

The County Monaghan Wetlands Map

Desk Survey & GIS Preparation

Prepared by Dr Peter Foss & Dr Patrick Crushell, November 2010

A report for Monaghan County Council & The Heritage Council

An Action of the Monaghan Heritage Plan 2006-2010



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Prepared on behalf of



by

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Report cover images:

Cutover bog hollows with transition mire vegetation on the western shore of Drumganny Lough, Co Monaghan.

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The County Monaghan Wetlands Map 2010 Project

The project created a digital GIS wetlands map and database of freshwater wetland sites in county Monaghan. The habitats include lake, pond, watercourses, spring, swamp, wet grassland, marsh, bog, fen, and wet woodland. In all, 32 wetland habitat types were mapped, 8 of which are listed as priority habitats in the EU Habitats Directive.

A variety of third party GIS data-sets, published surveys and reports on wetlands, and a systematic aerial photographic survey were used to identify wetland sites. These were mapped and entered into a database holding information on sites. The sites identified were characterised and mapped in terms of the wetland habitat(s) present.

The synthesis of this data-set forms an invaluable tool for future heritage conservation planning in the county, assist in the development of sustainable planning programmes, and will allow for the design of future targeted wetland surveys and research programmes in county Monaghan.

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2 Executive Summary

1. County Monaghan contains a wide range of wetlands and their associated species of high international and national importance (An Foras Forbartha 1981; Farrell 1972; Martin 2006; Foss & Crushell 2007 & 2008b; Woodrow 2008 & 2009 *inter alia*). Due to the varying topography, hydrology, climate and soils present it has wetland habitats ranging from degraded cutover raised bogs, blanket bogs, fens, marshes, large riverine systems, an abundance and variety of lakes, springs, wet woodlands and many more. Monaghan is likely to contain some of the finest examples of transition mire fens and mesotrophic inter drumlin lakes that occur in Ireland.

2. The aim of the County Monaghan Wetlands Map (MWM) was to prepare a GIS data-set and associated site database of all known freshwater wetland sites in county Monaghan.

The wetland sites were identified following an extensive review of literature and third party data sources. Information stored on these sites included details of previous surveys and general site characteristics.

In addition to the previously recorded wetland sites, a GIS dataset was established to record all mapped wetland habitat within the county by incorporating map data provided from third parties along with wetland identified by an analysis of aerial photography of all wetland habitat within the county.

Together these two datasets facilitated an assessment of the wetland resource of the entire county. Wetland habitats on sites were classified according to the Guide to Habitats published by The Heritage Council (Fossitt 2000). For the purposes of this study, 32 different habitat types are regarded as wetland habitats, these are listed below.

3. This study addressed the following research objectives:

- collect and amalgamate data on known wetland sites within county Monaghan from data sources following consultation with Monaghan County Council, State authorities, third party research groups and individuals;
- produce a map and associated database of all wetland sites to include key data on each site, including the specific wetland habitat type(s) present; the extent of each wetland type; and compile an inventory of available published and survey information on each site;
- undertake a desktop survey of aerial photography of the county to identify wetland sites of potential interest occurring outside of existing data sources and surveys;
- evaluate each site in terms of its conservation status, known habitat and area information, known survey information and threats;
- identify the main information gaps and make recommendations to guide future policy and research priorities towards the conservation of the wetland resource in county Monaghan.

4. The current study focused on the identification of 32 wetland types (16 of which are listed in Annex 1 of the EU Habitats Directive, and a further eight are listed as priority habitats) in county Monaghan, plus one generic wetland type entitled MWM Unknown wetland type, where the specific wetland habitat present could not be assigned with certainty to one of the recognised habitat types. The 32 Fossitt freshwater wetland types recorded during the MWM include:

Fossitt Level 3 Habitat Code and Name	Fossitt Level 3 Habitat Code and Name
FL1 Dystrophic lakes *	GM1 Marsh *
FL2 Acid oligotrophic lakes *	HH3 Wet heath *
FL3 Limestone/marl lakes *	PB1 Raised bogs * & **
FL4 Mesotrophic lakes	PB2 Upland blanket bog **
FL5 Eutrophic lakes *	PB3 Lowland blanket bog * & **
FL6 Turloughs **	PB4 Cutover bog *
FL7 Reservoirs	PB5 Eroding blanket bog
FL8 Other artificial lakes and ponds	PF1 Rich fen and flush * & **
FW1 Eroding/upland rivers *	PF2 Poor fen and flush
FW2 Depositing/lowland rivers *	PF3 Transition mire and quaking bog *
FW3 Canals	WN4 Wet pedunculate oak-ash woodland **
FW4 Drainage ditches	WN5 Riparian woodland
FP1 Calcareous springs **	WN6 Wet willow-alder-ash woodland
FP2 Non-Calcareous springs	WN7 Bog woodland **
FS1 Reed and large sedge swamps	WS1 Scrub *
FS2 Tall herb swamps *	
GS4 Wet grassland *	MWM Unknown wetland type

* EU Habitats Directive listed Annex 1 habitat; ** EU Habitats Directive Priority habitat. (For a detailed list of the habitats recorded and the relationship of Fossitt habitats to EU Habitats Directive habitats see Appendix 6a).

5. A variety of data sources (reports, publications, databases and inventory lists), groups and individuals were consulted in the compilation of information for the MWM project. Those contacted, are listed in Appendix 2, while published research and GIS data sources provided and consulted in the MWM are listed in Appendix 1 and cited in full in the Bibliography.

6. The total area of wetland habitat that has been mapped in county Monaghan is currently **7,319 ha**, which represents **5.8 % of the entire county** (this should be interpreted as a minimum area as wetland habitats within many sites were not mapped due to lack of baseline data).

7. Detailed information on **478** wetland sites and sub-sites is held in the **MWM site database**.

A total of **1,856** discrete wetland habitat polygons have been collated and mapped within the county in the **MWM GIS dataset**. Of the 1,862 discrete wetland units in the MWM GIS, **661** polygons have been newly identified by an analysis of aerial photography of the county. The specific wetland habitat could not be identified on these 661 polygons.

8. In relation to the wetland habitat types recorded within the County Monaghan Wetlands Map the following number of sites were recorded in the MWM site database, while the MWM GIS recorded the following number of wetland polygons and estimated area (ha) or length (km) of habitat:

	Number of Sites recorded in MWM Site Database	Number of discrete wetland habitat polygons mapped in MWM GIS dataset	Total area (ha) or Length (km) of habitat types recorded in MWM GIS dataset*
Total	478	1,856	7,319
Habitat Code & Name			
FL Lakes & Ponds	279	451	2,061
FL1 Dystrophic lakes	7	9	4.3
FL2 Acid oligotrophic lakes	129	247	564.6
FL3 Limestone/marl lakes	23	21	42.6
FL4 Mesotrophic lakes	42	50	410.8
FL5 Eutrophic lakes	33	32	910.6
FL6 Turloughs	9	2	15
FL7 Reservoirs	45	0	0
FL8 Other artificial lakes	10	2	0.2
FW Watercourses	119	1,329	1,439 km
FW1 Eroding/upland rivers	18	-	-
FW2 Depositing/lowland	16	-	-
FW3 Canals	4	2	1.4 km
FW4 Drainage ditches	78	76	19.9 km
FP Springs	3	-	-
FP1 Calcareous springs	1	33	NA
FP2 Non-Calcareous springs	2	2	NA
FS Swamps	168	100	402.3
FS1 Reed and large sedge	161	96	392.7
FS2 Tall herb swamps	3	3	6.2
G Grassland & Marsh	210	298	451
GS4 Wet grassland	160	258	405.2
GM1 Marsh	88	30	31.8
HH3 Wet heath	8	15	58.8
PB Bogs	46	45	1,184.8
PB1 Raised bogs	1	16	375.5
PB2 Upland blanket bog	2	8	89.1
PB3 Lowland blanket bog	0	0	0
PB4 Cutover bog	37	21	720.2
PB5 Eroding blanket bog	0	0	0
PF Fens & Flushes	101	93	159.6
PF1 Rich fen and flush	7	10	3
PF2 Poor fen and flush	17	21	21.2
PF3 Transition mire and	81	56	101.2
WN Semi-natural	151	138	184.7
WN4 Wet pedunculate oak-	1	0	0
WN5 Riparian woodland	4	0	0
WN6 Wet willow-alder-ash	117	115	194.8
WN7 Bog woodland	15	23	89.8
WS1 Scrub	79	77	57.7
Non-Fossitt Mosaics			
GS4 \ HH3 Wet grassland -	NA	4	38
GS4 \ PB4 Wet grassland -	NA	1	16.1
PF2 \ HH3 Poor fen and	NA	3	3.6
HH \ PB2 Heath - upland	NA	2	38.3
PF \ GS3 Fens and flushes -	NA	1	10.6
PB2 \ GS4 Upland blanket	NA	1	3.8
PB4 \ WS1 Cutover bog -	NA	1	56.2
MWM Unknown wetland	NA	661	2,665

**The area / length of habitat should be regarded as being a best minimal estimate, as many wetland habitats within sites were not mapped due to an absence of reliable information on their distribution and extent.*

9. These wetland habitat types can be found as discrete communities in their own right, or in association with (or within) larger semi-natural complexes such as blanket bog, cutover regenerating bog areas, turlough, wet heathland, wet grassland, woodland, lacustrine and riverine habitats and systems.

10. In terms of the main habitat types in county Monaghan the results suggest that on a county basis, the 7,319 ha of wetland habitat recorded includes 2,061 ha of lakes, 1,342 ha of bog and heath, 242 ha of wet woodland and scrub and 1,012 ha comprising fens, marshes, swamps and wet grassland. A further 2,665 ha of wetland has been assigned to the 'MWM unknown wetland type'.

11. It is probable that additional wetland sites exist outside of the sites which have been identified in the present County Monaghan Wetlands Map (see Results section 6.1 for further clarification).

12. In relation to the 1,856 wetland habitat units identified in the MWM, one key result to emerge is that significant gaps exist in relation to our knowledge of this resource, due primarily to a lack of detailed habitat surveys. Specifically, the following issues have been identified:

Wetland type distribution: it is clear from our results that information is lacking on many important wetland habitats that occur throughout the county. Apart from blanket bogs, and fens few other wetland habitats have been systematically surveyed in Monaghan. Without a full appreciation of the extent and condition of these wetland habitats it is not possible to set realistic conservation objectives or make informed decisions on their relative importance in relation to biodiversity and in the provision of other ecosystem services.

Exact extent of wetland types: our knowledge in relation to the location or extent of wetland type(s) present on sites is considered lacking or inadequate for many sites identified in the MWM.

13. One of the key findings to emerge from a conservation evaluation of wetland sites recognised in the MWM is that 372 site records or 76% of the sites listed (487 sites in total) have no protection although the conservation value of many has been recognised or proposed by third parties.

14. Based on the results of this analysis of wetlands, the following habitat types within the county should be prioritised as part of any future MWM Field Surveys: **Turloughs, Lakes, Tall Herb Swamp, Springs and Wet Grassland *inter alia*.**

15. Sites identified during the MWM which could not be assigned to a Fossitt category should be included in any future wetland survey.

14. Based on the results of this survey the following geographic areas within the county should be surveyed for potential wetland sites:

- Eastern and northern parts of the county, approximately that part of the county that lies East and North of Monaghan town

16. Our incomplete knowledge of many of the wetland areas in county Monaghan makes **a systematic survey of existing and newly recorded sites a priority**, if conservation worthy sites are to be identified and the best examples put forward for conservation under county conservation programmes such as the Monaghan Local Biodiversity Programme, or the NPWS national Natural Heritage Area (NHA) or European Habitats Directive Natura 2000 (SAC) network.

17. Other recommendations from the study included:

- The habitat mapping and research methodology developed during the Monaghan Wetland Survey, should be formalised by the Heritage Council, and a standard Phase I desk based wetland survey manual should be prepared, and made available to other local authorities so that similar wetland habitat inventories can be undertaken in their counties following standard guidelines.
- Extra resources should be put towards enforcing regulations preventing damage to wetland sites throughout county Monaghan.
- A public awareness campaign should be run to inform on the diverse wetland resource of the county and the value of this resource through amongst other things the provision of important ecosystem services (see section 4.3).

3 Introduction

3.1 Background

In February 2010 Monaghan County Council and The Heritage Council financed the production of a map and associated database holding information on freshwater wetlands in county Monaghan. This study has been part-funded by The Heritage Council and forms an important element of the County Monaghan Heritage Plan 2006-2010 (Monaghan County Council 2006).

Prior to this project no complete inventory of wetland areas existed for county Monaghan. The county has a variety and size of wetland types, with over 76 fen sites reported and 253 lakes or areas of open water (listed as areas of open water on the OS Discovery map series) with an area of 2,004 ha, and a further 2,267 cutover raised bog areas defined in the Teagasc subsoil map of the county (Meehan 2004), covering some 12,247 ha. These sites have ensured that county Monaghan has a rich wetland resource (Foss & Crushell 2007).

The wetlands of the county are not only important from a biodiversity perspective, and for their economic value (i.e. tourism and recreation use) but also provide many important ecosystem services such as flood prevention, provision of clean water and carbon storage.

The lack of a county wetland inventory has resulted in an incomplete picture of the distribution and extent of wetlands in county Monaghan. The lack of data on wetlands, their distribution and extent when taken together with the threat faced by these habitats from infilling and drainage may lead to the future loss of sites which have a county, national or even international value for biodiversity protection, and makes the development of wetland conservation programmes at a county level difficult.

3.2 Mains aims of project

To overcome the information deficit on the distribution of wetlands within the county, the main aim of the County Monaghan Wetlands Map (MWM) was to prepare a GIS data layer and associated site database of all previously recorded freshwater wetland sites in county Monaghan. The wetland habitats to be mapped included lakes and ponds, watercourses, springs, freshwater swamps, wet grassland, freshwater marsh, peat bogs, fens and flushes and semi-natural wet woodlands.

The sites identified were characterised and mapped as far as possible in terms of the wetland habitat(s) present. This allowed an assessment of the extent of each habitat type(s) within the county.

Wetland habitats on sites were to be classified according to the Guide to Habitats published by The Heritage Council (Fossitt 2000) to at least Level 2 and Level 3 where information was available that made such classification possible.

No field survey was undertaken in relation to this proposed data gathering and amalgamation project, which aimed to consolidate all known third party information on wetlands in county Monaghan, based on GIS and published information held by Government and State agencies, non-governmental organisations and private individuals, and published in previous reports and surveys. In addition, other as yet unidentified wetlands recognised from an aerial photographic survey of the county were also to be mapped, so as to produce a GIS wetland data set and associated map(s) for county Monaghan which was as complete as possible based on our current knowledge.

Based on the results of this study, the final report from the County Monaghan Wetlands Map (MWM), makes recommendations on priorities for future surveys based on critical or endangered habitats and geographical areas within the county where data is particularly lacking.

The methodologies developed and employed in the survey are documented in this report, together with a description of the importance of wetlands, the main wetland habitats present in county Monaghan and key findings from the current study.

Finally it was envisaged that the refined methodologies developed during this project and an earlier wetland habitat mapping project in county Clare (Crushell & Foss 2008), would provide a valuable blueprint to other counties where identification and mapping of the wetland resource and wetland surveys are also required.

4 Importance of Wetlands in County Monaghan

4.1 Definition

Wetland is a collective term for ecosystems (habitats and their associated species) whose formation has been dominated by water, and whose processes and characteristics and associated plants and animal are largely controlled by water. A wetland is a place that has been wet enough for a long enough time to develop specially adapted vegetation and other organisms (Maltby 1986).

They occur where the water table is at or near the surface of the land, or where the land is covered by a layer of shallow water, for some or all of the year.

The 1971 Ramsar Convention on Wetlands of International Importance defines wetland as:

“areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters”.

In addition, for the purpose of protecting coherent sites, Article 2.1 of the Ramsar Convention, to which Ireland is a signatory, provides that wetland sites be included in the Ramsar List of internationally important wetlands:

“may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six meters at low tide lying within the wetlands”.

Five major wetland types are generally recognized:

- **marine** (coastal wetlands including coastal lagoons, rocky shores, and coral reefs);
- **estuarine** (including deltas, tidal marshes, and mangrove swamps);
- **lacustrine** (wetlands associated with lakes);
- **riverine** (wetlands along rivers and streams); and
- **palustrine** (meaning “marshy” – wet grassland, marshes, swamps and bogs).

In addition to naturally occurring wetlands produced as a result of natural environmental processes, there are artificial wetlands such as fish ponds, farm ponds, irrigated agricultural land, reservoirs, gravel pits, sewage farms, treatment facilities, drainage ditches and canals (see Chapter 5 for additional details on wetland types).

Even in certain, so called “natural” wetland systems, human-kind has played a major factor in wetland formation since pre-historic times. In Ireland, forest clearance in the uplands helped trigger soil and vegetation changes, which altered the hydrology and led in some places to bog formation. And today, since some of these bogs have been harvested for fuel and their peat deposits removed, the flooding of the abandoned peat diggings has created new shallow lakes, with marginal fens and marsh areas.

In contrast to some other habitat types (e.g. woodlands), wetlands are therefore often young and dynamic ecosystems, changing in a relatively short period of time as vegetation changes, sediments are laid down, and local hydrological conditions are altered.

One other concept that should be born in mind when considering wetlands is that a specific wetland area is often composed of many different wetland types, which form a mosaic. So a cutover bog wetland, may in fact be composed of small regenerating fen and bog communities, pools, drainage ditches, and even deeper water pools or small lakes.

In the classification system of wetlands used in the context of MWM (outlined in the next chapter), wetland habitats are defined in greater detail based on The Heritage Council habitat classification scheme (Fossitt 2000).

On a global scale wetlands occur everywhere, from the tundra to the tropics. The area of the earth’s surface currently covered by wetlands is unknown. However, the UNEP-World Conservation Monitoring Centre has suggested an estimate of about 570 million hectares (5.7 million km²) of wetland – roughly

6% of the Earth's land surface – of which 2% are lakes, 30% bogs, 26% fens, 20% swamps, and 15% floodplains.

In the context of the County Monaghan Wetlands Map the project focused on the occurrence of freshwater wetlands within the county, which preliminary results suggest cover a minimum of some 5.7 % (7,319 ha) of the county, both of natural and artificial origin.

The 7,319 ha of the land area of the county covered by wetlands, includes 2,061 ha of lakes, 1,342 ha of bog and heath, 242 ha of wet woodland and scrub and 1,012 ha comprising fens, marshes, swamps and wet grassland. A further 2,665 ha of wetland identified during the current study could not be assigned to a particular habitat type and are recorded as '*unknown wetland type*'.

4.2 Why conserve wetlands?

As with many other natural environments humanity has generally looked on wetlands as an economic resource to be used for short term economic gain, and has often not recognised the long terms gain (both economic and non-economic) of functioning wetlands (DOEHLG 2008). Three examples of such actions in Ireland include:

- the national and local drainage schemes, or the embankment of rivers which can result in catastrophic floods during high rainfall periods when the drained land results in rapid surface water run-off;
- past afforestation schemes on bogs, which often did not produce the timber crop envisaged at the start of the afforestation project;
- overgrazing of blanket bogs which continues to have a detrimental effect on the western blanket bog habitats and is unsustainable.

Functional wetlands are among the world's most productive environments. They are cradles of biological diversity, providing the water and primary productivity upon which many species of plants and animals depend for survival. They support high concentrations and diversity of birds, mammals, reptiles, amphibians, fish and especially invertebrates. Wetlands are also important storehouses of plant genetic material.

The multiple roles of wetland ecosystems and their value to humanity have been increasingly understood and documented in recent years, as in the Irish Government report on the Economic & Social Aspects of Biodiversity (DOEHLG 2008). Internationally, this has led to large expenditures to restore the lost or degraded hydrological and biological functions of wetlands. But it is not enough – the race is on to improve practices on a significant global scale as the world's leaders try to cope with the accelerating water crisis and the effects of climate change. And this at a time when the world's population is likely to increase by 70 million every year for the next 20 years (UN statistic 2008).

Global freshwater consumption rose six fold between 1900 and 1995 – more than double the rate of population growth. One third of the world's population today lives in countries already experiencing moderate to high water stress. By 2025, two out of every three people on Earth may well face life in water stressed conditions.

The ability of wetlands to adapt to changing conditions, and to accelerating rates of change, will be crucial to human communities and wildlife everywhere as the full impact of climate change on our environment is felt. Small wonder that there is a worldwide focus on wetlands and their services to us.

In addition, wetlands are important, and sometimes essential, for the health, welfare and safety of people who live in or near them. They are amongst the world's most productive environments and provide a wide array of benefits (Ramsar website).

4.3 Wetland values

Wetlands range from ponds to rivers, reedbeds to bogs, and are home to a large diversity of plants and animals and are a haven for wildlife lovers. However, they are not just important for biodiversity. They also play a major role in storing flood water and can reduce flooding in built-up areas, vital given the changing weather patterns associated with global climate change.

Wetlands therefore provide tremendous economic benefits, for example: water supply (quantity and quality); fisheries (over two thirds of the world's fish harvest is linked to the health of coastal and inland wetland areas); agriculture, through the maintenance of water tables and nutrient retention in floodplains; timber and agricultural production; energy resources, such as peat and plant matter; wildlife resources; transport; and recreation and tourism opportunities.

- Wetlands improve water quality by removing and sequestering pollutants and sediments in the water.
- Wetlands store floodwaters, acting like natural sponges and slowing down the force of flood and storm waters as they travel downstream. Far from posing a flood threat, wetlands should be viewed as buffers, to protect areas where people live (DOEHLG 2008).
- Wetlands offer habitat for wildlife. Many migratory birds and other wildlife depend on the ecological setting of wetlands for their survival.
- Wetlands support biodiversity. The variety of living organisms found in wetlands contributes to the health of our planet and our own lives by ensuring our food supply, regulating the atmosphere and providing raw materials for industry and medicine.
- Wetlands provide valuable open space and create recreational opportunities. Hiking, fishing, boating and bird watching are just a few of the activities people can enjoy in wetland areas. The scenic vistas of wetlands make them an ideal area for nature photographers or painters.
- Wetlands are vital in preventing further climate change by acting as a store of carbon. Until recently this has not been fully appreciated, and in Ireland it has still not been adequately communicated to the general public. For example, peatlands are known to store 20-30% of the world's soil carbon, exceeding by three times the amounts stored in tropical rainforests (Bragg and Lindsay 2003).

In addition, wetlands have special attributes as part of the cultural heritage of humanity: they are related to religious and cosmological beliefs, constitute a source of aesthetic inspiration, provide wildlife sanctuaries, and form the basis of important local traditions.

These functions, values and attributes can only be maintained if the ecological processes of wetlands are allowed to continue functioning. Unfortunately, and in spite of important progress made in recent decades, wetlands continue to be among the world's most threatened ecosystems, owing mainly to ongoing drainage, conversion, pollution, and over-exploitation of their resources.

Putting an economic value on something as abstract as the ecological services of a wetland is a difficult idea for most people, but is becoming a more accepted economic tool. More commonly, the open market puts monetary values on society's goods and services. In the case of wetlands, there is no direct market for services such as clean water, maintenance of biodiversity, and flood control. There is, however, a growing recognition that such natural benefits do have real economic value and that these values need to be included in decision-making processes (see Table 4.1).

In a recent report by the Biodiversity Unit of the Department of the Environment, Heritage and Local Government (DOEHLG 2008) the biodiversity value of wetlands in Ireland was estimated to be worth €385 million per year to the Irish economy. In addition a further proportion of the €330 million assigned by this study to the economic value of the nature and eco-tourism value of all Irish habitats can be assigned to wetlands.

One other stark fact to emerge from this report is that "it is clear that the benefits of biodiversity far exceed the costs of the current levels of biodiversity protection" in Ireland, an indication that we still do not value the functions and services provided by wetlands to our well being as a society.

Numerous other reports exist in the literature that give clear examples of the economic value of wetlands. The UK Environment Agency has a wealth of literature showing the value of intact functioning wetlands in the control and alleviation of flooding episodes (Callan 2008). In addition a number of reports exists which show that intact wetland systems provide excellent value for money in the provision of water services when compared to the costs that would accrue if these services had to be supplied by artificial systems. An illustration is the example from the USA where the State of New York purchased a watershed area at a cost of 1.5 billion dollars, rather than spend 3 to 8 billion dollars it estimated it would cost for artificial waste water treatment facilities to do the same job.

The recent report "Wetland Ecosystem Economics: evaluating the benefits derived from Monaghan's wetlands" (Hime & Woodrow 2010) undertaken for Monaghan County Council estimated the economic value of just six case study wetlands in the county, covering a variety of wetland types. The report estimated that over a 50 year period, the value of the wetlands (at current prices) ranged from €10,000 for the smallest to €2.9 million for the largest of the six sites. Taken together the economic value for the 6 wetlands was estimated to lie between €4 million to €9.2 million over the same 50 year period, depending on the exact variables applied to functions provided by the wetlands in the economic analysis undertaken.

In many ways, the economic benefits received from wetlands are comparable to the benefits received from things such as public schooling, health care and municipal infrastructure.

Unfortunately, to date, society has generally only realized the benefit of wetland services after they have disappeared or been seriously degraded. Problems with flooding, lost recreational opportunities, reduced fish populations and more costly water treatment are examples of costs understood only after a wetland ecosystem has been degraded or destroyed.

The idea behind putting an economic value on some of these wetland benefits before ecosystem-altering decisions are made is to recognize these potential costs up front and thereby put wetland-related decisions on a more economically sound footing.

Table 4.1. Examples of the economic benefits that wetland provide

USE BENEFITS			NON-USE BENEFITS
Direct Use Benefits	Indirect Use Benefits	Option Benefits	Existence Benefits
recreation - boating - birding - wildlife viewing - walking - angling	nutrient retention water filtration flood control shoreline protection	potential future uses (as per direct and indirect uses) future value of information, e.g., pharmaceuticals, education	biodiversity culture heritage archaeology
trapping-hunting	groundwater recharge		non-use
commercial harvest - nuts - berries - grains - fisheries - peat - forestry	external ecosystem support micro-climate stabilization erosion control associated expenditures, e.g., travel, guides, gear, etc.		bequest value

(Modified from Barbier et al. 1997)

5 Wetlands in County Monaghan

5.1 County Monaghan an introduction

County Monaghan, occurs in the province of Ulster, and is an inland county in the north-central portion of Ireland. The name comes from the Irish, derived from *Muine Cheain* meaning the *place abounding with thickets*. The county extends from 53° 53' to 54° 25' (N. Latitude), and from 6° 33' to 7° 18' (W. Longitude).

County Monaghan covers an area of some 129,400 hectares. It is bounded by counties Tyrone to the north, Armagh and Louth to the east, Meath and Cavan to the south and Fermanagh to the west.

Monaghan, in the north, is the principal town. Other major towns include Carrickmacross and Castleblayney in the east, and Clones in the west. The population of Monaghan based on the 2002 census was 52,593 (25,787 female and 26,806 male). County Monaghan a relatively rural county in population terms, where 65% of the population live in rural areas.

5.2 Natural History of County Monaghan

County Monaghan has a rich natural heritage, particularly in relation to its wide range of natural and semi-natural habitats including wetland, woodland, hedgerow, lake, river and upland habitats that support a wide range of plant and animal species (Monaghan County Council 2006 & 2007).

In county Monaghan there are 38 proposed Natural Heritage Areas (pNHA's) comprising mainly wetland habitats, such as lakes, rivers, marshes, fens, bogs and woodland. These are recognised by Monaghan County Council as important conservation areas, and are included in the County Development Plan and County Heritage Plan (Monaghan County Council 2006).

The largest single wetland site in county Monaghan is Eshbrack bog on Sliabh Beagh, and known to many as Bragan. This site, in the main blanket bog, has recently been designated as a Natural Heritage Area (NHA), which provides it with full legal protection, against any adverse impacts. It is also a Special Protection Area (SPA) for birds because of the important population of the Hen Harriers occurring there. It is also important for Greenland White-fronted geese which use it as a wintering ground, and for Red Grouse, one of our native game species. Other species associated with the area include curlew, snipe and golden plover while buzzard is often seen hunting over the bogland.

Kilroosky Lough, just north of Clones is to date the only Special Area of Conservation (SAC) designated in county Monaghan under the Habitats Directive. This international conservation designation aims to protect the habitat of White-clawed Crayfish, a freshwater invertebrate species, whose survival relies on unpolluted water. Excellent examples of calcareous fens and lakes which are home to a variety of scarce plants and animals are also protected within this site.

The Erne catchment, comprising the Dromore River, the Finn River and the Bunnoe River systems dominate the west of the county. To the north lies the Blackwater system and to the south, the Fane and Glyde system can be found. The Ulster Blackwater and its tributaries, the Monaghan Blackwater and Mountain Water Rivers, contain good stocks of Brown Trout.

It is worth noting that these rivers also contain native White-clawed Crayfish, an internationally protected species. The Rivers Fane and Glyde contain Brown Trout and Salmon in county Monaghan. Both rivers also have good numbers of Sea Trout in their lower reaches in county Louth. The Bragan Mountain lakes, Lough More and Lough Emy contain good numbers of Brown Trout.

The lamprey, a species dating back to our glacial past is also present in many lakes and rivers. This is also an internationally important and protected species. Most lakes and rivers have good stocks of bream, roach, rudd, perch and pike. Eels are present in all waters in the county.

5.2.1 Topography and landforms

The county can be divided into 4 main topographic regions as follows (see Figure 5.1 below):

Southern Lowlands: the south eastern part of the county around Carrickmacross where the land ranges from 0 to 75 meters above sea level.

Central Region: the central portion of the county centered on Castleblayney where most of the land occurs between 75 and 150 meters above sea level. A number of smaller upland areas, reaching a maximum elevation of 300 m occur within this central zone .

Northern Lowlands: this lowland corridor, ranging in elevation from 0 to 75 m above sea level, runs from Clones in the west, eastward to Monaghan town, and northwards from there along the border with Armagh and Tyrone. The Ulster canal, as well as the Finn and Blackwater occur in this lowland corridor.

Northern Uplands: the northern part of the county is dominated by the upland area dominated by blanket bog and wet heath areas and by Slieve Beagh which has a peak of 372 m OD.

With the exception of the Northern uplands the remaining regions within the county all exhibit the classical drumlin landscape (small hills were formed from glacial action) created at the end of the Midlandian glaciation, the last ice age to occur in Ireland.

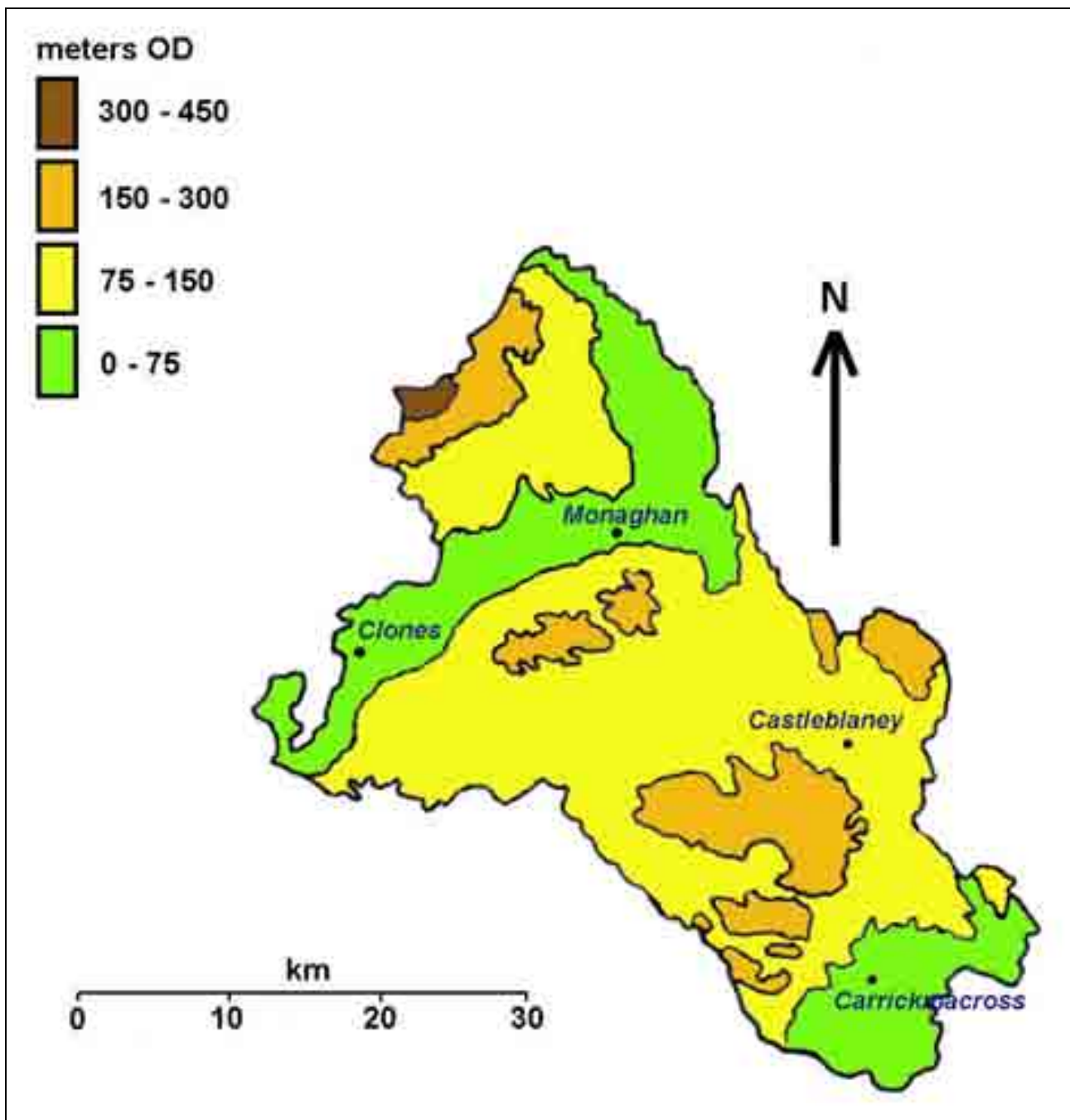


Figure 5.1. Relief map of county Monaghan showing elevation in meters above Ordnance Datum.
Adapted from the Royal Irish Academy – Atlas of Ireland, Anonymous 1979.

5.2.2 Geology

Geologically, county Monaghan consists of several rock types which are reflected in the different topographical and vegetation patterns (see Figure 5.2).

At the far north and south, the Dinantian limestone outcrops forming small knolls, many of which have been quarried. The remaining areas support patches of rich grassland or developing thorn scrub, both of which are of high ecological interest.

In the north-western corner, the Dinantian sandstones, shales and grits of the Yoredale Series form the hillside of Slieve Beagh. This is the highest point in county Monaghan, rising to 372 m. The acid bedrock is reflected in the overlying bog, heath and lake habitats.

The central part of the county consists entirely of Silurian and Devonian rocks, the land lying mainly between the 100 and 150 m contour. This main habitats of note in this region being the lake systems and smaller inter drumlin wetlands, including reedbeds, marsh and fen.

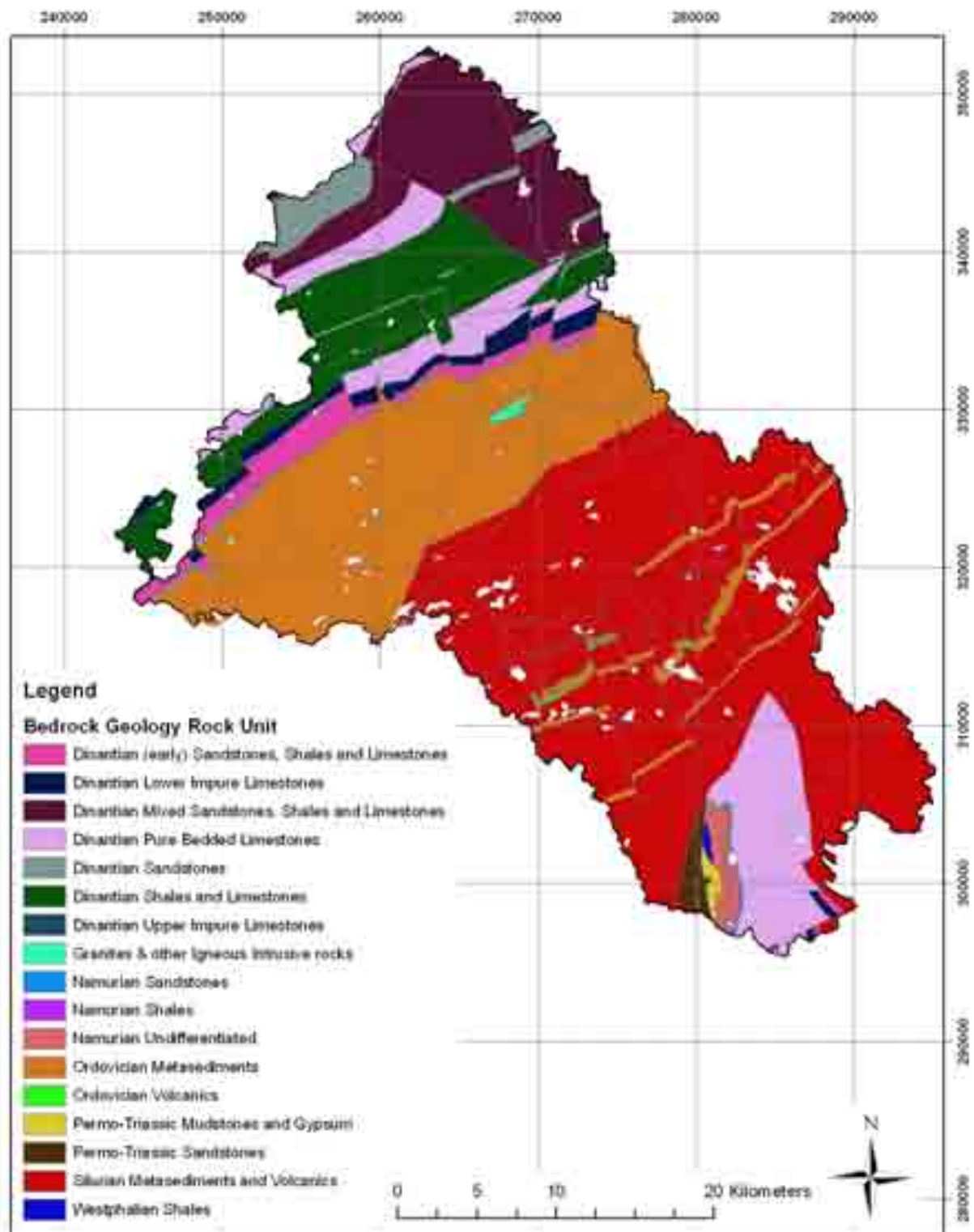


Figure 5.2. The solid geology of county Monaghan showing the main rock types occurring in the county. Source: Geraghty et al 1997.

5.2.3 Soils

The most recent period of geological history is the quaternary, beginning approximately 1.6 million years ago and continuing to today. During this period county Monaghan was glaciated on a number of occasions. Over much of the county the parent material of the soils is glacial drift (see Figure 5.3), which was deposited during the last (Midlandian) glaciation.

When the ice sheets were retreating during the most recent ice age, 10,000 years ago, unsorted mixtures of sediment, stones and boulders were deposited in mounds forming the drumlins which are a characteristic feature of the county today. In general the sediments deposited were heavy clays, leading to impeded drainage.

The hilly topography together with the soil types resulted in the creation of inter-drumlin lakes, fens, raised bogs and wetlands, another key characteristic of county Monaghan's landscape.

About 4,000 years ago a change in climate conditions resulted in the growth and accumulation of upland blanket bog. Sliabh Beagh or Eshbrack is Monaghan's largest area of upland blanket bog.

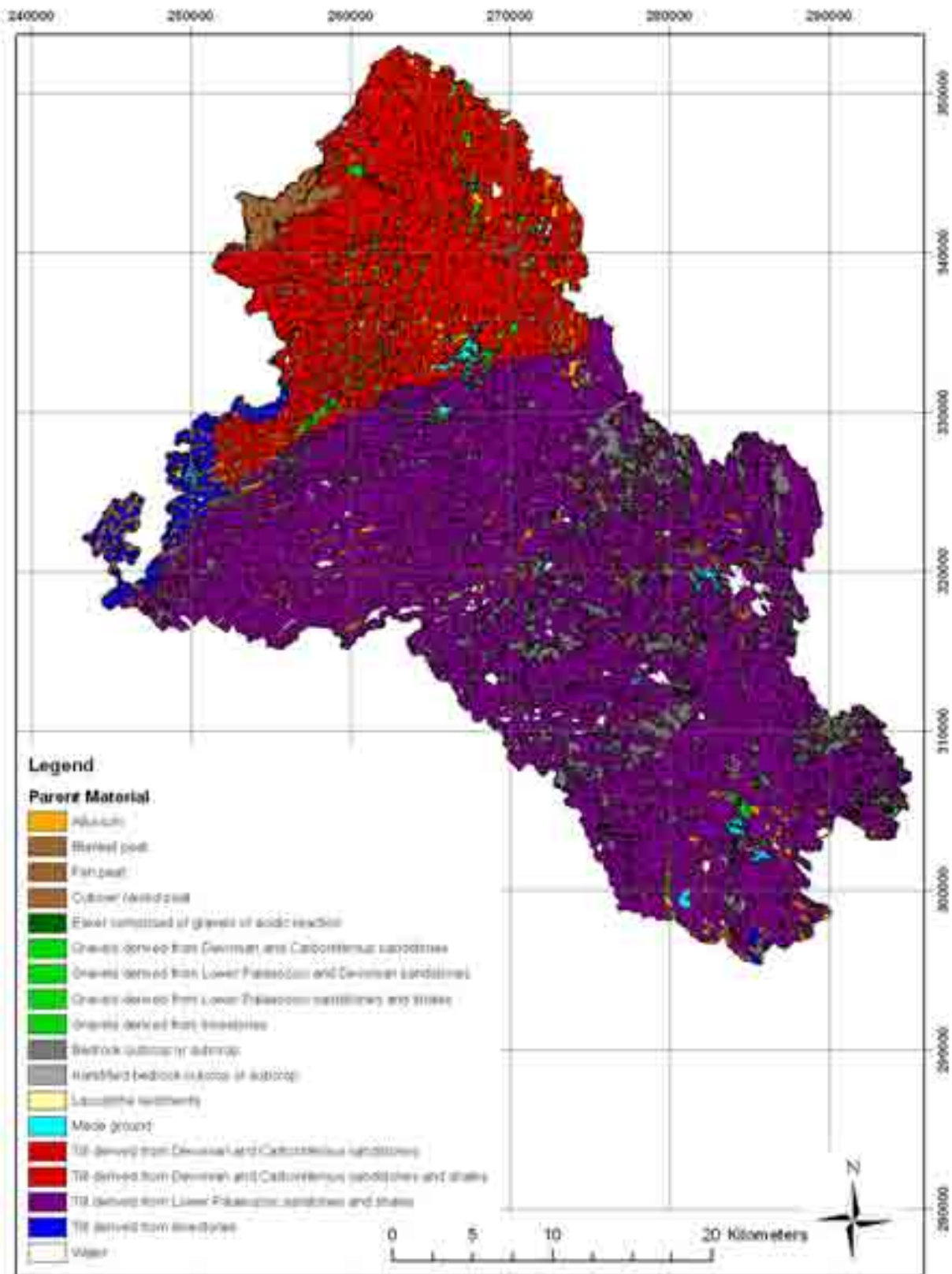


Figure 5.3. Sub-soil (parent material) map of county Monaghan.
Source: Teagasc subsoil map (Meehan 2004).

5.2.4 Climate

Ireland has a temperate maritime climate, that's best described as being mild, moist and changeable. Ireland's weather is also characterized by the abundant rainfall the country receives, and the notable absence of temperature extremes.

In comparison to climates typical of other countries in the same latitude, Ireland's weather is considerably warmer. Summers in Ireland are generally warm and the winters mild, thanks to the country's geographical position: lying in the Atlantic, the Gulf Stream warms Ireland all year.

Ireland's inland areas are generally cooler in winter and warmer in summer in comparison to the coastal regions. Clones, in county Monaghan and Mullingar, county Westmeath both have the lowest annual mean daily average temperature, at 8.8°C. Mean daily winter temperatures vary from 4°C to 7°C, and mean daily summer temperatures vary from 14.5°C to 16°C.

Typically, May and June are Ireland's sunniest months, averaging between 5 and 6½ hours of sunshine per day in most parts of the country. In contrast, December sunshine varies from 1 hour to 2 hours, with high cloud cover.

Ireland is noted for the abundant rainfall it receives. Rainfall is considerably greater in the western part of the country. County Monaghan receives between 800 and 1000 millimeters of rainfall in the year. The upland area in the north of the county at Slieve Beagh, has rainfall levels which exceed 1,200 millimetres per year. December and January are typically the wettest months of the year, and April the driest. County Monaghan averages 150 to 175 rain days per year.

5.2.5 Habitat Diversity and Wetlands

The geological, climatic and soil conditions referred to above have all contributed to a rich and diverse landscape within the county. The variety of wetland habitats found within county Monaghan is explored in more detail in section 6.3.

There are several upland areas in the county, the highest point being found on Slieve Beagh (365 m) on the border with Tyrone and Fermanagh. Eshbrack Bog is located on its slopes and contains the last remaining area of extensive blanket bog habitat in the county.

County Monaghan is important for lakes and wetlands; this is demonstrated by the large number of lakes that have been proposed as Natural Heritage Areas. Derrygoony Lough and Lough Bawn in the centre-west of the county are typical examples of the lakes found.

Drumlins are a characteristic feature of the topography of the county and fine examples of inter-drumlin lakes can be found on the River Dromore between Cootehill and Ballybay. Several of these feature characteristic swamp and marsh development. Elsewhere, small inter-drumlin hollows contain remnants of former raised bogs, that have long been cutaway and now contain a mosaic of regenerating fen, marsh and scrub habitats.

Moylan Lough in the east is a turlough site and is unusual in that it occurs in the northeast of Ireland whereas the majority of turloughs are found in the west of the country. The Kilroosky Lough Cluster to the west is of particular ecological interest due to its diversity of habitats and species and is noteworthy for being the only site to have been designated as a Special Area of Conservation (SAC) within county Monaghan. Of particular conservation significance are its hard water lakes containing White-clawed Crayfish and areas of alkaline fen.

As regards river systems, to the north lie the Blackwater and Mountain Water river systems, to the west the Finn river and to the south, the Fane, Annalee and Glyde river systems can be found (Martin 2006; see Figure 5.4).

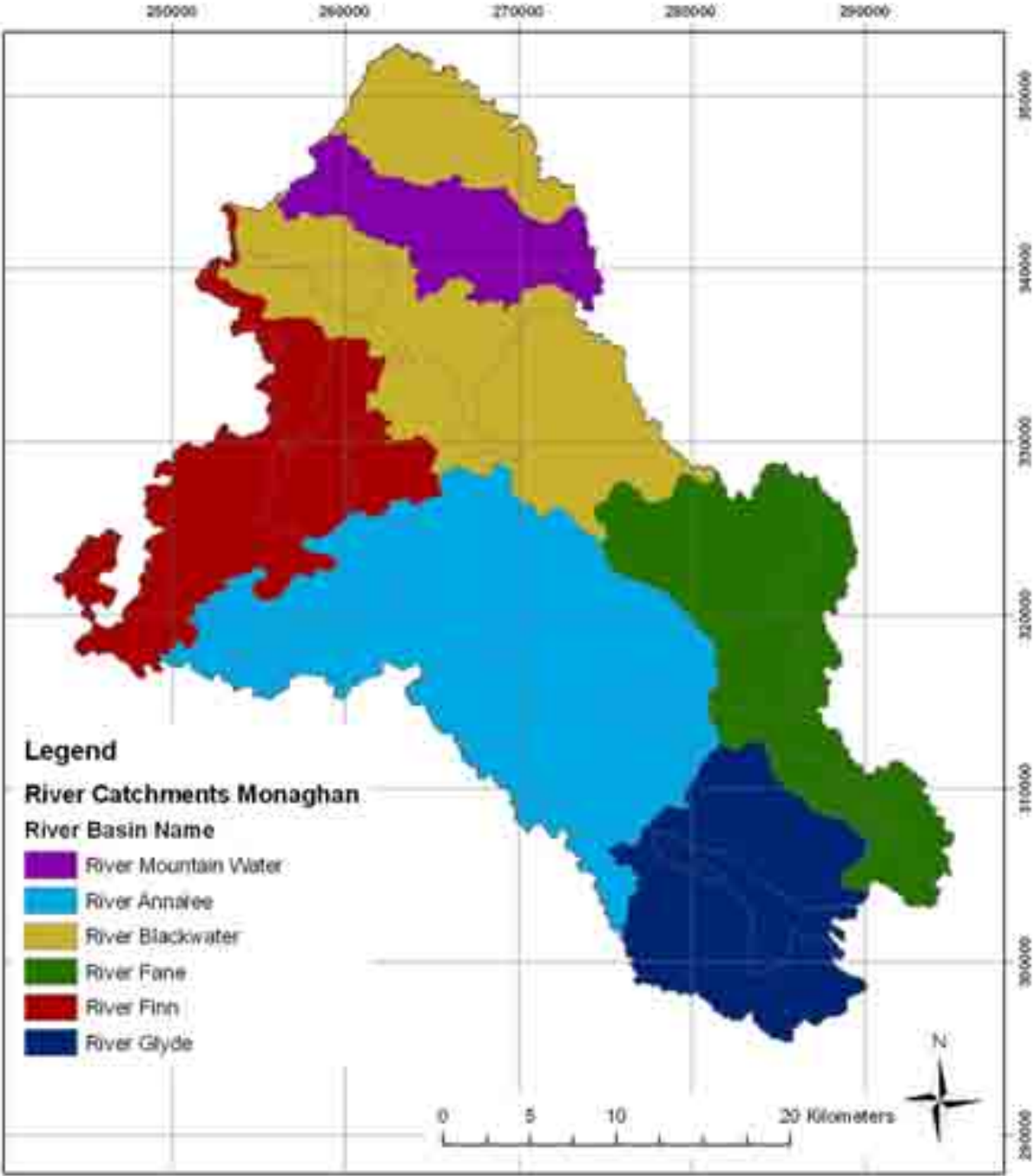


Figure 5.4. The River Basin Map of county Monaghan.
Source: after Ordnance Survey Ireland.

