Natural Heritage Research Partnership

Important Areas for Ponds (IAPs) and other small waterbodies in Northern Ireland

***Quercus* Project QU09-03**

Bog pool at Montiaghs Moss Nature Reserve and ASSI

Quercus
Biodiversity & Conservation Biology

Pond Conservation
For Life in Fresh Waters

NIEA Northern Ireland Environment Agency
www.ni-environment.gov.uk

Prepared for the

Northern Ireland Environment Agency (NIEA)

by

Helen Keeble, Penny Williams, Jeremy Biggs, *Pond Conservation*

& Neil Reid, Natural Heritage Research Partnership, *Quercus*

This report should be cited as:

Keeble, H. Williams, P. Biggs, J. & Reid, N. (2009) *Important Areas for Ponds (IAPs) and other small waterbodies in Northern Ireland.* Report prepared by Pond Conservation and the Natural Heritage Research Partnership, Quercus for the Northern Ireland Environment Agency, Northern Ireland, UK.

Pond Conservation
c/o Oxford Brookes University
Gipsy Lane, Headington
Oxford, OX3 0BP
www.pondconservation.org.uk

Quercus project QU09-03
Quercus hosts the Natural Heritage Research Partnership between the Northern Ireland Environment Agency and Queen's University Belfast.
http://www.quercus.ac.uk/ www.quercus.ac.uk

Acknowledgements

We would like to thank all those who provided data, photos or other information for this assessment, and especially those who took time to visit sites with us in June 2009. In particular: Bob Davidson, Brian Nelson, Catherine McSorley, Jane Preston, John Early, Lynne Rendle, Marcus Malley, Mary Gallagher, Patrick Kelly, Richard Weyl, Seamus Burns and Tony Waterman.

Report production: July 2009
Consultation: August 2009

SUMMARY

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

In 2007, the biodiversity importance of ponds was recognised 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 they are concentrated.

Once identified, IAPs provide a generic resource which can be used to protect small waterbodies 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 ponds, and to help develop pond networks at landscape level.

This report describes the Important Areas for Ponds in Northern Ireland. Within this area, Priority Ponds were identified using a standard set of biological criteria, using available data held by a range of 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 Northern Ireland, nine IAPs were identified:

- Pettigoe Plateau IAP
- West Erne Uplands IAP
- Lough Erne IAP
- Fivemiletown IAP
- Carrickmore Uplands IAP
- Lough Neagh Peatlands IAP
- South Armagh Interdrumlin Fens IAP
- East Down IAP
- Garron Plateau IAP

Three Additional Areas of Interest were also identified: the Cuilcagh Mountains, Western Lough Neagh shore and Rathlin Island.

Overall, this first assessment of IAPs in Northern Ireland highlights the importance of the pond resource within the country, and provides a framework which can be used 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 CONTENTSc

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 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 have often been shown to be more important in maintaining regional freshwater biodiversity than other more extensive freshwater habitats (Williams *et al.*, 2004; Davies *et al.*, 2008).

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, 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. Individual ponds are often too small to fit the standard model of site-based protection (e.g. ASSIs), and 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) initiative 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), and developed more fully for South-east England (Keeble *et al* 2009) using criteria published for assessing BAP Priority Ponds in 2007.

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

- Birdlife International's *Important Bird Areas* (IBAs): Heath *et al*. 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, the aim is that 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 the development and delivery of the Pond Habitat Action Plan (HAP) for example, informing site identification to support pond creation and management initiatives (e.g. the Million Ponds Project http://www.pondconservation.org.uk/millionponds/) and assisting in the choice of flagship pond sites

- Help to protect and build up 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 to provide the infrastructure needed for reporting on the new Pond HAP. As part of this work it aims to provide a suitable structure for taking forward future data gathering and other work focused on IAPs.

2 Ponds and small waterbodies in Northern Ireland

2.1 Background to the study area

Northern Ireland covers an area of approximately 14,000 km² and spans six counties: Fermanagh, Tyrone, Londonderry, Armagh, Antrim and County Down.

The main centres of population lie in the east of the country, with a strong focus around Belfast and the A1 and A3 corridors. To the west, Enniskillen and Omagh are the main population centres, to the north, Londonderry and Coleraine.

The country is dominated by five main geological regions. Tertiary basalts dominate the northeastern area, which stretches from the north coast south to the Lagan valley, and from the east coast to the Bann valley. Southwards, across the Southern Uplands Fault, the basalts give way abruptly to Permian greywackes and shales, and further south still to the Tertiary granites and other igneous strata of the Mourne Mountains. To the west of Lough Neagh, the Tyrone Uplands have a complex geology dominated by Old Red Sandstones, which falls away south and south-east to the lowlands of the Erne Basin on Carboniferous Limestones. The fifth major region, to the west of the Bann Valley, is the Sperrin Highlands. Here again the geology is complex, but is dominated by the ancient rocks of the Moinian and Dalradian schists.

Northern Ireland was covered by an ice sheet for most of the last ice age and its legacy remains in the extensive drumlins fields which blanket the solid geology of lowland areas across much of southern Northern Ireland, particularly in Counties Down Fermanagh, Armagh and southern Antrim.

The 2000 Northern Ireland Countryside Survey shows that approximately 50% of the county's terrestrial land cover is improved agricultural land (Table 2.1). Neutral grassland and bog habitats are the dominant semi-natural habitats. Woodland cover is relatively low for the UK (8 %), with over half comprising coniferous plantations. In contrast, fen marsh and swamp habitats are relatively extensive (4%), with Northern Ireland holding a considerable proportion of the UK resource (Cooper and McCann, 2000).

Table 1 Habitats in the Northern Ireland

Habitat	% of NI resource
Broadleaved Mixed and Yew Woodland	3.8
Coniferous Woodland	4.5
Arable and Horticultural	4.3
Improved Grassland	42.0
Neutral Grassland	18.7
Calcareous Grassland	0.1
Acid Grassland	2.1
Bracken	0.3
Dwarf Shrub Heath	0.9
Fen Marsh and Swamp	3.9
Bog	11.0
Urban	8.2

From Northern Ireland Countryside Survey 2000 (Cooper and McCann, 2000).

2.2 The pond resource in Northern Ireland

Northern Ireland is well known for its abundance of water. Lough Neagh is by far the largest lake in the United Kingdom and Fermanagh is justifiably famous as 'Ulster's Lakeland'. However, the country also has many smaller waterbodies that lie within the definition of a pond (see 3.1).

The number of ponds in Northern Ireland is unknown. Smith *et al*. (1993) counted the country's lakes and estimated that small lakes in cover approximately the same percentage land area as other areas in the UK. However the report gives little indication of the number of smaller waterbodies associated with bog, fen and upland habitats. Mapped counts (based on Ordnance Survey data) are equally unreliable for this purpose because of the irregularity with which maps are updated and the frequency with which even older ponds are missed by OS mapping.

Both small and large standing waters in Northern Ireland have a definite southern bias. County Down and Armagh, in particular, have considerable numbers of lakes and ponds.

Large numbers of the ponds in these areas are natural, rather than man-made waterbodies: many associated with moraine deposition and erosion from the last ice age. Kettlehole pools occur in both the uplands and lowland areas. Far more frequent are the ponds of inter-drumlin hollows formed within the extensive drumlin fields that swathe much of southern NI. After ice retreated at the end of the last ice age it is likely that surfacewater pools filled many of these hollows. Subsequent infilling by silt and organic material means that most hollows are now dominated by fen, bog or carr woodland, so that pools, if they remain at all, often lie within a complex of other wetland habitats.

In upland areas across Northern Ireland extensive areas of blanket bog has formed. Much of this has been cut-over for peat, but, in the more isolated and least damaged areas, such as the Pettigoe and Garron Plateaus, extensive natural bog pool complexes remain. Mountain lakelets, formed in natural depressions area also common.

In coastal areas, dune slack pools and coastal lagoons occur locally, but are rare.

Unlike other parts of the UK, there are very few floodplain ponds in Northern Ireland. This can in part be attributed to topography: many watercourses are short and steep, and there few large floodplains. However even small rivers typically have floodplain pools so it is likely that other agencies are also at work. Examination of map data and limited ground-truthing to investigate this in the Enniskillen area for the current project has shown that where floodplain pools exit, they have typically been dug-through and incorporated into the local drainage ditch systems.

Northern Ireland does not have a tradition of creating field ponds for watering stock, but a range of other man-made pond types have been created across the country.

Peat extraction over many centuries has created pools across both upland and lowland areas. In some cases extensive high-density networks of pools and dykes remain, most notably in Montiaghs Moss to the south of Lough Neagh.

Mineral extraction has resulted in a range of pond creation including Glastry Clay Pits in County Down, and complexes of sand and gravel pits to the north-east of Downpatrick, at Traad Point and Moyola along the western shore of Lough Neagh, and more locally in upland areas such as the Carrickmore Hills.

Other man-made pond types include stream-dammed mill ponds; flax retting (rotting) pools and fire ponds within conifer plantations (R Anderson pers. comm.)

Most recently ponds have begun to be made for education and nature conservation purposes including the protection of uncommon species such as Irish Damselfly (M. Malley, S. Burns pers comm.). In urban landscapes Sustainable Urban Drainage System (SUDS) ponds are increasingly created along new road and development areas and garden ponds are increasing in popularity (J. Early, M. Malley pers comm.).

2.3 Biodiversity importance of ponds in Northern Ireland

In Northern Ireland around 40 Biodiversity Action Plan (BAP) species are associated with ponds. Most of these species are wetland plants and aquatic invertebrates. However ponds are also used by BAP species with more generalist requirements such as Otter *Lutra lutra*, and as feeding grounds by bats and birds.

A number of species that are nationally uncommon in the UK, have a particular stronghold in Northern Ireland, and the country's small waterbodies are an important resource for these species. This includes water beetles like the Shady Whirligig

Gyrinus natator and the diving beetle *Acilius canaliculatus*, together with Nationally Scarce plants such as Cowbane *Cicuta virosa* and Fen Pondweed *Potamogeton coloratus*.

The biodiversity value of ponds at landscape level has not been investigated in Northern Ireland. However, landscape level studies in England and continental Europe have shown that ponds often 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, Davies *et al*., 2008) and a significant proportion of species unique to this habitat type (Oertli *et al*., 2005). Ponds are also known to be 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 freshwater invertebrate metapopulations are rare.

Figure 1 Newly created garden pond in County Down

2.4 Ponds in a wider context

Because ponds are small, they occur in all terrestrial environments where water can collect at the surface. They are often particularly numerous in wetland environments where separating them from other habitat types can sometimes be difficult. In Northern Ireland, for example, pools often occur within, and are integral to, bog and fen systems. Similarly, river systems have many mechanisms which create ponds including meander oxbows, cut-off channels on active braided rivers, swale pools and river-side rock pools. Ponds are also created by succession within larger lake basins creating acid bog or fen pools within larger wetlands. As ponds fill to the surface, many become temporary ponds, a long-lived habitat with a life span that can often exceed the fully aquatic phase of both ponds and lakes (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. In general a pond can be thought of as a basin which retains water, as opposed to a linear habitat with slope-based flow. For example, for the GB Countryside Survey the difference between a pond and a ditch, a ditch is pragmatically defined as a waterbody which is 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

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 GB 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). Most recently, the GB Countryside Survey has shown that the vast majority of ponds ~ 80% in England and Wales 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 upland areas, ponds, in common with other waterbody types, can become 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*).

Within Northern Ireland, drainage is likely to have been the greatest threat to both ponds and associated wetland habitats in past centuries. Today, pollution, particularly by nutrients, is clearly resulting in extensive and ongoing damage to pond and lake quality. As waterbodies become degraded, and their biodiversity value declines, isolation is likely to be an increasing concern for remaining high quality sites.

Infilling is also a significant issue. Many ponds in Northern Ireland are associated with fen habitats in interdrumlin hollows surrounded by farmland. They are particularly susceptible to infilling for expansion of agricultural land and urban dwellings. This infilling has been described to be occurring at an alarming rate by O'Neill et al (2004).

Invasive plants have recently been highlighted as a problem for Northern Ireland (Stokes et al., 2004), and 36% of ponds surveyed as part of the NI Smooth Newt Survey contained one or more invasive plant species (O'Neill et al., 2004).

In the future, climate change may 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 are likely to flood coastal dune slack and lagoon 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 is unclear. Certainly, 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, whist habitat specialists are declining under the effects of changing habitats, fragmentation and unsuitable habitat management, irrespective of the general warming (Warren *et al.*, 2001). Long-term monitoring is needed to assess these changes.

Figure 2 An illegally in-filled gravel pit pond on a golf course at Traad Point ASSI

Opportunities

Ponds are a widely threatened habitat, but they are also potentially one of the most easily protected of all freshwater habitats. The creation of new ponds, in particular, provides an important opportunity for landscape level enhancement 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, England, 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, and has sustained that quality for over 18 years (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 UK's historic 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.

Figure 3 New pond adjacent to Sperrin Integrated College near Magherafelt, County Londonderry, supporting the nationally uncommon water beetle *Acilius canaliculatus*.

2.6 Pond protection

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. 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 small waterbody 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 a small number of sites. Therefore Europe's most powerful piece of water legislation, as currently being implemented, is likely to bring relatively little additional protection for important ponds.

National legislation

Generally, Northern Ireland, has a far better record than other UK countries at protecting its ponds through conservation focussed legislation. Areas of Special Scientific Interest (ASSIs), National Nature Reserves (NNRs) and Special Areas of Conservation (SACs) are much more likely to specifically targeted at small waterbody and wetland habitats than elsewhere in the UK. This may be in part because many of the country's ponds (i.e. waterbodies under 2 ha) are relatively large natural waterbodies, whilst others are integral to other wetland habitats of value including fens and bogs.

This said, ASSI site selection criteria still 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) which inevitably tends to bias the sample against all but the very richest individual small waterbodies.

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 anywhere in the UK and lack of data make assessment difficult.

In part because of the shortcomings of the existing protection system across the UK as a whole, 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 aims to provide this for Northern Ireland.

3 Selection of Important Areas for Ponds and small waterbodies (IAPs) in Northern Ireland

3.1 Definitions

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, GB 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 waterbodies. 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.

Important Area for Ponds (IAP) and Priority Ponds definition

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.

3.2 Overview of IAP selection process

In summary, the process for identifying Important Areas for Ponds and small waterbodies in Northern Ireland 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 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 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). 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 species 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 and other pond records (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 as part of the Site Condition Assessments of Standing Water Features in SACs and ASSIs Reports for Northern Ireland (Goldsmith et al., 2008), and on data collated by species experts (e.g. the Aquatic Coleoptera Conservation Trust).

Criteria 1 assessments (essentially Habitats Directive Annex 1 types), were also applicable to a relatively small number of ponds, partly because these pond types are scarce, partly because of limited data. However, for larger waterbodies, the lake condition survey (Goldsmith *et al*. 2008) provided an excellent information source.

No ponds were identified on the basis of Criterion 4 (which uses PSYM - the Predictive SYstem for Multimetrics - to assess pond ecological quality) because this method of analysis has not yet been developed for use outside of England and Wales.

Criterion five was not applied at all in the current survey because "Other important pond(s)" types have not been formerly identified for Northern Ireland.

Once 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 Table 2 for a list of habitats).

Table 2 Priority Pond (PP) 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. Note – plant species considered to be 'Nationally Scarce in Ireland' were also included (i.e. species found in less than 3% of 10x10km squares in Ireland). Invertebrates were not assessed additionally as 'Nationally Scarce in Ireland' because species distribution data were not systematically available for all groups.

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: In England and Wales these are ponds classified in the top PSYM category ("high") for ecological quality (i.e. having a PSYM score ≥ 75%). However, this method is not applicable in Northern Ireland. 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. cut over bog pools and turloughs.

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.

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 because it 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 from 1988-2009 were potentially used to identify a Priority Pond. Negative results, if 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.
- Species judged to be 'Nationally Scarce' in Ireland were added to the criterion 2 list (see Table 2). Irish records in the *New Atlas of the British and Irish Flora*. (Preston *et al.* 2002) were used as the basis for this assessment.
- Three Nationally Scarce aquatic invertebrates: Any three records collected since 1988 counted towards this total
- 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* were only counted once). Wetland plant species were defined by the standard list used in the National Pond Survey (NPS).

For plants, 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.

An assessment was made of the number of wetland plant species recorded in Northern Ireland compared to the number in GB, to ensure that the '≥30 plant species' limit was appropriate for NI. The results showed that there are few GB wetland plant species not

recorded in Northern Ireland. Species that *are* absent are all rare plants with highly restricted distributions in GB. The '≥30 pant species' threshold was therefore retained, since omission of these very rare species was unlikely to affect species richness at the vast majority of sites.

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 '≥50 species' 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.

The "Irish bottle-neck" is known to have had relatively little influence on the occurrence of aquatic invertebrate taxa in Northern Ireland. Specific data are not available for most groups, but overall, at least 80% of GB taxa are likely to be present (B. Nelson pers comm.), and the majority of missing species are likely to be uncommon. No adjustment was therefore made to the '≥50 invertebrate spp' threshold.

Amphibian and dragonfly guidelines: Methods for assessing dragonfly assemblages are currently under review. The current IAP analysis included all Areas of Special Scientific Interest (ASSIs) 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 in Northern Ireland (see Appendix 1for a full list). In total, 20 contacts were made, of which the majority were NIEA staff. The organisations contacted included:

- Northern Ireland Environment Agency / DOENI
- LBAP officers
- CEDaR
- Wildlife Trusts
- Local Authorities
- Key individuals and national referees for specific groups (e.g. Brian Nelson, Garth Foster, Nick Stewart)

Pond data were gathered for wetland plants, invertebrates, amphibians, fish, birds and mammals (Table 3, see Appendix 2 for more details). Most of the data collected were individual species records. Few data were available to describe biological assemblages, with the exception of aquatic coleoptera data, and data collected for the Site Condition Assessments of Standing Water Features in SACs and ASSIs Reports for Northern Ireland (Goldsmith et al., 2008). 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 2 for more details)

Biotic group	Data type
Wetland plants	Stonewort species
	Vascular plant records (emergent and aquatic species and assemblages)
Invertebrates	Water beetle records/assemblages
	Macroinvertebrate assemblages
Fish	Fish records were collected but none were relevant to ponds
Amphibians	Smooth Newt 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	Otter records (bat records 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. Lough Erne IAP)
- ***Additional Areas of Interest***, where data was insufficient to class them as an IAP, but species records and expert knowledge identified the area to be of potential importance

Rationale for drawing IAP boundaries

IAP boundaries were drawn by enclosing clusters of records that were biologically and geographically coherent. Boundaries were modified where (i) it was logical to extend

them to coincide with appropriate Landscape Character Area and ASSI boundaries (ii) where expert opinion suggested areas were important but records were limited.

In total, nine IAPs and three additional areas of interest were defined by these 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. marl lake).

In the current assessment, 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.

- 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, annotated maps and 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 CeDAR database, 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.

A selection of pond inventory GIS layers were made available to us for Northern Ireland (Appendix 2). However, these cannot be seen as a comprehensive record as the majority of smaller waterbodies are not included, so we used them in conjunction with species records from known pond sites.

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 Google maps/ satellite imagery to ensure that the records were not from other freshwater habitats (e.g. fens, 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 northern County Tyrone and County Londonderry.

In addition, it is important to recognise that there are significant gaps in quantitative pond data for all areas of the UK. Within Northern Ireland there are likely to be records from fewer than 1% of the total pond resource in the country, 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 Action, 1998; Pond Conservation, 2002).

Priorities for further work are discussed in Section 15.

4 Overview of Important Areas for Ponds (IAPs)

A total of 9 Important Areas for Ponds (IAPs) have been identified in Northern Ireland (see Figure 4). These are:

- **Pettigoe Plateau IAP**

The Pettigoe Plateau IAP covers a small area on the western border of Northern Ireland in a region of international importance for its high quality peat-based loughs and lowland blanket bog pool complexes. Seven loughs of 2 ha or below, and a number of bog pools, are recognised as Annex 1 H3160 *Natural dystrophic lakes and ponds*. Two small loughs are also recognised as H3130 *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea.*

Five of the Annex 1 loughs also qualify as Priority Ponds on the basis of the uncommon species or rich communities they support. These include the Nationally Threatened Least Stonewort *Nitella confervacea* and three Red Data Book water beetles: the Relative Diver *Agabus congener*, the Kongsberg Marsh Beetle *Cyphon kongsbergensis* and the Distinguished Whirligig *Gyrinus distinctus*. Six of the loughs in the area are also exceptional in supporting over 30 wetland plant species.

- **West Erne Uplands IAP**

The West Erne Uplands IAP lies within the uplands of west Fermanagh. The IAP contains a considerable number of predominantly mesotrophic small waterbodies but also includes oligotrophic waters.

Seven loughs and a number of bog pools are recognised as the Habitats Directive Annex 1 type H3160 *Natural dystrophic lakes and ponds*. Two are recognised as H3130 *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea*. Twelve sites qualify as Priority Ponds on the basis of the uncommon species or rich communities they support. Species of importance include the Nationally Threatened Long Stalked Pondweed *Potamogeton praelongus* and five Red Data Book invertebrates: Arctic Diver *Agabus arcticus*, the Hydravore *Haliplus lineolatus*, the Distinguished Whirligig, *Gyrinus distinctus*, the Irish Damselfly *Coenagrion lunulatum* and the pond skater *Limnoporus rufoscutellatus*. Six of the loughs in the area were exceptional in supporting over 30 wetland plant species.

- **Lough Erne IAP**

The Lough Erne IAP is located in the lowlands of Fermanagh and comprises one of the most important concentrations of small waterbodies in Northern Ireland. The IAP is of international importance for three Habitats Directive Annex I type waterbodies: H3140 *Hard oligo-mesotrophic waters*, H3150 *Natural eutrophic lakes*, and H3180 *Turloughs*, with examples of each of these waterbody types of 2 ha or less in area.

Over 40 small loughs within the IAP support at least one nationally uncommon plant species. Species recorded include the Nationally Threatened Marsh Pea

Lathyrus palustris and the Nationally Scarce Pointed Stonewort *Nitella mucronata*, found in mesotrophic-eutrophic ponds in the border region in the southern part of the IAP. Sixteen sites within the IAP support a combined total of 10 Red Data Book or BAP invertebrate species, and a further six sites support three or more rare or nationally scarce invertebrates. Otters *Lutra lutra* and Smooth Newts *Triturus vulgaris* have also been recorded within the IAP. Six small waterbodies within the IAP have exceptional plant assemblages with 30 or more species.

- **Fivemiletown IAP**

The Fivemiletown IAP is located in South Tyrone and neighbouring Fermanagh. The IAP includes four small loughs of international importance which are referable to the Habitats Directive Annex 1 Habitat type H3160 *Natural dystrophic lakes and ponds*.

Within the lowland area of this IAP, five sites are identified as priority small waterbodies because they support plant species of high conservation importance including the Nationally Threatened Long-stalked Pondweed *Potamogeton praelongus*. Fifteen sites within the IAP support Red Data Book and BAP invertebrate species, and one site, Cullentra Lough, is identified as having an exceptional invertebrate assemblage of over 50 species.

