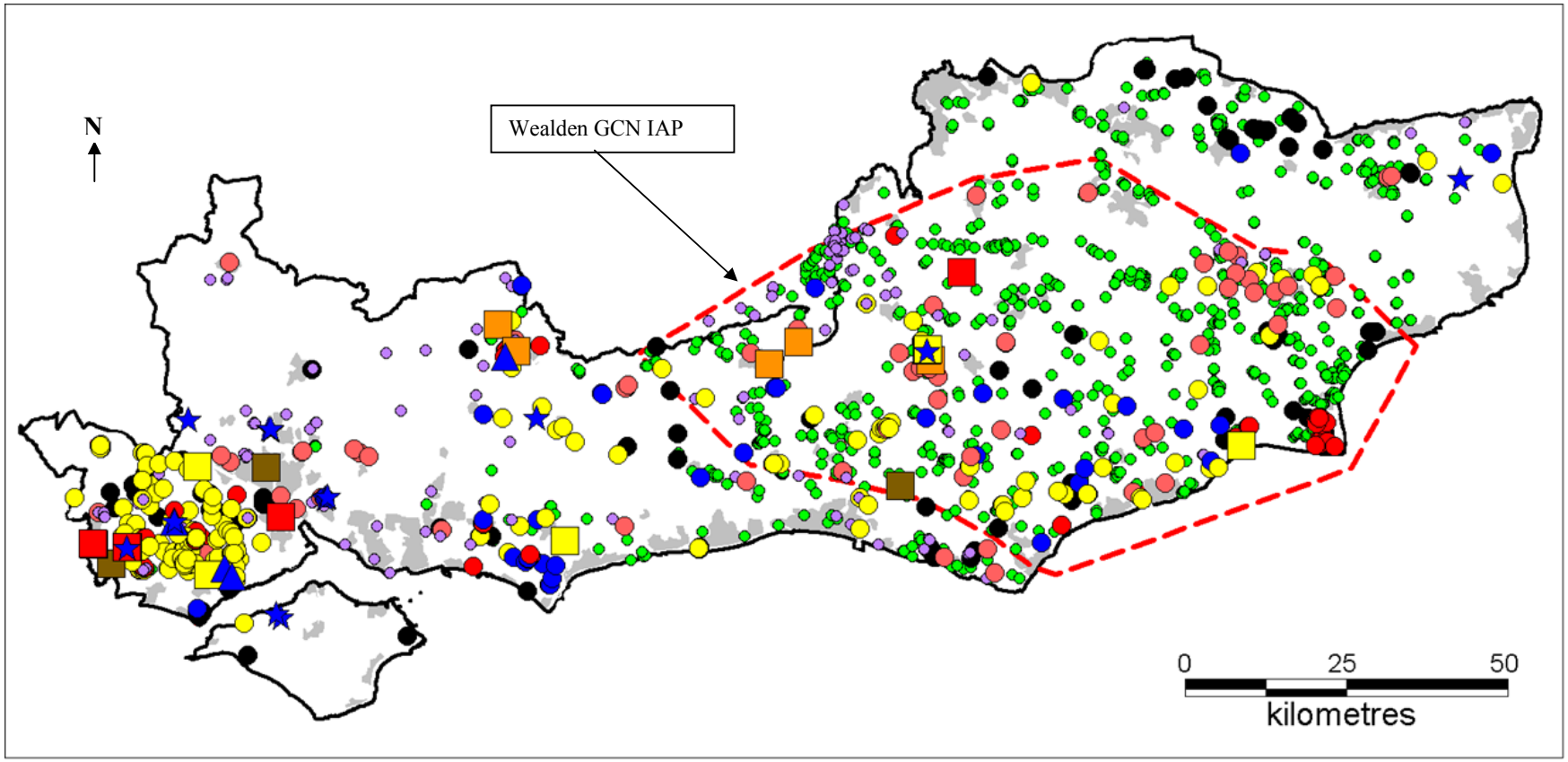


Figure 4 Overview of the Wealden GCN IAP in Southern England (please refer to IAP account for more details)

5 Important Areas for Ponds (IAPs) in Southern England

5.1 The New Forest and Avon Valley IAP

5.1.1 Summary

The New Forest IAP is of European significance. The ponds support at least two habitat types listed under Annex 1 of the Habitats Directive. Great Crested Newts *Triturus cristatus* (protected under Annex II of the Habitats Directive), are found at a small number of less acidic pools, particularly in the southern New Forest. Another Annex II species, Floating Water-Plantain *Luronium natans*, has recently been recorded from a single New Forest pool, but it is not known whether the species has been long established or is a recent introduction.

At a national level, the New Forest and Avon Valley areas support an outstanding range of Priority Ponds, many with nationally uncommon plant and invertebrate species. Some of these species, including Hampshire-purslane *Ludwigia palustris,* Bog Hair-grass *Deschampsia setacea* and the Tadpole Shrimp *Triops cancriformis* have national strongholds in New Forest ponds (in the case of *Triops*, the New Forest is one of only two sites in the UK). Currently, due to lack of suitable data, only a small range of sites qualify as Priority Ponds on the basis of other criteria including assemblage richness and PSYM score.

Site name	**New Forest and Avon Valley IAP**
IAP qualifying criteria	***Criterion 1*. Ponds referable to Habitats Directive types:** **3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*** **And potentially:** **3110 Oligotrophic waters containing very few minerals of sandy plains: *Littorelletalia uniflorae*** **3160 Natural dystrophic lakes and ponds** ***Criterion 2*: Annex II, RDB, NS and BAP species.** ***Criterion 3*: Assemblages** ***Criterion 4:* High PSYM scores**
SSSI and SAC designation	A large proportion of the ponds within the IAP are located within SSSIs: New Forest SSSI, Roydon Woods, SSSI, Hurst Castle and Lymington River SSSI, North Solent SSSI, Dibden Bay SSSI, Avon Valley SSSI, Poors Common SSSI. Much of the New Forest is covered by the New Forest SAC. Additional areas along the coast and in the Avon Valley are SPAs.
Central grid reference point for IAP: SU 2806	
Area covered: 684km²	

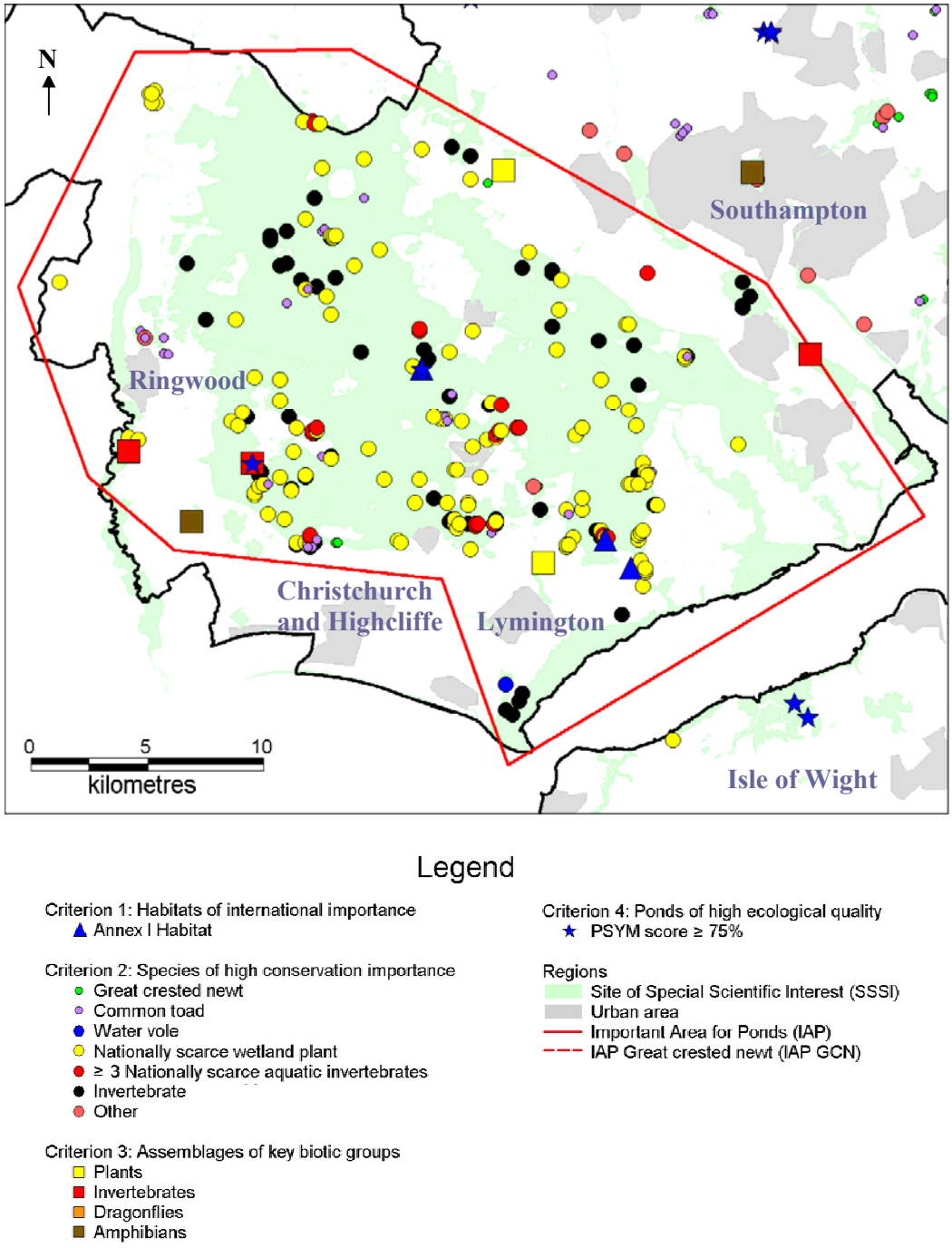


Figure 5. New Forest and Avon Valley IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.1.2 Site description

Location and designations
The New Forest and Avon Valley IAP lies in the south-west of the Environment Agency Southern Region, covering parts of both Hampshire and Wiltshire. The IAP includes all areas of the New Forest and the part of the Avon Valley between Bournemouth and Breamore, immediately to the west of the New Forest.

The New Forest itself is a National Park, and Special Area of Conservation (SAC). Much of the region is designated as a Ramsar site on the basis of its mire complexes, fen and wet heath, The New Forest's temporary ponds are noted within the Ramsar citation. The area is also recognised as an Important Bird Area, an Important Plant Area and an Important Stonewort Area (RSPB, 2009; Plantlife, 2009; Stewart, 2004). The Avon Valley to the west of the New Forest is also a Ramsar site, qualifying on the basis of its wetland flora and fauna and overwintering wetland bird populations. The IAP area as a whole includes seven SSSIs, which together cover some 29,000 hectares.

Geology and geomorphology
The New Forest is underlain by Tertiary clays and sands, covered in many areas, by extensive sheets of more recent Pleistocene gravels.

Most strata produce base-poor acidic soils, but in the south of the New Forest calcareous soils and marls occur south of Lyndhurst and around Brockenhurst, Lymington and Beaulieu.

Although generally low-lying with an average altitude of around 40 m, the New Forest is higher than the surrounding area and its streams drain east and west into the valleys of the River Avon and River Test, and southwards into the Solent.

Natural habitats
The New Forest is recognised as one of the largest remaining areas of lowland heath in Western Europe. It comprises a complex mosaic of semi-natural habitats, which include extensive tracts of heathland, woodland, mire and grassland. Common grazing, mostly by cattle and ponies which roam freely over extensive areas of unenclosed land, play an essential role in maintaining the New Forest's habitats. Villages are scattered across the area, with larger towns on the coastal borders.

The Avon Valley to the west of the Forest has a more mixed land use. Much of the River Avon floodplain is under intensive agriculture, but bordering areas such as Kingston North Common, Barnsfield Wood and Breamore Marsh retain areas of heathland, woodland and traditionally grazed grassland more closely allied to the neighbouring New Forest.

Pond types:
The New Forest supports an outstanding range and abundance of ponds of varied size, hydroperiod and water chemistry.

Chemically, the small waterbodies range from the nutrient rich eutrophic, to nutrient poor dystrophic. In size they vary from tiny pools a meter or so across, to large ponds like Fleet Water that are close to the 2 ha size limit. Some waterbodies, like the exceptionally diverse Hatchet Pond, exceed 2 ha. These large 'ponds' actually qualify as lakes and are therefore not strictly considered in this report (although records may be noted).

The majority of ponds in the New Forest are very small, and a high proportion are seasonal (retaining water for only part of the year). There are many thousands of these tiny ponds, scattered across

heathland, woodland and mire areas of the Forest, but most have yet to be surveyed and mapped in detail. Many of these shallow pools are maintained by at least moderately intensive grazing and poaching by stock.

Small pools of natural origin include:

- Tree-fall pools which sometimes occur in their hundreds in wooded marshy headwaters (e.g. Cadnam Common), and the anastamosing lower reaches of streams (e.g. Matley Bog)
- Cattle-poached and deer-trampled pools in flushes and wet grassland
- Seasonal floodplain pools: both channel cut-off depressions, and larger areas where surface water stands on the flood plain
- Pools formed as part of mire and fen systems
- Seasonal pools in natural depressions on poorly drained soils, reflecting the heterogeneity of semi-natural landscapes

A wide range of small pools have also been created as a by-product of man's activity: this includes off-road vehicle track ruts which are common across the Forest, and pools that have formed on low lying ground where water is trapped against road, track or other man-made embankments. Other small pools have been deliberately created along roadsides to take run-off water.

Sanderson (1998) created a provisional classification of the New Forest's seasonal pools based on differences in their vegetation types relating to nutrient status and the length of the inundation period:

1. '*Spike-rush – Purple Moor-grass community*': Grazed swards of spike-rush often with carpets of *Sphagnum*, typically occurring where there are pans and runnels in wet heath where acid water collects but is not sufficntly permanent for bog pools to develop. A characteristic species is the Locally Scarce Bog Hair-grass *Deschampsia setacea*.

2. '*Lesser Marshwort – Floating club-rush – Pillwort community'*: Typical well-grazed temporary pools formed in depressions in wet grassland areas that are less acidic than 1 above, but still nutrient poor. Associated with uncommon species such as Lesser water-plantain *Baldellia ranunculoides*, and the nationally rare Slender Marsh Bedstraw *Galium constrictum* and Hampshire-purslane *Ludwigia palustris*. Shoreweed *Littorella uniflora* also occurs in this habitat type.

3. '*Creeping bent – marsh foxtail – knotweed community'*: associated with a higher nutrient status and circum-neutral pH, in situations where there is heavy grazing, poaching and the accumulation of dung. They are commonly found within neutral greens and in water-retaining depressions in parched acid grasslands. This community type sometimes includes nationally rare species such as Mudwort *Limosella aquatica*, Pennyroyal *Mentha pulegium* and Small Fleabane *Pulicaria vulgaris*.

4. '*Floating sweet-grass community'*: occurs in old flood channels in floodplain wet grassland. It is generally a rather species-poor association, but sometimes supports the nationally rare Slender Marsh Bedstraw *Galium constrictum*.

5. '*Pool edge assemblages'*. These are the communities on the edge of large temporary ponds, and poached damp hollows in grassland which support a number of specialist species in a zone

with Bulbous Rush *Juncus bulbosus*. These include the two Nationally Scarce species: Coral-necklace *Illecebrum verticillatum* and Yellow Centaury *Cicendia filiformis*.

Although small seasonal pools are numerically dominant, especially in the New Forest, larger permanent and seasonal ponds are frequent in both the Forest and Avon Valley. Clusters of larger oligotrophic-dystrophic pools occur in some areas of acid heath (e.g. Buck Hill), whereas in other areas stock watering ponds have been created, often at spring heads. Old marl pits and gravel workings are scattered across the New Forest, and locally create small pond complexes such as at Crockford Bottom and East End.

In the Avon Valley gravel pit ponds and lakes have been dug over the last century in the areas around Ringwood. Older ponds include the shallow ponds and connecting waterways of Breamore Marsh: an ancient manorial green traditionally grazed by geese and cattle.

5.1.3 C1 - Habitats of high conservation importance

Data collated for the current project and information from the New Forest SAC, and SAC Management Plan (2001), suggest that the New Forest supports a range of ponds, potentially referable to three Annex 1 habitat types:

- *3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea*
- *3110 Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae*
- *3160 Natural dystrophic lakes and ponds.*

(i) 3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea

The New Forest SAC is partly designated for its seasonal pools which are recognised as supportting this Annex 1 habitat type.

Characteristic plant species are generally small ephemerophytes of oligotrophic to mesotrophic conditions, on lake, pond and pool banks and at water-land interfaces. The Directive lists two sub assemblage types: (a): *Littorella uniflora*, *Luronium natans*, *Potamogeton polygonifolius*, *Pilularia globulifera*, *Juncus bulbosus* ssp. *bulbosus*, *Eleocharis acicularis*, *Sparganium minimum* and (b) *Elatine* spp, *Cyperus fuscus*, *Limosella aquatica, Scirpus setaceus*, *Juncus bufonius*, *Cicendia filiformis*.

In the New Forest, many permanent and seasonal ponds which are referable to Habitat 3110 (below) are likely to also qualify as H3130a habitats.

In addition, a range of slightly more nutrient-rich pools are likely to be referable to H3130b. This includes Sanderson's type 5 '*Pool edge assemblages'* found on the margins of large temporary ponds, and poached damp hollows in grassland across the New Forest (Sanderson, 1998). Similar communities are found around the edge of more permanent ponds in the New Forest, and in the Avon Valley at Breamore Marsh (SU156181) and on Kingstone North Common (SU146026).

a)

b)

Figure 6. New Forest Ponds a) Slufter's Pond (© Jim Champion and licensed for reuse under a Creative Commons Licence), b) Pond near Brockenhurst with Floating Water Plantain *Luronium natans* (photo: Pond Conservation).

The New Forest SAC management Plan (2001) suggests that the area of surface water qualifying for the H3130 habitat type is likely to be less than 10 ha in total, but includes a very considerable number of ponds. Sites in the Avon Valley will add to this number.

(ii) H3110 Oligotrophic waters containing very few minerals of sandy plains: Littorelletalia uniflorae

This Annex 1 habitat is characterised by shallow oligotrophic base-poor waters with few minerals, with an aquatic to amphibious low perennial vegetation on pond and lake banks belonging to the *Littorelletalia uniflorae* order. Characteristic plants are: *Isoetes lacustris*, *I. echinospora*, *Littorella uniflora*, *Lobelia dortmanna*, *Deschampsia setacea*, *Subularia aquatica*, *Juncus bulbosus*, *Pilularia globulifera*, *Luronium natans* and *Potamogeton polygonifolius.*

The New Forest SAC designation lists Hatchet Pond as an example of this Habitat Directive type. Hatchet Pond itself is too large to be included in the current pond assessment. However data collated for the current project and information from the New Forest SAC Management Plan (2001) suggests that the New Forest is likely to support many other ponds potentially referable to this habitat type.

Of the characteristic isoetids (*Isoetes lacustris*, *I. echinospora*, *Littorella uniflora*, *Lobelia dortmanna)* only Shoreweed *Littorella uniflora* occurs in the New Forest (or indeed the south east region). However, other typical species including Bulbous Rush *Juncus bulbosus*, Bog Pondweed *Potamogeton Polygonifolius,* the uncommon Bog Hair-Grass *Deschampsia setacea* and Pillwort *Pilularia globulifera* all occur widely in the New Forest.

One of Sanderson's five temporary pond types '*Lesser Marshwort – Floating club-rush – Pillwort community'* see above) supports Shoreweed *Littorella uniflora* suggesting that very many of the New Forest's nutrient poor temporary pools may fall within this habitat type. There are also more permanent pools where this plant assemblage occurs in the drawdown zone and shallow water (e.g. Crockford Bridge SZ3598, and East End SZ365976).

(iii) H3160 Natural dystrophic lakes and ponds

The Habitats Directive defines *H3160 Natural dystrophic lakes and ponds* as natural ponds or lakes with brown tinted water due to peat and humic acids, generally on peaty soils in bogs or in heaths with natural evolution toward bogs. The pH is often low: 3 to 6. Plant communities belong to the order *Utricularietalia* and include: *Utricularia* spp, *Rhynchospora alba*, *R. fusca*, *Sparganium minimum* and *Sphagnum* species.

In the New Forest strongly acid pools occur locally within heathland, especially on gravel terraces in the southern part of the New Forest. They are usually dominated by Bulbous rush *Juncus bulbosus* and *Sphagnum*. Some, or many, of these ponds may be referable to H3160, but the New Forest SAC management plan (2001) suggests that further work is required to confirm this.

5.1.4 C2 - Species of high conservation importance

The New Forest and Avon Valley ponds support an exceptional range of uncommon plant and animal species, and many waterbodies qualify as Priority Ponds using these criteria.

Plants

New Forest ponds support populations of at least 15 species of nationally rare and scarce wetland plants, and for species such as Hampshire-purslane *Ludwigia palustris* and Bog Hair-grass

Deschampsia setacea, the New Forest is a national stronghold. The majority of uncommon plants are associated with temporary ponds and/or with the seasonal drawdown zone and shallow edge areas of more permanent waters.

The BAP fern Pillwort *Pilularia globulifera* has been recorded from more than 80 sites across the New Forest and sometimes occurs together with Nationally Scarce Bog Hair-grass *Deschampsia setacea* in more nutrient-poor temporary pools, flood pans and pond drawdown zones in wet heath and grassland. Important areas for these species occur around Beaulieu (SU356076), Janesmoor Plain (SU245136), Whitten Bottom (Burley) (SU200011), Crockford Bottom (SZ3598), Bramshaw Telegraph (SU223169), Ocknell Pond (SU234119) and elsewhere.

Assemblages which include the nationally threatened Lesser Water-plantain *Baldellia ranunculoides*, and the nationally rare Slender Marsh-Bedstraw *Galium constrictum* and Hampshire-purslane *Ludwigia palustris* occur in many well grazed seasonal pools and some more permanent sites in moderately nutrient poor wet grasslands located away from areas of habitation. Notable areas include Burley Lawn (SU218036), Church Moor (SU199021), Latchmoor Pond (SU302029) and other areas around Brockenhurst, Ipley Hanger Corner (SU390068), areas near Boldre (e.g. SZ334986, SZ336992), Butts and Balmer Lawns (SU300031, SU305035), pools associated with floodplain areas of around Matley and Fuliford bogs (SU338005, SU357044), and many pools present in the area around Hatchet Pond and East Boldre (e.g. SU368012, SU371003, SZ366991).

In both the New Forest and Avon Valley, heavily grazed and poached seasonal ponds on greens and other grasslands with a moderately high nutrient status sometimes support exceptionally rare species and assemblages including Mudwort *Limosella aquatica*, Pennyroyal *Mentha pulegium*, Small Fleabane *Pulicaria vulgaris*. Where grazing is less intensive, pond margins sometimes support species such as Brown Galingale *Cyperus fuscus*, Coral-necklace *Illbrecebrum verticillatum* and Yellow Centaury *Cicendia filiformis*. Key areas for these species generally occur in the south of the New Forest around Brockenhurst and Boldre (e.g. SZ334985) as well as more westerly areas including Picket Plain near Burley (SU200058) and sites in the Avon Valley including Breamore Common (SU158176), Kingston North Common (SU146032) and Plumley Wood (SU116098).

The New Forest is an important area for stoneworts with eight species recorded (Stewart, 2004), including records of the Nationally Scarce Clustered Stonewort *Tolypella glomerata* from Widden Bottom (SZ288995) and Crockford Bridge (SZ3598).