5.3 Wetland Habitats in County Monaghan – a Brief Description

Monaghan contains a wide range of wetlands of international and national importance. Due to the topography, hydrology, climate and soils present it has wetland habitats ranging from blanket bogs, fens, marshes, large riverine systems, a variety of lake types, wet woodlands and many more. County Monaghan is likely to contain some of the finest examples of transition mire fen in Ireland.

In the section which follows, a brief description and illustration of each of the main wetland habitat types occurring in county Monaghan, and being mapped as part of the County Monaghan Wetlands Map (MWM), are presented, together with examples of where these different wetland types can be seen in the county.

In addition to the general habitat descriptions this summary introduction to habitats includes some additional information on the wildlife value of these habitats. An indication is also provided of the main threats faced nationally by the more 'natural' of these habitats deemed to be of high conservation importance, which is based on the NPWS report entitled 'The Status of EU Protected Habitats and Species in Ireland' (NPWS 2008).

For a more detailed description of the wetland habitat types, the main floral species that occur in them, and detailed relationship of the Heritage Council classification system for habitats to the habitat classification system used in the EU Habitats Directive the reader is referred to **Appendix 6a** and **6b** at the end of this report. The detailed habitat accounts in this Appendix are based on The Heritage Council Guide to Habitats in Ireland (Fossitt 2000).

Photograph: Faltagh, Co. Monaghan



FL1 - Dystrophic lakes

Natural dystrophic lakes are an Annex 1 habitat under the EU Habitats Directive.

Natural lakes and ponds that are highly acidic (pH range 3.5-5.5), base-poor and low in nutrients, and where the water is brown in colour owing to inputs of humic and other acids from peat.

They are usually associated with blanket bogs, mainly the lowland type, raised bogs, cutover bogs and wet heathland areas and are characterised by peaty rather than rocky margins and substrata. The transition from bog to open

water is often abrupt. These lakes are important habitats for insect life.

The principal threats to natural dystrophic lakes and ponds are peat cutting, overgrazing and afforestation of peatland habitats.

Relatively common in upland blanket bog areas throughout the county such as within the Eshbrack Bog NHA, or in cutover bog sites in the lowlands such as at Faltagh.

FL2 - Acid oligotrophic lakes

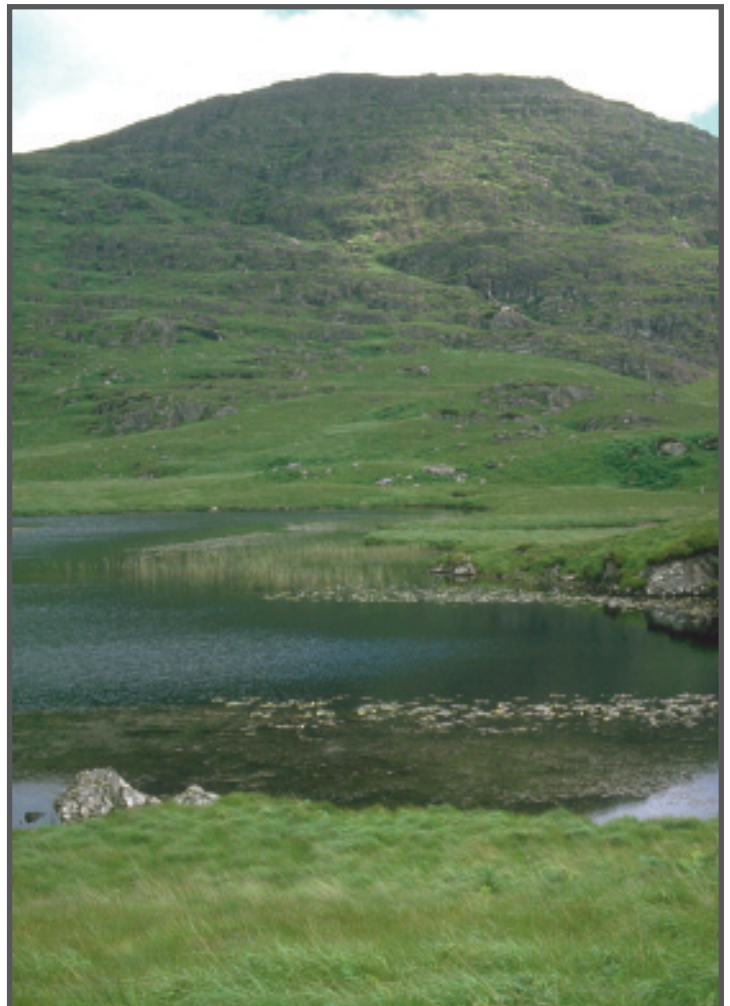
Annex 1 habitat under the EU Habitats Directive.

Lakes and ponds that are low in nutrients, base-poor and acidic. Most acid oligotrophic lakes are associated with areas of acidic bedrock and many have rocky margins. The substrate in shallow water is either rock, organic lake sediment, or coarse mineral material (sand and gravel). Water is often brownish in colour as a result of inputs from peaty soils or bogs in the catchments. These lakes support communities of submerged and floating aquatic plants.

These lakes are important habitats for insect life.

The principal threats to acid oligotrophic lakes include nutrient enrichment arising from agricultural practices such as overgrazing and excessive fertilisation, as well as afforestation, and waste water from housing developments in rural areas. Lakes may also be negatively affected by the introduction of invasive alien species, and their utilization for an increasing number of sport and leisure activities.

This habitat type is relatively common in areas with a non-calcareous bedrock. Example occur in county Monaghan in the Eshbrack Bog NHA.



Photograph: Blanket bog area, Co. Galway

Photograph: Dummy's Lough, Co. Monaghan



FL 3- Limestone and marl lakes

Annex 1 habitat under the EU Habitats Directive. Hard water lakes and ponds of limestone areas that are base-rich and poor to moderately rich in nutrients (oligo- to mesotrophic).

The water is typically clear and the lake sediment usually has a high proportion of marl, a white clay precipitate of calcium carbonate. Marl-forming Stoneworts (*Chara* spp.) are often abundant and may form dense carpets in unpolluted waters. Various-leaved

Pondweed (*Potamogeton gramineus*) is also characteristic. These lakes are frequently fringed by alkaline fen and flush vegetation. These lakes are important habitats for insect and birds.

Hard water lakes are often shallow and have a natural high capacity to buffer the effects of enrichment from phosphorus. However, build up of phosphorus in the sediment of these lakes can lead to rapid shifts in ecosystem quality. There is a continued threat from nutrient enrichment in these lowland lakes arising from intensification of agriculture and urban developments.

A good example of this lake type in Monaghan is Dummy's Lough located in the Kilroosky Lake Cluster SAC.

FL4 - Mesotrophic lakes

Lakes and ponds that are moderately rich in nutrients, and where the water is sometimes discoloured by algae. Characteristic aquatic plants include White Water-lily (*Nymphaea alba*), Yellow Water-lily (*Nuphar lutea*), and a large number of Pondweeds, Stoneworts (*Chara* spp.) may also be present. The fringing and aquatic plant communities are typically more lush than those associated with oligotrophic lakes.



Photograph: Drumgoast Lough, Co. Monaghan

These lakes are important habitats for insect and birds.

The principal threats to mesotrophic lakes include nutrient enrichment arising from agricultural practices such as overgrazing and excessive fertilisation, as well as afforestation, and waste water from housing developments in rural areas. Lakes may also be negatively affected by the introduction of invasive alien species, and their utilization for an increasing number of sport and leisure activities.

Many of the inter drumlin lakes in county Monaghan fit into this category, including Drumgoast Lough.

Photograph: Sheetrim, Co. Monaghan



FL5 - Eutrophic lakes

Natural Eutrophic lakes are an Annex 1 habitat under the EU Habitats Directive.

Eutrophic lakes and ponds that are high in nutrients and base-rich and the water is usually discoloured or turbid, often grey to green in colour, from the abundant algae and suspended matter present.

Some water bodies are naturally eutrophic but most Irish lakes are eutrophic as a result of enrichment and high levels of nutrients entering the water.

Characteristic aquatic plants of eutrophic lakes and ponds include

Duckweeds (*Lemna* spp.), Pondweeds (*Potamogeton* spp.) and Spiked Water-milfoil (*Myriophyllum spicatum*). Submerged aquatics are usually rare or are restricted to shallow waters owing to poor light penetration. Reed beds on sheltered shores and dense stands of fringing vegetation are characteristic of eutrophic lakes and ponds.

The main threat to this lake type is further nutrient enrichment caused by human activities.

Many of the smaller lakes in county Monaghan are categorised as Eutrophic lakes due to pollution caused by human activities, including Sheetrim Lough.

Photograph: Moylan Turlough, Co. Monaghan



FL6 - Turloughs

Priority habitat under the EU Habitats Directive.

Turloughs are seasonal lakes that occupy basins or depressions in limestone areas, and where water levels fluctuate markedly during the year. They are virtually unique to Ireland and their greatest concentration is in counties Clare, Galway and Roscommon.

The general pattern is to flood in winter and dry out in

summer, but there may be other sporadic rises in response to periods with high rainfall levels. Turloughs normally fill through underground passages and sinkholes in the limestone, but some also have inflowing rivers or streams. Some turlough basins retain standing water in channels, pools or small lakes when flooding subsides. All areas within the normal limit of flooding are considered as part of the turlough habitat. The presence of the distinctive dark moss, *Cinclidotus fontinaloides*, on stone walls or rocks can help to establish the flooding level within a turlough.

Soils of turlough basins can include marls, peat, clays or loams. Large boulders or exposures of bedrock may also be present.

Nutrient enrichment and inappropriate grazing regimes are the main threats to turlough habitats in Ireland.

A good example of this habitat type in Monaghan occurs at Moylan Lough.



Photograph: Swallow Hole at Moylan Turlough, Co. Monaghan

Photograph: Bohernabreena reservoir, Co. Dublin



FL7 - Reservoirs

Open water bodies that are used for the storage and supply of water. It includes natural lakes where water levels fluctuate significantly and unnaturally as a result of water abstraction, in addition to modified lakes with dams or retaining walls or banks or entirely artificial water bodies, some lined with concrete and that are used as reservoirs.

Redshank (*Polygonum persicaria*) is often common along the draw-down zone of reservoirs in lowland areas.

An example of this habitat occurs at Togan Reservoir and Lough Antraicer county Monaghan.

FL8 - Other artificial lakes and ponds

Includes farm ponds, artificial or ornamental bodies of standing water that may be found in parks, demesnes, gardens or golf courses as well as flooded quarries, tailings ponds and water treatment plants (with open water). The nutrient status of these artificial water bodies is variable and may be high as in the case of hypertrophic lakes in urban parks.

These water bodies are often important habitats for invertebrates and amphibians as they represent a more 'natural' habitat within otherwise highly managed environments. They may also have a high educational value in urban areas as a first contact point for people with a wetland habitat and its wildlife.

The main threats faced by such habitats include water pollution, habitat destruction caused by changes in farming practice or abandonment and infill by encroaching vegetation.

Example of this habitat can be seen in county Monaghan at Glaslough Constructed Wetlands or Eshveragh Quarry.



Photograph: Park pond, Tiergarten, Berlin, Germany

Photograph: Owenduff river tributary, Co. Mayo



Eshbrack Bog NHA fit this category.

FW1 - Eroding/upland rivers

Annex 1 habitat under the EU Habitats Directive.

Natural watercourses, or sections of these, that are actively eroding, unstable and where there is little or no deposition of fine sediment. Eroding conditions are typically associated with the upland parts of river systems where gradients are often steep, and water flow is fast and turbulent. For some rivers on the seaward side of coastal mountains, particularly in the west of Ireland, eroding conditions persist to sea level because of comparatively steep gradients over short distances, and high rainfall. Small sections of other lowland rivers may also be eroding where there are waterfalls, rapids or weirs. The beds of eroding/upland rivers are characterised by exposed bedrock and loose rock. Pebbles, gravel and coarse sand may accumulate in places, but finer sediments are rarely deposited. These rivers vary in size but are usually smaller and shallower than depositing/lowland rivers.

The unstable rocky channels of eroding/upland rivers usually support little vegetation cover. Submerged rocks and boulders may be colonised by aquatic mosses. Exposed rocks and wet shaded banks may also support extensive cover of lichens and liverworts. Higher plants are generally rare or absent except in places where fine sediments are trapped.

Pressures from eutrophication, overgrazing, excessive fertilisation, afforestation and the introduction of invasive alien species are the main threat to this habitat. Almost two thirds of the rivers assessed by the Environmental Protection Agency (EPA) are at risk of failing to meet their environmental objectives.

Many of the streams and rivers in the Monaghan uplands at

FW2 - Depositing/lowland rivers

Annex 1 habitat under the EU Habitats Directive.

Watercourses, or sections of these, where fine sediments are deposited on the river bed. Depositing conditions are typical of lowland areas where gradients are low and water flow is slow and sluggish. These rivers vary in size but are usually larger and deeper than those above. In a natural state these rivers erode their banks and meander across floodplains.

Plant and animal communities are influenced by numerous factors including substratum type, water force, nutrient status, water quality, channel size, water depth, human impact, disturbance and shade. Within a river channel there may be deep pools, backwaters, banks or mid-channel bars of gravel, sand or mud, in addition to vegetated islands and fringing reed beds. The substratum of depositing/lowland rivers comprises mainly fine alluvial or peaty sediments. Vegetation may include floating and submerged aquatics, with fringing emergents in shallow water or overgrowing the banks.

Due to their location in lowland areas, where agricultural activities are prevalent and with increased population pressures, most of these rivers have been modified to some extent to control water flow, facilitate navigation or prevent flooding and erosion. Canalised or walled sections of rivers, dredged or deepened sections, and artificial earth banks may occur. These activities all alter the natural river bank and adjacent vegetation occurring along such rivers.

The principal threats to these rivers include nutrient enrichment arising from agricultural practices, human developments along river banks and the introduction of invasive alien species, and utilization for sport and leisure activities.

There are some examples of this habitat occurring in county Monaghan such as the Dromore River System.



Photograph: Dromore River, Co. Monaghan

Photograph: Blennerville Canal, Co. Kerry



FW3 - Canals

Canals are artificial linear bodies of water that were originally constructed for the purpose of navigation. They typically lack strong currents and any significant channel or bank erosion. This means that canals tend to have closer affinities with ponds than rivers. They are readily colonised by aquatic plants and frequently support floating, submerged or emergent vegetation.

Locks that are used to control water levels are considered as part of the canal habitat.

Canals are important habitats for fish, insect and bird life.

All canals require management and maintenance to keep them open and operational. Where canals are abandoned they rapidly become choked with aquatic vegetation.

The Ulster Canal is an example of this habitat type in county Monaghan.

FW4 - Drainage ditches

These are linear water bodies or wet channels that are entirely artificial in origin, and some sections of natural watercourses that have been excavated or modified to enhance drainage and control the flow of water. Drainage ditches may be intimately associated with a range of other wetland types, including wet grassland, and modified marsh, bog and fen habitats.

Drainage ditches are generally not used for navigation and are typically narrower than canals. Drainage ditches either contain water (flowing or stagnant) or are wet enough to support wetland vegetation. Water levels are also likely to undergo seasonal fluctuations.

Drainage ditches must be maintained and cleared in order to keep them open. Those that are overgrown with vegetation are likely to be cleared intermittently.

Common habitat type throughout county Monaghan, examples of the habitat can be seen at most wetland sites such as Clonoony Lough.



Photograph: Clonoony Lough, Co. Monaghan

Photograph: Pollardstown Fen, Co. Kildare



FP1 - Calcareous springs

Priority habitat under the EU Habitats Directive.

Calcareous spring fens develop around permanent freshwater springs or areas of water seepage that are especially rich in calcium. The upwelling of water is often associated with an interface between permeable and impermeable rock or soil layers.

The water supply may be from upwelling groundwater sources, or from seepage sources or sometimes from geo-thermal sources. Petrifying springs may be

closely associated with Alkaline fens but with less fluctuations in water. A key requirement is a steady flow of water, though this may dry up for short periods.

Springs are often very small features covering no more than some tens of metres. Petrifying springs occur on shallow peaty or skeletal mineral soils.

On contact with the atmosphere at the spring head, carbon dioxide is lost from the water or is depleted by photosynthetic activities of plants growing in the spring, which results in the precipitation of a calcium bicarbonate marl or tufa crust. The vegetation in such areas, and especially mosses may be coated in a thick crust of lime. Larger petrifying springs may form tufa cones that constitute a singular habitat.

Springs occur in lowland and upland areas, are often very limited in extent and may be associated with a variety of different habitats such as alkaline fen, woodland, heathland, grassland, limestone rich boulder clay or gravel deposits or on exposed rock.

Spring vegetation is characterized by an abundant or dominant moss cover and may or may not be peat-forming.

Calcareous spring fens are rare in Ireland.

As calcareous spring sites are often small in extent they are threatened by a range of land reclamation, turf cutting, and drainage activities, which can rapidly degrade their structure and function. Damage to this habitat type is likely to have increased in severity since the 1990's due to these activities, which adversely impact on these small scale habitats.

To date this habitat type has not been reported from county Monaghan although it may occur in the limestone lake region of the county.

Photograph: Iron flush spring, Co. Mayo



FP2 - Non-Calcareous springs

Non-calcareous springs that are irrigated and kept permanently moist by acidic to neutral water that is base-poor and typically oligotrophic. They may be associated with skeletal mineral or peaty soils. Vegetation is typically dominated by mosses and a few higher plant species.

Non-Calcareous Springs occur in lowland and upland areas, are often very limited in extent and may be associated with a variety of different habitats such as woodland, heathland, grassland, bogs, wet clay banks or gravel deposits or on exposed bare rock.

As these spring sites are often small in extent they are threatened by a range of land reclamation, turf cutting, afforestation and drainage activities, which can rapidly degrade their structure and function. Damage to this habitat type is likely to have increased in severity since the 1990's.

This habitat type has been reported from county Monaghan along upland stretches of the River Fane.

FS1 - Reed and large sedge swamps

Swamps are commonly found around lakes, on slow flowing river banks and estuaries.

They are usually species-poor stands of vegetation that are dominated by Reeds and other large grasses or large, tussock-forming Sedges.

Most reed and large sedge swamps are overwhelmingly dominated by one or a small number of species, as in the case of reed beds. Stands of vegetation can range from very dense to open.

Unlike tall-herb swamps below, in reed and large sedge swamp the broad-leaved herb component is a minor element in the vegetation.

Swamps support a number of EU protected species including Otter, Sedge Warbler, Water Rail, Moorhen and other water fowl.

The principal threats to this habitat include nutrient enrichment and damage arising from agricultural practices (overgrazing, mowing and drainage), human developments around lakes and utilization of lakes for increased sport and leisure activities.

Examples of this habitat are common on lakes throughout county Monaghan, an example of the habitat can be seen at Shankill Lough.



Photograph: Shankill Lough, Co. Monaghan

Photograph: Greaghglas Lough, Co. Monaghan



FS2 - Tall herb swamps

Annex 1 habitat under the EU Habitats Directive.

Tall-herb swamps are comparatively species-rich stands of vegetation dominated by herbs that occur in wet areas where the water table is above the ground surface for most of the year, or where water levels fluctuate regularly as in the case of tidal sections of rivers. Tall herb swamps are not dominated by reeds.

Swamps support a number of EU protected species including Otter, Reed Warbler, Water Rail, Moorhen and other water fowl.

The principal threats to this habitat include nutrient enrichment and damage arising from agricultural practices (overgrazing, mowing and drainage), human developments around lakes and utilization of lakes for increased sport and leisure activities.

Reported in county Monaghan from Greaghglas Lough.

GS4 - Wet grassland

Annex 1 habitat under the EU Habitats Directive.

Rushy fields or wet grassland can be found on flat or sloping ground in upland and lowland areas. It occurs on wet or waterlogged mineral or organic soils that are poorly-drained or, in some cases, subjected to seasonal or periodic flooding. On sloping ground, wet grassland is mainly confined to clay-rich gleys and loams, or peaty soils that are wet but not waterlogged. Wet grassland occurs on areas of poorly-drained farmland that have not recently been improved, seasonally flooded alluvial grasslands such as the River Shannon callows, and wet grasslands of tur-
lough basins.



Photograph: Lisnalee, Co. Monaghan

Agricultural intensification over the past century, drainage, increased fertilisation and more recently, abandonment of pastoral systems, which contributes to rank vegetation and scrub encroachment, all lead to the loss of some typical flora and to a reduction in the area of the habitat nationally.

Common throughout county Monaghan, where the habitat can be seen in inter drumlin hollows throughout the lowlands of the county.

Photograph: Mullaglassan Lough, Co. Monaghan



GM1 - Marsh

Annex 1 habitat under the EU Habitats Directive.

Marsh is found on level ground near slow-flowing river banks, lake shores, and in other places where mineral or shallow peaty soils are waterlogged, and where the water table is close to ground level for most of the year.

Unlike swamps, standing water is not a characteristic feature except, perhaps, during very wet periods or in winter months. Marshes tend to be comparatively species-rich especially with herbs. It can be an ideal breeding ground for waders such as Snipe.

The main threats to this habitat

include the spread of invasive species, arterial drainage and agricultural improvement at the edge of rivers and lakes.

Marsh has been reported widely from county Monaghan. The habitat has been reported from Mullaglassan Lough.

HH3 - Wet Heath

Annex 1 habitat under the EU Habitats Directive.

Wet heaths include vegetation with at least 25% cover of dwarf shrubs such as Ling Heather, on peaty soils and shallow wet peats that typically have an average depth of 15-50 cm (where deeper peat deposits occur the habitat is usually classified as bog).

Wet heath can occur in upland and lowland areas and is widespread on the lower slopes of hills and mountains that are either too dry or too steep for deep peat accumulation. Wet heath can grade into, or form intimate mosaics with upland blanket bog, or lowland blanket bog with minor changes in slope and topography.

Wet heath is typically dominated by Ling Heather (*Calluna vulgaris*) and Cross-leaved Heath (*Erica tetralix*), or by Purple Moor-grass (*Molinia caerulea*) and/or Sedges. Moss and Lichen cover may be high in areas of undamaged wet heath. Wet heaths and adjacent blanket bog areas support a number of EU protected species including Red Grouse, Curlew, Golden Plover and Hen Harrier.

Reclamation, afforestation and burning have resulted in extensive loss of wet heath. Overstocking of land with sheep has also degraded large areas of the habitat, especially in western regions, through overgrazing and trampling. This has depleted heather and other plant cover and allowed invasion by non-heath species, or exposure of peat to severe erosion. Although various schemes to initiate recovery of damaged habitat through more sustainable stocking rates have been in operation for a number of years, recovery has been slow.

Examples of this habitat often occur in a mosaic with Blanket Bog in the uplands of the county such as Eshbrack Bog NHA and at Lough Nahinch among cutover bog.



Photograph: Lough Nahinch, Co. Monaghan



PB1 - Raised bogs

Priority habitat under the EU Habitats Directive.

Raised bogs are accumulations of deep acid peat (3-12 m) that originated in shallow lake basins or topographic depressions at the end of the last glaciation 10,000 years ago. The name is derived from the elevated surface, or dome, that develops as raised bogs grow upwards from the surface accumulating organic material; the domed effect is often exaggerated when the margins of a bog are damaged by turf cutting or drainage, and are drying out.

The surface of a relatively intact raised bog is typically wet, acid and deficient in plant nutrients (as bogs receive most of nutrients through rainfall), and supports specialised plant communities that are low in overall diversity. The vegetation is open and colourful *Sphagnum* mosses dominate the ground layer. Raised bogs are most abundant in the lowlands of central and mid-west Ireland.

Intact actively growing raised bog is extremely rare, having decreased in area by over 35% in the last 10 years. Ongoing deterioration of the hydrological conditions of raised bogs at current rates caused by peat cutting, drainage, forestry and burning severely threatens the viability of the habitat at most locations in Ireland.

Examples of this habitat are rare in county Monaghan where most of the raised bogs were cut in the past to win fuel. An intact example of this habitat has been reported from Lough Egish.

PB2 - Upland blanket bog

Priority habitat under the EU Habitats Directive, provided that active peat accumulation is occurring within a site.

Upland blanket bog occurs on flat or gently sloping ground above 150 m and is widespread on hills and mountains throughout Ireland. The 150 m limit serves to distinguish upland from lowland blanket bog but is loosely applied. Peat depths vary and normally fall in the range of 1-2 m, but can be much deeper in pockets. Upland blanket bog can be extremely wet where it occurs on level terrain and may have surface drainage features that are typical of lowland blanket bog.

Blanket bog areas support a number of EU species including Irish Hare, Red Grouse, Curlew, Golden Plover and Hen Harrier.

Current pressures and threats include overstocking by grazing animals (especially sheep), peat erosion, drainage, burning and infrastructural developments (i.e. windfarms).

Good examples of this habitat occurs within the Eshbrack Bog NHA in the north western part of the county.



Photograph: Owenduff Bog, Co. Mayo



PB3 - Lowland blanket bog

Priority habitat under the EU Habitats Directive, provided that active peat accumulation is occurring within a site. Depressions on peat substrates (found within blanket bog areas) are an Annex 1 habitat under the EU Habitats Directive.

Lowland blanket bog, also known as Atlantic or oceanic blanket bog, is more restricted in its distribution than the upland type and is largely confined to wetter regions along the western seaboard where the annual rainfall exceeds 1250 mm. Blanket formation started 4,000 years ago as the climate became wetter. Described as a climatic peat type, it occurs on flat or

gently sloping ground below 150 m. Peat depths vary considerably (1.5-7 m) depending on the underlying topography, and are usually intermediate between those of raised bog and upland blanket bog. The vegetation of lowland blanket bog is typically 'grassy' in appearance. This habitat includes important breeding grounds for a number of EU Bird Directive species including Merlin, Golden Plover, Hen Harrier and Red Grouse.

Blanket bogs depend to a large degree on maintenance of surface water flow patterns at a landscape scale and hence are dependent on sensitive land management practices. Extensive areas have been destroyed or highly modified (chiefly through reclamation, peat extraction, conifer afforestation but also via erosion and even landslides triggered by human activity). Current pressures include overstocking with grazing animals, peat extraction, drainage, burning and infrastructural developments, and in the past unsuitable afforestation projects.

This habitat type has not been reported from county Monaghan.

PB4 - Cutover bog

Depressions on peat substrates (found within cutover bog areas) are an Annex 1 habitat under the EU Habitats Directive.

Cutover bog is a variable habitat, or complex of habitats, that can include mosaics of bare peat and re-vegetated areas with woodland, scrub, heath, fen and flush or grassland communities. It occurs where part or all of the original peat has been removed through turf cutting, by the traditional hand method or mechanically, for either domestic or commercial purposes.



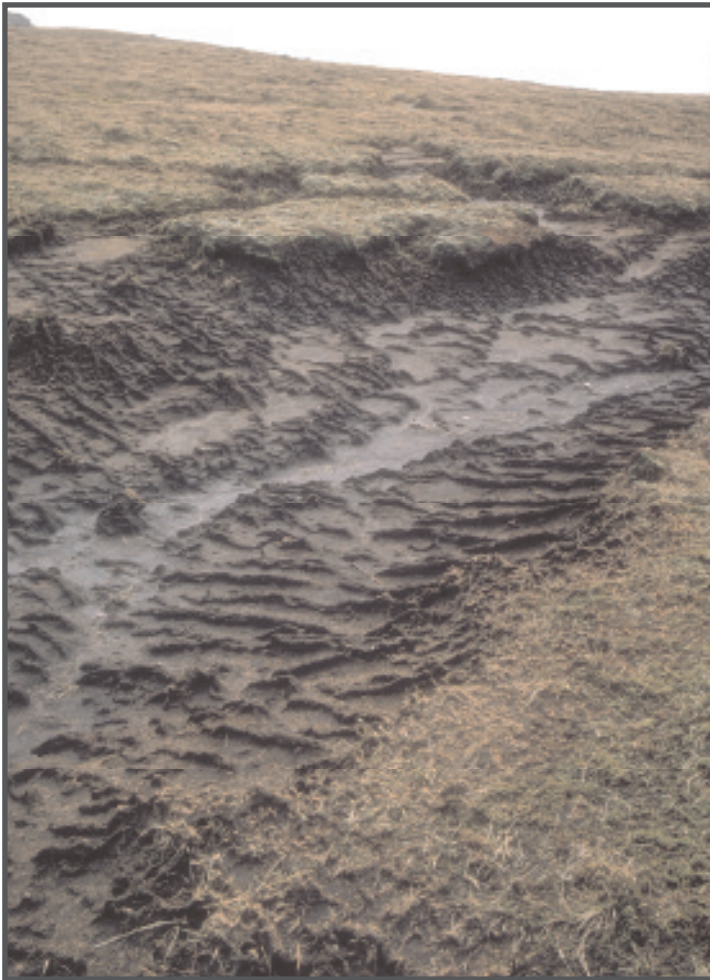
Photograph: Eshbrack, Co. Monaghan

The nature of the recolonising vegetation depends on numerous factors including the frequency and extent of disturbance, hydrology, the depth of peat remaining, and the nature and soil chemistry of the peat and the underlying rock or soil. Standing water is usually present in drains, pools or excavated hollows. Some large areas of cutover bog have been reclaimed as farmland or planted with trees, particularly conifers.

The full extent of the cutover may be difficult to establish as it frequently grades into other marginal habitats or farmland.

Common throughout the peatland areas of county Monaghan such as Eshbrack Bog NHA, and in cutover raised bog habitats found in inter-drumlin hollows in the lowlands.

Photograph: Kippure Bog, Co. Dublin



PB5 - Eroding blanket bog

This habitat occurs on blanket bogs (upland and lowland) where part of the original peat mass has been lost through erosion, and where sizeable areas of bare peat are exposed. Eroding blanket bog is most commonly associated with upland areas, and mountain peaks and ridges in particular. The causes of erosion are numerous; some erosion may have occurred as a natural process but, over the last two decades, overgrazing by livestock (particularly sheep) has been a major contributory factor.

Eroding blanket bog is often characterised by networks of channels and gullies that have cut down through the protective layer of vegetation to expose the underlying peat. As erosion continues, these channels widen, deepen and coalesce until eventually the rocky substratum is reached. Some small blocks of the original bog, known as peat hags, may remain.

To be categorised as eroding blanket bog, a substantial proportion of the original bog surface should be missing and peat should have eroded below the rooting zone of the surface vegetation. In such situations, the process is likely to be irreversible, or recovery very slow, even if damaging activities cease. Eroding blanket bog also occurs on peatlands damaged by bog bursts when sizeable areas of bare peat are exposed.

In county Monaghan this habitat has not been recorded.

PF1 - Rich fen and flush

Alkaline (rich) fen is an Annex 1 habitat under the EU Habitats Directive. Saw sedge (*Cladium mariscus*) fen, a particular type of rich fen, is a **priority habitat** under the EU Habitats Directive.

Rich fen and flush are peat forming wetlands that receive mineral nutrients from sources other than rainfall, usually groundwater or flowing surface waters that are at least mildly base-rich or calcareous, and are usually found over areas of limestone bedrock. The substratum is waterlogged peat and this usually has a high mineral content.



Photograph: Brosna floodplain, Co. Offaly

Fens differ from bogs because they are less acidic and have relatively higher mineral levels. They are therefore able to support a much more diverse plant and animal community.

They occur in a variety of situations including valleys or depressions, valley head fens, within transition mire and tall reed beds, on the landward side of hard-water oligotrophic lakeshore communities, calcium-rich flush areas in blanket bogs, dune slack areas, fens adjacent to raised and blanket bogs, in turlough sites, depressions in limestone pavement and wet hollows in machair, and spring fed habitats including cliffs, and even saltmarsh.

Alkaline fen may also occur as a secondary regenerating habitat on mined out bog sites which have been excavated to the fen peat layer.

Vegetation is typically dominated by Black Bog-rush (*Schoenus nigricans*) and/or small to medium Sedges (grass like plants). Rich fen and flush can be important for orchids. A well-developed layer of brown moss is also characteristic.



Photograph: Killyvilly Lough, Co. Monaghan

Rich fen are also important habitats insects and for a number of rare snail species.

Like most peatland types in Ireland, fens have declined in extent mostly as a result of activities such as peat mining, agricultural drainage, infilling, and fertiliser pollution and eutrophication. Only limited measures have been introduced to address these damaging activities, which are likely to have increased in severity since the 1990's.

The habitat is rare in county Monaghan. An example of the habitat has been reported from Killyvilly Lough NHA.

Photograph: Lisarilly Bog, Co. Monaghan



PF2 - Poor fen and flush

Poor fen and flushes include peat-forming communities that are fed by groundwater or flowing surface waters that are acid. In most cases the substratum is acid peat which has a higher nutrient status than that of surrounding acid bogs. The vegetation of poor fens and flushes is typically dominated by sedges and extensive carpets of mosses, in particular, *Sphagnum* moss.

Poor fens occur in a variety of situations including areas flushed by moving water in upland and lowland blanket bogs, flushed depressions in grassland areas, cutover bogs and wet heath areas.

Like most peatland types in Ireland, poor fens have declined in extent mostly as a result of activities such as peat cutting and mining, afforestation, agricultural drainage, infilling, and fertiliser pollution and eutrophication.

Present throughout many of the regenerating cutover bog sites in county Monaghan, and at Lisarilly Bogs NHA.

PF3 - Transition mire & quaking bog

Annex 1 habitat under the EU Habitats Directive. Transition mires and quaking bogs are peat-forming communities developed at the surface of waters with little or moderate amounts of nutrients, with characteristics intermediate between rich (alkaline) and poor (acidic) fen types. For this reason, they are considered as a separate habitat but they may occur within, or on the fringes of other peat-forming systems.

They present a large and diverse range of plant communities. In large peaty systems, the most prominent communities are swaying swards, floating carpets or quaking mires formed by medium-sized or small Sedges, associated with *Sphagnum* or brown mosses.

Transition mires and quaking bogs are usually associated with the wettest parts of a bog or fen and can be found in wet hollows, infilling depressions, or at the transition to areas of open water. The vegetation frequently forms a floating mat or surface scraw over saturated, spongy or quaking peat. Standing water may occur in pools or along seepage zones. The vegetation typically comprises species that are characteristic of bog, fen and open water habitats.

In some cases the mire occupies a physically transitional location between bog and fen vegetation, for example on the margin of a raised bog, or may be associated with certain valley and basin mires.

Like most peatland types in Ireland, transition mire have declined in extent mostly as a result of activities such as peat cutting and mining, afforestation, agricultural drainage and reclamation, infilling, and fertiliser pollution from adjacent farmland.



Photograph: Corlea Bog, Co. Monaghan

Extensive areas of this habitat were recorded in county Monaghan from Killyneill Fen and Corlea.



Photograph: Brackloon wood, Co. Mayo

WN4 - Wet pedunculate oak-ash woodland

Priority habitat under the EU Habitats Directive.

This type of woodland is associated with areas that are flooded or waterlogged in winter but which dry out in summer. It occurs on periodically-flooded alluvial sites that are well above the limits of regular inundation, and on drumlins and other sites with heavy, poorly-drained clay soils that are subject to waterlogging.

The woodland is dominated by Pedunculate Oak (*Quercus robur*) and/or Ash (*Fraxinus excelsior*), with other common components including Alder (*Alnus glutinosa*), Willows (*Salix* spp.) can be locally abundant.

When flooding subsides in alluvial sites, exposed channels and depressions may remain wet or waterlogged.

The area of alluvial forests has declined in Ireland and this, taken together with their fragmented nature, abundance of alien invasive species and sub-optimal grazing regimes and drainage continues to threaten the habitat.

A rare habitat in the county, recorded from Bishops Lough.

WN5 - Riparian woodland

Riparian woodlands are wet woodland habitats of river margins (gallery woodland) and low islands that are subject to frequent flooding, or where water levels fluctuate as a result of tidal movement (in the lower reaches of rivers).

Riparian woodland is dominated by stands of Willows that may include native and non-native species. Alder (*Alnus glutinosa*) is occasional. Stands of Reed Canary-grass (*Phalaris arundinacea*) are common. Indian Balsam (*Impatiens glandulifera*), an introduced species, is locally abundant. These woodlands often reveal an accumulation of river borne debris, including dead vegetation and plastic, when water levels are low. A fine coating of grey mud on vegetation and tree bases that are regularly submerged and emersed is also characteristic.



Photograph: Muckroom wood, Co. Cork

Their fragmented nature, abundance of alien invasive species and sub-optimal grazing regimes and drainage continues to threaten the habitat.

Habitat is known to occur in county Monaghan at Annamarron.

Photograph: Lisabuck Lough, Co. Monaghan



WN6 - Wet willow-alder-ash woodland

Includes woodlands of permanently waterlogged sites that are dominated by willows (*Salix* spp.), Alder (*Alnus glutinosa*) or Ash (*Fraxinus excelsior*), or by various combinations of some or all of these trees.

It includes woodlands of lake shores, stagnant waters and fens, known as carr, in addition to woodlands of spring-fed or flushed sites. Carr occurs on organic soils and fen peats that are subject to seasonal flooding but remain waterlogged even when flood waters recede.

As the area of fen has declined so has the area of wet woodland, mostly as a

result of activities such as peat cutting and mining, conifer afforestation, agricultural drainage and reclamation, infilling, and fertiliser pollution from adjacent farmland. Although drainage of fens may in some cases have led to a local short term increase in the cover of wet woodland in some areas.

Likely to be the most common wet woodland type in county Monaghan, examples of the habitat can be seen at Lisabuck Lough.

WN7 - Bog woodland

Priority habitat under the EU Habitats Directive.

Woodlands found on intact ombrotrophic bogs (raised or blanket), bog margins and cutover bog. Bog woodland typically occurs on deep acid peat that is relatively well-drained in the upper layers and is commonly associated with former turf cutting activity or drainage where internal raised bog drainage patterns allow the development of woodland stands (i.e. soak systems on bogs). It may also occur in areas of cutover bog where most of the peat has been removed. Downy Birch (*Betula pubescens*) is the usual dominant and may form pure stands. Willows (*Salix* spp.) may also occur.



Photograph: Sheetrim, Co. Monaghan

A characteristic feature is the ground cover of *Sphagnum* moss species which often form deep carpets, usually with *Polytrichum* mosses and occasional Lichens.

Woodland of waterlogged acid peats in hollows or depressions in areas of upland woodland on siliceous rocks may also be included in this habitat category.

Bog woodlands are closely associated with raised bogs, occurring either on intact bogs, on cutaway or on transition mires (transition between fen and bog). They are found mostly in the central and north midlands. Their total area is uncertain.

They are threatened by drainage, peat cutting, burning and development; although in the long term it is believed that they will expand as cutaway re-floods.

A relatively rare habitat in county Monaghan, a good example can be seen at Sheetrim.

Photograph: Morgans Lough, Co. Monaghan



WS1 - Scrub

Annex 1 habitat under the EU Habitats Directive.

Found on a variety of habitat types, scrub includes areas that are dominated by at least 50% cover of shrubs (e.g. Gorse), stunted trees or brambles. The canopy height is generally less than 5 m, or 4 m in the case of wetland areas.

Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland. In the absence of

grazing and mowing, scrub can expand to replace grassland or heath vegetation. Trees are included as components of scrub if their growth is stunted as a result of exposure, poor soils or waterlogging. If tall trees are present, these should have a scattered distribution and should not form a distinct canopy.

Examples of this habitat can be seen in county Monaghan at Morgans Lough.

5.4 Protection of Monaghan Wetlands

Due to their recognised ecological importance, a small number of wetland sites in county Monaghan are offered legislative protection under various site conservation designations. The main nature conservation designations that afford protection to wetland sites are summarised below.

NP – National Park

National parks are defined as areas where one or several ecosystems are not materially altered by human exploitation and occupation; where plant and animal species, geomorphological sites and habitats are of special scientific, educational and recreational interest or which contain a natural landscape of great beauty (www.NPWS.ie).

There is no National Park designated in county Monaghan.

NNR - National Nature Reserve

National Nature Reserve are areas set aside for their conservation value by the Minister for the Department of Environment, Heritage and Local Government. These sites are usually State owned, in cases where these areas are privately owned, land-owners enter into a management agreement with the National Parks and Wildlife Service.

There are no wetland sites designated as a National Nature Reserves in county Monaghan.

SAC – Special Area of Conservation

Special Areas of Conservation have been selected from the prime examples of wildlife conservation areas in Ireland. The legal basis from which selection is derived from the EU Habitats Directive (92/43/EEC of the 21st May 1992) (CEC 1979). SACs that are undergoing the formal designation process but have not finally been submitted to Europe are called cSACs which stands for “candidate Special Areas of Conservation”.

Actions that may affect the ecological integrity of sites are not to be permitted except in circumstances of overriding public interest or safety. Land-owners require permission from the Minister of the Environment to carry out certain ‘notifiable actions’ such as drainage or fertiliser application, depending on the habitats in question.

There is currently only one main site designated as an SAC in County Monaghan, the Kilroosky Lough Cluster SAC. Details on 6 sub-sites that occur within the SAC are held in the MWM site database (see Table 7.4 in results section 7.5 below and Appendix 8).

SPA - Special Protection Area

Special Protection Areas for Birds are areas which have been designated to ensure the conservation of certain categories of birds. Ireland is required to conserve the habitats of two categories of wild birds under the European Birds Directive (Council Directive 79/409/EEC of the 2nd April 1979) (CEC 1979).

The NPWS is responsible for ensuring that such areas are protected from significant damage.

There is currently only one main site designated as an SPA in County Monaghan, the Slieve Beagh SPA. Details on 6 sub-sites (known to contain wetland habitat) that occur within the SPA are held in the MWM site database (see Table 7.4 in results section 7.5 below and Appendix 8).

NHA – Natural Heritage Area

The basic designation for wildlife conservation is the Natural Heritage Area (NHA). This is an area considered important in a national context for the habitats present or which holds species of plants and animals whose habitat needs protection. Some of these sites are small, such as roosting areas for rare bats; others can be large such as a blanket bog complex or a sand dune system.

To date in Ireland, only raised bogs (75 sites) and blanket bogs (73 sites) have been formally designated as Natural Heritage Areas covering an area of ca 60,000 ha (www.NPWS.ie). Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally **proposed** for designation. The protection afforded to Natural Heritage Areas is similar to that afforded to Special Areas of Conservation as described above.

There is currently only one main site designated as an NHA in County Monaghan, the Eshbrack Bog NHA. Details on 9 sub-sites (known to contain wetland habitat) that occur within the NHA are held in the MWM site database (see Table 7.4 in results section 7.5 below and Appendix 8).

pNHA - proposed Natural Heritage Areas

Proposed Natural Heritage Areas (pNHA) were published on a **non-statutory** basis in 1995, but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats. Some of the pNHAs are tiny, such as a roosting place for rare bats. Others are large - a woodland or a lake, for example.

Nationally pNHAs cover approximately 65,000 ha and NPWS has indicated that designation will proceed on a phased basis over the coming years (www.NPWS.ie). Prior to statutory designation, pNHAs are subject to limited protection being considered in afforestation grants, REPS and recognition by planning authorities.

Within county Monaghan a total of 36 pNHA sites containing wetland habitats (as classified by the Monaghan Wetlands Map project) are recorded in the MWM site database. Details of the 36 sites, and the 23 sub-sites that occur within these are provided in Table 7.4 in results section 7.5 below and Appendix 8).

cNHA – candidate Natural Heritage Area

Candidate Natural Heritage Area (cNHA) is the name given to wildlife sites that are proposed by NPWS and by third parties for consideration as NHAs. Included within this category are the pNHA described above, together with newly discovered sites recommended for conservation by a variety of third parties.

These sites are of significance for wildlife and habitats.

Prior to designation these sites may require further detailed survey and evaluation for their conservation value. If they are considered of national conservation value they may then enter the formal NHA designation process. The cNHA sites have no legal protection until they are taken up into the formal NHA designation process, unless they are also former pNHA (see above).

A total of 82 site and sub-site cNHAs containing wetland habitats are recorded in county Monaghan in the MWM site database (see Table 7.4 in results section 7.5 below and Appendix 8).

5.5 MWM Wetland types

The County Monaghan Wetlands Map (MWM) set out to map the distribution and extent of all freshwater wetland habitat types as defined by the Fossitt habitat classification system of The Heritage Council Guide to Habitats (Fossitt 2000).

The Heritage Council Guide to Habitats in Ireland sets out a standard hierarchical scheme for the identification of habitats in Ireland. The guide is a practical tool to allow identification and recording of habitat types.

The guide lists the main terrestrial wetland and wetland related habitats in Ireland under the main level 1 categories of freshwater, grassland and marsh, heath and dense bracken, peatlands, woodland and scrub and coastland. Table 5.1 adapted from Fossitt (2000) lists the main wetland habitat types being recorded and mapped as part of the MWM.

The level 1 wetland habitat categories are further divided to level 2 and subsequently level 3 as shown in Table 5.1. These levels provide progressively more detail of the specific wetland habitat(s) recognised.

It was the aim of the MWM to categorise as many of the wetland sites identified in county Monaghan as possible in terms of the occurrence of the 32 level 3 wetland habitat types. Identification to this level was of course only possible where specific habitat information on sites was available or where aerial photography allowed identification of a particular level 3 habitat type (see Materials and Methods, for a discussion of limiting factors in relation to habitat recognition and identification encountered during the MWM).

Where a site could not be identified to level 3, the Fossitt classification scheme has the advantage that it allowed identification of habitats on sites to level 1 or level 2 in most cases.

See Appendix 6a of this report for a more detailed description of the individual level 3 habitats, and the relationship of the Fossitt habitat types to those listed on Annex 1 of the EU Habitats Directive. Detailed descriptions of each wetland habitats is presented in Appendix 6b. These descriptions are taken from Fossitt (2000) with some minor modifications to the text.

Table 5.1. The 32 level three Fossitt (2000) wetland habitat types being recorded as part of the County Monaghan Wetlands Map project 2010. Level 3 Fossitt habitats with an equivalent habitat under Annex 1 of the EU Habitats Directive are marked with an *, while priority habitats under the EU Habitats Directive are marked with **.

Fossitt Level 1 Habitat Code and Name	Fossitt Level 2 Habitat Code and Name	Fossitt Level 3 Habitat Code and Name
F Freshwater	FL Lakes and Ponds	FL1 Dystrophic lakes *
		FL2 Acid oligotrophic lakes *
		FL3 Limestone/marl lakes *
		FL4 Mesotrophic lakes
		FL5 Eutrophic lakes *
		FL6 Turloughs **
		FL7 Reservoirs
		FL8 Other artificial lakes and ponds
	FW Watercourses	FW1 Eroding/upland rivers *
		FW2 Depositing/lowland rivers *
		FW3 Canals
		FW4 Drainage ditches
	FP Springs	FP1 Calcareous springs **
		FP2 Non-Calcareous springs
	FS Swamps	FS1 Reed and large sedge swamps
		FS2 Tall herb swamps *
G Grassland and Marsh	GS Semi-natural grassland	GS4 Wet grassland *
	GM Freshwater marsh	GM1 Marsh *
H Heath & dense bracken	HH Heath	HH3 Wet heath *
P Peatlands	PB Bogs	PB1 Raised bogs * & **
		PB2 Upland blanket bog **
		PB3 Lowland blanket bog * & **
		PB4 Cutover bog *
		PB5 Eroding blanket bog
	PF Fens and Flushes	PF1 Rich fen and flush * & **
		PF2 Poor fen and flush
		PF3 Transition mire and quaking bog *
W Woodland and scrub	WN Semi-natural woodland	WN4 Wet pedunculate oak-ash woodland **
		WN5 Riparian woodland
		WN6 Wet willow-alder-ash woodland
		WN7 Bog woodland **
	WS Scrub/transitional woodland	WS1 Scrub *
MWM Unknown wetland type	na	na

6 Compilation of the County Monaghan Wetlands Map GIS and Site Database

6.1 Background and Project set-up

This County Monaghan Wetlands Map project was undertaken over a 6 month period from the start of March 2010. The study was primarily a desk study not involving any field survey of sites or ground truthing of habitat information.