- **Carrickmore Uplands IAP**

The Carrickmore Uplands IAP lies on the southern borders of the Sperrin Mountains in County Tyrone. Nine waterbodies within the IAP are of international importance as Annex 1 Habitats Directive type H3160 *Natural dystrophic lakes and ponds*. Four sites are of national importance as a result of the occurrence of important plant species. The species present include Tall Bog-sedge *Carex magellanica*, one of the rarest sedges in Ireland, which has been recorded from the edge of three of the small waterbodies within the IAP.

Five sites are identified as Priority Pond sites on the basis of their Red Data Book or BAP invertebrate species. The species recorded include the Irish Damselfly *Coenagrion lunulatum*, the Arctic Diver *Agabus arcticus* and the Highland Great Diving Beetle *Dytiscus lapponicus*. Otter *Lutra lutra* has also been recorded in the IAP at Loughnafreaghoge.

- **Lough Neagh Peatlands IAP**

The Lough Neagh Peatlands IAP is located to the south of the Lough Neagh shore and crosses the boundaries of four counties: Tyrone, Armagh, Down and Antrim. The IAP is notable for its unusual sites, particularly Montiaghs Moss, with extremely high densities of small bog pools created as a result of peat puddling.

Seven nationally important Priority Pond sites were identified. Three sites were identified because of their important plant species, including records of Frogbit *Hydrocharis morsus-ranae* at Montiaghs Moss. Four sites were identified because they supported important invertebrate species and two sites also qualified as priority sites because of their exceptional invertebrate assemblages: Montaighs Moss and Selshion Bog had 66 and 59 aquatic macroinvertebrate species respectively, the former being the richest single site for still-water aquatic invertebrates, primarily water beetles, in Northern Ireland.

- **South Armagh Interdrumlin Fens IAP**

The South Armagh Interdrumlin Fens IAP covers the south-west corner of County Armagh. Two small waterbodies within the IAP are of international importance: Lurgan Lough Upper is designated as an H3150 *Natural eutrophic lake,* and Tullybrick Lough as a H3140 *Hard oligo-mesotrophic waters with benthic vegetation of Chara species* (however, the latter is currently assessed as being in unfavourable condition and may no longer support the priority vegetation type).

Seven Priority Pond sites are identified as a result of the occurrence of important plant species, with at least five nationally uncommon species recorded from small waterbodies in the area. Notable records include Rugged Stonewort *Chara rudis* and Tubular Water-dropwort *Oenanthe fistulosa* from Tullybrick Lough. Twelve priority sites were identified for their Red Data Book and BAP invertebrate records, and five sites have records of three or more nationally scarce macroinvertebrates. An exceptional plant assemblage was recorded at Lurgan Lough Upper and Tullybrick Lough, and the invertebrate assemblages at Derryleckagh Bog and Drumcarn Fen were also exceptionally rich.

- **East Down IAP**

The East Down IAP is situated in the south-east corner of Northern Ireland in County Down. A total of nineteen sites were identified as nationally important Priority Pond sites within this IAP. Important plant species were found at six sites, of which the most notable was Loughkeelan with four nationally scarce stonewort species.

Red Data Book and BAP invertebrates occurred at 10 Priority Pond sites, of which seven also qualified on the basis of 3 or more nationally scarce invertebrate species. Corbally Fen and Loughkeelan also qualify as having exceptional assemblages of aquatic macroinvertebrates with 51 and 59 species recorded respectively. Smooth Newts *Triturus vulgaris* are recorded at four sites in the IAP.

- **Garron Plateau IAP**

The Garron Plateau IAP is situated in County Antrim, close to the north-east coast of Northern Ireland. It supports a range of small waterbodies that fall into two Habitats Directive Annex I types, and is considered to be of international importance for this reason. Seven of its small loughs are classed as H3130 *Oligotrophic to mesotrophic standing waters*, and eight are classed as H3160 *Natural dystrophic lakes and ponds*. At a national level, four ponds within the IAP were identified as priority sites for their important plant species, particularly the Nationally Scarce species Tall Bog-sedge *Carex magellanica*, and Long-stalked Pondweed *Potamogeton praelongus*. Three sites qualified as priority sites because of their Red Data Book and BAP invertebrate species, and three BAP water beetle species were recorded within the IAP. One site, Loughfine, was identified as having an exceptional wetland plant assemblage.

Areas of Interest

Three additional areas were highlighted as 'Areas of Interest' either because they are of limited geographic extent or because expert knowledge has identified these areas to be of potential importance but there are currently limited data. These are: *Cuilcagh Mountains, Western shore of Lough Neagh* and *Rathlin Island*.

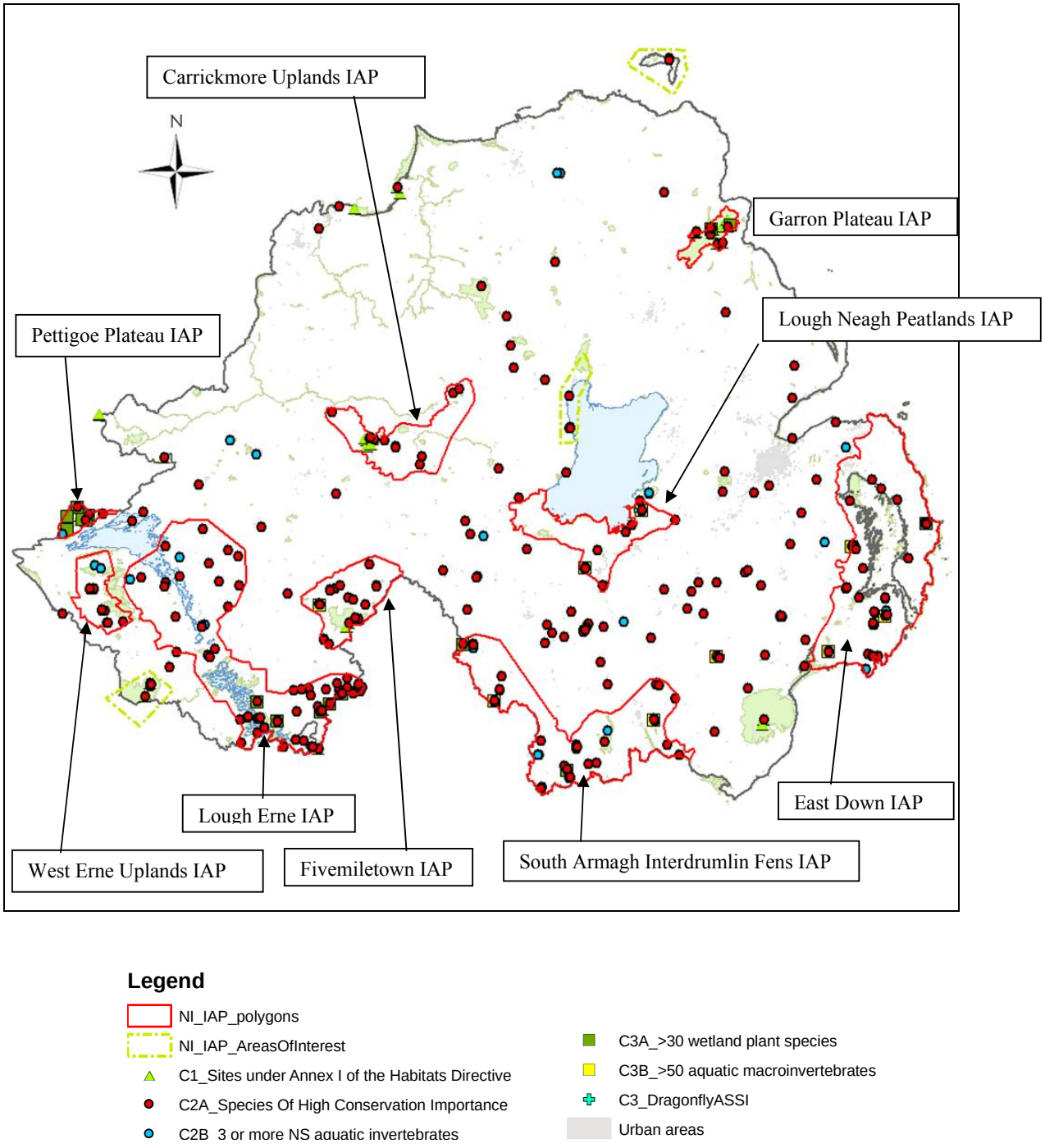


Figure 4 Overview of IAPs in Northern Ireland (please refer to IAP accounts for more details)

5 Pettigoe Plateau IAP

5.1 Summary

The Pettigoe Plateau IAP covers a small area on the western border of Northern Ireland in a region of international importance for its high quality peat-based loughs and lowland blanket bog pool complexes. Seven loughs of 2 ha or below, and a number of bog pools, are recognised as Annex 1 H3160 *Natural dystrophic lakes and ponds*. Two small loughs are also recognised as H3130 *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea.*

Five of the Annex 1 loughs also qualify as Priority Ponds on the basis of the uncommon species or rich communities they support. These include the Nationally Threatened Least Stonewort *Nitella confervacea* and three Red Data Book water beetles: the Relative Diver *Agabus congener*) the Kongsberg Marsh Beetle *Cyphon kongsbergensis* and the Distinguished Whirligig *Gyrinus distinctus*. Six of the loughs in the area are also exceptional in supporting over 30 wetland plant species.

Site name	Pettigoe Plateau IAP
IAP qualifying criteria	***Criterion 1*. H3160 Natural dystrophic lakes and ponds,** **H3130 Oligotrophic to mesotrophic standing waters** ***Criterion 2*: RDB, NS, BAP** ***Criterion 3*: Plant assemblage**
ASSI and SAC designation	Pettigoe Plateau SAC, ASSI, Ramsar site
Central grid reference point for IAP: H 0164	

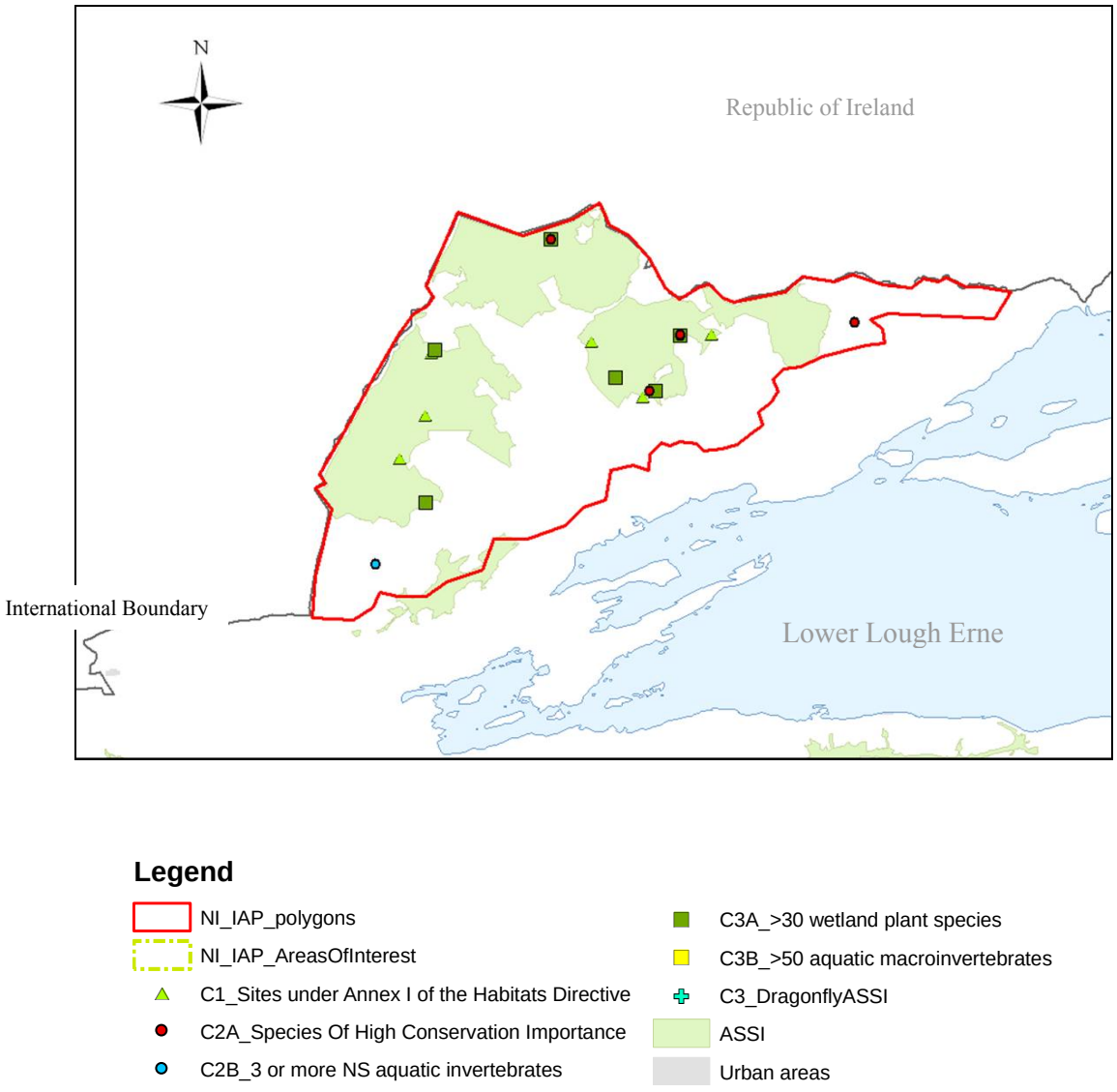


Figure 5 Pettigoe Plateau IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

5.2 Site description

Location and designations

The Pettigoe Plateau IAP is situated in Fermanagh to the north of Lower Lough Erne bounded by Belleek in the east and Pettigoe in the west. Northwards the IAP abuts the Republic of Ireland border, but topographically, the Pettigoe plateau extends north and westwards across the border into County Donegal.

Most of this IAP lies within Northern Ireland's Pettigoe Plateau SAC, which was designated for its natural dystrophic lakes and ponds, and areas of blanket bog. The area is also an ASSI and Ramsar site.

Geology, geomorphology and natural habitats

The Pettigoe Plateau lies in an area of metamorphic gneiss and schist overlain by peat.

Topographically, the much of the area is a rolling landscape of relatively low elevation (100-130 m) interspersed with hills with mineral soil. Lower areas are covered by extensive undulating blanket bog, creating one of the largest expanses of intact lowland blanket bog remaining in Northern Ireland.

Small lakes and pools are scattered through the peatland plateau of the IAP and include a number of well-developed bog pool complexes. Acid flushes are a common feature of the area. Fens occur rarely on lough shores such as at Lough Nafeola.

Generally the area is one of low intensity land management with some grazing by cattle and sheep, particularly around the periphery where the peatland adjoins mineral soils on low drumlins. To the east the area is bounded by extensive conifer plantations. The edge of the plateau, and roadside areas which cross it, have cut-over peatland in which there has been more recent mechanical extraction.

5.3 C1 - Habitats of high conservation importance

The Pettigoe Plateau supports a range of small loughs and pools of international importance including two Habitats Directive Annex 1 Habitat types (Table 4).

The majority of the area's waterbodies classify as Annex 1 H3160 *Natural dystrophic lakes and ponds*. They include seven small peat-based loughs: Derrintrig Lough, Lough Nacroagh, Lough Nafeola, Tullylough More, Tullylough Beg, Tullynaloob Lough, Tullywannia Lough, Tullyvogy Lough, which together range in size from 0.1 - 1.1 ha, and in maximum depth from 1 – 5 m.

North of Derryculloo (20177 36438) a complex of blanket bog pools also fall within this Annex 1 type, and are unique in the region as the only extensive lowland habitat of this type. The complex covers approximately 10 hectares and comprises six main pools (>100 m^2) with many smaller pools, some less than 1 m in diameter and all very shallow (ranging from 40 cm to of 75 cm depth) (Goldsmith *et al*. 2008).

Although most waterbodies in the area are dystrophic, two small loughs (Mallybreen and Meenaghmore), in the north of the IAP support a second Annex 1 habitat type: H3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/ or of the *Isoëto-Nanojuncetea*. Both loughs lie on shallow peats with local outcrops of bedrock in their catchment (Goldsmith *et al*. 2008).

Table 4 Pettigoe Plateau IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Amphibian	Plant	Invertebrate
Derrintrig Lough	199100 361800	H3160				✓	
Lough Nacroagh	198700 362500	H3160					
Lough Nafeola	203199 364486	H3160	✓			✓	
Mallybreen Lough	201116 366036	H3130	(✓)			✓	
Meenaghmore Lough	199258 364250	H3130					
Pettigoe Pool Complex	201770 364380	H3160					
Tullylough Beg	202800 363600	H3160		✓		✓	
Tullylough More	202600 363500	H3160					
Tullynaloob Lough	203700 364500	H3160					
Tullyvogy Lough	202152 363810	H3160				✓	
Tullywannia Lough	199100 363200	H3160					
Tullyvocady Lough.	206000 364700			✓	✓		

* H3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/ or of the Isoëto-Nanojuncetea
H3160 Natural dystrophic lakes and ponds

5.4 C2 - Species of high conservation importance

Plants

The Nationally Threatened Least Stonewort *Nitella confervacea*, one of the few stonewort species tolerant of acid waters, was recorded from the Annex 1 dystrophic Lough Nafeola in the 2007.

Smooth stonewort *Nitella flexilis* (agg.) was recorded from the oligotrophic Mallybreen Lough in 2006. It is not clear whether the record is of the Nationally Scarce *Nitella flexilis sensu stricto* or the similar but more frequent Dark Stonewort *Nitella opaca*. Given the nutrient preferences of the two species[1], *Nitella opaca* is more likely.

Amphibians

Smooth Newts *Triturus vulgaris* have been recorded at one site within the IAP. The record, made in June 2001 is from Tullyvocady Lough, in a forested area to the north of Derrin Mountain.

Invertebrates

Two sites are identified as priority water bodies based on the occurrence of Red Data Book, BAP or Nationally Scarce water beetle species. These are: Tullylough Beg and Tullyvocady Lough.

Tullylough Beg supported the Relative Diver *Agabus congener*, the Kongsberg Marsh Beetle *Cyphon kongsbergensis* and the Distinguished Whirligig *Gyrinus distinctus* all of which are included in the Ireland Red List. The site also supported eight further nationally scarce water beetles: *Agabus unguicularis*, *Enochrus affinis*, *Cyphon pubescens*, *Cyphon punctipennis*, *Graptodytes granularis*, *Gyrinus minutus* and *Ilybius aenescens*.

Tullyvocady Lough supported the Distinguished Whirligig *Gyrinus distinctus*.

5.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages

Six of the area's loughs were notable for their rich wetland plant assemblages, each supporting more than 30 wetland plant species. These were the dystrophic Derrintrig Lough, Lough Nafeola, Tullylough Beg and Tullyvogy Lough, and the oligotrophic Mallybreen and Meenaghmore Loughs. All supported rich marginal plant communities and aquatic assemblages that included a range of stonewort and *Potamogeton* species.

Invertebrate assemblages

There are no records of sites with >50 aquatic macroinvertebrate species within this IAP.

[1] *Nitella flexilis* s.s. appears to be restricted to eutrophic or mesotrophic waters, *Nitella opaca* has a wider tolerance range (Rich & Jermy 1998).

6 West Erne Uplands IAP

6.1 Summary

The West Erne Uplands IAP lies within the uplands of west Fermanagh. The IAP contains a considerable number of predominantly mesotrophic small waterbodies but also includes oligotrophic waters.

Seven loughs and a number of bog pools are recognised as the Habitats Directive Annex 1 type H3160 *Natural dystrophic lakes and ponds*. Two are recognised as H3130 *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea*. Twelve sites qualify as Priority Ponds on the basis of the uncommon species or rich communities they support. Species of importance include the Nationally Threatened Long Stalked Pondweed *Potamogeton praelongus* and five Red Data Book invertebrates: Arctic Diver *Agabus arcticus*, the Hydravore *Haliplus lineolatus*, the Distinguished Whirligig, *Gyrinus distinctus*, the Irish Damselfly *Coenagrion lunulatum* and the pond skater *Limnoporus rufoscutellatus*. Six of the loughs in the area were exceptional in supporting over 30 wetland plant species.

Site name	West Erne Uplands IAP
IAP qualifying criteria	***Criterion 1*. H3160 Natural dystrophic lakes and ponds,** **H3130 Oligotrophic to mesotrophic standing waters** ***Criterion 2*: NS, RDB, BAP** ***Criterion 3*: See note.**
ASSI and SAC designation*	Braade ASSI, Largalinny ASSI, Glennasheevar ASSI, West Fermanagh Scarplands ASSI, Carrickbrawn ASSI, Conagher ASSI Largalinny SAC, West Fermanagh Scarplands SAC
Central grid reference point for IAP: H 0749	

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

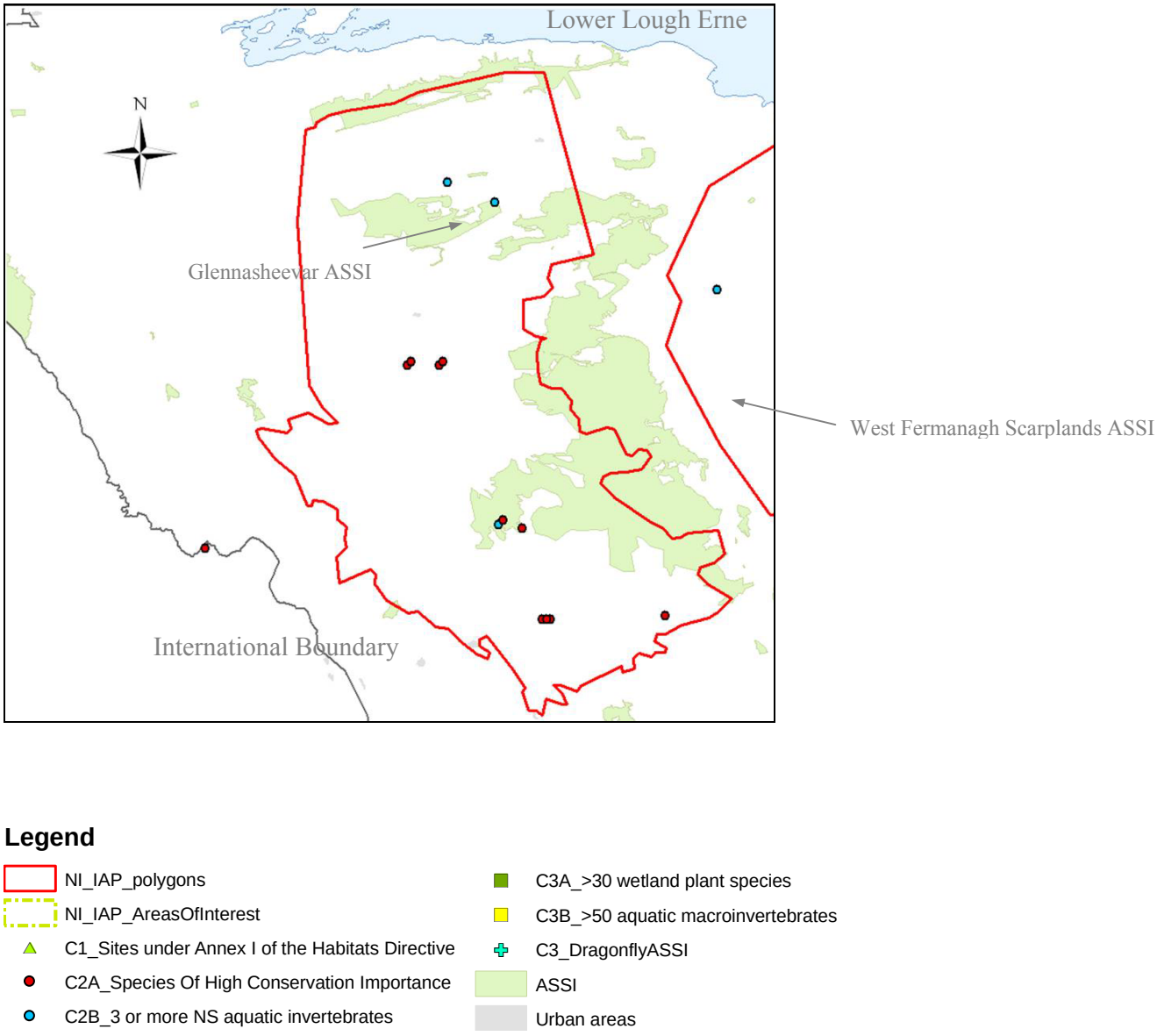


Figure 6 West Erne Uplands IAP: ponds with vertebrate, invertebrate or plants records which meet the Priority Pond criteria

6.2 Site description

The West Erne Uplands IAP is situated in the west of Northern Ireland, in the upland region of west Fermanagh that borders the Republic of Ireland. The IAP is bound by steep limestone escarpments to the north and east, and by the County River and Lough Melvin to the west. The IAP includes 6 ASSIs and 2 SACs including Glenasheevar ASSI, Largalliny ASSI and the West Fermanagh Scarplands SAC.