Mammals and birds

The New Forest Management Plan (New Forest Life Partnership, 2001) notes that breeding Lapwing *Vanellus vanellus*, and Curlew *Numenius arquata*, both Priority Species, are associated with permanent and temporary ponds in the New Forest.

No bat records were collated that were specific to ponds within the IAP. However, ponds are known to be important drinking areas for bat species, and provide an important source of insect food for some species. Of the 17 species of native bat, 11 have been recently recorded in the New Forest (New Forest SAC Management Plan, 2001) and it is probable that New Forest ponds help to support these populations.

Amphibians and Reptiles

Less acidic ponds within the New Forest support important populations of priority amphibian species.

Great Crested Newts *Triturus cristatus* are found at a relatively small number of locations in the New Forest. Multiple records occur at Balmer Lawn, Wootton Pond, Marlborough Deeps and Pilley Bailey.

There are records of Common Toad *Bufo bufo* from around 20 New Forest ponds and additional records from some of the smaller gravel pits around Blashford in the Avon Valley. Grass snake *Natrix natrix* has been recorded from the Blashford gravel pits and from Newlands Pond in Roydon Woods.

Invertebrates
The New Forest ponds support population of a number of Wildlife and Countryside Act, Red Data Book and BAP invertebrates, fulfilling Criterion 2 of the priority pond status. These include:

- the Medicinal leech *Hirudo medicinalis*
- the Fairy Shrimp *Chirocephalus diaphanus*
- the Tadpole Shrimp *Triops cancriformis* in one of only two known British sites.
- the Mud Snail *Omphiscola glabra*
- a group of aquatic weevils: *Bagous brevis*, *Bagous collignensis*, *Bagous czwalinai* and *Bagous frit* all of which are recorded in and on the banks of ponds and in bogs (Hyman and Parsons 1992).
- water beetles including *Haliplus variegatus*, the New Forest Mud Beetle *Helophorus laticollis* and the one-grooved diving beetle *Bidessus unistriatus*.
- a camphor beetle *Stenus longitarsis.*

At least 20 ponds sites supporting these species are distributed across the IAP though others probably remain to be located.

More than 50 sites in the New Forest qualify as Priority Ponds as they contain three or more Nationally Scarce aquatic invertebrates. These were identified as a result of surveys of water beetles undertaken by members of the Balfour Browne Club.

5.1.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages: Two ponds qualify as Priority Ponds on the basis of their exceptionally rich plant assemblages: Haskells pond on Kingston North Common (SU146032) in the Avon Valley and Chubbs Farm Pond near Burley (SU199021). Both sites also qualify as Priority Ponds on the basis of other criteria. In the current assessment, plant assemblage data were limited to a handful of sites, and it is likely that many additional ponds within the New Forest IAP would qualify under this criterion given further survey data.

Invertebrate assemblages: A relatively small number of ponds in the New Forest IAP have been surveyed in sufficient detail to identify important invertebrate assemblages. Two sites from the National Pond Survey, Chubbs Farm Pond (Long Pond on Ordnance Survey: SU199021) and Burley Moor East pond (70 species over three seasons: SU211047), qualify on this criterion. With more extensive surveys it is likely that there would be many more sites.

The suite of wetland habitats in the New Forest collectively forms one of the most important areas for dragonflies in Britain. Twenty-seven species breed in the New Forest including five pond-dwelling species which are found in less than 100 10 x 10 km squares (hectads):

- Hairy Dragonfly *Brachytron pratense*: 91 hectads post 1987 on NBN (Appendix 5)

- Small Red Damselfly *Ceriagrion tenellum*: 65 hectads post 1987 on NBN (Appendix 5)
- Downy Emerald *Cordulia aenea*: 44 hectads post 1987 shown on NBN (Appendix 5)

However, currently available data do not allow individual ponds supporting important dragonfly assemblages to be identified.

5.1.6 C4 - Ponds of high ecological quality-PSYM

Two ponds in the New Forest qualify with PSYM scores greater than 75%. These are Chubbs Farm Pond (SU199021) and Warwick Slade (SU272062). The small number of PSYM ponds qualifying, reflects lack of data rather than poor pond quality. Given the non-intensive catchments of many New Forest ponds, it is likely that many hundreds more would qualify for inclusion under this Priority Pond criterion, were sufficient survey data to be collected.

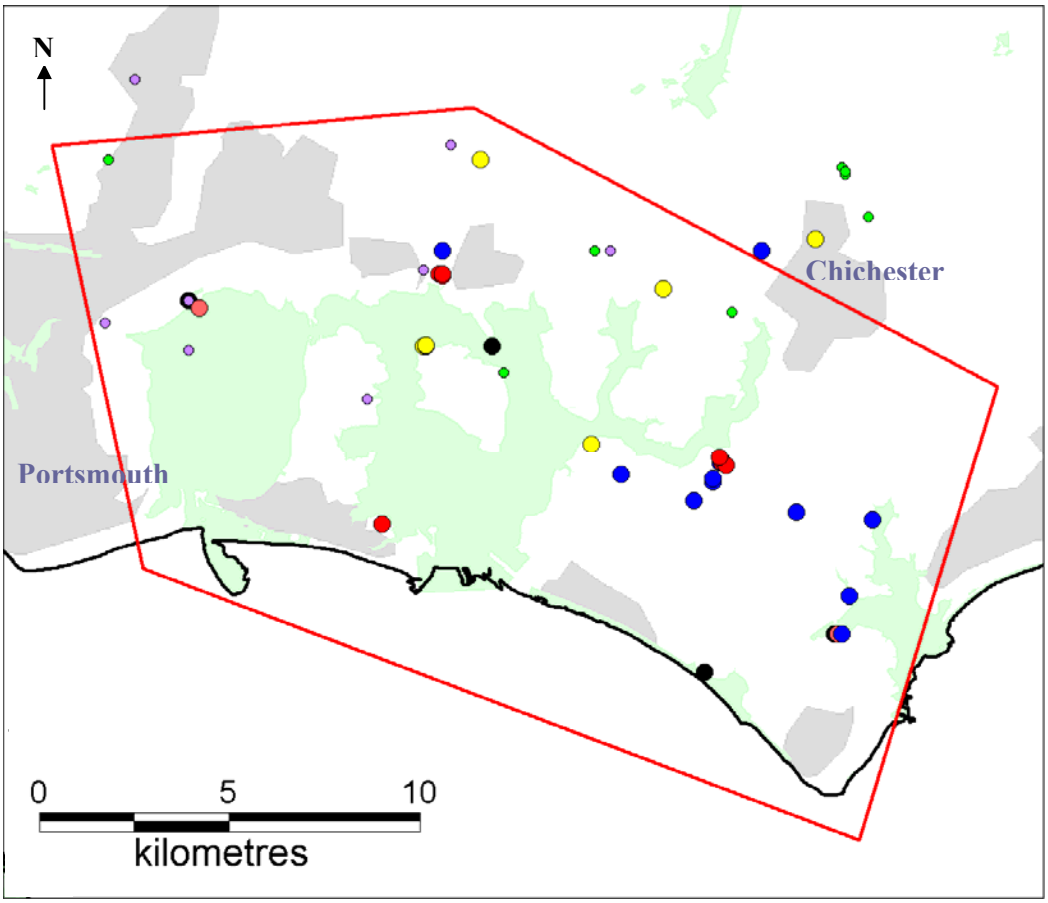
5.2 Thorney Island IAP

5.2.1 Summary

Thorney Island is an IAP of National Importance for its coastal ponds, lagoons and seasonal pools. Grass-poly *Lythrum hyssopifolia* (Endangered) occurs in seasonal depressions on Thorney Island and the adjacent mainland at West Itchenor. Areas of remnant coastal grazing marshes including Farlington Marshes and areas around Pagham Harbour and Thorney Island support assemblages of Nationally Scarce invertebrate species, and populations of Water Vole *Arvicola terrestris*, Common Toad *Bufo bufo* and Great Crested Newt *Triturus cristatus*.

Site name	**Thorney Island IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species**
SSSI and SAC designation*	SSSIs within the IAP are: Langstone Harbour SSSI, Sinah Common SSSI, Chichester Harbour SSSI, Bracklesham Bay SSSI, Pagham Harbour SSSI, Warblington Meadow SSSI. The coastal areas of the IAP are also covered by the Solent Maritime SAC.
Central grid reference point for IAP: SU7702	
Area covered: 304 km²	

*Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 7. Thorney Island IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.2.2 Site description

Location and designations
The Thorney Island IAP covers the coastal area between Portsmouth, Chichester and Selsey Bill in West Sussex. It includes both Hayling Island and Thorney Island, the latter now part of the mainland.

The coastal area of this IAP is covered by the Solent Maritime SAC. Chichester and Langstone Harbour are Important Bird Areas designated for their breeding terns and the passage and wintering of waterfowl and waders. SSSIs in the area are mainly designated for their salt marsh and bird interest.

Geology, geomorphology and natural habitats
The Thorney Island IAP has a mixed geology with formations of chalk, Reading and London clays and the sandier Bracklesham beds running east-west across the area. In the coastal lowlands, Quaternary river terrace, beach and raised marine deposits overlie the older Cretaceous and Tertiary rocks.

The IAP is generally low-lying, with much of the coastal area dominated by the estuary and mud-flat areas around Chichester, Langstone and Pagham Harbours. Coastal grazing marsh would once have been common around these harbours but remaining areas are now fragmented. To the north, the area along the A27 corridor is urbanised. The mainland area is predominantly under arable or pastoral land use with fragmented areas of woodland and common.

Pond types
The Thorney Island IAP includes an interesting mix of pond types. Along the coast, remnant areas of grazing marsh around Langstone and Pagham Harbours support a range of permanent and seasonal ponds and lagoons which range from freshwater to saline. Some of the small pools on Farlington Marshes were created as a result of munitions disposal and later aerial bombing in World War I and II.

Inland the landscape is dotted with many small farm ponds and some more recent irrigation reservoirs. To the east of Chichester is a series of twenty or so gravel pits although most are larger than 2 ha. Older industrial ponds occur in some areas, although again some, like Brickilns Pond, exceed the 2 ha size limit.

Figure 8. Newell's Lane Pond, a site with multiple Common Toad *Bufo bufo* records (© Simon Carey and licensed for reuse under a Creative Commons Licence)

5.2.3 C1 - Habitats of high conservation importance

No Habitats Directive Annex 1 pond types have been identified from the Thorney Island IAP.

5.2.4 C2 - Species of high conservation importance

Plants

Ponds in the area around Chichester Harbour and Thorney Island support three uncommon plant species. The rarest of these is the Nationally Rare and Endangered priority plant species Grass-poly *Lythrum hyssopifolia*, an annual species of seasonally inundated bare ground. Grass-poly was discovered on the western coast of Thorney Island, in 1987, on tenanted farmland belonging to the Ministry of Defence (SU7403). This was the first sighting of the species in West Sussex since1853. Around 250 plants were originally recorded in a depression in an arable field corner, liable to winter flooding (Briggs, 1988). A second population was subsequently found on private land on the mainland to the east of Thorney Island at West Itchenor (SU7901) in 2002 (Chichester Ecological Review, 2003)

Two other vunerable species recorded in the area are the submerged aquatic Opposite-leaved Pondweed *Groenlandia densa* found at Bosham (SU811054), and the damp grassland species Marsh Stitchwort *Stellaria palustris* which has been recorded from Aldsworth Pond (SU763088) near Emsworth.

Mammals

Water Vole *Arvicola terrestris* has been recorded from at least eight ponds in the area, with concentrations in the coastal zone around Pagham Harbour (e.g. SZ858963) and in the West Itchenor area on the eastern edge of Chichester Harbour (e.g. SU800005, SU800005).
There are records for Noctule Bat *Nyctalus noctula* from Lincolns Pond to the north of Farlington Marshes (SU689049).

Amphibians and Reptiles

There are 4 sites within the Thorney Island IAP where Great Crested Newts *Triturus cristatus* have been recorded. One of these sites (Newlands Farm, SU665088) is to the west of the IAP on the outskirts of Portsmouth, but the remaining 3 sites are in the central area of the IAP. Thorney Island Pond 3 (SU769032) and a pond at Fishbourne (SU829048) both have records from 2002, but the majority of Great Crested Newt records in the IAP are from Hambrook (SU793064) where they have been recorded from 1990 through to 2006.

Common Toads *Bufo bufo* have been recorded from at least five coastal ponds on Farlington Marshes on the northern edge of Langstone Harbour (e.g. SU686038, SU686051), and eastwards around Emsworth and on north Hayling Island (SU748059, SU733025). Further inland there are multiple records from the large Newells Lane Pond in Hambrook (SU797064).

Grass Snake *Natrix natrix* has been recorded from Ferry Small Pool (SZ857963) in Pagham Harbour LNR in the east of the IAP.

.

Invertebrates

The Starket Sea Anemone *Nematostella vectensis* has been recorded in two waterbodies of ≤2 ha: Mengham Salterns (SZ737992) and the linked Emsworth Slipper Millpond (1.8 ha) and Peter Pond (0.9 ha) (sometimes treated as two sites). It is also recorded in Birdham Pool, although this waterbody is classed as a small lake at 3.9ha.

Three sites qualify as Priority Ponds with three or more Nationally Scarce aquatic invertebrates. Farlington Marshes HWT Reserve (SU6861051), Thornham Point on Thorney Island (SU766039) (Southbourne) and Sidlesham Ferry in Pagham harbour (SZ856963).

The Farlington Marshes site qualifies on the basis of supporting the Nationally Scarce soldier flies Flecked General *Stratiomys singularior* and Long-horned Soldier *Vanoyia tenuicornis* and the Nationally Scarce Snail-killing Fly *Pherbellia griseola*. Larvae of the Flecked General *Stratiomys singularior* live in pools and ditches, being found in shallow water and dense floating vegetation, and are well adapted to situations that dry up. The Long-horned Soldier *Vanoyia tenuicornis* is associated with fens or wet meadows, usually with seepages, ditches and ponds (Stubbs and Drake, 2001).

Thornham Point and the Sidlesham Ferry pool have populations of three Nationally Scarce water beetles associated with brackish pools and ditches, including *Enochrus bicolour*, *Enochrus halophilus* and *Ochthebius viridis*.

5.2.5 C3 - Exceptional assemblages of key biotic groups

There are no data for sites with exceptional assemblages of key biotic groups in the Thorney Island IAP.

5.2.6 C4 - Ponds of high ecological quality -PSYM

No ponds in this area have been assessed using PSYM.

5.3 Woolmer IAP

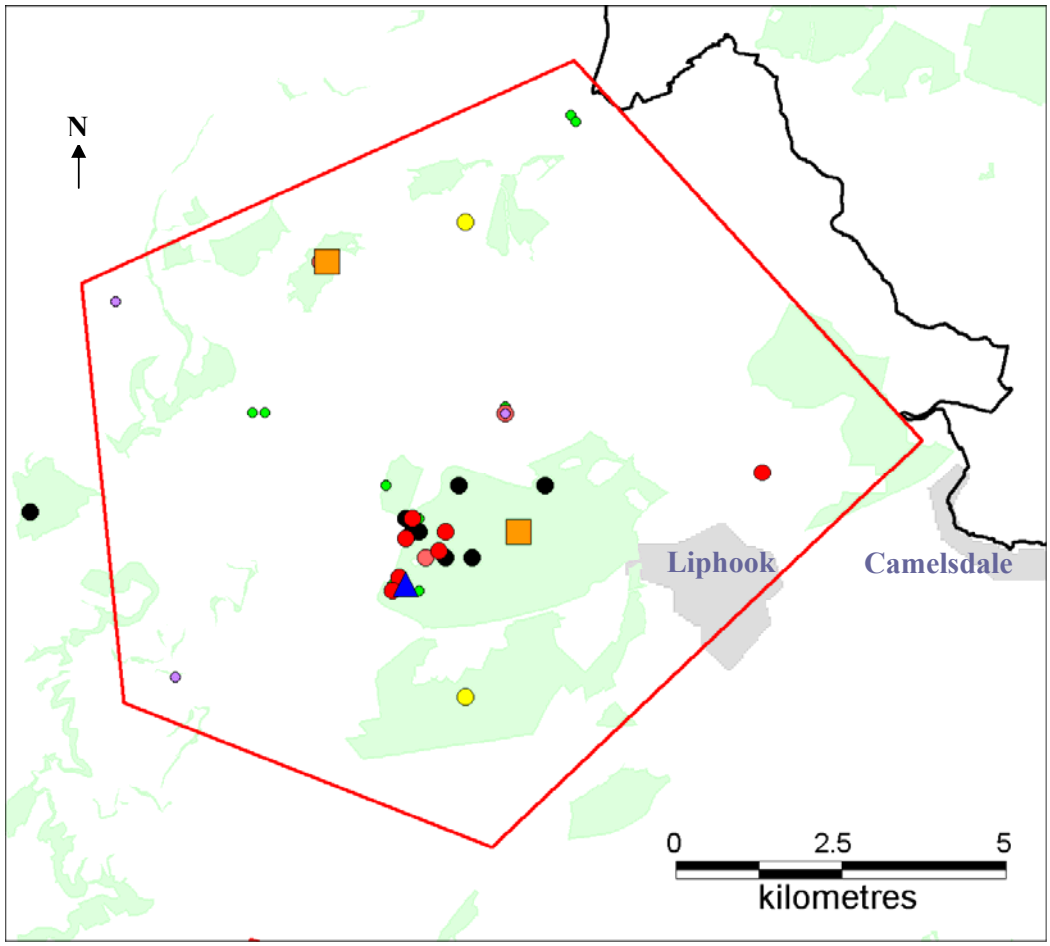
5.3.1 Summary

Woolmer IAP supports ponds attributable to the Habitat Directive Annex I habitat type: *Natural dystrophic lakes and ponds*, making the IAP of European Importance. There are also small populations of the Annex II Great Crested Newt *Triturus cristatus*.

At a national level, ponds and pools in the Woolmer area support nationally uncommon plant species including Coral-necklace *Illecebrum verticillatum* and Small Water-pepper *Polygonum minus.* Woolmer Forest is the the last native heathland site for the Natterjack Toad *Epidalea calamita.* The area is well known as only UK site for the Spangled Water Beetle *Graphoderus zonatus*, but ponds in Woolmer and adjacent heathland SSSIs also support rich assemblages of dragonflies and uncommon water beetle assemblages.

Site name	**Woolmer IAP**
IAP qualifying criteria	***Criterion 1*: 3160 Natural dystrophic lakes and ponds** ***Criterion 2*: Annex II, RDB, NS and BAP species** ***Criterion 3*: Dragonfly Assemblage**
SSSI and SAC designations*	Woolmer Forest SSSI, Forest Mere SSSI, Bramshott and Ludshott Commons SSSI, Broxhead and Kingsley Commons SSSI, Shortheath Common SSSI, Wick Wood and Worldham Hangar SSSI, Binswood SSSI, Shortheath Common SSSI, Coombe Wood and the Lythe SSSI, Upper Greensand Hangars: Empshott to Hawkley SSSI, Noar Hill SSSI, Chapel Common SSSI. All SSSI sites are also covered by SAC designation.
Central grid reference point for IAP: SU 8134	
Area covered: 94.5km²	

* Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 9. Woolmer IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.3.2 Site description

Location and designations
Woolmer IAP is located in the western Weald in the area around Bordon, and straddles the border between Hampshire and West Sussex. This IAP lies along the northern boundary of the Environment Agency Southern Region. However, in biogeographic terms it forms part of a larger area of sandy heaths and woodlands with a high density of Priority Ponds, which extends northwards into the area around Fleet, Crowthorne and Woking, in the Environment Agency Thames Region.

The Woolmer IAP covers Woolmer Forest SSSI, Shortheath Common, Broxhead and Kingsley Commons SSSIs, and partially includes others, such as Bramshott and Ludshot Commons SSSI and Binswood SSSI. A large part of the area around Woolmer is designated as an SAC for its internationally important dry heathland habitats and natural dystrophic lakes and ponds.

Geology and geomorphology
The Woolmer IAP is predominantly underlain by sands and sandstones. The wooded areas to the east of the IAP are dominated by the often coarse sands of the Lower Greensand. To the west are the siltstones and sandstones of the Upper Greensand. Between lies a band of Gault clay which runs northwards from east of Liss, broadening into the area around Binstead and Alice Holt Forest in the north. There are superficial deposits of alluvium in the valley of the River Wey and coarse sand, pebble and clay head overlying the Gault in some areas of Alice Holt Forest and around Rowledge.

Natural habitats
The central and eastern areas of this IAP are well wooded with around 50% of the area comprising interconnecting mosaics of plantation and other woodlands, with some areas of dry and wet heath and mire. At the centre of the IAP is Woolmer Forest: the largest and most diverse area of lowland heathland in Hampshire outside the New Forest, and considered the most important area of heathland within the Weald (Butterworth, 2009). This area is part of an ancient hunting forest with a long history of management as wood pasture and heathland. Much of the area was common land although Woolmer Forest itself was finally enclosed in 1864 and passed into military occupation where much of the heathland still survives. These heathlands are now considered to be of international importance and form a transition between the New Forest and the Surrey Heaths types. Other heathland common SSSIs within the eastern half of the IAP include Bramshott and Ludshott Common which are now mainly under public ownership and are being managed for conservation.

Westwards towards Selborne and Alton the woodland areas become more fragmented and the region is generally dominated by mixed farmland. However, relic areas of heathland, ancient woodland, wet woodland and lowland meadow are scattered across this part of the IAP including Selbourne Common and Shortheath Common SSSI.

Pond types
Ponds are common in the woodlands and farmlands of this IAP. Woodland ponds include ancient hammerponds and mill ponds, with shallow track-way pools on heathland and in woodland areas, particularly those used by army vehicles. The origin of many other small pools is unknown.

Ponds in Woolmer Forest include small pools and natural shallow flashes with a wide range of pH and nutrient statuses, as well as more recent conservation ponds and scrapes created over the last 40 years. In areas of wet heath, seepage mires fed from a mix of acidic and calcareous rocks support many small pools. The larger Woolmer and Cranmer Ponds are dystrophic waterbodies fed by ground water poor in mineral nutrients. Woolmer Pond is known to be at least 1000 years old with a 970AD record of

'Wulfamere' or 'Wolf's Pool' but analysis of its organic rich silt deposits has shown that it probably originated as peat cutting and, until the middle of the last century, was a much larger, sandy-bottomed lake. Dredging in the late 20th century restored it to much of its historic size and reinstated the sandy bottom conditions (SSSI citation, 2009).

Figure 10. Woolmer Pond, western end (photo by Jonty Denton).

5.3.3 C1 - Habitats of high conservation importance

Woolmer Forest is the southernmost SAC designated for the habitat Directive type: *3160 Natural dystrophic lakes and ponds.*

The Habitats Directive interpretation criteria define this habitat type as "Natural lakes and ponds with brown tinted water due to peat and humic acids, generally on peaty soils in bogs or in heaths with natural evolution toward bogs. pH is often low, 3 to 6.". Characteristic plant species are: *Utricularia* spp, *Rhynchospora alba*, *R. fusca*, *Sparganium minimum*, *Sphagnum* species.

The SAC designation notes that "Cranmer Pond is a southern example of a dystrophic pond in an area of 4010 Northern Atlantic wet heaths with *Erica tetralix* and 7150 Depressions on peat substrates of the *Rhynchosporion*. The aquatic flora is comprised of bulbous rush *Juncus bulbosus var. fluitans,* which grows submerged and forms dense mats at the margins, and bog-mosses *Sphagnum* spp. which grow in shallower areas".