Information on known and potential wetlands in county Monaghan; as well as key areas where wetlands might be likely to occur was abstracted from a variety of existing third party GIS datasets, previous surveys of particular wetland types, published and other research information sources, personal communication with ecological practitioners and staff in Monaghan County Council and from a desk-based survey of colour aerial photography of the entire county.

The project depended on the co-operation and assistance of the many groups and individuals who provided data to the project (see Appendix 2 for a list of all groups and individuals who were consulted).

The main challenge of this project was to abstract a list of sites containing one of the 32 wetland types being recorded (see above) and obtain area information for the different wetland types present on the sites recognised in county Monaghan.

As part of the MWM mapping project two main databases were created to hold site information.

The first was a MWM GIS dataset (created using ArcView 10 GIS software package and subsequently converted for use with MapInfo) to hold site related information on each wetland site identified. The dataset is in the form of an ESRI shapefile (point dataset) with numerous attributes containing information on each site such as, area, designation (where relevant), habitats recorded etc. The boundaries (where possible) of each individual site identified were recorded in a separate dataset (polygon).

The second was a MWM Site Database (Filemaker Pro 11.0 software database package supporting data export to Excel format spreadsheets) which held the same information as in the GIS database, plus some additional site specific data unsuitable for storing in GIS format. The site database allowed for easier sorting of site records, data input of site information and subsequent data analysis.

Data from both of these databases was readily exported into an Excel spreadsheet which allowed data exchange between the MWM GIS dataset and main MWM Site database, and accessibility to data for third parties without the appropriate GIS or Filemaker database software.

6.2 Materials & Methods

The data collection period for information on sites held within the MWM GIS and associated site database was undertaken from the start of March 2010 to the end of September 2010. See Appendix 1 for details of data sources used during the project period and Appendix 3 for the methodologies used in importing site data.

The methodology employed during the course of the study is illustrated in Figure 6.1. The main stages involved were: data acquisition; design and set-up of *MWM Site database* and *MWM GIS database*; site identification and background research; data entry (and mapping) and data transfer between databases; data analysis and result presentation.

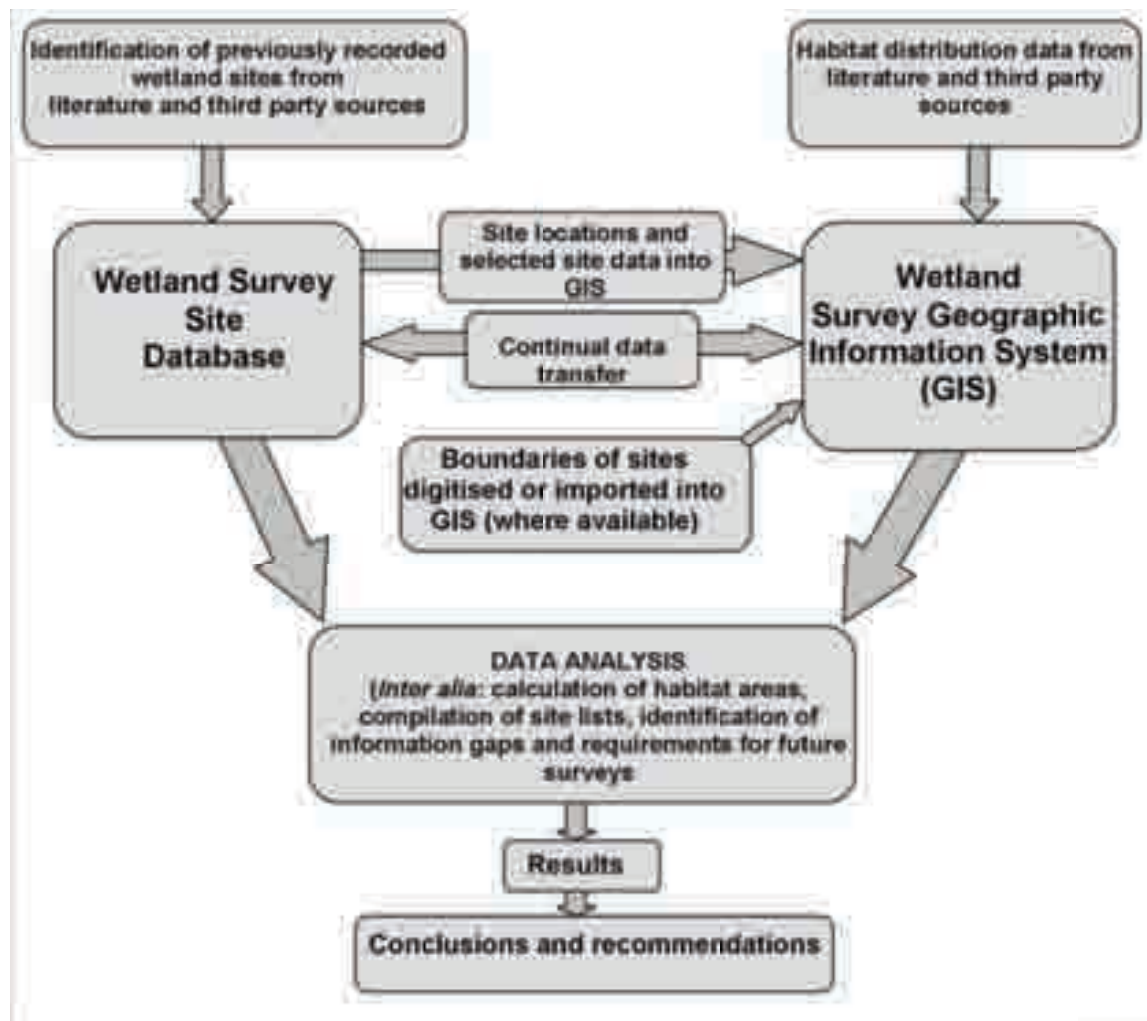


Figure 6.1. Flow chart illustrating the various steps undertaken during the course of the Monaghan Wetlands Map project 2010.

6.2.1 Data acquisition

The first stage of the County Monaghan Wetlands Map project involved identifying potential wetland site data sources which included published literature, unpublished reports, scientific publications, digital data-sets, and information held by State agencies, non-governmental organisations and ecological practitioners.

Data acquisition involved gathering published and unpublished literature and requesting data from as wide a range of relevant third parties as possible. The list of data sources consulted in the compilation of the county Monaghan wetland site list is provided in Appendix 1.

The requested information was held in a variety of formats including GIS data sets, habitat and site records in databases and spreadsheets, and in published reports, surveys and scientific publications.

Within these sources wetlands have been identified and assigned to a particular wetland category using a variety of classification schemes, including the Annex 1 Habitats Directive system; Fossitt classification system; the CORINE wetland classification system; together with other classification systems used in relation to specific habitat studies (e.g. NHA survey, fens & flushes, fen classification system of Crushell 2000) and raised and blanket bog surveys.

A list of sites containing various "wetland" categories identified by these research groups, was produced from the data sources that existed, to compile a comprehensive list of all sites that contain at least one of the 32 wetland habitats being mapped as part of the MWM.

6.2.2 MWM Site identification and background research

On project commencement an extensive literature review was carried out on the amalgamated datasets with the aim of identifying previously reported wetland sites throughout county Monaghan. Following the literature review each site found to contain, or believed to contain one or more of the 32 wetland types being recorded in this study, was added to the MWM site database and an individual site record was created. Basic site data (county, grid reference etc.) and data in relation to the occurrence and extent of one or more of the wetland types was recorded in relation to each site record.

Where more than one individual site occurred within a larger NHA or SAC complex, a record was created for both the site complex (the main site) and the individual sub-sites within the main site recognised by previous researchers (see Appendix 3 for further details).

For an explanation of the specific data recorded on sites see Appendix 3. This information was stored in the MWM site database within a series of database fields thus enabling effortless searches, data-examination and creation of site lists during the data analysis stage of the study.

6.2.3 GIS Data compilation and GIS wetland identification

ArcView 10 GIS software package on a Windows Operating System was used throughout the MWM for all mapping purposes. During the same period as the site database was being developed, GIS data-sources were incorporated into the MWM Geographical Information System (GIS). Following the acquisition of the relevant base-maps and aerial photography from Monaghan County Council other data-sets were entered as they became available (see Appendix 1 for list of all GIS datasets used during the MWM). See Appendix 3 for further details of methodology employed in compiling the GIS.

Soon after commencement of the survey it became apparent that the literature review would mainly identify sites that had been previously surveyed or reported in any detail. Therefore, GIS data compilation work was concentrated on identifying sites that may occur outside of the existing network of designated sites (which are a major proportion of previously reported sites). The county was systematically surveyed on a 10km x 10km basis using the OS series of 6 Inch Maps in combination with Colour Aerial Photography (Ordnance Survey of Ireland, 2005 series) and other datasets, avoiding areas within existing designated sites and known lakes and rivers (which were contained in data-sources obtained from the EPA). A minimum area of circa 1 hectare was set in the identification of new wetland sites by GIS. As new sites were identified, they were digitised by drawing a polygon around all identifiable contiguous wetland habitats.

In general, it is relatively straight-forward to identify wetlands from non-wetland habitats based on aerial photography in combination with six inch mapping, parent material (sub-soil) dataset and topographical mapping. Where possible, habitat types were recorded in the associated attribute table, although in many cases this was not possible due to difficulty in differentiating between wetland habitats such as wet grassland, fen, reed swamp and marsh on aerial photography. In the cases where it was not possible to definitively determine the wetland type from aerial photographic examination (with reference to other datasets), the site was entered into the 'MWM unknown wetland type' habitat category. In other cases a mosaic category was created to map habitat types that are impossible to differentiate due to their close spatial association (e.g. HH3_PB3 Wet heath - Blanket bog mosaic; HH1_HH3 - Dry - wet Heath mosaic *inter alia*). Digitising was undertaken at a scale of 1:2000 and the feature being digitised followed the centre of the feature in the underlying raster (usually either aerial photography or OS 1:5000 mapping).

It is important to note that aerial photographic surveying is a relatively crude exercise and should not be used for any more than identifying 'potential' wetland types. Habitats can only be assigned (especially to level 3 of Fossitt) by field survey and ground-truthing. All wetland areas that were identified by GIS analysis alone have been coded with the appropriate 'survey method' code as recommended for use by Smith *et al.* (2010) (see Table 6.1).

Datasets added from third party sources were transformed where necessary (and possible) to comply with the Fossitt classification. Details on how these datasets were dealt with and incorporated into the GIS are presented in Appendix 3 and 4.

Table 6.1. Survey method codes assigned to habitat polygons recorded during MWM 2010. *The codes are recorded in the attributes of the relevant GIS dataset (taken from Smith et al. 2010).*

Code	Survey method
S	Field data have been collected by <i>walkover survey</i> where the habitat has been walked through by the field ecologist, allowing relatively detailed inspection of habitat structure and species composition.
V	Data have been <i>field validated</i> where the habitat has been viewed in the field in less detail, such as over the hedge or inspection through binoculars from a distance.
DA	Habitat information is from a <i>desktop</i> source that provides <i>recent</i> (i.e. within 10-15 years), <i>high quality</i> data that permit a confident identification of habitat type and other data, such as a previous survey carried out as part of a research project or EcIA or information from a trusted third party.
DB	Habitat information is from a <i>desktop</i> source that provides <i>older</i> (i.e. greater than 10-15 years old), <i>high quality</i> data that permit a confident identification of habitat type and other data.
DC	Habitat information is derived from <i>desktop</i> interpretation of <i>aerial photography</i> supplemented by additional data sources of good quality.
DD	Habitat information is derived from <i>desktop</i> interpretation of <i>aerial photography only</i>

6.2.4 Data Transfer and Mapping of MWM Database sites

The sites identified from the literature review were exported from the site database and imported into the GIS as individual points by using the grid co-ordinates reported in the literature. Each of the sites was examined in the GIS and the exact location confirmed. This took considerable time as many of the reported grid references were inaccurate, therefore, other means such as townland searches had to be used to aid in the identification of site locations. Once sites were confirmed, corrected data was exported back into the MWM site database. Following this, boundaries of MWM sites were identified. In the case of many sites, boundaries previously drawn by the relevant third party were used (e.g. NPWS in the case of designated sites), however where boundaries were not available from other sources, draft boundaries were drawn around the area that appeared to contain the wetland site in question (see Appendix 3 for further details).

Due to time constraints, it was not possible to systematically attempt to map the habitats of all of the MWM sites. From the existing information on these sites, their potential to hold wetland habitats is known and GIS analysis would have been of limited further value, as sites would need to be ground-truthed in any case to confirm habitat identification. Furthermore, much of the existing digital habitat data-sets that became available during the course of the MWM tended to be biased towards these sites.

The specific mapping considerations employed in the MWM are outlined in Table 6.2 below. This table gives an indication of the particular mapping rules applied in relation to each of the 32 wetland types being mapped in the MWM.

6.2.5 Data Analysis and presentation of results (GIS and MWM site database)

Following the compilation of the GIS, area calculations were carried out on each habitat type, including the category 'MWM unknown wetland type'. This allowed a minimum estimate of the extent of each habitat type within the county to be prepared. These calculations were also carried out at Level 1 and Level 2 of Fossitt, as some areas were only identified to these levels.

Maps were drawn showing the distribution of MWM wetland sites throughout the county. The GIS shapefiles emanating from the survey were converted into MapInfo Format as required by Monaghan County Council. Both ESRI shape-file and MapInfo Table formatted files are included on the CD accompanying this report.

Due to the scale of mapping used, it was not possible to display the entire habitat map of the county in printed format to be included in this final report. As an alternative two random 10km x 10km squares were selected to display the approximate coverage and appearance of the final habitat map. The complete MWM wetland GIS dataset is included on the report CD.

Various site lists and tables were drawn up using a combination of the MWM site database and the GIS database. This together with the area data allowed a provisional assessment to be made of the diversity and extent of different wetland habitats in county Monaghan. Other details of sites were summarised using the MWM site database based on the fields such as damage, threats and conservation status thus allowing overall conclusions to be drawn concerning the status of the wetland resource in county Monaghan.

Table 6.2. Habitat mapping considerations from the County Monaghan Wetlands Map project 2010.

Fossitt Level 3 Habitat Code and Name	Comments on Habitat Mapping
FL1 Dystrophic lakes	Systematic recording of all lakes undertaken. Assignment to this habitat type where data available.
FL2 Acid oligotrophic lakes	Systematic recording of all lakes undertaken. Assignment to this habitat type where data available.
FL3 Limestone/marl lakes	Systematic recording of all lakes undertaken. Assignment to this habitat type where data available.
FL4 Mesotrophic lakes	Systematic recording of all lakes undertaken. Assignment to this habitat type where data available.
FL5 Eutrophic lakes	Systematic recording of all lakes undertaken. Assignment to this habitat type where data available.
FL6 Turloughs	Systematic recording of all turloughs identified in third party GIS files and paper based maps undertaken.
FL7 Reservoirs	Not mapped unless identified in third party GIS data sets.
FL8 Other artificial lakes and ponds	Not mapped unless identified in third party GIS data sets.
FW1 Eroding/upland rivers	All rivers were identified in third party GIS data set but not possible to definitively determine Level 3.
FW2 Depositing/lowland rivers	All rivers were identified in third party GIS data set but not possible to definitively determine Level 3.
FW3 Canals	Not mapped unless identified in third party GIS data sets.
FW4 Drainage ditches	Only mapped where third party GIS data sets include this habitat type.
FP1 Calcareous springs	Only mapped where third party GIS data sets include this habitat type.
FP2 Non-Calcareous springs	Only mapped where third party GIS data sets include this habitat type.
FS1 Reed and large sedge swamps	Not possible to determine from Aerial Photographs. Only mapped where third party GIS data sets include this habitat type.
FS2 Tall herb swamps	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
GS4 Wet grassland	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
GM1 Marsh	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
HH3 Wet heath	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
PB1 Raised bogs	Mapped to level 2 from Aerial Photography. Also mapped where third party GIS data sets include this habitat type.
PB2 Upland blanket bog	Mapped to level 2 from Aerial Photography. Also mapped where third party GIS data sets include this habitat type.
PB3 Lowland blanket bog	Mapped to level 2 from Aerial Photography. Also mapped where third party GIS data sets include this habitat type.
PB4 Cutover bog	Mapped to level 2 from Aerial Photography. Also mapped where third party GIS data sets include this habitat type.
PB5 Eroding blanket bog	Mapped to level 2 from Aerial Photography. Also mapped where third party GIS data sets include this habitat type.
PF1 Rich fen and flush	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
PF2 Poor fen and flush	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
PF3 Transition mire and quaking bog	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
WN4 Wet pedunculate oak-ash woodland	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
WN5 Riparian woodland	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
WN6 Wet willow-alder-ash woodland	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
WN7 Bog woodland	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
WS1 Scrub	Not possible to determine from Aerial Photography. Only mapped where third party GIS data sets include this habitat type.
MWM Unknown wetland type	Areas mapped under this category where habitat could not be assigned to one wetland habitat types above or where habitats occurred in a complex mosaic within a site.

6.2.6 MWM Site Database – structure and content

A specific MWM site database was created at the outset of this project to hold data on the wetland sites recorded during the course of this study. The database was created in Filemaker Pro Version 11.0 which runs on both PC and Mac platforms. Site information from this database is readily exported to Excel spreadsheets (see Appendix 8 and the associated total database export Excel spreadsheet included on the CD Rom containing this report).

In summary the main MWM site database held information on site name and code, site provenance, size (area in ha or length in km), third party site name and code codes, national grid reference, site conservation designations, habitat information on the specific wetland vegetation type(s) present and the area of each (or an estimate where no accurate data was available), information on rare species of note, and a list of published reports holding information on the site and the nature of same, and a site description where this could be imported from a digital third party source.

A second bibliography database, holding a list of references relating to the GIS data sources, scientific reports and publications referring to wetlands in county Monaghan, make up the complete MWM site database. Each of these data sources or publications was given a unique code number which was recorded with the individual site records within the MWM site database.

An overview of the data fields used to record information on sites, in the MWM GIS and site database are provided in Appendix 4. The main data entry layouts within the MWM site database are illustrated in Appendix 5.

7 Results

7.1 MWM Data Limitations

A number of difficulties and limitations with respect to the compilation of the MWM list of wetland sites were encountered, which the reader should be aware of, before interpretation of the data is undertaken and to provide an estimate of the level of confidence that can be applied to the data from the current study.

7.1.1 Wetland site identification

Although every effort was made to compile a complete map of all wetland sites in county Monaghan, from an examination of aerial photographs, and from data held by external sources, it is very probable that additional smaller wetland sites do occur which have not been mapped within the MWM GIS and database. Therefore the list of sites presented here should not be regarded as definitive.

Primarily this lack of site identification is due to: the small nature of some wetland types making mapping impractical (e.g. drains); it was not possible to include all areas of common habitat types such as wet grassland, which may occur in a mosaic within other habitats including improved grassland; the occurrence of wetland areas that cannot be identified from aerial photographs; and because detailed habitat maps do not exist for certain areas identified as being of conservation value.

7.1.2 Wetland habitat type classification

During the selection of wetland sites, it was not always possible to ascertain with certainty, which of the wetland types recognised by this survey, occurred on a given site.

In other cases, where more than one wetland type occurred within a site, in a complex mosaic of habitats, the habitat was recorded as 'MWM Unknown Wetland Type'. To ascertain the level 3 Fossitt category (or even level 1 in the case of wet grassland, reed-swamp, marsh or fen) present on these sites ground truthing via field surveying will be required.

The data-sets which contributed to the habitat map came from a variety of sources (as recorded within GIS). This has meant that it is of varying quality, much of it originates from detailed field surveys while other data may originate from Satellite Imagery (in the case of degraded raised bog from Corine dataset). Therefore, it must be emphasised that the habitat map should be treated with care and used only as an indicative map of habitat distribution. The methodology and scales used when digitising also varies across datasets.

7.1.3 Estimation of the extent of wetland habitats on sites identified

Where a detailed GIS habitat map existed, with wetland habitats mapped and characterised to Fossitt level 3, the information was incorporated into this study, and the area data was used in final estimation of level 3 Fossitt habitat extent within county Monaghan. The habitat extent data covers the entire county (with patchy distribution) and although somewhat biased towards previously recorded sites was not restricted to these areas.

In the case where wetland habitats could only be characterised to Fossitt level 1 or 2, the area data was used to this level only.

As a result of these limitations the area data provided here should be regarded as provisional. Only with future surveys and ground truthing by experienced ecologists will level 3 habitat identification be possible. It is envisaged that the habitat map is a 'work in progress' and should improve as new data becomes available. The calculated habitat areas are a useful guide towards the relative abundance of different habitat types in the county and we believe provide a good indication of minimum area estimates for each habitat type.

7.1.4 Time constraints

In general all data provided to the MWM was incorporated in the GIS dataset prepared during the course of this study.

Due to time constraints, it was not possible to systematically assess the threats and damage to all MWM wetland sites by aerial photograph analysis. Reports of threats and damage within the MWM site database are based on reported activities taken from published sources.

7.2 MWM Site Database

The MWM site database version 1.0 holds information on 487 wetland sites (sites and sub-sites) in county Monaghan. The report CD includes a copy of the original Filemaker Pro MWM site database.

A summary list of all the wetland sites recorded in the MWM site database and the specific wetlands recorded on each is provided in Appendix 9 in this report (an Excel version of this spreadsheet is included on the report CD). The data on wetland habitats occurring on sites is summarised in Table 7.1 below.

The complete list of all information held on the site records in the MWM site database is provided on a separate Excel spreadsheet file (MWM_total_dbase_site_data_export.xls) included on the report CD.

7.3 MWM GIS Database

In all, approximately 30 datasets were incorporated into the GIS (see Appendix 1 for full list of GIS sources). Data was extracted from many of these sources while others were used as base maps to indicate the likely occurrence or otherwise of wetland habitats.

A total of 1,195 wetland habitat polygons were imported from other datasets and a further 661 were created during the course of the MWM. The total area of wetland in county Monaghan within the MWM GIS dataset is 14,588 ha, this includes the area of all MWM sites from the site database together with wetland areas mapped outside of these sites. This is an over-representation of the true wetland figure of the county because it includes dry-land habitats that may be included within larger site boundaries. The total extent of wetland habitats is therefore likely to lie somewhere between 7,300 ha (currently mapped wetland habitats) and 14,500 ha or 5.7% to 11.2% of the county.

The outputs from the MWM GIS includes six individual ESRI shape-files and equivalent MapInfo Tab files. These are summarised in Table 7.1 below and further details are presented in Appendix 3 and 4. Copies of these files can be found on the report CD.

Table 7.1. Final GIS output files from the MWM project. Further details of output files are presented in Appendix 4.

File Name	Brief Description
MWM Site Locations	Point file showing the location of each MWM site stored in the MWM site database. Contains much of the data contained in the MWM site database within the file attribute table.
MWM Site Boundaries	Polygon file showing the boundary of each MWM site stored in MWM site database. Standard attributes include area, site name, area, source, designation etc.
MWM Polygon Habitats	Polygon file showing the boundary of each MWM site stored in MWM site database. Standard attributes include area, Fossitt code and source.
MWM Spring Sites	Point file showing the location of spring sites identified during the course of the MWM. Standard attributes include Fossitt code, townland name, source and grid co-ordinates.
MWM Monaghan Rivers	Line file showing rivers throughout county Monaghan as identified from third party sources. Attributes include name, length, order, source, and unique segment code.
MWM Drainage Ditches	Line file showing drainage ditches throughout as identified from third party sources. Standard attributes include area, Fossitt code, source, survey method and survey year.

7.4 Distribution and extent of wetlands in County Monaghan

The County Monaghan Wetlands Map project has identified more than 1,856 wetland habitat polygons which have been mapped within the county, representing an area of 7,319 ha (or 5.8% of the entire county).

Of the total area: lakes cover 2,061 ha (29%); bog and heath covers 1,342 ha (18%); wet woodland and scrub covers 242 ha (2.8%); and fens marshes swamps and wet grassland makes up 1,012 ha (14%) of the total wetland area. A further 2,665 ha (35.7%) of wetland has been assigned to 'MWM unknown wetland type'.

The average area of each habitat unit was 4 hectares, which comprised the following size categories:

- 45% (872) of all habitat units are less than 1 hectare
- 36% (663) are between 1 and 5 hectares in extent
- 10% (189) are between 5 and 10 hectares
- 4% (86) are between 10 and 20 hectares
- 3% (49) are between 20 and 50 hectares
- Less than 0.1% (12) are over 50 ha in extent

Therefore the vast majority (91%) of habitat polygons are less than 10 hectares in extent. While generally speaking the larger habitat areas would be of higher conservation value, a large number of smaller sites are especially important as they can offer connectivity at the landscape scale between the larger habitat patches. Furthermore, some important habitat types typically occur as small discrete sites such as poor fen and springs.

Detailed information is stored on 478 wetland sites in the MWM Site database. These wetland sites occur within and outside of recognised conservation worthy areas. Figure 7.1 below shows the location of MWM sites identified, represented as points, in county Monaghan. The boundaries (where they have been drawn, see Appendix 4) of these sites are included in Figure 7.2. Extensive data that has been extracted from existing data sources for each of these sites is stored in the MWM site database and the GIS database.

It is clear from Figure 7.2 that a considerable number of wetland sites have been surveyed in county Monaghan, with the highest concentration of sites in the western part of the county. In contrast there are areas of the county that appear to be poorly represented most notably in the far northern and eastern part of the county. It is probable that these areas contain less wetlands of conservation importance due to topographical and hydrological conditions.

From an analysis of the detailed habitat distribution map of the county (not shown), there is an abundance of un-surveyed wetlands throughout the county. The true value of these areas for wetland biodiversity will remain unknown until systematic field surveys are carried out.

The County Monaghan Wetlands Map has identified more than 1,856 discrete wetland habitat polygons (total extent 7,319 ha), mainly by collating existing mapped data but also through the identification of unknown wetland sites by analysis of aerial photography. Due to resolution difficulties created by the scale of the county no large scale complete high resolution wetland habitat map of the county is presented in this report, although an example of the final MWM GIS layout with the various MWM shape-files presented is shown in Figure 7.3. This map is only for illustration purposes therefore the habitat polygons are all indicated by the same colour (red).

Two 10km squares representing two different parts of the county (H62 and H81, see Figure 7.4 below for details of their location) were selected to illustrate the extent of the habitat mapping within the MWM GIS. Figure 7.5a shows the overall habitat distribution for the 10km square H62 and Figure 7.5b shows the south-eastern part of this square in greater detail. Similarly Figure 7.6a and 7.6b show the habitat maps for the 10km square H81.

To obtain a complete overview of the wetland distribution in county Monaghan based on the results of this study, the reader is asked to consult the GIS map file contained on the CD accompanying this report. It is envisaged that the GIS will be primarily used as an exploratory and research tool in future biodiversity inventories of the county, as mentioned earlier this should only be used as a crude indicative habitat map.

It is clear that blanket bog and heath is mostly confined to the northwestern part of the county, on the slopes of Eshbrack (Slieve Beagh). These upland habitats have been surveyed in the past. A number of remnant raised bogs were identified during the current study in the western part of the county, which have not been surveyed to date.

The lakes of County Monaghan are varied in character, depending on the hydrogeology of the area in question. Limestone / marl lakes are of high conservation importance and are mainly confined to the western of the country. However, from literature sources, it is clear that these lakes are becoming increasingly endangered due to nutrient enrichment.

Other internationally important wetlands that are widespread throughout Monaghan include fens. Rich fens are mainly confined to the very western part of the County in association with other alkaline habitats such as limestone / marl lakes. Transition mires are widespread throughout the county, occurring frequently in inter-drumlin hollows, replacing the former raised bogs that have been cutaway in the past.

Table 7.2 summarises the extent of each wetland habitat type recorded during the course of the Monaghan Wetlands Map. Because there has been extensive digital mapping of lakes and rivers the total number of sites appearing in the MWM GIS database is likely to be very accurate. We can see from table 7.2 that of the 429 open water lakes in the county, the ecology of some 279 has been reported in the past (based on MWM site database review). The breakdown of the lakes into the trophic categories identified by Fossitt is based on desktop work by NPWS and is therefore only indicative. It is most likely that many of the oligotrophic lakes in the GIS would actually fall towards the mesotrophic category based on the results water chemistry studies and ecological field surveys undertaken in recent times (Crushell and Foss 2007; Barron 2006; EPA water quality dataset).

Watercourses

Natural watercourses are abundant throughout county Monaghan, totalling over 1,400 km in length. It is likely that the majority of the water courses identified would fit into the Upland Eroding river category, while there are some sections of river in the low-lying areas that would correspond to lowland depositing rivers.

Drainage ditches are common throughout the wetland sites in Monaghan, however they have only been previously mapped in a small number of sites. The disused Ulster canal crosses part of county Monaghan, and retains wetland characteristics along much of its length.

Springs

It is most likely that springs are under-represented in the current survey. Most of the sites originated from the Geological Survey of Ireland karst database and fit into the calcareous spring category being largely confined to the limestone region in the southern part of the county. Calcareous Springs (*with Tufa formation) are of international ecological importance, to date they have not been reported from county Monaghan. However, such features are often small and extremely local and to date have not been the subject of targeted survey.

Swamps

Swamps often occur around the margin of open water lakes. Again, it is likely that this habitat is under-represented in the survey, especially the tall herb variant, which was only previously mapped at three sites. As can be seen from Table 7.2, swamps have been quite widely reported from known sites (168 sites recorded). It is not possible to identify this habitat from aerial photography therefore it is likely some of the 'MWM Unknown wetland category' sites may in fact hold this habitat type.

Wet Grassland and Marsh

Wet grassland is one of the more common wetland types throughout Ireland. However, partly due to its widespread distribution, it has not been surveyed in detail. There are likely to be many species rich wet grasslands throughout county Monaghan, that may correspond to the EU Habitat '*Molinia* meadows'. Again, it is difficult to distinguish this habitat from marsh and other wetland habitats from aerial photography.

Bogs

Bogs are probably the most widely surveyed habitats in county Monaghan. They are also relatively easy to distinguish (to Fossitt level two) from aerial photography. Many of the blanket and raised bogs in Monaghan have been heavily impacted by afforestation, drainage and peat cutting. Only tiny fragments of the original raised bog resource remains.

Fens & Flushes

A total area of 160 ha of fens and flushes have been mapped in county Monaghan and 101 sites have been reported in the literature. Recent surveys carried out in Monaghan have highlighted the importance of this ecosystem, the threats and damage they face, and also highlighted the absence of reliable information on their distribution and extent (Foss and Crushell 2007 & 2008). It is likely that further areas of fen remain un-surveyed in county Monaghan. It is not possible to determine the habitat using remote sensing techniques.

Wet Woodland

Wet woodlands have been reported from 151 sites in the literature and 184 ha of the habitat have been mapped in the GIS. This includes 90 ha of Bog Woodland, a priority habitat on the EU habitats directive, recorded from 15 sites in the literature. Unfortunately the habitat mapping from the National Survey of Native Woodland (NSNW) (Perrin *et al.* 2008) was not yet available to be included in the GIS. However, relevé data and site data that was reviewed indicates that significant areas of wet woodland habitats were identified by the NSNW in county Monaghan. Aerial photography coupled with the NSNW data were useful in mapping areas of wet woodland habitats throughout the county.

Scrub is a common habitat that often occurs as a mosaic with wetland habitats. It is especially common on regenerating cutover bogs, where grazing and other land management practices are not carried out.

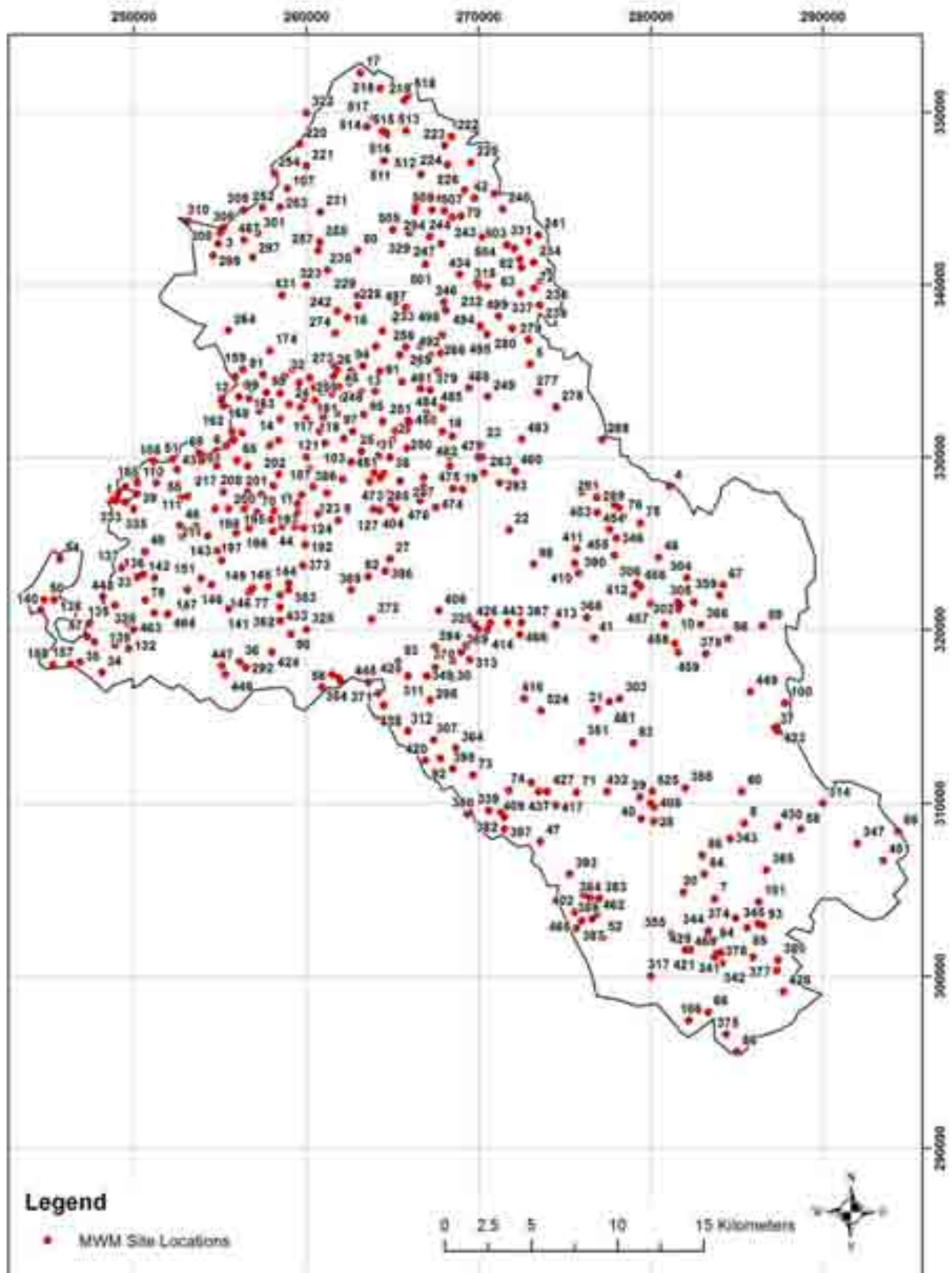


Figure 7.1: Location of wetland sites throughout Monaghan, and labelled according to MWM site database code recorded during the County Monaghan Wetlands Map 2010.

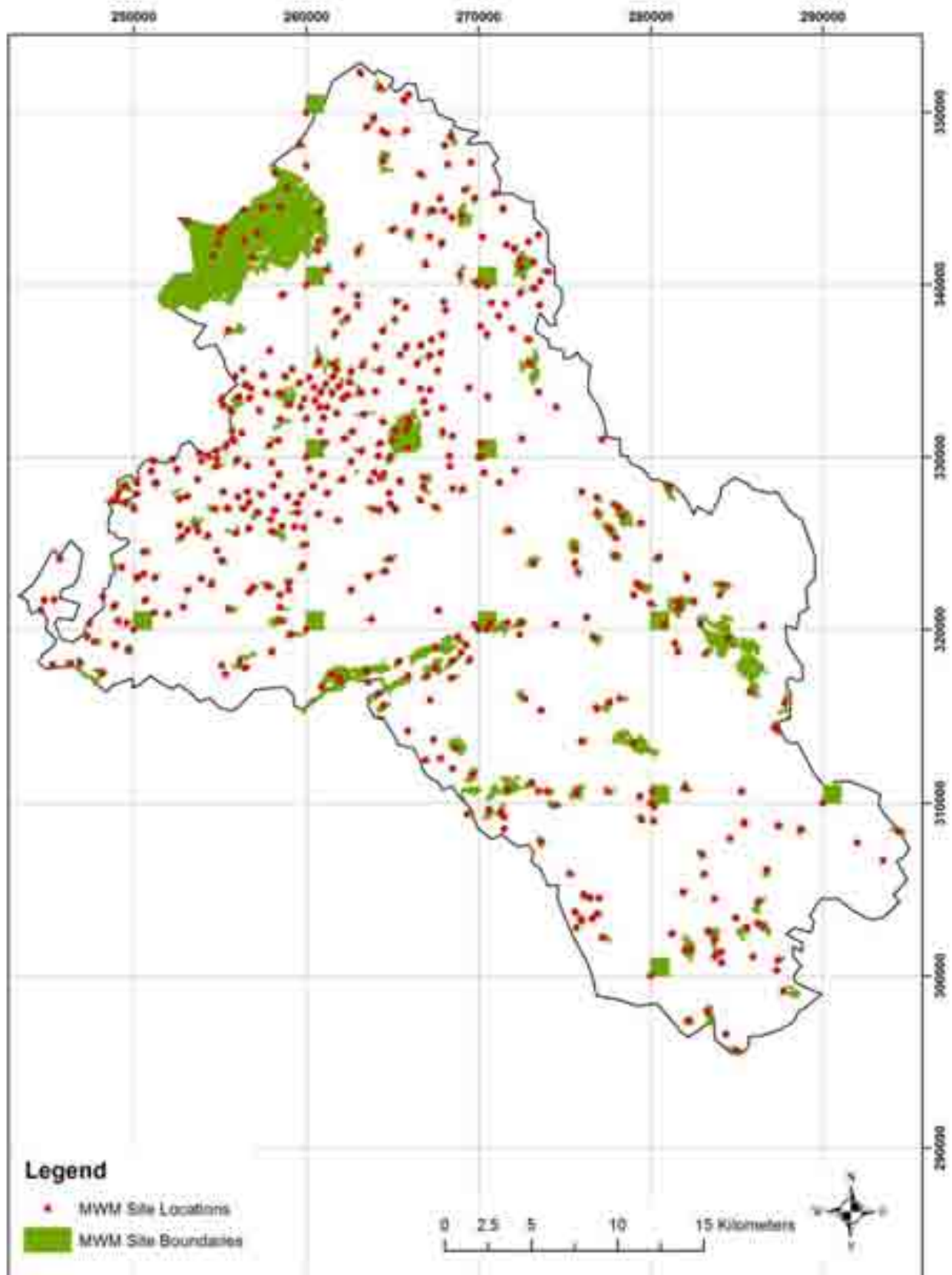


Figure 7.2. The location and extent of wetland boundary areas, and unmapped areas (without a boundary) represented as point sources, in County Monaghan based on the County Monaghan Wetlands Map 2010.

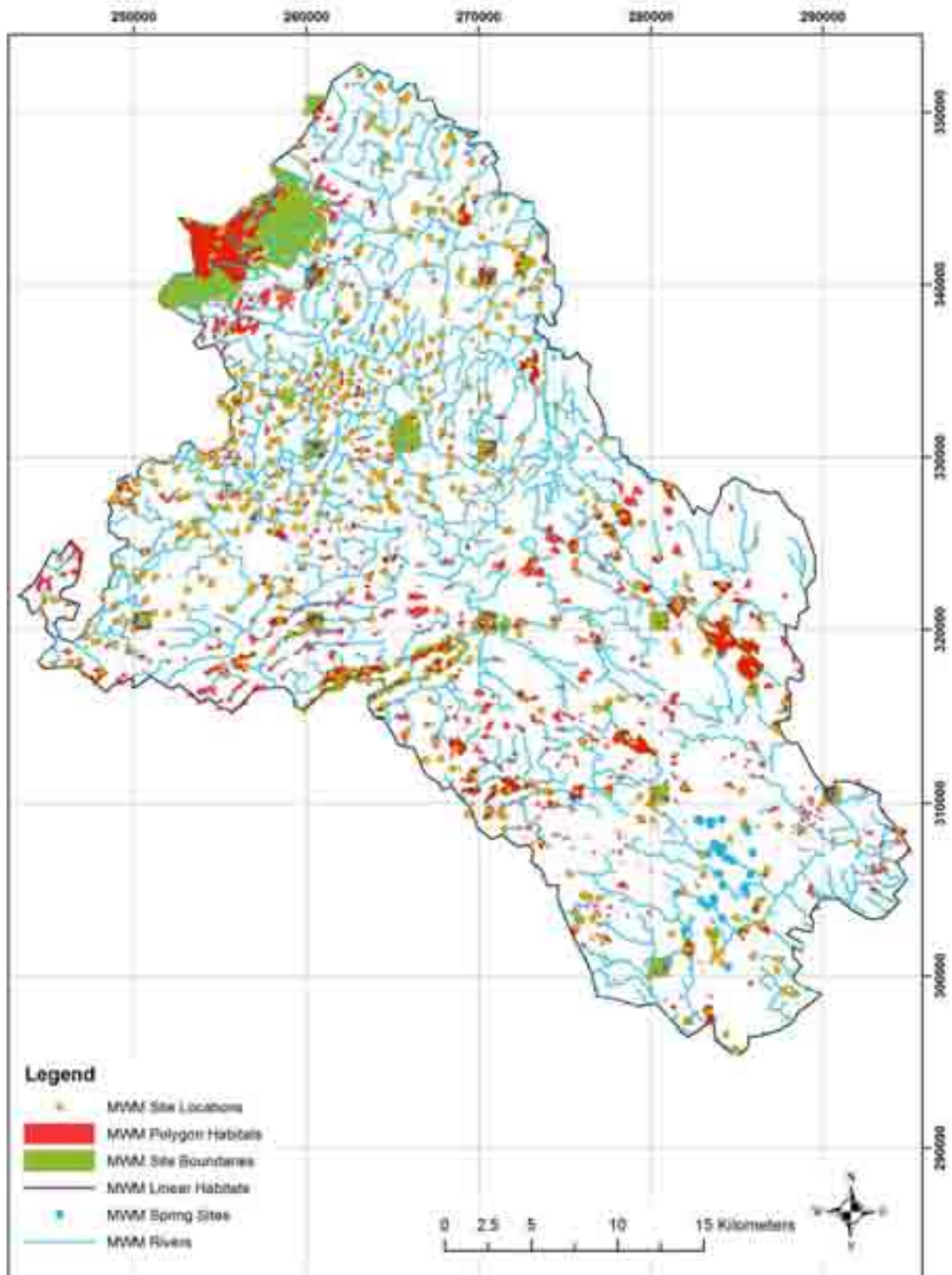


Figure 7.3. Example of final MWM GIS layout with the various MWM shape-files presented. This map is only for illustration purposes therefore the habitat polygons are all indicated by the same colour (red). For a detailed example of habitat maps see Figures 7.5 & 7.6 below.

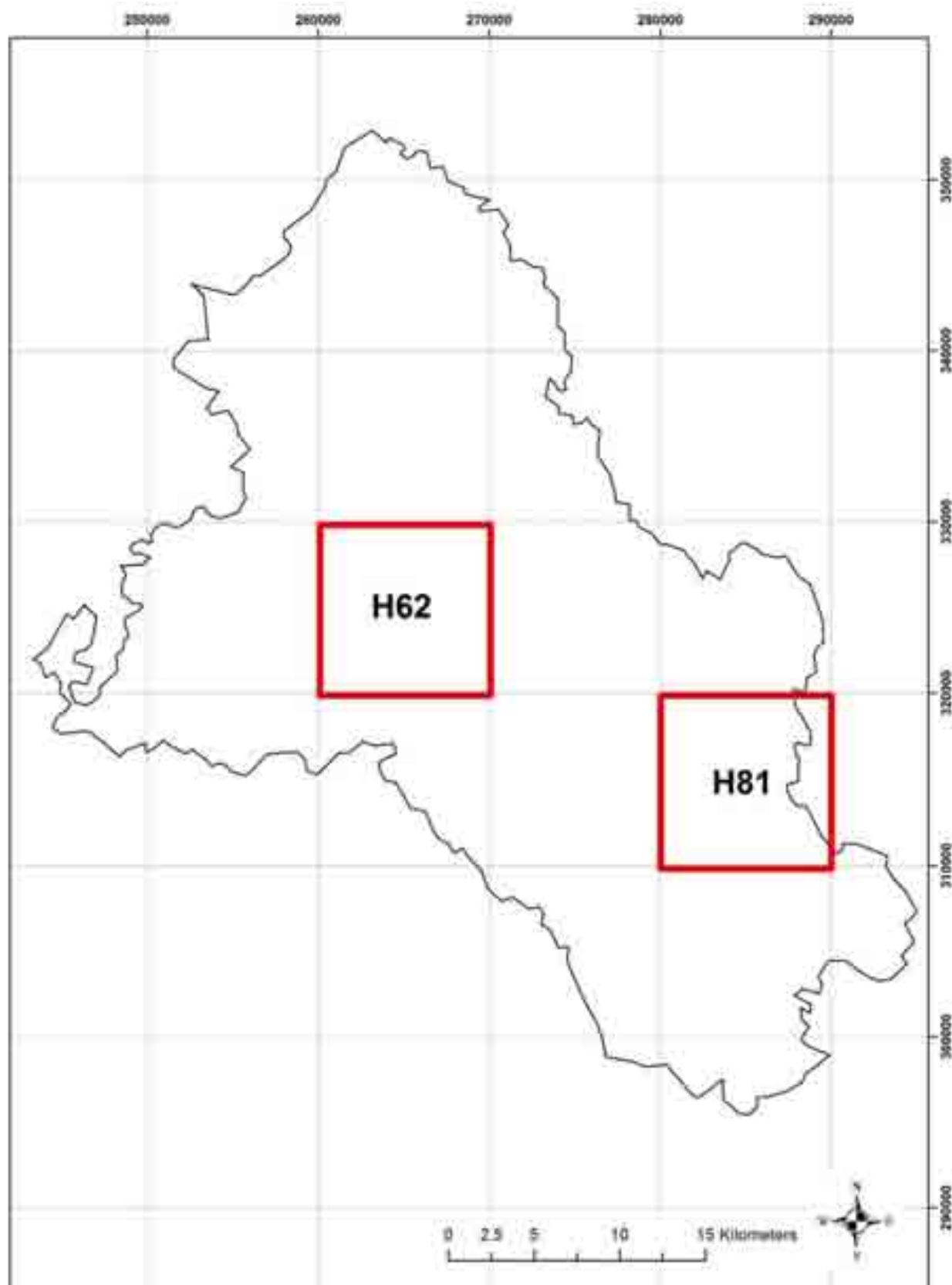


Figure 7.4. The location within County Monaghan of the two representative areas selected to illustrate habitat coverage within the MWM GIS (see Figures 7.5a;b & 7.6a;b below). H62 is in the central part of the county while H81 is in the eastern part of the county.