Geology, geomorphology and natural habitats

The West Erne Uplands lies in an area of shale, sandstone, gritstone and limestone, overlain in part by blanket peat with some till.

Topographically the area lies between 150 and 300 m elevation, and comprises a series of gritstone-capped sandstone plateaus separated by steep-sided, glacially deepened, valleys.

Although largely forested: 39% of land cover is plantation, the terrain of the West Erne Uplands IAP is varied by areas of open moorland broken by rocky outcrops with patches of native trees. Blanket bog is locally extensive across plateau areas. Much has been cut-over but, a number of intact bogs remain including Glennasheevar ASSI which has well developed hummock and lawn complexes.

Pond types

The area supports many small loughs fringed by marsh and fen. These vary considerably in nutrient status from oligotrophic pools to naturally mesotrophic-eutrophic ponds in more nutrient- and base-rich areas. Areas of peatlands support small oligotrophic pools with a well-developed pool system within the Glennasheevar ASSI blanket bog.

Figure 7 Unnamed lough (G067 565) in the West Erne Uplands

6.3 C1 - Habitats of high conservation importance

There are no Habitats Directive Annex I sites identified within this IAP.

6.4 C2 - Species of high conservation importance

Plants

Small loughs within this IAP support a number of uncommon aquatic species. The Nationally Threatened Long Stalked Pondweed *Potamogeton praelongus* was recorded from three small loughs in the area between 1988 and 1996: Lough Alaban, Lough Nacloyduff and Lough Nabrickboy. Because *P. praelongus* is a deepwater species which is easily overlooked, it may also be present more widely in the area. Nationally, *Potamogeton praelongus* is an increasingly uncommon plant of clean mesotrophic waters, and was one of the species which showed most rapid decline in the UK in the 2000 Plant Atlas, almost certainly due to increasing eutrophication of lowland areas (Preston *et al.* 2002).

Another charophyte "Smooth Stonewort *Nitella flexilis*" was recorded from three waterbodies in between 1988 and 1990: Lough Alaban, Lough Nacloyduff and Lough Blocknet. However these records need to be treated with caution. Prior to the 1990's the Nationally Scarce *Nitella flexilis sensu stricto* was rarely distinguished from the more frequent Dark Stonewort *Nitella opaca*, and given the survey dates it is likely that these records should be treated as *Nitella flexilis agg.* Fruiting material is required to confirm which of the two species is present. (Rich *et al*. 1998).

Parabaun Lough, although slightly larger than the 2ha cut-off for small waterbodies, is worth noting as an unusual site, with records of two Nationally Threatened aquatic species with differing water quality requirements: both the mesotrophic *Potamogeton praelongus* and the much more acid-loving Least Stonewort *Nitella confervacea* occur here in the same lough.

Table 5 West Erne Uplands IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Lough Alaban.	206800 343800		✓	✓	✓		
Lough Blocknet.	209900 343900		✓				
Lough Nacloyduff.	206300 346100		✓				
Lough Nabrickboy	203500 350300		✓				
Loughanquin	205800 346300			✓	✓		
Akista Lough.	204200 350200			✓			
Tullywannia Lough	204300 350800			✓			
Braade	204400 354800			✓			
Glennasheevar ASSI	205600 354300			✓			

Amphibians

Smooth Newts *Triturus vulgaris* have been recorded at two sites within the IAP. Both records occur in ponds that are on the edge of the Ballintempo Forest. In July 1995, Smooth Newts were recorded at Loughanquin, and in June 1998 they were recorded at Lough Alaban.

Invertebrates

Five sites qualified as priority ponds as a result of the occurrence of Red Data Book or BAP invertebrates. These were:

- Akista Lough: the Arctic Diver *Agabus arcticus*
- Lough Alaban: Irish Damselfly *Coenagrion lunulatum* and *Limnoporus rufoscutellatus*
- Parabaun Lough: The Hydravore *Haliplus lineolatus*
- Tullywannia Lough: two Red Data Book species (Distinguished Whirligig, *Gyrinus distinctus* and the Hydravore *Haliplus lineolatus*)
- Loughanquin: the pond skater *Limnoporus rufoscutellatus*.

Two additional sites, Braade and Glennasheevar, were identified as priority ponds because they supported three or more nationally scarce invertebrate species. These sites supported a variety of species associated with acid waters including: the diving beetles *Ilybius aenescens*, *I. guttiger*, *Graptodytes granularis* and *Stictonectes lepidus* and the scavenger beetle *Enochrus affinis*.

6.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages

There are currently few plant assemblage data for most of the smaller waterbodies within this IAP. However, a brief visit to the area by one of the current authors (PW) in June 2009, suggest that some of the 20 or so small loughs in the area would be likely to qualify as Priority Ponds on the basis of plant assemblage richness were further surveys to be undertaken.

Invertebrate assemblages

There are no records of sites with >50 aquatic macroinvertebrate species within this IAP.

7 Lough Erne IAP

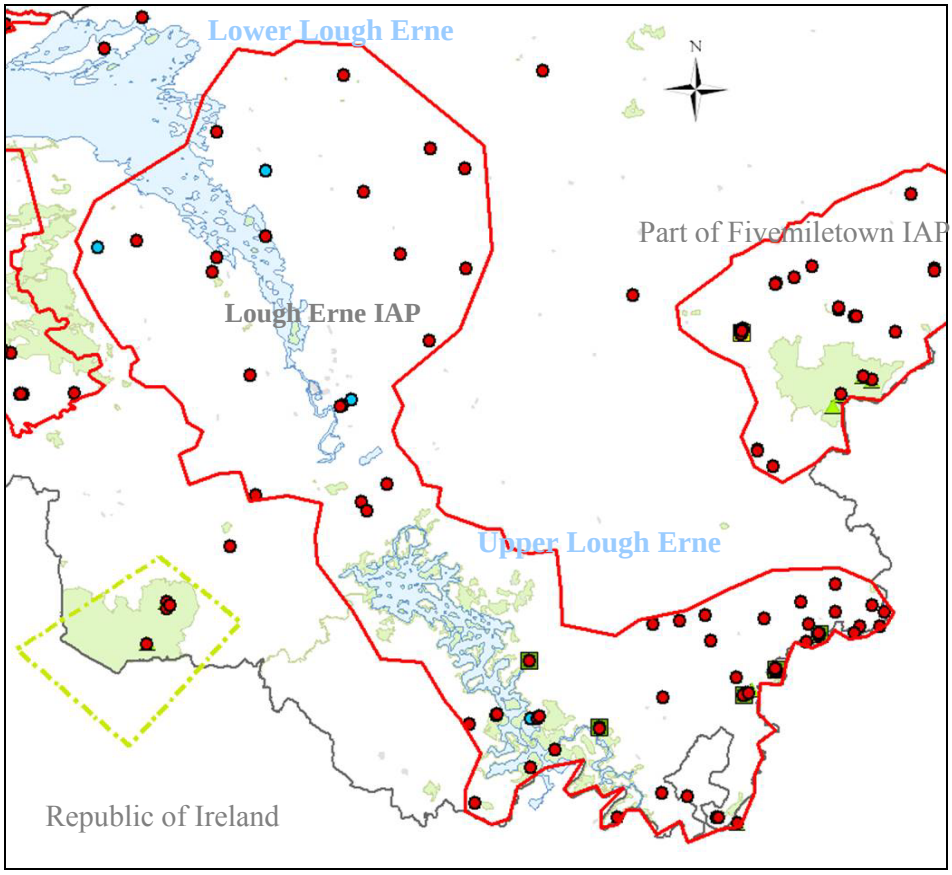
7.1 Summary

The Lough Erne IAP is located in the lowlands of Fermanagh and comprises one of the most important concentrations of small waterbodies in Northern Ireland. The IAP is of international importance for three Habitats Directive Annex I type waterbodies: H3140 *Hard oligo-mesotrophic waters*, H3150 *Natural eutrophic lakes*, and H3180 *Turloughs*, with examples of each of these waterbody types of 2 ha or less in area.

Over 40 small loughs within the IAP support at least one nationally uncommon plant species. Species recorded include the Nationally Threatened Marsh Pea *Lathyrus palustris* and the Nationally Scarce Pointed Stonewort *Nitella mucronata,* found in mesotrophic-eutrophic ponds in the border region in the southern part of the IAP. Sixteen sites within the IAP support a combined total of 10 Red Data Book or BAP invertebrate species, and a further six sites support three or more rare or nationally scarce invertebrates. Otters *Lutra lutra* and Smooth Newts *Triturus vulgaris* have also been recorded within the IAP. Six small waterbodies within the IAP have exceptional plant assemblages with 30 or more species.

Site name	Lough Erne IAP
IAP qualifying criteria	***Criterion 1*: H3140 Hard oligo-mesotrophic waters** **H3150 Natural eutrophic lakes** **H3180 Turloughs** ***Criterion 2*: RDB, BAP, NS** ***Criterion 3*: Plant assemblages**
ASSI and SAC designations*	Fardrum & Roosky Turloughs SAC and ASSI, Cladagh (Swanlinbar) River SAC and ASSI, Magheraveely Marl Loughs SAC , Moninea Bog SAC and ASSI, Upper Lough Erne SAC, Upper Lough Erne - Trannish ASSI, Upper Lough Erne - Crom ASSI, Killymackan Lough ASSI,, Upper Lough Erne - Belleisle ASSI, Upper Lough Erne - Galloon ASSI, Tullanaguiggy ASSI, Horse Island ASSI, Bellanaleck ASSI, Mill Lough ASSI , Corraslough Point ASSI, Inishroosk ASSI, Annachullion Lough ASSI, Knockninny Hill ASSI, Burdautien Lough ASSI, Summerhill Lough ASSI, Kilroosky Lough ASSI, Knockballymore Lough ASSI, Dernish Island ASSI, Finn Floods ASSI, Banagher ASSI, Devenish Island ASSI, Drumaharvey ASSI, Lisdoo ASSI, Paris Island Big ASSI, Tedd ASSI
Central grid reference point for IAP: H 3233	

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



Legend

- NI_IAP_polygons
- NI_IAP_AreasOfInterest
- C1_Sites under Annex I of the Habitats Directive
- C2A_Species Of High Conservation Importance
- C2B_3 or more NS aquatic invertebrates
- C3A_>30 wetland plant species
- C3B_>50 aquatic macroinvertebrates
- C3_DragonflyASSI
- ASSI
- Urban areas

Figure 8 Lough Erne IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

7.2 Site description

Location and designations

The Lough Erne IAP is one of the largest of Northern Ireland's Important Areas for Ponds. It encompasses the undulating lowlands around Upper Lough Erne extending eastwards towards Newtownbutler, together with the southern half of Lower Lough Erne extending northeast towards Irvinestown. The area is bounded by the Knockmore scarpland to the west and by gently rising agricultural lands to the east. Over thirty ASSIs and five SACs are included within the region.

Geology, geomorphology and natural habitats

Much of the IAP lies within the Lough Erne Lowlands: a drift-covered landscape overlying Devonian Old Red Sandstone and Carboniferous limestone. Drumlin fields and interdrumlin hollows dominate much of the landscape creating an undulating topography, reflected in the intricate shoreline and many islands of Lough Erne itself.

Over 80% of the farmland is improved lowland grassland used for pasture or silage, although locally there has been some reversion to rush meadow.

The interdrumlin hollows support significant numbers of ponds, lakes and fens and a number of bogs including Tonnagh Beg Bog ASSI: one of the best examples of a lowland raised bog remaining in the west of Northern Ireland.

Pond types

The region's small waterbodies range from mesotrophic to eutrophic, and are often associated with areas of carr woodland, reedbed or fen merging into marshy and wet grasslands.

The southern part of Upper Lough Erne is particularly important for its range of ponds and lakes. To the south-east within the Newtownbutler and Rosslea lowlands, the Magheraveely Marl Lakes are well known for their clear, hard water loughs with a high base status. Further west, naturally eutrophic ponds and lakes around the southern edge of Lough Erne are of exceptional biodiversity value.

The IAP also encompasses the Fardrum & Roosky Turloughs SAC. Underlain by Carboniferous limestone, the three small aquifer-fed waterbodies here are the only turloughs in Northern Ireland, and represent the most northerly occurrence of this habitat in Ireland and the UK.

Table 6 Lough Erne IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Annachullion Lough	251913 330242	**H3140**	✓			✓	
Annashanco Lough	254900 331900		✓				
Black Lough	227500 338700		✓				
Bog nr. Fivepoints Crossroads	220100 338100		✓	✓			
Breandrum Lough	224900 343100		✓				
Burdautien Lough	249520 328110	**H3140**	✓	✓		✓	
Cam Lough	255300 330700		✓				
Carran. Ballinamallard	231900 356564		✓				
Castle Archdale	217900 358600				✓		
Castle Lough	240500 319900				✓		
Clonshannagh Lough	243000 321300		✓	✓			
Coramy Lough	247700 333200			✓			
Cornagague Lough	247400 330300		✓	✓			
Corraharra Lough	235600 322700	**H3150**	✓	✓		✓	
Crawford's Lough.	255200 333000		✓				
Cromaghy Lough	251300 330800		✓				
Derrybeg West and Derrymacrow	235600 325500			✓			
Derrycanon Lough	232200 325200		✓				
Dresternan Lough.	250900 332100		✓				
Drumacrittin Lough	254800 332900			✓			
Drumaveale Lough	247300 319600	**(H3150)**	✓				
Drumbarrow Lough.	252800 331500		✓				
Drumskimly Lough	213400 352500		✓				
Drumsloe Lough	228300 351700		✓				
Drumswords Lough	248800 331100		✓				
Drumyarkin Lough	252800 333100		✓				
Ely Lodge Forest	217900 351500			✓			
Fardrum Turlough	218100 350100	**3180**					
fen north of Drumacrittin	254840 332910			✓			
Finn Floods	246200 319900			✓			

Five Points Bog	220100 338100			✓			
Green Loughs	217700 350700	**3180**	✓				
Gublusk Bay	220700 352700				✓		
Gublusk Bay	220700 352700				✓		
Inishfendra Island	237000 323700			✓			
Islandhill Lough	254200 330700		✓				
Johnstown Lough	247200 327800		✓				
Killymackan Lough	232500 320700			✓			
Knockballymore A Lough	247672 326801	**(H3140)**	✓	✓		✓	
Knockballymore Lough B	247900 326900	**(H3140)**	✓	✓			
Knockballymore C Lough	248100 327100	**(H3140)**					
Lakelet between Knock & Cloonatrig	226100 337700		✓				
Lakeview Lough	244500 321100		✓				
Largy Lough	229900 346800		✓				
Lenaghan Lough	219800 344900		✓				
Lough Coole	225500 343500			✓			
Lough Mulshane	232000 350900			✓			
Lough Nalughoge	236600 324300				✓		
Lough Sarah	242406 319678	**H3150**	✓			✓	
Lough Slane	233750 325750			✓			
Lough-a-Hache	245500 331300			✓			
Lyon's Lough	255600 331500		✓				
Maghera Lough	230000 357700			✓			
Mullynagowan Lough	243100 326700		✓				
Pound Lough	239500 324900	**H3150**	✓			✓	
Rathkeevan Lough	253900 330300		✓				
Raw Lough	225100 361800		✓				
Relagh Lough	226200 355200		✓				
Roosky Lough	218530 349430	**H3180**					
Rose Lough	251200 329800		✓				
Rossbrick Lough	245800 329900		✓				
Rossdill Lough	236000 325500		✓	✓			
Tattycam Lough	244000 331000		✓				
Tonnagh Bog	211200 352100			✓			

* H3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp
H3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation

7.3 C1 - Habitats of high conservation importance

The Lough Erne IAP includes a range of small loughs of international importance, including three Habitats Directive Annex 1 Habitat types.

In the south-west of the IAP, northwest of Newtownbutler, five small loughs within the Magheraveely Marl Lakes SAC are classified as Annex 1 H3140 *Hard oligo-mesotrophic waters with benthic vegetation of Chara spp*. The 2006 lake condition survey (Goldsmith 2008) indicates that of the five loughs, Annachullion Lough was in the best condition with extensive beds of *Chara*, including the Nationally Scarce Hedgehog Stonewort *Chara aculeolata* and the nationally threatened Rugged Stonewort *Chara rudis.* Lough Burdautien supported fewer stonewort species and charophyte beds were limited to less than 10% of the photic zone. The three remaining loughs: Knockballymore Loughs A, B and C showed some evidence of degradation, with none of the stoneworts characteristic of this Annex 1 type recorded in 1998, present in the 2006 survey.

A second group of Annex 1 loughs lie south of Newtownbutler, just north of the border with the Irish Republic. All fall into the H3150 habitat type: *Natural eutrophic lakes with Magnopotamion or Hydrocharition*. The 2006 lake condition survey (Goldsmith et al. 2008) recognises three small H3150 loughs within the area: Corraharra Lough, Lough Sarah and Pound Lough. All support a characteristic flora including frogbit *Hydrocharis morsus-ranae* and a diverse range of submerged and floating-leaved aquatics including uncommon taxa (see below). Despite their small size and relatively low intensity catchments, Goldsmith et al.'s assessments suggest that all three waterbodies remain vulnerable to degradation in the short to medium term.

Species records from the 1998 Lake Survey suggest that a fourth small waterbody,: Drumaveale Lough, which straddles the Irish border, also supports some species characteristic of the H3150 Annex 1 type, including Frog bit *Hydrocharis morsus-ranae* and Greater Bladderwort *Utricularia vulgaris sensu stricto*. Futher survey work is necessary to confirm whether Drumaveale Lough fully conforms to H3150.

To the west of Lower Lough Erne, three small turloughs (H3180), all under 2 ha (Fardrum Lough, Roosky Lough, and Green Lough), are the only turloughs in Northern Ireland and one of only two sites in the UK. All three contain distinctive vegetation communities associated with their inundation zone.

7.4 C2 - Species of high conservation importance

Plants

Small waterbodies in the Lough Erne IAP support an exceptional number of wetland plants.

At least 20 nationally uncommon plant species have been recorded from small waterbodies in the area (excluding putative native records of Smooth Stonewort *Nitella flexilis*).

Over 40 loughs have been recorded as supporting at least one nationally uncommon plant species (Table 7). Four loughs (Annachullion Lough, Corraharra Lough, Lough Sarah and Pound Lough) have outstanding assemblages supporting five or more uncommon species.

Cowbane *Cicuta virosa* (Nationally Scarce), which has been recorded from 34 waterbodies is by far the most widespread uncommon plant. Other uncommon species have each been recorded from seven or fewer sites.

The most distinctive assemblages of uncommon species occur in the border region to the south of the IAP. Here, small a range of mesotrophic-eutrophic loughs including Pound Lough, Clonshannagh Lough, Corraharra Lough, Drumaveale Lough and Lough Sarah support outstanding communities with the BAP species Frogbit *Hydrocharis morsus-ranae*, Marsh Stitchwort *Stellaria palustris*, Greater Water-parsnip *Sium latifolium* and Tubular Water-dropwort *Oenanthe fistulosa*, and more rarely the Nationally Threatened Marsh Pea *Lathyrus palustris* and Nationally Scarce Pointed Stonewort *Nitella mucronata*, and Elongated Sedge *Carex elongata.*

Loughs in and around the Magheraveely region south east of Lough Erne are also a focus for uncommon species, with regional strongholds for the Nationally Scarce Fen Pondweed *Potamogeton coloratus* and Nationally Threatened Long-stalked Pondweed *Potamogeton praelongus*, and local records for the Nationally Threatened Rugged Stonewort *Chara rudis*.

Other records of note within the IAP include Flat-stalked Pondweed *Potamogeton friesii* (Nationally Threatened) recorded from Breandrum Lough on the outskirts of Enniskillen, and the Nationally Scarce Slender-leaved Pondweed *Potamogeton filiformis* from Largy Lough in the hills NE of Enniskillen.

Further north, to the west of Lower Lough Erne, (see Table 8) Marsh Fern *Thelypteris palustris* (Nationally Scarce), a species of carr or wooded fen has been regularly recorded from Drumskimly Lough.

Green Lough, one of the area's three turloughs, Green Lough, is known to support the nationally rare BAP species Fen Violet *Viola persicifolia*, although the last recorded sighting was in 1992.