5.3.4 C2 - Species of high conservation importance

Plants

There are two recent records of the nationally rare priority species Coral-necklace *(Illecebrum verticillatum)*: an annual plant of seasonally inundated areas. Both were from puddles on trackways in woodland areas: a railway track in the Longmoor Camp area (SU47971302) and sandy tracks used by army vehicles on Broxhead Common (47971374).

Woolmer Pond supports the Vulnerable Small Water-pepper *Polygonum minus* and regionally uncommon Lesser Marshwort *Apium inundatum* both of which colonised the sandy shores of the pond after its restoration.

Amphibians and Reptiles
Woolmer Forest supports the last inland heathland population of Natterjack Toad *Epidalea calamita* in Britain. The Common Toad *Bufo bufo* has been recorded at four ponds in the Woolmer IAP. Hawley Hurst (SU753305) has Common Toad records from 2000 and 2001, whereas Hartley Mauditt (SU744362), Shortheath Pond (SU775368), and Woolmer Pond (SU788318) have one record at each pond.

The Woolmer Forest IAP also supports populations of Great Crested Newts *Triturus cristatus*. Some of these records are from the more nutrient enriched pools around the edge of Woolmer Pond and Woolmer pond itself (SU788318), and others occur at Frith End Quarry Ponds (SU81293903) and Selborne Brickworks Ponds (SU76663451).

Grass snakes *Natrix natrix* have also been recorded in ponds within the Woolmer IAP, at Woolmer Pond (SU788318) and Shortheath Pond (SU775368) in 2001 and 1999 respectively.

Invertebrates
The Woolmer IAP includes the only UK site for the Spangled Water Beetle *Graphoderus zonatus*.

Shortheath Pond (1.0 ha; SU775368), and peripheral habitats, supports a range of uncommon water beetle and dragonfly species. The pond qualifies as a priority pond on the basis of its water beetle fauna. Although records are not all precisely localised to Shortheath Pond, nine Nationally Scarce water beetles have been recorded. The area also supports a rich dragonfly assemblage (see below).

A further nine ponds within Woolmer Forest support 3 or more Nationally Scarce aquatic inverts. Holywater Pond (SU809334) also qualifies under this criterion.

5.3.5 C3 - Exceptional assemblages of key biotic groups

Shortheath Common and Woolmer Forest are designated as SSSIs partly on the basis of their dragonfly assemblages. At the time of notification the assemblage included 23 breeding species of dragonflies, including two which are relatively uncommon nationally. These are: Small Red Damselfly *Ceriagrion tenellum* which has 65 10 x 10 km square (hectad) records from 1988 onwards on the NBN and the Downy Emerald *Cordulia aenea* (44 hectads post 1987 shown on NBN) (Shortheath SSSI citation, 2009 and NBN Gateway).

Note that recent analysis of dragonfly distribution data (Daguet *et al,* 2008) indicates that neither of these species is threatened in terms of IUCN categories. However, based on records available on the NBN, both are probably still justificably considered to be Nationally Scarce. Hectad records on which this analysis is based are listed in Appendix 5.

Note that these records are not precisely localised on individual ponds.

5.3.6 C4 - Ponds of high ccological quality -PSYM

No ponds in the Woolmer IAP area have been assessed using PSYM.

5.4 Western Rother Valley IAP

5.4.1 Summary

The Western Rother Valley IAP ponds support a range of nationally uncommon plant species including Opposite-Leaved Pondweed *Groenlandia densa*, Frogbit *Hydrocharis morsus-ranae*, Round-Fruited Rush *Juncus compressus* and Tubular Water-dropwort *Oenanthe fistulosa.* There are also records of Water Vole *Arvicola terrestris*, Common Toad *Bufo bufo* and Great Crested Newt *Triturus cristatus*. A river cut-off pool in semi-natural grassland at Trotton Bridge qualifed as a Priority Pond on the basis of its high PSYM score.

Site name	**Western Rother Valley IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, NS and BAP species** ***Criterion 4*: PSYM score**
SSSI and SAC designations*	Heyshott Down SSSI, Duncton to Bignor Escarpment SSSI, Burton Park SSSI, Coates Castle SSSI, Ambersham Common SSSI, Iping Common SSSI, Fyning Moor SSSI.
Central grid reference point for IAP: SU 8518	
Area covered: 150 km²	

*Note: All SSSIs within the IAP are listed, not just those containing ponds

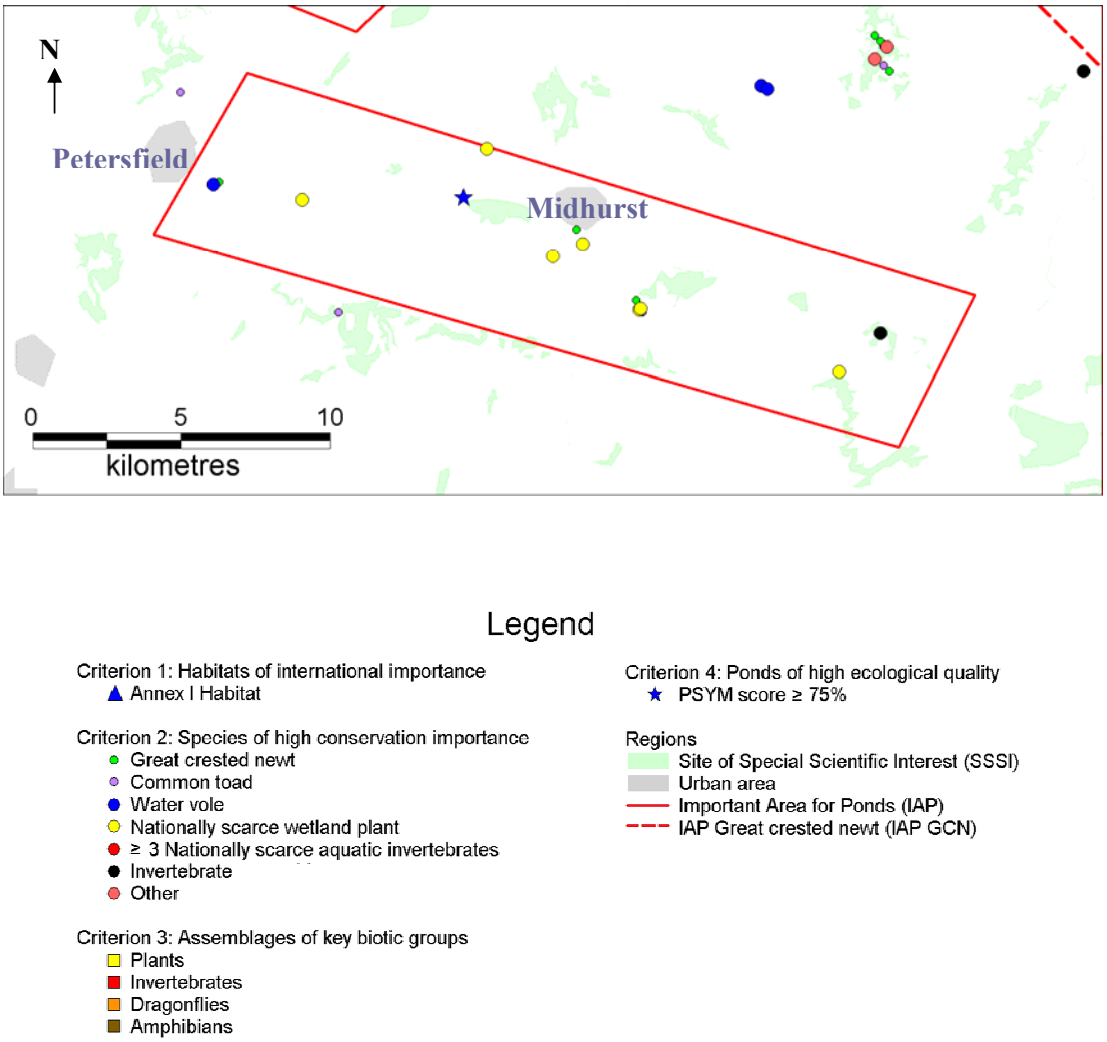


Figure 11. Western Rother Valley IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.4.2 Site description

Location and designations
The Western Rother Valley IAP follows the valley of the River Rother in West Sussex from Petersfield in the west to Frittleworth in the east. Along its southern borders it runs parallel with the South Downs. The IAP includes part of the South Downs AONB and National Park and contains seven SSSIs.

Geology, geomorphology and habitats
Geological strata in the area generally run east-west, parallel with the river. Most of the area is underlain by Lower Greensand: the generally finer sands and silts of the Hythe Formation to the north of the river and coarser sands of the Folkstone Beds to the south. Futher south still are Gault Clay and Upper Greensand strata bordering the Chalk Downs. The Rother Valley plain and slopes have locally extensive deposits of Quaternary river terrace sands and gravels overlying the older rocks.

The course of the River Rother follows a narrow valley, which is flanked by the broader slopes of the vale of the Rother Farmlands. The area supports a patchwork that includes remants of marsh, unimproved pasture and traditional watermeadows on the valley floor. Narrow strips of woodland occur on the moderate and steep valley slopes (West Sussex County Council, 2009). In the wider Western Rother Valley IAP there are locally significant areas of heathland (e.g. Coates Common), the remnants of a heathland area that was once much more extensive. An area of medieval pasture parkland survives at Burton Park (Butterworth, 2009).

Pond types:
The Rother Valley supports a moderately diverse range of pond types. Spring-fed ponds and mill ponds run along the southern boundary near to the base of the chalk. Hammer ponds were created on some of the Rother's wooded tributaries. Field ponds are present in the valley itself, and permanent and seasonal channel cut-off pools occur locally close to the river.
Burton Mill Pond is widely acknowledged for its outstanding biodiversity, but at 22 ha is too large to be considered as a Priority Pond using the BAP definition. It supports a rich invertebrate fauna, and is particularly important for Coleoptera (beetles) Odonata (dragonflies) and Diptera (flies) including three nationally rare invertebrates: the craneflies *Erioptera meijerei* and *Tipula marginata* and the Mud Snail *Lymnaea glabra*.

5.4.3 C1 - Habitats of high conservation importance

No Habitat Directive pond types have been identified from this IAP.

5.4.4 C2 - Species of high conservation importance

Plants
Four nationally uncommon plant species have been recorded from ponds across the Western Rother Valley IAP. All are species with a preference for neutral to alkaline waters.

Opposite-Leaved Pondweed *Groenlandia densa,* a nationally Vulnerable submerged aquatic species of clean alkaline waters, was recorded in the spring-fed Duncton Mill Pond (SU963165), now managed as a trout lake.

The small floating-leaved, nationally Vulnerable Frogbit *Hydrocharis morsus-ranae* has been recorded from a wooded hammerpond near Chithurst (SU845240).

Round-Fruited Rush *Juncus compressus* (Nationally Threatened) was found on the margins of Marsh Pond on Heyshott Green (SU89641863). Another marginal species, Tubular Water-dropwort *Oenanthe fistulosa* (Vulnerable, BAP) was recorded from New Pond, Midhurst (SU87702080).

Mammals

Water vole *Arvicola terrestris* has been recorded at Heath Pond (SU753228) to the south-east of Petersfield in 2002. The valley is also an important in-migration route for Otter *Lutra lutra* (Butterworth, 2009) which often use pond-caught fish and amphibians to support their diet, and may frequent ponds adjacent to the Rother.

Amphibians and Reptiles

The Western Rother Valley IAP is home to both Common Toad *Bufo bufo* and Great Crested Newt *Triturus cristatus* populations. Common Toads were recorded at Heyshott Green Fishpond (SU897185) in 2002. Great Crested Newts are found at 2 sites within the IAP: Midhurst Common (SU875213) and Barbers Cottage; Heyshott (SU895189).

5.4.5 C3 - Exceptional Assemblages of Key Biotic Groups

There are no data for sites with exceptional assemblages of key biotic groups in this IAP.

5.4.6 C4 - Ponds of High Ecological Quality -PSYM

Trotton Bridge pond (SU837224) was surveyed as part of the National Pond Survey in June 1992. It had a PSYM score of 94%, indicating good status.

Figure 12. Pond on Iping Common (P. Greenhalf).

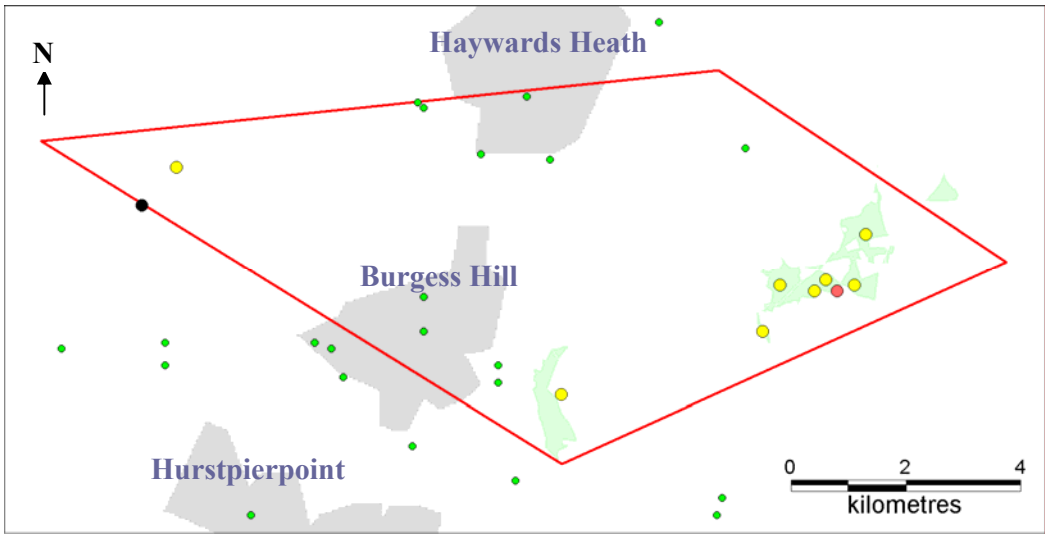
5.5 Sussex Heaths IAP

5.5.1 Summary

This IAP is of National Importance for its pond margin and seasonal pool plant assemblages, often associated with areas of current or former heathland. This includes records (not all confirmed) of the BAP species: Pennyroyal *Mentha pulegium*, Water Germander *Teucrium scordium* and Tubular Water-dropwort *Oenanthe fistulosa*. Assemblages with three Nationally Scarce aquatic invertebrates have been recorded from Bolney Pond. Records of Great Crested Newt *Triturus cristatus* are scattered throughout the IAP, which forms a small part of the larger Wealden Great Crested Newt IAP.

Site name	**Sussex Heaths IAP**
IAP qualifying criteria	***Criterion 2*: RDB, NS and BAP species**
SSSI and SAC designations*	SSSIs included in this area are: Chailey Common SSSI, Ditchling Common SSSI.
Central grid reference point for IAP: TQ 3521	
Area covered: 60.5 km²	

* Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 13. Sussex Heaths IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.5.2 Site description

Location and designations
The Sussex Heaths IAP lies in the area between Haywards Heath, Uckfield and Burgess Hill. Part of the region falls within the High Weald Area of Outstanding Natural Beauty (AONB). There are two SSSIs within the IAP: Chailey Common and Ditchling Common.

Geology, geomorphology and natural habitats
Geologically, most of the area is underlain by the interbedded sands, silts and mudstones of the Hastings Beds: mainly Tunbridge Wells Sandstones with horizons of Grinstead and Wadhurst Clays. These are locally overlain by Quaternary head deposits (gravels, sands and clays) and river alluvium, both mostly associated with the River Ouse and its larger tributaries.

The landscape forms a transition between the Low and High Weald. The low rolling hills and valley sides are covered by a patchwork of many small and some larger woodlands with cultivated fields between. Small pockets of remnant heathland remain, but most of the formerly grazed areas have disappeared under scrub and regenerating or planted woodland (West Sussex County Council, 2009). The Ouse Valley to the north and west of the area broadens as it flows eastwards to become a flat-bottomed predominantly pastoral valley with some significant tracts of arable land (West Sussex and Mid Sussex County Councils, 2009).

Pond types
Many wooded stream valleys retain hammer, furnace and mill ponds: a legacy of the industries that were once common throughout the county. Small seasonal ruts and pools associated with trackways are an important habitat type on some current and former heathland areas. Field ponds are common in the larger cultivated valleys. Ornamental lakes and ponds have been created in some of the many historic parks and gardens in this area.

5.5.3 C1 - Habitats of high conservation importance

No Habitat Directive pond types have been identified from this IAP.

5.5.4 C2 - Species of high conservation importance

Plants
The Sussex Heaths are recorded as supporting a range of exceptionally uncommon plants. The Sussex Record Centre has records for the period 1989-2000 for the Endangered BAP species Pennyroyal *Mentha pulegium* from a range of sites around Chailey Common including Godley's Green (TQ3719), Romany Ridge Common (TQ3720), Pound Common (TQ3820), Memorial Common (TQ3820) and Red House Common (TQ3821). There is also a 1998 record of Water Germander *Teucrium scordium* (status: Endangered) from Godley's Green. Note however that, to date, we have been unable to check the veracity of records for either of these species. The marginal species Tubular Water-dropwort *Oenanthe fistulosa* (Vulnerable, BAP) also occurs in the Chailey area with a 1999 record from Beggars Wood Pond (TQ382208).

Away from Chailey, there is a record of Starfruit *Damasonium alisma* from Ditchling Common (TQ336188), but this pre-dates the current IAP assessment period (Nicola Hutchinson, *pers com*). More recently (late 1990's) Pennyroyal *Mentha pulegium* has been recorded from a pond at a new site in the Bolney area (TQ2622): this may be native.

Figure 14. Ditchling Common Pond an old site for Starfruit *Damasonium alisma* (© Janine Forbes and licensed for reuse under a Creative Commons Licence).

Amphibians and Reptiles

Records of Great Crested Newt *Triturus cristatus* are scattered across the rural areas of this IAP. Closer to urban areas, there are 23 records from a recent (2006) survey of a former sewage treatment works at Burgess Hill (Fairbridge: TQ312205) and a number of records from Haywards Heath (TQ334229) between 1992 and 1994.

Grass Snake *Natrix natrix* was recorded in Pound Common Pond (TQ384206) near North Chailey in 1997.

Invertebrates

Assemblages supporting three Nationally Scarce aquatic invertebrate species (*Anacaena bipustulata, Hydraena testacea, Ilybius fenestratus*) have been recorded from ponds at Bolney (TQ263221).

5.5.5 C3 - Exceptional assemblages of key biotic groups

There are no records of sites with exceptional assemblages of key biotic groups in the Sussex Heaths IAP.

5.5.6 C4 - Ponds of high ecological quality -PSYM

There are no records of ponds with a high PSYM score (≥75%) in the Sussex Heaths IAP.

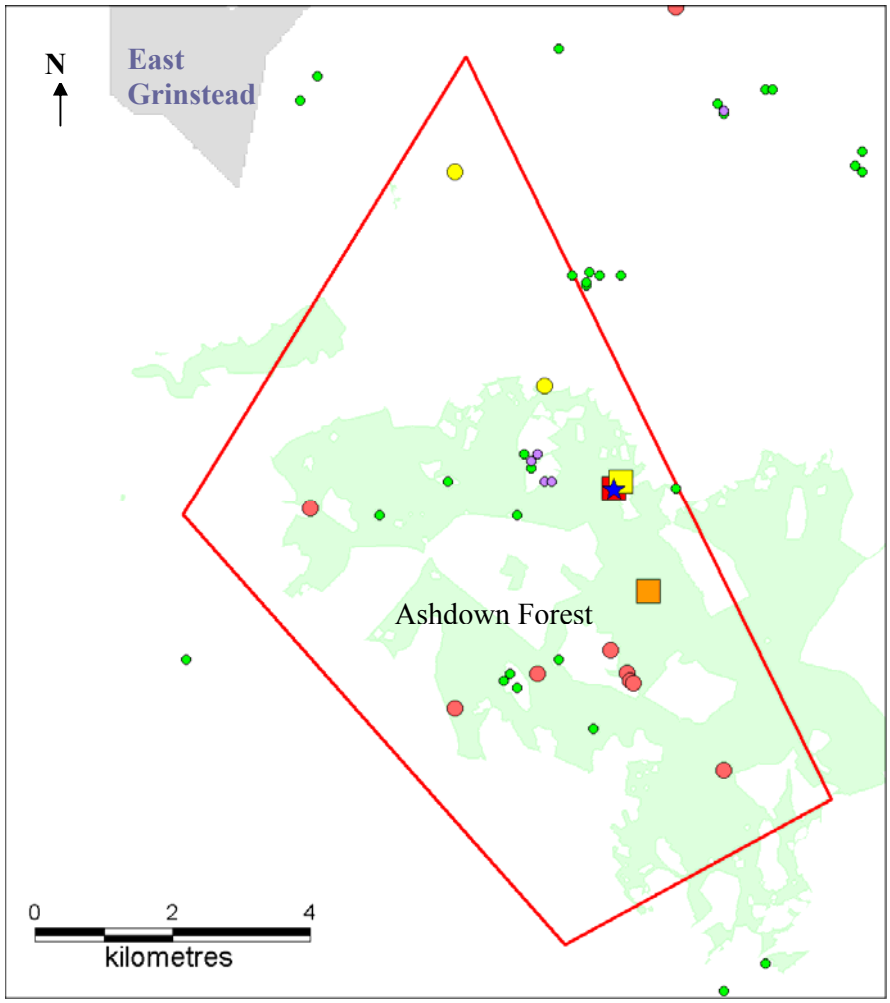
5.6 Ashdown IAP

5.6.1 Summary

Ashdown IAP is of National Importance with ponds and pools supporting a range of BAP species. There are (unconfirmed) records of Yellow Centaury *Cicendia filiformis* and Water Germander *Teucrium scordium*. Common Toad *Bufo bufo* and Grass Snake *Natrix natrix* are known from ponds in the area. Records of Great Crested Newt *Triturus cristatus* are also scattered across the IAP. Ponds in the Colemans Hatch area are particularly important for their diverse plant and invertebrate assemblages which include a range of Nationally Scarce water beetles.

Site name	**Ashdown IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species.** ***Criterion 3*: Assemblages: Plant, invertebrate and dragonfly** ***Criterion 4*: PSYM – Ashdown Forest Pond A**
SSSI and SAC designations*	Weir Wood Reservoir SSSI, Ashdown Forest SSSI SACs: 4030 European dry heaths, 4010 Northern Atlantic wet heaths with *Erica tetralix*
Central grid reference point for IAP: TQ 4531	
Area covered: 58 km²	

* Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 15. Ashdown IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.6.2 Site description

Location and designations
The Ashdown IAP lies in East Sussex and covers the area in and around Ashdown Forest, south-west of Tunbridge Wells. The area is partially covered by the High Weald AONB and includes two SSSIs: Ashdown Forest SSSI and Weir Wood Reservoir SSSI.

Ashdown Forest is also a Special Protection Area (SPA) and Special Area of Conservation (SAC) designated for its dry and wet heaths which are habitats of European importance. The Forest's Great Crested Newt *Triturus cristatus* populations are cited as a qualifying feature within the SAC. The area was also recently included as an Important Bird Area in the RSPB's 2000 review (RSPB, 2009).

Geology, geomorphology and natural habitats
Geologically, the Ashdown IAP is mainly underlain by the bedded sandstones and siltstones of the Cretaceous Ashdown Formation. Wadhurst Clays of similar age outcrop around the periphery of the region.

The central area of the IAP is dominated by Ashdown Forest which covers 2,630 ha and is part of one of the largest continuous blocks of lowland heath in south-east England. This European protected heathland comprises a matrix of open heath, ancient woodland, ghyll woodland, wetlands and bogs (Butterworth, 2009).