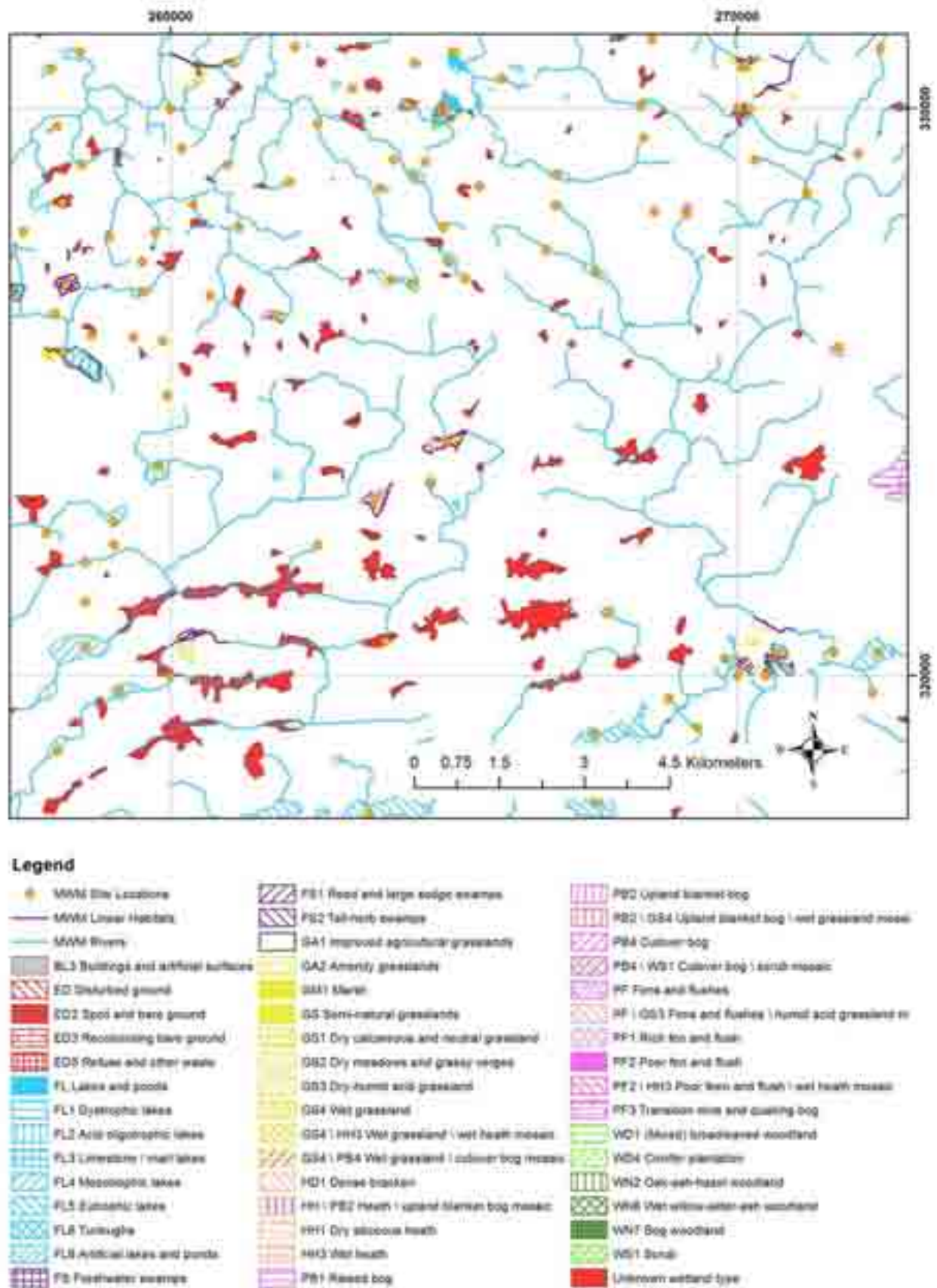


Figure 7.5a. Indicative wetland habitat distribution within 10km H62 in central Monaghan compiled as part of the County Monaghan Wetlands Map 2010.

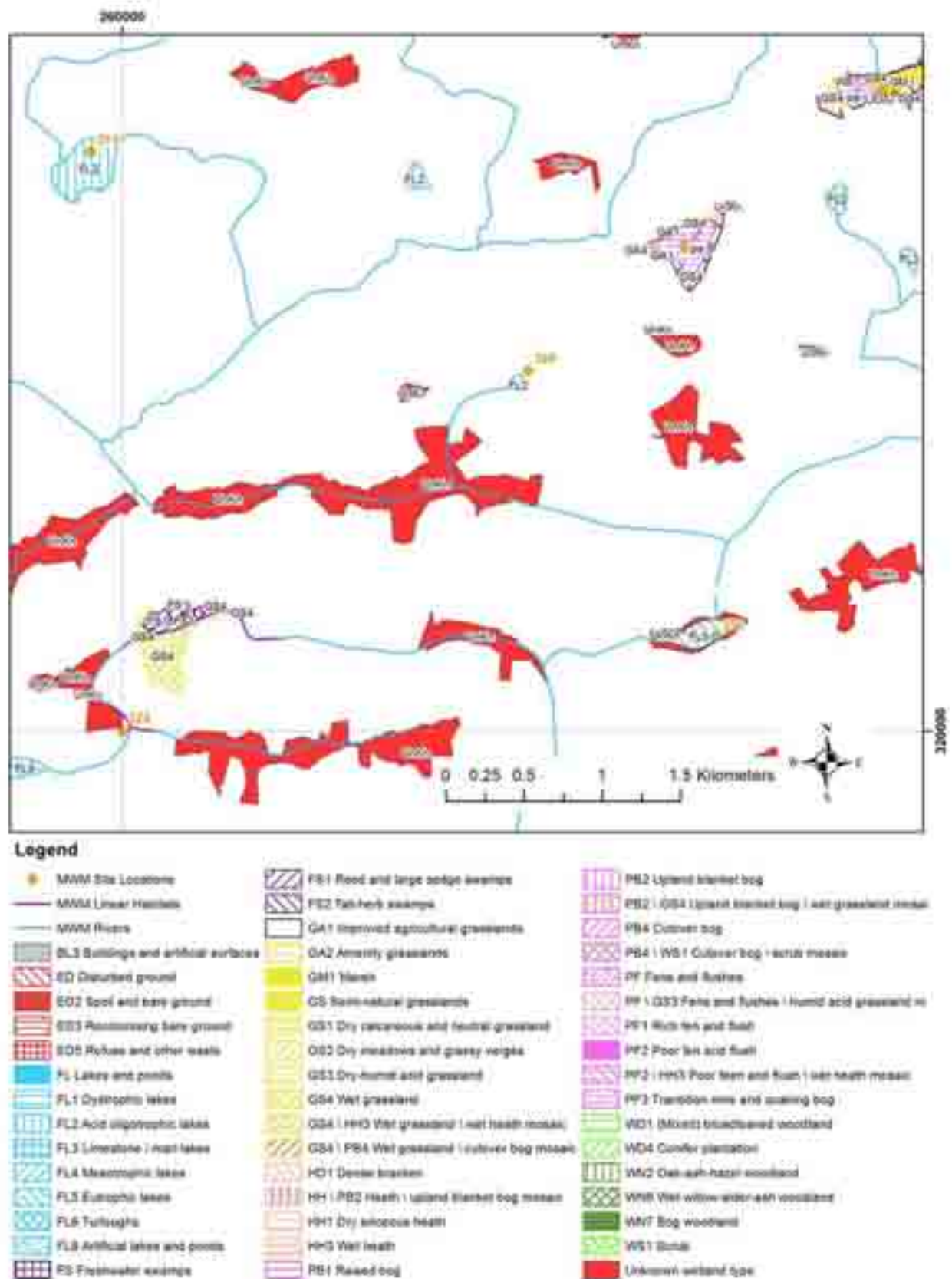


Figure 7.5b. A subset of Figure 7.5a above showing the detail of habitats in the south-western part of Square H62. Habitats are labelled according to Fossitt code. Compiled as part of the County Monaghan Wetlands Map 2010.

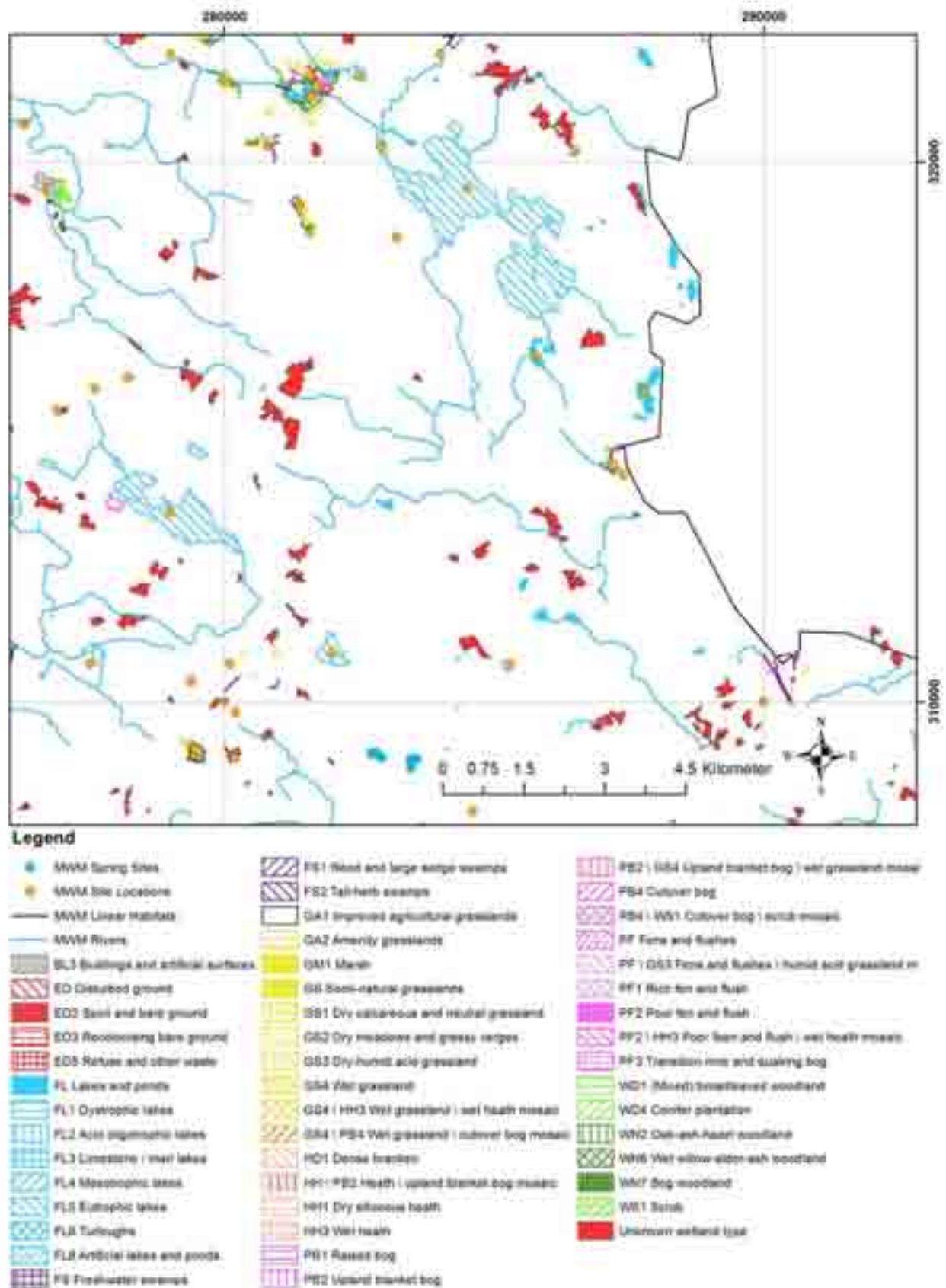


Figure 7.6a. Indicative wetland habitat distribution within 10km H81 in eastern Monaghan compiled as part of the County Monaghan Wetlands Map 2010.

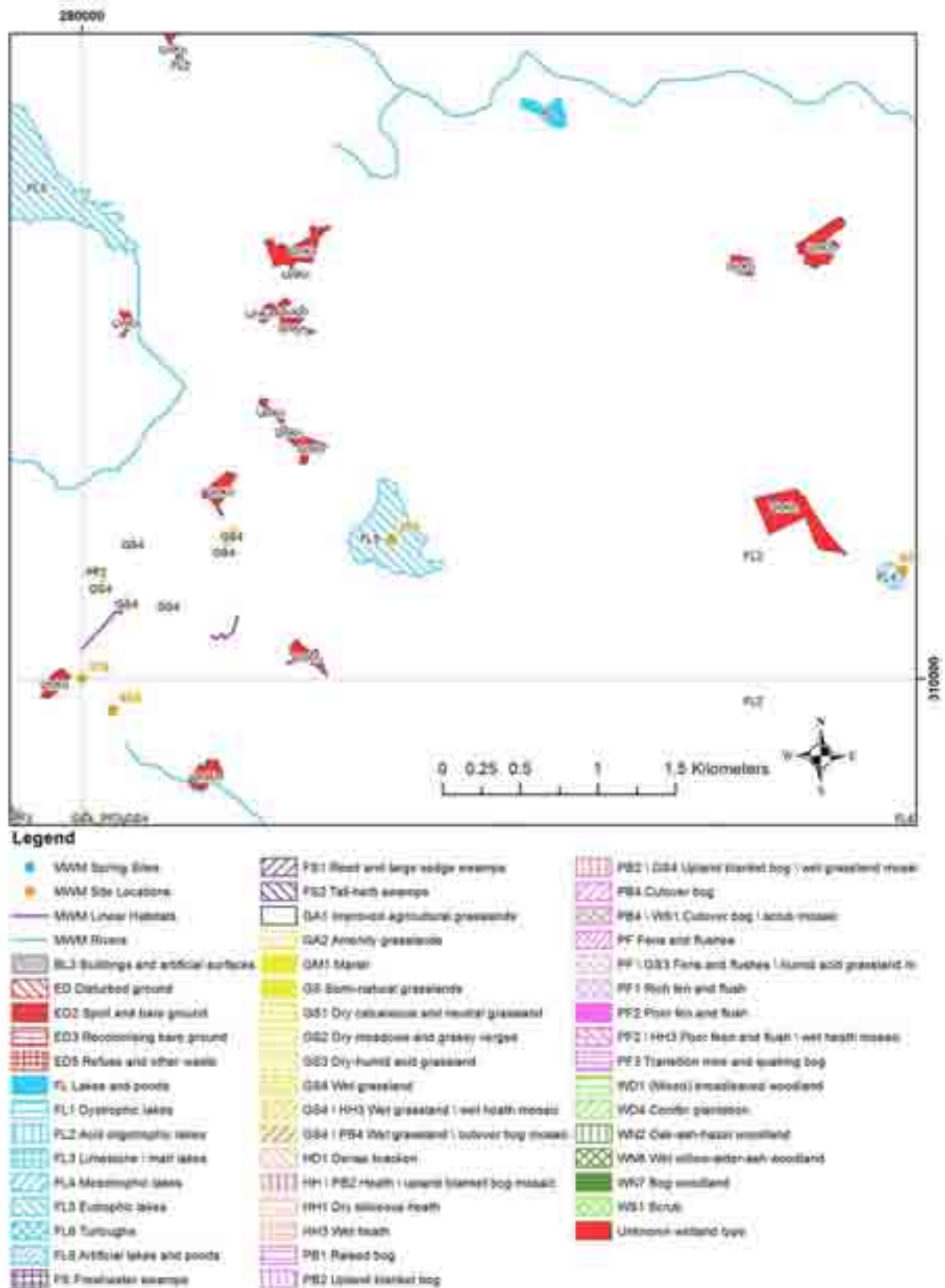


Figure 7.6b. A subset of Figure 7.6a above showing the detail of habitats in the south-western part of Square H81. Habitats are labelled according to Fossitt code. Compiled as part of the County Monaghan Wetlands Map 2010.

Table 7.2. The number of discrete sites in MWM site database and polygons in the MWM GIS containing the Fossitt wetland recorded in County Monaghan.

	Number of Sites recorded in MWM Site Database	Number of discrete habitat polygons mapped in MWM GIS dataset	Total area (ha) or Length (km) of habitat types recorded in MWM GIS dataset*
Total	478	1,856	7,319
Habitat Code and Name			
FL Lakes & Ponds	279	429	2,061
FL1 Dystrophic lakes	7	9	4.3
FL2 Acid oligotrophic lakes	129	247	564.6
FL3 Limestone/marl lakes	23	21	42.6
FL4 Mesotrophic lakes	42	50	410.8
FL5 Eutrophic lakes	33	32	910.6
FL6 Turloughs	9	2	15
FL7 Reservoirs	45	0	0
FL8 Other artificial lakes	10	2	0.2
FW Watercourses	119	1,329	1,439 km
FW1 Eroding/upland rivers	18	-	-
FW2 Depositing/lowland	16	-	-
FW3 Canals	4	2	1.4 km
FW4 Drainage ditches	78	76	19.9 km
FP Springs	3		
FP1 Calcareous springs	1	33	NA
FP2 Non-Calcareous springs	2	2	NA
FS Swamps	168	100	402.3
FS1 Reed and large sedge	161	96	392.7
FS2 Tall herb swamps	3	3	6.2
G Grassland & Marsh	210	298	451
GS4 Wet grassland	160	258	405.2
GM1 Marsh	88	30	31.8
HH3 Wet heath	8	15	58.8
PB Bogs	46	45	1,184.8
PB1 Raised bogs	1	16	375.5
PB2 Upland blanket bog	2	8	89.1
PB3 Lowland blanket bog	0	0	0
PB4 Cutover bog	37	21	720.2
PB5 Eroding blanket bog	0	0	0
PF Fens & Flushes	101	93	159.6
PF1 Rich fen and flush	7	10	3
PF2 Poor fen and flush	17	21	21.2
PF3 Transition mire and	81	56	101.2
WN Semi-natural	151	138	184.7
WN4 Wet pedunculate oak-	1	0	0
WN5 Riparian woodland	4	0	0
WN6 Wet willow-alder-ash	117	115	194.8
WN7 Bog woodland	15	23	89.9
WS1 Scrub	79	77	57.7
Non-Fossitt Mosaic			
GS4 \ HH3 Wet grassland -	NA	4	38
GS4 \ PB4 Wet grassland -	NA	1	16.1
PF2 \ HH3 Poor fen and	NA	3	3.6
HH \ PB2 Heath - upland	NA	2	38.3
PF \ GS3 Fens and flushes -	NA	1	10.6
PB2 \ GS4 Upland blanket	NA	1	3.8
PB4 \ WS1 Cutover bog -	NA	1	56.2
MWM Unknown wetland	NA	661	2,665

7.5 Wetland site conservation evaluation

As discussed in section 5.4 above, few wetland sites in Monaghan are offered legislative protection under either national and / or international site conservation designation schemes.

Within the MWM site database information on conservation designations or status of sites was recorded in relation to the following conservation categories:

NHA - Natural Heritage Area with legal protection
cNHA - candidate Natural Heritage Area - no legal protection
pNHA - proposed Natural Heritage Area as advertised in 1995 - some legal protection
SAC - Special Area of Conservation with legal protection
cSAC - candidate Special Area of Conservation open to appeal/ transmitted to EU
pcSAC - proposed candidate Special Area of Conservation open to appeal/ not yet transmitted to EU
SPA - Special Protection Area with legal protection
cSPA - candidate Special Protection Area
NP - National Park with legal protection
WHS - World Heritage Site
NNR - National Nature Reserve with legal protection
BIO - Unesco Biosphere Reserve
RAM - Ramsar Site
ESA - Environmentally Sensitive Area
EDS - Eurodiploma Site
ASI - Area of Scientific Interest
BGR - Berne Convention Biogenetic Reserve
COR - Corine site
WS - Wildfowl Sanctuary
RFF - Refuge for Flora or Fauna
CBA - Coillte Biodiversity Area
CFP - Coillte Forest Park
 Undesignated site - no known designation

The number of sites listed in the MWM site database with a nature conservation designation and the degree of protection offered are summarised in Table 7.4 below. A list of the 487 wetland sites recorded in the MWM site database and the specific conservation designations on each site is provided in Appendix 8 of this report (the Excel version of this spreadsheet is included on the report CD).

In the case of 487 known wetland sites in County Monaghan, it is disappointing to note that just 3 main sites fall within areas formally designated for nature conservation (SAC, NHA or SPA).

Table 7.3: The number of discrete wetland sites (and sub-sites) recorded in the MWM Site database with their conservation designation and protection.

Conservation Designation	Protected Status	Number of discrete sites in the MWM site database with this conservation designation	Number of sites and sub-sites in MWM site database with this conservation designation	Total area of designated sites (ha) (inclusive of non-wetland habitats) from MWM GIS
NP - National Park	Protected	0	0	0
NHA - Natural Heritage Area	Protected	1 *	9	1,136
pNHA - proposed Natural Heritage Area	Partially Protected	36	59	2,126
cNHA – candidate Natural Heritage Area	Not Protected	55	82	Unknown
SAC - Special Area of Conservation	Protected	1 *	6	58
SPA - Special Protection Area	Protected	1 *	6	3,470
NNR - National Nature Reserve	Protected	0	0	0
ASI - Area of Scientific Interest	Not protected	22	25	Unknown
Other (e.g. Wildfowl Sanctuary; Refuge for Flora and Fauna; Wildfowl Sanctuary)	Limited Protected	2	6	Unknown
Undesignated sites	Not protected	351	372	5,526 **

* Data on the current number of sites designated as NHA, SAC and SPA is confirmed by information on the NPWS website dated June 2010.

** Partly based on provisional site boundaries drawn during MWM 2010.

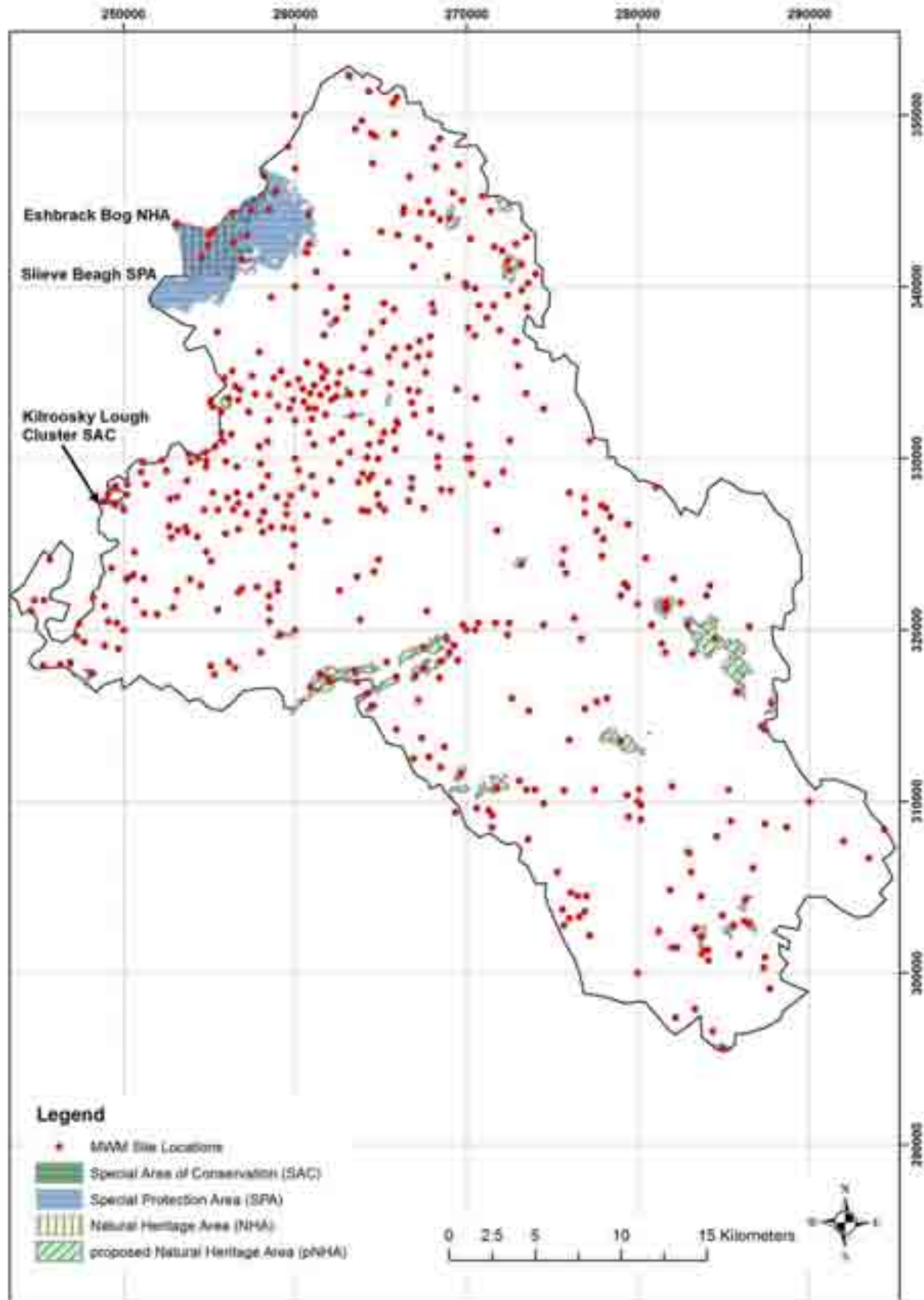


Figure 7.7. The location of MWM sites in relation to designated sites (NHAs; pNHAs; SAC and SPAs) throughout County Monaghan recorded during the County Monaghan Wetlands Map 2010. Source of designated site boundaries: NPWS, June 2010.

7.6 Damage to County Monaghan wetlands

The majority of, if not all, Irish wetland sites, and by extension those in county Monaghan, have been subject to some degree of human impact, damage or modification from their natural state in the past, and continue to be threatened and decline in abundance due to such activities (Foss & Crushell 2007).

Wetlands, (bog, fen and marsh areas in particular) have historically been regarded as less productive than adjacent agricultural land and measures have been taken to 'improve' their quality for agriculture. The principal method of land improvement usually involved some form of drainage, burning or the addition of nutrients so as to either facilitate the removal of peat, the planting of trees, or the creation of new grazing areas, pasture or farmland. Historical evidence from the Plantation period indicates that peatlands or bogs, and by extension fens and other associated wetlands, were common in County Monaghan (Moloney 2006) and were increasingly utilised by the growing population of the county. The removal of peat by this growing population resulted in many worked out bogs, which when abandoned became ideal locations for the formation of secondary wetland habitats (fen, marsh and wet woodland *inter alia*).

A more recent trend has been the use of wetlands as areas to dispose of building rubble, rubbish and landfill materials (Foss & Crushell 2007; Anonymous 2009; Monaghan County Council 2006).

Reclamation and drainage works are ongoing agricultural management techniques which affect the hydrology of wetland habitats.

During the course of the MWM, past and existing damage to wetlands were noted when these were reported in third party reports, surveys and data sources, and an overall assessment of the severity was undertaken where information was provided. The scale for the severity of damage used was: Not serious; Serious; Very Serious and Unknown.

It is likely that the information recorded on site activities, impacts and damage represents a minimum, and that additional sites have been negatively affected by human operations which have not been documented in the MWM site database. The MWM site database does however provide a tool for recording such damage on sites in the future, and provides an indication of the types of activities which have affected wetland habitats to date.

A list of Impacts and Activities influencing the conservation and status of the site, to a varying degree (adapted from Natura 2000 form) with impact code used during the MWM project is presented in Appendix 8. The original list supplied from EU Commission has been modified slightly for use in Ireland by NPWS (Source: Foss & Crushell 2008 and D. Lynn, NPWS *pers com.* 2009).

The main impacts and activities and the wetland types most likely to be affected by these activities is summarised in Table 7.5.

Although insufficient time was available to analyse aerial photography, to record damage on sites recorded in the MWM, published reports indicate that 238 (49%) of the sites recorded in the MWM site database (see MWM Site Database on the report CD) were being influenced by human impacts and activities (see Table 7.6). It was clear from the MWM project that extensive damage has been caused to the Monaghan wetland resource by past infilling of wetlands with building waste (Foss & Crushell 2007), planting of conifers in upland bog areas, peat cutting in the blanket bog areas and drainage activities across most wetland types (Foss & Crushell 2007 & 2008).

It is likely that the final number of sites being negatively affected or influenced by a variety of human impacts and activities will be higher, as the 2008 NPWS report on the conservation status of EU Habitat Directive sites in Ireland (NPWS 2008), many of which are wetlands, found that the conservation status of these habitats is far from satisfactory. In fact the overall assessment for wetland habitat types listed under the EU Habitats Directive (see Appendix 6a) found that only 4 habitats were in favourable conservation status, while 7 were poor and 16 habitat types were deemed to have a bad conservation status overall.

Included in the latter bad conservation status category were habitats such as Oligotrophic and Hard water lakes, Blanket bogs, Wet heath, Transition mires, Alkaline fens and Alluvial wet woodland; while habitats defined as poorly conserved included Turloughs, Tall herb swamps, Marsh and Bog woodland. These habitats account for a significant part of the wetland habitat resource in county Monaghan.

Table 7.4: Natura 2000 Impacts and Activities recorded on wetland sites as part of the MWM which are likely to have a negative effect on wetlands, and the wetland type most likely to be affected by these activities.

Natura 2000 Impacts and Activities Main Code	Natura 2000 Impacts and Activities Category with brief description	Broad Wetland habitat types most at threat or likely to be affected from Impacts and Activities
A	Agriculture <i>Including cultivation, fertilisation, and over grazing</i>	Fens, Marsh, Bog, Wet heath, Reed Swamp, Lake and Lake margins, Wet grassland, Wet woodland, Bog woodland, Turlough, Rivers
B	Sylviculture, forestry <i>Including fertilisation, planting and re-planting, forestry practices</i>	Fens, Marsh, Bog, Wet heath, Reed Swamp, Lake and Lake margins, Wet grassland, Wet woodland, Bog woodland, Turlough, Rivers
C	Mining, extraction of materials and energy production <i>Including quarry activities, turbary and peat removal</i>	Bog, Dystrophic lake, Bog woodland
D	Transportation and service corridors <i>Including road construction, power transmission</i>	All wetland types
E	Urbanisation, residential and commercial development <i>Including Urban and industrial development, discharges and waste disposal</i>	Fen, Bog, Marsh, Wet Grassland, Scrub
F	Biological resource use other than agriculture & forestry <i>Including leisure fishing, hunting</i>	Lake, Fen, Marsh, River, Bog
G	Human intrusions and disturbances <i>Including recreational facilities, outdoor leisure activities, littering, trampling overuse</i>	Bog, Fen, Marsh, Reed Swamp, Wet Grassland
H	Pollution <i>Including surface and groundwater water pollution, air pollution</i>	Oligotrophic Lake, River, Marsh, Fen
I	Invasive, other problematic species and genes <i>Including invasive species, genetic pollution</i>	Oligotrophic Lake, River, Marsh, Fen
J	Natural System modifications <i>Including landfill, drainage, drain maintenance, water abstraction, burning</i>	Fen, Marsh, Bog, Reed Swamp, Lake margins, Wet grassland, River
K	Natural biotic and abiotic processes (without catastrophes) <i>Including organic material accumulation,</i>	Fen, Marsh, Bog, Wet woodland

Table 7.5: The number of sites where Natura 2000 Impacts and Activities were recorded on wetland sites as part of the MWM. Impacts and Activities were recorded on a total of 238 sites in the MWM site database.

Natura 2000 Impacts and Activities Main Code	Natura 2000 Impacts and Activities	Number of sites and sub-sites recorded in the MWM site database where this Impact and Activity was recorded
A	Agriculture	
	A03 mowing / cutting of grassland	7
	A04 grazing	23
	A04.01.02 intensive sheep grazing	1
B	Sylviculture, forestry	
	B02 Forest and Plantation management & use	8
	B02.02 forestry clearance	1
C	Mining, extraction of materials and energy production	
D	Transport and service corridors	
	D01.02 roads, motorways	9
	D02.01 electricity and phone lines	2
E	Urbanisation, residential and commercial development	
	E03.01 disposal of household waste	9
	E03.03 disposal of inert materials	9
F	Biological resource use other than agriculture & forestry	
	F01 Marine and Freshwater Aquaculture	1
	F02.03 Leisure fishing	89
G	Human intrusions and disturbances	
H	Pollution	
	H01 Pollution to surface waters (limnic & terrestrial)	10
	H01.05 diffuse pollution to surface waters due to agricultural and forestry activities	40
	H04 Air pollution, air-borne pollutants	1
I	Invasive, other problematic species and genes	
	I01 invasive non-native species	10
J	Natural System modifications	
	J02.01 Landfill, land reclamation and drying out, general	30
	J02.01.03 infilling of ditches, dykes, ponds, pools, marshes or pits	15
	J02 human induced changes in hydraulic conditions (drainage)	69
	J02.10 management of aquatic and bank vegetation for drainage purposes	2
	J02.05 Modification of hydrographic functioning, general	12
	J02.05.03 modification of standing water bodies	36
	J02.13 Other human induced changes in hydraulic conditions	7
K	Natural biotic and abiotic processes (without catastrophes)	
	K02.02 accumulation of organic material	7

8 Conclusions & Recommendations

8.1 Distribution and extent of the Monaghan wetland resource

The aim of the County Monaghan Wetlands Map (MWM) was to prepare a MWM GIS dataset and maps with an associated MWM site database of all freshwater wetland sites in county Monaghan. Through the inclusion of data on sites and their habitats, provided by other groups, it has been possible to create a provisional summary wetland habitat map for the county, incorporating a large number of disparate data sets.

In total, some **1,856 wetland habitat polygons with a total area of 7,319 ha** has been identified in the county Monaghan wetland GIS, representing **5.8 % of the area within the county**. In addition the MWM site database contains additional site information on 478 discrete wetland sites that have been previously reported in the literature. All of the 32 wetland habitat categories were recorded during the course of the survey illustrating the diversity of the wetland resource within County Monaghan.

The wetland sites identified were characterised and mapped as far as possible in terms of the wetland habitat(s) present (using Fossitt 2000) and the extent of each habitat type(s) within the county was estimated. The accuracy of this data and the detail of information was dependent on the level of detail recorded by previous surveys and reports.

A significant number (661 polygons) of previously unrecorded wetland totaling over 2,665 ha were identified through analysis of aerial photography. These sites could only be positively identified as belonging to the 'MWM unknown wetland type' category.

Additional wetland sites exist within the county that have not been incorporated into the MWM dataset due to ongoing surveys in the county which have yet to be completed, some additional reference data sets that were not made available during the survey (see Appendix 1) or due to a lack of mapped habitat data particularly within recognised conservation areas (i.e. NHAs, SACs and SPAs).

The most valuable outcomes of the MWM are the two databases that have been developed during the course of the survey. These contain considerable information on the extent, distribution, previous studies carried out and characteristics of the entire wetland resource in the county. They should prove most useful as information sources for any future investigations into the biodiversity contribution of Monaghan wetlands.

8.2 Knowledge of the Monaghan wetland resource

From the results of the County Monaghan Wetlands Map it has been possible to produce a comprehensive list of sites that contain wetland habitats.

In relation to the sites which have been identified to date, significant gaps exist in relation to our knowledge of this wetland resource. Specifically, the following information deficits have been identified:

- Only 89 sites (18%) listed in the MWM site database have been surveyed in the detail required to produce detailed habitats maps (mainly produced as part of the Monaghan Fen Surveys 2007 & 2008 (Foss & Crushell), and the Monaghan Wetland Survey 2006 (BEC) and other environmental impact studies). The remaining 82% of the sites listed therefore require habitat survey and mapping.
- On 189 sites (38%) information on the general occurrence of habitats, vegetation and species is available, but no habitat maps exist for the sites.
- Confusion over the wetland type that exists on many of the MWM sites. This confusion arises principally due to the fact that wetlands often occur as a mosaic of different types within a single site and no detailed habitat maps exist that make area estimation on such sites possible. In addition due to the limitations associated with habitat identification from aerial photography it was not possible to identify the habitat type present within many sites.
- There is a lack of information on the true extent of wetland habitat types occurring on many sites, making it difficult to assign more than estimated area data to many sites, and limiting our knowledge of the exact extent of the complete wetland resource in county Monaghan.

- Improvements in our knowledge of the wetland resource in county Monaghan, will only be achieved when a systematic wetland survey of the county, where classification of wetland type follows strict criteria, where extent of wetland type(s) is accurately mapped, and where previously un-surveyed areas identified as being potentially important for wetlands are surveyed. Any future wetland surveys of the county should prioritise key habitats that are deemed most threatened and for which information is lacking.

To this end, **Table 8.1** is an overall appraisal of the necessity to carry out further research or surveys on the various wetland habitats in county Monaghan based on the results of this survey and with reference to previous experience of wetland habitat conservation. Habitats are scored according to their requirement for future survey.

The scoring system applied is based on a priority scale: low priority (1) – medium priority (2) – high priority (3). Scores are applied to three different criteria including conservation importance of the habitat, the occurrence of an information deficit and perceived threat and sensitivity of the habitat (see caption of Table 8.1). These scores are then summed for each habitat type and ranked from highest to lowest.

Those habitats with a higher score are deemed to be of the highest priority for future research or investigation using a 'traffic light' system. Red being high priority (score 11-15), orange being medium (score 6-10) and green being of low priority (score 1-5). This ranking system has been developed for use in the MWM and should be considered provisional. We believe however, that it is a relatively robust objective means of determining survey priorities.

Those habitats that came out with the highest priority **include turloughs, lakes, springs and wet woodlands**. In the case of **raised bogs** and **fens**, they came out high due to their high conservation importance and threatened status. However since surveys have been carried out on these habitat type before it scored low for information gaps. We believe in this case the high ranking indicates that restoration or management measures should be applied to safeguard the habitat from future loss.

Table 8.1: Assessment of survey priority for County Monaghan wetland habitats recorded during the County Monaghan Wetlands Map 2010.

Conservation interest is based on the following scale: Very High (5) = habitat listed as priority on EU Habitats Directive; High (4) = habitat listed on EU Habitats Directive; Medium (3) = Semi-natural habitats; Low (1) = Artificial or heavily modified habitats.

Information Deficit is based on the following scale: High (5) = Major information gaps, no previous systematic survey carried out; Medium(3) = Habitats well reported but no systematic survey carried out; Low (1) = Habitats Surveyed systematically throughout county.

Perceived Threat (sensitivity) is based on the following scale. High (5) = Habitat currently threatened and highly sensitive; Medium (3) = Habitat under threat but not overly sensitive; Low (1) = Habitats not threatened and resilient.

Fossitt Level 3	Conservation interest	Information deficit	Perceived threat	Overall Priority for survey and assessment
MWM Unknown wetland type	Unknown	5	Unknown	High
FP1 Calcareous springs	5	3	5	13
FL3 Limestone/marl lakes	5	3	5	13
FL6 Turloughs	5	3	5	13
FP2 Non-Calcareous springs	3	5	5	13
FL2 Acid oligotrophic lakes	4	3	5	12
FS2 Tall herb swamps	4	5	3	12
PF1 Rich fen and flush	5	1	5	11
PF3 Transition mire and quaking bog	4	1	5	11
PF2 Poor fen and flush*	5	3	3	11
PB1 Raised bogs	5	1	5	11
WN5 Riparian woodland	5	1	5	11
WN6 Wet willow-alder-ash woodland	3	3	5	11
WN7 Bog woodland	5	3	3	11
GM1 Marsh	4	3	3	10
FW1 Eroding/upland rivers	4	3	3	10
FW2 Depositing/lowland rivers	4	3	3	10
GS4 Wet grassland	3	3	3	9
FL4 Mesotrophic lakes	3	3	3	9
FS1 Reed and large sedge swamps	3	3	3	9
PB2 Upland blanket bog	5	1	3	9
PB3 Lowland blanket bog	5	1	3	9
HH3 Wet heath	4	1	3	8
PB5 Eroding blanket bog	4	1	3	8
FL1 Dystrophic lakes	4	1	3	8
WN4 Wet pedunculate oak-ash woodland	5	1	Unknown	6
FW4 Drainage ditches	1	3	1	5
PB4 Cutover bog	3	1	1	5
WS1 Scrub	1	1	3	5
FL5 Eutrophic lakes	1	1	1	3
FL8 Other artificial lakes and ponds	1	1	1	3
FW3 Canals	1	1	1	3
FL7 Reservoirs	1	1	1	3

*Poor fen, although not listed as being on the Habitats Directive is an almost unique to Ireland and is recognised as being of high conservation importance.

8.3 Monaghan Wetland Map Recommendations

From the results of the County Monaghan Wetlands Map the following recommendations in relation to future surveys, additional data acquisition and project development are suggested:

1. Both datasets should be maintained and updated regularly. Additional sources of information on wetlands in County Monaghan should be incorporated into them as these become available. In addition NPWS are likely to produce additional detailed habitat maps of sites (i.e. NHAs, SACs and SPAs) which should be incorporated into the MWM dataset as they become available.
2. The MWM GIS and site database provides a useful reference source on the identification of sites for future wetland survey in county Monaghan and should be developed further. **A significant number of sites have been identified for which site boundaries, and detailed survey information and associated habitat maps are lacking.** These sites should be examined as part of any future county Monaghan wetland field survey.
3. A number of wetland habitat types have been identified in county Monaghan, for which habitat data, information on habitat extent, site boundaries and conservation status is lacking in many cases. These should be a priority for surveyed as part of the ongoing development of a wetland inventory for the county. These habitats include: **turloughs and other lakes, tall herb swamp, spring sites and wet woodlands** (see **Table 8.1**).
4. Within the MWM GIS a large number of wetland polygons have been newly identified for which habitat data is absent. Similarly in the MWM site database 298 sites (61% of the sites listed) also lack detailed information on the occurrence and extent of habitats. These should be surveyed to improve our knowledge of this resource, in terms of the habitat types and extent present and assess their potential as conservation worthy areas.
5. Future phases of the MWM should aim to provide the following information on the wetland sites being surveyed:
 - A detailed site description highlighting the wetland habitat types (classified according to Fossitt) present on each site;
 - Detailed mapping of the extent of each of the wetland type(s) within each site;
 - Mapping of general site boundaries to ensure conservation of a hydrologically intact unit;
 - Recording of threats to the conservation and future protection of the site; to include restoration suggestions and management priorities and needs;
 - Evaluation of each site on a national scale and ranking of each site in terms of its suitability and priority for designation within the NHA and/or SAC process.
6. The following habitats should be targeted and prioritised in any future surveys: **turloughs, lakes and springs**. In addition, previously un-surveyed sites recorded during the course of the MWM should be prioritised for survey (see **Table 8.1**).
7. The protection of Monaghan's diverse wetland resource depends on strict enforcement of national conservation legislation by the NPWS, and planning laws to ensure unauthorised damaging activities (such as those identified during the MWM) are prevented.
8. Restoration of threatened and degraded wetland habitats should be encouraged such as the highly modified blanket bogs of the upland areas where forestry has caused significant losses. Funding opportunities for such initiatives should be investigated and pursued.
9. **On-going public awareness campaigns** should be undertaken to inform the people of Monaghan of the value of the county's wetland resource and the ecosystem services they provide.
10. A standard methodology / approach should be developed by the Heritage Council for Phase I desk based wetland surveys that may be undertaken in the future throughout Ireland. The methodology used during the MWM could be refined further and improved upon to provide a useful template.

9 MWM Bibliography & Data Sources

The bibliography list is presented in alphabetical order by author. Code number appearing on the LHS is reference/report code number in the MWM Bibliography Database.

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10 Appendices

In the report appendices which follow, the PDF layouts (produced from Excel or Word files) have been formatted and reduced to allow printing of tables at A4 page size. The original Excel spreadsheets from which some of these PDF's were produced are included on the CD rom included with this report.

List of Appendices

1. Reports & information sources consulted during the compilation of the MWM GIS & Site Database
2. Groups & individuals contacted in the compilation of data for the MWM
3. Data import methodology for the MWM GIS and Site Database
4. Key to data fields in the MWM GIS and Site Database
5. MWM Site, Bibliography & GIS database layouts
6. MWM habitat classification scheme used for wetlands
7. MWM Glossary of Terms
8. Impacts and Activities list
9. Summary table of the The County Monaghan Wetlands Map 2010 Site List held within the MWM site database

Appendix 1: Reports & information sources consulted during the compilation of the MWM GIS & Site Database

Sorted by information source code. A full citation to the data sources used can be found in the MWM Report Bibliography.

Source title and author	MWM Bibliography Code	Information type	Data Content Comments
Irish Peatland Conservation Council Action Plan (Foss et al.)	03	Published report	Used to abstract information on sites
AFF Areas of Scientific Interest (An Foras Forbartha)	12	Published report	Used to abstract information on the wetland sites recognised in Monaghan by AFF
The Raised Bogs of Ireland (Cross)	39	Published Report	No data on Monaghan sites
NPWS Blanket bog Evaluation report (Derwin et al.)	89	Published report	Used to abstract information on the wetland habitats. Report contains specific areas of blanket bog on sites
Vegetation of Irish Lakes (Heuff)	101	Published report	No data on Monaghan sites
A preliminary survey of Irish Lakes (Flanagan & Toner)	103	Published Paper	Used to abstract information on 2 sites
Shadow SAC Project (Crushell)	106	Published report	Used to abstract information on sites
NPWS Blanket bog report (Conaghan)	108	Published report	No data on Monaghan sites
River Finn Catchment (Lockhart)	111	Published Paper	Used to abstract information on sites
The Water Framework Directive, North-South Share Project: Register of Protected Areas (Curtis, Downes & Ni Chathain)	116	Published Paper	Used to abstract information on sites
County Monaghan Wetland Survey (Barron)	123	Published Report & GIS Dataset	Used to abstract information on sites; and in site and habitat mapping and wetland site identification
Monaghan Fen Site Reports 2006 (Foss, Ó Críodáin & Clerkin)	126	Internal report	Used to abstract information on 3 sites
NPWS Fen Study Database (Foss)	155	Database and Excel Spreadsheet	Used to abstract information on 76 sites recognised in Monaghan
Survey of rare/threatened and scarce vascular plants in Monaghan (Martin)	181	Published Report	Used to abstract information on sites
Monaghan Fen Survey I (Foss & Crushell)	182	Published Report	Used to abstract information on 47 sites recognised in Monaghan
NPWS Finn/Lackey arterial pre-drainage survey (Douglas, Lockhart & Ryan)	200	Internal Report	Used to abstract information on a total of 140 sites recognised in Monaghan
NPWS Blackwater River arterial pre-drainage survey (Douglas & Ryan)	201	Internal Report	Used to abstract information on 93 sites recognised in Monaghan
GSI National Bedrock Map of Ireland 1:500,000 Scale (GSI)	246	GIS Dataset	Used to determine the underlying solid geology of sites
EPA (2006) Lakes Water Quality. EPA, Wexford (EPA)	253	GIS Dataset	Selection of 23 lakes for which trophic status has been monitored. Used to establish level three of Fossitt for those

Source title and author	MWM Bibliography Code	Information type	Data Content Comments
			lakes that have been monitored.
EPA (1997) Catchments All Island. EPA, Wexford (EPA)	255	GIS Dataset	Used as base-map in site and habitat mapping and wetland site identification.
Geological Survey of Ireland (1998) Karst features dataset (GSI)	256	GIS Dataset	Used to locate known turlough and spring sites
OSI Color orthophotos (OSI)	258	GIS Dataset	Used as base-map in site and habitat mapping and wetland site identification
EPA Corine Land-cover in Ireland (CLC2000) (OSI)	259	GIS Dataset	Used in the production of habitat and site maps
OSI 1:5000 OS vector maps (OSI)	261	GIS Dataset	Used as base-map in site and habitat mapping and wetland site identification
OSI 6 Inch Map series (OSI)	262	GIS Dataset	Used as base-map in site and habitat mapping and wetland site identification
Monaghan Fen Survey II (Foss & Crushell)	267	Published Report	Used to abstract information on 34 sites recognised in Monaghan
Turloughs over 10 ha (Goodwillie)	276	Published report & Habitat Maps	No data on Monaghan sites
OSI 1:50000 Discovery series (OSI)	331	GIS Dataset	Used as base-map in site and habitat mapping and wetland site identification
OSI Townlands (OSI)	332	GIS Dataset	Used as base-map to identify townlands
Teagasc (2006) National Subsoils Data (EPA)	333	GIS Dataset	Identification of subsoil types
NPWS (2008) pNHA Boundaries (NPWS)	334	GIS Dataset	Used in site and habitat mapping and wetland site identification
NPWS (2008) SPA Boundaries (NPWS)	344	GIS Dataset	Used in site and habitat mapping and wetland site identification
Teagasc (2006) National Soils Data (EPA)	345	GIS Dataset	Identification of soil types
Turlough Report (Sheehy Skeffington et al.)	349	Published report	Used to abstract information on 6 sites
Report Wetlands of International and National Importance (Anonymous)	356	Published report	No data on Monaghan sites
Vegetation of Irish Rivers (Heuff)	357	Published report	Used to abstract information on 1 site
NPWS Fossitt Habitat Assignment on Conservation Areas (Lockhart)	360	Excel Spreadsheet	Used to abstract information on the wetland habitats present on conservation worthy sites recognised in Monaghan by NPWS and added to MWM database
Monaghan Dragonfly Sites - preliminary site analysis (Nelson & Woodrow)	394	Published Report	Used to abstract information on 38 sites
AFF Preliminary Report on Areas of Scientific Interest in Monaghan (Farrell)	444	Published report	Used to abstract information on the wetland sites in Monaghan

Source title and author	MWM Bibliography Code	Information type	Data Content Comments
The County Monaghan Wetlands Map 2010 (Foss & Crushell)	466	GIS Dataset and Published report	Current report used in site and habitat mapping
Monaghan Dragonfly Survey 2008 (Anonymous)	473	Published Report	Used to abstract information on sites
NPWS Conservation areas (pNHA, NHA etc) in Monaghan from NPWS Website; Site Descriptions	474	On-line web resource	Used to abstract information on 5 additional sites recognised in Monaghan
NPWS Areas of Conservation Control file (Lockhart 2008)	475	Excel Spreadsheet	Used to abstract information on wetland habitats and EU Habitat Directive habitats recorded on sites from NHA surveys etc.
An Anglers Guide to County Monaghan (Anonymous)	477	On-line web resource	Used to abstract information on 79 sites
Monaghan Irish Damselfly and Water Beetle Survey 2009	478	Published Report	Used to abstract information on 27 sites
Ireland's Peatland Conservation Action Plan 2020 (Malone & O'Connell)	479	Published Report	Used to abstract information on sites
Monaghan Marsh Fritillary Survey 2008 (Malone)	480	Published Report	Used to abstract information on sites
2008 Eirgrid Cavan to Tyrone 400kV Interconnector. Distribution of Whooper Swan Feeding and Roosting Sites (Tobin Consulting)	481	Published Report & On-line Resource	Used to abstract information on sites
2009 Eirgrid Cavan to Tyrone 400kV Interconnector. Distribution of Whooper Swan Feeding and Roosting Sites (Appendix 7.4) (Tobin Consulting)	483	Published Report & On-line Resource	Used to abstract information on sites
National Survey of Native Woodland in Irelands 2003-2008 (Perrin et al.)	484	Published Report	Used to abstract information on 24 sites
iWEBs Whooper Swan sites surveyed in Co. Monaghan in 2010 (Anonymous)	485	On-line Web Resource	Used to abstract information on sites
NPWS (2010) Various Digital habitat maps originating from regional and national ecological surveys carried out by NPWS, Dublin submitted to MWM See additional information below	486	GIS Datasets	Used in the production of habitat and site maps
iWEBs complete site list in Monaghan (Anonymous)	487	On-line Site list	Used to abstract information on sites 98 sites; 13 additional sites added
Wetlands used for visitor and recreation in Monaghan, Tourism Section, Monaghan County Council (Condra)	489	Site Submission	Used to abstract information on sites
N2 Clontibret to Castleblayney Road Realignment, Co. Monaghan. Ecology Further Information Report - Habitat Survey (Atkins)	490	Published Report & GIS data source	Used to abstract information on sites
Eshveragh Quarry cNHA site		Published	Used to abstract information on

Source title and author	MWM Bibliography Code	Information type	Data Content Comments
survey and habitat notes (NPWS)	491	Report	sites
Eirgrid Meath to Tyrone 400kV Interconnector. Monaghan Heritage Officer Observations (Clerkin)	492	Internal Report	Used to abstract information on sites
Turlough Database Consolidation Project (Mayes)	497	Published Report & GIS data source	Used to abstract information on 9 sites and map sites
North Western and Neagh Bann river basin districts (2008) Lake segments. EPA, Wexford (EPA)	498	GIS Dataset	Used in Identifying lakes and water-bodies
NPWS (2010) NHA Boundaries (NPWS)	499	GIS Dataset	Used in site and habitat mapping and wetland site identification
NPWS (2010) SAC Boundaries (NPWS)	500	GIS Dataset	Used in site and habitat mapping and wetland site identification
Water Framework Amenity Lakes (Monaghan County Council 2010)	501	GIS Dataset	Used to abstract information on sites
Lake Water Supply Sources (Monaghan County Council 2010)	502	GIS dataset	Used to abstract information on sites
North Western and Neagh Bann river basin districts (2008) River segments (EPA)	503	GIS Dataset	Used in Identifying rivers
N2 Clontibret to Northern Ireland Border Road Scheme (2nd draft) Grontmij (2010)	523	Published Report & GIS data source	Used in site and habitat mapping and wetland site identification

NPWS Individual Data Sets Received in 2010 and included under data source code 486 above. Source code is referenced in the source attribute field of the polygon habitat shapefile in the MWM GIS.