Table 7 Uncommon species recorded from small waterbodies in the Lough Erne IAP

Common name	Binomial	Status
Elongated Sedge	*Carex elongata*	Nationally Scarce
Hedgehog Stonewort	*Chara aculeolata*	Nationally Scarce
Lesser Bearded Stonewort	*Chara curta*	Nationally Scarce
Strawberry Stonewort	*Chara fragifera*	Vulnerable
Rugged Stonewort	*Chara rudis*	Nationally Threatened
Cowbane	*Cicuta virosa*	Nationally Scarce
Marsh Helleborine	*Epipactis palustris*	W(NI)O:Sch8, EC CITES:B
Frogbit	*Hydrocharis morsus-ranae*	Vulnerable
Marsh Pea	*Lathyrus palustris*	Nationally Threatened, Nationally Scarce W(NI)O:Sch8
Smooth Stonewort[2]	*Nitella flexilis*	Nationally Scarce
Pointed Stonewort	*Nitella mucronata*	Nationally Scarce
Tubular Water-dropwort	*Oenanthe fistulosa*	Vulnerable, BAP
Fen Pondweed	*Potamogeton coloratus*	Nationally Scarce
Slender-leaved Pondweed	*Potamogeton filiformis*	Nationally Scarce
Flat-stalked Pondweed	*Potamogeton friesii*	Nationally Threatened, Nationally Scarce
Long-stalked Pondweed	*Potamogeton praelongus*	Nationally Threatened
Greater Water-parsnip	*Sium latifolium*	BAP, Endangered, Nationally Scarce
Marsh Fern	*Thelypteris palustris*	Nationally Scarce
Marsh Stitchwort	*Stellaria palustris*	BAP, Vulnerable
Water Soldier	*Stratiotes aloides*	Nationally Threatened, Nationally Rare
Fen Violet	*Viola persicifolia*	BAP, Nationally Rare, Endangered, WCA Sch8, W(NI)O:Sch8

[2] It is not clear whether records of *Nitella flexilis* are of the Nationally Scarce *Nitella flexilis*, or more common *Nitella opaca*.

Table 8 Nationally uncommon wetland plant species recorded from small waterbodies in the Upper Lough Erne IAP

Site	Carex elongata	Chara fragifera	Chara aculeolata	Chara curta	Chara rudis	Cicuta virosa	E. palustris	H. morsus-ranae	Lathyrus palustris	Nitella flexilis	Nitella mucronata	O. fistulosa	P. coloratus	P. filiformis	P. friesii	P. praelongus	Sium latifolium	Stellaria palustris	S. aloides	T. palustris
Annachullion Lough			✓		✓	✓	✓		✓	✓			✓							
Annashanco Lough.						✓														
Black Lough						✓											✓	✓		
Breandrum Lough		✓				✓									✓					
Burdautien Lough						✓														
Cam Lough						✓														
Carran Ballinamallard						✓														
Clonshannagh Lough						✓		✓										✓		
Cornagague Lough																✓				
Corraharra Lough						✓		✓				✓				✓	✓		✓	
Crawford's Lough.						✓														
Cromaghy Lough						✓							✓							
Derrycanon Lough						✓														
Dresternan Lough.						✓														
Drumaveale Lough								✓										✓		
Drumbarrow Lough						✓										✓				
Drumsloe Lough						✓														
Drumswords Lough						✓														
Drumskimly Lough																				✓
Drumyarkin Lough						✓				✓						✓				
Green Loughs		✓																		
Islandhill Lough						✓														
Johnstown Lough													✓							

Table 8 (continued) Nationally uncommon wetland plant species recorded from small waterbodies in the Upper Lough Erne IAP

Site	Carex elongata	Chara fragifera	Chara aculeolata	Chara curta	Chara rudis	Cicuta virosa	Epipactis palustris	H. morsus-ranae	Lathyrus palustris	Nitella flexilis	Nitella mucronata	O. fistulosa	P. coloratus	P. filiformis	P. friesii	P. praelongus	Sium latifolium	Stellaria palustris	S. aloides	T. palustris
Knockballymore A Lough				✓		✓														
Knockballymore B Lough				✓		✓														
Knockballymore C Lough						✓														
Lakelet between Knock & Cloonatrig						✓						✓					✓	✓		
Lakeview Lough						✓				✓										
Largy Lough		✓				✓								✓						
Lenaghan Lough						✓														
Lough Sarah						✓		✓				✓					✓		✓	
Lyon's Lough						✓														
Mullynagowan Lough						✓												✓		
Pound Lough		✓				✓		✓	✓		✓							✓		
Rathkeevan Lough						✓										✓				
Raw Lough		✓				✓				✓										
Relagh Lough						✓														
Rose Lough						✓														
Rossbrick Lough.						✓										✓				
Rossdill Lough.	✓																			
Tattycam Lough																✓				

Figure 9 Corraharra Lough (H3150 habitat type: *Natural eutrophic lakes with Magnopotamion or Hydrocharition*).

Mammals

The Upper Lough Erne SAC provides representation of the otter *Lutra lutra* in Northern Ireland. The province holds one of the strongest populations of otters in the UK and Upper Lough Erne with its extensive associated wetland habitats holds a dense and large population. Otters were recorded at Lough Nalughoge on the Crom Castle Estate in April 1997.

Amphibians

Smooth Newts have been found in a variety of ponds in the Lough Erne IAP. In 1996 they were recorded in a new pond at Castle Archdale Country Park, and in 2004/5 more than fifteen individuals were seen in garden ponds in Gublusk Bay on the shore of Lower Lough Erne, west of the town of Ballinamallard. More recently, in 2008, Smooth Newts were recorded in a small pond among sedges at Castle Lough.

Invertebrates

The Lough Erne IAP supports a variety of Red List invertebrates with a total of 16 sites supporting ten Red List or BAP species. The area is also notable for the occurrence of lough populations of Atlantic Stream Crayfish.

The sites were: Burdautien Lough, Coramy Lough, Corraharra Lough, Ely Lodge Forest, a fen north of Drumacrittin, a bog near Fivepoints Crossroads, Finn Flood, Five Points Bog, Inishfendra Island,

Kilroosky, Knockballymore Loughs A and B, Lough Mulshane, Lough Slane, Lough-a-Hache, Maghera Lough and Rossdill Lough.

The species recorded in these sites were:

- a diving beetle *Acilius canaliculatus*
- Atlantic Stream Crayfish *Austropotamobius pallipes* (6 sites)[3]
- The Ring-eyed Great Diving Beetle *Dytiscus circumcinctus* (3 sites)
- The Hydravore *Haliplus lineolatus* (2 sites)
- Mr Scale's Beetle *Hydroporus scalesianus* (3 sites)
- The Copper Diver *Ilybius chalconatus* (3 sites)
- The Dualist *Laccornis oblongus* (2 sites)
- The Shield Scavenger Beetles *Paracymus scutellaris* (2 sites)

There were single sites for the Arctic Diver *Agabus arcticus*, the Zircon Reed Beetle *Donacia aquatica* and the Three B's Diver *Hydroporus glabriusculus*.

Drumskimly Lough was a also priority site as a result of the occurrence of Irish Damselfly *Coenagrion lunulatum*. However, this record is from 1996, and it is thought that the species is now extinct from this site (Brian Nelson, pers comm).

A further six sites qualified on the basis of supporting three or more rare or nationally scarce species. These were:

- a bog south of Drumskea, Burdautien Lough, Cornagague Lough, Drumacrittin Lough, Lough Coole, Tonnagh Bog.

These sites supported beetle assemblages typical of two main site types: acid bogs and mesotrophic to base-rich fens.

7.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages:

Six of the area's loughs were notable for their rich wetland plant assemblages, each supporting more than 30 wetland plant species: Annachullion Lough, Burdautien Lough, Corraharra Lough, Knockballymore A Lough, Lough Sarah and Pound Lough.

All were Habitats Directive Annex 1 oligo-mesotrophic or eutrophic loughs surveyed in 2006 for the lough condition Survey (Goldsmith *et a*l. 2008). All supported rich marginal plant communities and aquatic assemblages that included stonewort and Potamogeton species.

Invertebrate assemblages:

There are no records of sites with >50 aquatic macroinvertebrate species within this IAP.

[3] However Atlantic Stream Crayfish *Austropotamobius pallipes* are in serious decline at a number of these locations (Tony Waterman, pers comm.).

8 Fivemiletown IAP

8.1 Summary

The Fivemiletown IAP is located in South Tyrone and neighbouring Fermanagh. The IAP includes four small loughs of international importance which are referable to the Habitats Directive Annex 1 Habitat type H3160 *Natural dystrophic lakes and ponds*.

Within the lowland area of this IAP, five sites are identified as priority small waterbodies because they support plant species of high conservation importance including the Nationally Threatened Long-stalked Pondweed *Potamogeton praelongus*. Fifteen sites within the IAP support Red Data Book and BAP invertebrate species, and one site, Cullentra Lough, is identified as having an exceptional invertebrate assemblage of over 50 species.

Site name	Fivemiletown IAP
IAP qualifying criteria	***Criterion 1*. H3160 Natural dystrophic lakes and ponds** ***Criterion 2*: RDB, NS** ***Criterion 3:* Invertebrate Assemblage**
ASSI and SAC designations*	Fymore Lough ASSI, Fardross Stream ASSI, Cullentra Lough ASSI, Slieve Beagh ASSI, Derrycloony Lough ASSI, Round Lough & Lough Fadda, Lough Na Blaney Bane ASSI, Lough Mccall ASSI Slieve Beagh SAC
Central grid reference point for IAP: H 5248	

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

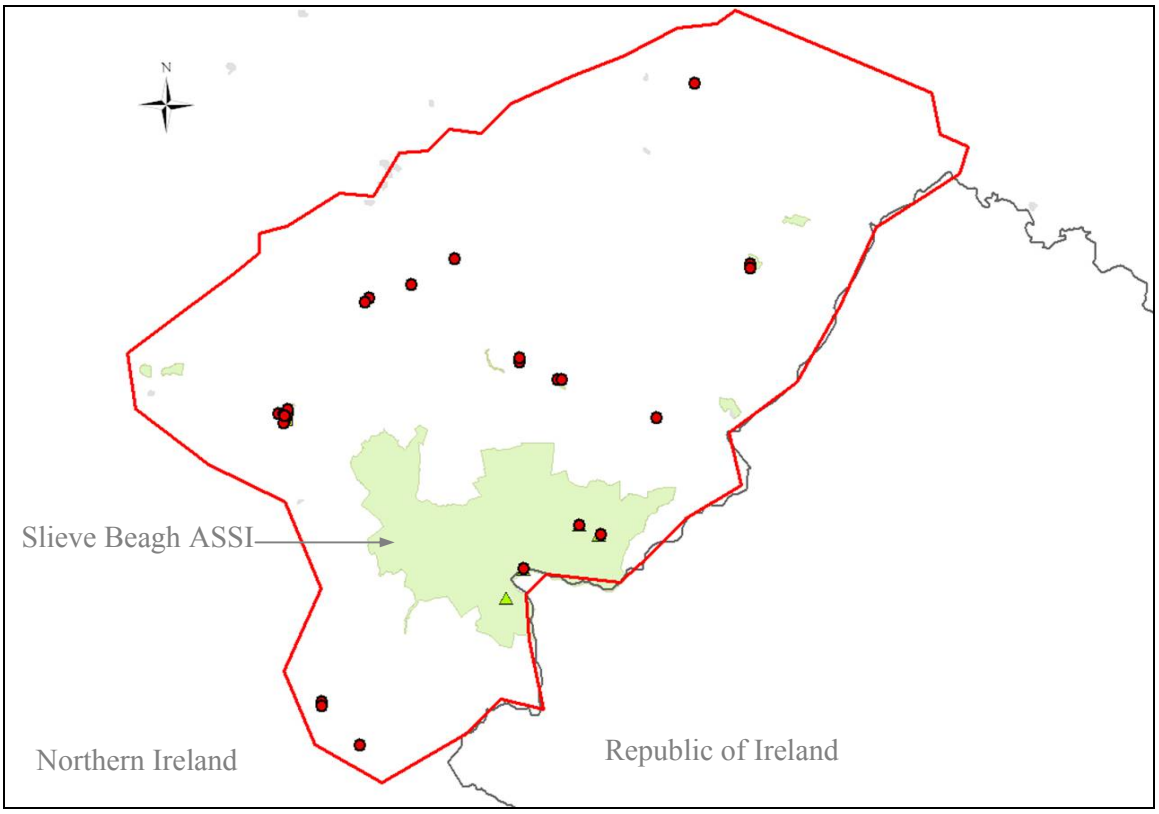


Figure 10 Fivemiletown IAP: ponds with vertebrate, invertebrate or plant records that meet the Priority Pond criteria

8.2 Site description

Location and designations

Centred around Fivemiletown in South Tyrone, this IAP comprises two areas: the Slieve Beagh uplands to the south, and to the north, the lowlands of the Clogher Valley between Fivemiletown and Clogher. The area includes seven ASSIs and the Slieve Beagh ASSI and SAC - designated for its natural dystrophic waterbodies and blanket bog habitats.

Geology, geomorphology and natural habitats

The Slieve Beagh uplands comprise an area of rolling Carboniferous sandstone hills separated by deep valleys. The uplands rise to the rounded summit of Slieve Beagh (380m), but below ca 350m much of the landscape is dominated by thick drift deposits, including prominent drumlin fields. The lower hills, flat ridges and areas of drift are capped by extensive areas of upland blanket bog, which together comprise the third largest intact expanse of this habitat in Northern Ireland. To the west of Slieve Beagh much of the blanket bog has been cut-over or converted to conifer plantation.

To the south of the Slieve Beagh uplands a steep forested escarpment gives way to the lowlands of the Clogher Valley. These undulating lowlands are underlain by Carboniferous limestone, but covered by boulder clay drumlins and long winding eskers of sand and gravel. Pastureland accounts for 85% of the landcover in this area.

Pond types

The Slieve Beagh uplands include a number of oligotrophic and dystrophic water bodies and small pool complexes within the peatlands. At lower altitudes and in the valley lands to the north, small rounded mesotrophic loughs are common often bounded by a fringe of reed or carr.

8.3 C1 - Habitats of high conservation importance

Four small loughs in the Fivemiletown IAP are referable to the Habitats Directive Annex 1 Habitat type H3160 *Natural dystrophic lakes and ponds*: Glenbower Lough, Lough Eshbrick, Lough Sallagh, and Shane Barnagh's Lough. The lough are closely clustered in the more southerly upland areas of the IAP, all occurring within 3 kms of each other, on slopes of Slieve Beagh.

Table 9 Fivemiletown IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Annagh Lough	250500 350400		✓	✓			
Annaghloughan Bog	257100 355100			✓			
Black Lough	248400 340700			✓			
Cloghcor Lough	253000 348700		✓				
Cullentra Lough	247600 347500		✓	✓	✓		✓
Derrycloony Lough	258400 350900			✓			
Findermore	251500 351000		✓				
Glenbower Lough	254900 344600	**H3160**		✓			
Lough Eshbrick	254400 344800	**H3160**		✓			
Lough Fadda	244700 348500			✓	✓		
Lough Gunnell	249500 350100		✓				
Lough McCall	254000 348200			✓	✓		
Lough Nabraddagh	249300 339700			✓			
Lough Sallagh	253100 343800	**H3160**		✓			
Shane Barnagh's Lough	252700 343100	**H3160**					

* H3160 Natural dystrophic lakes and ponds

8.4 C2 - Species of high conservation importance

Plants

Small waterbodies with nationally uncommon species are restricted to the lowland areas of this IAP. Cloghcor Lough is notable for a 1989 record of Strawberry Stonewort *Chara fragifera* (Vulnerable) and also supports Cowbane *Cicuta virosa* (Nationally Scarce) and Smooth Stonewort *Nitella flexilis*[4] (Nationally Scarce), although the latter requires confirmation.

[4] From the late 1990's onwards the stonewort "*Nitella flexilis"* has been split into two species in the UK on the basis of fruiting material (Rich *et al*. 1998). Of the two species, Dark Stonewort *Nitella opaca* is a relatively frequent stonewort whilst *Nitella flexilis sensu stricto* is Nationally Scarce. The current record for "*Nitella flexilis*" was collected in the late 1980s before the species were routinely distinguished, and the record therefore needs to be treated with caution.

A second lough: Lough Gunnell is of note for Long-stalked Pondweed *Potamogeton praelongus* (Nationally Threatened), and also supports both Cowbane *Cicuta virosa* and Smooth Stonewort *Nitella flexilis* (unconfirmed) [4].

There are additional records of Cowbane *Cicuta virosa* from Annagh Lough and Cullentra Lough. Brief visits by the authors to a number of other small loughs in this area in June 2009, indicate that this species is likely to be present in other small waterbodies in the area.

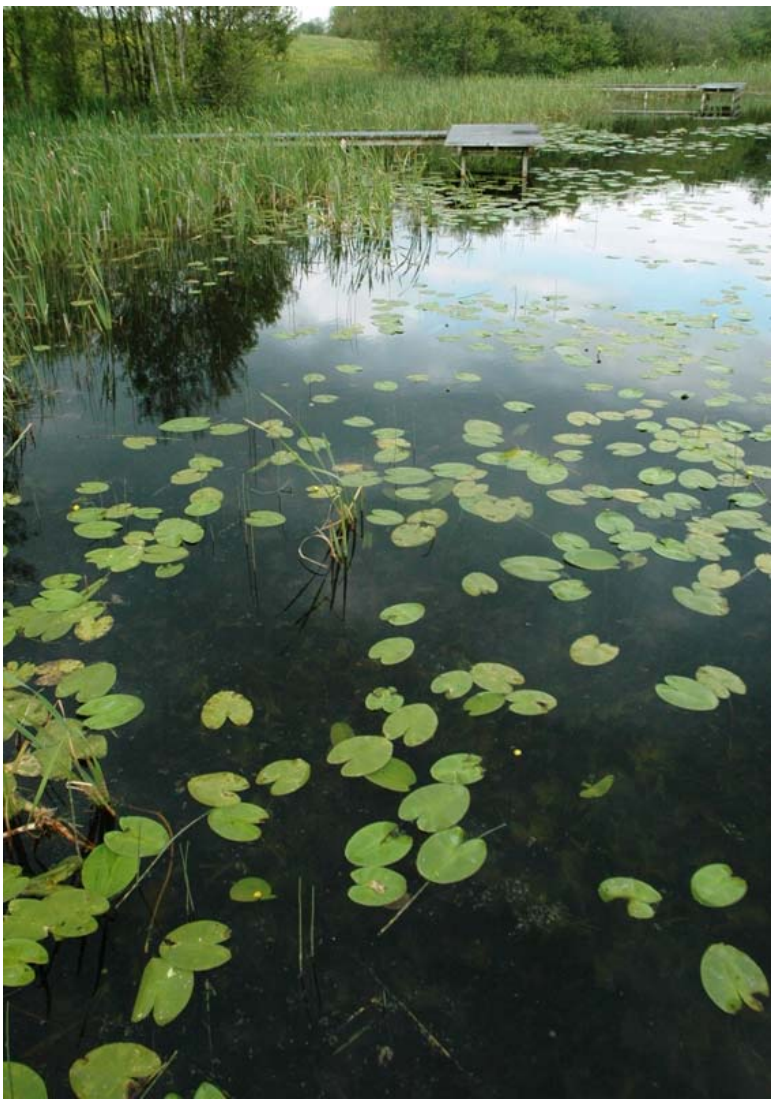


Figure 11 Cullentra Lough

Amphibians

Smooth Newts *Triturus vulgaris* have been recorded at three sites within the Fivemiletown IAP. In 1996 they were recorded at Cullentra Lough and Lough McCall. From May to August 2000, Smooth Newts were again recorded at these sites, and an additional record was made at Lough Fadda, on the north side of Fivemiletown itself.

Invertebrates

The Fivemiletown IAP includes 15 sites supporting Red List and BAP species. These are:

- Annagh Lough, Annaghloughan Bog, Black Lough (north of Lough Jenkin), Cloghcor Lough, Cullentra Lough, Derrycloony Lough, Glenbower Lough, Lough Eshbrick, Lough Fadda, Lough McCall, Lough Nabraddagh, Lough Sallagh, Lough Sallagh, Lough McCall, Lough Nabraddagh.

Nine Red List and BAP species were present in these sites including: *Acilius canaliculatus,* the Arctic Diver *Agabus arcticus*, The Relative Diver *Agabus congener*, Irish Damselfly *Coenagrion lunulatum*, Highland Great Diving Beetle *Dytiscus lapponicus*, The Shady Whirligig *Gyrinus natato*r, The Hydravore *Haliplus lineolatus*, Mr Scale's Beetle *Hydroporus scalesianus*, The Dualist *Laccornis oblongus* and a Bubblegum Diver *Stictotarsus multilineatus*.

8.5 C3 - Exceptional Assemblages of Key Biotic Groups

Plants

There were no sites identified as priority ponds on the basis of their plant assemblages.

Invertebrates

Cullentra Lough qualifies as Priority Pond for it's exceptional assemblage of aquatic macroinvertebrates. 52 species have been recorded at this site – which also qualifies as a priority pond on three other criteria.

9 Carrickmore Uplands IAP

9.1 Summary

The Carrickmore Uplands IAP lies on the southern borders of the Sperrin Mountains in County Tyrone. Nine waterbodies within the IAP are of international importance as Annex 1 Habitats Directive type H3160 *Natural dystrophic lakes and ponds*. Four sites are of national importance as a result of the occurrence of important plant species. The species present include Tall Bog-sedge *Carex magellanica*, one of the rarest sedges in Ireland, which has been recorded from the edge of three of the small waterbodies within the IAP.

Five sites are identified as Priority Pond sites on the basis of their Red Data Book or BAP invertebrate species. The species recorded include the Irish Damselfly *Coenagrion lunulatum*, the Arctic Diver *Agabus arcticus* and the Highland Great Diving Beetle *Dytiscus lapponicus*. Otter *Lutra lutra* has also been recorded in the IAP at Loughnafreaghoge.