Pond types
Ashdown Forest supports over 100 ponds, predominantly man-made. Some are likely to have been originally created to water stock, others are the legacy of old pits and quarries once dug for marl. A number of mill ponds are present in the area, and there are both fish ponds and ornamental waterbodies, like the Chelwood Vachery Pond cascade, associated with larger country houses.

5.6.3 C1 - Habitats of high conservation importance

No Habitats Directive pond types have been identified from this IAP.

5.6.4 C2 - Species of high conservation importance

Plants
Yellow Centaury *Cicendia filiformis* (Vulnerable, BAP), a plant sometimes found on seasonally inundated pond margins, has been recorded from Forest Row Golf course (TQ436343), although the veracity and precise location of the record remain unconfirmed. More recently, Water Germander *Teucrium scordium* (Endangered, BAP W&CAct Sch 8), another plant of seasonal waters has a recorded from "Crockers Bank" (TQ4237) in 2004, although again the record is unconfirmed.

Amphibians and Reptiles
The area around Broadstone Farm (TQ437329) in the north of Ashdown Forest has a cluster of ponds with records for Common Toad *Bufo bufo*. There is also a Common Toad record further south in Ashdown Forest at Ellison's Pond near Camp Hill (TQ462287).

Great Crested Newts *Triturus cristatus* are also present in the Ashdown IAP. Records are distributed across the forest with clusters at Chelwood Vachery Ponds (TQ435300), around Broadstone Farm (TQ434331), and in forest ponds along Ridge Road (TQ447329).

Grass Snakes *Natrix natrix* have been recorded from ponds in and around the forest including: Pippingford Park (TQ447301), and Ashdown Forest, the latter including Ellison's Pond (TQ462287), Goat Pond (TQ402325) and Vachery Drive Pond (TQ435301).

Invertebrates

One of two sites, on The Ridge, Coleman's Hatch (TQ446328) in the north of Ashdown Forest, supports five Nationally Scarce invertebrate species and qualifies as a Priority Pond on this basis. All the uncommon species were water beetles: *Cercyon sternalis, Helochares punctatus, Hydaticus seminiger*, *Hydraena testacea* and *Hydrochus angustatus*.

5.6.5 C3 - Exceptional assemblages of key biotic groups

The Ridge Pond was also surveyed during the National Pond Survey in the early 1990s when it supported both exceptionally rich plant and invertebrate assemblages (38 plant species and 71 invertebrate species). The adjacent pond, lying closer to the road, at TQ447329, supported 35 plant species and qualifies as a Priority Pond on plant richness criteria.

The SSSI notification for Ashdown Forest includes a number of pond dwelling dragonflies but the records are not localised to specific ponds. The NBN Gateway lists a total of 26 post-1987 dragonfly species inside the SSSI boundary. These include three Red Data Book or Nationally Scarce species that occur in ponds: Brilliant Emerald *Somatochlora metallica* (RDB: Vulnerable), Hairy Dragonfly *Brachytron pratense* (equivalent to Nationally Scarce being found in 91 post-1987 hectads nationally – see Appendix 5), Small Red Damselfly *Ceriagrion tenellum* (equivalent to Nationally Scarce) and Downy Emerald *Cordulia aenea* (equivalent to Nationally Scarce).

5.6.6 C4 - Ponds of high ecological quality -PSYM

The Ridge Pond near Colemans Hatch pond (TQ446328) noted above for its plant and invertebrate assemblages also qualifies as a high quality PSYM pond, with a PSYM score of 78% in June 1990.

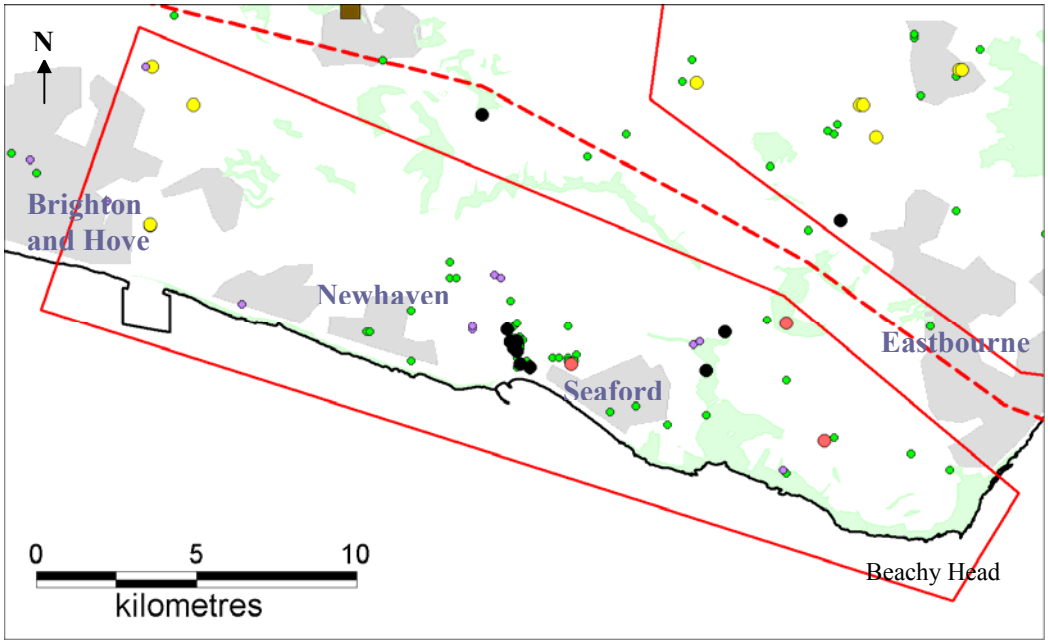
5.7 Newhaven IAP

5.7.1 Summary

Newhaven IAP is of National Importance for its grazing marsh ponds which support assemblages of uncommon water beetles. There are also recent records of Pennyroyal *Mentha pulegium* and Whorled Water-milfoil *Myriophyllum verticillatum* in areas around Brighton. Common Toad *Bufo bufo* and Grass Snake *Natrix natrix* have been recorded from a range of sites, and Great Crested Newt *Triturus cristatus* is widespread in both rural and urban ponds.

Site name	**Newhaven IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species.**
SSSI and SAC designations*	SSSIs within this IAP are: Seaford to Beachy Head SSSI, Castle Hill SSSI, Kingston Escarpment and Iford Hill SSSI, Lewes Brooks SSSI, Firle Escarpment SSSI, Lullington Heath SSSI, Wilmington Downs SSSI, Brighton to Newhaven Cliffs SSSI.
Central grid reference point for IAP: TQ 4403	
Area covered: 232 km²	

* Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 16. Newhaven IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.7.2 Site description

Location and designations
Newhaven IAP is located on the south Sussex coast, between Brighton and Eastbourne and includes part of the South Downs AONB. The Seaford to Beachy Head SSSI, and Lullington Heath SSSI lie wholly within the bounds of the Newhaven IAP; other SSSIs (see above) are partially included.

Geology, geomorphology and natural habitats
The Newhaven region has a relatively simple geology. Most of the area is underlain by chalk, although an outlier of Gault Clay lies under the Lewes Brooks. More recent head deposits flank some areas of the South Downs and the tops are locally capped by clay-with-flints. The River Ouse has deposited extensive alluvial sediments across its valley floor between Lewes and Newhaven.

The inland areas of the Newhaven IAP are dominated by the chalk grassland hills and valleys of the South Downs. Two major rivers run through the IAP: the Cuckmere and the Ouse. Both have extensive floodplains and associated grazing marshes and coastal saltmarsh. Coastal areas within the IAP are urbanized in the west between Brighton and Seaford, with more limited areas of maritime cliffs, saltmarsh, saline lagoons and vegetated shingle eastwards to Beachy Head and Eastbourne.

Pond types
Dew ponds are still present in many downland areas of this IAP. Within the valleys, stock-watering ponds occur within the grazing marshes. More recently, scrapes have been created in some coastal areas, including the Seven Sisters Country Park, to improve habitat for wading birds and wintering wildfowl.

5.7.3 C1 - Habitats of high conservation importance

No Habitat Directive pond types have been identified from this IAP.

5.7.4 C2 - Species of high conservation importance

Plants
There are a number of older records of the marginal plant Pennyroyal *Mentha pulegium* (Endangered, BAP, W&C Act Sch 8) from ponds in this IAP but most of these sites have now been lost. One of the last was from Falmer Pond (TQ354087) where there are records until 1996. Recently, two new Pennyroyal populations have been recorded from seasonally inundated grassland areas in the Sheepcote Valley, Brighton (TQ340049) in 2005 and 2006. It is not yet clear whether these records are of native plants or aliens introduced as a contaminant of grass seed.

Another notable record is of the Vulnerable aquatic plant Whorled Water-milfoil *Myriophyllum verticillatum*, a species usually associated with clean calcarious waters, which was recorded from a downland dewpond pond (TQ341099) near Stanmer north of Brighton in 2003.

Amphibians and reptiles
Common Toad *Bufo bufo* has been recorded from 10 areas of the Newhaven IAP: This includes a number of dew ponds (e.g. TQ339099, TQ510012), Winchester's Pond (TQ539019) and recent (2007) records from the Valley Road Ponds (TQ441018).

There are many records of Great Crested Newt *Triturus cristatus* within the IAP. Sites with multiple records include: Tide Mills Ponds (TQ461002), Seaford (TV488992), Newhaven Ouse Estuary Ponds (TQ455011), Winchesters Pond (TQ539019), and Friston Pond (TV551982). Viable populations have also been identified within the coastal conurbations, around Brighton, Eastbourne, Newhaven and Seaford (Sussex GCN SAP, 2004).

Grass snake *Natrix natrix* has been recorded at three ponds in the IAP: Bishopstone Pond (TQ472006), Winchester's Pond on Lullington Heath (TQ539019), and Friston Pond (TV551982).

Figure 17. Winchester's Pond, a dewpond supporting Common Toad *Bufo bufo* (© Kevin Gordon and licensed for reuse under a Creative Commons Licence).

Invertebrates

Two ponds in the Cuckmere Valley between West Dean and Alfriston qualify as Priority Ponds using the criterion of three or more Nationally Scarce invertebrates. These are: Pond 25P at West Dean Brooks (TQ514004) and a pond at Frog Firle Farm, Alfriston (TQ520016). Both support water beetle assemblages typical of coastal marshes.

A further seven ponds at Newhaven qualify under this criterion. The ponds are located in grazing marsh to the east of the town, centred on TQ455011. They support Nationally Scarce water beetle fauna typical of long-estabished grazing marshes with species such as the scavenger beetle *Limnoxenus niger* and the crawling water beetle *Peltodytes caesus* (Ball SG, 1986).

5.7.5 C3 - Exceptional assemblages of key biotic groups

There are no data for sites with exceptional assemblages of key biotic groups in the Newhaven IAP.

5.7.6 C4 - Ponds of high ecological quality -PSYM

There are no records of ponds with a high PSYM score (≥75%) in the Newhaven IAP area.

5.8 Pevensey IAP

5.8.1 Summary

Although the Pevensey Levels are well known for their rich ditch flora and fauna, for ponds, the known Priority sites largely lie away from the Levels in the hillside areas around Pevensey, and in the Coombe Haven valley to the east. Ponds and seasonal pools in these areas support nationally uncommon plants including Frogbit *Hydrocharis morsus-ranae,* Opposite-leaved Pondweed *Groenlandia densa*, Three-lobed Crowfoot *Ranunculus tripartitus* and Coral-necklace *Illecebrum verticillatum*. There are a range of ponds with assemblages of uncommon invertebrates. Others with Water Vole *Arvicola terrestris* and Grass Snake *Natrix natrix*. Records of Great Crested Newt *Triturus cristatus* are frequent in the area, which is encompassed in the larger Wealden GCN IAP.

Site name	**Pevensey IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species**
SSSI and SAC designations*	SSSIs included in the area: Arlington Reservoir SSSI, Milton Gate Marsh SSSI, Pevensey Levels SSSI, Ashburnham Park SSSI, High Woods SSSI, Combe Haven SSSI, Fore Wood SSSI, Marline Valley Woods SSSI.
Central grid reference point for IAP: TQ 6111	
Area covered: 333 km²	

* Note: All SSSIs within the IAP are listed, not just those containing ponds

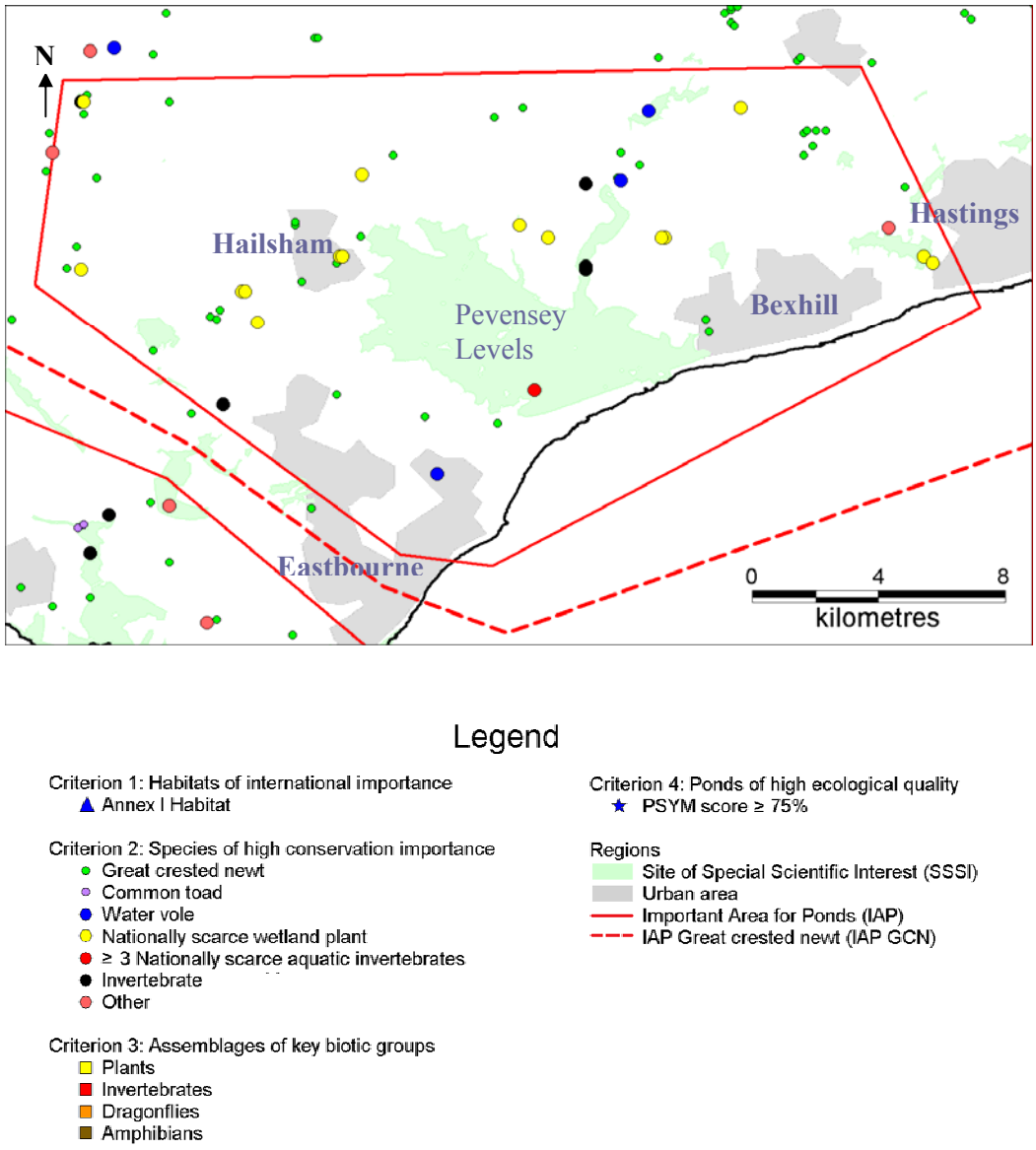


Figure 18. Pevensey IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.8.2 Site description

Location and designations
The Pevensey IAP lies on the Sussex coast between Eastbourne and Hastings, extending inland towards Uckfield. The IAP encompasses six SSSIs including Pevensey Levels, Arlington Reservoir and High Woods SSSIs. Several other SSSIs are partially included in the IAP. Pevensey Levels is also designated a Ramsar site and a NNR.

Geology, geomorphology and natural habitats
Geologically, the area is underlain by sandstones and clays, with geological strata running broadly southeast-northwest across the IAP. Greensand and Gault Clay outcrop in the west towards Eastbourne and give way eastwards to the Weald and Wadhurst Clays and Tunbridge Wells and Ashdown Sandstones. Through the centre of the area these older rocks are overlain by the extensive recent alluvial clays and more local peat deposits of the Pevensey Levels. The coastal boundary here is formed by the early Holocene Crumbles shingle ridge which isolates the wetland from the sea. To the north, a second, more limited area of alluvial deposition occurs south of Hastings around Coombe Haven.

The Pevensey IAP includes a varied landscape. The Pevensey Levels itself is one of the largest and least fragmented lowland wet grassland systems in the south-east. Its low lying grazing meadows are intersected by a complex system of ditches which support important wetland communities. Eastwards along the coast between Bexhill and Hastings lies the flat widing valley floor Coombe Haven. Although far smaller than Pevensey, it too supports areas of grazing marsh and Filsham reedbeds: the largest aea of reedbed in East Sussex. To the north of Pevensey and Coombe Haven, the land rises to the High Weald, giving a relatively wooded landscape dissected by many north-south running ridges and valleys and some local areas of heath.

Pond types
To the north, the wooded valleys of the High Weald have a high density of ponds with numerous hammer ponds and more occasional moats and decoy ponds. Fish ponds are associated with some of the larger manors and more recent ornamental lakes and ponds with landscaped gardens. The locally high density of golf courses has resulted in the creation of new golf course ponds in some areas. Small woodland and heathland ponds and the ruts in trackways running through these areas locally support uncommon plant species. In the lowlands, grazing marsh ponds are scattered across the Pevensey Levels and Coombe Haven Basin.

5.8.3 C1 - Habitats of high conservation importance

No Habitat Directive pond types have been identified from this IAP.

5.8.4 C2 - Species of high conservation importance

Plants
Pevensey Levels grazing marsh ditches are well known for their exceptionally rich aquatic flora, but there are no recent records of nationally uncommon plants from ponds in this area. Ponds on the hillsides around the levels, however, support a number of uncommon species. The nationally Vulnerable floating-leaved plant Frogbit *Hydrocharis morsus-ranae* is recorded to the north of the Levels (TQ65011079), and in the Coombe Haven valley west of Hastings (TQ778098, TQ781096). To the west of Hailsham, there are records for both Frogbit (Wilmington Woods TQ567077) and Opposite-leaved Pondweed *Groenlandia densa* (near Ripe TQ511094).

On the ex-heath and woodland around Hailsham there are multiple records for Three-lobed Crowfoot *Ranunculus tripartitus*, an Endangered BAP plant of heaths and common which thrives in tiny seasonal pools and ruts, often kept open by stock poaching or vehicle movements on track-ways. A collection of sites occur around East Hoathley with records from a pond in Milton Hide (TQ562087), around ponds in Rowland Wood to the south in 2007 (TQ512147, TQ512147), and an additional record from a pond east of Hailsham (TQ593098).

Three-lobed Crowfoot is also found in trackway pools to the west of the Levels in Wartling Wood (TQ659104), Hooe Common Sussex Wildlife Trust Reserve (TQ6910) and from a small pond on the Warren Catsfield (TQ720145).

Coral-necklace *Illecebrum verticillatum*, another nationally Vulnerable priority species associated with track-ruts, seasonal pools and pond edges was recorded near by in Park Wood, Hellingly (TQ600124) in 1997.

Mammals
There are three sites within the Pevensey IAP where Water Voles *Arvicola terrestris* have been recorded: Langney Centre Pond (TQ624029) in the eastern outskirts of Eastbourne, Ashburnham Park Ponds (TQ691144) and a pond at Hazard's Green water treatment works (TQ682122). A Water Vole survey (commissioned by the EA and undertaken by the Sussex Biodiversity Records Centre) has recently been carried out in the Cuckmere and Pevensey Levels Catchment and may identify more sites in the area.

Amphibians and Reptiles
There are many records of Great Crested Newt *Triturus cristatus* scattered across the Pevensey IAP, and this area is encompassed in the larger Wealden GCN IAP (see section 7). Concentrations of records for the species occur at Fore Wood Ponds (TQ740137), Bexhill (TQ709078), Hazards Green near Ninfield (TQ682122), Hailsham (TQ592096,) Pevensey and Westham School (TQ643045) and Upper Vert Wood Ponds (TQ512148).

There is one record for Grass Snake *Natrix natrix* at Decoy Farm Pond, Crowhurst (TQ767107) in 2004.

Invertebrates
Ditches on the Pevensey Levels support exceptional freshwater invertebrate assemblages. Many of the rare species for which the area is special also occur in ponds in long established wetland environments. Thus, animals such as the Shining Ram's-horn snail *Segmentina nitida* (RDB: Endangered), the Great Silver Water Beetle *Hydrophilus piceus* (RDB: Rare) and the nationally rare water beetle *Hydrovatus clypealis* (RDB: Rare) may all occur in ponds in the Levels but, in the absence of survey data, it is not possible to assess the significance of ponds for these species.

Away from the Levels, there are records of three ponds which support three or more Nationally Scarce aquatic invertebrate species:

- Park Corner Heath, near East Hoathly (TQ511147): a pond in coniferous woodland with a rich water beetle assemblage
- Wootton Manor, near Wilmington (TQ556051): a pond on the floodplain of the Cuckmere River, with a rich water beetle assemblage

- BCS 75b, a new pond near Boreham Street (TQ671121), just north of the Pevensey Levels, with four Nationally Scarce beetles including *Rhantus grapii* which is a species characteristic of primary fen habitats (i.e. ancient wetlands) which can move into newly created waterbodies.

5.8.5 C3 - Exceptional assemblages of key biotic groups

There are no data for ponds with exceptional assemblages of key biotic groups in the Pevensey IAP.

5.8.6 C4 - Ponds of high ecological quality -PSYM

There are no sites with PSYM data in the Pevensey IAP.