NPWS Survey / Habitat Type	GIS Source Code	Shape-file Name
<i>Lakes</i>	486a	3110_3130_lwseg_0207 3140_lwseg_0207
<i>Turloughs</i>	486b	turloughlistmay09
<i>Raised Bogs</i>	486c	7110_7120_2dary_degraded_unsurv_othersources 7110_7120_rb_unsurv_indesign_other sources 7110_7120_rb_unsurv_outdesign_oth ersources
<i>NPWS Indicative Habitat Mapping – Conservation Planning Unit</i>	486d	CPU_habitats
<i>National Survey of Native Woodlands</i>	486e	native woodland Woodland_Releves_NSNW
<i>Review and amendment of GIS mapping for blanket bog NHAs (DRAFT) – BEC Consultants Ltd. 2010</i>	486f	Combined_polygons_v26_Monaghan

Data sources on wetland habitats and species in county Monaghan that were not incorporated in the MWM project due to time constraints.

Title	Data Type	Comments
Bat Record Data for County Monaghan 2010 (Bat Conservation Ireland)	Excel data set. MWM Bibliography Reference 496	Received 4 November 2010. Not incorporated into MWM site database.

Appendix 2: Groups and individuals contacted in the compilation of data for the MWM

** Sorted by organisation*

Individual	Organisation	Date Contacted
Paul O Donoghue	Atkins	March 2010
Tina Aughney	Bat Conservation Ireland	March 2010
Patrick Lenihan	Botanical Society of Britain and Ireland (BSBI)	March 2010
Alan Hill	Retired Botanical Society of Britain and Ireland (BSBI)	February 2010
Damian McFerran	CEDaR - Centre for Environmental Data and Recording	February 2010
Pat Neville & Aileen O'Sullivan	Coillte Teoranta	March 2010
Tom Curtis	Environmental Consultant	February 2010
Fiona O'Rourke	Environmental Protection Agency	March 2010
Michael Sheehy	Geological Survey of Ireland	March 2010
Fran Igoe	Irish Char Conservation Group	March 2010
Tadhg O Corcora	Irish Peatland Conservation Council	February 2010
David Nash	Irish Butterfly Survey	February 2010
Trevor Boyd	Butterfly Conservation, NI	March 2010
Shirley Clerkin	Heritage Officer, Monaghan County Council	February 2010
Martin Murray	Monaghan County Council	February 2010
Adrienne Burns	GIS Section, Monaghan County Council	February 2010
Mark Johnson	Water Services, Monaghan County Council	March 2010
Dympna Condra	Tourism Officer, Monaghan County Council	March 2010
Gemma Weir	MPSU, National Parks and Wildlife Service	March 2010
John Cross	National Parks and Wildlife Service	February 2010
Caitriona Douglas	National Parks and Wildlife Service	February 2010
Jochen Roller	National Parks and Wildlife Service	March 2010
Naomi Kingston	National Parks and Wildlife Service	March 2010
Neil Lockhart	National Parks and Wildlife Service	February 2010
Paul O'Donoghue	Atkins	March 2010
Katie O'Hora	Atkins	March 2010
Agnes Gruschka	Tobin Consulting Engineers	May 2010
Catherine Farrell	Ecologist	April 2010
Faith Wilson	Environmental Consultant	August 2010

Appendix 3: Data import methodology for the MWM GIS & Site Database

A variety of data sources were used in the compilation of the list of sites included within the County Monaghan Wetlands Map site database. The full list of published and electronic data sources consulted are listed in Appendix 1.

The initial electronic import of data on 76 sites to the MWM database was from the NPWS Fen Study database (see below). All further site and data additions to the MWM database were undertaken manually. Listed below are the larger data sets which helped in the creation of the MWM dataset.

In the case of one off sites provided by individuals or groups, data was entered directly from the information provided to the MWM database.

The following import methodologies were applied to the import of site information from more extensive electronic data sets and published reports.

1 MWM Site Database

1.1 NPWS Fen Study Database (Version 2.4)

An electronic list of the sites held in the NPWS Fen Study Database (Foss 2007) was imported directly into the respective data fields created within the MWM database. This NPWS Fen Study Database included the results of all sites examined during the Monaghan Fen Surveys conducted in 2007 & 2008 (Foss & Crushell 2007 & 2008).

Allowing for sites with multiple records created by the occurrence of sub sites within larger conservation worthy sites a total of 76 unique site records were imported.

Imported data included (*inter alia*): Site name, Site Source, Fen types present on sites; Scientific interest on sites (Botanical; Zoological etc.); Previous reports and survey holding site related information; Site designation; Grid reference data; Fossitt habitats present on sites; and Site descriptions.

1.2 Foras Forbartha ASI Site Lists for County Monaghan

Site data from both the AFF Preliminary ASI County Report (Farrell 1972) and the final report on Areas of Scientific Interest in Ireland (1981) were abstracted for sites listed within the MWM database.

The data for these sites was imported manually from the published reports. Seventeen additional site records were added to the MWM database from these reports.

Imported data included: Scientific interest on sites (Botanical; Zoological etc.); Previous reports and survey holding site information; Grid reference data where this data was missing on sites; a provisional list of Fossitt habitats present on sites were added to database on any sites lacking Fossitt data.

1.3 Finn-Lackey and Blackwater Pre-drainage NPWS Reports

During the 1980's the NPWS undertook two pre-drainage surveys in County Monaghan on the Finn-Lackey and Blackwater River systems (Douglas et al. 1983, Douglas & Ryan 1981). Site information from these unpublished reports was abstracted, and where sites were not already in the MWM database they were added.

In total 93 sites were recorded from the NPWS Blackwater survey and 140 from the NPWS Finn-Lackey report. The data for these sites was imported manually from the reports.

Imported data included: Site name, Grid reference, 6 inch map number, Scientific interest on sites (Botanical; Zoological etc.); and a provisional list of Fossitt habitats present on sites was compiled from the information on habitats provided.

1.4 Natural Heritage Area & Special Area of Conservation NPWS Site Data and Fossitt habitat types

An electronic list of the sites provided by NPWS containing all recognised NHA, cNHA, SAC, cSAC and SPA sites was supplied by Dr. Neil Lockhart of NPWS and dated July 2008. The site list included the Fossitt habitat types present on the majority of the sites, together with site designation information.

The data for the sites provided was imported manually from a series of Excel spreadsheets.

Imported data included: Site code number; Site name; Site designation; Fossitt habitats present on sites; National Grid reference E & N.

1.5 Other reports holding wetland information on Monaghan

A series of other reports holding information on wetland sites in County Monaghan were consulted. A full list of these reports, studies and surveys can be seen in MWM Appendix 1.

In the case of each report the sites listed in County Monaghan were screened against the existing sites in the MWM database. If a site was not located within the MWM database, a new database site record was created. In the case where sites already existed in the database the information provided in the additional reports was screened and new information was added to the existing site record.

In the case of both new and existing site records, data on the scientific interest present on the site, previous research sources, habitats present, and basic site information was recorded within the MWM database.

The data for these sites was imported manually from the various published reports.

2 MWM GIS Database

2.1 Sites from MWM site database

A shapefile was created from a Microsoft Excel spreadsheet exported from the MWM site database. This dataset contained point information showing the location of each MWM site recorded from the extensive literature search and input from third parties.

Each point denoting a site had basic site information (originating from MWM site database) recorded in various attribute fields including site name, site code, designation etc. The location of each point was subsequently checked using GIS to ensure that grid references were correct. Those MWM sites for which grid references are not available or could not be located using GIS are not included in the MWM GIS dataset.

2.2 Designated sites – NHA/SAC/SPA

Site boundary files for all existing NHA, SAC and SPA sites in County Monaghan were obtained from NPWS and directly imported into the MWM GIS. These boundary files were subsequently used to denote the boundaries of many MWM sites (those lying within designated sites). Where a MWM site was found to lie within a designated site, the boundary of the appropriate designated site was exported into a MWM site boundary shape-file. This shapefiles has a number of attributes including; source of the boundary, MWM site Code(s), calculated area, X_coord (easting), Y_coord (northing) of the polygon centroid.

In many cases, MWM sites had no existing boundaries associated with them especially in the cases where: they lay within a large designated site complex; or sites that had never been previously mapped (including many cNHA's). In the case where sites were contained within much larger designated sites, individual boundaries were not drawn, but the subsites were recorded in the attributes of the larger boundary. In the case where sites were outside of existing boundaries, a boundary was generated where on inspection the site was clearly visible on the aerial photograph and other base-maps.

Unfortunately, in some cases, MWM sites do not have boundaries associated with them as it was not possible to confirm the wetland area by referring to the relevant base-maps and background site data available.

2.3 *Habitat type datasets*

Many existing datasets (as listed in Appendix 1) were imported directly into the MWM GIS. Each habitat unit was then exported from its source into a MWM habitat (polygon) shapefile. This shapefile has a number of attribute fields associated with it including source, survey method and date (as proposed in Smith *et al.* 2010), area and habitat type recorded as the alpha numeric code assigned by Fossitt (2000). Due to the different sources of the data it was often necessary to convert the habitat data into an appropriate Fossitt category. Where it was not possible to attain level 1 in Fossitt, then the habitat was assigned into a category 'Unknown wetland type'.

In the case of rivers, data was extracted from one primary source and imported into a separate MWM (linear) shapefile. Similarly with springs, the data was displayed in a separate (point) shapefile. The same attributes were assigned to these shapefiles as the polygon one above.

Appendix 4: Key to data fields in the MWM GIS and Site Database

As part of the MWM mapping project two main databases were created to hold site information.

The first was the **MWM GIS Dataset** (ArcView 10.0 GIS software package) to hold site related information on each polygon, point or linear feature mapped. Data held in this dataset were transformed into MapInfo format at the end of the project period for use by Monaghan County Council.

The second was the **MWM Site Database** (Filemaker Pro 11.0 software package) which held some of the information in the GIS database, but allowed for easier sorting of site records, additional data input on sites (e.g. site descriptions) and data analysis of records.

This main MWM site database was supported by a second smaller **Bibliography database** which held information on reports, survey and GIS data sets which were consulted during the project. This database was used to create the report bibliography.

Data from both the GIS and Site database is readily exported into an Excel spreadsheet which allowed data exchange between the MWM GIS database and main MWM site database.

4.1 MWM Site database

A series of database layouts, containing related site data, form the main structure and content of the MWM site database. These layouts were used when adding site related data to the database. These layouts (indicated by green buttons along the top of the MWM database window) and the site information they hold are:

Title layout: Opening title page layout of database displayed when FileMaker Pro application is launched, with title copyright statement and enter button.

Main Data Entry Layout: Layout containing basic site details including site names and codes (i.e. name and code; other names and codes used by third party groups for site), total site area, location data and information on site designations.

Habitat, Species & Threats Layout: Layout containing site details on the wetland habitat type(s) present; Biological interest and rare species data on sites and where this information has been published.

This layout additionally recorded information on site damaging operations recorded with an overall severity scale.

Habitat Area Layout: Layout containing site details on the extent of the different wetland habitat type(s) present on the site (recorded in ha or length (km) for linear features).

Site Description Layout: Layout containing site descriptions obtained from various third party sources (e.g. NPWS, IPCC etc.).

An explanation of the data fields used in both the GIS database and site database are provided below. Name in bold is the name applied to database field and seen when accessing the database in browse mode, the underlined name is the actual field name within database (used when exporting data). The appearance of the GIS, site and bibliography databases is presented in Appendix 5.

4.2 Data fields in the MWM Site database

Main Data Entry Layout

Site Code (Site Code)

A unique site code created for the site as part of the MWM project as each data record was created. This field cannot be altered.

Site Name (Site Name)

The name of the wetland site, based on the most widely used name for site proposed by third party sources and adopted for the MWM project. (see also Other Groups Site Name below).

Where a site record occurs as a subsite within a larger site complex, the specific subsite name is followed by the name of the main site preceded by a - (e.g. DUMMYS LOUGH - KILROOSKY LOUGH CLUSTER SAC, here Dummys Lough, a subsite occurs within the Kilroosky Bog Cluster SAC, the main site).

Total Site Area (ha) from Literature (Total Site Area (ha) from Literature)

The total site area in hectares as reported in Literature source.

Total Site Extent (ha) from GIS (Total Site Extent (ha) from GIS)

The total site area in hectares as calculated from the GIS.

Total Site Length (km) from GIS (Total Site Length (km) from GIS)

The total site length in km as calculated by the GIS for linear features such as rivers; ditches etc.

Easting Centre (Easting Centre)

The grid reference of the E co-ordinate of the site is recorded, where this is given in the new format of a 6 digit number.

Northing Centre (Northing Centre)

The grid reference of the N co-ordinate of the site is recorded, where this is given in the new format of a 6 digit number.

Grid Reference (Grid ref old)

The grid reference of the site is recorded, where this is given in the old format of a letter followed by 4 or 6 digit number.

(It should be noted that this grid reference, based on information provided in published reports, should be interpreted with care, and in many cases may be found to be inaccurate. In relation to site location the Easting and Northing co-ordinates above are considered the more reliable when locating the site in question).

Ortho photo number (ortho photo number)

Aerial photograph number of OSI ortho photo.

Six Inch map number (six inch map number)

The number(s) of the Ordnance Survey six inch to one mile scale map(s) in which the site is located.

1:5000 map number (one to 5000 map number)

The number(s) of the Ordnance Survey one to 5000 scale map(s) in which the site is located.

Discovery map number (discovery map number)

The number(s) of the Ordnance survey 1:50,000 map(s) in which the site is located.

Site Source (site source)

Details of who proposed the site as a site containing wetland types being recorded in MWM and where appropriate a reference to the study or report where the site was recorded.

Other Groups Site Code (Other Group Site Code)

The code number for the site used by third party groups (e.g. NPWS NHA code number *inter alia*).

Other Groups Site Name (Other Group Site Name)

The name of the site used by third party groups in other studies or surveys, or where alternative spellings for a site name have been used.

(When trying to locate a site within the database it is essential that this field is also searched in the case where the site cannot be found under the Site Name field above).

Site Designations (site designations)

If the site has or was designated under one of the various conservation initiatives the appropriate designation was recorded, together with explanatory key.

Options:

NHA - Natural Heritage Area with legal protection

cNHA - candidate Natural Heritage Area no legal protection

pNHA - proposed Natural Heritage Area as advertised in 1995 no legal protection

SAC - Special Area for Conservation with legal protection

cSAC - candidate Special Area for Conservation open to appeal/ transmitted to EU
pcSAC - proposed candidate Special Area for Conservation open to appeal/ not yet transmitted to EU
SPA - Special Protection Area
cSPA - candidate Special Protection Area
NP - National Park with legal protection
WHS - World Heritage Site
NNR - National Nature Reserve with legal protection
BIO - Unesco Biosphere Reserve
RAM - Ramsar Site
ESA - Environmentally Sensitive Area
EDS - Eurodiploma Site
ASI - Area of Scientific Interest
BGR - Berne Convention Biogenetic Reserve
COR - Corine site
WS - Wildfowl Sanctuary
RFF - Refuge for Flora or Fauna
CBA - Coillte Biodiversity Area
CFP - Coillte Forest Park
 Undesignated site - no known designation

Townland Name(s) (Townland)

The name of the townlands in which the GIS or site occurs. Obtained from the GIS.

(In the case of a main site (see definition below), all townland(s) recorded within the site polygon mapped are provided. For subsites only the townland directly at the grid reference point location is provided. Similar rules apply to information provided for site Solid Geology, Subsoil Type, River Catchment & Corine Landuse).

Solid Geology (Solid Geology)

The solid geology underlying the site. Obtained from the GIS.

Subsoil Type (Subsoil Type)

Subsoil (quaternary deposit) underlying the site. Obtained from the GIS.

Code	Parent Material
A	Alluvium undifferentiated
AcEsk	Clayey esker sands and gravel
BktPt	Blanket peat
Cut	Cutover peat
FenPt	Fen peat
GDCSs	Sandstone sands and gravels (Devonian/Carboniferous)
GLPSsS	Sandstone and shale sands and gravels (Lower Palaeozoic)
GLs	Limestone sands and gravels (Carboniferous)
KaRck	Karstified limestone bedrock at surface
L	Lake sediments undifferentiated
Made	Made ground
Rck	Bedrock at surface
TDCSs	Sandstone till (Devonian/Carboniferous)
TDCSsS	Sandstone and shales till (Devonian/Carboniferous)
TLs	Limestone till (Carboniferous)
Water	Open water at the surface

River Catchment (River catchment Name)

River catchment in which the site occurs. Obtained from the GIS.

Corine Landuse (Corine Landuse)

Corine habitat type within site based on Corine GIS classification.

Liable to Flood (Liable to Flood)

Whether the site occurred within a Liable to Flood area as mapped on the OS six inch map. Yes/no option. Obtained from the GIS.

Polygon Source Comment (Polygon Source Comment)

Source of the GIS polygon used to describe the site.

Options:

NPWS Existing - shape file obtained from NPWS source;

Wetland Survey new - polygon created as part of the current project;

Other existing - shape file obtained from other third party study.

GIS Shapefile Data Reference (GIS shapefile data reference)

Code number relating to the report or data source, as per Appendix 1, which contained the GIS shapefile for the site in question.

Date of last field survey (Date of last survey)

The year in which the last known field survey of the site was undertaken.

Site background/research/previous survey data (Site Background data)

List of publications and reports holding habitat information on the site. The data source code used is presented in full in the MWM Bibliography database, and listed in Appendix 1 associated with this report.

Type of Information held on site in literature (Type of Information Source available on site)

A list of information categories under which data has been recorded on the site in previous reports or data sources, including:

Vegetation Type - relevé data recorded from site

Species Data - recorded for general and/or on rare species

Habitat Data - habitat data in Fossitt format available for all or part of site

Habitat Map - map data of variable quality available (may include GIS habitat map)

Hydrochemical Data - water chemistry data available on site

Site Size - from published source

Ownership Data - owner information available on site

Detailed Site Description - detailed description of available in published report

Site Management - site management recommendations have been made in published report

Conservation Designation - site conservation recommendations have been made in published report or site is a recognised conservation area

iWeBS Site - site is listed as a location for bird recording as part of the Irish Wetlands Birds Survey Scheme

Visitor & Recreation Facilities - wetland site with visitor and recreational facilities i.e. parking, walks and trails, picnic areas, seating, viewing platforms etc., other than angling facilities

Angling Lake - lake or river is used or managed as a location for angling, with or without angling facilities

Wetland Area on Site (Wetland Areas on site)

Check box system to record whether a MWM wetland type occurred on site, was likely to occur or was absent.

Comment Box (Comment box) (not exported to GIS site database)

Text field to hold temporary comments on site, queries on site etc. Used during data compilation phase of the project.

Temporary flag record (Temporary flag record) (not exported to GIS site database)

Check box allowing the temporary flagging of selected site records. Used during data compilation or data abstraction phase of the project.

Site Type (Site Type) (not exported to GIS site database)

Check box allowing a site record to be characterised, i.e. whether the database record is for a discrete site or a subsite, a smaller part (e.g. lake) within a larger site complex. A subsite record was generally created where specific site data related to the subsite.

(Example: RAMAGES LOUGH (KILROOSKY LOUGH CLUSTER) - here Ramages Lough has a unique data record, while the inclusion of the Kilroosky Lough Cluster in the site name allows the relationship to the larger main site (an SAC) to be maintained and recognised).

Species Data Layout

Annex Species Present - EU Birds or Habitats Directive ([Annex Species Present EU Birds Habitats Directive](#))

Yes/ No check box to indicate the occurrence of listed Annex species on the EU Birds or Habitats Directive.

Red Data Book Species Present ([Red Data Book Species Present](#))

Yes/ No check box to indicate the occurrence of listed Red Data book or Red Data list species on the site.

Rare/Noteworthy Species interest present on site ([Site rare species present](#))

A list of species categories (for both flora and fauna) of interest which occur on the site; including:

Botanical	Zoological Invertebrates	Zoological Vertebrates
Higher Plant Fern Bryological Lichen Algae	Invertebrates Mollusc Invertebrates Insect Invertebrates Arachnid Invertebrates Crustacean	Birds Mammals Bats Amphibian Fish

Rare/Noteworthy Species data source ([Species data source](#))

List of publications and reports holding species information on rare and threatened species on the site. Code used to identify report in related MWM Bibliography database.

EU Habitats Directive Annex II Species ([EU Habs Annex Species](#))

List of species listed in Annex II of the Habitats Directive.

EU Birds Directive Annex I Species ([EU Birds Annex Species](#))

List of selected bird species listed in Annex I of the Birds Directive and likely to be recorded on freshwater wetland habitats.

Irish Red and Rare Species or Important Species Assemblages ([Irish Red n Rare Species](#))

List of selected rare and important species groups or individual species likely to be recorded on freshwater wetland habitats.

Habitat Data Layout

Main Fossitt Habitat(s) Present ([Main Fossitt habitat present](#))

A list of all Fossitt habitat types present within the site, based on the classification system of Fossitt was recorded (excluded Marine habitat types).

EU Habitats Directive Habitat(s) Present ([EU habitats directive code](#))

A list of all EU Habitats Directive habitat types present within the site, based on the classification system in Annex I of the Directive.

Habitat Area Layout

Habitat Area in ha fields ([Fossitt code plus the word Area e.g. PF1 Area](#))

A list of the extent of the Fossitt wetland habitat types occurring within the site, was recorded. Areas were calculated from the GIS and were entered against the appropriate habitat type.

Length present in km fields ([Fossitt code plus the word Length e.g. FW2 Length](#))

A list of the length of the linear wetland habitat types occurring within the site, was recorded. Lengths were calculated from the GIS and were entered against the appropriate habitat type.

Threats Data Layout

Overall severity of site damage (Severity of damage)

Check box system allowing the severity of damage reported on the site to be categorised. Scale recorded:

- 1 – Not Serious
- 2 – Serious
- 3 – Very Serious
- 4 – Unknown

Site damaging operations (Site damaging operations)

The below is the list of threats, pressures and activities influencing the conservation status of Natura 2000 sites as used in monitoring of Natura 2000 sites under Article 17 of the Habitats Directive. This list is a revision (dated November 2009) of an earlier set of codes used for monitoring and reporting on standard Natura 2000 site data forms.

Site Description Layout

Site Description and Source (Site description) (*not exported to GIS site database*)

Text field to hold site description(s) and name of the third party source who provided site description e.g. NPWS, IPCC etc.

4.3 Data fields in the MWM Bibliography database

Bibliog Number: Unique number created by Filemaker Pro application when new publication record is added to database. This is subsequently used in the main MWM database to relate back to reference in the Bibliography database.

Authors: Author(s) of report, surname and initial format.

Year: Year in which report/publication was published.

Title: Title of report/publication and where relevant title of book this appeared in.

Journal, Publisher, Location, No. Pages: further details of publication.

A series of check boxes indicating whether this reference was cited in the final fen study report; provided information to the study database and or was a NPWS blanket bog or raised bog survey report. These check boxes were subsequently used to generate lists of publication.

4.2 Data fields in the MWM GIS database

Six different GIS shapefiles (MapInfo Tab files) were created during the course of the MWM each containing a number of different attribute fields as described below.

4.2.1 MWM Site Locations

This file was created from an Excel file exported from the main MWM site database (section 4.1 above). All of the MWM sites and much of the information relating to each site are included within the file. The information relating to the sites are stored in columns of spreadsheet known as attribute fields. The title of the various attribute fields (columns) differ somewhat from the corresponding titles used in the MWM site database as detailed in Table 4.1 below.

Table 4.1. Data field labels from the MWM site database and corresponding labels from the MWM GIS site locations database.

MWM Site Database Label (see details in section 4.1 above)	MWM GIS Database Label
Site Code	site_code
Site Name	site_name
Northing Centre	northing
Easting Centre	easting
Townland	townland
Solid Geology	solid_geol
Subsoil Type	subsoil
River Catchment Name	catchment
Corine Landuse	corine
Site Rare Species Present	rare_spp

4.2.2 MWM Site Boundaries

This file shows the boundaries of previously recorded wetland sites in county Monaghan, where such boundaries were available in digital format or could be drawn with confidence. The various attributes fields associated with this file are as follows:

OBJECT_ID	Unique numeric identifier for each polyline in the dataset.
SITE_NAME	This contains the site name as recorded in the MWM site database.
SITE_CODE	The site code according to that recorded in the MWM site database. In the case of larger sites there may be a number of site codes referring to numerous sub-sites.
AREA	A calculation field which automatically calculates the area contained within the site boundary.
SOURCE	The numeric code in this field refers to the source dataset as displayed in the <i>Bibliography</i> and <i>Appendix 1</i> of the final MWM report.
northing	Automatically generated field giving the central (X) coordinate of the polygon.
easting	Automatically generated field giving the central (Y) coordinate of the polygon.
polyg_sour	The source of the boundary is given in this field, this relates to the source of the boundary feature.

4.2.3 MWM Polygon Habitats

This file shows the distribution and extent of the various wetland habitats recorded during the MWM throughout the county. Much of the information has been imported from third part sources. It is not possible to definitively confirm many habitat types by aerial photography therefore much of the wetland recorded during the MWM falls within the 'unknown wetland habitat' category, unless third party sources provided level 3 Fossitt habitat assignment data. The following attributes are associated with this shapefile:

OBJECT_ID	Unique numeric identifier for each polyline in the dataset.
FOSSITT_NA	Full name and code of habitat according to Fossitt (2000). There is an additional category 'unknown wetland type', where it was possible to identify a wetland but not possible to assign it to a Fossitt category.
FOS_CODE_1	Alphanumeric code according to Fossitt (2000) to level 1.
FOS_CODE_2	Alphanumeric code according to Fossitt (2000) to level 2.
FOSSITT_CO	Alphanumeric code according to Fossitt (2000) to level 3.
ANNEX_CODE	Where applicable, EU Habitat Directive Annex I habitat code.
SURVEY_MET	An indication of field data quality or survey method. Coded according to Smith et al (2010) ¹ .
SURVEY_DAT	Date of field survey as proposed for use by Smith et al (2010).
AREA	A calculation field which automatically calculates the area covered by the habitat.
SOURCE	The source of the habitat shape is given in this field, this relates to the dataset from which the habitat information originates. The code used within this field identifies bibliographic and GIS records as presented in the main report and Appendix 1.

¹GIS Data Quality (Survey Method)

Data quality classification scheme as proposed in the Heritage Council's 2010, Best Practice Guidance for Habitat Survey and Mapping [Pre-publication Version].

- S** = Field data have been collected by *walkover survey* where the habitat has been walked through by the field ecologist, allowing relatively detailed inspection of habitat structure and species composition
- V** = Data have been *field validated* where the habitat has been viewed in the field in less detail, such as a quick look over the hedge or inspection through binoculars from a distance
- DA** = Habitat information is from a *desktop* source that provides *recent* (i.e. within 10-15 years), *high quality* data that permit a confident identification of habitat type and other data, such as a previous survey carried out as part of a research project or EcIA or information from a trusted third-party
- DB** = Habitat information is from a *desktop* source that provides *older* (i.e. greater than 10-15 years old), *high quality* data that permit a confident identification of habitat type and other data
- DC** = Habitat information is derived from *desktop* interpretation of *aerial photography* supplemented by additional data sources of good quality, such as those listed in Appendix C
- DD** = Habitat information is derived from *desktop* interpretation of *aerial photography only*

4.2.4 Monaghan Rivers

Due to the complexity of mapping rivers accurately these are presented within a separate (linear) shapefile. The river dataset originates from the EPA and has the following attributes associated with it:

OBJECT_ID	Unique numeric identifier for each polyline in the dataset.
SEG_CD	Unique segment code which identifies the segment of river.
NAME	Name of river segment.
EPA_NAME	Name of river segment in EPA dataset.
EPA_CODE	Code of river segment in EPA dataset.
SOURCE	The source of the habitat shape is given in this field, this relates to the dataset from which the habitat information originates.
LENGTH_	Refers to the length of river segment.
ORDER	Refers to a classification system known as the 'Strahler' stream order. It ranges from 1 upwards. 1 refers to first order streams, 2 refers to second-order stream which form when two first-order streams come together. When two second-order streams come together, they form a third-order stream etc. While the rivers have not been classified to level three in Fossitt, it generally follows that lower order streams fit into the upland eroding streams category (FW1) while higher order rivers fit into the lowland depositing streams (FW2).

4.2.5 Monaghan Spring Sites

Springs are mapped separately as points in an individual file. These sites are mainly extracted from the Geological Survey of Ireland Karst Features dataset. The following attributes are associated with this file:

OBJECT_ID	Unique numeric identifier for each point in the dataset.
NAME	Name of spring site.
TOWNLAND	Townland name.
FOSSITT	Full name and code of habitat according to Fossitt (2000).
FOS_CODE_1	Alphanumeric code according to Fossitt (2000) to level 1.
FOS_CODE_2	Alphanumeric code according to Fossitt (2000) to level 2.
ANNEX_CODE	Where applicable, EU Habitat Directive Annex I habitat code.
SURVEY_MET	An indication of field data quality or survey method. Coded according to Smith et al (2010) ¹ .
SURVEY_DAT	Date of field survey as proposed for use by Smith et al (2010).
SOURCE	Dataset from which site originated.
GRID_ACCUR	Accuracy of grid reference, taken from field in original GSI file.
easting	Automatically generated field giving the (X) coordinate of the shape.
northing	Automatically generated field giving the (Y) coordinate of the shape.

4.2.6 Drainage Ditches

Drainage ditches are presented within a separate (linear) shapefile. Such a ubiquitous habitat type is often not mapped during habitat mapping exercises due to scale. There are occasional records of drainage ditches mapped in County Monaghan and these are contained within this file. The following attribute fields are attached to the file:

OBJECT_ID	Unique numeric identifier for each polyline in the dataset.
LENGTH	Calculation field which calculates the length of the feature.
SOURCE	Dataset from which site originated.
FOSSITT	Full name and code of habitat according to Fossitt (2000).
ANNEX_CODE	Where applicable, EU Habitat Directive Annex I habitat code.
SURVEY_MET	An indication of field data quality or survey method. Coded according to Smith et al (2010) ¹ .
SURVEY_DAT	Date of field survey as proposed for use by Smith et al (2010).
FOS_CODE_1	Alphanumeric code according to Fossitt (2000) to level 1.
FOS_CODE_2	Alphanumeric code according to Fossitt (2000) to level 2.
FOS_CODE_3	Alphanumeric code according to Fossitt (2000) to level 3.

Appendix 5: MWM Site, Bibliography & GIS Database Layouts

Title Layout – Monaghan Wetlands Map Site Database



Species Layout – Site Database

Monaghan Wetlands Map Sites Database

Back to CMS Home Page

KILROOSKY LOUGH CLUSTER

001798

Site Species Data

Annex Species Present - EU Birds or Habitats Directive ☒ Yes ☐ No

Red Data Book Species Present ☒ Yes ☐ No

Rare / Noteworthy Species Interest Present on site

<input checked="" type="checkbox"/> Botanical	<input type="checkbox"/> Invertebrates Mollusc	<input type="checkbox"/> Amphibian
<input checked="" type="checkbox"/> Higher Plant	<input type="checkbox"/> Invertebrates Insect	<input type="checkbox"/> Fish
<input type="checkbox"/> Fern	<input type="checkbox"/> Invertebrates Arachnid	
<input type="checkbox"/> Bryophyte	<input type="checkbox"/> Invertebrates Crustacean	
<input type="checkbox"/> Lichen		
<input type="checkbox"/> Algae	<input type="checkbox"/> Vertebrates	
	<input type="checkbox"/> Birds	
<input checked="" type="checkbox"/> Zoogeographical	<input type="checkbox"/> Mammals	
<input checked="" type="checkbox"/> Invertebrates	<input type="checkbox"/> Reptile	

Rare / Noteworthy Species Data Source

394, 161, 155, Annex 475, 473, 480

Wetland Areas on Site

☒ Yes

☐ No - without presence

☐ No Data - without presence

☐ No Data - without priority

Look up list of Residents/survey and other data source - or add a new one

CLICK HERE

EU Habitats Directive Annex II Species

<input type="checkbox"/> 1102 <i>Alosa alosa</i> - Alosa Shad	<input type="checkbox"/> 1092 <i>Austropelecotus pallens</i> - Yellow-clawed Crayfish
<input type="checkbox"/> 1103 <i>Alosa fallax fallax</i> - Tenip Shad	<input type="checkbox"/> 1065 <i>Euchydryas auraria</i> - Marsh Frillfly
<input type="checkbox"/> 1040 <i>Alosa fallax kilamensis</i> - Kilamby Shad	<input type="checkbox"/> 1024 <i>Gastrophilus maculatus</i> - Kerry Slug
<input type="checkbox"/> 1090 <i>Lampetra fluviatilis</i> - River Lamprey	<input type="checkbox"/> 1029 <i>Margaritana margaritana</i> - Freshwater Pearl Mussel
<input type="checkbox"/> 1090 <i>Lampetra planeri</i> - Brook Lamprey	<input type="checkbox"/> 1090 <i>Margaritana dumyensis</i> - Non-Freshwater Pearl Mussel
<input type="checkbox"/> 1085 <i>Protomyzon macrodon</i> - Sea Lamprey	<input type="checkbox"/> 1014 <i>Vertigo angustior</i> - Narrow-mouthed Whorl Snail
<input type="checkbox"/> 1106 <i>Salmo salar</i> - Atlantic Salmon	<input type="checkbox"/> 1013 <i>Vertigo geyeri</i> - Geyer's Whorl Snail
	<input type="checkbox"/> 1016 <i>Vertigo moulinsiana</i> - Desmoulin's Whorl Snail
	<input type="checkbox"/> 1064 <i>Hydrobia ulvae</i> - Grey Bait
	<input type="checkbox"/> 1025 <i>Lutra lutra</i> - Otter
	<input type="checkbox"/> 1065 <i>Phoca vitulina</i> - Common Harbour Seal
	<input type="checkbox"/> 1351 <i>Phocoena phocoena</i> - Harbour Porpoise
	<input type="checkbox"/> 1303 <i>Rhinopholis tripeperoides</i> - Lesser Horseshoe Bat
	<input type="checkbox"/> 1349 <i>Tursiops truncatus</i> - Bottle-nosed Dolphin
	<input type="checkbox"/> 1383 <i>Halimacoccyx leucocollis</i> - Stender Green Feather-Moose
	<input type="checkbox"/> 1833 <i>Najas flexilis</i> - Slender Nais
	<input type="checkbox"/> 1395 <i>Pterodroma hypoleuca</i> - Petrel
	<input type="checkbox"/> 1528 <i>Saxifraga hirculus</i> - Marsh Saxifrage
	<input type="checkbox"/> 1421 <i>Trichomanes speciosum</i> - Killarney Fern

EU Birds Directive Annex I Species

<input type="checkbox"/> Greenland White-fronted Goose - <i>Anser albifrons flavinucha</i>
<input type="checkbox"/> Hain Frigate - <i>Circus cyaneus</i>
<input type="checkbox"/> Merlin - <i>Falco columbarius</i>
<input type="checkbox"/> Red Goshawk - <i>Lagopus lagopus</i>
<input type="checkbox"/> Osprey - <i>Nyctalex nyctalex</i>
<input type="checkbox"/> Golden Plover - <i>Pluvialis apricaria</i>

Irish Red and Rare Species or Important Species assemblages

<input type="checkbox"/> Dragon - <i>Gerrhonotus</i>
<input type="checkbox"/> <i>Codrigodon furcatus</i> - Irish Blue
<input type="checkbox"/> <i>Lentis gryllus</i> - Scarce Emerald Damselfly
<input type="checkbox"/> <i>Condula semina</i> - Dorey Emerald
<input type="checkbox"/> <i>Condula semina</i> - Moonend or Northern Emerald
<input type="checkbox"/> Water Beetles
<input type="checkbox"/> Birds
<input type="checkbox"/> Whodoo Swan
<input checked="" type="checkbox"/> Higher Plants
<input type="checkbox"/> <i>Cardamine hirsuta</i>
<input type="checkbox"/> <i>Galium elongata</i>
<input checked="" type="checkbox"/> <i>Pyrola rotundifolia</i>

Habitats Layout – Site Database

Monaghan Wetlands Map Sites Database

Search: **KILROCKERY LOUGH CLUSTER**

Map: **001798**

Site Habitat Data

Main Fossitt Habitats Present

<input checked="" type="checkbox"/> B	<input checked="" type="checkbox"/> ED1	<input checked="" type="checkbox"/> GA	<input checked="" type="checkbox"/> PB3
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<input type="checkbox"/> BC1	<input type="checkbox"/> ED3	<input type="checkbox"/> GA2	<input type="checkbox"/> PB5
<input type="checkbox"/> BC2	<input type="checkbox"/> ED4		
<input type="checkbox"/> BC3	<input type="checkbox"/> ED5	<input checked="" type="checkbox"/> GM	<input checked="" type="checkbox"/> PF
<input type="checkbox"/> BC4		<input checked="" type="checkbox"/> GM1	<input checked="" type="checkbox"/> PF1
	<input type="checkbox"/> ER		<input type="checkbox"/> PF3
<input checked="" type="checkbox"/> BL	<input type="checkbox"/> ER1	<input checked="" type="checkbox"/> GS	
<input type="checkbox"/> BL1	<input type="checkbox"/> ER2	<input type="checkbox"/> GS1	
<input type="checkbox"/> BL2	<input type="checkbox"/> ER3	<input type="checkbox"/> GS2	<input checked="" type="checkbox"/> W
<input checked="" type="checkbox"/> BL3	<input type="checkbox"/> ER4	<input type="checkbox"/> GS3	<input checked="" type="checkbox"/> WD
		<input checked="" type="checkbox"/> GS4	<input type="checkbox"/> WD1
<input type="checkbox"/> C	<input type="checkbox"/> EU		<input type="checkbox"/> WD2
<input type="checkbox"/> C8	<input type="checkbox"/> EU1	<input type="checkbox"/> H	<input type="checkbox"/> WD3
<input type="checkbox"/> C81	<input type="checkbox"/> EU2	<input type="checkbox"/> HD	<input type="checkbox"/> WD4
<input type="checkbox"/> CC		<input type="checkbox"/> HD1	<input type="checkbox"/> WD5
<input type="checkbox"/> CC1	<input checked="" type="checkbox"/> F		
<input type="checkbox"/> CC2	<input checked="" type="checkbox"/> FL	<input type="checkbox"/> HH	<input checked="" type="checkbox"/> WL
	<input type="checkbox"/> FL1	<input type="checkbox"/> HH1	<input checked="" type="checkbox"/> WL1
<input type="checkbox"/> CD	<input type="checkbox"/> FL2	<input type="checkbox"/> HH2	<input type="checkbox"/> WL2
<input type="checkbox"/> CD1	<input type="checkbox"/> FL3	<input type="checkbox"/> HH3	
<input type="checkbox"/> CD2	<input type="checkbox"/> FL4	<input type="checkbox"/> HH4	<input checked="" type="checkbox"/> WN
<input type="checkbox"/> CD3	<input type="checkbox"/> FL5		<input type="checkbox"/> WN1
<input type="checkbox"/> CD4	<input type="checkbox"/> FL6	<input type="checkbox"/> L	<input type="checkbox"/> WN2
<input type="checkbox"/> CD5	<input type="checkbox"/> FL7	<input type="checkbox"/> LR	<input type="checkbox"/> WN3
<input type="checkbox"/> CD6	<input type="checkbox"/> FL8	<input type="checkbox"/> LR1	<input type="checkbox"/> WN4
		<input type="checkbox"/> LR2	<input type="checkbox"/> WN5
<input type="checkbox"/> CM	<input type="checkbox"/> FP	<input type="checkbox"/> LR3	<input checked="" type="checkbox"/> WN6
<input type="checkbox"/> CM1	<input type="checkbox"/> FP1	<input type="checkbox"/> LR4	<input type="checkbox"/> WN7
<input type="checkbox"/> CM2	<input type="checkbox"/> FP2	<input type="checkbox"/> LR5	
			<input checked="" type="checkbox"/> WS
<input type="checkbox"/> C8	<input checked="" type="checkbox"/> FS	<input type="checkbox"/> LS	<input checked="" type="checkbox"/> WS1
<input type="checkbox"/> C81	<input checked="" type="checkbox"/> FS1	<input type="checkbox"/> LS1	<input type="checkbox"/> WS2
<input type="checkbox"/> C82	<input type="checkbox"/> FS2	<input type="checkbox"/> LS2	<input type="checkbox"/> WS3
<input type="checkbox"/> C83		<input type="checkbox"/> LS3	<input type="checkbox"/> WS4
	<input checked="" type="checkbox"/> FW	<input type="checkbox"/> LS4	<input type="checkbox"/> WS5
<input type="checkbox"/> CW	<input checked="" type="checkbox"/> FW1	<input type="checkbox"/> LS5	
<input type="checkbox"/> CW1	<input type="checkbox"/> FW2		
<input type="checkbox"/> CW2	<input type="checkbox"/> FW3	<input checked="" type="checkbox"/> P	
	<input checked="" type="checkbox"/> FW4	<input type="checkbox"/> PB	
<input type="checkbox"/> E		<input type="checkbox"/> PB1	
<input type="checkbox"/> ED	<input checked="" type="checkbox"/> G	<input type="checkbox"/> PB2	

EU Habitats Directive Habitats Present

(1100) Estuaries
(1150) Coastal lagoons
(1200) Vegetated sea cliffs of the Atlantic and Baltic coasts
(2100) Humid dune-slacks
(21A0) Machaera (*) in Ireland
(3110) Oligotrophic waters containing ... of sandy plains
(3130) Oligotrophic to mesotrophic standing waters with
(3140) Hard oligo-mesotrophic waters with benthic veg.
(3150) Natural eutrophic lakes with Magnopotamion or
(3160) Natural dystrophic lakes and ponds
(3180) Turf-cuttings
(3200) Water courses of plain to montane levels with
(3270) Rivers with muddy banks with Chenopodium rubrum
(4010) Northern Atlantic wet heaths with Erica tetralix
(4030) European dry heaths
(4080) Alpine and Boreal heaths
(5130) Juniperus communis formations on heaths or calc.
(9990) Semi-natural calcareous dry grasslands (orchid-poor)
(6210) Semi-natural calcareous dry grasslands (orchid-rich)
(6410) Molinia meadows on calcareous, peaty or clay
(6510) Lowland hay meadows (Alopecurus pratensis)
(7110) Active raised bogs
(7130) Degraded raised bogs still capable of natural
(7230) Peatfying sponges with lufa formation
(7230) Aulone fens
(8110) Siliceous screes of the montane to snow levels
(8120) Calcareous and calcareous screes of montane
(8240) Limestone pavements
(8310) Caves not open to the public
(8130) Calluna heath grasslands of the Violette
(9230) Species-rich Nardus grasslands, on siliceous
(9430) Hydrophilous tall herb fringe communities
(7130) Blanket bog (*active only)
(8900) Blanket bog (not active)
(7140) Transition mires and quaking bogs
(7100) Depressions on peat substrates of the Rhyncho-
(7210) Calcareous fens with Cadium mariscus and
(8210) Calcareous rocky slopes with chamaephytic v.
(8220) Siliceous rocky slopes with chamaephytic veg
(9100) Bog woodland
(91E0) Alluvial forests with Alnus glutinosa and Frax.
(91J0) Trestle beech woods of the British Isles
(91A0) Old sessile oak woods with Ilex and Blechn.