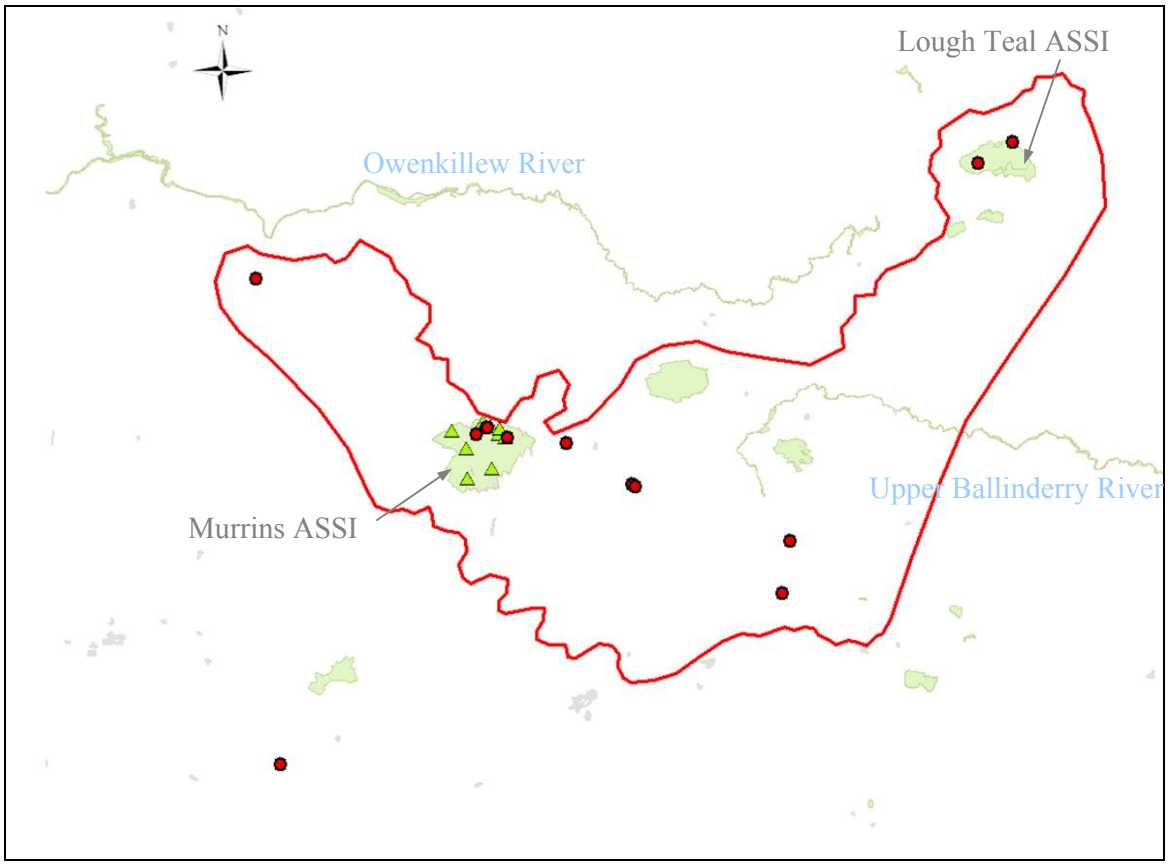
Site name	Carrickmore Uplands IAP
IAP qualifying criteria	***Criterion 1*. H3160 Natural dystrophic lakes and ponds** ***Criterion 2*. RDB, NS, BAP**
ASSI and SAC designations*	Teal Lough Part Ii ASSI, Teal Lough & Slaghtfreeden Bogs ASSI, Black Bog ASSI, Upper Ballinderry River ASSI, Lime Hill Farm ASSI, Lough Doo ASSI, Murrins ASSI Teal Lough SAC, Owenkillew River SAC, Black Bog SAC, Upper Ballinderry River SAC
Central grid reference point for IAP: H 6777	

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

9.2 Site description

Location and designations

The Carrickmore Uplands IAP lies on the southern edge of the Sperrin Mountains in County Tyrone. The IAP forms a broad arc from Gortin in the west, southwards through the Murrins and north east to the plateau lands below Slieve Gallion. The area contains six ASSIs and four SACs, including the Murrins ASSI designated for its natural dystrophic lakes, ponds and blanket bog habitats.



Legend

- NI_IAP_polygons
- NI_IAP_AreasOfInterest
- C1_Sites under Annex I of the Habitats Directive
- C2A_Species Of High Conservation Importance
- C2B_3 or more NS aquatic invertebrates
- C3A_>30 wetland plant species
- C3B_>50 aquatic macroinvertebrates
- C3_DragonflyASSI
- ASSI
- Urban areas

Figure 12 Carrickmore Uplands IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

Geology, geomorphology and natural habitats
The geology of this upland area is complex, but dominated by granitic and volcanic igneous rocks forming open plateaus and steep rocky summits. Much of the plateau areas are covered in thick fluvioglacial deposits including ridges of, locally quarried, glacial moraine-outwash.

The vegetation of this undulating upland landscape is dominated by heath, moorland and acid grassland with some plantation forestry. However plateau areas support locally extensive areas of blanket bog some of which retain relatively intact pool and hummock complexes.

Pond types

The IAP supports considerable numbers of peaty dystrophic pools lying within blanket bog complexes. These range from tiny 1m² bog pools to extensive waterbodies over 2 ha in area. Kettlehole ponds are also locally common within areas of glacial outwash. To the east of the IAP around the edge of Lough Fea, gravel pit ponds have been created as a result of extensive sand and gravel extraction in the area.

Table 10 Carrickmore Uplands IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Black Lough	257700 379200	**H3160**					
Camlough	266800 374100		✓				
Craiganawork	267046 375758		✓				
Creggan Lough	262000 377600		(✓)	✓			
Lough Nanallog	259900 378900			✓			
Loughanillan	257458 379447	**H3160**	✓				
Loughnabrackey	257200 379600	**H3160**					
Loughnacree	256652 378736	**H3160**					
Loughnadarragh	256688 377758	**H3160**					
Loughnafeebane	257900 379100	**H3160**					
Loughnafreaghoge	258000 379100	**H3160**			✓		
Loughnamaddy	256200 379300	**H3160**					
Loughnatorpoge	257500 378100	**H3160**					
Mill Lough.	274200 388600		✓				
Murrin Loughs	257000 379200			✓			
New Lough	249900 384200			✓			
Teal Lough	273100 387900			✓			

9.3 C1 - Habitats of high conservation importance

Located on the southwestern edge of the Carrickmore Uplands IAP, the Murrins ASSI includes over 20 small waterbodies (under 2 ha) across an 8 km^2 area of upland peatland.

Nine of these waterbodies, all surveyed in the 2006 lake condition survey, have been attributed to the Annex 1 habitat type H3160 *Natural dystrophic lakes and ponds* (Goldsmith *et al*. 2008). These are: Black Lough, Loughanillan, Loughnabrackey, Loughnacree, Loughnadarragh, Loughnafeebane, Loughnafreaghoge, Loughnamaddy and Loughnatorpoge.

Dystrophic waterbodies are characteristically species-poor, with brown peat-stained water often limiting the extent of the photic zone. However, botanically, the Murrin pools show moderate between-waterbody variety with waterbodies such as Loughanillan supporting a diverse range of aquatic species including the isoetids: Quillwort *Isoetes lacustris,* Shoreweed *Littorella uniflora* and Water Lobelia *Lobelia dortmanna*, whilst others such as Loughnatorpoge and Loughnacree are dominated by little more than Bog-moss *Sphagnum* spp and Bulbous Rush *Juncus bulbosus.*

Figure 13 Large pond at Murrins ASSI

9.4 C2 - Species of high conservation importance

Plants

Tall Bog-sedge *Carex magellanica*, one of the rarest sedges in Ireland[5], has been recorded from the edge of three small waterbodies within the IAP, often in association with dense carpets of Sphagnum

[5] Protected under the Wildlife (Northern Ireland) Order Schedule 8

mosses. There is a recent (2005) record of this species from Loughanillan in the Murrins, and older 1990s records from Camlough and Mill Lough on the north-western edge of the Crockendun Hills.

Other records of note within the IAP include the occurrence of Cowbane *Cicuta virosa* (Nationally Scarce) recorded in 2007 from an unnamed pool west of Craiganawork (H670757), and an unconfirmed 1990 record of Smooth Stonewort *Nitella flexilis*[6] (Nationally Scarce) associated with Creggan Lough.

Mammals

Otters have been recorded at one site within the Carrickmore Uplands IAP, at Loughnafreaghoge in the townland of Backan in 1997.

Invertebrates

The Carrickmore Uplands IAP included five priority sites identified on the basis of Red List or BAP invertebrate species: Creggan Lough, Lough Nanallog, Murrin Loughs, New Lough and Teal Lough.

The species present in these sites were Irish Damselfly *Coenagrion lunulatum*, the Arctic Diver *Agabus arcticus* and the Highland Great Diving Beetle *Dytiscus lapponicus*.

9.5 C3 - Exceptional assemblages of key biotic groups

There are no records of sites with exceptionally rich plant or invertebrate assemblages in the Carrickmore Uplands IAP.

[6] From the late 1990's onwards the stonewort "*Nitella flexilis*" has been split into two species in the UK on the basis of fruiting material (Rich *et al*. 1998). Of the two species Dark Stonewort *Nitella opaca* is a relatively frequent stonewort whilst *Nitella flexilis sensu stricto* is Nationally Scarce. The current record for "*Nitella flexilis*" was collected in the late 1980s, before the species were routinely distinguished, and therefore needs to be treated with caution.

10 Lough Neagh Peatlands IAP

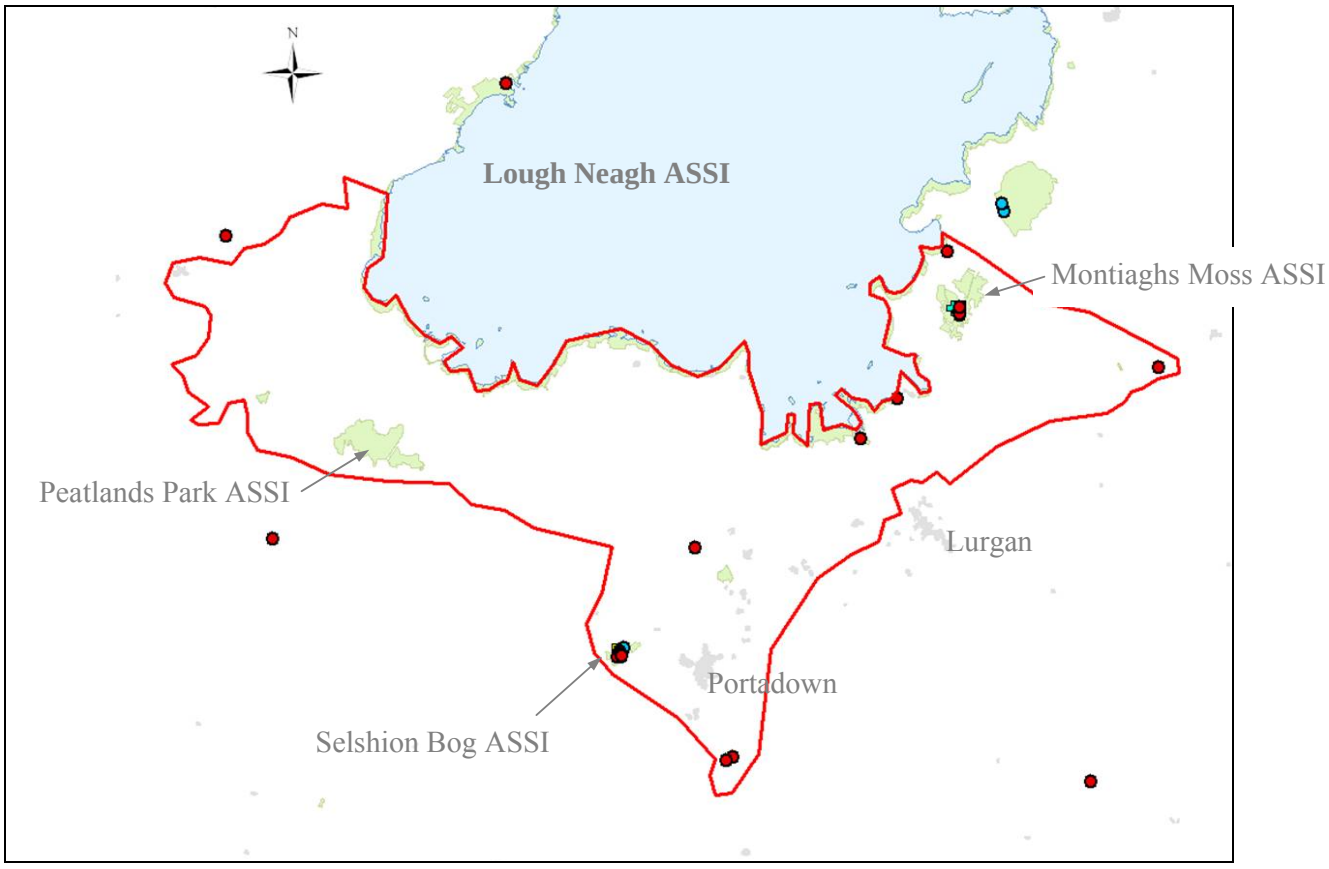
10.1 Summary

The Lough Neagh Peatlands IAP is located to the south of the Lough Neagh shore and crosses the boundaries of four counties: Tyrone, Armagh, Down and Antrim. The IAP is notable for its unusual sites, particularly Montiaghs Moss, with extremely high densities of small bog pools created as a result of peat puddling.

Seven nationally important Priority Pond sites were identified. Three sites were identified because of their important plant species, including records of Frogbit *Hydrocharis morsus-ranae* at Montiaghs Moss. Four sites were identified because they supported important invertebrate species and two sites also qualified as priority sites because of their exceptional invertebrate assemblages: Montaighs Moss and Selshion Bog had 66 and 59 aquatic macroinvertebrate species respectively, the former being the richest single site for still-water aquatic invertebrates, primarily water beetles, in Northern Ireland.

Site name	Lough Neagh Peatlands IAP
IAP qualifying criteria	***Criterion 2*: NS, BAP, RDB** ***Criterion 3*: Plant and Invertebrate**
ASSI and SAC designations*	Montiaghs Moss ASSI, Ballynanaghten ASSI, Derryvore ASSI, Selshion ASSI, Peatlands Park ASSI, Drumcrow ASSI. Montiaghs Moss SAC, Peatlands Park SAC.
Central grid reference point for IAP: J 0660	

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



Legend

- NI_IAP_polygons
- NI_IAP_AreasOfInterest
- C1_Sites under Annex I of the Habitats Directive
- C2A_Species Of High Conservation Importance
- C2B_3 or more NS aquatic invertebrates
- C3A_>30 wetland plant species
- C3B_>50 aquatic macroinvertebrates
- C3_DragonflyASSI
- ASSI
- Urban areas

Figure 14 Lough Neagh Peatlands IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

10.2 Site description

Location and designations

The Lough Neagh Peatlands IAP is located to the south of Lough Neagh and crosses the boundaries of four counties: Tyrone, Antrim, Down and Armagh. The IAP extends along the shore of Lough Neagh, southwards through Portadown, and includes six ASSIs and two SACs including Montiaghs Moss which is designated for its dragonfly and invertebrate assemblages.

Geology, geomorphology and natural habitats

The solid geology of this lowland area is dominated by Tertiary basalts to the east, and Triassic mudstones and sandstones and Cretaceous limestones to the west. Overlying these strata are quaternary tills including locally extensive drumlin swarms. In some areas the till are themselves overlain by post-glacial alluvium associated with the floodplains of the Blackwater and Bann. Around the Lough Neagh shore a band of lacustrine alluvium is exposed, most probably by the lowering of Lough Neagh in historical times to improve drainage within the Basin.

In general the area forms a low-lying marshy landscape with small drumlins, and a varied patchwork of pasture, plantations and regenerating bog areas. There are few strong topographic features and the low gradients of the rivers, especially on the clay lowlands immediately around Lough Neagh, create inherent problems for drainage. In the southern part of the IAP, the Upper Bann floodplain includes the extensive areas of fen and lowland raised bogs including Brackagh Bog Nature Reserve and Selshion ASSI. Much of the IAP peatland area has been extensively worked for peat.

Pond types

Larger loughs are relatively infrequent within this IAP: the majority of waterbodies are fen pools and ponds in interdrumlin hollows and within cut-over peat bogs. Amongst these sites Montiaghs Moss supports a unique mosaic of many hundreds of pools and drains created by peat “puddling”: removing peat as a wet slurry which is then dried on the bank. Towards the south of the IAP peat was also extracted by puddling at Brackagh Bog NNR, but the remaining pools are less extensive and in part degraded by floodwater from the River Bann.

Table 11 Lough Neagh Peatlands IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Brackagh Bog				✓			
Castor Bay. Lough Neagh	307300 362500		(✓)				
Kinnegoe	306100 361200			✓			
Montiaghs Moss	309260 365410		✓	✓			✓
Pond at Gawleys Gate. Lough Neagh	308900 367200				✓		
Portadown garden pond	300800 357700				✓		
Selshion Bog	298360 354400		✓	✓	✓		✓
Soldierstown (Spence's) Quarry	315700 363500				✓		

10.3 C1 - Habitats of high conservation importance

There are no sites within this IAP that are classified as Habitats Directive Annex I habitats.

10.4 C2 - Species of high conservation importance

Plants

The Montiaghs Moss complex supports a rich wetland flora. The floating-leaved Frogbit *Hydrocharis morsus-ranae* (Vulnerable), is well known from the site, although there appear to be no formal records post 2003. The Nationally Scarce Cowbane *Cicuta virosa* is also present.

The submerged aquatic Slender-leaved Pondweed *Potamogeton filiformis* has been recorded from "Castor Bay Lough Neagh". However it currently not clear whether the record is from the lake shore or the adjacent small pond at the grid reference given.

Invertebrates

Four sites were identified as priority waterbodies in terms of the occurrence of Red List and BAP invertebrates. These were Brackagh Bog, Kinnegoe, the Montiaghs and Selshion ("Excelsion") Bog. The Montiaghs and Selshion ("Excelsion") Bog also qualified on the basis of assemblages of 3 or more Nationally Scarce species.

The Red List and BAP invertebrate species recorded in this IAP included five water beetles (a diving beetle *Acilius canaliculatus*, the Chummier Australian *Chaetarthria seminulum*, the Ring-eyed Great Diving Beetle *Dytiscus circumcinctus*, the Shady Whirligig *Gyrinus natator*, the Bereft Scavenger Beetle *Hydrochus brevis* and the Dualist *Laccornis oblongus*), the Irish Damselfly *Coenagrion lunulatum* and the Pond skater *Limnoporus rufoscutellatus*.

The Nationally Scarce species recorded at the Montiaghs and Selshion ("Excelsion") Bog were *Agabus unguicularis*, *Cercyon convexiusculus*, *Chaetarthria simillima*, Hairy Marsh Beetle *Cyphon pubescens*, *Enochrus affinis*, *Enochrus ochropterus*, *Eubrychius velutus*, *Gyrinus minutus*, *Hydaticus seminiger*, *Ilybius aenescens*, *Ilybius guttiger*, *Noterus crassicornis*, *Rhantus grapii* and *Stictonectes lepidus*.

Amphibians

Smooth Newts *Triturus vulgaris* have been recorded at four sites within the Lough Neagh Peatlands IAP. Early records from 1990 were taken from ponds at Selshion Bog ASSI, and in 1997 in a pond at Gawleys Gate on the edge of Lough Neagh. Smooth Newts were recorded in a newly created garden pond nr Portadown in 1998, and again in 2000. The most recent record is from Soldierstown (aka Spence's) Quarry in August 2003, however a number of people have noted informal records of Smooth Newts at Brackagh Bog and Montiaghs Moss in 2009 (Stephen Foster, pers comm.).

10.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages

Although the tiny peat cuts on Montiaghs Moss support relatively few species individually, the pool complex as a whole is exceptionally rich and the site is designated as an ASSI partly on the basis of its diverse plant assemblage.

Invertebrate assemblages

Both Montiaghs Moss and Selshion ("Excelsion") Bog also qualify as priority sites for small waterbodies under Criterion C3 – Exceptional assemblages of key biotic groups. The sites supported 66 and 59 aquatic invertebrates respectively. Montiaghs Moss ASSI is also designated for its dragonfly assemblage.

Figure 15 Series of cut bog pools at Montiaghs Moss

11 South Armagh Interdrumlin Fens IAP

11.1 Summary

The South Armagh Interdrumlin Fens IAP covers the south-west corner of County Armagh. Two small waterbodies within the IAP are of international importance: Lurgan Lough Upper is designated as an H3150 *Natural eutrophic lake,* and Tullybrick Lough as a H3140 *Hard oligo-mesotrophic waters with benthic vegetation of Chara species* (However, the latter is currently assessed as being in unfavourable condition and may no longer support the priority vegetation type).

Seven Priority Pond sites are identified as a result of the occurrence of important plant species, with at least five nationally uncommon species recorded from small waterbodies in the area. Notable records include Rugged Stonewort *Chara rudis* and Tubular Water-dropwort *Oenanthe fistulosa* from Tullybrick Lough. Twelve priority sites were identified for their Red Data Book and BAP invertebrate records, and five sites have records of three or more nationally scarce macroinvertebrates. An exceptional plant assemblage was recorded at Lurgan Lough Upper and Tullybrick Lough, and the invertebrate assemblages at Derryleckagh Bog and Drumcarn Fen were also exceptionally rich.

Site name	South Armagh Interdrumlin Fens IAP
IAP qualifying criteria	***Criterion 1*. H3140 Hard oligo-mesotrophic waters** **H3150 Natural eutrophic lakes** ***Criterion 2*: NS, RDB, BAP** ***Criterion 3*: Plant and invertebrate assemblages**
ASSI and SAC designations*	Castle Enigan ASSI, Derryleckagh ASSI, Greenan ASSI, Greenan Lough ASSI, Slieve Gullion ASSI, Cashel Loughs ASSI, Drumlougher Lough ASSI, Tullyard ASSI, Carrickastickan ASSI, Loughaveeley ASSI, Levallymore ASSI, Lurgan Lough ASSI, Fathom Upper ASSI, Cam Lough ASSI, Tullybrick Lough ASSI, Kiltubbrid Loughs ASSI, Straghans Lough ASSI, Crossbane Lough ASSI, Drumcarn ASSI Derryleckagh SAC, Slieve Gullion SAC
Central grid reference point for IAP: J 0120	

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

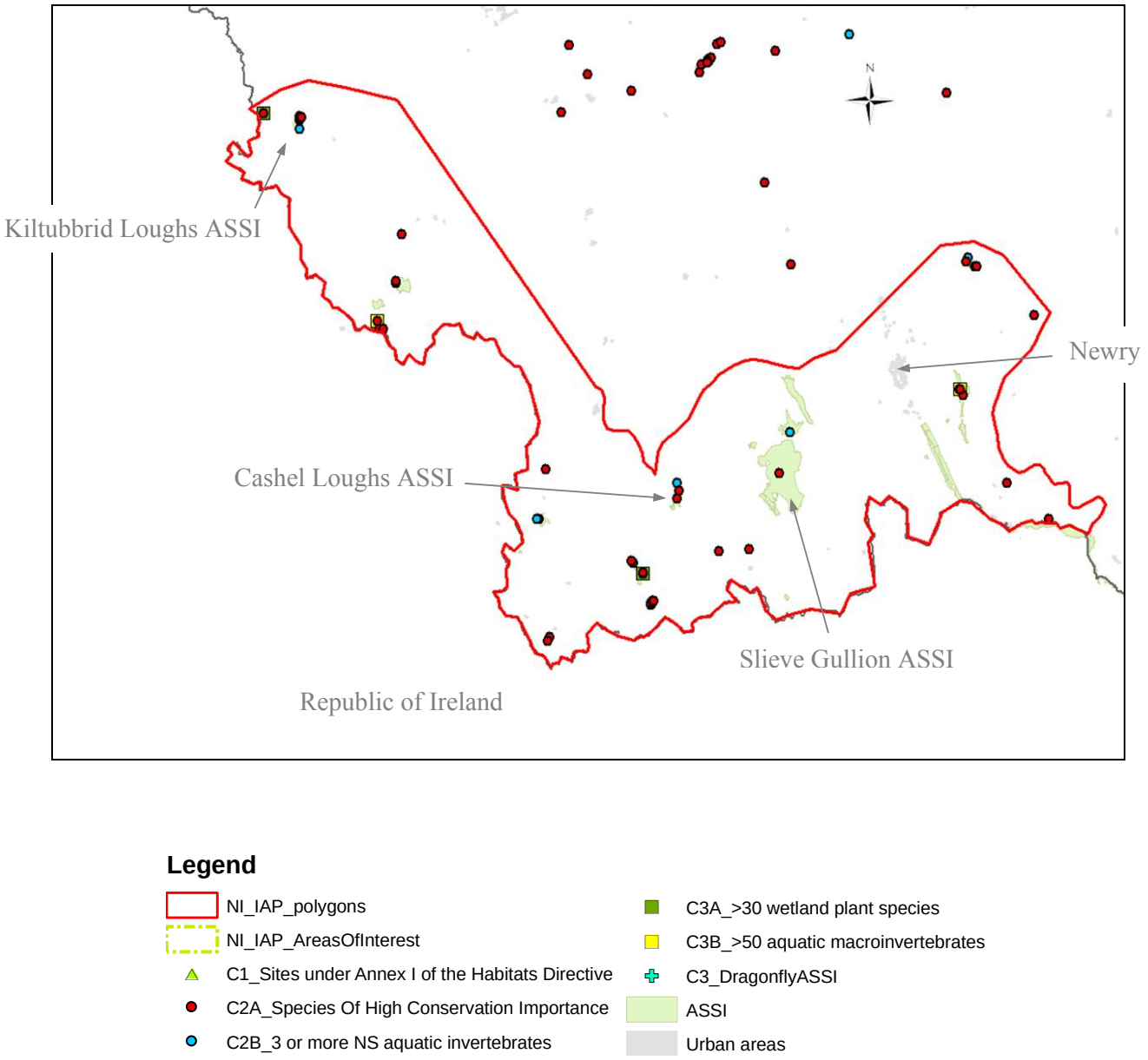


Figure 16 South Armagh Interdrumlin Fens IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

11.2 Site description

Location and designations

The South Armagh Interdrumlin Fens IAP lies in the south-west corner of County Armagh. The IAP's southerly and westerly limit is defined by the border with the Republic of Ireland however, topographically, the area extends westward across the border into County Monaghan.