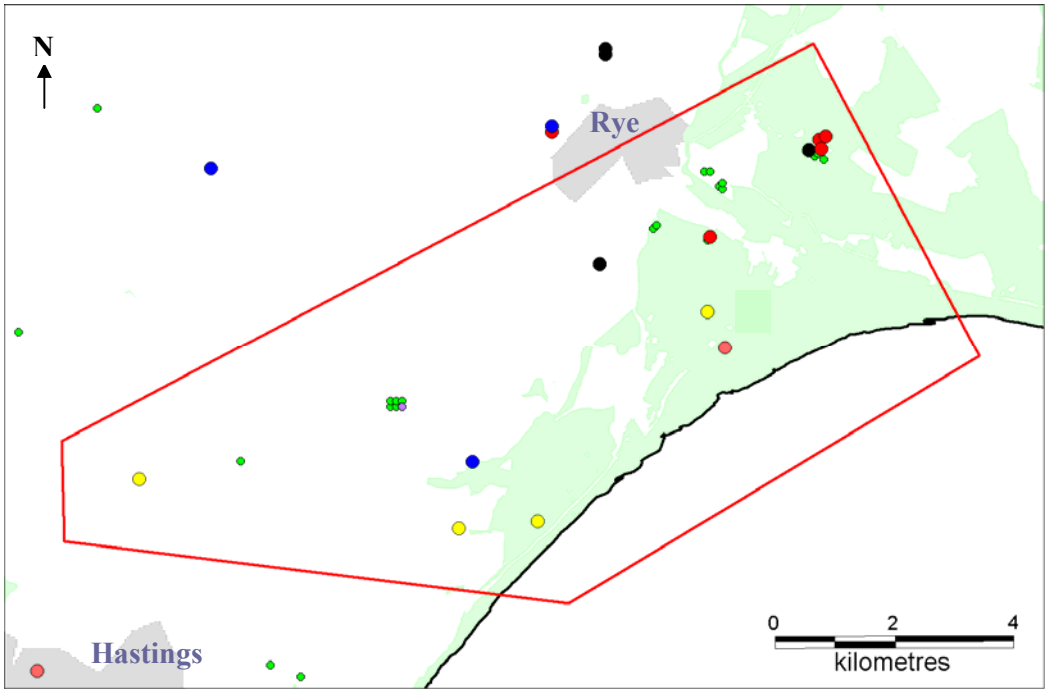
5.9 Winchelsea IAP

5.9.1 Summary

The Winchelsea IAP supports ponds with a range of Nationally Important species both on the coastal plain and in the more wooded hillside hinterland. Plants include Frogbit *Hydrocharis morsus-ranae*, Lesser Water-plantain *Baldellia ranunculoides* and *Oenanthe fistulosa* Tubular Water-dropwort. There are records of Water Vole *Arvicola terrestris*, Great Crested Newt *Triturus cristatus* and Common Toad *Bufo bufo,* and these species are likely to ocurr more commonly in ponds than the few specific records suggest. Ponds in the area also support rich assemblages of uncommon beetles and populations of Medicinal Leech *Hirudo medicinalis*.

Site name	**Winchelsea IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species**
SSSI and SAC designations*	SSSIs that lie within the IAP: Dungeness, Romney Marsh and Rye Bay SSSI, Hastings Cliff to Pett Beach SSSI. Dungeness SAC, 1210 Annual vegetation of drift lines, 1220 Perennial vegetation of stony banks. Dungeness to Pett Level SPA designated for its breeding and overwintering bird species.
Central grid reference point for IAP: TQ 9017	
Area covered: 76 km²	

* Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 19. Winchelsea IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.9.2 Site description

Location and designations
The Winchelsea IAP covers the coastal plain area between Pett Level and Rye, extending north-west into the Brede Valley towards Westfield. The area includes part of the Dungeness, Romney Marsh and Rye Bay SSSI, and covers the eastern end of the Hastings Cliff to Pett Beach SSSI.

Geology, geomorphology and natural habitats
Geologically the Winchelsea IAP is underlain by the Creatceous sandstones and clays of the Hastings Beds: largely the sand and siltstones of the Ashdown Formation and the Wadhurst Clays. Along the coast between Pett Levels and Rye these older rocks are covered by tidal flat deposits, which extend inland into the valley of the River Brede. Storm beach deposits are locally extensive along the coast between Winchelsea and Rye.

The Winchelsea IAP is a generally low-lying area of pasture, and has more arable land than Pevensey to the west. It supports a mix of semi-natural habitats which range from grazing marsh and saltmarsh to saline lagoons with extensive areas of shingle beach particularly in Rye Bay. Above the coastal strip and Brede Valley, the flatlands give way to rising ground with the woods, farms and fields in the sandstone hills.

Pond types
The coastal areas of the Winchelsea IAP includes a complex network of saline, brackish and freshwater bodies. In the Rye Harbour area, extensive gravel pits were created by shingle excavation between 1930 and 1970 and now support important wildlife assemblages. Most are too large to be included within this report, although some ponds exist. Smaller pools and scrapes have also been recently created among the shingle and saltmarsh surroundings to provide wading bird habitat.

The grazing marsh areas of Pett Levels and Rye Marsh are drained by an extensive network of ditches, with few ponds. Pond numbers increase in the Brede Valley, and in the wooded hills above the marshes, where hammer ponds are common.

5.9.3 C1 - Habitats of high conservation importance

No Habitats Directive pond types have been identified from this IAP.

5.9.4 C2 - Species of high conservation importance

Plants
There are records for Frogbit *Hydrocharis morsus-ranae* (Vulnerable) from one of the small ponds (TQ928181) within the larger Rye Harbour wetland complex. Further inland there are also Frogbit records from Maxfield Manor near Three Oaks (TQ833153) and at Carters Farm above Pett Level (TQ8864314476). The Carters Farm pond also has a record for Nationally Threatened Lesser Water-plantain *Baldellia ranunculoides.*

Large waterbodies (c.2 ha) at Pett (e.g. TQ89961459) have records for the BAP species *Oenanthe fistulosa* Tubular Water-dropwort (Status: Vulnerable).

Mammals
There is a record of Water Vole *Arvicola terrestris* at Henderson's Pond, Carters Farm (TQ88871559) south-west of Winchelsea village. Other Water Vole records are not localised to specific ponds, but the coastal plains and Brede Valley are known to have strong and long established populations of Water

Voles associated with their ditches, ponds and lagoons (Dungeness, Romney Marsh and Rye Bay SSSI citation).

Amphibians and reptiles

Records of Great Crested Newt *Triturus cristatus* are scattered across both the coastal lowlands and more inland areas of the IAP, with clusters of records at Icklesham (TQ877166) and Moneypenny Farm (TQ946207). Common Toad *Bufo bufo* are also recorded from the Icklesham Ponds (TQ877165).

Invertebrates

The Dungeness, Romney Marsh and Rye Bay area supports a wide range of Red Data Book and Nationally Scarce aquatic invertebrates. Areas of shallow open water and emergent vegetation have a rich water beetle assemblage including four species of *Dytiscus* and the Great Silver Water Beetle *Hydrophilus piceus*, a substantial dragonfly assemblage and a suite of reed beetles (*Donacia* spp.). However, data identifying matching waterbodies to specific invertebrate species were not generally available for this assessment. The exception is Medicinal Leech *Hirudo medicinalis* where data were available for two sites within Winchelsea IAP: Moneypenny Pit and associated ponds (TQ946209, TQ947208, TQ947210), and Barnfield Pond (TQ928193)

Moneypenny Farm also qualifies under the Priority Pond criterion of supporting three or more Nationally Scarce invertebrates. Species lists from surveys in 2002-3 include the following Nationally Scarce water beetles: *Hydrovatus clypealis*, *Limnoxenus niger*, *Noterus crassicornis*, *Peltodytes caesus*, *Helochares lividus*, *Ochthebius viridis*, *Cercyon sternalis*, *Chaetarthria seminulum* and *Rhantus grapii*. Most are species associated with long-established wetland environments.

5.9.5 C3 - Exceptional assemblages of key biotic groups

There are no data for ponds with exceptional assemblages of key biotic groups in the Winchelsea IAP.

5.9.6 C4 - Ponds of high ecological quality -PSYM

There are no PSYM survey data for ponds within the Winchelsea IAP.

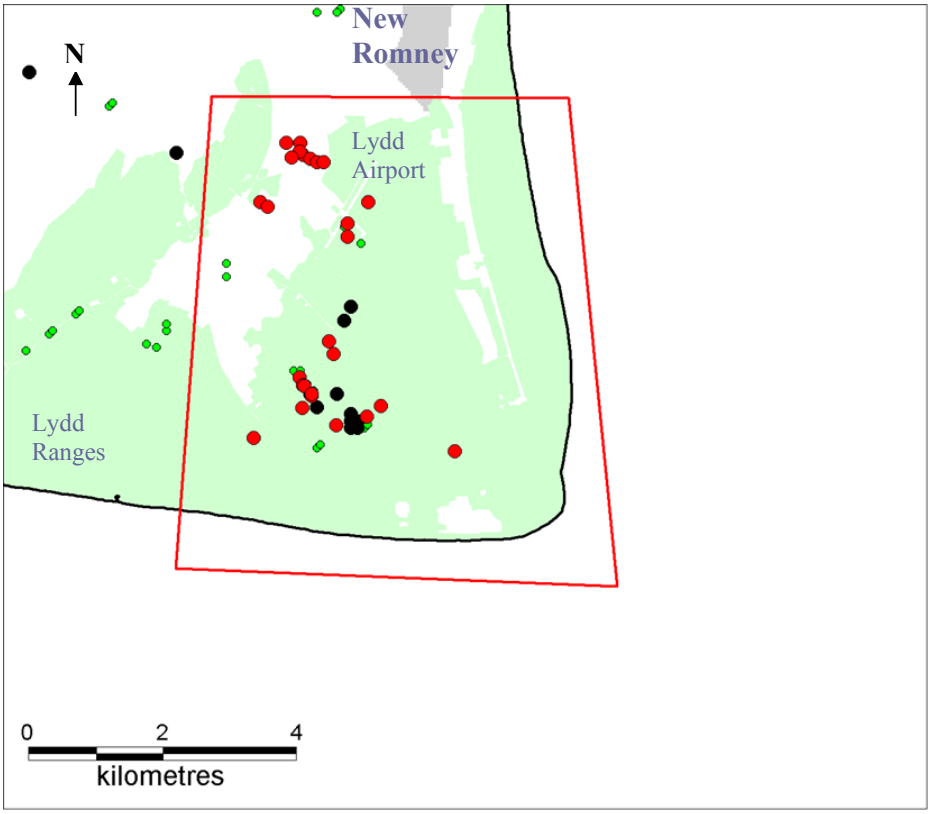
5.10 Dungeness IAP

5.10.1 Summary

The Dungeness IAP is of National Importance for its invertebrate assemblages. Its small waterbodies support important populations of Medicinal Leech *Hirudo medicinalis* and ponds with rich assemblages of Nationally Scarce invertebrates. Great Crested Newt *Triturus cristatus* occur across the region. Uncommon plant species including Frogbit *Hydrocharis morsus-ranae* and Lesser Water-plantain *Baldellia ranunculoides* may occur in ponds, but most records are not located accurately enough for use in the analysis.

Site name	**Dungeness IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species**
SSSI and SAC designations*	Includes the following SSSI: Dungeness, Romney Marsh and Rye Bay SSSI.
Central grid reference point for IAP: TR 0620	
Area covered: 43 km²	

*Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 20. Dungeness IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.10.2 Site description

Location and designations
The Dungeness IAP lies on the Dungeness headland, south of New Romney on the Sussex coast. The IAP falls within the Dungeness, Romney Marsh and Rye Bay SSSI, Special Protection Area (SPA) and Special Area of Conservation (SAC). The area of the IAP is also a National Nature Reserve (NNR) and Important Bird Area.

Geology geomorphology and natural habitats
Although underlain at depth by the Cretaceous sands and clays of the Hastings Beds, the surface geology of the Dungeness area comprises more recent deposits. Seaward areas are dominated by extensive storm beach shingle ridges: Dungeness IAP has the largest shingle expanse in Europe. Further inland are tidal mud flat deposits and occasional patches of wind-blown sand.

Habitats within the IAP include a mosaic of shingle ridges, wetlands, reedbed, dry and wet grasslands, with some areas of intensive mixed farming in the Denge Marshes.

Pond types
The Dungeness IAP is permeated by a complex network of waterbodies in varying stages of sucession from open water and marginal reed-swamp to fen, marsh and willow carr. Between the coastal shingle ridges are a number of natural freshwater pools (the 'Open Pits' or 'Long Pits'), most with a water area of less than 2 ha. Inland, flooded gravel pits dug to extract shingle during the 20th century have created around 90 waterbodies. Most are large, but some fall within the 2 ha upper pond size limit. Ponds are uncommon in other areas of the IAP, such as the ditch-drained Denge Marshes.

5.10.3 C1 - Habitats of high conservation importance

No Habitat Directive pond types have been identified from this IAP.

5.10.4 C2 - Species of high conservation importance

Plants
The Dungeness RSPB reserve has records for a number of nationally uncommon aquatic plant species including Frogbit *Hydrocharis morsus-ranae* (Vulnerable) and Lesser Water-plantain *Baldellia ranunculoides* (Nationally Threatened). However many records are not localised, so may be associated with the larger lakes or ditches in the area.

Amphibians and reptiles
Great Crested Newt *Triturus cristatus* records occur across the IAP, with clusters at Lydd Airport (TR064212), Dungeness NNR (TR067182), Denge Marsh (TR060179) and on the RSPB reserve (TR058188).

Invertebrates
Medicinal leech *Hirudo medicinalis* (Habitats Directive Annex 5) is found in a range of shallow, well vegetated water bodies across the Dungeness headland, with loci of records at Lydd Golf Course Ponds (TR059221) and on the RSPB reserve (TR060190). Overall there are records from at least 20 ponds in the area.

Figure 21. Larger pond on Dungeness (© Simon Carey and licensed for reuse under a Creative Commons Licence).

A number of ponds have three or more Nationally Scarce invertebrate species with nine ponds within the RSPB reserve qualifying under this criterion and one pond at Dungeness ARC Pits. In total 24 Nationally Scarce water beetles have been recorded from these sites including species associated with long-established wetland environments, such as the crawling beetle *Peltodytes caesus* and the diving beetle *Noterus crassicornis*, and species associated with brackish coastal environments such as the diving beetle *Agabus conspersus* and the scavenger beetle *Ochthebius viridis* .

5.10.5 C3 - Exceptional assemblages of key biotic groups

There are no current records of ponds ≤2 ha with exceptional assemblages of key biotic groups in the Dungeness IAP. A 2.2 ha gravel pit (TR062184) surveyed as part of the National Pond Survey was recorded as having 52 invertebrate species in a summer season sample. This exceeds the qualifying number of species for a Priority Pond, but the waterbody is just over the 2 ha size limit.

5.10.6 C4 - Ponds of high ecological quality -PSYM

There are no ponds with PSYM data within the Dungeness IAP.

5.11 Ashford District IAP

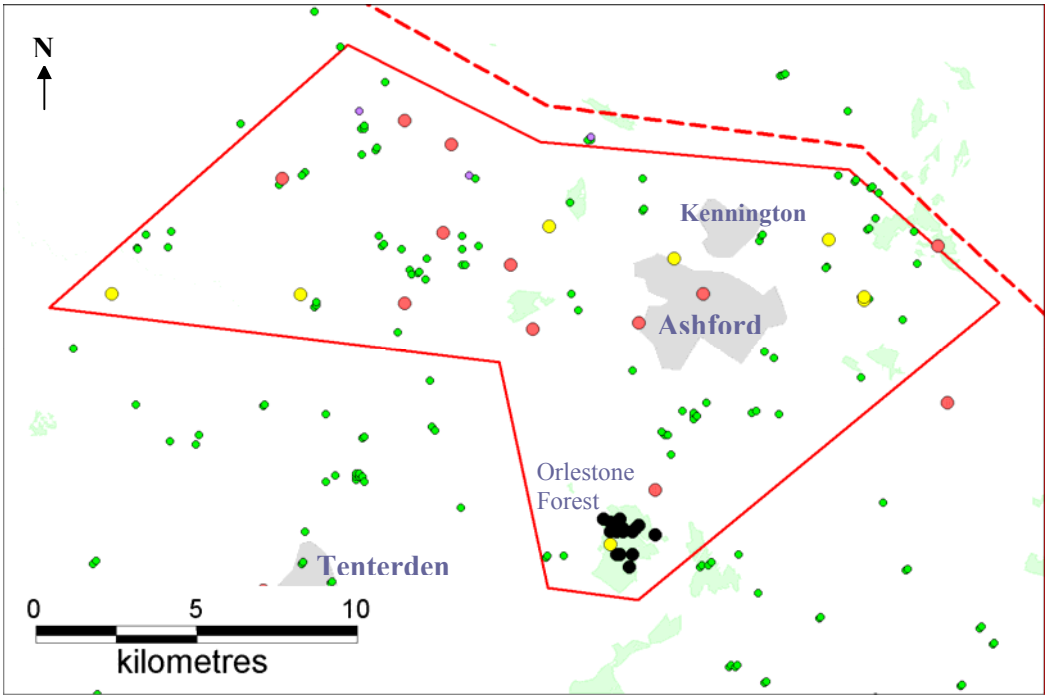
5.11.1 Summary

The Ashford District IAP is of National Importance for its plant, invertebrate and amphibian assemblages. Important plants include Three-lobed Crowfoot *Ranunculus tripartitus*, Fox Sedge *Carex vulpina*, Tubular Water-dropwort *Oenanthe fistulosa*, Frogbit *Hydrocharis morsus-ranae* and Clustered Stonewort *Tolypella glomerata*.

Woodland ponds in the Orlestone Forest area have important invertebrate sites, and ponds with assemblages of 3 or more Nationally Scarce water beetles are scattered throughout the IAP. Common Toad *Bufo bufo* and Grass Snake *Natrix natrix* occur in a variety of areas, and there are five concentrations of Great Crested Newt *Triturus cristatus* ponds.

Site name	**Ashford District IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species**
SSSI and SAC designations*	SSSIs included in the IAP: Orlestone Forest SSSI, Hothfield Common SSSI, Ham Street Woods SSSI, Alex Farm Pastures SSSI, Hoads Wood SSSI, Hatch Park SSSI, Wye and Crundale Downs SSSI
Central grid reference point for IAP: TQ 9844	
Area covered: 229 km²	

*Note: All SSSIs within the IAP are listed, not just those containing ponds



Legend

Criterion 1: Habitats of international importance
- Annex I Habitat

Criterion 2: Species of high conservation importance
- Great crested newt
- Common toad
- Water vole
- Nationally scarce wetland plant
- ≥ 3 Nationally scarce aquatic invertebrates
- Invertebrate
- Other

Criterion 3: Assemblages of key biotic groups
- Plants
- Invertebrates
- Dragonflies
- Amphibians

Criterion 4: Ponds of high ecological quality
- PSYM score ≥ 75%

Regions
- Site of Special Scientific Interest (SSSI)
- Urban area
- Important Area for Ponds (IAP)
- IAP Great crested newt (IAP GCN)

Figure 22. Ashford District IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.11.2 Site description

Location and designations
The Ashford District IAP lies in central Kent and occupies the area around, and to the north-west of, Ashford. Seven SSSIs fall wholly or partly within the IAP: Orlestone Forest SSSI, Hothfield Common SSSI, Ham Street Woods SSSI, Alex Farm Pastures SSSI, Hoads Wood SSSI, Hatch Park SSSI and Wye and Crundale Downs SSSI.

Geology, geomorphology and natural habitats
The north eastern edge of the Ashford IAP follows the line of the North Downs along the boundary between the Lower Chalk and Gault Clay. To the south west the Gault gives way to the Lower Greensand and then, south and west of Ashford, to Weald Clay underlying the extensive lowlands of the Low Weald.

The landscape around Ashford is varied. The Greensand Ridge to the north supports nationally important acid grassland and heathland sites, the most extensive of which is Hothfield Common, as well as many smaller acid grassland fragments. On lower ground Ham Street Woods and Orlestone Forest include a range of dry and wet woodland types and areas of unimproved grassland. Elsewhere are blocks of wood pasture and some very small areas of fen. Much of the remaining landscape is mixed farmland with small woodlands. However the area has significant and increasing amounts of urban development, particularly along the communication corridors of the M20 and A20.

Pond types
The region has a high density of ponds, particularly in the Low Weald areas, and includes a wide range of pond types. This includes spring-fed ponds and lakes at the foot of the Downs, fish ponds, many farm and woodland ponds, and ornamental waterbodies including the Hatch Deer Park ponds. Clay pits and woodland and heathland trackway-pools are of particular conservation importance in the area, and additional ponds and scrapes have been created for a number of uncommon species in Orlestone Forest and on Hothfield Common.

5.11.3 C1 - Habitats of high conservation importance

No Habitat Directive pond types have been identified from this IAP.

5.11.4 C2 - Species of high conservation importance

Plants
The considerable density of ponds and wide variety of pond types found in the Ashford IAP area is reflected in the diversity of uncommon pond plant species found.

In more acid sand-based heathland and woodland areas Three-lobed Crowfoot *Ranunculus tripartitus* (Endangered, BAP) has been recorded. In Orlestone Forest (TQ979351) there has been successful management of pools for *Ranunculus tripartitus*. Scrapes have also been successfully created on Hothfield Common (TQ9645), and plants occurred in some quantity after scrub clearance work on the bogs (Kent Red Data Book, 1999).

The rare Fox Sedge *Carex vulpina* (Vulnerable, BAP), a plant of pond and ditch drawdown zones, has a historic stronghold in Kent, and within the Ashford IAP has been recorded from a seasonal field pond near Headcorn in the Low Weald (TQ824429).

Tubular Water-dropwort *Oenanthe fistulosa* (Vulnerable, BAP) and Frogbit *Hydrocharis morsus-ranae* (Vulnerable) have been recorded from ponds in the Ashford area, at, respectively, Brook Meadow (TR058428, TR058427) and Ashford Warren (TQ999440). Frogbit has also been recorded from a pond at Smarden, south-east of Headcorn TQ88274289.

The disused Naccolt Clay Pit (TR047446) north east of Ashford is one of richest sites for stoneworts in Kent. Six species are found here including the Nationally Scarce Clustered Stonewort *Tolypella glomerata* (Stewart, 2004).

Amphibians and Reptiles

In 1999, three records of Common Toad *Bufo bufo* were made as part of the Kentish Stour Pond Survey. Two records lie to the north-west of Ashford at Chart Court Farm (TQ935466) and Burscombe Farm (TQ901486). The third is from Claypits near Bromley Green (TQ993368).

Great Crested Newt records are distributed throughout the IAP. Clusters of records occur from ponds at The Chantry, Headcorn (TQ841443), Weathercock at Smarden (TQ887425), Monkery Farm (TQ913417), Saracens Cottage at Pluckley (TQ938444), and Smithfield Farmhouse (TQ996385).

There are nine records of Grass Snake *Natrix natrix* from the Ashford District IAP; all recorded as part of the Kentish Stour Pond Survey in 1999. One record is from a pond in central Ashford (TR008429) and one from Claypits at Bromley Green to the south of Ashford (TQ993368). The seven remaining records all come from the area to the west of Ashford, near to Hothfield and Pluckley: Coldharbour Farm (TQ877465), High Ridge (TQ948438), Buxford Meadow (TQ988420), South of Etchden wood (TQ955418), Pond House (TQ927448), Newhouse Farm (TQ915426) and Field Mill (TQ915483).

Invertebrates

There are four woodland ponds that contain three or more Nationally Scarce aquatic macroinvertebrate species: Faggs Wood (TQ985344), Longrope Wood (TQ981355), Birchett Wood (TQ987356) and Bayland Wood (TQ979358). Their assemblages include a variety of clayey woodland pond species such as the diving beetle *Hydaticus seminiger* which has a stronghold in the south-east, the scavenger beetle *Hydrochus angustatus* and small woodland associated diving beetle *Hydroporus neglectus*.

Pond 10 in Bayland Wood supported seven Nationally Scarce water beetles when surveyed in 1994: *Cercyon convexiusculus* (now known from more than 100 10 x 10 km squares but still classified by JNCC as Nationally Scarce), *Cercyon ustulatus*, *Haliplus heydeni*, *Hydaticus seminiger*, *Hydraena testacea*, *Hydrochus angustatus* and *Ilybius chalconatus*.

Pond 1 in Birchett Wood (TQ988357) supported five Nationally Scarce water beetles in 1994 - *Haliplus heydeni*, *Hydraena testacea*, *Hydrochus angustatus*, *Ilybius chalconatus* and *Ilybius guttiger*.