Wetland Areas on Site

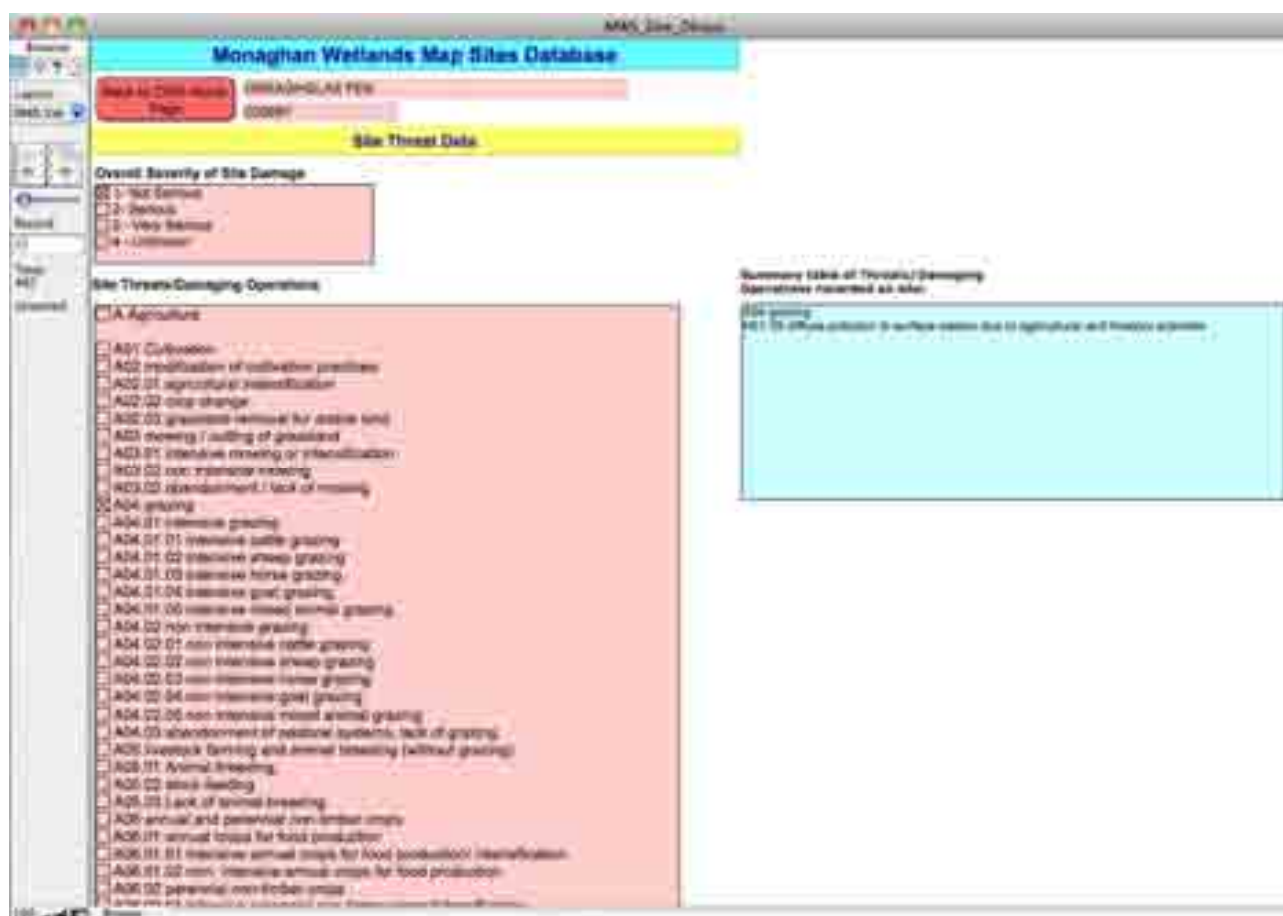
☒ YES

☐ No wetland present

☐ No Data - wetland present

☐ No Data - wetland unknown

[Lookup Fossitt full habitat key - click here](#)



Wetland Habitat Area Layout – Site Database

Monaghan Wetlands Map Sites Database			
KILRODSKY LOUGH CLUSTER			
Site Wetland Habitat Area Data			
Area Present in ha	Length Present in km	Wetland Fossitt Categories	
CN Area		CN Salt marshes	
CW Area		CW Brackish water	
CW1 Area		CW1 Lagoons and saline lakes	
CD Area		CD Sand dune systems	
CD5 Area		CD5 Dune stacks	
FL Area		FL Freshwater	
FL1 Area		FL1 Lakes & Ponds	
FL2 Area		FL2 Eutrophic lakes	
FL3 Area		FL3 Acid oligotrophic lakes	
FL4 Area		FL4 Limestone lakes	
FL5 Area		FL5 Mesotrophic lakes	
FL6 Area		FL6 Eutrophic lakes	
FL7 Area		FL7 Turbidity	
FL8 Area		FL8 Reservoirs	
FL9 Area		FL9 Other artificial lakes and ponds	
FP Area		FP Springs	
FP1 Area		FP1 Calcareous springs	
FP2 Area		FP2 Non-Calcareous springs	
FS Area		FS Swamps	
FS1 Area		FS1 Reed and large sedge swamps	
FS2 Area		FS2 Tall herb swamps	
FW Area		FW Watercourses	
FW1 Area		FW1 Eroding/upland rivers	
FW2 Area		FW2 Depositing/lowland rivers	
FW3 Area		FW3 Canals	
FW4 Area		FW4 Drainage ditches	
G Area		G Grassland & Marsh	
GM Area		GM Marsh	
GM1 Area		GM1 Marsh	
GM2 Area		GM2 Wet grassland	
H Area		H Heath	
H1 Area		H1 Wet heath	
P Area		P Peatlands	
P1 Area		P1 Bogs	
P2 Area		P2 Raised bog	
P3 Area		P3 Upland blanket bog	
P4 Area		P4 Lowland blanket bog	
P5 Area		P5 Cutover bog	
P6 Area		P6 Eroding blanket bog	
PF Area		PF Fens & Flumes	
PF1 Area		PF1 Rich fen and flush	
PF2 Area		PF2 Poor fen and flush	
PF3 Area		PF3 Transition mire & quaking bog	
W Area		W Woodland and scrub	
WN Area		WN Semi-natural woodland	
WN1 Area		WN1 Wet pedunculate oak-wet woodland	
WN2 Area		WN2 Riparian woodland	
WN3 Area		WN3 Wet willow-ash woodland	
WN4 Area		WN4 Bog woodland	
WN5 Area		WN5 Scrub/transitional woodland	
WS Area		WS Scrub	

Monaghan Wetlands Map Sites Database			
<input type="button" value="Back to Data Entry Page"/>	<input type="button" value="Printed Not Indexed Site"/>	<input type="button" value="Go Home to New Index"/>	KILROOSKY LOUGH CLUSTER 00198
Site Description & Source			
Site Descriptive & Source: <p>Monaghan Fen Survey Description:</p> <p>Kilrosky Lough Cluster straddles the border with Northern Ireland, and is located approximately 3 km north-west of Clonsilla, Co. Monaghan.</p> <p>The site consists of six separate (semi)-fresh, clear water (oligo-mesotrophic) lakes and three vertically developed marginal reed and fen vegetation, as well as Bannagee Lough which is a reed bed dominated area without open water. The Lough cluster includes Kinrossy, Burtisland, Summerville and Durney's Lagoons.</p> <p>Kinrossy Lough is a reed fringed thin lake, the southern half of which is in the Republic. This near circular oligomesotrophic Lough, oligo-mesotrophic in character with extensive Chara communities present in the fringing reed zones and out into the open water areas. In addition a pool of floating macrophyte vegetation existed beyond the reed zone into the open water areas. Nymphaea alba and Najas lutea were the most obvious components. The Lough has a wide fringe of tall reed vegetation around the entire shoreline, consisting of mosaic stands of Phragmites australis and Schoenus palustris. A narrow species rich fen zone 3-5 m wide occurs in patches on the landward side of the reed zone around the margins of the shallow shore of the lake, as well as an area of Cladium mariscus fen.</p> <p>Burtisland Lough, just to the north of Kilrosky, is a more enriched lake with a fringe of reed and sedge vegetation. There is no fen community at the site.</p> <p>Durney's Lough is another marginal, the southern half of which is in the Republic, which lies just to the west of Kinrossy Lough and is surrounded by reed and wet woodland communities with a quaking alkaline fen and Cladium fen area in the western shore of the lake. The northern portion of this lake lies within Northern Ireland and is not designated as a conservation area in that jurisdiction despite the southern portion of the site being designated as an internationally important SAC in the Republic.</p> <p>The south-eastern section of Summerville Lough is included within the site, the remainder of the lake lying in Northern Ireland. A sedge-dominated quaking fen occurs on the northwestern side of this lake and represents the largest fen area within the Kilrosky Lough Cluster SAC.</p> <p>SITE TYPE: 3330P5M SITE NAME: KILROOSKY LOUGH CLUSTER SITE CODE: 00198</p> <p>Kilrosky Lough Cluster straddles the border with Northern Ireland, and is located approximately 3 km north-west of Clonsilla, Co. Monaghan. The site consists of three separate semi-fresh waters (oligo-mesotrophic) lakes and three marginal fen vegetation.</p> <p>The lough cluster includes Kinrossy, Burtisland, Summerville and Durney's Lagoons, which are of interest for their characteristic and extensive catenoid plant communities - reed beds are relatively rare in succession, high in richness and have good water quality. These types of sites are rare due to urban expansion, in particular, and have been recognised by the European Union as being of international importance. They are listed as Annex I of the Habitats Directive. Such bird-rich sites are internationally rare in themselves. Wetland species recorded from Kinrossy include Chara bipinnata, C. polyacanthus, Najas lutea and the nationally rare Chara vulgaris.</p> <p>Kinrossy Lough is a reed lake surrounded by two soil species-rich, freshwater marshes. Of particular note is the occurrence of a fringe of Great Irish Hedge (Typhula nemoralis). Plant species of regional or local significance recorded here include Cornus sanguinea, Fox Squirrels (Sciurus hibernicus), Fox Prunella (Vernonia officinalis), Fox Ground-Spleenwort (Saxifraga hypnoides), Tufted-edge (Carex elata) and Grass-of-paradise (Ficaria verna). Eight species of birds, including North Humberstone (Eidolon helveticum), have also been recorded.</p>			

Bibliography Layout – Bibliography Database

MWS_Bibliography

The County Monaghan Wetlands Map

To add a publications or report to the bibliography:

1. Make sure the reference is not already in the bibliography first - if you are unsure click the "Reference list in alphabetical order" button above.
2. Then return to the Main reference layout (this one)
3. Then click "Add new reference" button above and enter the reference. Formats to be used are displayed to the left hand side of each data field below.

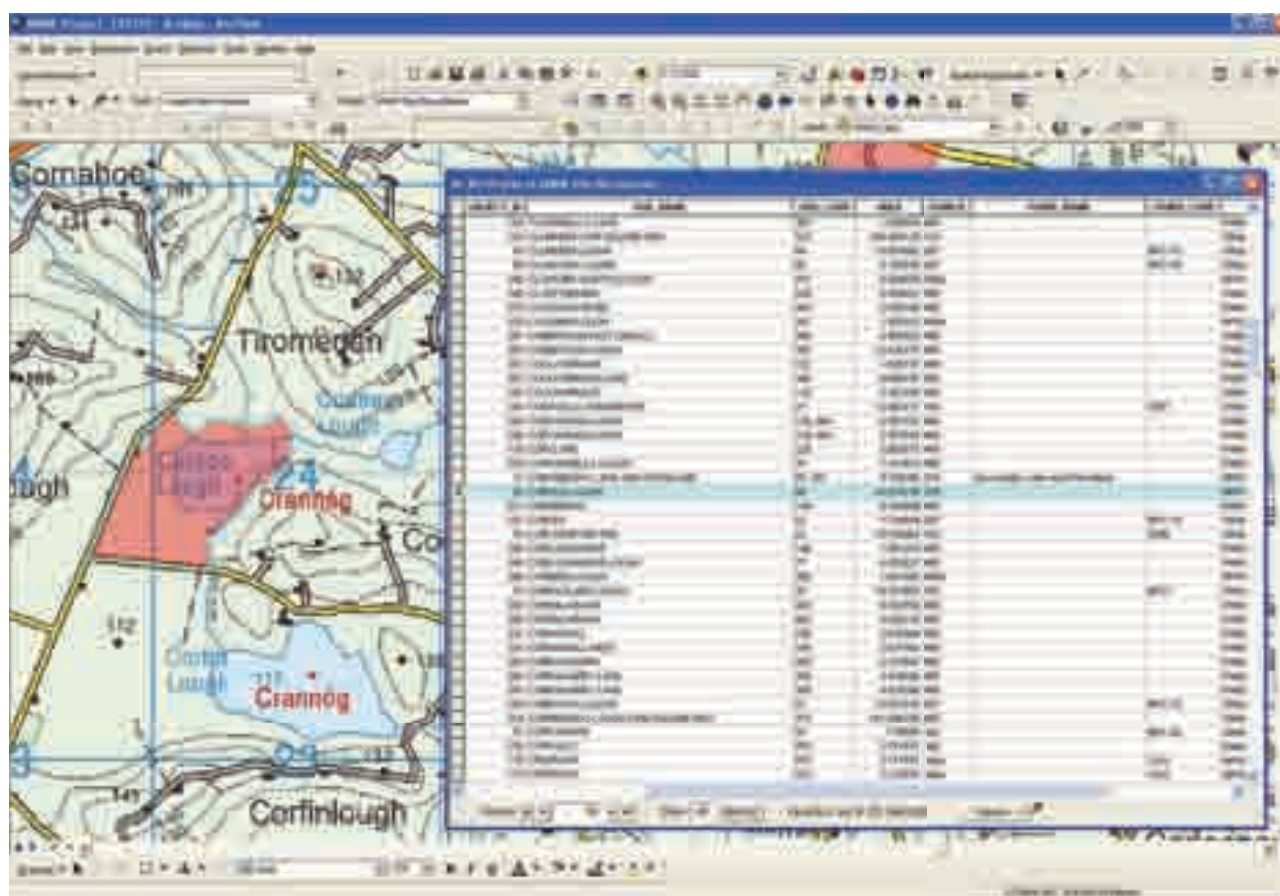
Wetland Publications and Reports Bibliography

Bibliog Number	463
Authors: surname, initials	Smith, G., O'Donoghue, P., O'Hara, K. & Delaney E.
Year	2009
Title: paper/ book/ chapter title followed by book it is in format: in: Author (ed/s.) book title	Best practice guidelines for habitat survey and mapping in Ireland (Draft)
Journal, Publisher, Location, No. pages pp. X- Y.	The Heritage Council

Referenced in Monaghan Wetlands Map 2010 ☒ Yes
 Datasource in Monaghan Wetlands Map 2010 ☐ Yes
 Datasource in MWM but no MO Wetland Info ☐ Yes
 GIS Datasource in Monaghan Wetlands Map 2010 ☐ Yes

100 Browse

Attributes Layout – GIS Database



Appendix 6: MWM habitat classification scheme used for wetlands

Within the context of 2010 County Monaghan Wetlands Map the following wetland habitat types as defined by the Guide to Habitats published by the Heritage Council (Fossitt 2000) were mapped and recorded when they occurred and could be identified within sites in the county (see Appendix 6a).

This Appendix also includes a description of each of these wetland habitat types, reproduced from Fossitt 2000 (see Appendix 6b). *Copyright The Heritage Council 2000.*

Appendix 6a. The County Monaghan Wetlands Map 2010. Habitat Types recorded and their relationship to the EU Habitats Directive.

Adapted from Fossitt (2000).

level 3 = 32 wetland habitat types; of which 8 are priority

Fossitt Classification Level	Fossitt Category Code and Name	EU Habitats Directive Annex 1 habitats & Natura 2000 Code	EU Habitats Directive Status
Level 1	F Freshwater		
Level 2	FL Lakes & Ponds		
Level 3	FL1 Dystrophic lakes	Natural dystrophic lakes and ponds (3160)	Annex 1 Habitat
Level 3	FL2 Acid oligotrophic lakes	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) (3110) Lowland; Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea (3130) Upland	Annex 1 Habitat
Level 3	FL3 Limestone/marl lakes	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. (3140)	Annex 1 Habitat
Level 3	FL4 Mesotrophic lakes		
Level 3	FL5 Eutrophic lakes	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation (3150)	Annex 1 Habitat
Level 3	FL6 Turloughs	Turloughs (3180)	Priority Habitat
Level 3	FL7 Reservoirs		
Level 3	FL8 Other artificial lakes and ponds		
Level 2	FP Springs		
Level 3	FP1 Calcareous springs	Petrifying springs with tufa formation (Cratoneurion) (7220)	Priority Habitat
Level 3	FP2 Non-Calcareous springs		
Level 2	FS Swamps		
Level 3	FS1 Reed and large sedge swamps		
Level 3	FS2 Tall herb swamps	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)	Annex 1 Habitat
Level 2	FW Watercourses		
Level 3	FW1 Eroding/upland rivers	Watercourses of plain to montane levels with the Ranunculus fluitantis and Callitriche-Batrachion vegetation (3260)	Annex 1 Habitat
Level 3	FW2 Depositing/lowland rivers	Rivers with muddy banks with Chenopodium rubri p.p. and Bidentation p.p. vegetation (3270)	Annex 1 Habitat

Fossitt Classification Level	Fossitt Category Code and Name	EU Habitats Directive Annex 1 habitats & Natura 2000 Code	EU Habitats Directive Status
Level 3	FW3 Canals		
Level 3	FW4 Drainage ditches		
Level 1	G Grassland & Marsh		
Level 2	GM Freshwater Marsh		
Level 3	GM1 Marsh	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)	Annex 1 Habitat
Level 2	GS Semi-natural grassland		
Level 3	GS4 Wet grassland	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) (6410)	Annex 1 Habitat
Level 1	H Heath & Dense Bracken		
Level 2	HH Heath		
Level 3	HH3 Wet heath	Northern Atlantic wet heaths with Erica tetralix (4010)	Annex 1 Habitat
Level 1	P Peatlands		
Level 2	PB Bogs		
Level 3	PB1 Raised bogs	Active raised bogs (7110); Degraded raised bogs still capable of natural regeneration (7120); Depressions on peat substrates of the Rhynchosporion (7150)	Priority Habitat; Annex 1 Habitat
Level 3	PB2 Upland blanket bog	Blanket bog (*if active bog) (7130)	Priority Habitat
Level 3	PB3 Lowland blanket bog	Blanket bog (*if active bog) (7130); Depressions on peat substrates of the Rhynchosporion (7150)	Priority Habitat; Annex 1 Habitat
Level 3	PB4 Cutover bog	Depressions on peat substrates of the Rhynchosporion (7150)	Annex 1 Habitat
Level 3	PB5 Eroding blanket bog		
Level 2	PF Fens & Flushes		
Level 3	PF1 Rich fen and flush	Calcareous fens with Cladium mariscus and species of the Caricion davallianae (7210); Alkaline fens (7230)	Priority Habitat; Annex 1 Habitat
Level 3	PF2 Poor fen and flush		
Level 3	PF3 Transition mire & quaking bog	Transition mires and quaking bogs (7140)	Annex 1 Habitat
Level 1	W Woodland and scrub		
Level 2	WN Semi-natural woodland		

Fossitt Classification Level	Fossitt Category Code and Name	EU Habitats Directive Annex 1 habitats & Natura 2000 Code	EU Habitats Directive Status
Level 3	WN4 Wet pedunculate oak-ash woodland	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-padion, Alnion incanae, Salicion albae) (91E0)	Priority Habitat
Level 3	WN5 Riparian woodland		
Level 3	WN6 Wet willow-alder-ash woodland		
Level 3	WN7 Bog woodland		
Level 2	WS Scrub/transitional woodland	Bog woodland (91D0)	Priority Habitat
Level 3	WS1 Scrub	Juniperus communis formations on heaths or calcareous grasslands (5130)	Annex 1 Habitat
N/A	MWM Unknown wetland type		

Appendix 6b: Freshwater habitat types descriptions

Reproduced from a Guide to Habitats published by the Heritage Council (Fossitt 2000). Copyright The Heritage Council.

In the case of each wetland type the relevant level 1, 2 and 3 Fossitt habitat type code and descriptive information for the wetland habitats is presented.

F Freshwater

This section includes all bodies of freshwater that may be either natural, modified or entirely artificial, and that are either permanent or seasonal. Areas of land that flood temporarily in winter or during very wet periods are excluded if there is no differentiation or evidence of a shoreline or draw-down zone, and if there are no aquatic plants. Springs that are maintained by a more or less continual supply of moving water are included in this section, as are swamps. Swamps are an integral part of many freshwater bodies but may also occur in brackish waters and tidal situations. Note, however, that apart from swamps, all other brackish water and tidal habitats are excluded.

FL Lakes and Ponds

Lakes and ponds include all bodies of open or standing freshwater that lack a strong unidirectional flow of water. These can be either natural, modified or entirely artificial, as in the case of some reservoirs, ornamental lakes, or flooded quarries and gravel pits, and may be either temporary or seasonal as in the case of turloughs and some ponds. Artificial linear water bodies with no obvious connection to a wider drainage network are also included here. To distinguish a lake from a wide stretch of river, most of the water in the former should be either standing, moving imperceptibly or circulating within the basin, as opposed to moving with a strong unidirectional flow. Note that no distinction is made between lakes and ponds.

Only the area of open water, with or without floating or submerged aquatic vegetation, is included here. This is taken as the area normally occupied by a water body in situations where water levels fluctuate, or as the normal limit of flooding in the case of seasonal or temporary lakes and ponds. Swamps (FS1-2), which may include floating mats or surface scraws of vegetation, and any other peripheral wetland habitats, are excluded. Note that some tall reeds die back in winter and have a late but vigorous growing season; their full extent may not be evident before about mid-May. Any fish farming operations should be categorised separately under **fish cages and rafts - CC2**.

The classification of most open water bodies is largely based on the trophic, or nutrient status of the water. The concentrations of phosphorus and phytoplankton, which require measurements in the laboratory, have well defined categories to recognise oligotrophic, mesotrophic and eutrophic water bodies. Because the present classification is based on vegetation and not actual values of water quality parameters, this approach is only loosely applied here. **Turloughs - FL6, reservoirs - FL7 and other artificial lakes and ponds - FL8** are considered separately but may also differ in terms of their trophic status.

FL1 Dystrophic lakes

This category includes lakes and ponds that are highly acidic (pH 3.5-5.5), base-poor and low in nutrients, and where the water is brown in colour owing to inputs of humic and other acids from peat. They are usually associated with blanket bogs, mainly the lowland type, and are characterised by peaty rather than rocky margins and substrata. The transition from bog to open water is often abrupt. Among the aquatic plants that colonise these lakes are bladderworts (*Utricularia* spp.), pondweeds (*Potamogeton natans*, *P. polygonifolius*) and Bogbean (*Menyanthes trifoliata*). Aquatic Sphagnum mosses such as *S. auriculatum* and *S. cuspidatum* may also be present.

Links with Annex I: Corresponds to the annexed habitat, 'natural dystrophic lakes and ponds (3160)'.

FL2 Acid oligotrophic lakes

This category includes lakes and ponds that are low in nutrients, base-poor and acidic; those that are oligotrophic and base-rich should be considered under limestone/marl lakes - FL3. Most acid oligotrophic lakes are associated with areas of acidic bedrock and many have rocky margins. The substratum in shallow water is either rock, organic lake sediment, or coarse mineral material (sand and gravel). Water is often brownish in colour as a result of inputs from peaty soils or bogs in the catchments. These lakes

support communities of submerged and floating aquatic plants. Small submerged aquatics such as Shoreweed (*Littorella uniflora*), Water Lobelia (*Lobelia dortmanna*) and Bulbous Rush (*Juncus bulbosus*) occur in shallow water. Quillworts (*Isoetes* spp.) may be abundant but are rarely visible as they colonise lake sediments in deep water. Floating aquatics include Bog Pondweed (*Potamogeton polygonifolius*), Alternate Water-milfoil (*Myriophyllum alterniflorum*) and Floating Club-rush (*Eleogiton fluitans*). Fringing emergent vegetation may include open stands of Common Reed (*Phragmites australis*); if extensive, reed beds should be considered under reed and large sedge swamps - FS1.

Links with Annex I: Acid oligotrophic lakes correspond to two annexed habitats, 'oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) (3110)' and 'oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoto-Nanojuncetea (3130)'.

FL3 Limestone/marl lakes

This category includes lakes and ponds of limestone areas (other than **turloughs - FL6**) that are base-rich and poor to moderately rich in nutrients (oligotrophic to mesotrophic). The water is typically clear and the lake sediment usually has a high proportion of marl, a white clayey precipitate of calcium carbonate. Marl-forming stoneworts (*Chara* spp.) are often abundant and may form dense carpets in unpolluted waters. Various-leaved Pondweed (*Potamogeton gramineus*) is also characteristic. These lakes are frequently fringed by **rich fen and flush - PF1 vegetation**.

Links with Annex I: Corresponds to the annexed habitat, 'hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. (3140)'.

FL4 Mesotrophic lakes

This category includes lakes and ponds that are moderately rich in nutrients, and where the water is sometimes discoloured by algae. Characteristic aquatic plants include White Water-lily (*Nymphaea alba*), Yellow Water-lily (*Nuphar lutea*), and a large number of pondweeds (*Potamogeton gramineus*, *P. obtusifolius*, *P. perfoliatus*). Stoneworts (*Chara* spp.) may also be present. The fringing and aquatic plant communities are typically more lush than those associated with oligotrophic lakes.

FL5 Eutrophic lakes

This category includes lakes and ponds that are high in nutrients and base-rich and where the water is usually discoloured or turbid, often grey to green in colour, from the abundant algae and suspended matter. Some water bodies are naturally eutrophic but most Irish lakes are eutrophic as a result of enrichment and high levels of nutrients entering the water. This category can also include hypertrophic or highly-enriched (polluted) waters. Characteristic aquatic plants of eutrophic lakes and ponds include duckweeds (*Lemna* spp.), pondweeds (*Potamogeton pectinatus*, *P. crispus*) and Spiked Water-milfoil (*Myriophyllum spicatum*). Submerged aquatics are usually rare or are restricted to shallow waters owing to poor light penetration. Reed beds on sheltered shores and dense stands of fringing vegetation are characteristic of eutrophic lakes and ponds; if reed beds are extensive they should be considered under reed and **large sedge swamps - FS1**.

Links with Annex I: Only those lakes that are naturally eutrophic are recognised as the annexed habitat, 'natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation (3150)'.

FL6 Turloughs

Turloughs are ephemeral lakes that occupy basins or depressions in limestone areas, and where water levels fluctuate markedly during the year. They are virtually unique to Ireland and their greatest concentration is in counties Clare, Galway and Roscommon. The general pattern is to flood in winter and dry out in summer, but there may be other sporadic rises in response to high rainfall. Turloughs normally fill through underground passages and sinkholes but some also have inflowing rivers or streams. Some turlough basins retain standing water in channels, pools or small lakes when flooding subsides. All areas within the normal limit of flooding are considered as part of the turlough habitat. The presence of the distinctive dark moss, *Cinclidotus fontinaloides*, on stone walls or rocks can help to establish this level. Soils of turlough basins can include marls, peat, clays or loams. Large boulders or exposures of bedrock may also be present.

Turloughs support a range of different plant communities that comprise a mixture of aquatic, amphibious and terrestrial species. Plant communities typically form a concentric pattern around the basin; the different zones reflect differences in the extent

and duration of flooding. Wet grassland usually dominates and characteristic species include Creeping Bent (*Agrostis stolonifera*), small sedges (particularly *Carex nigra* and *C. panicea*), Silverweed (*Potentilla anserina*), Meadowsweet (*Filipendula ulmaria*), Creeping Buttercup (*Ranunculus repens*), Marsh Pennywort (*Hydrocotyle vulgaris*) and Amphibious Bistort (*Polygonum amphibium*). Permanent pools, channels and lakes may also be present and may support Common Spike-rush (*Eleocharis palustris*), Water-plantain (*Alisma plantago-aquatica*), pondweeds (*Potamogeton* spp.), and tall reeds such as Common Club-rush (*Schoenoplectus lacustris*).

Links with Annex I: Corresponds to the priority habitat, '*turloughs (3180)'.

FL7 Reservoirs

This category incorporates all open water bodies that are used for the storage and supply of water. It includes natural lakes where water levels fluctuate significantly and unnaturally as a result of abstraction, in addition to modified lakes with dams or retaining walls or banks. Entirely artificial water bodies, some lined with concrete, that are used as reservoirs are also included here (See also other **artificial lakes and ponds - FL8**). Other lakes where there is evidence of water abstraction (pumps, pump houses or out flowing pipes) but where there are no indications of significant water level changes are not included here. Redshank (*Polygonum persicaria*) is often common along the draw-down zone of reservoirs in lowland areas

FL8 Other artificial lakes and ponds

This category should be used for artificial or ornamental bodies of standing water that may be found in parks, demesnes, gardens or golf courses. Flooded quarries, tailings ponds and water treatment plants (with open water) should also be included. The nutrient status of these artificial water bodies is variable and may be high as in the case of hypertrophic lakes in urban parks. Moats can also be included here if there is no obvious connection to a wider drainage network.

FW Watercourses

This section includes linear channels of freshwater that are primarily associated with drainage and the movement or transport of water on the land surface. Sections of watercourses that flow underground are not considered in this classification unless they feature as part of **non-marine caves - EU1**. Linear water bodies with no obvious links to a wider drainage network (some moats and ornamental water bodies) are excluded (See **other artificial lakes and ponds - FL8**). The main subdivision in this section is between watercourses that are primarily natural (rivers) and those that are primarily artificial (canals and drainage ditches). Rivers are divided into watercourses that are mainly eroding, as in the case of upland streams, and those that are mainly depositing, as in the case of lowland rivers. No distinction is made between streams and rivers.

Rivers differ from most artificial watercourses in that they have a strong unidirectional flow of water. They are dynamic systems where water levels and flow rates can fluctuate markedly. The entire channel is included as part of the river habitat, irrespective of water levels at the time of the survey. Natural watercourses may flood beyond the limits of their banks but note that floodplains are excluded. Tidal sections of rivers that are influenced by brackish waters should be considered under **tidal rivers - CW2**, while the freshwater tidal sections should be included under **depositing/lowland rivers - FW2**. Note that large fringing swamps or reed beds should be recorded separately (See **reed and large sedge swamps - FS1**). Any mid-channel islands should be noted and classified on the basis of the habitats present.

Links with Annex I: Clear unpolluted rivers can contain the annexed habitat, 'watercourses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation (3260)'. The annexed habitat, 'rivers with muddy banks with Chenopodion rubri p.p. and Bidention p.p. vegetation (3270)' can occur in association with rivers but stands are typically small and fragmented in Ireland.

FW1 Eroding/upland rivers

This category includes natural watercourses, or sections of these, that are actively eroding, unstable and where there is little or no deposition of fine sediment. Eroding conditions are typically associated with the upland parts of river systems where gradients are often steep, and water flow is fast and turbulent. Rivers in spate are included. For some rivers on the seaward side of coastal mountains, particularly in the west of Ireland, eroding conditions persist to sea level because of comparatively steep gradients over short distances, and high rainfall. Small sections of other lowland rivers may also be eroding where there

are waterfalls, rapids or weirs. The beds of eroding/upland rivers are characterised by exposed bedrock and loose rock. Pebbles, gravel and coarse sand may accumulate in places, but finer sediments are rarely deposited. These rivers vary in size but are usually smaller and shallower than **depositing/lowland rivers - FW2**. Small mountain streams that dry out periodically can be included if an obvious channel persists or wetland plants are present.

The unstable rocky channels of eroding/upland rivers usually support little vegetation cover. Submerged rocks and boulders may be colonised by aquatic mosses such as *Fontinalis* spp. and *Racomitrium aciculare*. Exposed rocks and wet shaded banks may also support extensive cover of lichens and liverworts. Higher plants are generally rare or absent except in places where fine sediments are trapped. Typical species include water-crowfoots (*Ranunculus penicillatus*, *R. aquatilis*), Alternate Water-milfoil (*Myriophyllum alterniflorum*) and the aquatic form of Bulbous Rush (*Juncus bulbosus*). Plant and animal communities of eroding/upland rivers are influenced by a range of factors including bedrock and substratum type, nutrient status, water force, water quality, shade and human impact. Habitat conditions also vary along different stretches of a river where there are riffles, runs, pools, waterfalls and backwaters.

FW2 Depositing/lowland rivers

This category includes watercourses, or sections of these, where fine sediments are deposited on the river bed. Depositing conditions are typical of lowland areas where gradients are low and water flow is slow and sluggish. These rivers vary in size but are usually larger and deeper than those above. In a natural state these rivers erode their banks and meander across floodplains. Because of this, most have been modified to some extent to control water flow, facilitate navigation or prevent flooding and erosion. Canalised or walled sections of rivers are included here, as are natural watercourses that have been dredged or deepened, and those with artificial earth banks. If channels have been excavated to divert water away from the main watercourse, these should be considered under **canals - FW3**. Tidal sections of rivers with brackish water influence are excluded (See **tidal rivers - CW2**). Rejuvenated sections of lowland rivers associated with rapids, waterfalls and weirs should be considered under eroding/upland rivers - FW1 if eroding conditions predominate.

Plant and animal communities are influenced by numerous factors including substratum type, water force, nutrient status, water quality, channel size, water depth, human impact, disturbance and shade. Within a river channel there may be deep pools, backwaters, banks or mid-channel bars of gravel, sand or mud, in addition to vegetated islands and fringing reedbeds. The substratum of depositing/lowland rivers comprises mainly fine alluvial or peaty sediments. Vegetation may include floating and submerged aquatics, with fringing emergents in shallow water or overgrowing the banks. Floating aquatics can include water-lilies (*Nuphar lutea*, *Nymphaea alba*), pondweeds (*Potamogeton* spp.), water-starworts (*Callitriche* spp.) and Unbranched Bur-reed (*Sparganium emersum*). Tall emergents such as Common Club-rush (*Schoenoplectus lacustris*), Common Reed (*Phragmites australis*) and Yellow Iris (*Iris pseudacorus*) may also be present. Large areas of fringing reedbed should be considered under **reed and large sedge swamps - FS1**.

FW3 Canals

Canals are artificial linear bodies of water that were originally constructed for the purpose of navigation. They typically lack strong currents and any significant channel or bank erosion. This means that canals tend to have closer affinities with ponds than rivers. Canals can normally be distinguished from drainage ditches - FW4 by a combination of width and function. Channels that have been excavated to divert water away from the main watercourse are included in this category but canalised sections of rivers are excluded (See **depositing/lowland rivers - FW2**). Locks that are used to control water levels are considered as part of the canal habitat, but note that any built stone structures, including bridges and banks that are faced with stone, are excluded (See **stone walls and other stonework - BL1**). All canals require management and maintenance to keep them open and operational. They are readily colonised by aquatic plants and frequently support floating, submerged or emergent vegetation. Typical aquatics include water-milfoils (*Myriophyllum* spp.), water-lilies (*Nuphar lutea*, *Nymphaea alba*), Amphibious Bistort (*Polygonum amphibium*), bur-reeds (*Sparganium* spp.) and duckweeds (*Lemna* spp.). Canals with standing water are included here even if they are overgrown with swamp-like vegetation. Disused dry canals are excluded and should be classified on the basis of habitats they now support.

FW4 Drainage ditches

This category includes linear water bodies or wet channels that are entirely artificial in origin, and some sections of natural watercourses that have been excavated or modified to enhance drainage and control the flow of water. Drainage ditches are generally not used for navigation and are typically narrower than

canals - FW3, but there may be exceptions. To be included here, drainage ditches should either contain water (flowing or stagnant) or be wet enough to support wetland vegetation. Dry ditches that lack wetland plants are not included. As with canals - FW3, drainage ditches must be maintained and cleared in order to keep them open. Those that are overgrown with vegetation are likely to be cleared intermittently. Note that water levels are also likely to undergo seasonal fluctuations. Drainage ditches may be intimately associated with hedgerows and should be recorded as a separate habitat if they meet the criteria outlined above.

FP Springs

Springs are usually very small local features that are maintained by a more or less continual supply of water from upwelling groundwater sources, or along seepage zones. They occur in upland and lowland areas and may be associated with a variety of different habitat groups such as woodland, heath, grassland or exposed rock. Springs are characterised by abundant mosses and may or may not be peat-forming.

FP1 Calcareous springs

This category is used for springs that are irrigated and kept permanently moist by water that is calcareous and oligotrophic. These springs may be associated with shallow peaty or skeletal mineral soils. There may be some precipitation of marl, or tufa formation. Calcareous springs are typically dominated by mosses, and by *Cratoneuron* spp. in particular; *Bryum pseudotriquetrum* is also characteristic. Other common components of the vegetation include grasses (*Festuca rubra*, *Briza media*), sedges (*Carex dioica*, *C. pulicaris*, *C. flacca*, *C. nigra*), Common Butterwort (*Pinguicula vulgaris*) and Marsh Horsetail (*Equisetum palustre*). The relatively rare Yellow Saxifrage (*Saxifraga aizoides*) can occur in calcareous springs and is diagnostic of this habitat.

Links with Annex I: Calcareous springs with tufa formation are recognised as the priority habitat, '*petrifying springs with tufa formation (*Cratoneuron*) (7220)'.

FP2 Non-calcareous springs

This category is used for springs that are irrigated and kept permanently moist by acidic to neutral water that is base-poor and typically oligotrophic. They may be associated with skeletal mineral or peaty soils. Vegetation is typically dominated by mosses (particularly *Sphagnum auriculatum*, *Calliergon sarmentosum* and *Polytrichum commune*), grasses (*Agrostis* spp., *Deschampsia caespitosa*, *Nardus stricta*), Bulbous Rush (*Juncus bulbosus*), and wetland species such as Marsh Violet (*Viola palustris*), Lesser Spearwort (*Ranunculus flammula*) and Marsh Pennywort (*Hydrocotyle vulgaris*).

FS Swamps

Swamps are stands of emergent herbaceous vegetation that generally occupy a zone at the transition from open water to terrestrial habitats. Water levels may fluctuate but swamps typically remain wet with the water table above ground level for most of the year. They can be associated with freshwater or brackish systems, and the water may be stagnant, slow-moving or tidal. Swamps occur along the margins of rivers, lakes, canals, lagoons and estuaries, but may also occupy more extensive flooded areas or infilling basins. Some swamps occur as floating mats of vegetation.

FS1 Reed and large sedge swamps

This category includes species-poor stands of herbaceous vegetation that are dominated by reeds and other large grasses or large, tussock-forming sedges. Most reed and large sedge swamps are overwhelmingly dominated by one or a small number of species, as in the case of reedbeds. Stands of vegetation can range from very dense to open. Typical components include Common Reed (*Phragmites australis*), Common Club-rush (*Schoenoplectus lacustris*), Reed Sweet-grass (*Glyceria maxima*), Branched Bur-reed (*Sparganium erectum*), Reed Canary-grass (*Phalaris arundinacea*), Great Fen-sedge (*Cladium mariscus*), Greater Tussock-sedge (*Carex paniculata*), Bulrush (*Typha latifolia*) and Water Horsetail (*Equisetum fluviatile*). Stands of Sea Club-rush (*Bolboschoenus maritimus*) may also occur in brackish waters. Note that a number of the possible dominants have a late growing season and their full extent may be difficult to determine before mid-May. Unlike tall-herb swamps - FS2 below, the broadleaved herb component is minor. Vegetation typically lacks stratification as there is little or no development of an understorey element. In some situations there may be a mixture of other species such as Common Marsh-bedstraw (*Galium palustre*), Water Mint (*Mentha aquatica*), forget-me-nots (*Myosotis* spp.), Bogbean (*Menyanthes trifoliata*), Marsh Cinquefoil (*Potentilla palustris*), Wild Angelica (*Angelica sylvestris*), Meadowsweet (*Filipendula ulmaria*) or Fool's Water-cress (*Apium nodiflorum*).

FS2 Tall-herb swamps

Tall-herb swamps are comparatively species-rich stands of herbaceous vegetation that occur in wet areas where the water table is above the ground surface for most of the year, or where water levels fluctuate regularly as in the case of tidal sections of rivers. Tall or robust broadleaved herbs dominate and common components include Lesser Water-parsnip (*Berula erecta*), Fool's Water-cress (*Apium nodiflorum*), Gipsywort (*Lycopus europaeus*), Brooklime (*Veronica beccabunga*), Hemlock Water-dropwort (*Oenanthe crocata*), Hemp-agrimony (*Eupatorium cannabinum*) and Water Forget-me-not (*Myosotis scorpioides*). These swamps may also support Yellow Iris (*Iris pseudacorus*), Water-plantain (*Alisma plantago-aquatica*) and Water Horsetail (*Equisetum fluviatile*), in addition to occasional reeds, large grasses (*Glyceria maxima*, *Festuca arundinacea*) and sedges. Cover of the latter should, at most, be patchy or dispersed; swamps that are dominated by reeds, and other large grasses or sedges should be considered under reed and large sedge swamps - FS1 above. Tall-herb swamps may have an understorey element with a range of smaller wetland plants.

Links with Annex I: Tall-herb swamps can include pockets of the annexed habitat 'hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)'. In Ireland, however, stands of the latter are usually fragmented and poorly developed.

G Grassland and Marsh

This section includes habitats where the vegetation is either dominated by grasses, or is 'grassy' in appearance with abundant small sedges or rushes. Freshwater marshes are also considered here since they are difficult to distinguish, on floristic grounds, from some types of grassland.

There are few, if any, natural grasslands in Ireland, particularly in the lowlands, as most have been modified or managed to some degree by grazing, mowing, fertiliser application or drainage. In the absence of such management, most grasslands would revert to scrub, woodland or heath. The key distinction being made in this classification is between grasslands that are improved, defined here as species-poor and intensively managed grasslands, and those that are unimproved or semi-improved. Improved grassland is by far the most widespread type and makes up a large proportion of Ireland's productive farmland. Much of it is reseeded, fertilised or heavily grazed with the result that species diversity is low. It is of comparatively little conservation interest. Grass leys that are planted as part of an arable rotation are included in this section, as are areas of amenity grassland that are improved and managed specifically for recreation, amenity or sport, as opposed to agriculture. 'Semi-natural' grasslands may receive some inputs of fertiliser (organic or artificial), but they are not intensively managed and have not recently been reseeded. Low levels of improvement and high levels of grazing can influence sward composition, reduce species diversity and lead to increased representation of 'agricultural' herbs. These are listed below in the **improved agricultural grassland - GA1 category**.

Coastal grasslands, other than those of salt marshes (CM1-2) and sand dune systems (CD1-6), are included in this section. Grassland vegetation should be primarily herbaceous. If cover of dwarf shrubs exceeds 25%, the habitat should be considered under heath. If scattered trees are prominent in areas of grassland but canopy cover is less than 30%, the habitat should be recorded as **scattered trees and parkland - WD5**.

GS Semi-natural Grassland

GS4 Wet grassland

This type of grassland can be found on flat or sloping ground in upland and lowland areas. It occurs on wet or waterlogged mineral or organic soils that are poorly-drained or, in some cases, subjected to seasonal or periodic flooding. On sloping ground, wet grassland is mainly confined to clay-rich gleys and loams, or organic soils that are wet but not waterlogged. This category includes areas of poorly-drained farmland that have not recently been improved, seasonally-flooded alluvial grasslands such as the River Shannon callows, and wet grasslands of turlough basins (See also turloughs - FL6).

Species composition varies considerably. Wet grassland often contains abundant rushes (*Juncus effusus*, *J. acutiflorus*, *J. articulatus*, *J. inflexus*) and/or small sedges (*Carex flacca*, *C. hirta*, *C. ovalis*), in addition to grasses such as Yorkshire-fog (*Holcus lanatus*), Creeping Bent (*Agrostis stolonifera*), Marsh Foxtail (*Alopecurus geniculatus*), Rough Meadow-grass (*Poa trivialis*) and Tufted Hair-grass (*Deschampsia caespitosa*). Purple Moor-grass (*Molinia caerulea*) may also be present but should not dominate. The proportion of broadleaved herbs is often high; those that commonly occur in wet grassland include Creeping Buttercup (*Ranunculus repens*), Marsh Thistle (*Cirsium palustre*), Silverweed (*Potentilla*

anserina), Meadowsweet (*Filipendula ulmaria*), Water Mint (*Mentha aquatica*), Common Marsh-bedstraw (*Galium palustre*), Devil's-bit Scabious (*Succisa pratensis*), Lesser Spearwort (*Ranunculus flammula*) and Cuckooflower (*Cardamine pratensis*). Other common broadleaved herbs that occur on drier grasslands may also be present, depending on the degree of wetness. Wet grassland may be important for orchids such as Spotted-orchid (*Dactylorhiza maculata*). Horsetails (*Equisetum* spp.), Yellow Iris (*Iris pseudacorus*), Floating Sweet-grass (*Glyceria fluitans*) and clumps of tall reeds may be locally abundant.

Wet grassland frequently grades into **marsh - GM1** and there are many similarities in the range of species present in both habitats. To be included in the wet grassland category, the cover of grasses should exceed 50%, except in areas where rushes or small sedges predominate, and the total cover of reeds, large sedges and broadleaved herbs should be less than 50%. Among the suite of broadleaved herbs that are present, there should be a significant proportion of drier grassland species in addition to those that are more commonly associated with wetlands.

Links with Annex I: Wet grassland may contain examples of the annexed habitat, 'Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*)' (6410)'.

GM Freshwater Marsh

Marsh GM1

Marsh is found on level ground near river banks, lakeshores, and in other places where mineral or shallow peaty soils are waterlogged, and where the water table is close to ground level for most of the year. Unlike swamps, standing water is not a characteristic feature except, perhaps, during very wet periods or in winter months. Marsh is comparatively species-rich and supports a high proportion of wetland species in addition to the typical dominants: rushes (*Juncus* spp.), sedges (*Carex* spp.) and Meadowsweet (*Filipendula ulmaria*). Grasses such as Creeping Bent (*Agrostis stolonifera*), Tall Fescue (*Festuca arundinacea*) and Purple Moor-grass (*Molinia caerulea*) may be present but not abundant. To be considered as marsh, the proportion of sedges and grasses should not exceed 50%. The broadleaved herb component may include Water Mint (*Mentha aquatica*), Marsh Thistle (*Cirsium palustre*), Wild Angelica (*Angelica sylvestris*), Marsh Pennywort (*Hydrocotyle vulgaris*), Marsh-marigold (*Caltha palustris*), Common Valerian (*Valeriana officinalis*), Ragged-robin (*Lychnis flos-cuculi*), Purple-loosestrife (*Lythrum salicaria*), Marsh Woundwort (*Stachys palustris*) and Marsh Cinquefoil (*Potentilla palustris*). Marsh may also support horsetails (*Equisetum* spp.), Yellow Iris (*Iris pseudacorus*), reeds and other large grasses and sedges but these should not dominate. Herbs that are characteristic of drier ground are rare or absent in marshes. Mosses, particularly Calliergon and Climacium spp., may be plentiful.

Marsh differs from swamps in that the vegetation is usually more species-rich, standing water is absent for much of the year, and reeds and other tall or bulky grasses and sedges, and tall herbs are not overwhelmingly dominant in the former. The distinction between marsh and **wet grassland - GS4** is less clear but, in marsh, wetland herbs should be prominent, and species of drier ground should generally be absent. If there is greater than 50% cover of grasses and sedges, the habitat should be considered under grassland or, if it is a peat-forming system, under fens and flushes. Marsh is not a peat-forming habitat.

Links with Annex I: Marsh may contain pockets of the annexed habitat, 'hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)'.

H Heath & Dense Bracken

HH Heath

Heath includes areas where the vegetation is open and there is at least 25% cover of dwarf shrubs, or where mosses dominate in the case of some montane areas. If the underlying soil is peat, peat depths of less than 0.5 m are usually, but not always, indicative of heath. Trees and larger shrubs may be present but should not be abundant; low-growing Western Gorse (*Ulex gallii*) and Juniper (*Juniperus communis*) are exceptions as they may be components of heath. Note that any areas of heath on sand dunes should be considered under fixed dunes - CD3 in the coastland section; all other types of heath in coastal areas are included here.

HH3 Wet heath

Vegetation with at least 25% cover of dwarf shrubs on peaty soils and shallow wet peats that typically have an average depth of 15-50 cm. Wet heath can occur in upland and lowland areas and is widespread on the lower slopes of hills and mountains that are either too dry or too steep for deep peat

accumulation. It can grade into, or form intimate mosaics with **upland blanket bog - PB2**, **lowland blanket bog - PB3** or **dry siliceous heath - HH1** with minor changes in slope and topography. Wet heath is typically dominated by Ling (*Calluna vulgaris*) and Cross-leaved Heath (*Erica tetralix*), but can also be dominated by Purple Moor-grass (*Molinia caerulea*) and/or sedges. Other common species include Bell Heather (*Erica cinerea*), Crowberry (*Empetrum nigrum*), Deergrass (*Trichophorum caespitosum*), Heath Rush (*Juncus squarrosus*) and Green-ribbed Sedge (*Carex binervis*). Moss and lichen cover may be high in areas of undamaged wet heath. Typical mosses include Hylocomium splendens, Dicranum scoparium, Rhytidiadelphus loreus and Polytrichum commune. Sphagnum mosses (particularly *S. papillosum*, *S. subnitens* and *S. capillifolium*) may also be present.

Wet heath differs from dry siliceous heath - HH1 in that Cross-leaved Heath (*Erica tetralix*), Purple Moor-grass (*Molinia caerulea*) and Deergrass (*Trichophorum caespitosum*) are usually abundant in the former. Wet heath differs from **upland blanket bog - PB2** in that Heath Rush (*Juncus squarrosus*), Green-ribbed Sedge (*Carex binervis*) and mosses other than Sphagnum are usually present in the former. The absence of Black Bog-rush (*Schoenus nigricans*) distinguishes wet heath from **lowland blanket bog - PB3**. The depth of peat can also be used to differentiate these habitats, particularly when they occur in a degraded condition. Peat, or peaty soils, are either absent or very shallow (<15 cm) in the case of dry heath (siliceous or calcareous types), while peat depths in excess of 50 cm are usually, but not exclusively, indicative of blanket bogs.

Links with Annex I: Corresponds to the annexed habitat, 'northern Atlantic wet heaths with *Erica tetralix* (4010)'.

HH4 Montane heath

This category is used for vegetation with a substantial cover of dwarf shrubs and/or mosses that occurs at high altitudes on mountains and in other very exposed locations in the uplands or on the coast. Montane heath is usually associated with shallow mineral soils or peats that are eroding and unstable. It can also be found on areas of loose rock and coarse sediment on mountain tops and ridges. High rainfall and humidity mean that montane heath is kept very wet even if soils are free-draining or rocky. Vegetation is characterised by stunted and wind-contoured dwarf shrubs such as Crowberry (*Empetrum nigrum*), Ling (*Calluna vulgaris*) and Bearberry (*Arctostaphylos uva-ursi*) and/or prostrate shrubs such as Dwarf Willow (*Salix herbacea*) and Juniper (*Juniperus communis*). Montane heath may also be dominated by mosses. Other components of the vegetation can include low-growing grasses (*Deschampsia flexuosa*, *Festuca vivipara*, *F. ovina*, *Nardus stricta*), Heath Rush (*Juncus squarrosus*), Stiff Sedge (*Carex bigelowii*), Heath Bedstraw (*Galium saxatile*) and Sheep's Sorrel (*Rumex acetosella*), in addition to clubmosses (*Huperzia selago*, *Diphasiastrum alpinum*) and mosses (particularly *Racomitrium lanuginosum*, *Polytrichum alpinum* and *Dicranum fuscescens*). Montane heath may also have extensive and varied carpets of lichens. Vegetation cover is rarely complete but should exceed 50%. If the total area of exposed rock is greater than 50%, the habitat should be considered in the appropriate exposed rock category. Note that **eroding blanket bog - PB5** is treated as a separate category. Montane heath differs from other types of heath in terms of its wind-contoured and stunted growth form, and its species composition.