The IAP includes nineteen ASSIs of which two, Derryleckagh and Slieve Gullion, are also designated SACs. Several of the ASSIs are centred on small loughs (e.g. Drumcarn Fen ASSI) which qualify as priority waterbodies.

Geology, geomorphology and natural habitats

The IAP covers three landscape types. To the west and east are lowlands largely dominated by undulating drumlin landscapes overlying Ordovician greywakes and shales.

The westernmost of these lowlands, the Crossmaglen Drumlins and Loughs area, comprises rolling drumlins with broad areas of wetland including locally extensive fens and fen-fringed loughs within inter-drumlin hollows. To the east, the Newry Basin is dominated by broader ridges of moraine separated by narrow, flat-bottomed valleys with ribbon loughs such as Greenan Lough. Although many of the smaller inter-drumlin fens in this area have been lost to agriculture, some larger fens, such as Derryleckagh, remain.

Between these two lowland areas lies the Ring of Gullion an area of igneous uplands dominated by open moorland and forestry plantations with pasture on lower land.

Pond types

Ponds within this IAP are largely limited to the lowland areas. Most have formed naturally within interdrumlin hollows and form part of more extensive bogs and fens systems. A very small number of waterbodies are associated with protected peatland sites e.g. Drumcarn Fen, and calcareous spring fed ponds produce typical clear water marl type waterbodies e.g. Tullybrick Lough. Peat cutting on some sites (e.g. Castle Enigan) has also created a variety of pools within the cut-over bogs.

Table 12 South Armagh Interdrumlin Fens IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Ballard Fen	302760 323070			✓			
Ballynarea Lake	289900 321100		✓				
Brackly Lough. Straghans	282000 330900			✓	✓		
Calliagh Berras Lough	302200 320900			✓			
Carrigans Lough	296800 319600			✓			
Cashel Lough Lower	296900 320000			✓			
Castle Enigan	312500 331800		✓	✓	✓		
Clonalig Lough	290100 312300			✓	✓		
Croslieve Lough	300600 316900		(✓)				
Cullion Road Ponds	315600 329200		✓				
Derryleckagh Fen/Bog	311700 325300			✓			✓
Donaghaguy Reservoir	314200 320400		✓				
Drumcarn Fen (aka Drumnahavil)	281100 328500			✓			✓
Kiltubbrid Loughs	276900 339500		✓	✓	✓		
Lagan Fen	282300 333500			✓			
Loughaveely	295400 314100			✓	✓		
Lurgan Upper Lough	295012 315641	**H3150**	✓	✓	✓	✓	
Near Carlingford Lough	316400 318500				✓		
Mullaghbane West	299000 316800			✓			
Tullybrick Lough	275028 339818	**H3140**	✓			✓	

*H3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation
H3140: Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp

11.3 C1 - Habitats of high conservation importance

The Armagh Interdrumlin Fens IAP includes two site supporting the Habitats Directive Annex 1 habitat type:

Lurgan Lough Upper located east of Creggary near Crossmaglen is designated as an H3150 *Natural eutrophic lake with Magnopotamion or Hydrocharition-type vegetation*. However, in the 2006 lake condition survey (Goldsmith *et al*. 2008) notes that in practice the presence of species such as Red Pondweed *Potamogeton alpinus* and Lesser Marshwort *Apium inundatum*, suggest Lurgan Lough is more typical of an intermediate stage between mesotrophic and eutrophic lake types. It's current eutrophic status may in part result from nutrient pollutant inputs.

Tullybrick Lough is also of international importance, as an example of the Habitats Directive Annex 1 habitat type: H3140 *Hard oligo-mesotrophic waters with benthic vegetation of Chara species*. Tullybrick Lough, which is located on the western edge of the IAP north of Middletown, supports extensive stonewort beds dominated by Bristly Stonewort *Chara hispida* and Rugged Stonewort *Chara rudis* and a rich marginal flora bordered by wet woodland. However the site shows some evidence of eutrophication and is currently considered to be in Unfavourable Condition.

11.4 C2 - Species of high conservation importance

Plants

At least five nationally uncommon species have been recorded from small waterbodies in the area.

Two loughs, both north of Middletown, support exceptional plant assemblages. The lower of the two Kiltubbrid Loughs (H769397) has records for a diverse assemblage of aquatics including the Vulnerable Strawberry Stonewort *Chara fragifera*, Nationally Scarce Hedgehog Stonewort *Chara aculeolata* and Nationally Threatened Long-stalked Pondweed *Potamogeton praelongus*. There are also (unconfirmed) records of the Nationally Scarce Smooth Stonewort *Nitella flexilis*[7]. The site also notable for one of the few county records of Marsh Fern *Thelypteris palustris* (Nationally Scarce).

Two kilometres to the west, the Annex 1 Tullybrick Lough (see above) has records of both the Nationally Threatened charophyte Rugged Stonewort *Chara rudis* and the marginal BAP species Tubular Water-dropwort *Oenanthe fistulosa* (Vulnerable).

Strawberry Stonewort *Chara fragifera* (Vulnerable), has also been recorded from Donaghaguy Reservoir, north of Warrenpoint, although the 1989 record is comparatively old.

There is a single record of the Nationally Scarce aquatic: Fen Pondweed *Potamogeton coloratus* recorded from the Cullion Road Ponds, North of Mayobridge in the 1990s.

[7] From the late 1990's onwards the stonewort "*Nitella flexilis"* has been split into two species in the UK on the basis of fruiting material (Rich *et al*. 1998). Of the two species Dark Stonewort *Nitella opaca* is a relatively frequent stonewort whilst *Nitella flexilis sensu stricto* is Nationally Scarce. The current records for "*Nitella flexilis*" were collected in the late 1980-early 1990s, before the species were routinely distinguished, and therefore needs to be treated with caution.

Another Nationally Scarce plant, Cowbane *Cicuta virosa,* was recorded from the inter-drumlin pools of Castle Enigan ASSI and also from Lurgan Lough Upper in the 1990s, although it was not recorded in the 2006 lake condition survey. Another record of *Cicuta virosa* from Harvesseys Rock Fen, east of Crossmaglen (H956142) is not specifically localisable to a pond.

Fringed Water-lily *Nymphoides peltata*, which although Nationally Scarce in the UK, is not native in Ireland, was recorded in Lurgan Lough Upper in 1990, but like *Cicuta virosa* was not re-found during the more recent Lake condition Survey in 2006.

There are currently unconfirmed records of Smooth Stonewort *Nitella flexilis* (Nationally Scarce) from Ballynarea Lake and Croslieve Lough collected in 1989 and 1990 respectively.

Amphibians

Six sites within the South Armagh Interdrumlin Fens IAP have records of Smooth Newt *Triturus vulgaris*. All the records are over 10 years old and were taken in 1997 and 1998 at the following sites: Clonalig Lough, Kiltubbrid Loughs, Lurgan Lough Upper, nr Carlingford Lough (not located to a specific pond) and Loughaveely in the south-west of the IAP, and Castle Enigan ASSI in the north-east of the IAP.

Invertebrates

Twelve sites were identified as priority waterbodies on the basis of the occurrence of Red List or BAP species. These were:

- Calliagh Berras Lough, Carrigans Lough, Cashel Lough Lower*, Castle Enigan*, Derryleckagh Bog*, Loughaveely*, Lurgan Loughs and Fen*, Mullaghbane West, Brackly Lough (Straghans)*, Drumcarn Fen*, Kiltubbrid Loughs* and Lagan Fen.

The following species were recorded at these sites: a diving beetle *Acilius canaliculatus*, the Relative Diver *Agabus congener*, the Ring-eyed Great Diving Beetle *Dytiscus circumcinctus,* the Chummier Australian *Chaetarthria seminulum*, the Quicksilver Diver *Hydroporus morio*, the Shady Whirligig *Gyrinus natator*, Mr Scale's Beetle *Hydroporus scalesianus*, the Dualist *Laccornis oblongus,* the pond skater *Limnoporus rufoscutellatus* and the Irish Damselfly *Coenagrion lunulatum*. Sites marked with a * above also qualified as a result of having three or more Nationally Scarce species.

- Two further sites, Ballard Fen and Clonalig Lough, were also identified as priority sites as a result of supporting three or more Nationally Scarce species.

The Nationally Scarce species recorded in addition to Red List and BAP species included: *Agabus unguicularis*, *Chaetarthria simillima*, *Cyphon punctipennis*, *Donacia clavipes*, *Donacia obscura*, *Donacia thalassina*, *Graptodytes granularis*, *Hydaticus seminiger*, *Ilybius aenescens*, *Ilybius guttiger*, *Laccornis oblongus*, *Noterus crassicornis, Rhantus grapii* and *Rhantus suturalis*; three whirligigs *Gyrinus aeratus*, *Gyrinus minutus*, *Gyrinus paykulli*; three scavenger beetles *Cercyon convexiusculus*, *Cercyon ustulatus*, *Enochrus ochropterus*; and a weevil *Gymnetron villosulum.*

11.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages:

Lurgan Lough Upper was considered a rather degraded waterbody in the 2006 lake condition survey (Goldsmith *et al*. 2008), however the site still supports over 30 plant species with aquatics that include Red Pondweed *Potamogeton alpinus,* Bladderwort *Utricularia australis and* Creeping Marshwort *Apium inundatum.*

Tullybrick Lough which is both an Annex 1 waterbody and supports a number of nationally uncommon species (see above), also qualifies as a Priority Pond on the basis of its rich wetland flora, with over 30 plant species recorded. It supports locally extensive stands of Bristly stonewort *Chara hispida* and Rugged Stonewort *Chara rudis*.

Invertebrate assemblages:

Derryleckagh Bog was also identified as a priority waterbody as a result of its rich invertebrate assemblage with 63 aquatic macroinvertebrate species recorded on site.

Drumcarn Fen qualifies as a Priority Pond sites for it's exceptional invertebrate assemblage. 54 aquatic macroinvertebrate species have been recorded there.

12 East Down IAP

12.1 Summary

The East Down IAP is situated in the south-east corner of Northern Ireland in County Down. A total of nineteen sites were identified as nationally important Priority Pond sites within this IAP. Important plant species were found at six sites, of which the most notable was Loughkeelan with four nationally scarce stonewort species.

Red Data Book and BAP invertebrates occurred at 10 Priority Pond sites, of which seven also qualified on the basis of 3 or more nationally scarce invertebrate species. Corbally Fen and Loughkeelan also qualify as having exceptional assemblages of aquatic macroinvertebrates with 51 and 59 species recorded respectively. Smooth Newts *Triturus vulgaris* are recorded at four sites in the IAP.

Site name	East Down IAP
IAP qualifying criteria	***Criterion 2*: BAP, NS, RDB** ***Criterion 3*: Invertebrate assemblage**
ASSI and SAC designations*	Heron & Carrigullian Loughs ASSI, Turmennan ASSI, Carrowcarlin ASSI, Quoile ASSI, Loughmoney ASSI, Loughkeelan ASSI, Woodgrange ASSI, Ballynagross Lower ASSI, Hollymount ASSI, Ballykilbeg ASSI, Corbally ASSI, Ballycam ASSI, Murlough ASSI, Killough Bay And Strand Lough ASSI, Sheepland Coast ASSI, Scarbo ASSI. Turmennan SAC, Hollymount SAC, Lecale Fens SAC, Murlough SAC, Ballykilbeg SAC
Central grid reference point for IAP: J 5044	

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

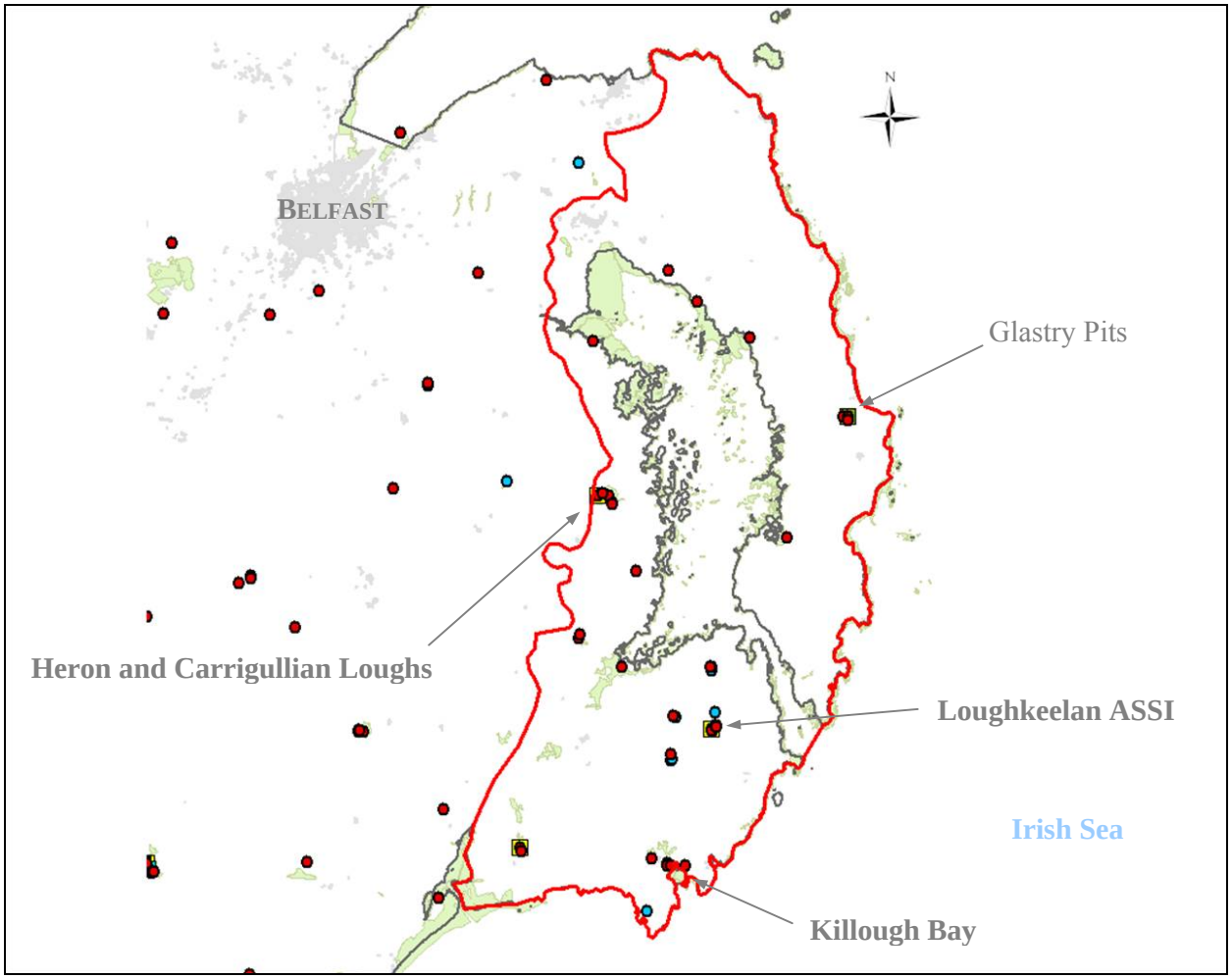


Figure 17 East Down IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

12.2 Site description

Location and designations

The East Down IAP is located in County Down and stretches from the Lecale region in the south along the south western borders of Strangford Lough and across to the Ards Peninsula. The IAP encompasses 15 ASSIs and five SACs.

Geology, geomorphology and natural habitats

Geologically the area comprises peneplained Silurian greywakes and siltstones, overlain by extensive Quaternary drumlin swarms.

The character of the drumlins, and the hollows between them, varies across the region. In the north around west of Strangford Lough, drumlins are relatively small and inter-drumlin areas typically contain marshy pasture or loughs with well wooded margins. Notable interdrumlin fens and marshes occur locally in the zone between Killyleagh to the south and Killinchy to the north. Southwards within the Locale region, interdrumlin areas become generally broader and more open, often with flat-bottomed fen and wetland areas.

Pond types

A range of pond types are found within interdrumlin areas across the IAP from larger pools surrounded by fringes of fen or woodland to small ponds within more extensive fens. Many of the peatlands have been cut-over in the past, and although the pools created remain in some fens, most have grown over.

The Lecale region in the south of the IAP includes an area of marl lakes and fen peat pools of considerable biodiversity importance at Loughkeelan west of Downpatrick. Further south still, the coastal region at Killough includes an area of gravel pits. The nearby Strand Lough is one of Northern Irelands few saline lagoons.

Along the Ards Peninsula ponds are found in interdrumlin hollows in a landscape dominated by farming. These ponds are susceptible to nutrient enrichment from improved grassland.

Glastry pits represent another pond type found in the IAP. They originate from flooded brickworks and now form an interconnecting network of pools. However they have recently had extensive problems with alien invasive plants.

Figure 18 Pond near Heron and Carrigullian Loughs ASSI

12.3 C1 - Habitats of high conservation importance

No small waterbodies have been officially recognised as supporting Habitat Directive Annex 1 habitat types within the East Down IAP area. However, the fen peat pools around Loughkeelan west of Downpatrick support outstanding assemblages of stoneworts which, given updated EU guidelines (see Appendix 4), may potentially be attributable to H3140: *Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.*

12.4 C2 - Species of high conservation importance

Plants

The Loughkeelan ASSI supports an exceptional number of uncommon stoneworts, and the area is already recognised as an Important Stonewort Area (Stewart 2004). The fen pools are of particular note and support: Hedgehog stonewort *Chara aculeolata (Nationally Scarce)*, Strawberry Stonewort *Chara fragifera* (Vulnerable) and the Nationally Scarce *Tolypella glomerata.* Fen Pondweed *Potamogeton coloratus* (Nationally Scarce) is also common in these pools.

A fourth uncommon stonewort, the Nationally Scarce Lesser Bearded Stonewort *Chara curta* is found in the larger mesotrophic Loughkeelan itself. The BAP species Marsh Stitchwort *Stellaria palustris* (Vulnerable) occurs in adjacent areas of fen.

Table 13 East Down IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Ballycam Fen	352300 334800			✓			
Ballygeegan Ponds	350300 358100		✓				
Ballynagross	353700 343720			✓			
Carrowcarlin	355990 348700			✓			
Castle Espie Quarry	349200 367300			✓			
Corbally Ponds Fen	345100 338200		✓	✓			✓
Fens pools at Heron & Carrigullian Loughs ASSI	349480 358510			✓			(✓)
Glastry Clay Pits	363500 363000		✓				
Glastry Pit 1B	363799 362980			✓			
Killough brickpits	352600 337800			✓			
LoughdooTd.	360300 356100				✓		
Loughkeelan	356300 345300	H3140?	✓	✓	✓		✓
Loughmoney	353800 345900			✓			
Mill Pond Shrigley	351700 354200		✓				
Mount Stewart	355200 369600				✓		
Nr Rosemount	358200 367500		✓				
Quoile	350900 348700			✓			
Turmennan	348380 350380			✓			
J7970A	353504 371323				✓		

H3140: Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

There are 2001-2002 records of the Vulnerable floating-leaved species Frogbit *Hydrocharis morsus-ranae* from the smaller pond to the south of Glastry Lake, although this species was not recorded in a recent (2007) NIEA survey. For plants, the site now appears degraded with serious invasion by alien species including New Zealand Pigmyweed *Crassula helmsii*, Water Fern *Azolla filiculoides* and Floating Pennywort *Hydrocotyle ranunculoides.*

Other Priority Ponds with post 1988 records for nationally uncommon plant species include:

- The Mill Pond at Shrigley which has1989 records for Strawberry Stonewort *Chara fragifera* (Vulnerable) and Long-stalked Pondweed *Potamogeton praelongus* (Nationally Threatened).

- Corbally Fen pond has a 1989 record for Fen Pondweed *Potamogeton coloratus* (Nationally Scarce).

- The ponds in fenland at Ballygeegan which have 1996 and 2009 records of Cowbane *Cicuta virosa* (Nationally Scarce).

Figure 19 Frogbit *Hydrocharis morsus-ranae* (Vulnerable), recorded from Glastry Clay Pits in 2001 and 2002, but not re-recorded in 2007.

Amphibians

Smooth Newt *Triturus vulgaris* records have been taken from four sites within the IAP: Loughkeelan, Loughdoo Td., a pond in a formal garden at Mount Stewart, and one of the Quercus Smooth Newt Survey sites – J7970A.

Invertebrates

10 sites were identified as priority ponds in the East Down IAP on the basis of the criterion C2, Red List and BAP species. These were:

- Ballynagross*, Carrigullian Lough, Carrowcarlin*, Corbally Ponds Fen*, Heron and Carrigullian Loughs*, Killough brickpits, Loughmoney ASSI*, Quoile. E of Castle Island, Turmennan*, Glastry Pits*.

The 4 ha, brackish, Strand Lough (Killough) is outside the size limit but should be noted because of the rarity of this habitat type.

The species occurring at these sites were: a diving beetle *Acilius sulcatus*, the Chummmier Australian *Chaetarthria seminulum*, the Ring-eyed Great Diving Beetle *Dytiscus circumcinctus*, *Elodes elongata*, the Shady Whirligig *Gyrinus natator*, the Saltmarsh Crawler Water Beetle *Haliplus apicalis*, the Hydravore *Haliplus lineolatus*, *Ilybius subaeneus,* Mr Scale's Beetle *Hydroporus scalesianus*, the Dualist *Laccornis oblongus* and the Marine Moss Beetle *Ochthebius marinus*.

Seven of these sites (identified with a * above) also supported three or more Nationally Scarce species. Two further sites, Ballycam Fen and Loughkeelan were also identified on the basis of this criterion.