5.11.5 C3 - Exceptional assemblages of key biotic groups

There are currently no data for sites with exceptional assemblages of key biotic groups in the Ashford District IAP.

5.11.6 C4 - Ponds of high ecological quality -PSYM

There are currently no sites with PSYM data in the Ashford District IAP.

5.12 North Kent Marshes IAP

5.12.1 Summary

The North Kent Marshes IAP is of National Importance for its invertebrate and amphibian assemblages, and Water Voles *Arvicola terrestris* are found in some ponds. Ponds with assemblages of 3 or more Nationally Scarce water beetles are scattered throughout the IAP. There are a considerable number of Great Crested Newt *Triturus cristatus* records in the area (~500) with three significant pond-associated clusters. Common Toad *Bufo bufo* is recorded at two pond sites.

Site name	**North Kent Marshes IAP**
IAP qualifying criteria	***Criterion 2*: Annex II, RDB, NS and BAP species.**
SSSI and SAC designations*	SSSIs within this IAP: South Thames Estuary and Marshes SSSI, Medway Estuary and Marshes SSSI, The Swale SSSI, Cobham Woods SSSI, Shorne and Asbenbank Woods SSSI, Great Crabbles Wood SSSI, Chattenden Woods SSSI, Northward Hill SSSI, Church Woods (Blean) SSSI, West Blean and Thornden Woods SSSI, East Blean Woods SSSI, Ellenden Woods SSSI, Stodmarsh SSSI, Chequers Wood and Old Park SSSI Blean Complex SAC, Stodmarsh SAC
Central grid reference point for IAP: TQ 9268	
Area covered: 890 km²	

* Note: All SSSIs within the IAP are listed, not just those containing ponds

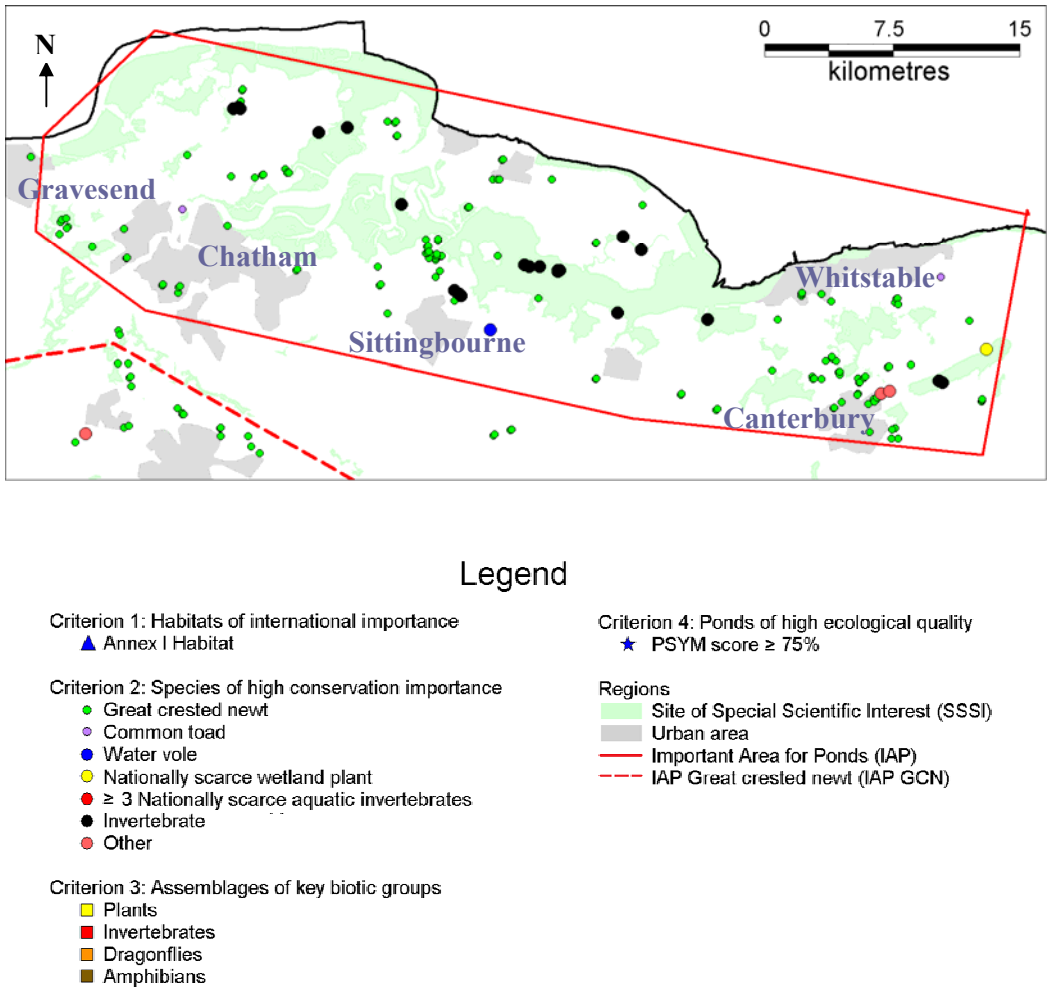


Figure 23. North Kent Marshes IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.12.2 Site description

Location and designations
The North Kent Marshes IAP extends over an area of 890 km², covering the coastal fringe between Herne Bay in the east, and Gravesend in the Thames Estuary to the west. The IAP includes both the Isle of Sheppey and the estuary of the River Medway. The North Kent Marshes are designated, almost in their entirety, as SSSIs, SPA and/or Ramsar sites, and are of national and international importance for breeding and overwintering bird populations with three IBAs in the area (Butterworth, 2009).

Geology, geomorphology and natural habitats
Coastal areas of the IAP are underlain by a broad strip of London Clay stretching from Canterbury to the coast, across the Isle of Sheppey and westwards towards Rochester. Inland, the London Clay gives way first to the variable sands, gravels, silts and clays of the Palaeocene Harwich, Lambeth and Thanet Formations, then to the Upper Chalk of the North Downs. In coastal areas much of the London Clay is overlain by recent alluvial deposits.

The North Kent Marshes IAP is dominated by the flat open landscape of its internationally important grazing marshes and intertidal mudflats stretching from the Thames Estuary in the west to the Swale Estuary in the east. The area includes significant areas of saltmarsh which extend inland along creeks and drainage dykes as well as lagoons and freshwater wetlands. The marshes are still largely grazed, but in places substantial tracts have been converted to arable cultivation. Rising ground to the south and east of the area, particularly around Canterbury, supports areas of heathland and woodland within a landscape otherwise dominated by mixed farming and urban areas.

Pond types
Disused mineral workings have created many ponds within this IAP. Gravel pits occur across the North Kent marshes and in river valleys further inland. Clay pits have created locally important waterbodies (e.g. in Swale SSSI, Shorne Country Park). Lagoons and reedbed complexes at Stodmarsh resulted from the subsidence of old colliery workings. Other traditional pond types are common in the area including farm ponds, village ponds, mill ponds and fish ponds. More recently farm reservoirs, golf course ponds and bird scrapes have been created.

5.12.3 C1 - Habitats of high conservation importance

No Habitat Directive pond types have been identified from this IAP.

5.12.4 C2 - Species of high conservation importance

Plants
Given the extensive areas of grazing marsh within the North Kent IAP there are surprisingly few records of nationally uncommon plants from the ponds scattered across the area with only a single record of Frogbit *Hydrocharis morsus-ranae* (Vulnerable) from a pond at Port Farm (TR22596244) adjacent to Stodmarsh NNR in 1991.

Mammals
Water Voles *Arvicola terrestris* are common on many marshes, and have been recorded continuously from 1990 to 2003 at Tonge Pond (TQ9340663565), east of Sittingbourne.

Figure 24. Pond in the North Kent Marshes (Lee Brady)

Amphibians and reptiles
Common Toads *Bufo bufo* have been recorded in two ponds in the North Kent Marshes IAP; Frog Island Pond near Rochester (TQ7530707) and Broomfield Pond near Herne Bay (TR199667) at the eastern end of the IAP.

There are over 500 Great Crested Newt *Triturus cristatus* records dispersed throughout the IAP. Many of these are undoubtedly from ditches, but clusters of pond associated records appear near Sittingbourne (TQ905679), to the north and east of Canterbury (TR143587), and in the area around Shorne Wood Country Park and Cobham (TQ676693). Peters Pit chalk quarry pools, a SAC for Great Crested Newt, lies to the southeast of Rochester, just outside the area.

Invertebrates
Ponds with assemblages of three or more Nationally Scarce water beetles occur in ponds at a number of locations in the IAP including High Halstow (TQ783766), Middle Stoke (TQ 833752), Isle of Grain (TQ850755), Chetney Marsh SSSI, (TQ882710), Church Marsh (3 sites ~TQ916657), Westbeare Marshes (TR200605), Oare Marshes (TR009646) and Elmley (TQ957673) plus several other sites. Species recorded include several with low mobility that are often associated with long-established wetland environments, such as *Limnoxenus niger*, *Peltodytes caesus*, *Rhantus grapii* and *Noterus crassicornis*.

These sites probably represent only a small proportion of the important water bodies in the IAP.

5.12.5 C3 - Exceptional assemblages of key biotic groups

There are no data for sites with exceptional assemblages of key biotic groups in the North Kent Marshes IAP.

5.12.6 C4 - Ponds of high ecological quality – PSYM

There are currently no ponds with PSYM data from the North Kent Marshes IAP.

Wealden Great Crested Newt IAP

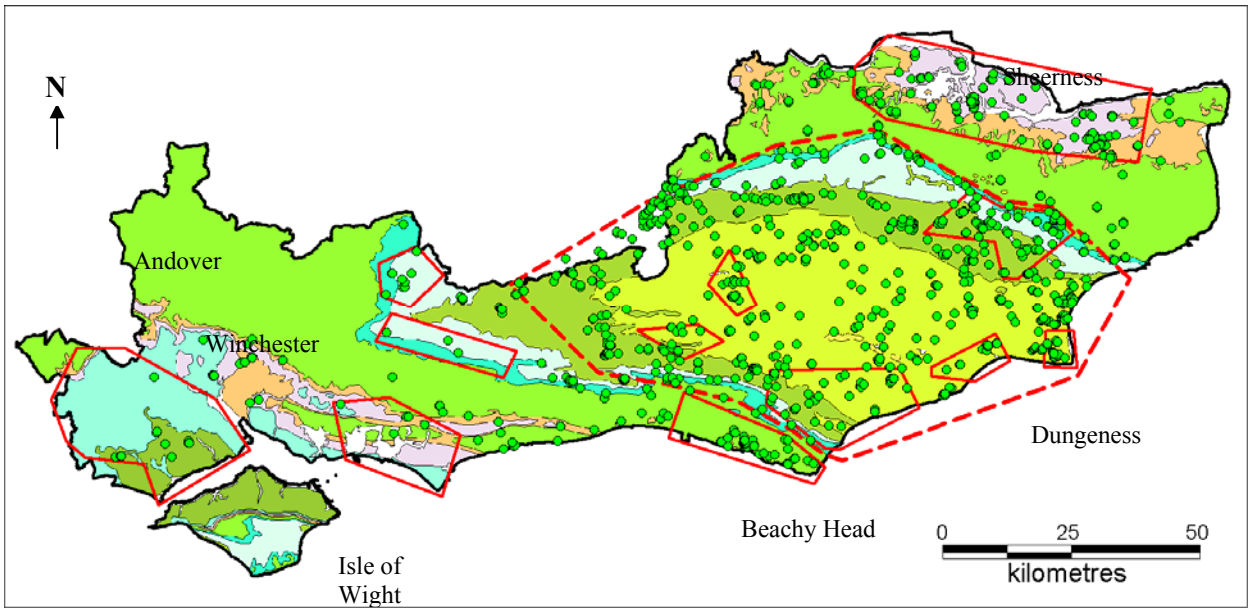
6.1 Wealden GCN IAP

6.1.1 Summary

The Wealden GCN IAP is a substantially larger IAP covering the central Wealden area. It was identified for its high concentrations of Great Crested Newts *Triturus cristatus*. This area spans parts of four counties: Kent, East Sussex, West Sussex, and Surrey. It covers an area of roughly 4800 km² and is delimited in a large part due to the geology of the area (Fig 25).

Summary of site features and qualifying criteria:

Site name	**Wealden GCN IAP**
IAP qualifying criteria	**High density of Great Crested Newt *Triturus cristatus* records**
Ordnance survey grid reference corner points: SU91, TQ60, TR23, TQ76.	
Area covered: 4761 km²	



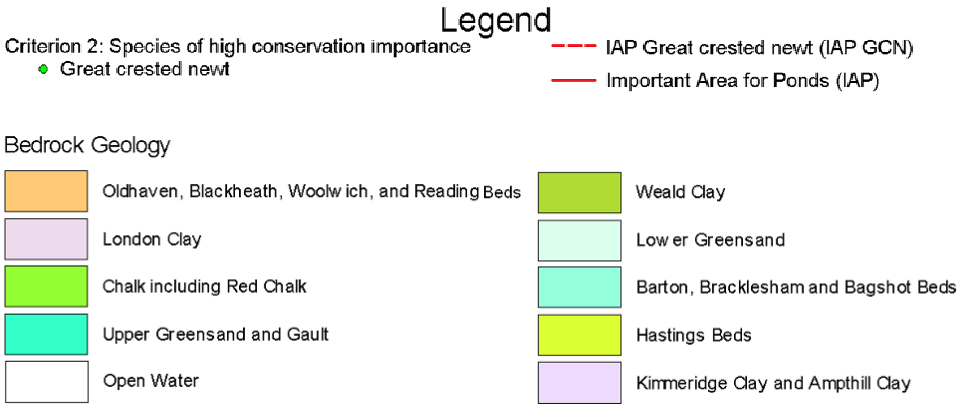


Figure 25. Distribution of Great Crested Newt *Triturus cristatus* records in the Wealden GCN IAP. Based upon DiGMapGB data 1: 625 000 MapInfo® [Bedrock geology], with the permission of the British Geological Survey

6.1.2 GCN ecology

The Great Crested Newt *Triturus cristatus* is listed on Annexes II and IV of the EC Habitats Directive and Appendix II of the Bern Convention. It is also protected under Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations, 1994, (Regulation 38) and Schedule 5 of the WCA 1981 (GCN SAP).

As amphibians, Great Crested Newts (GCNs) require both suitable aquatic and terrestrial habitats. They breed preferentially in ponds with ample aquatic vegetation (which is used for egg-laying), but have also been recorded in ditches and small lakes. Suitable terrestrial habitat provides food in the form of ground dwelling invertebrates, places where the adults can shelter during the day, and cover whilst the adults hunt their invertebrate prey at night. Broad habitat type varies greatly, the most frequent being pastoral and arable farmland, woodland, scrub, and grassland. However, Kent has two GCN Special Areas of Conservation (SAC) with large numbers of individuals which do not fall under any of the above habitat types. At Dungeness, they live on open shingle – presumably exploiting gaps between large stones and rough areas, and at Peters Pit, they are frequently found under chalk scree in an open exposed situation (KRAG, 2004).

Great Crested Newts can be found in rural, urban and post-industrial settings, but populations are less able to thrive where there are high degrees of fragmentation or low pond density. The connectivity of the landscape is important since GCNs often occur in metapopulations that encompass a cluster of several or many ponds. This helps ensure the survival of populations even if sub-populations are affected by, for example, pond desiccation or fish introductions.

6.1.3 GCN distribution

In a European context, Great Crested Newt populations are thought to have declined dramatically throughout the species' range. The UK is one of the few remaining strongholds for the species, with populations widespread throughout much of England and Wales, but occuring only sparsely in south-west England, mid Wales and Scotland.

Although Great Crested Newt have undergone a decline in the UK as a result of the loss of ponds and fragmentation of nearby terrestrial habitat, they are still widespread in the south-east, particularly in Kent and Sussex, occurring in woodland and garden ponds, flooded quarries and gravel pits, and a number of other habitats including marsh dykes. The species is, however, still considered to be in decline within the area, and is listed in the Kent Red Data Book (KRAG, 2004).

A recent survey, using volunteers, to assess the distribution of Great Crested Newts in Sussex, found that the species was present in 14% of randomly selected 1km squares. This figure increased to 32% where surveys were carried out in areas with historical records. The resulting database, held by the Sussex Amphibian and Reptile Group and the Sussex Biodiversity Record Centre, contains records from 250 sites, many of which are focussed around areas with significant recording effort. From these results, Sussex appears to have an internationally significant Great Crested Newt population, even though the majority of sites have yet to be identified (Sussex GCN SAP, 2004).

6.1.4 GCN Distribution within the Wealden GCN IAP

The Wealden Great Crested Newt IAP identified in this study covers a large area of East Sussex and Kent. Standing open water within the GCN IAP includes natural and man-made ponds, lakes, reservoirs and canals. Man-made ponds have been in the landscape for hundreds of years. Such ponds include moats, millponds, fisheries, farm ponds and abandoned mineral works. Ponds occur throughout

Kent but are characteristic and frequent in the Low Weald and High Weald Natural Areas (KRAG, 2006).

The whole of the Low Weald Natural Area is important for GCNs due to the high pond density. The High Weald and Romney Marshes also support large amphibian metapopulations (Lee Brady, pers comm.)

Within the Wealden GCN IAP there are variations in density of GCN records. These are described in detail below.

Figure 26. A small farm pond in the Low Weald supporting Great Crested Newts (Lee Brady)

6.1.4.1 GCN hotspots within the Wealden GCN IAP

Great Crested Newt records are densest in the areas of Weald Clay around the western and north-eastern boundaries of the GCN IAP. Pond density is known to be high in these areas, and the large numbers of Great Crested Newt records reflects the tendency for the species to favour areas with high pond density (KRAG, 2006).

There are 4 broad areas within the GCN IAP where a large number of sites have records of GCNs. These occur within the clay geology to the north-west, south-west and eastern perimeters of the GCN IAP, and also an area in the centre of the GCN IAP (Fig 27).

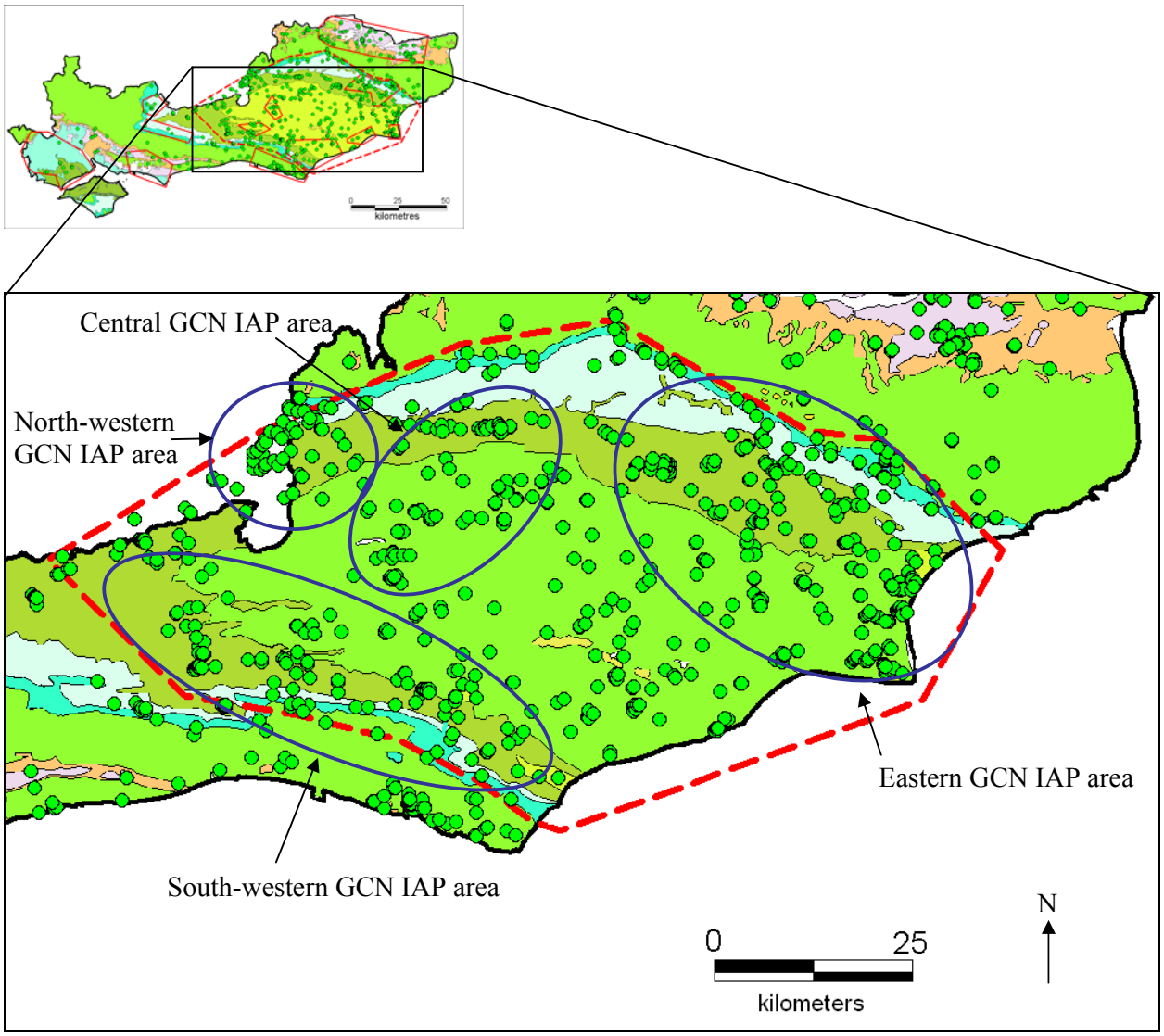


Figure 27. Detailed view of Wealden GCN IAP with areas of high Great Crested Newt record density. Based upon DiGMapGB data 1: 625 000 MapInfo® [Bedrock geology], with the permission of the British Geological Survey

North-western GCN IAP area

The area around Reigate and Horley has a very high density of Great Crested Newt records. Common Toad *Bufo bufo* are also recorded in high density here indicating that this is a 'good' area for amphibians.

South-western GCN IAP area

There are four smaller clusters of Great Crested Newt populations within the Low Weald clays to the south-west of the GCN IAP:

- An area to the north-west of Horsham
- An area to the north-west of Henfield
- The area around Hassocks, Burgess Hill and Haywards Heath
- An area around Uckfield.

Central GCN IAP area

In the central region of the GCN IAP there are two clusters of high density Great Crested Newt records:

- The areas around Royal Tunbridge Wells and Pembury have a cluster of records, although this concentration of records might be related to higher survey effort near areas of human population.
- The Ashdown Forest is also an area with a high density of Great Crested Newt records. This is likely due to the extensive semi-natural habitats for which Ashdown Forest is designated as a Site of Special Scientific Interest (SSSI) and a Special Protection Area (SPA). The area has also recently been designated as a Special Area of Conservation (SAC), with the GCN population being cited as one the features of interest (Sussex GCN SAP, 2004), and overlays the Ashdown IAP identified for it's diverse plant and invertebrate assemblages, amongst other records (section 5.6).

Eastern GCN IAP area

Towards the eastern end of the GCN IAP there are a large number of clusters of Great Crested Newt records. This area covers the clays of the Low Weald and Romney Marsh areas, both known to have a high density of ponds.