Links with Annex I: Corresponds to the annexed habitat, 'Alpine and Boreal heaths (4060)'.

P Peatland

Peatlands are subdivided into two main types, bogs and fens. Bogs are ombrotrophic (rain-fed) peatlands where almost all inputs of water to the system are derived from precipitation and where acid, oligotrophic peat deposits accumulate. Fens are minerotrophic peatlands that, in addition to precipitation, are fed by groundwater or moving surface waters. They have a higher nutrient status than bogs and can be either acid or base-rich. Flushes, which may or may not form peat, are included with fens as they support similar vegetation communities. The category cutover bog - PB4 is mainly associated with bogs but should also be used in situations where peat has been extracted from fens. Any peatland areas that are dominated by trees or shrubs, including conifer plantations, are excluded.

Note that intertidal or subtidal peat deposits are not included in this section of the classification but should be considered under the littoral or sublittoral rock categories in the marine section or, in the case of salt marshes that have developed on intertidal peats, in the coastland section.

PB Bogs

This section includes ombrotrophic (rain-fed) bogs where acid, oligotrophic peat has accumulated in areas of impeded drainage and/or high rainfall and humidity. The two main types are raised bog and blanket bog. Blanket bog is further subdivided into upland and lowland (Atlantic) types and the boundary between the two is taken as 150m above sea level. However, this should be loosely applied as the distinction is also based on vegetation and other characteristics, including geographical location; lowland blanket bog in Ireland is confined to Atlantic seaboard counties.

Comparatively few raised bogs remain intact and in good condition in Ireland. A large proportion of the original raised bog resource has been damaged or destroyed by peat extraction, drainage and burning. The same is true of upland and lowland blanket bog where large expanses of the habitat resource have also been lost or degraded through overgrazing and afforestation. Damaged and degraded areas of bog are not distinguished as separate categories in this classification, except in the case of **cutover bog - PB4** and **eroding blanket bog - PB5**. Note that in relation to overgrazing, damage is considered severe if 5-10% of an area is bare or eroding, or very severe if this figure exceeds 10%. Peat depths can be used to differentiate blanket bog and heath in situations where the vegetation cover has been altered or removed (e.g. overgrazed or burnt). As a general rule, peat depths of greater than 0.5 m are indicative of blanket bog while those of less than 0.5 m are indicative of heath, but there are exceptions. Charred woody remains of dwarf shrubs provide evidence of recent fires. Any areas of bogs that have been planted with conifers should be classified as **conifer plantation - WD4**.

PB1 Raised bog

Raised bogs are accumulations of deep acid peat (3-12 m) that originated in shallow lake basins or topographic depressions. The name is derived from the elevated surface, or dome, that develops as raised bogs grow upwards from the surface; the domed effect is often exaggerated when the margins of a bog are damaged by turf cutting or drainage, and are drying out. Raised bogs are most abundant in the lowlands of central and mid-west Ireland. Exploitation has been extensive and no Irish raised bogs remain completely intact. Excavated face banks, whether active or inactive, are a common feature around the margins. Only the areas of high bog are included in this definition of the habitat, raised bog, and the condition of the high bog can range from very good to poor. Any areas where part of the bog has been removed should be considered under **cutover bog - PB4**. In a natural state, raised bogs are circled by a wetland fringe, known as the lagg zone, which is usually characterised by fen communities. In Ireland, most lagg have been lost through drainage and land reclamation; any remnants should be categorised separately on the basis of the habitats present.

The surface of a relatively intact raised bog is typically wet, acid and deficient in plant nutrients, and supports specialised plant communities that are low in overall diversity. The vegetation is open and Sphagnum mosses dominate the ground layer. Small-scale mosaics of plant communities are characteristic and reflect the complex microtopography of hummocks and hollows on the bog surface. Raised bogs are driest at the margins and wetness generally increases towards the centre of the peat mass where well-developed pool systems are most likely to occur. Dry areas and hummocks usually support Ling (*Calluna vulgaris*), Hare's-tail Cottongrass (*Eriophorum vaginatum*), Deergrass (*Trichophorum caespitosum*), Cross-leaved Heath (*Erica tetralix*), lichens (*Cladonia* spp.), and Sphagnum (*S. capillifolium*, *S. imbricatum*, *S. papillosum*) and other mosses (*Dicranum scoparium*, *Leucobryum glaucum*). Wet areas and pools are characterised by Common Cottongrass (*Eriophorum angustifolium*), White Beak-sedge (*Rhynchospora alba*), Bog Asphodel (*Narthecium ossifragum*), sundews (*Drosera* spp.), Bogbean (*Menyanthes trifoliata*), bladderworts (*Utricularia* spp.) and Sphagnum mosses (*S. cuspidatum*, *S. auriculatum*). Raised bogs may also contain soaks and flushed areas (*wet or dry*) where the supply of nutrients over time is increased through concentrated surface flows, or where there are links with groundwater or the underlying mineral substratum. Slight mineral enrichment enhances habitat and species diversity. Flushed areas can be recorded separately on the basis of the habitats present, or as an integral part of the raised bog habitat.

When damaged by peat extraction or drainage, the bog surface is relatively dry, pools are rare or absent, cover of Sphagnum is greatly reduced and Ling (*Calluna vulgaris*) increases in abundance. The effect is normally greatest around the margins and wetness may increase towards the centre of the bog. Trees such as Downy Birch (*Betula pubescens*) and Scots Pine (*Pinus sylvestris*) frequently invade the drier cut margins, but may also occur in flushed areas.

Links with Annex I: Raised bogs correspond to the priority habitat, '*active raised bogs (7110)' if they are still capable of peat formation, or if peat formation has temporarily ceased. 'Degraded raised bogs still capable of natural regeneration (7120)' are also listed as an annexed habitat. These are damaged

bogs where it is judged that the peat-forming capability can be restored within 30 years. The annexed habitat, 'depressions on peat substrates of the Rhynchosporion (7150)' occurs in pockets as a sub-habitat of raised bog.

PB2 Upland blanket bog

Upland blanket bog occurs on flat or gently sloping ground above 150 m and is widespread on hills and mountains throughout Ireland. The 150 m limit serves to distinguish upland from lowland blanket bog but is loosely applied. Peat depths vary and normally fall in the range of 1-2 m, but can be much deeper in pockets. Vegetation is typically dominated by Deergrass (*Trichophorum caespitosum*), cotton grasses (*Eriophorum* spp.) and dwarf shrubs such as Ling (*Calluna vulgaris*), Cross-leaved Heath (*Erica tetralix*) and Bilberry (*Vaccinium myrtillus*). Purple Moor-grass (*Molinia caerulea*) and Crowberry (*Empetrum nigrum*) may be locally abundant. Cover of Sphagnum mosses is usually high in areas of undamaged bog. Upland blanket bog can be extremely wet where it occurs on level terrain and may have surface drainage features that are typical of **lowland blanket bog - PB3**, but without any abundance of Black Bog-rush (*Schoenus nigricans*). Upland blanket bog may be difficult to distinguish from **wet heath - HH3** as a number of key species are common to both habitats. They may also grade from one to the other, or form intimate mosaics with changes in slope or topography. Peat depths in excess of 0.5 m are usually indicative of blanket bog. Heath Rush (*Juncus squarrosus*) and Green-ribbed Sedge (*Carex binervis*) may occur in **wet heath - HH3** but not in upland blanket bog.

Only the area of uncut bog should be included here; **cutover bog - PB4** is considered as a separate habitat. The uncut bog may include areas that are severely damaged or degraded from overgrazing. Levels of damage are not assessed in this classification. Note, however, that damage is considered severe if over 5% of an area of bog is bare or eroding. Areas of bog that are heavily eroded (below the rooting zone of plants) should be considered under **eroding blanket bog - PB5**.

Links with Annex I: Blanket bogs that are still capable of peat formation correspond to the priority habitat, 'blanket bogs (*if active bog) (7130)'. The annexed habitat, 'depressions on peat substrates of the Rhynchosporion (7150)' occurs in pockets as a sub-habitat of blanket bog.

PB3 Lowland blanket bog

Lowland blanket bog, also known as Atlantic or oceanic blanket bog, is more restricted in its distribution than the upland type and is largely confined to wetter regions along the western seaboard where the annual rainfall exceeds 1250 mm. Described as a climatic peat type, it occurs on flat or gently sloping ground below 150 m. Peat depths vary considerably (1.5-7 m) depending on the underlying topography, and are usually intermediate between those of **raised bog - PB1** and upland **blanket bog - PB2**. The vegetation of lowland blanket bog is typically 'grassy' in appearance and is characterised by abundant Black Bog-rush (*Schoenus nigricans*), Purple Moor-grass (*Molinia caerulea*), cotton grasses (*Eriophorum* spp.), Deergrass (*Trichophorum caespitosum*) and White Beak-sedge (*Rhynchospora alba*). Heathers (*Calluna vulgaris*, *Erica* spp.) are common but cover is generally less extensive than in **upland blanket bog - PB2**. Cover of dwarf shrubs is reduced in areas that are overgrazed. Broadleaved herbs can include sundews (*Drosera* spp.), Heath Milkwort (*Polygala serpyllifolia*), Lousewort (*Pedicularis sylvatica*) and Pale Butterwort (*Pinguicula lusitanica*). Bog-myrtle (*Myrica gale*) may be locally abundant. Sphagnum mosses and mucilaginous algae, collectively known as Zygonium ericetorum, may also be present; the latter increases in abundance in overgrazed areas where Sphagnum mosses are rare or absent. Wet areas of intact lowland blanket bog are characterised by a variety of surface drainage features which may include scattered pools and channels, small peat-basin lakes, streams, peat gullies and swallow holes that lead to underground drainage systems. Many of these support aquatic plants such as bladderworts (*Utricularia* spp.), Water Lobelia (*Lobelia dortmanna*) and, locally, Pipewort (*Eriocaulon aquaticum*). Lowland blanket bog may form intimate mosaics with areas of **wet heath - HH3** and dry **siliceous heath - HH1**.

As is the case with upland blanket bog, only the areas of uncut bog are included in this category; where part of the bog has been removed through turf cutting or any other form of peat extraction, this should be recorded as **cutover bog - PB4**. Areas of bog that are eroding should be considered under **eroding blanket bog - PB5**.

Links with Annex I: As for upland **blanket bog - PB2** above.

PB4 Cutover bog

This category should be used in situations where part of the original mass of peat has been removed through turf cutting or other forms of peat extraction. Areas of high bog that have been exploited using

Difco cutters, or 'sausage' machines, are included only if the surface vegetation has been removed. Cutover can be associated with all peat-forming systems, including fens and some areas of **wet heath - HH3**. Turf cutting activity is characterised by vertical face banks or rectangular peat ramparts where the cutover section is at a distinctly lower level than the uncut high bog. These banks vary in height, depending in part on the depth of peat, and remain in evidence for a long time after turf cutting ceases. Old turf banks may be overgrown with vegetation. Cutover bog occurs on a much larger scale in the case of industrial or commercial peatlands where peat is harvested mechanically (sod, milled or moss peat production). Areas of bog that are actively being worked are included in this category, as are areas of abandoned or exhausted cutover.

Cutover bog is a variable habitat, or complex of habitats, that can include mosaics of bare peat and revegetated areas with woodland, scrub, heath, fen and flush or grassland communities. The nature of the recolonising vegetation depends on numerous factors including the frequency and extent of disturbance, hydrology, the depth of peat remaining, and the nature of the peat and the underlying substratum. Standing water is usually present in drains, pools or excavated hollows. Some large areas of cutover bog have been reclaimed as farmland or planted with trees, particularly conifers. If the regenerating habitats of cutover bog cover a sizeable area and can easily be fitted elsewhere in the classification, this should be done. The full extent of the cutover may be difficult to establish as it frequently grades into other marginal habitats or farmland.

Links with Annex I: The annexed habitat, 'depressions on peat substrates of the Rhynchosporion (7150)' can occur in pockets on cutover bog, mostly in association with areas of cutover raised bog.

PB5 Eroding blanket bog

This category should be used in situations where part of the original peat mass has been lost through erosion, as opposed to extraction (See **cutover bog - PB4**), and where sizeable areas of bare peat are exposed. Eroding blanket bog is most commonly associated with upland areas, and mountain peaks and ridges in particular. Causes are numerous; some erosion may have occurred as a natural process but, over the last two decades, overgrazing by livestock (particularly sheep) has been a major contributory factor. Eroding blanket bog is often characterised by networks of channels and gullies that have cut down through the protective layer of vegetation to expose the underlying peat. As erosion continues, these channels widen, deepen and coalesce until eventually the rocky substratum is reached. Some small blocks of the original bog, known as peat hags, may remain.

To be categorised as eroding blanket bog, a substantial proportion of the original bog surface should be missing and peat should have eroded below the rooting zone of the surface vegetation. In such situations, the process is likely to be irreversible, or recovery very slow, even if damaging activities cease. If erosion has occurred to such an extent that large areas of the rocky substratum are exposed, the habitat should be considered elsewhere in the classification. This also applies to formerly eroded areas where most of the peat has been removed but where the underlying mineral or peaty substratum has been extensively recolonised by vegetation. Peatlands damaged by bog bursts can be included here if sizeable areas of bare peat are exposed.

PF Fens and Flushes

Fens are peat-forming systems that differ from bogs in that they are fed by groundwater or moving surface waters. They occur in river valleys, poorly-drained basins or hollows, and beside open stretches of water (lake margins or river floodplains). Fens may also be associated with the fringes or other parts of acid bogs where there is enrichment of the water supply. Any areas of fen that have been modified by turf cutting should be considered under **cutover bog - PB4**. Flushes are usually smaller features that are maintained by the movement or seepage of water. They occur on slopes and may or may not be peat-forming. Some flushes feed into fens while others may be associated with a range of different habitat types including bogs, woodlands and grasslands. Flushes in bogs are usually characterised by changes in the vegetation that are brought about by an enhanced supply of nutrients. Note that springs are considered in the **freshwater section (FP1-2)**.

Fens and flushes are divided into 'rich' (basic) and 'poor' (acid) types depending on the origin and nature of the water supply. A third category, transition mire and **quaking bog - PF3**, is also distinguished because it has vegetation characteristics that are intermediate between rich and poor fen categories.

PF1 Rich fen and flush

Rich fens and flushes are fed by groundwater or flowing surface waters that are at least mildly base-rich or calcareous, and are usually found over areas of limestone bedrock. The substratum is waterlogged

peat (except in the case of some flushes) and this usually has a high mineral content. Vegetation is typically dominated by Black Bog-rush (*Schoenus nigricans*) and/or small to medium sedges such as *Carex viridula*, *C. nigra*, *C. dioica* and *C. panicea*. Other prominent components of the vegetation include rushes, particularly Blunt-flowered Rush (*Juncus subnodulosus*), Purple Moor-grass (*Molinia caerulea*), Marsh Pennywort (*Hydrocotyle vulgaris*), Lesser Spearwort (*Ranunculus flammula*), Water Mint (*Mentha aquatica*), Common Marsh-bedstraw (*Galium palustre*), Grass-of-parnassus (*Parnassia palustris*), Common Butterwort (*Pinguicula vulgaris*) and Devil's-bit Scabious (*Succisa pratensis*). Rich fen and flush can be important for orchids such as *Epipactis palustris* and *Dactylorhiza* spp. A well-developed moss layer with *Campyllum stellatum*, *Scorpidium scorpioides* and *Drepanocladus revolvens* is also characteristic. The tops of Black Bog-rush (*Schoenus nigricans*) tussocks are relatively dry and may support plants such as heathers (*Calluna vulgaris*, *Erica tetralix*), Tormenitl (*Potentilla erecta*), Bog-myrtle (*Myrica gale*) and Bog Asphodel (*Narthecium ossifragum*).

Rich fens and flushes may have some patchy cover of Common Reed (*Phragmites australis*), Bulrush (*Typha latifolia*), or tussock-forming species such as Great Fen-sedge (*Cladium mariscus*) and Greater Tussock-sedge (*Carex paniculata*). If large areas are dominated by species-poor or monodominant stands of tall herbaceous plants, they should be considered under **reed and large sedge swamps - FS1**. Fens may contain patches of scrub or woodland, or bodies of open water with aquatics such as Bogbean (*Menyanthes trifoliata*). If the surface is quaking and very wet, and the vegetation comprises some species that may also be found in acid bogs, consider the category **transition mire and quaking bog - PF3**.

Links with Annex I: This category corresponds to two annexed habitats, 'alkaline fens (7230)' and '*calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (7210)'. The latter is a priority habitat that describes stands of species-rich alkaline fen vegetation in which Great Fen-sedge (*Cladium mariscus*) is dominant.

PF2 Poor fen and flush

This category includes peat-forming fens and flushes that are fed by groundwater or flowing surface waters that are acid. Flushes that are acidic but not peat-forming should also be considered here. In most cases the substratum is acid peat which has a higher nutrient status than that of ombrotrophic bogs. The vegetation of poor fens and flushes is typically dominated by sedges (particularly *Carex rostrata*, *C. nigra*, *C. curta*, *C. lasiocarpa* and *C. echinata*) and/or rushes (*Juncus effusus*, *J. articulatus*, *J. acutiflorus*). Other common components include Common Cottongrass (*Eriophorum angustifolium*), Velvet Bent (*Agrostis canina*), Purple Moor-grass (*Molinia caerulea*), Yorkshire-fog (*Holcus lanatus*) and broadleaved herbs such as Marsh Violet (*Viola palustris*), Bogbean (*Menyanthes trifoliata*), Heath Bedstraw (*Galium saxatile*), Tormenitl (*Potentilla erecta*) and Marsh Cinquefoil (*Potentilla palustris*). There may be some limited cover of dwarf shrubs. Extensive carpets of mosses including, in particular, *Sphagnum palustre*, *S. recurvum*, *S. auriculatum*, *Calliergon stramineum* and *Polytrichum commune*, are characteristic.

Although poor fen and flush is not listed in Annex I of the Habitats Directive, it is very limited in extent in Ireland and should be regarded as being of special conservation importance (C. Ó Críodáin, pers. comm.).

PF3 Transition mire and quaking bog

Transition mires and quaking bogs are extremely wet peat-forming systems with characteristics that are intermediate between poor and rich fens. For this reason, they are considered as a separate habitat but they may occur within, or on the fringes of other peat-forming systems. Transition mires and quaking bogs are usually associated with the wettest parts of a bog or fen and can be found in wet hollows, infilling depressions, or at the transition to areas of open water. Vegetation frequently forms a floating mat or surface scraw over saturated, spongy or quaking peat. Standing water may occur in pools or along seepage zones. The vegetation typically comprises species that are characteristic of bog, fen and open water habitats. Small to medium sedges, mainly *Carex* spp. (particularly *Carex diandra*, *C. lasiocarpa*, *C. limosa* and *C. viridula*), usually dominate and may occur together with White Beak-sedge (*Rhynchospora alba*), cotton grasses (*Eriophorum angustifolium*, and the much rarer *E. gracile*), Creeping Bent (*Agrostis stolonifera*), Purple Moor-grass (*Molinia caerulea*), and a range of broadleaved wetland herbs such as Bogbean (*Menyanthes trifoliata*), Marsh Pennywort (*Hydrocotyle vulgaris*), Lesser Spearwort (*Ranunculus flammula*), Marsh Cinquefoil (*Potentilla palustris*) and Marsh Lousewort (*Pedicularis palustris*). Extensive moss cover is characteristic; *Sphagnum* spp., *Calliergon* spp. and *Scorpidium scorpioides* are usually abundant.

Links with Annex I: Corresponds to the annexed habitat, 'transition mires and quaking bogs (7140)'

W Woodland and Scrub

This section groups habitats in which the predominant structural element of the vegetation is provided by trees, shrubs or brambles. It includes almost all types of woodland and scrub - natural, semi-natural or planted - in urban and rural situations, with the exception of woodland or scrub associated with sand dunes (See **dune scrub and woodland - CD4**) and commercial orchards or tree nurseries (See **horticultural land - BC2**). Linear boundary features that are dominated by trees and shrubs are also included in this section.

Woodland is defined here as any area that is dominated by trees, as opposed to shrubs, and where the canopy height is greater than 5 m, or 4 m in the case of woodland in wetland areas or on bogs. The canopy may be open but should be distinct. Scrub or transitional woodland includes areas that are dominated by shrubs, brambles and stunted or immature trees, and where the canopy height is less than that outlined above for woodland. Note that birches (*Betula* spp.), Hazel (*Corylus avellana*) and some willows (*Salix* spp.) can occur both as trees and shrubs. Sessile Oak (*Quercus petraea*) may also occur in stunted form in exposed locations. Areas that are dominated by young or sapling trees (*with the exception of most stands of planted conifers*) are categorised as **immature woodland - WS2**. The categories, **hedgerows - WL1** and **treelines - WL2**, should be used for any linear strips of woodland or scrub that are less than 4 m wide.

The main subdivision in the woodland section is between semi-natural woodlands and all other woodland types, including commercial plantations. Natural or 'ancient' woodland vegetation is now very rare in Ireland and most stands of trees have been modified and managed to some extent by humans over centuries. Because of this, the term 'semi-natural' is generally used for stands that resemble the potential natural woodland cover. To be considered as semi-natural, woodland should be dominated by native trees, the understorey should be reasonably well-developed, and there should be no systematic removal of timber, dead wood or fallen trees. Stands that originate from planting in the past may be included if they are now regenerating naturally, as may stands that were formerly coppiced. Some common non-native broadleaved trees that occur in Irish woodlands include Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*), limes (*Tilia* spp.), Horse Chestnut (*Aesculus hippocastanum*), Spanish Chestnut (*Castanea sativa*) and Hornbeam (*Carpinus betulus*). Yew (*Taxus baccata*) and Scots Pine (*Pinus sylvestris*) are the only conifers that can be considered native to Ireland; the latter has been widely re-introduced following a major decline and possible extinction in prehistoric times.

Seven types of semi-natural woodland are recognised. Most other woodland stands, except conifer plantations, can be classified in three general woodland categories that are subdivided on the basis of the different proportions of broadleaved trees and conifers that are present. They include various stands of native and non-native trees that were planted for a variety of reasons including commercial timber or energy production, landscaping, shelter or conservation in rural and urban areas. Broadleaved and mixed plantations are included, as are other stands of trees that may have originated naturally but do not meet the criteria for semi-natural woodland above. In the case of broadleaved or conifer woodland categories, the term 'mixed' should be used in the title if a number of different species contribute significantly to the canopy. Conifer plantations are considered separately and are defined here as dense stands of planted conifers where the overriding influence is commercial timber production. The proportion of conifers should exceed 75%. All other plantations should be considered in the general woodland categories.

WN Semi-natural Woodland

WN4 Wet pedunculate oak-ash woodland

This type of woodland is associated with areas that are flooded or waterlogged in winter but which dry out in summer. It occurs on periodically-flooded alluvial sites that are well above the limits of regular inundation, and on drumlins and other sites with heavy, poorly-drained clay soils that are subject to waterlogging. Woodland is dominated by Pedunculate Oak (*Quercus robur*) and/or Ash (*Fraxinus excelsior*); other common components include Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*) and willows (*Salix* spp.). Alder (*Alnus glutinosa*) can be locally abundant. The ground flora typically comprises Meadowsweet (*Filipendula ulmaria*), Primrose (*Primula vulgaris*), Enchanter's-nightshade (*Circaea lutetiana*), Ivy (*Hedera helix*), Bramble (*Rubus fruticosus* agg.), Remote Sedge (*Carex remota*), Golden-saxifrage (*Chrysosplenium oppositifolium*) and Ramsons (*Allium ursinum*). When flooding subsides in alluvial sites, exposed channels and depressions may remain wet or waterlogged. Alder (*Alnus glutinosa*) is often prominent in these situations.

Links with Annex I: On alluvial sites, this type of woodland corresponds to the priority habitat, '*alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-padion*, *Alnion incanae*, *Salicion albae*) (91E0)'. The term 'residual' means that only small stands remain in Europe; these need not be of ancient origin.

WN5 Riparian woodland

This category includes wet woodlands of river margins (gallery woodland) and low islands that are subject to frequent flooding, or where water levels fluctuate as a result of tidal movement (in the lower reaches of rivers). Riparian woodland is dominated by stands of willows that may include native (*Salix cinerea*, *S. purpurea*, *S. triandra*) and non-native (*Salix fragilis*, *S. alba*, *S. viminalis*) species. Alder (*Alnus glutinosa*) is occasional. The field layer is characterised by broadleaved herbs such as Nettle (*Urtica dioica*), Creeping Buttercup (*Ranunculus repens*), Wood Dock (*Rumex sanguineus*), Meadowsweet (*Filipendula ulmaria*), Wild Angelica (*Angelica sylvestris*), Hemlock Water-dropwort (*Oenanthe crocata*) and Hedge Bindweed (*Calystegia sepium*). Stands of Reed Canary-grass (*Phalaris arundinacea*) are common. Indian Balsam (*Impatiens glandulifera*), an introduced species, is locally abundant. These woodlands often reveal an accumulation of river borne debris, including dead vegetation and plastic, when water levels are low. A fine coating of grey mud on vegetation and tree bases that are regularly submerged and emerged is also characteristic. Willows were widely coppiced and used for basket-making in the past; old Osier (*Salix viminalis*) beds are included in this category but any actively coppiced areas should be considered under **short rotation coppice - WS4**.

WN6 Wet willow-alder-ash woodland

This broad category includes woodlands of permanently waterlogged sites that are dominated by willows (*Salix* spp.), Alder (*Alnus glutinosa*) or Ash (*Fraxinus excelsior*), or by various combinations of some or all of these trees. It includes woodlands of lakeshores, stagnant waters and fens, known as carr, in addition to woodlands of spring-fed or flushed sites. Carr is dominated by Rusty Willow (*Salix cinerea* ssp. *oleifolia*) and Alder (*Alnus glutinosa*). The field layer comprises Creeping Bent (*Agrostis stolonifera*), Meadowsweet (*Filipendula ulmaria*), Common Marsh-bedstraw (*Galium palustre*), Purple-loosestrife (*Lythrum salicaria*) and Skullcap (*Scutellaria galericulata*). Mosses such as *Climacium dendroides*, *Calliergon cordifolium* and *Homalia trichomanoides* are characteristic. Carr occurs on organic soils and fen peats that are subject to seasonal flooding but remain waterlogged even when flood waters recede.

Woodlands of flushed or spring-fed sites are typically dominated by Alder (*Alnus glutinosa*) or Ash (*Fraxinus excelsior*) and the ground flora is often 'grassy' in appearance with abundant Remote Sedge (*Carex remota*) and Creeping Bent (*Agrostis stolonifera*). Other common components of the field layer include Bramble (*Rubus fruticosus* agg.), Creeping Buttercup (*Ranunculus repens*), Meadowsweet (*Filipendula ulmaria*), Common Marsh-bedstraw (*Galium palustre*), Yellow Pimpernel (*Lysimachia nemorum*) and Lady-fern (*Athyrium filix-femina*). This type of woodland occurs on mineral soils or fen peats, and may occasionally be associated with river banks or lakeshores. Note that **riparian woodland - WN5** is treated as a separate category.

Also included in this category are woodlands of calcareous spring-fed hollows that are characterised by a mixture of trees including willows (*Salix* spp.), Alder (*Alnus glutinosa*), Ash (*Fraxinus excelsior*) and Downy Birch (*Betula pubescens*). Greater Tussock-sedge (*Carex paniculata*) dominates the field layer and tussocks may support species of drier land. Common Reed (*Phragmites australis*) may be abundant in open wet areas. The ground surface is often treacherous and water-filled hollows and channels typically support aquatic plants.

WN7 Bog woodland

This category includes woodlands of intact ombrotrophic bogs, bog margins and cutover bog. Bog woodland typically occurs on deep acid peat that is relatively well-drained in the upper layers and is commonly associated with former turf cutting activity or drainage. It may also occur in areas of cutover bog where most of the peat has been removed. Downy Birch (*Betula pubescens*) is the usual dominant and may form pure stands. Other trees and shrubs can include Holly (*Ilex aquifolium*), Rowan (*Sorbus aucuparia*), Scots Pine (*Pinus sylvestris*), oaks (*Quercus* spp.) and willows (*Salix* spp.). Dwarf shrubs such as Ling (*Calluna vulgaris*) or Bilberry (*Vaccinium myrtillus*) may occur in the field layer, usually in association with Bracken (*Pteridium aquilinum*), Bramble (*Rubus fruticosus* agg.), Ivy (*Hedera helix*), Purple Moor-grass (*Molinia caerulea*) and Honeysuckle (*Lonicera periclymenum*).

Woodland of waterlogged acid peat in hollows or depressions in areas of upland woodland on siliceous rocks should also be included in this category. Downy Birch (*Betula pubescens*) and/or willows (*Salix* spp.) dominate and the ground flora is characterised by extensive cover of mosses (*Sphagnum* and

Polytrichum spp.), in addition to grasses (*Molinia caerulea*, *Anthoxanthum odoratum*), Star Sedge (*Carex echinata*), Soft Rush (*Juncus effusus*) and ferns (*Dryopteris dilatata*, *Blechnum spicant*).

Links with Annex I: Since the Annex I habitat, '*bog woodland (91D0)', refers to woodland of intact raised bog, examples of this priority habitat are very rare in Ireland.

WS Scrub/Transitional Woodland

WS1 Scrub

This broad category includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. The canopy height is generally less than 5 m, or 4 m in the case of wetland areas. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland. In the absence of grazing and mowing, scrub can expand to replace grassland or heath vegetation. Trees are included as components of scrub if their growth is stunted as a result of exposure, poor soils or waterlogging. If tall trees are present, these should have a scattered distribution and should not form a distinct canopy. This category does not include areas that are dominated by young or sapling trees (<5 or 4 m in height) or young conifer plantations (See **immature woodland - WS2** or **conifer plantation - WD4**). Linear boundary features of scrub that are less than 4 m wide should be considered under **hedgerows - WL1**.

Scrub can be either open, or dense and impenetrable, and it can occur on areas of dry, damp or waterlogged ground. Common components include spinose plants such as Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Gorse (*Ulex europaeus*), Juniper (*Juniperus communis*), Bramble (*Rubus fruticosus* agg.) and erect or scrambling roses (*Rosa* spp.), in addition to a number of willows (*Salix* spp.), small birches (*Betula* spp.) and stunted Hazel (*Corylus avellana*). Scrub may also contain Bog-myrtle (*Myrica gale*) and Broom (*Cytisus scoparius*). The field layer is often impoverished and poorly-developed but, in some situations, may be similar to that of woodland. Low-growing Western Gorse (*Ulex gallii*) and prostrate Juniper (*Juniperus communis*) can also be components of heath. Note that any areas that are dominated by non-native shrubs should be excluded (See **ornamental/non-native shrub - WS3**).

Links with Annex I: Stands of juniper scrub correspond to the annexed habitat, 'Juniperus communis formations on heaths or calcareous grasslands (5130)'.

Appendix 7: Glossary of Terms

ABIOTIC - Of or relating to the non-living components of a habitat or ecosystem.

ACIDIFICATION - The detrimental effect of acid rain on soils and freshwater.

AFFORESTATION - The planting of trees (usually conifers) over an area of previously unplanted ground.

ALTITUDE - Vertical height above sea level.

ALLUVIAL - Of or relating to silty deposits transported by water, or occurring on river flood plains.

AMPHIBIANS - A vertebrate group whose members spend part of their life cycle in water and part on land e.g. Frog.

ANNEX 1 - of the EU Habitats Directive, lists habitats including priority habitats for which SACs have to be designated.

ANNEX 2 - of the EU Habitats Directive is a list of species for which SACs have to be designated.

ANNUAL PLANT - Plant that completes its life cycle within a single growing season.

AQUATIC ENVIRONMENT - Rivers, streams, lakes, ponds, springs and features that depend on natural waters e.g. marsh, bogs and wetlands.

ArcGIS A comprehensive desktop Geographic Information System (GIS) software package developed by ESRI used to carry out many GIS operations.

ASIs - Areas of Scientific Interest. Areas that were identified in the 1970s as being of conservation interest. The NHA designation developed from ASIs.

ATTRIBUTE - Non-spatial information about a geographic feature in a GIS, usually stored in a table (or spreadsheet) and linked to the feature by a unique identifier. For example, attributes of a wetland site might include its name, area, and soil type.

ATTRIBUTE FIELD - A column on an attribute table containing specific data such as area or site name on a number of features (rows).

ATTRIBUTE TABLE - Tabular file containing rows and columns. In GIS, **attribute tables** are associated with a class of geographic features, such as wells or roads. Each row represents a geographic feature, such as a river, a wetland site etc.

BASE POOR SOILS - Soils that only slowly release the dissolved chemicals or minerals contained within them.

BASIN - A depressed area of the Earth's surface, in which sediments accumulate.

BIODIVERSITY - A general term used to describe all aspects of biological diversity, including: the number of species present in a given environment; the genetic diversity present within a species; the number of different ecosystems present within a given environment.

BIOTOPE - An environmental region, defined by certain conditions characteristic organisms that typically inhabit it. Combination of the physical habitat and its recurring community of animals and plants.

BIOTIC - Of or relating to the living components of a habitat or ecosystem.

BIRDS DIRECTIVE (Council Directive 79/ 409/ 2nd April 1979) - Under this Directive Ireland is required to conserve the habitats of two categories of wild birds: 1) Listed rare and vulnerable species and 2) Regularly occurring migratory species. The Directive also obliges Ireland to conserve wetlands, especially those of international importance and regulates the hunting and trading of wild birds. It was transposed into Irish legislation by the EU (Natural Habitats) Regulations, 1997.

BLANKET BOG - Bogs which carpet the landscape, following the underlying topography. They can cover extensive areas along the west coast and on uplands throughout the country.

BOG - General term for ombrotrophic mire or peatland (but sometimes used colloquially for other wetland type e.g. marsh, fen). A peat filled or covered area.

BORD NA MÓNA - Irish peat extraction board, founded by the Irish state in 1946.

BOULDER - Large rock that is greater than 256 mm in diameter.

BRACKISH - Where salinity is intermediate between that of freshwater and sea water.

BRYOPHYTES - A group of simple non-vascular spore-bearing green plants comprising the mosses, liverworts and hornworts.

CALCAREOUS - Rich in calcium salts (lime-rich), or pertaining to limestone or chalk.

CALCICOLOUS - Organisms that have an affinity for habitats that are rich in calcium (lime-loving).

CALLOW - Wetland areas at edge of large rivers, that were or are still seasonally regularly flooded. May contain fen vegetation, but often with a peat layer less than 40 cm deep.

CATCHMENT - An area of land draining to a defined point. The term river catchment refers to the area of land that drains into a particular river system.

CENTROID - The central point of an shape such as a polygon.

CLAY - Very fine sediment particles that are less than 0.004 mm in diameter - component of mud.

COLONISATION - The entry and spread of a species into an area, habitat or population from which it was formerly absent.

COMMONAGE - An area of land which are undivided but are owned by more than one person / or the rights to use the land are owned by more than one person.

COMMUNITY - a well-defined assemblage of plants and/or animals, clearly distinguishable from other such assemblages.

CONSERVATION STATUS - The sum of the influences acting on a habitat and its typical species that may affect its long term distribution, structure and functions. Also refers to the long-term survival of its typical species within the European territory of the Member States.

CORINE - An information and mapping system, developed within the context of the Commission of the European Communities biotope project, which is used as a tool for the description of sites of importance for nature conservation in Europe. It catalogues recognisable communities of flora and fauna. The primary objective of this catalogue is to identify all major communities whose presence contributes to the conservation significance of a site. Included in this list of communities are interesting but rare natural or near-natural communities as well as the more widespread semi natural ones.

CUTAWAY BOG - Areas of bog which have been systematically cut, by mechanical means. Any peat remaining has no economic value. Underlying mineral soil or marl layer or bedrock often exposed. Cutaway areas are normally a mosaic of cut areas, drainage ditches, flooded area, uncut higher banks of peat, scrub, grassland etc.

CUTOVER BOG - Areas of bog which have been previously cut, although not down to the marl layer or bedrock. Often using traditional hand-cutting methods. Cutover areas are normally a mosaic of cut areas, face banks, pools, drainage ditches, uncut areas of peat, scrub, grassland etc.

DRAW-DOWN ZONE - Area exposed when water levels are reduced, normally as a result of abstraction in the case of reservoirs, or of drying out in the case of ponds.

DIVERSITY - see biodiversity.

DOMESTIC PURPOSES - Used in relation to the cutting of peat. Peat that is cut for domestic purposes is not for commercial sale and is cut at the rate of one year's supply for a household per year.

DRUMLIN - Streamlined, oval-shaped hill formed by glacial activity and usually comprising unsorted sediment, or till.

DYSTROPHIC – shallow lake that is a dark brown colour due to the presence of organic material, and are of low biological productivity and have poor light penetration.

ECOLOGY - The study of the interactions between organisms, and their physical, chemical and biological environment.

EDAPHIC - Of the soil, or influenced by the nature of the soil.

ENVIRONMENT – The biological and physical conditions in which an organism lives.

EPA – Environmental Protection Agency.

EMERSED - Above the level of the water, or exposed to air.

EPIBIOTA - Surface-dwelling animals and plants.

EPIFAUNA - Surface-dwelling animals.

EROSION - The processes whereby the materials of the Earth's crust are dissolved, or worn away and simultaneously moved from one place to another by natural agencies which include weathering, solution, corrosion and transportation.

EUROPEAN BIRDS DIRECTIVE (79/ 409/ 2nd April 1979) - See Birds Directive.

EUTROPHIC – Biological effects of an increase in plant nutrients on aquatic systems.

ESKER - Long, sinuous, steep-sided ridge, comprising layers of sediments (cross-bedded sands and gravels) laid down by glacial melt waters.

ESRI - Environmental Systems Research Institute. ESRI is the company that makes Arc/INFO, Arc/View and many other related software for GIS.

EUTROPHIC - Having high levels of primary productivity or nutrients.

FAUNA - Animal life.

FAVOURABLE CONSERVATION STATUS - The conservation status of a natural habitat will be taken as "favourable" when: its natural range and areas it covers within that range are stable or increasing, and the specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable.

FEN - General term for minerotrophic mires, formed under the influence of groundwater.

FLORA - plant life.

FORMATION – A geological term for a body of rocks having easily recognised boundaries that can be traced in the field, and large enough to be represented on a geological map as a practical and convenient unit for mapping and description.

GEOGRAPHIC INFORMATION SYSTEM (GIS) - GIS is a system of hardware and software used for storage, retrieval, mapping, and analysis of geographic data. Practitioners also regard the total GIS as including the operating personnel and the data that go into the system. Spatial features are stored in a coordinate system (latitude/longitude, state plane, UTM, etc.), which references a particular place on the earth. Descriptive attributes in tabular form are associated with spatial features. Spatial data and associated attributes in the same coordinate system can then be layered together for mapping and analysis. GIS can be used for scientific investigations, resource management, and development planning.

GEOMORPHOLOGY – The study of the form and structure of the landscape, which is shaped by the underlying geology.

GIS – see Geographic Information System (GIS)

GLEYS - Soil type subject to water logging because of the high content of impermeable clays.

GRAVEL - Sediment particles that are between 4-16 mm in diameter.

HABITAT - Refers to the environment defined by specific abiotic and biotic factors, in which a species lives at any stage of its biological cycle. In general terms it is a species home. In the Habitats Directive this term is used more loosely to mean plant communities and areas to be given protection.

HABITATS DIRECTIVE - (Council Directive 92/43/EEC). The Directive on the conservation of Natural Habitats and of Wild Flora and Fauna. This Directive seeks to legally protect wildlife and its habitats. It was transposed into Irish legislation by the EU (Natural Habitats) Regulations, 1997.

HAND CUTTING OF PEAT - Refers to traditional cutting of peat using a slean or spade.

HERBACEOUS - Of or relating to non-woody plants or vegetation.

HUMIC ACID - Dark brown acid derived from humus or partially decomposed organic material in soils, particularly peats.

HUMMOCK - A small hillock/mound. Often used to describe the surface of active bogs where the ground forms a pattern of mounds, hollows and pools. Such hummocks commonly comprise bog mosses.

HYDROLOGY - The movement of water through a catchment area including freshwater and seawater inputs, water level changes and drainage mechanisms which are all influenced by the underlying geology.

HYPERTROPHIC - Over-enriched with nutrients, polluted.

IMMERSED - Submerged by water.

IPCC - Irish Peatland Conservation Council. Non-governmental organisation established in 1982 to promote the protection of Irish bogs and fens.

LAGG - Fringing wetland area around raised bogs where groundwater mixes with bog water, and where vegetation communities are transitional between bog and fen.

LATITUDE - The angular distance measured in degrees north or south of the equator.

LICHENS - An organism that consists of a fungus growing in close association (symbiosis) with an alga.

LINES - A feature that is linear such as a river or a hedgerow, which are difficult to map spatially due to scale are often stored in the GIS in this format.

LOAM - Friable or crumbly soil comprising sand, silt, clay and organic matter.

MANAGEMENT - a) Controlling processes within a site (this can be actively carrying out work or can be doing nothing), preferably in accordance with a conservation plan. - b) The practical implementation of the management plan. - c) Undertaking any task or project identified in the management plan, including the identification of new opportunities.

MapInfo - A commonly used desktop GIS software package produced by the MapInfo Corporation. Similar basic functionality and capabilities as ArcGIS.

MapInfo TABLE - Similar to the shapefile concept but used with MapInfo.

MARGINAL VEGETATION - At or near the margin or border, often used to describe the vegetation at the edge of a lake or river.

MARL - White calcareous clay or precipitate with a high proportion of soft calcium carbonate, usually found as an alluvial deposit.

MARSH - Wet grassy habitats, with more or less permanent standing water at or near ground level, with little or no peat formation. Generally quite species rich.

MECHANICAL PEAT EXTRACTION - Refers to the use of machinery to cut peat. This includes extrusion cutting such as by sausage machine (e.g. Difco) or any other type of mechanical cutter (e.g. Hopper).

MESOTROPHIC – freshwater lake systems containing moderate concentrations of mineral nutrients, such as phosphorous, calcium and nitrogen. Having moderate levels of primary productivity or nutrients (intermediate between oligotrophic and eutrophic).

MICROTOPOGRAPHY - Very small-scale variations in the height and roughness of the ground surface.

MINEROTROPHIC MIRE - A peatland system that is fed by ground water.

MIRE - A general term applied to peat producing ecosystems. cf. bog, peatland.

MONITORING – A repeat or repeats of a survey using the same methodology. Designed to look for or measure specific changes and the rate or extent of change. Used to check the “health” quantity or quality of a habitat or species.

MONTANE - Of or relating to mountains.

MOOR - Shallow acid peatland less than 40 cm peat depth, often resting on iron pan and podzol; and dominated by ericaceous vegetation.

MOR HUMUS - Organic soil that is acid and comprises layers of plant litter.

MORAINE - Ridge or mound of unsorted mineral material deposited by glaciers.

MOSAIC - Used to describe habitats that occur together and cannot easily be mapped separately. Complex pattern or patchwork of habitats or species occurring in intimate associations.

MUD - Silt/clay fraction where sediment particles are less than 0.063 mm in diameter.

MULTIPLE PRIVATE OWNERSHIP- Lands that are divided into areas which are privately owned. There must be more than one private landowner under this heading. (lands in commonage are not described under this heading).

NATIONAL PARKS AND WILDLIFE SERVICE (NPWS) – the section of the Environment Infrastructure and Services division of the Department of Environment, Heritage and Local Government with responsibility for nature conservation and implementation of Government conservation policy as enunciated by the Minister for the Environment, Heritage and Local Government.

NATURA 2000 - A network of sites across the European Community, selected for the purpose of conserving natural habitats and species of plants and animals which are rare, endangered or vulnerable in the European Community. SACs and SPAs form the Natura 2000 network.

NATURAL HABITAT - Can be aquatic or terrestrial areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural.

NATURAL HERITAGE AREA (see also NHA types below) - The basic designation for wildlife conservation is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection. Some of these sites are small, such as roosting areas for rare bats; others can be large such as a blanket bog or a sand dune system. To date, 75 raised bogs have been given legal protection, covering some 23,000 hectares. A further 73 blanket bogs, covering 37,000ha are also designated as NHAs. Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally **proposed** for designation.

pNHA - Proposed Natural Heritage Areas which were published on a **non-statutory** basis in 1995, but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats. Some of the pNHAs are tiny, such as a roosting place for rare bats. Others are large - a woodland or a lake, for example. The pNHAs cover approximately 65,000ha and designation will proceed on a phased basis over the coming years.

Prior to statutory designation, pNHAs are subject to limited protection, in the form of:

Rural Environment Protection Scheme (REPS) plans which require conservation of pNHAs and operate for a period of 5 years

Forest Service requirement for NPWS approval before they will pay afforestation grants on pNHA lands

Recognition of the ecological value of pNHAs by Planning and Licensing Authorities.

cNHA - Candidate Natural Heritage Area is the name given to wildlife sites that are proposed to NPWS by third parties for consideration as NHAs. Prior to designation these sites require survey and evaluation for their wildlife value. If they are considered of national conservation value they may enter the formal NHA designation process. These sites have no legal protection until they are taken up into the formal NHA designation process.

NNR - National Nature Reserve. Areas set aside for their conservation value by the Minister for the Department of Environment, Heritage and Local Government.

NOTABLE SPECIES - Plants or animals which are worthy of mentioning either because they are particularly typical of a habitat, or because they are rare/ scarce/ atypical.

NPWS - National Parks and Wildlife Service (see above).

OLIGO - Prefix denoting few or little.

OLIGOTROPHIC - Applied to waters that are relatively low in nutrients, as in lakes which are low in dissolved minerals and which can only support limited plant growth. Having low levels of primary productivity or nutrients.

OMBROTROPHIC - Rain-fed, of or relating to vegetation or ecosystems that receive most of their nutrients from precipitation.

OSI - Ordnance Survey of Ireland.

PEAT - Organic soil material saturated by water, composed of the partial decomposed remains of plants and mosses.

PEAT CUTTING BY HAND - See hand cutting of peat.

PEAT CUTTING BY MACHINE - See mechanical peat extraction.

PEBBLE - Sediment particle, or stone, that is between 16-64 mm in diameter.

PERIPHERY - Distant from the centre, on the fringe/edge.

pH - A quantitative expression for the acidity or alkalinity of a solution or soil. The scale ranges from 0-14: pH 7 is neutral, less than 7 is acidic and greater than 7 is alkaline.

PLATEAU - A wide, mainly level area of elevated land.

PHYTOSOCIOLOGY - Study and classification of plant communities based primarily on floristic considerations.

PODZOL - Acid soil with an organic layer over a highly leached mineral layer.

POINTS - Some features such as freshwater springs or a site location are represented by a point. are difficult to map spatially due to scale and are often stored in the GIS in this format.

POLYGON - An feature that closes on itself to make a circle or any closed irregular shape. An example of a set of data that would be stored in the GIS in this format would be a bog, a lake or a field.

PRECIPITATION - Water moving from the atmosphere to the ground in the form of rain, fog, mist, snow or hail.

PRIORITY HABITAT - A subset of the habitats listed in Annex I of the EU Habitats Directive. These are habitats which are in danger of disappearance and whose natural range mainly falls within the territory of the European Union. These habitats are of the highest conservation status and require measures to ensure that their favourable conservation status is maintained.

RARE - An ecological term applied to distribution of species when assessed on a national grid reference system. The assessment is made on the basis of the number of occupied 10 km National Grid squares. A species is described as rare if has been recorded in to 3-10, 10 km squares.

RED DATA BOOK – A register of threatened species that includes definitions of degrees of threat.

RED DATA BOOK (lower plants) - This Red Data Book deals with Stoneworts which are recognised as a separate class, Characea, of the Green Algae Chlorophyta). Many of these species are threatened by loss of habitat or pollution.

RED DATA BOOK 1 (vascular plants) This Red Data Book deals with rare and threatened flowering plants and ferns of Ireland with an account of their present distributions and conservation status.

RED DATA BOOK 2 (mammals, birds, amphibians and fish) - identifies those species threatened in Ireland or those species whose populations are considered to be of international importance, though not necessarily threatened in Ireland. It details the current state of Irish vertebrates and provides a concise summary of the various legislation for each species.

RIPARIAN - Of or relating to a river bank.