The Nationally Scarce species recorded were: *Agabus unguicularis*, *Cercyon convexiusculus*, *Cercyon tristis*, *Cercyon ustulatus*, *Chaetarthria simillima*, *Cyphon pubescens*, *Cyphon punctipennis*, *Enochrus ochropterus*, *Gyrinus minutus*, *Gyrinus paykulli*, *Hydaticus seminiger*, *Ilybius guttiger*, *Rhantus frontalis* and *Rhantus grapii*.

12.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages:

There are no records of ponds with more than 30 wetland plant species within this IAP.

Invertebrate assemblages:

Two sites qualified on the basis of exceptionally rich invertebrate assemblages with 51 and 59 species recorded. These were Corbally Fen and Loughkeelan, both of which also qualified on other invertebrate criteria.

Additionally, the fens pools at Heron and Carrigullian Loughs have recorded 52 species of macroinvertebrate.

13 Garron Plateau IAP

13.1 Summary

The Garron Plateau IAP is situated in County Antrim, close to the north-east coast of Northern Ireland. It supports a range of small waterbodies that fall into two Habitats Directive Annex I types, and is considered to be of international importance for this reason. Seven of its small loughs are classed as H3130 *Oligotrophic to mesotrophic standing waters*, and eight are classed as H3160 *Natural dystrophic lakes and ponds*.

At a national level, four ponds within the IAP were identified as priority sites for their important plant species, particularly the Nationally Scarce species Tall Bog-sedge *Carex magellanica*, and Long-stalked Pondweed *Potamogeton praelongus*. Three sites qualified as priority sites because of their Red Data Book and BAP invertebrate species, and three BAP water beetle species were recorded within the IAP. One site, Loughfine, was identified as having an exceptional wetland plant assemblage.

Site name	Garron Plateau IAP
IAP qualifying criteria	***Criterion 1*. H3160 Natural dystrophic lakes and ponds** **H3130 Oligotrophic to mesotrophic standing waters** ***Criterion 2*: NS, RDB, BAP** ***Criterion 3*: Plant assemblage**
ASSI and SAC designations*	Garron Plateau ASSI Garron Plateau SAC
Central grid reference point for IAP: D 2219	

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

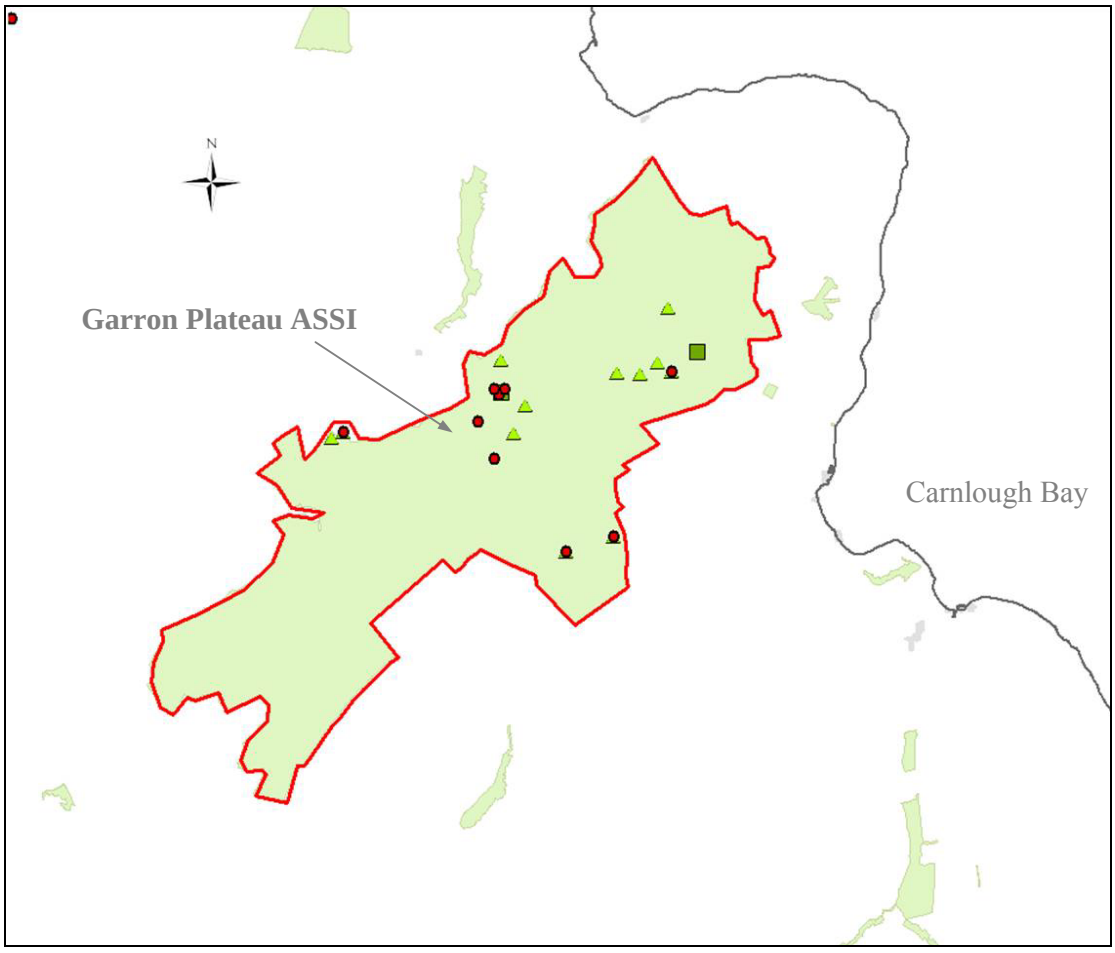


Figure 20 Garron Plateau IAP: ponds with vertebrate, invertebrate or plant records which meet the Priority Pond criteria

13.2 Site description

Location and designations

The Garron Plateau IAP lies in County Antrim, inland from Carnlough on the north-east coast.

The area includes only one ASSI, the Garron Plateau itself, which is also a Ramsar site and SAC designated for its natural dystrophic lakes and ponds, blanket bogs and transition mires/quaking bogs.

Geology geomorphology and natural habitats

Geologically the area is part of the Antrim Plateau: a table of Tertiary Upper Basalt which stretches inland from central Ballymena to the coast at Garron Point. The plateau has an uneven relief with rocky outcrops, steep cliffs, incised streams and summits that reach over 400 m in many places.

The landscape is dominated by open moorland with low intensity sheep grazing. Coniferous forest has been planted on former peatland in the Glenariff area.

Waterbodies and wetlands are important, comprising over 30% of the total land cover. The area supports the most extensive area of intact upland blanket bog in Northern Ireland comprising a mosaic of raised bogs, flushed peat, blanket peat, wet heath and acid grassland.

Pond types

Within the IAP small peat-based oligotrophic and dystrophic loughs occur in many areas scattered across the uneven plateau surface.

Dystrophic bog pool mosaics are locally well developed within the area's raised bogs, with the best example below, and to the west of, the summit of Aghalum.

13.3 C1 - Habitats of high conservation importance

The Garron Plateau supports a range of small waterbodies that fall into two Habitats Directive Annex 1 types.

Seven of its small loughs are attributable to H3130 *Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and / or of the Isoëto-Nanojuncetea*. These waterbodies are mainly clustered in peat-based catchments on the western flanks of the Trosk hills, with two sites located in the more sheltered areas of the western Garron Plateau on the SW slopes of Crockravar. Goldsmith et al (2008) note that although some H3130 waterbodies such as Loughfine, fit well within the UK's Common Standards Monitoring criteria for this habitat type, others such as Loughascraban and Loughisland are very shallow (0-6 m -1.2 m) and not typical of their Annex I typology.

Table 14 Garron Plateau IAP: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Black Lough	325556 420105	**H3160**					
Cranny Lough	323855 416575	**H3160**	✓				
Pools in Crockravar / Inver River watershed	322200 419000			✓			
Evish Lough	319488 418698	**H3160**					
Garron Pool Complex	324230 419420	**H3160**					
Inver River mire	322500 418300			✓			
Loughascraban	324803 419907	**H3130**					
Loughfine	326291 420296	**H3130**				✓	
Loughisland	325234 419873	**H3130**					
Loughnabrick	325819 419918	**H3130**	✓				
Loughnacally 1	325758 421110	**H3130**					
Loughnacarry 2	322645 420148	**H3130**					
Loughnaweelan	319702 418790	**H3160**	✓				
Unnamed Lough 175	324745 416845	**H3160**	✓				
Unnamed Lough 182	322629 419538	**H3160**					
Unnamed Lough 183	323091 419285	**H3130**					
Unnamed Lough 184	322875 418775	**H3160**					
Upper Glenariff Mts	322500 419600			✓			

* H3160 Natural dystrophic lakes and ponds
H3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and / or of the Isoëto-Nanojuncetea

Small waterbodies falling within the second Annex 1 type: H3160 *Natural dystrophic lakes and ponds*, are found across a more extensive area of the Garron Plateau, between Evish Hill, Berry Hill and Little Trosk Most waterbodies are relatively species-poor, brown-stained peaty loughs often dominated by bryophytes. However towards the centre/west of the plateau an extensive area of raised species-rich blanket bog (a rare habitat in Northern Ireland) supports a complex of over 100 dystrophic pools ranging in size from less than 1.0 m in diameter to 40 m length and from a few centimetres depth to over a meter.

13.4 C2 - Species of high conservation importance

Plants

Two wetland plant species of particular note occur in small waterbodies within the IAP. Both occur in loughs already noted for their Annex 1 plant assemblages (see above).

The Nationally Scarce Tall Bog-sedge *Carex magellanica* (a species listed under Schedule 8 of the Wildlife (Northern Ireland) was recorded from three small dystrophic loughs in the 2006 lake condition survey. These lough were:

(i) Cranny Lough where *C. magellanica* was recorded growing sparsely on the western margin
(ii) Loughnaweelan where it was common on tussock tops and away from the wettest areas on the west side of the lough
(iii) Unnamed Lough 175, which is now succeeding to boggy pools, it was found around boggy depressions

Long-stalked Pondweed *Potamogeton praelongus* was recorded from a single waterbody on the plateau: Loughnabrick, a relatively deep (1.9 m) oligotrophic lough. *P. praelongus* occurred on the western side of the lough between 0.8-1.5 m water depth.

Mammals and Amphibians

There are no records of mammals or amphibians using ponds in this upland IAP.

Invertebrates

Three sites in this IAP qualified as priority ponds on the basis of Red List or BAP species. These were pools in the Cockraver / Inver River watershed, Inver River mire and a small lough in Upper Glenariff Mountains. Three BAP water beetle species were recorded in these sites: the Arctic Diver *Agabus arcticus*, the Quicksilver Diver *Hydroporus morio* and a bubblegum diver *Stictotarsus multilineatus*.

13.5 C3 - Exceptional assemblages of key biotic groups

Plant assemblages:

The oligotrophic Loughfine, a lough already noted for its Annex 1 plant assemblage is also classified as a Priority Pond on the basis of its rich plant assemblage.

Invertebrate assemblages:

There are no records for sites with exceptional invertebrate assemblages within this IAP.

14 Overview of Additional Areas of Interest (AAIs)

Important Areas for Ponds are, as noted in Section 3.1, geographically distinct areas which support significant clusters of waterbodies of Priority Pond status.

In the current assessment of Priority Pond distribution in Northern Ireland, a small number of areas were identified which did not fully meet IAP requirements, but were never-the-less, sufficiently interesting to warrant further note.

These areas have been designated in this report as Additional Areas of Interest (AAIs).

Four AAIs have been identified in total. Two are important pond clusters that were too small to justify full IAP status but too isolated to justify merging with an adjacent IAP. The remaining two are areas indentified by experts as having a greater potential than is currently represented by existing records.

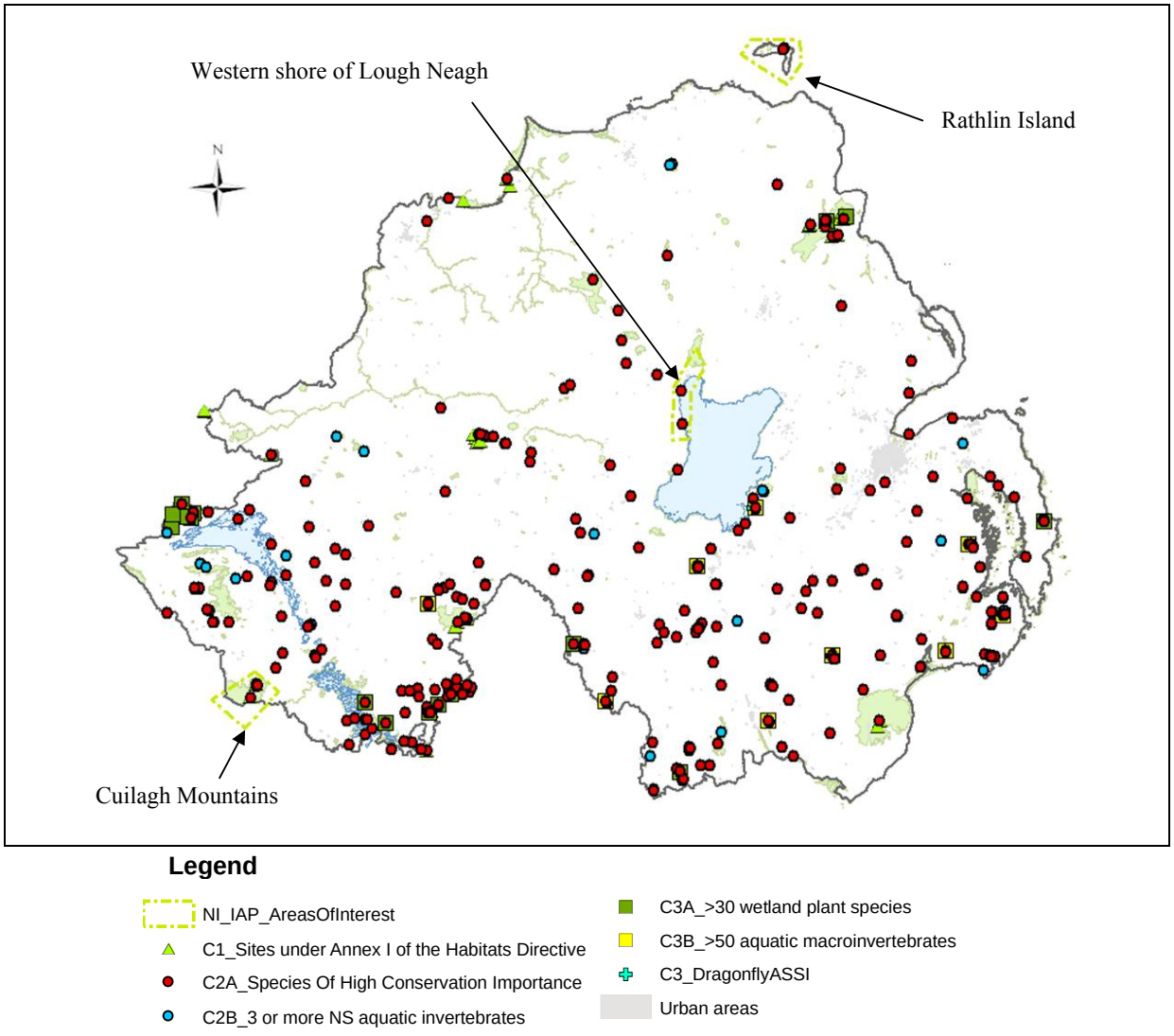


Figure 21 Overview of Additional Areas of Interest in Northern Ireland

14.1 Cuilcagh Mountains AAI

Summary of site features and qualifying criteria:

Site name	Cuilcagh Mountains AAI
Criteria of interest	***Criterion 1*. H3160 Natural dystrophic lakes and ponds** ***Criterion 2*: Invertebrates**
Central grid reference point: H 1330	

The Cuilcagh Mountains ASSI and SAC is designated in part for it's dystrophic lakes and ponds, and blanket bog habitats. The area extends across the border between Northern Ireland and the Republic of Ireland and is characterised as acid bog uplands.

Table 15 Cuilcagh Mountains: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Cuilcagh	214000 329700	**H3160**		✓			
Lough Aleim	215100 331700	**H3160**		✓			
Pool near Lough Atona	211240 329050			✓			
Trien	215300 331900			✓			

Habitats of High Conservation Importance

The Cuilcagh Mountains IAP includes two sites classified as the Habitats Directive Annex 1 type: H3160 Natural dystrophic lakes and ponds. Both of these sites have recently been assessed to be in favourable condition (Goldsmith et al., 2008). Lough Aleim is a is a small and shallow characteristically species-poor dystrophic lake with brown with stained water, and the Cuilcagh pool complex lies within an extensive area of species-rich blanket bog on the north-eastern flanks of Cuilcagh itself. The complex includes three main clusters of pools with in excess of 50 pools in total. The pools themselves are characteristically species poor, and dominated by aquatic bryophytes, particularly *Sphagnum* spp.

Species of High Conservation Importance

Five sites in this AAI qualified as priority small waterbodies on the basis of occurrence of species of high conservation importance. These were: Cuilcagh pool system, pool near Lough Atona and Trien. These sites supported two mountain species of note: the Arctic Diver *Agabus arcticus* and the Highland Great Diving Beetle *Dytiscus lapponicus*.

3 or more aquatic invertebrates

Lough Aleim also supported an assemblage of more than three Nationally Scarce invertebrate species.

Although four pond sites within this area qualify as Priority Ponds, this report does not cover sites in the Republic of Ireland, and so any additional sites across the border that may qualify as Priority Ponds have not been assessed. It is therefore not possible to define the extent of the possible IAP over the border in ROI – further data is required to do this.

14.2 Western Lough Neagh shore AAI

Along the western shore of Lough Neagh there are a number of pond complexes. Creagh Pondage, between Lough Neagh and Lough Beg to the north, Moyola Water Foot due east of Magherafelt, and a pond complex created by sand a gravel extraction at Traad Point, north of Ballyronan.

Summary of site features and qualifying criteria:

Site name	Western shore of Lough Neagh AAI
Criteria of interest	***Criterion 2*: Plants and amphibians**
Central grid reference point: H 9587	

Species of High Conservation Importance

Botanically, the best known site in the area is Ballinderry Waterfoot, which has 1989 records for the Nationally Scarce Slender-leaved Pondweed *Potamogeton filiformis*. Smooth Newts *Triturus vulgaris* have been found in ponds north of the River Ballinderry inlet to Lough Neagh, and Cowbane Cicuta virosa was found in a pond at Traad Point ASSI in June 2009.

Table 16 Western shore of Lough Neagh: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Ponds N of River Ballinderry inlet	295480 381270				✓		
Ballinderry Waterfoot	295400 381200		✓				
Traad Point	295300 387400		✓				

Unfortunately there are very few records for pond related species in this area, therefore it cannot be classed as an IAP. However, local knowledge and expert advice has highlighted this area as a possible focus for a landscape scale wetland connectivity project. This area has great potential for linking the series of pond sites along the western shore of Lough Neagh to enhance wetland connectivity in the area.

14.3 Rathlin Island AAI

Summary of site features and qualifying criteria:

Rathlin Island is found off the coast of Northern Ireland, north of Ballycastle.

Site name	Rathlin Island AAI
Criteria of interest	***Criterion 2*: Invertebrates**
Central grid reference point: D 1351	

Species of High Conservation Importance:

The Shield Scavenger Beetle *Paracymus scutellaris* was found in two ponds in the north-east of the island in 1997. Unfortunately there are no other records to identify Priority Ponds on the Island and so it cannot be counted as an IAP. However, Rathlin Island has a large number of ponds forming a relatively dense network of freshwater, and local expert knowledge has highlighted the area as potentially important for the pond resource.

Table 17 Rathlin Island: summary of data for small waterbodies with plant, invertebrate or vertebrate records that meet Priority Pond criteria

Site	Grid reference	Habitats Directive Annex 1 type*	Species of high conservation importance			Exceptional assemblages	
			Plant	Invertebrate	Other	Plant	Invertebrate
Mire pool above Portnacooly	314600 452200			✓			
Ballyconagan Central Pond 1	314500 451800			✓			

15 Conclusions and recommendations

In this first assessment of Important Areas for Ponds (IAPs) in Northern Ireland, nine concentrations of Priority Ponds are identified as significant at European, UK and/or country level. A further three Additional Areas of Interest (AAIs) have been identified through expert knowledge and more limited species records.

The aim of an IAP report is to increase understanding and recognition of high quality pond clusters amongst stakeholders, in order to act as a stimulus for biodiversity protection. Recommendations for further work that will help to achieve these aims are given below.

15.1 Data gaps and survey priorities

Pond numbers

Northern Ireland has a lake inventory, based on map counts (Smith *et al*.1993), which includes many small waterbodies that fall below the 2 ha upper size limit for a pond, as defined in the UK BAP. Other pond types have, however, been little surveyed and there is currently no overall estimate of the number of ponds in Northern Ireland. This is an issue of some importance, because it prevents Northern Ireland country targets being set for the Pond HAP.

Ordnance Survey map counts alone are not likely to be sufficient to provide an assessment of small waterbody stock in Northern Ireland. Data from the GB Countryside Survey has shown that considerable numbers of small ponds, including many temporary pools, are not shown on OS maps. Recent data from 2007 has also indicated extensive pond creation in Britain, with an approximately 12.5% increase in the total number of ponds over the last decade (Carey *et al.* 2008). There is some evidence that both factors are likely to be an issue in Northern Ireland. For example, a trial search of single a randomly selected 1 km^2 of countryside near Fivemiletown (centred on H4647) by the report authors during June 2009, identified seasonal floodplain pools, and a pond abutting the embankment of a minor country road, neither of which were marked on the 1:50,000 OS map (H4599 4700). New ponds are also known to be being made across Northern Ireland for a range of purposes including conservation, amenity (garden ponds) and to provide ecosystem services within, for example, Sustainable Urban Drainage System (SUDS) schemes.

Recommendation

To provide a first estimate of the number of ponds in Northern Ireland it is recommended that ponds are included in any future NI Countryside Survey. As far as possible, the criteria used for the assessment should be compatible with the GB Countryside Survey methods and Priority Pond definitions.

Figure 22 Small seasonal pond adjacent to a road embankment - not marked on OS map

15.2 Assessing Pond quality and locating priority ponds

Northern Ireland has comprehensive botanical data for its larger lakes collected during surveys undertaken in the late 1980s and in 2006. In addition, plant and invertebrate data are routinely collected from ponds by NIEA, as part of monitoring against the EU Nitrates Directive (91/676/EEC). These data sources provide a generic resource which have been used to identify ponds which can be assigned to Habitat Directive Annex 1 types and to prioritise waterbodies for monitoring and protection through statutory mechanisms and policy, including agri-environment schemes.

Many smaller waterbodies which were included in these botanical surveys have benefitted from the associated knowledge and protection. However, the coverage remains far less complete for ponds than for larger lakes. There are also a wide range of other pond types including gravel pits, clay pits, mill ponds and retting pools, for which there are no systematic data. Information presented in this report suggests that some of these waterbodies have considerable biodiversity importance and a proportion are likely to be attributable to Annex 1 Habitat Directive types.