- Marden and Staplehurst – this area has a high density of ponds and is likely to host a strong metapopulation of GCNs.
- The Pluckley and Hothfield area is included in the Ashford District IAP. It has a high density of GCN records, especially around the Hothfield Heath SSSI.
- Tenterden, to the south-west of Ashford also has a cluster of GCN records.
- The area around Wye, to the north-east of Ashford has a cluster of GCN records. This area is on the North Downs and lies on Upper Greensand and Chalk geology. It is therefore likely to have different pond types to the nearby clay ponds of the Low Weald.
- Bromley Green, Ham Street Woods and Bilsington Woods form a mosaic of woodland to the south of Ashford that has a high density of GCN records.
- To the south-east, Romney Marsh forms an extensive area of grazing marsh to the east of Dungeness. The high density of GCN records in this area relate only to pond habitats. If Great Crested Newt records from ditches were to be included the density of records is likely to be much higher.
- Dungeness is another area with a high density of GCN records and is designated as a SAC for this reason. Lydd Ranges, owned by the Defence Estates, has a number of ponds in which Great Crested Newts are found amongst the shingle (Guy Hagg, pers comm.).

6.1.4.2 Gaps in Great Crested Newt distribution within the IAP

Although the GCN IAP is identified for its overall high density of Great Crested Newt records, there are small areas where records are scarce. There are three main areas that fall into this category:

- Towards the North of the GCN IAP in the area from Sevenoaks and Borough Green to Wateringbury and Maidstone there are few Great Crested Newt records. This may be due to the geology of the area which is underlain by Greensands and may have fewer ponds available for GCNs to occupy.
- Towards the western end of the GCN IAP in the area from Horsham to Haywards Heath there are very few records of GCNs. The reasons for this low density of records are unclear.
- In the centre of the GCN IAP, around Wadhurst and in the River Rother catchment. This area appears to have many steep sided wooded river valleys but also has a high density of ponds. It is not clear why GCN records are sparcer in this area.

Although the areas described above currently do not host a high density of Great Crested Newts, they could form the basis upon which to continue to achieve the GCN Species Action Plan target to 'establish populations in 100 appropriate unoccupied sites each year from 1995 to 2005' (Great Crested Newt Species Action Plan). This could also be tied in with the Million Ponds pond creation work.

7 Conclusions and recommendations

7.1 Conclusions

In this first assessment of Important Areas for Ponds (IAPs) in the Environment Agency Southern Region, twelve areas which have important concentrations of Priority Ponds were identified as IAPs. Another larger area was highlighted as significant for its large numbers of Great Crested Newt *Triturus cristatus* sites. These areas covered a considerable proportion of the region, reflecting the wide distribution of high quality ponds.

7.1.1 Identification of Important Areas for Ponds (IAPs)

This assessment has applied the IAP approach to the identification of groups of ponds in the Environment Agency Southern Region: highlighting regions which are important for ponds at both European and national levels. IAPs were characterised by the types of ponds within them, the species assemblages and the rare species they supported.

The IAPs selected include some areas of known value of ponds, such as the New Forest and Woolmer areas. But also highlights previously unrecognised areas including the West Rother Valley and Ashford District IAPs.

We aniticipate that this assessment will stimulate discussion and exchange of information to help create a shared understanding and recognition of the high quality pond resource for the many practitioners working with this habitat type in the south-east, including conservation agencies, local authorities, Defra and NGOs. Even this desk study emphasises the importance for biodiversity of man-made and often overlooked pond types found in the south-east, such as disused marl pits and temporary ponds. With further development, IAPs can also act as a focus for delivering the Pond HAP through pond creation and management, and so lead to an improvement of the pond resource.

The successful application of the IAP approach in the present study suggests that it will be valuable as the basis for similar work on dispersed small water bodies in other parts of the UK, particularly as the first step for identifying sites for the new Million Ponds Project and other Pond HAP work (see http://www.pondconservation.org.uk/millionponds/).The IAP approach is also now beginning to be applied abroad: and is currently being carried out in the Mediterranean region as part of European Pond Conservation Network (EPCN; http://campus.hesge.ch/epcn/) activities.

7.1.2 Contacts with data holders

Identifying IAPs in the Environment Agency Southern Region involved making contact with 72 individuals. Between them they represented 37 organisations. Many of the datasets included were collected using volunteer effort so represent the survey and recording work of many more people. This demonstrates the wide interest and enthusiasm for ponds and the species they support. These people will potentially be future contacts for involvement with recording or conservation activities on the IAPs which their data have been used to identify. We are, of course, very grateful for their hard work in generating and providing these data.

7.1.3 Datasets collated

Over 29 datasets were collected and analysed in the IAP assessment. Over half of these were individual species records and the remainder were comprised of pond inventory data and full pond

surveys. This is an impressive knowledge base for a habitat for which, up until recently, there has been little statutory monitoring. While these data have been valuable in identifying IAPs they also illustrate how little is known about ponds in the region. No information is available for the majority of ponds and large data gaps were identified in the present project. Much more comprehensive data is needed to understand the condition of ponds in IAPs and across the south-east as a whole, and to assess how their status is changing through time.

7.2 Recommendations

In light of the results of this first assessment using the new Priority Pond criteria, we make the following recommendations:

7.2.1 Data gaps and survey priorities

Data gaps identified in this assessment should be addressed through (i) standardised pond surveys, and (ii) transcribing paper-based data, unavailable to this study, into electronic format.

This first assessment of IAPs in the Environment Agency Southern Region was based mainly on relatively easily accessible datasets available in electronic format. This has allowed major IAPs to be identified, and many important ponds to be located. However, the study has also highlighted the fact that there are extensive areas with real data gaps, either because the data were (i) inaccessible due to the relatively short timescale of the project, (ii) mostly in paper-based format, or (iii) insufficient or completely lacking.

The most urgent practical problem in the study area is the large number of ponds which have never been assessed. We suggest therefore a twin track strategy of:
(i) rapid assessment to 'spot' potential priority ponds based on simple criteria (e.g. conductivity, intensity of pond catchment land-use, order level rapid assessment of invertebrates) to identify ponds that may be high quality sites.

(ii) more detailed survey of the subset of ponds which are 'spotted' as potentially important sites using simple chemical, landuse and simple biological recording techniques.

This strategy should initially focus on the existing IAPs to identify ponds within these areas that may be important sites. But, should also expand into none IAP areas to explore whether the low numbers of Priority Ponds currently identified in these areas is an artefact of sampling (i.e. ponds are high quality but have not yet been surveyed) or because few high quality ponds are present.

Wider data collection and monitoring could be facilitated by the development of a simple standard method for surveying ponds on designated sites in the south-east, or ideally a UK wide Common Standards Monitoring method for ponds.

To assess the condition of the Priority Pond resource as a whole, comprehensive monitoring data also needs to be collected using standardised methods on minimally impaired ponds across the south-east. In order to assess how the status of high quality of ponds is changing through time this monitoring programme needs to take a stratified random subset of high quality ponds, complementing the broader national picture provided by the Countryside Survey.

7.2.2 IAP assessment Stage 2

The IAP assessment process should be further developed in a second phase by (i) incorporating data unavailable or lacking in the current study, (ii) carrying out dedicated pond surveys to fill geographic or taxonomic gaps in the dataset, (iii) exploring the data to find potential sites for pond creation as a part of the Million Ponds Project.

To further develop this first identification of the IAP pond resource in the south-east, a second stage of data collection and analysis is needed. Specifically, data which could not be accessed due to the short timescale of the project or which are held in paper format, should be collated and the analysis repeated. This could also include an assessment of the pond resource that is currently included within designated areas, data held on them, and their monitoring requirements, and further analysis and discussion of potential pond creation sites focussed on BAP species, to support the Million Ponds Project. At this stage we also recommend that contact be made with neighbouring regions (i.e. South-west and Thames Regions), in order to ensure that potential cross-regional IAPs are correctly delineated and action co-ordinated appropriately.

7.2.3 IAP dissemination

Information on IAPs in the south-east should be widely disseminated to raise awareness of the importance of the small waterbodies in the region.

Dissemination of the IAP assessment is a key objective of the project, and it is important that the IAP assessment does not become another 'on the shelf' report. There are a number of mechanisms that can be used to ensure that the information gathered is widely accessible:

- The NPMN, though its website and newsletter, will ensure that the report reaches a wide audience throughout the UK, including all stakeholders
- The consultation process should be an opportunity for pond workers and other freshwater specialists to comment on the IAPs they are involved in and, potentially, fill some of the information gaps
- Following consultation, a summary of the report could be published as a high quality colour document to inform and enthuse readers about ponds of biodiversity importance in the south-east
- The final report will be made available in electronic format via the Pond Conservation website, and will be emailed to data providers, and local authorities
- A national IAP GIS layer will be collated as regional projects are completed. This will also be made accessible for download via the web.

7.2.4 Conservation action

The IAP study should lead to 'on the ground' pond conservation action to protect and enhance the pond resource, and use ponds to strengthen freshwater biodiversity more generally.

The IAP assessment should help focus and stimulate 'on the ground' pond conservation action. The information collated to date allows for Priority Ponds to be identified, but gives little information about whether:

- management of these sites, if any, is appropriate

- Priority Ponds are part of a pond complex, or isolated sites which are less likely to support viable populations in the longer term
- these Priority Ponds are threatened in the short, medium or longer term

To address these issues, it is recommended that current pond conservation action, such as pond management, monitoring and creation, should be coordinated locally through existing groups (including LBAP groups) using IAPs as a stimulus and focus. Activities could be informed by the IAP assessment. For example, pond creation effort could be focused on sites which are relatively isolated, or which create appropriate landscape level links between existing Priority Ponds.

This could be most effective if a Pond Officer was employed in each of the areas within the Environment Agency Southern Region to stimulate and co-ordinate this work. The Pond Officers could work closely with Pond Conservation's regional Million Ponds Project Officer for the South-east to pilot the use of the IAP assessment for focussing pond creation work.

8 References

Ashdown Forest Tourism Association, 2009, Ashdown Forest, http://www.ashdownforest.com/forest.html Accessed March 2009.

Anderson S, 2002, *Identifying Important Plant Areas*. Plantlife International.

Ball SG, 1986, Terrestrial and freshwater invertebrates with Red Data Book, Notable or Habitat Indicator Status. *Invertebrate Site Register Report 66.*Nature Conservancy Council, Peterborough.

Biggs J, Williams P, Whitfield M, Nicolet P and Weatherby A, 2005, 15 Years of Pond Assessment in Britain: results and lesson learned from the work of Pond Conservation. *Aquatic Conservation: Marine and Freshwater Ecosystems* 15: 693-714.

Biggs J, Corfield A, Walker D, Whitfield M, Williams P, 1995, The importance of ponds for wildlife *In* Protecting Britain's Ponds *Eds* J Biggs and C Aistrop, Pond Conservation Group Oxford.

Briggs M, 1988 *Lythrum hyssopifolia* L .in Sussex. *BSBI news,* 49 p 41.

Butterworth T, 2009, South-east Biodiversity Strategy – Draft. http://sxbrc.org.uk/consultation/statements/17_Eastern-Sussex-and-South-Kent.doc Accessed March 2009.

Chichester harbour wildlife and ecological review, 2003-4, p5. *http://www.conservancy.co.uk/uploads/user_documents/wildlife_report_2003-4_000.pdf* Accessed March 2009.

Carey PD, Wallis S, Chamberlain PM, Cooper A, Emmett BA, Maskell LC, McCann T, Murphy J, Norton LR, Reynolds B, Scott WA, Simpson IC, Smart SM, Ullyett JM, 2008, *Countryside Survey: UK Results from 2007*. Report by the Centre for Ecology and Hydrology. http://www.countrysidesurvey.org.uk/reports2007.html. Accessed March 2009.

Copp G H, Wesley K J and Vilizzi L, 2005, Pathways of ornamental and aquarium fish introductions into urban ponds of Epping Forest (London, England): the human vector. *Journal of Applied Ichthyology* 21 (4): 263–274.

Daguet C, French G and Taylor P, 2008, *The Odonata Red Data List for Great Britain*. Peterborough, JNCC.

Davies BR, Biggs J, Williams P, Whitfield M, Nicolet P, Sear D, Bray S and Maund S, 2008, Comparative biodiversity of aquatic habitats in the European agricultural landscape. *Agriculture, Ecosystems and Environment*. Volume 125, p1-8.

Davies BR, 2005, Developing a strategic approach to the protection of aquatic biodiversity. PhD thesis. Oxford Brookes University.

East Sussex County Council, 2009, Ouse Estuary Nature Reserve. http://www.eastsussex.gov.uk/leisureandtourism/countryside/coast/ouseestuary/default.htm Accessed February 2009.

English Nature, 1999, *Natural Areas in London and the South East Region: helping to set the regional agenda for nature*, Peterborough.

Environment Agency, 2005, *Water Framework Directive. Summary report of the characterisation, impacts and economics analyses required by Article 5. South East River Basin District.* http://webarchive.nationalarchives.gov.uk/20080305115859/http://www.defra.gov.uk/environment/water/wfd/pdf/southeasttext.pdf Accessed March 2009.

Gasca-Tucker and Acreman, 1997, The Pevensey Levels Wetland, RAMSAR Report, http://www.ramsar.org/cop7/cop7181cs06.doc Accessed February 2009.

Gray J, 1988, Evolution of the freshwater ecosystem: the fossil record. *Palaeogeography, Palaeoclimatology, Palaeoecology* 62: 1-214.

Haines-Young R H, Barr C J, Black H I J, Briggs D J, Bunce R G H, Clarke R T, Cooper A, Dawson F H, Firbank L G, Fuller R M, Furse M T, Gillespie M K, Hill R, Hornung M, Howard D C, McCann T, Morecroft M D, Petit S, Sier A R J, Smart S M, Smith G M, Stott A P, Stuart R C and Watkins J W, 2000, *Accounting for nature: assessing habitats in the UK countryside*. DETR.

Heath M F, Evans M I, Hoccom D G, Payne A J and Peet N B (Eds), 2000, *Important bird areas in Europe: priority sites for conservation*. BirdLife International.

Hughes M, Hornby DD, Bennion H, Kernan M, Hilton J, Phillips G and Thomas R, 2004, The development of a GIS-based inventory of standing waters in Great Britain together with a risk-based prioritisation protocol. *Water, Air, and Soil Pollution: Focus* 4: 73–84.

Hull A, 1997, The pond life project: a model for conservation and sustainability. In: *British Pond Landscape, Proceedings from the UK conference of the Pond Life Project* (Ed. by Boothby J), pp. 101-109. Liverpool: Pond Life Project.

KRAG, 2004, Great Crested Newt *Triturus cristatus* (leaflet), http://www.kentbap.org.uk/assets/library/documents/Great_crested_newt.pdf. Accessed March 2009.

KRAG, 2006, Great Crested Newt Monitoring Project, Kent Amphibian and Reptile Group, pp2.

New Forest Life Partnership, 2001, New Forest SAC Management Plan: Part 1 Description. http://www.newforestlife.org.uk/life2/managementplan.htm. Accessed February 2009.

Nicolet P, Weatherby A, Biggs J, Williams P, Hatton-Ellis T, 2007, *A Preliminary Assessment of Important Areas for Ponds (IAPs) in Wales*, Pond Conservation, Oxford.

Oertli B, Biggs J, Cereghino R, Grillas P, Joly P and Lachavanne J-B, 2005, Conservation and Monitoring of Pond Biodiversity. Special issue of *Aquatic Conservation: Marine and Freshwater Ecosystems* 15 (6): 535-540.

Plantlife, 2009, Important Plant Areas. http://www.plantlife.org.uk/international/plantlife-ipas.html Accessed March 2009.

Pond Conservation (formerly Pond Action), 2002, *A guide to monitoring the ecological quality of ponds and canals using PSYM*. Ponds Conservation, Oxford.

Pond Conservation (formerly Pond Action), 1998, *The National Pond Survey (NPS) methods*. Pond Conservation, Oxford.

Rackham O, 1986, *The history of the countryside: the classic history of Britain's landscape, flora and fauna.* Dent, London.

RSPB, 2009, Important Bird Areas. http://www.rspb.org.uk/ourwork/science/datazone/iba.asp Accessed March 2009.

Sanderson, N A, 1998, Description and evaluation of New Forest grasslands and mires. Contract Report for English Nature.

Stewart N S, 2004, *Important Stonewort Areas: an assessment of the best areas for stoneworts in the United Kingdom*. Plantlife International.

Stubbs A and Drake M, 2001, British soldierflies and their allies. British Entomological and Natural History Society, Reading.

Sussex GCN SAP, 2004, Species Action Plan for Sussex: Great Crested Newt *Triturus cristatus* http://www.biodiversitysussex.org/PDF%20files/great%20crested%20newt.pdf.

Warren M S, Hill J K, Thomas J A, Asher J, Fox R, Huntley B, Roy D B, Telfer M G, Jeffcoat S, Harding P, Jeffcoate G, Willis S G, Greatorex-Davies J N, Moss D and Thomas C D, 2001, Rapid responses of British butterflies to opposing forces of climate and habitat change. *Nature* 414 (6859): 65-69.

West Sussex County Council, 2009, *Landscape Character Assessment of West Sussex.* Website accessed March 2009: http://www.westsussex.gov.uk/ccm/.

Williams P J, Biggs J, Barr C J, Cummins C P, Gillespie M K, Rich T C G, Baker A, Baker J, Beesley J, Corfield A, Dobson D, Culling A S, Fox G, Howard D C, Luursema K, Rich M, Samson D, Scott W A, White R and Whitfield M, 1998, *Lowland Pond Survey 1996*. Pond Action and The Institute of Terrestrial Ecology (ITE).

Williams P, Whitfield M, Biggs J, Bray S, Fox G, Nicolet P and Sear D, 2004, Comparative biodiversity of rivers, streams, ditches and ponds in an agricultural landscape in Southern England. *Biological Conservation* 115: 329-341.

Williams P, Whitfield M, and Biggs J, 2008, How can we make new ponds biodiverse? A case study monitored over 7 years. *Hydrobiologia*. Volume 597, p137-148.

Appendix 1 List of protected species associated with ponds in Southern England

The table below shows designations of species that use ponds in Southern England that are listed as UK BAP Priority Species (UK BAP), receive full protection under the Wildlife and Countryside Act Schedule 5 or 8 (WCA), are Habitats Directive Annex II species (HD Annex II)

Species - Common Name	Species - Latin Name	UK BAP	WCA	HD Annex II
Invertebrates				
Medicinal Leech	*Hirudo medicinalis*		*	
Fairy Shrimp	*Chirocephalus diaphanus*		*	
Scarce Four-dot Pin-palp	*Bembidion quadripustulatum*	*		
One-grooved Diving Beetle	*Bidessus unistritatus*	*		
Zircon Reed Beetle	*Donacia aquatica*	*		
Spangled Water Beetle	*Graphoderus zonatus*	*	*	
New Forest Mud Beetle	*Helophorus laticollis*	*		
Puzzled Skipper	*Laccophilus poecilus*	*		
A camphor beetle	*Stenus longitarsis*	*		
Sackformed moss animal	*Lophopus crystallinus*	*		
Pondweed Leafhopper	*Macrosteles cyane*	*		
Window Winged Sedge	*Hagenella clathrata*	*		
White-clawed Crayfish	*Austropotamobius pallipes*	*	*	*
Lagoon Sand Shrimp	*Gammarus insensibils*	*		
Tadpole Shrimp	*Triops cancriformis*	*	*	
Little Whirlpool Ramshorn Snail	*Anisus vorticulus*	*		*
Mud Snail	*Omphiscola glabra*	*		
Shining Ram's-horn Snail	*Segmentina nitida*	*		
Fen Raft Spider	*Dolomedes plantarius*	*		
Vascular Plants				
Pillwort	*Pilularia globulifera*	*		
True Fox-sedge	*Carex vulpina*	*		
Yellow centaury	*Cicendia filiformis*	*		
Brown Galingale	*Cyperus fuscus*	*	*	
Coral-necklace	*Illecebrum verticillatum*	*		
Floating Water-plantain	*Luronium natans*	*	*	*
Marsh Clubmoss	*Lycopodiella inundata*	*		
Grass-poly	*Lythrum hyssopifolia*	*	*	
Pennyroyal	*Mentha pulegium*	*	*	
Tubular Water-dropwort	*Oenanthe fistulosa*	*		
Small fleabane	*Pulicaria vulgaris*	*	*	
Three-lobed Crowfoot	*Ranunculus tripartitus*	*		
Marsh stitchwort	*Stellaria palustris*	*		
Water Germander	*Teucrium scordium*	*	*	
Vertebrates				
Common Toad	*Bufo bufo*	*	*	
Natterjack Toad	*Epidalea calamita*	*		
Great Crested Newt	*Triturus cristatus*	*	*	*
Water Vole	*Arvicola terrestris*	*	*	
Otter	*Lutra lutra*	*		*
Grass Snake	*Natrix natrix*	*	*	

Appendix 2 Revised Pond Priority Habitat Proposal December 2006

Suggested habitat name: **Ponds**

CORRESPONDING HABITATS

BAP broad habitat: Standing open waters and canals

Phase 1:	G1 Standing water
NVC:	Various aquatic, swamp and fen communities; OV28-OV35; and others
Annex I:	Oligotrophic waters containing very few minerals of sandy plains (part); oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoeto-Nanojuncetea* (part); Hard oligo-mesotrophic waters with benthic vegetation of *Chara* species (part); Natural dystrophic lakes and ponds (part); Mediterranean temporary ponds; Natural eutrophic lakes (part)

DESCRIPTION

BAP Priority Habitat Ponds are defined as permanent and seasonal standing water bodies up to 2ha in extent which meet one or more of the following criteria.

- *Habitats of high conservation importance.* Ponds that meet criteria under Annex 1 of the Habitats Directive.
- *Species of high conservation importance*. Ponds supporting Red Data Book species, BAP species, species fully protected under the Wildlife and Countryside Act Schedule 5 and 8, Habitats Directive Annex II species, a Nationally Scarce wetland plant species, or three Nationally Scarce aquatic invertebrate species.
- *Exceptional assemblages of key biotic groups*: Ponds supporting exceptional populations or numbers of key species. Based on (i) criteria specified in guidelines for the selection of biological SSSIs (currently amphibians and dragonflies only), and (ii) exceptionally rich sites for plants or invertebrates (i.e. supporting ≥30 wetland plant species or ≥50 aquatic macroinvertebrate species).
- *Ponds of high ecological quality:* Ponds classified in the top PSYM category ("high") for ecological quality (i.e. having a PSYM score ≥75%). [PSYM (the Predictive SYstem for Multimetrics) is a method for assessing the biological quality of still waters in England and Wales. Plant species and / or invertebrate families are surveyed using a standard method. The PSYM model makes predictions for the site based on environmental data and using a minimally impaired pond dataset. Comparison of the prediction and observed data gives a % score for ponds quality.]
- *Other important ponds:* Individual ponds or groups of ponds with a limited geographic distribution recognised as important because of their age, rarity of type or landscape context e.g. pingos, duneslack ponds, machair ponds.

Estimates based on the relatively small pond data sets currently available suggest that around 20% of the c.400,000 ponds outside curtilage in the UK might meet one or more of the above criteria.

GEOGRAPHIC DISTRIBUTION AND EXTENT

Widespread throughout the UK, but high-quality examples are now highly localised, especially in the lowlands. In certain areas high quality ponds form particularly significant elements of the landscape, e.g. Cheshire Plan marl pits, the New Forest ponds, pingos of East Anglia, mid-Wales mawn pools, the North East Wales pond landscape, the forest and moorland pools of Speyside, dune slack pools, the machair pools in the Western Isles of Scotland, and examples of Habitats Directive Annex I pond habitats across Northern Ireland.