Providing more comprehensive information about the quality of these small waterbodies is a priority, because the data provide a generic resource that can be used to prioritise appropriate surveillance and protection for both habitats and species. However, because the number of potential survey sites is large a stratified approach is recommended.

Recommendations

The following approach to further data collection is suggested:

1. Ponds and lakes within IAP areas are an obvious target for additional pond quality surveys because there is a greater likelihood that high quality waterbodies and uncommon species will be present. It is recommended that within IAPs the following protocol is adopted:
   (i) Undertake rapid stratified Phase 1 assessments of un-surveyed small waterbodies using simple assessment tools e.g. surrounding land-use, water conductivity and presence of key species.
   (ii) Develop a priority list of (a) newly identified sites with good potential (b) priority ponds already identified within this report, but with limited data.
   (iii) Undertake more detailed biological, threat and opportunity assessment of key sites focusing on waterbodies that are likely to be high quality, support key species or are important for statutory purposes.

2. In the longer term, there are benefits from gathering more detailed pond data from the wider landscape beyond IAP areas. These data will provide a necessary check to ensure that important ponds and pond areas have not been missed because of poor data coverage, and also give better estimates of the number of Priority Ponds across Northern Ireland for monitoring and reporting purposes. They will also provide information about the value of new pond creation.

   Inclusion of pond quality assessments within the NI Countryside Survey is likely to be the best mechanism for gathering these data

15.3 Method development

In England and Wales PSYM (the Predictive SYstem for Multimetrics), has been developed to provide a WFD-compatible technique for assessing waterbody quality. The method uses both wetland plant and family-level aquatic invertebrate measures to assess waterbody quality compared to a semi-natural baseline. The benefits of using PSYM are that:

i. it provides an overall assessment of pond quality that can be used for statutory monitoring (e.g. Water Framework Directive, Nitrates Directive).
ii. PSYM is a criterion for identifying Priority Ponds under the UK BAP
iii. PSYM can be used as a site and landscape scale information tool. In the GB Countryside Survey for example, it has been used to investigate the extent of pond degradation and change at national level, and to help identify possible factors causing decline.

Recommendation

PSYM has not yet been developed for Northern Ireland, but would be a useful tool for statutory and policy-based assessment and monitoring. With minor modification, the method could be largely developed using data already routinely collected by NEIA. Pond Conservation are happy to advise on this.

15.4 Strategies for protection

Given the catchment scale threats to waterbody quality and the landscape scale movement of many freshwater species, there is a clear need for a strategic, landscape-based approach to protecting small waterbodies in Northern Ireland.

Maintaining landscape-scale *networks* of high quality waterbodies needs to be a critical element of any strategy, because there is increasing evidence that landscape scale connectivity is essential to sustain populations of our rarest freshwater species and maintain waterbody biodiversity in the long-term. Such actions are particularly encouraged in areas associated with Natura sites under Articles 3 and 10 of the Habitats Directive.

Small waterbodies, with their limited water volumes, are likely to be particularly vulnerable to the effects of future climate change. So functional networks of high quality waterbodies are likely to become increasingly important over coming decades to provide stepping-stone and refuge habitats as water and climatic conditions change.

Recommendations

To maximise the effectiveness of protection measures it is recommended that a national small waterbody strategy (or series of regional strategies) are developed in association with stakeholders to target action within IAP areas. This should:

- Prioritise the key individual waterbodies and pond associated species which require most urgent protection, taking into account statutory requirements
- Assess in detail the *threats* to prioritised waterbodies and species
- Evaluate the *measures* needed to protect prioritised waterbodies and species including:
    - (i) measures to buffer waterbody catchments, including the catchment of inflow streams and groundwater sources, to protect against nutrient enrichment, high sediment loads, organic and other pollutants and habitat loss
    - (ii) proactive management through control of grazing or physical works to: reduce the pollutant and sediment burden, retain key species habitat features such as bare ground, halt or reverse succession including removal of trees, scrub or control invasive species.
    - (iii) measures to ensure optimal hydrological regimes are maintained

- Looks at the distribution of waterbodies as a whole, identifying opportunities for habitat creation likely to enhance the connectivity of pond networks within IAPs. This should:
    - (i) prioritise habitat creation targeted to help maintain important assemblages and key species within the network, but also
    - (ii) encourage wider enhancement and creation to maximise landscape connectivity and diversity of waterbody types.

15.5 Strategy implementation: policy development and action on the ground

Strategies are meaningless without effective mechanisms for implementation. For small waterbodies to be adequately protected will require a wide range of approaches including both policy development and action on the ground. Liaison with many stakeholders will be necessary including discussion with statutory bodies and, critically, buy-in from farmers and landowners.

To ensure this work is effective will require dedicated project officer time: working on the ground, developing policy and working to release funding streams.

Recommendations

Policy
Use the available mechanisms of Biodiversity Implementation Plans and the Wildlife Order (NI) 1985 to protect sites and species.

Ensure agri-environment scheme funding can be targeted to protect high quality sites and used to fund habitat management and creation work to maintain sites, species and functional habitat networks.

Ensure that planning instruments such as Planning Policy Statements (PPS2) and Local Area Plans are implemented to protect waterbodies in IAP areas and the wider countryside.

Seek to include nationally important ponds in river basin management plans i.e. those that lie within ASSIs, SACs etc.

Consider how small waterbodies can be more comprehensively included in the second round of river basin management planning by dint of their role contributing to the good ecological status of larger waterbodies.

Project development
Develop multi-partner projects, and associated funding streams to promote habitat protection, management and creation to benefit key habitats and species.

On the ground:
Engage with landowners, managers, Local Biodiversity Officers and other stakeholders to encourage waterbody protection, management and creation, including take-up of agri-environment and other grants. Actions should be waterbody- and species- specific. At statutorily protected sites, actions should work within existing management frameworks (e.g. conservation objectives, site management plans).

15.6 Management experiments

Given that the optimal methods for managing small-waterbody sites and species have many unknowns and are often site-specific, there is a need for experimentation and subsequent monitoring, both to increase the pond conservation knowledge-base and to ensure individual sites are responding appropriately. As a basis for this work, a short review of the current evidence for pond and lake management would be useful.

Recommendations

Review evidence-based lake and pond management and protection techniques to act as an information source.

Undertake, and monitor, experimental management of small waterbodies. Key areas for investigation include: (i) impact and longevity of dredging on waterbodies of different size and quality (ii) effects of removing secondary scrub and tree growth (iii) timescale and impact of buffering waterbodies and inflow streams (iv) value of habitat specific management and creation for protecting key species.

15.7 Advice materials

Advice materials are a cost-effective means of distributing information, and influencing attitudes amongst stakeholders. They also provide a means to encourage action amongst the wider community, including small landowners and homeowners who can contribute to the quality of the pond network through management and creation in the wider landscape.

A tool-kit providing information to support high quality pond creation has recently been developed to support the Pond HAP (http://www.pondconservation.org.uk/millionponds/). It would be useful to develop additional materials to support pond management, particularly targeted at uncommon species such as Irish Damselfly.

Recommendation

Create a tool kit to support priority protection within IAPs, with a focus on pond management, and management and creation for key species

15.8 Monitoring and surveillance

Monitoring and surveillance are key tools necessary to look at the effectiveness of policy, and to establish whether statutory requirements are met.

Currently, some pond quality monitoring of wetland plant species and invertebrates families is carried out by NIEA for the Nitrates Directive. It is important that this monitoring continues, and is extended to meet strategic goals.

Recommendations

- Monitor key small waterbodies and species (a) by statutory agencies through continuation and expansion of existing programmes, (b) through purpose-developed projects and where appropriate (c) the involvement of interested naturalists or naturalist groups
- Set up a surveillance strategy and monitor to assess quality trends at national level (potentially by inclusion within the Countryside survey)
- Monitor the value of management and creation and ensure results are used to inform practitioners more widely

Summary of recommendations

Recommendation	Reason	Policy Driver
Survey needs		
Include pond *counts* in future NI Countryside Survey.	Generic resource for assessment and monitoring purposes	UK BAP
Within IAP areas: (i) undertake stratified phase one surveys of small waterbodies (ii) undertake biological, threat and opportunity assessments at priority sites	Better understanding of the resource, ensuring important sites are not missed and are adequately assessed in terms of value, threats and opportunities	UK BAP, Habitats Directive, WFD
In the longer term inclusion of pond quality assessment within the NI Countryside Survey	Check to ensure that import sites have not been missed and to provide national estimates of the number of Priority ponds in Northern Ireland	UK BAP, Habitats Directive, WFD
Method development		
Develop PSYM for Northern Ireland	An essential tool for statutory and policy-based assessment and monitoring of pond quality	UK BAP, WFD
Strategies for protection		
Develop a national strategy for IAPs in association with stakeholders which: • Identifies key waterbodies and key pond associated species • Identifies threats and protection measures for priority waterbodies and species including: (i) measures to buffer waterbody catchments against nutrient enrichment, high sediment loads and habitat loss (ii) proactive management through control of grazing, physical works etc (iii) measures to ensure hydrological regimes are maintained • Identifies opportunities for habitat creation likely to enhance the connectivity of pond networks within the IAP. This should: (i) prioritise habitat creation targeted to help maintain key habitats and species (ii) encourage wider enhancement and creation within IAPs to increase landscape connectivity and the diversity of waterbody types.	Ensures that resources and effort are targeted strategically to give greatest biodiversity benefit	UK BAP, LBAPs, Habitats Directive, WFD
Policy development		
• Ensure agri-environment scheme funding can be targeted to buffer high quality sites and fund strategic	Provides a top-down impetus for action on the ground. Helps to	UK BAP, LBAPs,

habitat management and creation • Ensure that PPS2 is implemented to protect waterbodies in IAP areas and the wider countryside. • Seek to include ponds in river basin management plans	release funding and other resources.	Habitats Directive, WFD
Work on the ground		
• Develop multi-partner projects, and associated funding streams to promote habitat management and creation to benefit key habitats and species. • Engage with landowners, mangers and other stakeholders on the ground to ensure appropriate waterbody protection, management and creation, including take-up of agri-environment grants.	The key requirement needed to protect and enhance freshwater biodiversity and meet statutory requirements	UK BAP, LBAPs, Habitats Directive, WFD
Management experiments		
• Review evidence-based lake and pond management and protection techniques to act as an information source. • Undertake, and monitor, experimental management of small waterbodies.	Important to fill knowledge gaps and ensure advice is effective	UK BAP, LBAPs, Habitats Directive, WFD
Advice materials		
Create tool kit materials to support priority protection within IAPs, with a focus on pond management, and management and creation for key species.	Cost effective way to provide supporting information and disseminate lessons learnt amongst key stakeholders and the wider community	UK BAP, LBAPs, Habitats Directive, WFD
Monitoring		
• Maintain and build upon existing monitiring • Encourage monitoring of key sites and species by statutory agencies through existing programmes and naturalist groups? • Set up a surveillance strategy and monitor to assess quality trends • Monitor management and management experiments at sites.	Critical to ensure policies and their implementation are effective and to evaluate against statutory requirements	UK BAP, LBAPs, Habitats Directive, WFD and duaughter Directives

16 References

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

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.

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.

Cooper A & McCann T, 2000, Northern Ireland Countryside Survey 2000. Environment and Heritage Service. Belfast.

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.

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.

Goldsmith B, Davidson TA, Burgess A, Hughes M, Madgwick G, Rawcliffe R, Rippey B & Tyler J, 2008, Site Condition Assessments of Standing Water Features in SACs and ASSIs: Northern Ireland. Final Report to the Northern Ireland Environment Agency.

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

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.

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.

Keeble HL, Williams P, Biggs J and Athanson M, 2009, Important Areas For Ponds (IAPs) in the Environment Agency Southern Region. Report produced for the Environment Agency.

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.

O'Neill K, Jennings S, Forsyth L, Carey R, Portig A, Preston J, Langton T & McDonald R, 2004, *The distribution and status of smooth newts in Northern Ireland*, Report to Environment & Heritage Service. Quercus, Queens University Belfast, Belfast.

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.

Preston CD, Pearman DA, and Dines TD, 2002, *New Atlas of the British and Irish Flora*. Oxford University Press. Oxford.

Rich TCG and Jermy AC, 1988, *Plant Crib 1998.* Botanical Society of the British Isles

Smith S J, Wolfe-Murphy S A, Enlander I, Gibson C E, 1993, *The Lakes of Northern Ireland: an annotated inventory*, Countryside and Wildlife Research Series No.3, Queens University, Belfast.

Stewart, N.F. (2004).*Important Stonewort Areas. An assessment of the best areas for stoneworts in the United Kingdom (summary).* Plantlife International, Salisbury, UK.

Stokes K, O'Neill K & McDonald RA, 2004. *Invasive species in Ireland*. Unpublished report to Environment & Heritage Service. Quercus, Queens University Belfast, Belfast.

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.

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.

16.1 Appendix 1 List of contacts

Organisation	Name
Aquatic Coleoptera Conservation Trust	Garth Foster
Northern Ireland Environment Agency, Regional Operations	Patrick Kelly
Belfast City Council	Orla Maguire
CEDaR	Lynne Rendle
Coleraine Borough Council	Jim Allen
Craigavon Borough Council	Marcus Malley
NIEA Water Management Unit	Catherine McSorley
NIEA Water Management Unit	Haidee Chamberlain
NIEA Water Management Unit	Mary Gallagher
NIEA Biodiversity Unit	Richard Weyl
NIEA Regional Operations	Stephen Foster
Lough Neagh & Lower Bann Wetlands (now RSPB)	Seamus Burns
National Museums of Northern Ireland	Brian Nelson
NIEA Biodiversity Unit	Bob Davidson
NIEA Biodiversity Unit	John Early
Quercus	Jane Preston
Ulster Wildlife Trust	Ciaran Mullan
Independent	Roy Anderson
Independent	Nick Stewart

16.2 Appendix 2 Overview of datasets collated for the IAP assessment

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

Dataset	Data type	Dataset obtained from
Pond Inventory		
NI Lakes GIS layer	Waterbody location	Quercus
LCM 2000 water GIS layer	Pond location	Quercus
GB lakes < 2ha	Pond location	UK lakes: http://www.uklakes.net/
Pond Survey Data		
ENSIS Site Condition Assessments of Standing Water Features in SACs and ASSIs Reports for Northern Ireland	Habitat and macrophyte species data	NIEA
Assemblage Data		
Aquatic invertebrate data	Selected assemblage data	Garth Foster
SSSI designations	SSSIs designated for outstanding dragonfly/ amphibian assemblage	NIEA
Species Records		
Invertebrate, mammal, amphibian and plant data	Species records	CEDaR
Smooth Newt Records	Species Records	Quercus
Aquatic invertebrate data	Species records and assemblages	ACCT
Stonewort records	Species records	Nick Stewart
Selected plant data	Plant species records	NIEA

16.3 Appendix 3 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 GB 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

16.4 Appendix 4. Pond associated habitats and species protected under the Habitats Directive [8]

3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae)*

1) Shallow oligotrophic waters with few minerals and base poor, with an aquatic to amphibious low perennial vegetation belonging to the *Littorelletalia uniflorae* order, on oligotrophic soils of lake and pond banks (sometimes on peaty soils). This vegetation consists of one or more zones, dominated by *Littorella*, *Lobelia dortmana* or *Isoetes,* although not all zones may not be found at a given site.
2) Plants: *Isoetes lacustris*, *I. echinospora*, *Littorella uniflora*, *Lobelia dortmanna*, *Deschampsia setacea*, *Subularia aquatica*, *Juncus bulbosus*, *Pilularia globulifera*, *#Luronium natans*, *Potamogeton polygonifolius*; in the Boreal region also *Myriophyllum alterniflorum*, *Drepanocladus* spp., *Warnstorfia* spp. and *Fontinalis* spp.

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

1) 22.12 x 22.31 - aquatic to amphibious short perennial vegetation, oligotrophic to mesotrophic, of lake, pond and pool banks and water-land interfaces belonging to the *Littorelletalia uniflorae* order.
22.12 x 22.32 - amphibious short annual vegetation, pioneer of land interface zones of lakes, pools and ponds with nutrient poor soils, or which grows during periodic drying of these standing waters: *Isoeto-Nanojuncetea* class. These two units can grow together in close association or separately. Characteristic plant species are generally small ephemerophytes.
2) Plants: 22.12 x 22.31: *Littorella uniflora*, *Luronium natans*, *Potamogeton polygonifolius*, *Pilularia globulifera*, *Juncus bulbosus* ssp. *bulbosus*, *Eleocharis acicularis*, *Sparganium minimum*.
22.12 X 22.32 : *Lindernia procumbens*, *Elatine* spp., *Eleocharis ovata*, *Juncus tenageia*, *Cyperus fuscus*, *C.flavescens*, *C.michelianus*, *Limosella aquatica*, *Schoenoplectus supinus, Scirpus setaceus*, *Juncus bufonius*, *Centaurium pulchellum*, *Centunculus minimus*, *Cicendia filiformis*.

3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

1) Lakes and pools with waters fairly rich in dissolved bases (pH often 6-7) (21.12) or with mostly blue to greenish, very clear, waters poor (to moderate) in nutrients, base-rich (pH often >7.5).
(21.15). The bottom of these unpolluted water bodies are covered with charophyte, *Chara* and *Nitella*, algal carpets. In the Boreal region this habitat type includes small calcareous-rich oligomesotrophic gyttja pools with dense *Chara* (dominating species is *C. strigosa*) carpets, often surrounded by various eutrophic fens and pine bogs.
2) Plants: *Chara* spp., *Nitella* spp.

3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation

1) Lakes and ponds with mostly dirty grey to blue-green, more or less turbid, waters, particularly rich in dissolved bases (pH usually > 7), with free-floating surface communities of the *Hydrocharition* or, in deep, open waters, with associations of large pondweeds (*Magnopotamion*).
2) Plants: *Hydrocharition - Lemna* spp., *Spirodela* spp., *Wolffia* spp., *Hydrocharis morsus-ranae, Stratiotes aloides, Utricularia australis, U. vulgaris, #Aldrovanda vesiculosa,* Ferns (*Azolla*), Liverworts (*Riccia* spp., *Ricciocarpus* spp.); *Magnopotamion - Potamogeton lucens, P. praelongus, P. zizii*, *P. perfoliatus*.

3160 Natural dystrophic lakes and ponds

1) 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. Plant communities belong to the order *Utricularietalia*.
2) Plants: *Utricularia* spp, *Rhynchospora alba*, *R. fusca*, *Sparganium minimum*, *Sphagnum* species. In the Boreal region also *Nuphar lutea*, *N. pumila*, *Carex lasiocarpa*, *C. rostrata*, *Nymphaea candida*, *Drepanocladus* spp., *Warnstorfia trichophylla*, *W. procera*.
Animals: Odonata (dragonflies and damselflies)

3170 *Mediterranean temporary ponds

1) Very shallow temporary ponds (a few centimetres deep) which exist only in winter or late spring, with a flora mainly composed of Mediterranean therophytic and geophytic species belonging to the alliances *Isoetion, Nanocyperion flavescentis, Preslion cervinae, Agrostion salmanticae, Heleochloion* and *Lythrion tribracteati.*
2) Plants: *Agrostis pourretii, Centaurium spicatum, Chaetopogon fasciculatus, Cicendia filiformis, Crypsis aculeata, C. alopecuroides, C. schoenoides, Cyperus flavescens, C. fuscus, C. michelianus, Damasonium alisma, Elatine macropoda, Eryngium corniculatum, E. galioides, Exaculum pusillum, Fimbristylis bisumbellata, Glinus lotoides, Gnaphalium uliginosum, Illecebrum verticillatum, Isoetes boryana, I. delilei, I. duriei, I. heldreichii, I. histrix, I. malinverniana, I. velata, Juncus buffonius, J. capitatus, J. pygmaeus, J. tenageia, Lythrum castellanum, L. flexuosum, L. tribracteatum, Marsilea batardae, M. strigosa, Mentha cervina, Ranunculus dichotomiflorus, R. lateriflorus, Serapias lingua, S. neglecta, S. vomeracea.*

[8] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

3180 * Turloughs

1) Temporary lakes principally filled by subterranean waters and particular to karstic limestone areas. Most flood in the autumn and then dry up between April and July. However, some may flood at any time of the year after heavy rainfall and dry out again in a few days; others, close to the sea, may be affected by the tide in summer. These lakes fill and empty at particular places. The soils are quite variable, including limestone bedrock, marls, peat, clay and humus, while aquatic conditions range from ultra oligotrophic to eutrophic. The vegetation mainly belongs to the alliance *Lolio-Potentillion anserinae* Tx. 1947, but also to the *Caricion davallianae* Klika 1934.
2) Plants: *Cinclidotus fontinaloides, Fontinalis antipyretica* (Bryophyta).
Animals: *Tanymastix stagnalis* (wet phase) and the beetles *Agonum lugens*, *A. livens, Badister meridionalis, Blethisa multipunctata* and *Pelophila borealis* (dry phase) 15.

2190 Humid dune slacks

1) Humid depressions of dunal systems. Humid dune-slacks are extremely rich and specialised habitats very threatened by the lowering of water tables.
16.31 - Dune-slack pools (*Charetum tomentosae, Elodeetum canadense, Hippuridetum vulgaris, Hottonietum palustris, Potametum pectinati*): fresh-water aquatic communities (cf. 22.4) of permanent dune-slack water bodies.
16.32 - Dune-slack pioneer swards (*Juncenion bufonii* p.: *Gentiano-Erythraeetum littoralis, Hydrocotylo-Baldellion*): pioneer formations of humid sands and dune pool fringes, on soils with low salinity.
16.33 - Dune-slack fens: calcareous and, occasionally, acidic fen formations (cf. 54.2, 54.4, in particular 54.21, 54.2H, 54.49), often invaded by creeping willow, occupying the wettest parts of dune-slacks.
16.34 - Dune-slack grasslands: humid grasslands and rushbeds (see 37.31, 37.4) of dune-slacks, also often with creeping willows (*Salix rosmarinifolia*, *S. arenaria*).
16.35 - Dune-slack reedbeds, sedgebeds and canebeds: reedbeds, tall-sedge communities and canebeds (cf. 53.1, 53.2, 53.3) of dune-slacks.

21A0 Machairs (* in Ireland)

1) Complex habitat comprised of a sandy coastal plain resulting partially from grazing and/or rotational cultivation, in an oceanic location with a cool, moist climate. The wind blown sand has a significant percentage of shell derived material, forming a lime rich soil with pH values normally greater than 7. Vegetation is herbaceous, with a low frequency of sand binding species.
2) Plants: *Cochlearia scotica, Dactylorhiza fuchsii* ssp. *hebridensis, Euphrasia marshallii, Festuca rubra, Galium verum, Lotus corniculatus, Plantago lanceolata, Poa pratensis, Trifolium repens*.
4) Lakes (ponds and small lakes in Scotland) of widely varying salinity, pH and chemical composition, transitions to saltmarsh and blanket bog are associated habitats. In the United Kingdom, twelve different types of vegetation under the National Vegetation Classification can be identified.

* Priority Habitat

Information source: Interpretation Manual of the European Union Habitats (2007) European Commission DG Environment (Nature and Biodiversity).