Identification of the proposed habitat: Priority Habitat Ponds can be readily identified by standard survey techniques such as those developed for NVC, Common Standards Monitoring, the National Pond Survey or for specific species groups. Ponds will need to be distinguished from other existing Priority Habitat types. The general principle to be applied is that where the standing water element is functionally a component of another Priority Habitat and that Priority Habitat definition takes account of the standing water element then it should be treated as part of that habitat.. For example small waterbodies within blanket bog should be considered as part of the blanket bog Priority Habitat, but ponds in heathland (which are not dealt with through the heathland HAP) should be considered under the pond Priority Habitat. Agreement has been reached with the lake HAP group that the pond Priority Habitat will cover to most water bodies up to 2ha while the lake Priority Habitat will cover most larger water bodies. As with other potentially overlapping priority habitat types a small proportion of cases will need to be individually assessed to decide how they are best dealt with.

Inventory. An inventory of ponds, including many high quality sites, has been established as part of the National Pond Monitoring Network and work is in progress to add further known sites to this database. This is publicly accessible (for non-sensitive sites/species) at www.pondnetwork.org.uk. Currently about 500 high quality sites are listed on this database.

Monitoring. The National Pond Monitoring Network (NPMN) will provide the main mechanism for monitoring Priority Habitat ponds. The NPMN was established in 2002 as a partnership of organisations involved in pond monitoring led by the Environment Agency and Pond Conservation.

REASONS FOR RECOMMENDATION

Habitats of international importance.

Six Habitats Directive Annex I types are included within this habitat (either entirely or in part), these include upland lochans, ponds in blanket bogs, machair pools and Mediterranean temporary pools in the Lizard in Cornwall.. The importance of ponds as 'stepping stone' habitats is recognised in Article 10 of the Habitats Directive. Current freshwater priority habitats, in particular, do not adequately meet UK obligations under the Directive because the majority currently cover only lakes. In addition, many high quality ponds will not be covered by SACs. UK guidelines for implementation of the Water Framework Directive indicate a UK responsibility for assessing and monitoring ponds under the Directive. In August 2006 English Nature submitted a proposal to Defra for River Basin Characterisation to identify a limited number of ponds of significance for EU or UK biodiversity.

Habitats at risk

Ponds are vulnerable to loss and damage by a wide range of factors including nutrient enrichment and infilling. The 1996 Lowland Pond Survey (LPS96) shows that at least 50% of ponds in the wider countryside are highly degraded and that there is widespread evidence of enrichment and other diffuse pollution impacts. Temporary ponds are believed to be more degraded than permanent ponds. There is also growing concern that even ponds in semi-natural landscapes are at risk from air-borne pollution (e.g. acidification, nutrient-enriched rainfall) and climate change, to which shallow ponds are recognised as being particularly vulnerable. Pond numbers in the UK are probably at an historic low, with the loss of about 70% of the ponds existing in 1880. Much of the loss appears to have occurred in the second half of the 20th century as a result of agricultural change and urbanisation. In addition, LPS96 and Countryside Survey 2000 data show that, although pond numbers are now beginning to stabilise, there is an exceptionally high turnover of ponds, with 1% of the total resource both destroyed and created each year. There is currently no indication of the quality of ponds lost compared to those gained. However, LPS96 suggests that most new ponds are created (a) with stream inflows - a practice discouraged in many other European countries, since most inflows are polluted, and (b) as fishing lakes. Both trends are worrying. Recent evidence shows that many high value ponds are seriously at risk from the spread of alien invasive species of plants and animals. With increased

emphasis on access to the countryside, this risk is likely to increase.

Habitats important for key species

At the landscape level, ponds typically support more invertebrate and plant species than other water body types (i.e. lakes, rivers, streams and ditches). The criteria and thresholds listed in the habitat description have been selected so that the Priority Habitat includes ponds that qualify as important for key taxon groups, particularly in terms of international obligation, threat / rarity, exceptional populations / richness, and ecological quality. Ponds support considerable numbers of key species. Species with statutory protection include at least 65 BAP Priority Species (e.g. water vole, tadpole shrimp, lesser silver water and spangled water beetles, starfruit, pennyroyal, three-lobed crowfoot), at least 28 animal and plant species listed under the W&C Act Schedules 5 & 8, and six Habitats Directive Annex II species including: great crested newt, white-clawed crayfish, otter (in larger ponds) and floating water-plantain. Ponds have additionally been shown to support at least 80 aquatic RDB species. The number of RDB species using the damp margins and drawdown zones of ponds (e.g. Diptera, ground beetles) has never been estimated but is likely to be considerable. There is increasing evidence that ponds are an important feeding resource for bats and also for farmland birds, including species for which there is a current Public Service Agreement, such as Tree Sparrow and Yellow Wagtail.

NAME OF PROPOSER/ORGANISATION(S)

Anita Weatherby, on behalf of Pond Conservation, Freshwater LCN, Environment Agency, Scottish Environment Protection Agency

DATE Revised version received 6th December 2006

Appendix 3 List of contacts

Organisation	Name
Aquatic Coleoptera Conservation Trust	Garth Foster
Biological Records Centre (CEH)	Steph Ames
Botanical Society of the British Isles (BSBI)	Alex Lockton
Botanical Society of the British Isles (BSBI)	Kevin Walker
British Dragonfly Society	Katharine Parkes
BTCV - Kent Training Manager	Mike Phillips
Buglife	Matt Shardlow
Buglife	Vicky Kindemba
Defence Estates	Guy Hagg
Environment Agency	Adam Fulton
Environment Agency	Alice Hiley
Environment Agency	Bradley Jamieson
Environment Agency	Catherine Fuller
Environment Agency	Chris Catling
Environment Agency	Garf Williams
Environment Agency	Joe Stevens
Environment Agency	Nicola Barnfather
Environment Agency	Pauline Morrow
Environment Agency	Rachael Hunter
Environment Agency	Tom Reid
Farming and Wildlife Advisory Group (FWAG)	Debbie Miller
Forestry Commission	Jay Doyle
Forestry Commission	Simon Weymouth
Froglife	Daniel Piec
Game and Wildlife Conservation Trust	Pete Thompson
Game and Wildlife Conservation Trust	Rufus Sage
Hampshire Amphibian and Reptile Group	Natalie Rogers
Hampshire and IOW Wildlife Trust	Alison Cross
Hampshire and IOW Wildlife Trust	Amanda Bassett
Hampshire and IOW Wildlife Trust	David Rumble
Hampshire and IOW Wildlife Trust	Debbie Tann
Hampshire and IOW Wildlife Trust	John Durnell
Hampshire and IOW Wildlife Trust	Richard Grogan
Hampshire Biodiversity Information Centre	Becky Collybeer
Hampshire Biodiversity Information Centre	Lizzy Peat
Hampshire Biodiversity Information Centre	Nicky Court
Hampshire Rare Plants Register	Martin Rand
Hants County Council	Jo Thornton
Herpetological Conservation Trust	Dorothy Wright
Heteroptera Recording Scheme	Sheila Brooke
High Weald AONB	Philip Sansum
Island 2000 Trust	Ian Boyd
Isle of Wight Records Centre	Anne Marston
Kent Amphibian and Reptile Group	Lee Brady
Kent and Medway Biological Records Centre	Hannah Cook
Kent Biological and Geological Records & Archives Centre	Ed Jarzembowski
Kent High Weald Project	Jane Frostick

Kent Wildlife Trust	Richard Moyse
National Biodiversity Network	Oli Grafton
Natural England	Jackie Kelly
Natural England	Georgina Terry
Natural England	Russell Wright
Natural England	Tom Butterworth
Plantlife	Beth Newman
Plantlife	Dominic Price
Southampton University	Terry Langford
Surrey Biological Records Centre	Sarah Jane Chimbwandira
Surrey Biodiversity Information Centre	Alistair Kirk
Surrey Biodiversity Information Centre	Mary Campling
Sussex Biological Records Centre	Henri Brocklebank
Sussex Biological Records Centre	Penny Green
Sussex Wildlife Trust	Andrew Lawson
Sussex Wildlife Trust	Laurie Jackson
The Selborne Society	Nic Ferriday
Independent	Jonty Denton
Independent	Nick Stewart
Independent	Phil Buckley
Independent	Kirsten Wright
Independent	Richard Osmond
Independent (Sussex University, PhD)	Naomi Ewald
Independent	David Holyoak

Appendix 4. Overview of datasets collated for the IAP assessment

The datasets used in this assessment of Important Areas for Ponds (IAPs) in Southern England can be obtained from Pond Conservation or the contacts listed below.

Dataset	Data type	Dataset obtained from
Pond Inventory		
Kent Inventory	Pond location	Kent and Medway BRC
Sussex Inventory	Pond location	Sussex BRC
New Forest Inventory	Pond location	HWT
GB lakes < 2ha	Pond location	UK lakes: http://www.uklakes.net/
Pond Survey Data		
National Pond Survey	Habitat and species data	NPMN
Lowland Pond Survey	Habitat and species data	NPMN
Kentish Stour Pond Survey	Habitat and species data	Kentish Stour Countryside Partnership
Selected Pond Surveys	Habitat and species data	Kent High Weald Project
Assemblage Data		
SSSI designations	SSSIs designated for outstanding dragonfly/ amphibian assemblage	Natural England
Aquatic invertebrate data	Selected assemblage data	Jonty Denton
PSYM		
ROPA	PSYM scores	NPMN
Wetland Habitat Systems PhD	PSYM scores	Kirsten Wright
Test Valley Ponds	PSYM scores	Richard Osmond
Species Records		
Amphibian data	Species records	HCT
Selected plant data	Plant species records	NBN
Invertebrate and plant data	Species records	EA
Aquatic invertebrate data	Species records and assemblages	ACCT
Protected/ wetland species	Species records	HBIC
Protected species records	Species records	IOW
Breeding Dragonfly Data	Species records	BDS
Protected/ wetland species	Species records	KMBRC
Breeding sites data	GCN/ Common Toad species records	KRAG
Stonewort records	Species records	Nick Stewart
Selected species records	Species records	Plantlife
Aquatic bugs	Species records	Sheila Brooke
Protected/ wetland species	Species records	Surrey BRC
Protected/ wetland species	Species records	Sussex Biodiversity Partnership
National GCN Breeding Site Register	National site register	
Hampshire Rare Plants Register	Selected species records	Martin Rand (BSBI Recorder, VC 11)

Appendix 5. Post 1987 10 x 10 km square records for the Small Red Damselfly *Ceriagrion tenellum*, Downy Emerald *Cordulia aenea* and Hairy Dragonfly *Brachytron pratense*. Downloads from NBN Gateway 7 March 2009.

10km squares with records for Ceriagrion tenellum

	10 Grid Sq	Easting	Northing	Date from	Date to
BRCODON0	SH33	52.840606	-4.525444	1975	1988
BRCODON0	SN13	51.935981	-4.765283	1982	1988
BRCODON0	SU00	50.799556	-2.001367	1960	1988
BRCODON0	SU10	50.799472	-1.859470	1960	1988
BRCODON0	SU20	50.799215	-1.717574	1926	1988
BRCODON0	SU21	50.889139	-1.717031	1955	1988
BRCODON0	SU30	50.798786	-1.575681	1897	1988
BRCODON0	SU94	51.152187	-0.714573	1949	1988
BRCODON0	SU96	51.331979	-0.709552	1884	1988
BRCODON0	SX05	50.315926	-4.810609	1960	1988
BRCODON0	SX27	50.502062	-4.539584	1972	1988
BRCODON0	SX58	50.600389	-4.120915	1977	1988
BRCODON0	SY89	50.709282	-2.284613	1969	1988
BRCODON0	SY98	50.619615	-2.142715	1953	1988
BRCODON0	SZ08	50.619702	-2.001360	1933	1988
BRCODON0	SZ19	50.709546	-1.859738	1960	1988
BRCODON0	SZ39	50.708862	-1.576493	1976	1988
GA000073	SU21	50.889139	-1.717031	1997	1997
GA000163	SU30	50.798786	-1.575681	1969	2004
GA000163	SU40	50.798184	-1.433793	1981	1997
GA000163	SU49	51.607416	-1.423788	1988	1991
GA000163	SU76	51.334789	-0.996572	1993	1993
GA000163	SU94	51.152187	-0.714573	1959	1989
GA000163	SU95	51.242084	-0.712069	1970	1998
GA000163	SU96	51.331979	-0.709552	1970	1995
GA000163	SY99	50.709542	-2.142989	999	1988
GA000163	SZ09	50.709630	-2.001363	999	1989
GA000163	SZ29	50.709290	-1.718114	1981	1989
GA000459	SU20	50.799215	-1.717574	1991	1991
GA000459	SU94	51.152187	-0.714573	1992	1992
GA000459	SW75	50.304983	-5.231332	1992	1998
GA000459	SX06	50.405750	-4.815923	1992	1992
GA000468	NJ70	57.090004	-2.496660	1988	1989
GA000489	SU10	50.799472	-1.859470	1993	1993
GA000489	SY88	50.619356	-2.284069	1952	1994
GA000489	SY89	50.709282	-2.284613	1952	1994
GA000489	SY98	50.619615	-2.142715	1984	1988
GA000489	SY99	50.709542	-2.142989	1980	1999
GA000489	SZ09	50.709630	-2.001363	1979	1989
GA000489	SZ19	50.709546	-1.859738	1952	1991
GA000491	NJ26	57.622837	-3.341046	1997	1997
GA000491	NJ70	57.090004	-2.496660	1988	1989
GA000501	SW32	50.018812	-5.770595	2003	2003
GA000501	SW97	50.492071	-4.962063	1991	1991
GA000501	SX17	50.498902	-4.680437	1991	2003
GA000501	SX27	50.502062	-4.539584	1993	1993

GA000501	SX29	50.681742	-4.549277	2006	2006
GA000506	SH33	52.840606	-4.525444	1940	2005
GA000506	SH64	52.939077	-4.084695	1976	1999
GA000506	SN01	51.752888	-4.898983	1975	1990
GA000506	SN03	51.932476	-4.910552	1965	2000
GA000506	SN31	51.762802	-4.464818	1984	2004
GA000506	SN44	52.035253	-4.333976	1990	1991
GA000506	SN65	52.130515	-4.046729	1975	1990
GA000506	SN66	52.220362	-4.050859	2001	2001
GA000506	SN69	52.489892	-4.063380	1900	2001
GA000506	SU94	51.152187	-0.714573	1990	1990
GA000506	SU95	51.242084	-0.712069	1990	1990
GA000506	SX68	50.602875	-3.979705	1999	1999
GA000506	SY78	50.618925	-2.425420	1996	1996
GA000506	SY98	50.619615	-2.142715	1996	2001
GA000506	SY99	50.709542	-2.142989	1998	1998
GA000506	SZ08	50.619702	-2.001360	1996	1996
GA000506	SZ29	50.709290	-1.718114	1996	1996
GA000548	SK14	52.957277	-1.852590	2004	2004

10km squares with records for *Cordulia aenea*

BRCODON0	NH12	57.231162	-5.149424	1947	1988
BRCODON0	NH22	57.235204	-4.984014	1978	1988
BRCODON0	SO61	51.787214	-2.581303	1961	1988
BRCODON0	SP31	51.787854	-1.566471	1986	1989
BRCODON0	ST07	51.420158	-3.439526	1979	1989
BRCODON0	ST55	51.246964	-2.717735	1947	1988
BRCODON0	SU20	50.799215	-1.717574	1982	1988
BRCODON0	SU21	50.889139	-1.717031	1952	1988
BRCODON0	SU30	50.798786	-1.575681	1900	1988
BRCODON0	SU84	51.153670	-0.857519	1966	1988
BRCODON0	SU85	51.243572	-0.855293	1973	1988
BRCODON0	SU86	51.333472	-0.853056	1900	1988
BRCODON0	SU94	51.152187	-0.714573	1960	1988
BRCODON0	SU98	51.511765	-0.704479	1963	1988
BRCODON0	SX87	50.517445	-3.694000	1922	1989
BRCODON0	SZ39	50.708862	-1.576493	1947	1988
BRCODON0	TQ22	50.966926	-0.292443	1973	1988
BRCODON0	TQ34	51.144508	-0.142931	1976	1988
BRCODON0	TQ49	51.591458	0.019608	1906	1992
BRCODON0	TQ73	51.044197	0.423710	1947	1988
GA000073	ST73	51.068536	-2.429531	1991	1991
GA000073	ST85	51.248811	-2.287933	1999	1999
GA000073	SU09	51.608829	-2.001395	1999	1999
GA000073	SU21	50.889139	-1.717031	1997	1997
GA000073	SU22	50.979061	-1.716485	1996	1999
GA000163	SD29	54.299318	-3.230782	1992	1992
GA000163	SJ56	53.134794	-2.748809	1980	1989
GA000163	SU31	50.888708	-1.574865	1992	1992
GA000163	SU44	51.157857	-1.429403	1989	1989
GA000163	SU76	51.334789	-0.996572	999	1993
GA000163	SU84	51.153670	-0.857519	1965	1997

GA000163	SU94	51.152187	-0.714573	1965	1989
GA000163	SU98	51.511765	-0.704479	1963	1990
GA000163	SZ09	50.709630	-2.001363	1979	1989
GA000163	SZ39	50.708862	-1.576493	1779	1988
GA000426	ST46	51.335906	-2.862673	0	1989
GA000426	ST55	51.246964	-2.717735	0	2005
GA000426	ST68	51.517491	-2.577861	1994	1994
GA000459	NS77	55.905491	-4.081019	1991	1991
GA000459	SU98	51.511765	-0.704479	1999	1999
GA000489	SZ09	50.709630	-2.001363	1979	1989
GA000489	SZ19	50.709546	-1.859738	1969	1991
GA000495	NH22	57.235204	-4.984014	1985	1989
GA000537	SJ50	52.595478	-2.739577	1972	2003

10km squares with records for Brachytron pratense

BRCODON0	NX55	54.822319	-4.336270	1988	1988
BRCODON0	NX85	54.830407	-3.869632	1987	1988
BRCODON0	SE51	53.584208	-1.246212	1911	1988
BRCODON0	SH37	53.199819	-4.546523	1987	1989
BRCODON0	SH48	53.292732	-4.401989	1960	1988
BRCODON0	SH58	53.295659	-4.252087	1979	1988
BRCODON0	SH95	53.035925	-3.641916	1989	1989
BRCODON0	SJ66	53.135641	-2.599348	1945	1988
BRCODON0	SJ67	53.225525	-2.600603	1988	1988
BRCODON0	SK79	53.402186	-0.948611	1987	1988
BRCODON0	SN20	51.669857	-4.604399	1983	1989
BRCODON0	SN30	51.672974	-4.459936	1965	1989
BRCODON0	SN40	51.675913	-4.315447	1984	1988
BRCODON0	SN62	51.860965	-4.034468	1984	1989
BRCODON0	SS59	51.588826	-4.166647	1982	1988
BRCODON0	SS88	51.506147	-3.730422	1982	1989
BRCODON0	ST25	51.243539	-3.147471	1981	1988
BRCODON0	ST34	51.154951	-3.002281	1942	1988
BRCODON0	ST43	51.066178	-2.857648	1920	1988
BRCODON0	ST44	51.156089	-2.859314	1914	1988
BRCODON0	ST46	51.335906	-2.862673	1921	1988
BRCODON0	ST47	51.425812	-2.864365	1919	1988
BRCODON0	ST48	51.515717	-2.866066	1989	1989
BRCODON0	SU11	50.889396	-1.859200	1988	1988
BRCODON0	SU85	51.243572	-0.855293	1970	1988
BRCODON0	SX84	50.247767	-3.684417	1978	1988
BRCODON0	TF11	52.676542	-0.374468	1988	1988
BRCODON0	TM02	51.842765	0.901948	1992	1992
BRCODON0	TQ01	50.880846	-0.579901	1966	1988
BRCODON0	TQ22	50.966926	-0.292443	1965	1988
BRCODON0	TR01	50.854921	0.840168	1985	1988
BRCODON0	TR02	50.944734	0.845641	1982	1988
BRCODON0	TR16	51.300370	1.011068	1845	1988
GA000073	SU16	51.338998	-1.857829	1999	1999
GA000073	SU22	50.979061	-1.716485	2002	2002
GA000163	SJ57	53.224675	-2.750376	1980	1989
GA000163	SJ66	53.135641	-2.599348	1988	1988

GA000163	SJ67	53.225525	-2.600603	1988	1988
GA000163	SP65	52.145035	-1.124605	2003	2003
GA000163	SP86	52.232391	-0.830035	2003	2003
GA000163	SP96	52.230849	-0.683652	2003	2003
GA000163	SP98	52.410605	-0.678307	2003	2003
GA000163	ST25	51.243539	-3.147471	1980	1989
GA000163	ST45	51.245998	-2.860989	1991	1992
GA000163	ST46	51.335906	-2.862673	1982	1991
GA000163	ST47	51.425812	-2.864365	1949	1992
GA000163	SZ19	50.709546	-1.859738	999	1992
GA000163	SZ39	50.708862	-1.576493	1988	1988
GA000163	TF10	52.586681	-0.377795	1971	1992
GA000163	TF11	52.676542	-0.374468	1989	2005
GA000163	TF55	53.026263	0.235121	1843	1988
GA000163	TL09	52.498742	-0.528351	1993	1993
GA000163	TL19	52.496819	-0.381104	1993	1993
GA000163	TL26	52.225136	-0.244592	1990	1993
GA000163	TL27	52.314996	-0.241038	1989	1989
GA000163	TL28	52.404855	-0.237466	1991	1994
GA000163	TL30	51.683716	-0.120951	2000	2000
GA000163	TL35	52.133014	-0.102103	2000	2000
GA000163	TL37	52.312722	-0.094424	1983	1988
GA000163	TL39	52.492423	-0.086665	1999	1999
GA000163	TL55	52.127952	0.189883	1990	1990
GA000163	TL56	52.217791	0.194300	1983	1992
GA000163	TM07	52.291712	0.931217	1988	1988
GA000163	TQ27	51.416322	-0.275750	2004	2004
GA000163	TQ41	50.872548	-0.011626	1974	1988
GA000163	TQ50	50.780179	0.126309	1973	1993
GA000163	TR01	50.854921	0.840168	1985	1988
GA000163	TR03	51.034545	0.851142	1990	1990
GA000426	ST35	51.244856	-3.004235	0	2004
GA000426	ST36	51.334760	-3.006198	0	2002
GA000426	ST45	51.245998	-2.860989	0	2006
GA000426	ST46	51.335906	-2.862673	0	2003
GA000426	ST47	51.425812	-2.864365	0	2006
GA000426	ST57	51.426784	-2.720549	0	2006
GA000426	ST58	51.516692	-2.721967	0	2005
GA000459	TF10	52.586681	-0.377795	1972	1993
GA000483	SH48	53.292732	-4.401989	1988	1988
GA000489	SZ19	50.709546	-1.859738	1952	1991
GA000506	SH48	53.292732	-4.401989	1964	2004
GA000506	SJ17	53.219397	-3.349370	1989	1989
GA000506	SN20	51.669857	-4.604399	1984	1990
GA000506	SN21	51.759675	-4.609567	1991	1991
GA000506	SN31	51.762802	-4.464818	1991	1992
GA000506	SN40	51.675913	-4.315447	1983	1992
GA000506	SN69	52.489892	-4.063380	1990	1992
GA000506	SR99	51.569657	-5.031629	1963	2000
GA000506	SS59	51.588826	-4.166647	1985	1991
GA000506	ST38	51.514564	-3.010156	1500	2004
GA000506	ST48	51.515717	-2.866066	1985	2002
GA000506	SZ08	50.619702	-2.001360	1991	1991
GA000506	TG42	52.724356	1.552670	1992	1992