SACs - Special Areas of Conservation have been selected from the prime examples of wildlife conservation areas in Ireland. Their legal basis from which selection is derived is The Habitats Directive (92/43/EEC of the 21st May 1992). SAC's have also been known as cSAC's which stands for "candidate Special Areas of Conservation", and pcSAC's which stands for "proposed candidate Special Areas of Conservation."

SCIENTIFIC MONITORING - this is carried out by the monitoring section of the NPWS, whose function here is to ensure that the favourable conservation status of the site is maintained and where possible improved.

SEDIMENT - Solid particles that can originate by the weathering and erosion of pre-existing rock, by chemical precipitation from water, or by the breakdown of organisms.

SEDIMENTARY - Formed by the deposition of sediment, i.e. rock particles or chemical precipitate, or pertaining to the process of sedimentation.

SHAPEFILE - A set of files that contain a set of points, arcs, or polygons (or *features*) that hold tabular data and a spatial location. The tabular data makes up the attribute table (see below). This file format is used in ArcGIS software.

SILICEOUS - Of or relating to rocks or sediments that contain silica and are acid.

SILT - Fine sediment particles that are between 0.004-0.063 mm in diameter - component of mud.

SINKHOLE - Steep-sided, enclosed depression linking to underground drainage systems in a limestone region.

SLACK - Wet depression in a sand dune system or, in the case of rivers, a backwater.

SLIVER POLYGON - A extremely small polygon, usually of elongated shapes, that results from errors in data capture and overlay analysis when identical linear objects fail to register. It is also known as a spurious polygon.

SPAs - Special Protection Areas for Birds are areas which have been designated to ensure the conservation of certain categories of birds. Ireland is required to conserve the habitats of two categories of wild birds under the European Birds Directive (Council Directive 79/ 409/ 2nd April 1979). The NPWS is responsible for ensuring that such areas are protected from significant damage.

SPECIES - the lowest unit of classification normally used for plants and animals.

STRATEGY - A course of action or a broad approach towards achieving an objective. It is the general thrust of management towards achieving an objective. It is a description of how the objective is to be achieved.

SUBMERSED - Submerged or covered by water.

SURVEY - a) Study/visit to produce an inventory of what is present / record a situation.- b) Establishing a baseline (study).

SUSTAINABLE - The highest rate at which a renewable resource can be used without reducing its supply (without causing damage to the resource).

TILL - Unsorted sediments laid down directly by glacier ice without the intervention of water.

TRANSITION MIRE – Acidophilous vegetation intermediate between poor fen and ombrotrophic (rain-fed) bog.

TROPHIC - Of or relating to nutrient levels or nutrition.

TUFA - Deposit or precipitate of calcium carbonate around calcareous springs.

TURBARY – Refers to the right to harvest turf.

VASCULAR PLANTS - Higher plants with specialised conducting tissue, including angiosperms (flowering plants), ferns and clubmosses.

VERTEBRATES - Animals with backbones.

VERY RARE - an ecological term which is applied to distribution of species when assessed on a national grid reference system. The assessment is made on the basis of the number of occupied 10 km National Grid squares. Very Rare applies to 1-2, 10 km squares in this context.

Appendix 8: Impacts and Activities List

The below is the list of threats, pressures and activities influencing the conservation status of Natura 2000 sites as used in monitoring of Natura 2000 sites under Article 17 of the Habitats Directive. This list is a revision (dated November 2009) of an earlier set of codes used for monitoring and reporting on standard Natura 2000 site data forms.

CODE	DESCRIPTION
A Agriculture	
A01	Cultivation
A02	modification of cultivation practices
A02.01	agricultural intensification
A02.02	crop change
A02.03	grassland removal for arable land
A03	mowing / cutting of grassland
A03.01	intensive mowing or intensification
A03.02	non intensive mowing
A03.02	abandonment / lack of mowing
A04	grazing
A04.01	intensive grazing
A04.01.01	intensive cattle grazing
A04.01.02	intensive sheep grazing
A04.01.03	intensive horse grazing
A04.01.04	intensive goat grazing
A04.01.05	intensive mixed animal grazing
A04.02	non intensive grazing
A04.02.01	non intensive cattle grazing
A04.02.02	non intensive sheep grazing
A04.02.03	non intensive horse grazing
A04.02.04	non intensive goat grazing
A04.02.05	non intensive mixed animal grazing
A04.03	abandonment of pastoral systems, lack of grazing
A05	livestock farming and animal breeding (without grazing)
A05.01	Animal breeding,
A05.02	stock feeding
A05.03	Lack of animal breeding
A06	annual and perennial non-timber crops
A06.01	annual crops for food production
A06.01.01	intensive annual crops for food production/ intensification
A06.01.02	non- intensive annual crops for food production
A06.02	perennial non-timber crops
A06.02.01	intensive perennial non-timber crops/intensification
A06.02.02	non-intensive perennial non-timber crops
A06.03	biofuel-production
A06.04	abandonment of crop production
A07	use of biocides, hormones and chemicals
A08	Fertilisation
A09	Irrigation
A10	Restructuring agricultural land holding
A10.01	removal of hedges and copses or scrub
A10.02	removal of stone walls and embankments
A11	Agriculture activities not referred to above
B Sylviculture, forestry	
B01	forest planting on open ground
B01.01	forest planting on open ground (native trees)
B01.02	artificial planting on open ground (non-native trees)
B02	Forest and Plantation management & use
B02.01	forest replanting
B02.01.01	forest replanting (native trees)

- B02.01.02 forest replanting (non native trees)
- B02.02 forestry clearance
- B02.02 removal of forest undergrowth
- B02.04 removal of dead and dying trees
- B02.05 non- intensive timber production (leaving dead wood/ old trees untouched)
- B02.06 thinning of tree layer
- B03 forest exploitation without replanting or natural regrowth
- B04 use of biocides, hormones and chemicals (forestry)
- B05 use of fertilizers (forestry)
- B06 grazing in forests/ woodland
- B07 Forestry activities not referred to above

C Mining, extraction of materials and energy production

- C01 Mining and quarrying
 - C01.01 Sand and gravel extraction
 - C01.01.01 sand and gravel quarries
 - C01.01.02 removal of beach materials
 - C01.02 Loam and clay pits
 - C01.03 Peat extraction
 - C01.03.01 hand cutting of peat
 - C01.03.02 mechanical removal of peat
 - C01.04 Mines
 - C01.04.01 open cast mining
 - C01.04.01 underground mining
 - C01.05 Salt works
 - C01.05.01 abandonment of saltpans (salinas)
 - C01.05.02 conversion of saltpans
 - C01.06 Geotechnical survey
 - C01.07 Mining and extraction activities not referred to above
- C02 Exploration and extraction of oil or gas
 - C02.01 exploration drilling
 - C02.02 production drilling
 - C02.03 jack-up drilling rig
 - C02.04 semi-submersible rig
 - C02.05 drill ship
- C03 Renewable abiotic energy use
 - C03.01 geothermal power production
 - C03.02 solar energy production
 - C03.03 wind energy production
 - C03.04 tidal energy production

D Transportation and service corridors

- D01 Roads, paths and railroads
 - D01.01 paths, tracks, cycling tracks
 - D01.02 roads, motorways
 - D01.03 car parks and parking areas
 - D01.04 railway lines, TGV
 - D01.05 bridge, viaduct
 - D01.06 Tunnel
- D02 Utility and service lines
 - D02.01 electricity and phone lines
 - D02.01.01 suspended electricity and phone lines
 - D02.01.02 underground electricity and phone lines
 - D02.02 pipe lines
 - D02.03 communication masts and antennas
 - D02.09 other forms of energy transport
- D03 shipping lanes, ports, marine constructions
 - D03.01 port areas
 - D03.01.01 slipways
 - D03.01.02 piers
 - D03.01.03 fishing harbours
 - D03.01.04 industrial ports
 - D03.02 Shipping

- D03.03 marine constructions
- D04 airports, flightpaths
 - D04.01 airport
 - D04.02 aerodrome, heliport
 - D04.03 flight paths
- D05 Improved access to site
- D06 Other forms of transportation and communication

E Urbanisation, residential and commercial development

- E01 Urbanised areas, human habitation
 - E01.01 continuous urbanisation
 - E01.02 discontinuous urbanisation
 - E01.03 dispersed habitation
 - E01.04 other patterns of habitation
- E02 Industrial or commercial areas
 - E02.01 factory
 - E02.02 industrial stockage
 - E02.03 other industrial / commercial area
- E03 Discharges
 - E03.01 disposal of household waste
 - E03.02 disposal of industrial waste
 - E03.03 disposal of inert materials
 - E03.04 Other discharges
 - E03.04.01 costal sand suppletion/ beach nourishment
- E04 Structures, buildings in the landscape
 - E04.01 Agricultural structures, buildings in the landscape
 - E04.02 Military constructions and buildings in the landscape
- E05 Storage of materials
- E06 Other urbanisation, industrial and similar activities
 - E06.01 demolition of buildings & human structures
 - E06.02 reconstruction, renovation of buildings

F Biological resource use other than agriculture & forestry

- F01 Marine and Freshwater Aquaculture
 - F01.01 intensive fish farming, intensification
 - F01.02 suspension culture
 - F01.03 bottom culture
- F02 Fishing and harvesting aquatic resources
 - F02.01 Professional passive fishing
 - F02.01.01 potting
 - F02.01.02 netting
 - F02.01.03 demersal longlining
 - F02.01.04 pelagic longlining
 - F02.02 Professional active fishing
 - F02.02.01 benthic or demersal trawling
 - F02.02.02 pelagic trawling
 - F02.02.03 demersal seining
 - F02.02.04 purse seining
 - F02.02.05 benthic dredging
 - F02.03 Leisure fishing
 - F02.03.01 bait digging
- F03 Hunting and collection of wild animals (terrestrial)
 - F03.01 Hunting
 - F03.01.01 damage caused by game (excess population density)
 - F03.02 Taking and removal of animals (terrestrial)
 - F03.02.01 collection of animals (insects, reptiles, amphibians.....)
 - F03.02.02 taking from nest (falcons)
 - F03.02.03 trapping, poisoning, poaching
 - F03.02.04 predator control
 - F03.02.05 accidental capture
 - F03.02.09 other forms of taking animals
- F04 Taking / Removal of terrestrial plants, general
 - F04.01 pillaging of floristic stations

F04.02 collection (fungi, lichen, berries etc.)

F04.02.01 hand raking

F04.02.02 hand collection

F05 Hunting, fishing or collecting activities not referred to above

F05.01 game/ bird breeding station

G Human intrusions and disturbances

G01 Outdoor sports and leisure activities, recreational activities

G01.01 nautical sports

G01.01.01 motorized nautical sports

G01.01.02 non-motorized nautical sports

G01.02 walking, horse riding and non-motorised vehicles

G01.03 motorised vehicles

G01.03.01 regular motorized driving

G01.03.02 off-road motorized driving

G01.04 mountaineering, rock climbing, speleology

G01.04.01 mountaineering & rock climbing

G01.04.02 speleology

G01.05 gliding, delta plane, paragliding, ballooning

G01.06 skiing, off-piste

G01.07 other outdoor sports and leisure activities

G02 Sport and leisure structures

G02.01 golf course

G02.02 skiing complex

G02.03 stadium

G02.04 circuit, track

G02.05 hippodrome

G02.06 attraction park

G02.06 sports pitch

G02.07 camping and caravans

G02.08 wildlife watching

G02.09 other sport / leisure complexes

G03 Interpretative centres

G04 Military use and civil unrest

G04.01 Military manoeuvres

G04.02 abandonment of military use

G05 Other human intrusions and disturbances

G05.01 Trampling, overuse

G05.02 Vandalism

G05.03 intensive maintenance of public parks

G05.04 tree surgery, felling for public safety, removal of roadside trees

G05.05 missing or wrongly directed conservation measures

G05.06 closures of caves or galleries

G05.07 fences, fencing

G05.08 overflying with aircrafts (agricultural)

H Pollution

H01 Pollution to surface waters (limnic & terrestrial)

H01.01 pollution to surface waters by industrial plants

H01.02 pollution to surface waters by storm overflows

H01.03 other point source pollution to surface water

H01.04 diffuse pollution to surface waters via storm overflows or urban run-off

H01.05 diffuse pollution to surface waters due to agricultural and forestry activities

H01.06 diffuse pollution to surface waters due to transport and infrastructure without connection to canalization/sweepers

H01.07 diffuse pollution to surface waters due to abandoned industrial sites

H01.08 diffuse pollution to surface waters due to household sewage and waste waters

H01.09 diffuse pollution to surface waters due to other sources not listed

H02 Pollution to groundwater (point sources and diffuse sources)

H02.01 groundwater pollution by leakages from contaminated sites

H02.02 groundwater pollution by leakages from waste disposal sites

H02.03 groundwater pollution associated with oil industry infrastructure

H02.04 groundwater pollution by mine water discharges

- H02.05 groundwater pollution by discharge to ground such as disposal of contaminated water to soakaways
- H02.06 diffuse groundwater pollution due to agricultural and forestry activities
- H02.07 diffuse groundwater pollution due to non-sewered population
- H02.08 diffuse groundwater pollution due to urban land use
- H03 Marine water pollution
 - H03.01 oil spills in the sea
- H04 Air pollution, air-borne pollutants
 - H04.01 Acid rain
 - H04.02 Nitrogen-input
 - H04.03 other air pollution
- H05 Soil pollution and solid waste (excluding discharges)
 - H05.01 garbage and solid waste
- H06 excess energy
 - H06.01 Noise nuisance, noise pollution
 - H06.01.01 point source or irregular noise pollution
 - H06.01.02 diffuse or permanent noise pollution
 - H06.02 Light pollution
 - H06.03 Thermal heating of water bodies
- H07 Other forms of pollution

I Invasive, other problematic species and genes

- I01 invasive non-native species
- I02 problematic native species
- I03 introduced genetic material, GMO
 - I03.01 genetic pollution (animals)
 - I03.02 genetic pollution (plants)

J Natural System modifications

- J01 fire and fire suppression
 - J01.01 burning down
 - J01.02 suppression of natural fires
 - J01.03 lack of fires
- J02 human induced changes in hydraulic conditions
 - J02.01 Landfill, land reclamation and drying out, general
 - J02.01.01 polderisation
 - J02.01.02 reclamation of land from sea, estuary or marsh
 - J02.01.03 infilling of ditches, dykes, ponds, pools, marshes or pits
 - J02.01.04 recultivation of mining areas
 - J02.02 Removal of sediments (mud...)
 - J02.02.01 dredging/ removal of limnic sediments
 - J02.02.02 estuarine and coastal dredging
 - J02.03 Canalisation & water deviation
 - J02.03.01 large scale water deviation
 - J02.03.02 canalisation
 - J02.04 Flooding modifications
 - J02.04.01 flooding
 - J02.04.02 lack of flooding
 - J02.05 Modification of hydrographic functioning, general
 - J02.05.01 modification of marine currents
 - J02.05.02 modifying structures of inland water courses
 - J02.05.03 modification of standing water bodies
 - J02.05.04 reservoirs
 - J02.05.05 small hydropower projects, weirs
 - J02.06 Water abstractions from surface waters
 - J02.06.01 surface water abstractions for agriculture
 - J02.06.02 surface water abstractions for public water supply
 - J02.06.03 surface water abstractions by manufacturing industry
 - J02.06.04 surface water abstractions for the production of electricity (cooling)
 - J02.06.05 surface water abstractions by fish farms
 - J02.06.06 surface water abstractions by hydro-energy
 - J02.06.07 surface water abstractions by quarries/ open cast (coal) sites
 - J02.06.08 surface water abstractions for navigation

- J02.06.09 surface water abstractions for water transfer
 - J02.06.10 other major surface water abstractions
 - J02.07 Water abstractions from groundwater
 - J02.07.01 groundwater abstractions for agriculture
 - J02.07.02 groundwater abstractions for public water supply
 - J02.07.03 groundwater abstractions by industry
 - J02.07.04 groundwater abstractions by quarries/open cast (coal)sites
 - J02.07.05 other major groundwater abstractions from groundwater for agriculture
 - J02.08 Raising the groundwater table /artificial recharge of groundwater
 - J02.08.01 discharges to groundwater for artificial recharge purposes
 - J02.08.02 returns of groundwater to GWB from which it was abstracted
 - J02.08.03 mine water rebound
 - J02.08.04 other major groundwater recharge
 - J02.09. Saltwater intrusion of groundwater
 - J02.09.01 saltwater intrusion
 - J02.09.02 other intrusion
 - J02.10 management of aquatic and bank vegetation for drainage purposes
 - J02.11 Dumping, depositing of dredged deposits
 - J02.11 Dykes, embankments, artificial beaches, general
 - J02.11.01 sea defence or coast protection works, tidal barrages
 - J02.11.02 dykes and flooding defence in inland water systems
 - J02.12 Abandonment of management of water bodies
 - J02.13 Other human induced changes in hydraulic conditions
- J03 Other ecosystem modifications
 - J03.01 reduction or loss of specific habitat features
 - J03.01.01 reduction of prey availability (including carcasses)
 - J03.02 anthropogenic reduction of habitat connectivity
 - J03.02.01 reduction in migration/ migration barriers
 - J03.02.02 reduction in dispersal
 - J03.02.03 reduction in genetic exchange
 - J03.03 reduction, lack or prevention of erosion
 - J03.04 applied (industrial) destructive research

K Natural biotic and abiotic processes (without catastrophes)

- K01 abiotic (slow) natural processes
 - K01.01 Erosion
 - K01.02 Silting up
 - K01.03 Drying out
 - K01.04 Submersion
 - K01.05 Soil salinization
- K02 Biocenotic evolution, succession
 - K02.01 species composition change (succession)
 - K02.02 accumulation of organic material
 - K02.03 eutrophication (natural)
 - K02.04 acidification (natural)
- K03 Interspecific faunal relations
 - K03.01 competition
 - K03.02 parasitism
 - K03.03 introduction of disease
 - K03.04 predation
 - K03.05 antagonism arising from introduction of species
 - K03.06 antagonism with domestic animals
 - K03.07 other forms of interspecific faunal competition
- K04 Interspecific floral relations
 - K04.01 competition
 - K04.02 parasitism
 - K04.03 introduction of disease
 - K04.04 lack of pollinating agents
 - K04.05 damage by herbivores (including game species)
- K05 reduced fecundity/ genetic depression
 - K05.01 reduced fecundity/ genetic depression in animals (inbreeding)
 - K05.02 reduced fecundity/ genetic depression in plants (incl. endogamy)
- K06 other forms or mixed forms of interspecific floral competition

L Geological events, natural catastrophes

- L01 volcanic activity
- L02 tidal wave, tsunamis
- L03 earthquake
- L04 avalanche
- L05 collapse of terrain, landslide
- L06 underground collapses
- L07 storm, cyclone
- L08 inundation (natural processes)
- L09 fire (natural)
- L10 other natural catastrophes

M Climate change

- M01 Changes in abiotic conditions
 - M01.01 rise of temperature & extremes
 - M01.02 droughts and less precipitations
 - M01.03 flooding and rising precipitations
- M02 Changes in biotic conditions
 - M02.01 habitat shifting and alteration
 - M02.02 desynchronisation of processes
 - M02.03 decline or extinction of species
 - M02.04 migration of species (natural newcomers)

X No threats or pressures

- XO** Threats and pressures from outside the Member State
- XE** Threats and pressures from outside the EU territory

Appendix 9: The County Monaghan Wetlands Map Site List held within the MWM Site Database

The list is sorted alphabetically by site name and formatted so as to print on A4 page.

Data presented for each site includes: MWM site code, MWM Site name, Site designation, Grid reference and Fossitt wetland types recorded on the site.

For a complete list of all data held on each site (with the exception of detailed site descriptions) within the MWM site database see the Excel file (MWM_total_dbase_site_data_export.xls) included on the MWM Project CD Rom. For an explanation of the data columns in the Excel file see MWM Report Appendix 4.

Appendix 9. The County Monaghan Wetlands Map 2010. List of sites held within the MWM Site Database, with selected site information.

For a complete list of all data held on each of the sites within the Site Database see the Excel file (MWM_total_dbase_site_data_export.xls) included on the MWM Project CD Rom.

List is presented in alphabetical order by site name.

Site Code	Site Name	Site designations	Easting Centre	Northing Centre	in Fossitt Habitat Present
314	1KM SQUARE H91 - RIVER FANE	Undesignated site	290000	310000	G; GS ; GS4; F; FS; FS1; W; WN ; WN6 ; P; PF; PF1; FW; FW1 ; FW4; WD ; WD1 ; WL; WL2
26	AGHABOY FEN	cNHA	262612	335000	ED2; E; ED; F; FL; FW4; FW; FS1; FS; G; GM; GM1; GS4; GS ; GA1; GA; WD4; W; WD ; WS ; WS1; FL2
173	AGHABOY LAKE	Undesignated site	259200	335100	F; FL; FL2
504	AGHABOY WOOD	Undesignated site	270226	342775	
28	AGHACLOGHAN FEN	cNHA	280180	308963	BL3; BL ; B ; ED2; E; ED; GM1; GM; G; GS4; GS ; PF3; PF; P; WD4; W; WD ; WL1; WL; WN6 ; WN
219	AGHADERRY	Undesignated site	265700	350704	G; GM; GM1; W; WS ; WN ; FS; FS1; WD4; WD1
518	AGHADERRY	Undesignated site	265939	351031	
51	AGHAFIN LOUGH	Undesignated site	252257	329882	F; FL; FL4; FS; FS1; FW; FW4; G; GA; GA1; GS ; GS4; P; PB; PB4; W; WL; WL1; WN ; WN6
43	AGHAFIN LOUGH LITTLE	Undesignated site	252492	329288	F; FL; FL1; FS; FS1; FW; FW4; G; GS ; GS4; W; WL; WL1; WL2; WN ; WN6 ; WS ; WS1
95	AGHALISK - ULSTER CANAL	ASI; pNHA; cNHA	263351	332497	F; GM; FW; FW3; G; FS; W; WD ; WD1 ; WL; WN ; WN2 ; WS
512	AGHALISKEEVAN	Undesignated site	266662	346414	
485	AGHANANIM LOUGH	Undesignated site	267911	332851	F; FS; FS1; P; PF; PF3; W; WN ; WS
184	AGHAMALLAGH	Undesignated site	261000	332300	F; FL; FS1; FS; FW4; FW; GM; GM1; G; GS4; GS ; PF2; PF; P; PF3; W; WL; WL1; WN2 ; WN ; WN6 ; WS1; WS ; FL2
30	AGHAMULLEN FEN	cNHA	268433	317194	
488	AGHASEDAGH LOUGH	Undesignated site	269448	334021	FS1; FS; F; FW4; FW; G; GA; GA1; GM; GM1; GS4; GS ; WL; WL1; WS1; WS ; W
32	ALLAGESH LOUGH	Undesignated site	258761	334698	
252	ALTACANOO - ESHBRACK BOG	NHA	257460	344480	P; PB; G; GS ; GS4
422	ANLORE - RIVER FINN	Undesignated site	253720	325700	F; FW
235	ANNACATTY	Undesignated site	274049	340766	P; PF; PF3
236	ANNACATTY LAKE	Undesignated site	273600	340215	F; FL
509	Annagh (Trough By)	Undesignated site	267776	345016	
119	ANNAGHBRACK	Undesignated site	261000	329000	PF; PF3; P; G; GM; GM1; W; WN ; WS ; F; FL; FL2
35	ANNAGHEANE LOUGH		246869	318110	ED2; E; ED; F; FL; FS; FS1; FW; FW4; G; GA; GA1; GS4; GS ; PF3; PF; P; W; WL; WL1; WN ; WN6 ; ED5; GM; GM1; WD ; WD4; WN7; FL1
260	ANNAGHERVY	pNHA; cNHA			
114	ANNAGHKILLY LOUGH LARGE	Undesignated site	261789	332550	F; FL; GM; GM1; G
113	ANNAGHKILLY LOUGH LITTLE	Undesignated site	252800	325400	F; FL; FS; FS1; PF; PF3; P
362	ANNAGHMAKERIG LOUGH	Undesignated site	253152	325784	F; FL; FL7; FL4
325	ANNAGHYDUFF (1KM SQUARE H62)	Undesignated site	258500	320500	G; GS ; GS4; F; FS; FS1; FW; FW4; FW1
44	ANNAGOSE LOUGH	Undesignated site	260000	320000	F; FL; FL4; FS; FS1; G; GA; GA1; GS ; GS4; WL; W; WL1; WN ; WN6 ; WS ; WS1
428	ANNAMARRON	Undesignated site	258100	325700	W; WN ; WN5; WN6 ; PB4; P; PB; WN2
479	Annaroe	Undesignated site	287700	299100	
		Undesignated site	270219	329994	

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List is presented in alphabetical order by site name.

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130	ANNAVEAGH	Undesignated site	247400	320350	F; FW; G; GM; GM1; FS; FS1
448	ANNIES BRIDGE - RIVER FINN	Undesignated site	248200	321900	F; FW; FW2
135	ANNIES LOUGH	Undesignated site	248900	321400	F; FL; FS; FS1; W; WN ; WS ; PB4; P; PB; WN7
45	ANNYALTY LOUGHS	Undesignated site	261900	334100	F; FL; FL4; FS; FS1; G; GA; GA1; GS ; GS4; WL; W; WL1; WN ; WN6
166	ANNYEEB LOUGH	Undesignated site	259681	332900	F; FL; FS; FS1; P; PF; PF3; FL2
37	ARDKIRK FEN - LISLANNAN BOG	pNHA; cNHA	287200	314400	ED2; ED5; E; ED; FS1; FS; F; FW; FW1 ; FW4; G; GA; GA1; GM; GM1; GS4; GS ; W; WS ; WS1
223	ASTRISH LOUGH	Undesignated site	268050	348100	F; FL; PF; PF3; P; WN ; WN6 ; WS ; WS1; W
222	ASTRISH MORE	Undesignated site	268429	348619	G; GS ; GS4; WN ; WN6 ; W
452	AVALREAGH CUTOVER	Undesignated site	276000	328000	HH1; HH; GS3 ; GS ; W; WS ; WS1; GS4; F; FW; FW4; WL2; WL; WL1
291	AVALREAGH HOLLOWES	Undesignated site	276874	327675	G; GM; GM1; P; PF; PF3; FS; FS1; GS ; GS4; WS ; WS1; HD1; H; WL; WL1; WL2; FW; FW4
128	BALLAGH LOUGH	Undesignated site	264300	328800	F; FL; FL5; FS; FS1; WN6 ; WN ; W
413	BALLINTRA BRIDGE	Undesignated site	274500	320300	F; FL; FW; FW2 ; G; FS; FS1; GS ; GS4; FL2
443	BALLYBAY - DERRYVALLY (1KM SQUARE H72)	Undesignated site	271700	320400	F; FL; FW
425	BALLYCOGHILL BRIDGE - DROMORE RIVER	Undesignated site	265900	317300	F; FL; FS; FS1; WN ; W; WN6 ; B ; BL ; BL3; FW; FW2 ; FW4; G; GA; GA1; GM; GM1; GS ; GS4; WN7; WS ; WS1; FL2
86	BALLYHOE LOUGH	ASI; pNHA; cNHA	285000	295600	F; FL; FL6
272	BALLYLECK LAKE	Undesignated site	264426	332079	F; FL; WN ; WN6 ; W; WS ; FL2; WD ; WD4
340	BALLYLOUGHAN A	Undesignated site	283709	301100	F; FL; FL6
341	BALLYLOUGHAN B	Undesignated site	283880	301329	F; FL; FL6
342	BALLYLOUGHAN C	Undesignated site	284130	300750	F; FL; FL6
423	BALLYNACARRY BRIDGE - RIVER FANE	cNHA	287400	314200	F; FW
420	BARAGHY LOUGH	Undesignated site	266910	312495	F; FL; FL7; FL5
250	BARNHILL LAKE - ROSSMORE PARK	CFP	265807	331599	F; FL; W; WN ; WS ; FL2
284	BARTLES AND SHEENSON LOUGHS - ROSSMORE PARK	CFP	265852	330528	W; WD ; F; FL; FL2
427	BELLATRAIN LOUGH	Undesignated site	274000	310700	F; FL; FL2
204	BILLARY LOUGH	Undesignated site	257900	330700	F; FL; FS; FS1; WN ; WN6 ; W; FL2
268	BILLISES (TOWNLAND) LAKE	Undesignated site	266650	336471	F; FL; G; GM; GM1
265	BILLISES LOUGH	Undesignated site	267260	336826	F; FL; W; WN ; WS ; WN6
46	BISHOPS LOUGH	Undesignated site	252667	326032	F; FL; FL4; FS; FS1; G; GM; GM1; GS ; GS4; W; WN ; WN4
73	BLACK AND DERRYGOONY LOUGHS NHA	pNHA; ASI; cNHA	269671	311639	F; FW; FW4; H; HD; HD1; W; WN ; ED2; E; ED; FL; FL4; FS; FS1; FW1 ; G; GA; GA1; GS ; GS4; PF; PF3; WD4; WL1; WL; WN6 ; GM1; GM
289	BLACK LOUGH	Undesignated site	278150	327080	F; FL; H; HH; FL4
125	BLACKRAW AND GREAGH	Undesignated site	263900	326979	F; FL; FL7; FL5
360	BLACKWATER RIVER	Undesignated site			F; FW
432	BOCKS LOUGH / TULLYGLASS	Undesignated site	277500	310700	W; WN ; WN7; F; FL; WD ; WD2 ; FL2

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40	BOCKS UPPER	Undesignated site	279455	309116	BL3; BL ; B ; E; ED; ED2; G; GA; GA1; GM1; GM; GS ; GS4; P; PF; PF3; W; WD ; WD1 ; WL; WL1; WN ; WN6
212	BOUGHILL	Undesignated site	255500	327000	G; GS ; GS4
253	BRAGAN MOUNTAIN - SLIEVE BEAGH SPA	SPA	258500	344500	P; PB; G; GS ; GS4
244	BUCK LOUGH	Undesignated site	267301	344344	F; FL; FS; FS1; FL2
215	BULLOGBREAD	Undesignated site	254835	329902	G; GS ; GS4
353	BUNNOE RIVER	Undesignated site	259000	322300	F; FW
334	BURDAUTTEN LOUGH - KILROOSKY LOUGH CLUSTER	SAC	249500	328300	F; FL; FS; FS1; WD4; W; WD ; GS ; GS4; G; WL; WL1; FL3
207	CAM LOUGH	Undesignated site	255369	330700	F; FL; FS; FS1; G; GM; GM1; W; WN ; WS
211	CAPPOG	Undesignated site	254300	325440	G; GS ; GS4
365	CAPRAGH LOUGH	Undesignated site	286722	306142	F; FL; W; WN ; WN6 ; WN2 ; FL2
47	CARGAGHMORE FEN	Undesignated site	273600	307800	B ; BL ; BL3; E; ED; ED2; ED3; F; FS; FS1; FW; FW4; G; GA; GA1; GS ; GS4; PB4; P; PB; PF; PF3; W; WL; WL1; WS ; WS1
326	CARNROE (1KM SQUARE H52)	Undesignated site	250000	320000	W; WN ; WN6 ; WD ; WD4; FL8; FL; F; FW; FW1 ; FW4
463	CARNROE RESERVOIR	Undesignated site	251188	320976	F; FL; FL7
453	CARRICKANURE CUTOVER	Undesignated site	276900	326800	PF2; PF; P; HH; HH3; WS ; WS1; W; HD1; H; FW; FW4
48	CARRICKASLANE LOUGH & MULLAGHDUFF LAKE	Undesignated site	280469	324196	F; FL; FL4; FS; FS1; FW; FW4; FW1 ; G; GS ; GS4; W; WL; WL1; WS ; WS1
524	Carrikkatee	Undesignated site	273645	315297	PF2
61	CARRICKMORE	Undesignated site	253922	329758	W; WL; WL1; WN ; WN6 ; GS ; GS4; G; FW; FW4; F; GS3 ; FL; FL1; GM; GM1; PF; PF1; P
109	CARRIVETRAGH LOUGH	Undesignated site	251008	329200	F; FL; FS; FS1; FL3
454	CASHEL BOG	Undesignated site	277600	325800	PF2; PF; P; HH; HH3; H; GS ; GS4; G; FS; FS1; F; WS ; WS1; FW4; FW; GS3 ; GS2; WL; WL1; W; ED2; E; ED; PB4; PB
191	CASHLAN LOUGH	Undesignated site	259500	326767	F; FL; FL7; FL2
271	CASTLE LAKE - ROSSMORE PARK	CFP	265190	331515	F; FL; FL2
283	CASTLE LOUGH	Undesignated site	265190	331515	F; FL; FS; FS2; W; WN ; WS ; FL2
161	CAVANACROSS	Undesignated site	256500	334200	G; GS ; GS4
476	Cavanagarvan	Undesignated site	266629	327506	
198	CAVANAVALLY	Undesignated site	256400	327000	G; GS ; GS4
411	CLARDERRY	Undesignated site	275700	324700	P; PB; PB4
357	CLAREBANE RIVER	Undesignated site			F; FW; FW2
407	CLEN LOUGH (NORTH) - CLEN LOUGH (SOUTH)	Undesignated site	258500	322000	F; FL; FS; FS1
164	CLEN LOUGH (SOUTH)	Undesignated site	258480	332220	F; FL; FS; FS1; FL2
430	CLOHOGE & ATTIDUFF LOUGHS	Undesignated site	287400	308700	W; WN ; WN7; F; FL; WN2 ; B ; BL ; BL1; FL2
385	CLONAMULLY LAKE	Undesignated site	260200	334600	F; FS; FS1; WN ; WN6 ; W; WL; FL2
322	CLONKEEN (1KM SQUARE H65)	Undesignated site	260000	350000	G; GS ; GS4; F; FW; FW1 ; W; WN ; WN2 ; WL; WL2
49	CLONKEEN LOUGH	CNHA	250637	324524	F; FL; FL4; FS; FS1; G; GA; GA1; GS ; GS3 ; GS4; PF; PF3; P; WL; WL1; WN ; WN2 ; WN6 ; W

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50	CLONOONY LOUGH	Undesignated site	244785	321737	F; FL; FL4; FS; FS1; FW; FW3; FW4; G; GA; GA1; GS ; GS4; W; WN ; WN6
377	CLONTURK (DUFF'S) LOUGH	Undesignated site	287332	300318	F; FL; FL2
230	CLONTYBUNNIA	Undesignated site	261233	340874	G; GS ; GS4
445	CLOSSAGH MORE	Undesignated site	263600	316950	F; FW; FW2 ; G; GS ; GS4
201	COAGHEN LOUGH	Undesignated site	258090	328330	F; FL; FL7; FL2
507	Coma Lough	Undesignated site	268019	344295	
388	COMERTAGH EAST (SMALL)	Undesignated site	276600	303300	F; FL; FS; GM; W; WN ; WN6 ; WD ; WD1 ; FS1; FL2
387	COMERTAGH LOUGH	Undesignated site	276000	303200	F; FL; FS; FS1; FL2
245	CONN'S LOUGH	Undesignated site			F; FL; FL5; FS; FS1
486	Convent Lake	Undesignated site	266819	333251	
122	COOLCORRAGH	Undesignated site	263943	329100	G; GS ; GS4
386	COOLCORRAGH LAKE	Undesignated site	262100	328700	F; FL; FS; FS1; FL7; FL4
118	COOLDARRAGH	Undesignated site	262200	331090	PF; PF3; P; F; FL; FL2
269	COOLSHANAGH	Undesignated site	267626	335014	G; GS ; GS4
27	CORAVILLA / RAKEEN FEN	cNHA	264877	324103	ED2; E; ED; F; FS; FS1; FW; FW4; G; GA; GA1; GM; GM1; GS ; GS4; P; PF; PF3; W; WL; WL1; WN ; WN6
473	Corcaghan Cutover	Undesignated site	264815	327909	FL7; F; FL; W; WN ; WN6 ; WS ; WS1; FL5
129	CORCAGHAN LOUGH	Undesignated site	264900	327300	P; PF; PF3; W; WN ; WS
226	CORCLARE	Undesignated site	269194	345491	
78	CORCONNELLY LOUGH	Undesignated site	250664	321700	F; FL; G; GA; GA1; FL7; FL4
97	CORCREEGHY LAKE AND WOODLAND	pNHA; cNHA	262700	331500	B ; BL ; BL3; F; FL; FS; FS1; FW; G; GM; GM1; GS4; GS ; W; WL; WL1; WN ; WS ; WS1; WN6 ; P; PB; PF; PF3; FL2
98	CORDOO LOUGH	pNHA; ASI; cNHA	273200	323800	F; FL; FS; FS1; FW; FW4; B ; BL ; BL3; E; ER; G; GA; GA1; GM; GM1; GS ; GS4; W; WL; WN ; WS ; FL2
149	CORKEERAN	Undesignated site	255100	324000	F; FS; FS1
349	CORKEERAN LOUGH - DROMORE LAKES NHA	pNHA; cNHA	268500	318200	F; FL; FL7; FL5
52	CORLEA	Undesignated site	277200	302200	B ; BL ; BL3; E; ED; ED2; ED3; F; FL; FL8; GS ; GS4; G; PF; PF2; P; PF3; W; WL; WL1; WN ; WN6 ; WS ; WS1
295	CORLEADARGAN BOG - LOUGH SMILEY	pNHA; cNHA	281600	321600	F; FL; FL2
22	CORLONGFORD FEN	cNHA	271783	325791	ED2; E; ED; F; FW; FW4; G; GM; GM1; GS ; GS4; P; PF; PF3; W; WL; WL1; WN ; WN6 ; WS ; WS1
146	CORLOUGHAROE	Undesignated site	256900	322400	F; FS; FS1; P; PF; PF3
77	CORLOUGHAROE LOUGH	Undesignated site	256700	322200	F; FL; G; GA; GA1; FL2
296	CORMEEN LOUGH	Undesignated site	267200	315900	F; FL; FL2
38	CORNAGLARE LOUGH	Undesignated site	264860	329990	F; FL; FS; FS1; G; GS ; GS4; P; PB; PB4; PF; PF2; PF3; W; WL; WL1; WN ; WN6 ; WS ; WS1; FL2
462	CORNALARAGH	Undesignated site	276900	303600	W; WN ; WN6
188	CORNAWALL	Undesignated site	259730	327820	F
190	CORNAWALL WEST	Undesignated site	258919	327740	G; GM; GM1
409	CORRACHARRA	Undesignated site	271500	309200	PB4; P; PB; WN ; WN6 ; W

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389	CORRAGARRY LAKE	Undesignated site	262600	322300	F; FL; WN ; WN6 ; WS ; WS1; FL2
53	CORRAVOO LOUGH	Undesignated site	265356	318132	B ; BL ; BL3; F; FL; FS; FS1; FW; FW4; G; GA; GA1; GS ; GS4; W; WL; WL1; FL2
315	CORRINSHIGO LOUGH (1KM SQUARE H82)	Undesignated site	280800	320300	F; FL; FL4; G; GS ; GS4; W; WN ; WN6 ; FS; FS1; FL8; FW; FW4; ED2; E; ED; WL; WL1; FW2
54	CORVAGHAN	Undesignated site	245700	324100	B ; BL ; BL3; F; FW; FW4; G; GS ; GS4; PB4; P; PB; WL; WL1; WN ; WN6 ; WS ; WS1; W
293	CORVALLY	Undesignated site	271234	328525	G; GS ; GS4; WN ; WN6 ; W; P; PB4
433	CRAPPAGH	Undesignated site	258500	321300	W; WN ; WN7
162	CRAWFORD'S LOUGH	Undesignated site	255200	333000	F; FL; G; GM; GM1
55	CREEVAGHY LOUGH	pNHA; cNHA	252697	327618	GS ; GS4; GA; GA1; G; WN6 ; WN ; W; B ; BL ; BL3; F; FW; FW4; WS ; FL
416	CREEVE LOUGH	Undesignated site	272655	316000	F; FL; FL2
213	CREEVELEA	Undesignated site	254700	327000	G; GS ; GS4
88	CREEVY LOUGH	ASI; pNHA	283000	307000	F; FL; FS; FL4
499	Creighans	Undesignated site	271188	338192	
455	CREMARTIN CUTOVER	Undesignated site	277900	324300	W; WN ; WN6 ; G; GS ; GS4; WS ; WS1; GS3 ; WL; WL2; WL1; F; FW; FW2 ; FW4
41	CRINKILL LOUGH	Undesignated site	276700	319500	B ; BL ; BL3; E; ER; ER1; F; FL; FS; FS1; FW; FW4; G; GM; GM1; GS ; GS4; H; HH; HH1; P; PB; PB4; PF; PF2; PF3; W; WL; WL1; WN ; WN2 ; WS ; WS1; FL7; FL5
145	CROVER	Undesignated site	257800	322500	F; FS; FS1; P; PF; PF3
270	CROVER (MONAGHAN BY)	Undesignated site	265560	334366	G; GS ; GS4
31	CRUMLIN LOUGH	Undesignated site	264195	330060	E; ED; ED2; F; FL; P; PF; PF3; W; WL; WL1; WN ; WN6 ; FL2
313	CUMRY LOUGH	Undesignated site	269500	318242	F; FL; FS; FS1; WN ; WN6 ; W; FL2
474	Darraghlan Mill Pond	Undesignated site	267508	327108	
514	Dernaqola	Undesignated site	263530	349173	
81	DERNAHAMSHA LOUGH	Undesignated site	257500	334800	F; FL; FS; FS1; G; GM; GM1; FL3
243	DERRYGASSAN UPPER	Undesignated site	268464	343921	G; GS ; GS4
429	DERRYLAVAN	Undesignated site	282000	301500	W; WN ; WN6 ; WN2 ; F; FL; FL4
218	DERRYLEVICK	Undesignated site	264300	351400	P; PF; PF3; FS; FS1; WN6 ; WN ; W; WS ; WS1; G; GS4; GS
492	Derrynagrew	Undesignated site	267827	336041	
414	DERRYNALOOBINAGH - DERRYVALLY (1KM SQUARE H72)	Undesignated site	270500	320000	
431	DERRYNANAMPH	Undesignated site	258600	339400	W; WN ; WN7; PB4; P; PB
323	DERRYNASELL EAST (1KM SQUARE H64)	Undesignated site	260000	340000	G; GS ; GS4; W; WN ; WN7; HH; HH3; H; WN6 ; FW; FW1 ; FW4; FP; FP2 ; WN2 ; WS ; WS1
369	DERRYVALLEY LAKE	Undesignated site	269779	320301	F; FL; FL2
354	DERRYVALLEY RIVER AND DROMORE SYSTEM	Undesignated site	262000	317000	F; FW
320	DERRYVALLY (1KM SQUARE H72)	Undesignated site	270000	320000	FS; FS1; F; FL; G; GS ; GS4; GM; GM1; FW; FW2 ; FW4; FL2; FL4
434	DERRYVEEN WOOD	Undesignated site	268900	340600	W; WN ; WN7; P; PB; PB4

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106	DESCART LOUGH	cNHA	282200	297420	F; FL; FS; G; GA; GA1; GS; GS4; W; WS; WS1; FL2
318	DOONAGH (1KM SQUARE H74)	Undesignated site	270000	340000	F; FW; FW4; W; WN; WN7; WN6
288	DOOSKY	Undesignated site	277178	331025	F; FL; FS; FS1
56	DROMORE LAKES NHA	cNHA; pNHA	260900	316660	B; BL; BL3; F; FL; FS; FS1; FW; FW2; G; GA; GA1; W; WD; WD1; WD4; WN; WN6; FL2; FL5; FL7
36	DRUM LOUGH	Undesignated site	256130	318133	B; BL; BL3; F; FL; FS; FS1; G; GA; GA1; W; WL; WL1; WN; WN6; FL7; FL5
282	DRUMACLAN LOUGH	Undesignated site	264314	330808	F; FL; PF; P; PF3; FL2; WS; WS1; W
217	DRUMADDARAINY	Undesignated site	254800	329500	G; GS; GS4
89	DRUMAKILL LOUGH (LOUGH CLARE)	ASI; pNHA; cNHA	286500	320200	F; FL; PF; P; G; GM; FS; GM1; GS; GS4; W; WS; WS1; PF3; FS1
225	DRUMARRELL	Undesignated site	269558	347106	P; PF; PF3; WN; WN6; FS; FW4; FW; F
373	DRUMATE LOUGH	Undesignated site	259800	323700	F; FL; FL2
133	DRUMAVEALE	Undesignated site	247700	319300	P; PB; W; WN; WS
57	DRUMAVEALE LOUGH	Undesignated site	247300	319600	GS; GS4; G; F; GA; GA1; W; WL; WL1; FL; FL4; FS; FS1; WN; WN6; FW; FW4
275	DRUMBARNET	Undesignated site	264037	336422	G; GS; GS4; F; FL; FL3
256	DRUMBENAGH LOUGH	Undesignated site	265800	336400	F; FL; FS; FS1; FL2
408	DRUMBERAGH	Undesignated site	280200	309800	P; PB; PB4; G; GM; GM1
246	DRUMCAW LOUGH	Undesignated site	268000	339000	F; FL; FS; FS1; FL3
34	DRUMCOR LOUGH	pNHA; cNHA	248140	317506	B; BL; BL3; E; ED; ED5; F; FL; FS; FS1; G; GA; GA1; GM; GM1; GS; GS4; W; WL; WL1; WS; WS1; FL2
378	DRUMCREW LOUGH	Undesignated site	283200	318600	F; FL
148	DRUMEE	Undesignated site	254508	322600	P; PF; PF3
254	DRUMFURRER - SLIEVE BEAGH SPA	SPA	258189	346471	P; PB; G; GS; GS4
4	DRUMGALLAN BOG	cNHA	281079	328323	P; PB; PB4; W; WS; WS1; F; FS; FS1; G; GS; GS4; B; BL; BL3; ED5; E; ED; H; HD; HD1; WL; WL1; WN; WN6; HH; HH3; PF3; PF
58	DRUMGANNY LOUGH	Undesignated site	288700	308500	PF; PF3; P; G; GA; GA1; F; FS; FS1; E; ED; ED2; ED3; FL; FL4; GS; GS4; PB4; PB; WL; WL1; W; WN; WN6
192	DRUMGARLY	Undesignated site	259940	324936	G; GS; GS4
491	Drumgoask	Undesignated site	266460	335455	
59	DRUMGOAST LOUGH	Undesignated site	257672	333752	F; FL; FS; FS1; FW; FW4; G; GM; GM1; GS; GS4; W; WL; WN; WN6; FL4
90	DRUMGOLE LOUGH	ASI; pNHA	259100	319719	F; FL; FS; FS1; E; ED; ER; FW; FW4; G; GM; GM1; GS; GS4; W; WL; WL1; WS; WS1; FL7; FL5
495	Drumgoole	Undesignated site	270482	337138	
390	DRUMGRISTIN LOUGH	Undesignated site	275800	323300	F; FL; FS; FS1; FL2
60	DRUMHARRIF LOUGH	Undesignated site	285300	310700	ED2; E; ED; F; FL; FL4; FS; FS1; G; GA; GA1; GS; GS4; W; WD; WD2
424	DRUMHAY LAKE	Undesignated site	258000	318700	F; FL; FL2
302	DRUMILLARD LOUGH - LOUGH SMILEY	pNHA; cNHA	281700	321400	F; FL; W; WN; WN6; FS; FS1; FL2

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303	DRUMLANE	Undesignated site	278200	316000	F; FL; FL2
123	DRUMLONY	Undesignated site	261200	327900	G; GS ; GS4
363	DRUMLONA LOUGH - DROMORE LAKES NHA	pNHA; cNHA	263500	317600	F; FL; FL5
174	DRUMLOO LOUGH	Undesignated site	257900	336200	F; FL; FL2
285	DRUMMUCK LOUGH	Undesignated site	265445	328628	F; FL; PF; P; PF3; FS; FS1; FL2
196	DRUMMULLAN	Undesignated site	256700	325870	G; GM; GM1
206	DRUMMULLY	Undesignated site	256600	329500	G; GS ; GS4
91	DRUMREASKE LOUGH	ASI; pNHA; cNHA	264300	335000	F; FL; GM; GM1; G; W; B ; BL ; BL3; FS; FS1; FW; GS ; GS4; WD ; WD2 ; WN ; FL2
151	DRUMREENAGH	Undesignated site	253900	322960	G; GM; GM1
210	DRUMROO LOUGH	Undesignated site	256284	331400	F; FL; FS; FS1
372	DRUMSAUL LOUGH	Undesignated site	263800	320600	F; FL; FL7; FL5
138	DRUMSLOE LOUGH	Undesignated site	245360	321736	F; FL
121	DRUMSNAT LOUGH	Undesignated site	261100	330800	F; FL; FS; FS1; FL2
150	DRUMSWORDS	Undesignated site	252900	321300	P; PF; PF3; G; GM; GM1
332	DUMMYS LOUGH - KILROOSKY LOUGH CLUSTER SAC	SAC	248800	327500	F; FL; FS; FS1; W; WN ; WS ; PF; PF1; P; FL3
316	DUNAREE (1KM SQUARE H81)	Undesignated site	280000	310000	G; GS ; GS4; F; FL; FL5; FW; FW4; W; WL; WL2
29	DUNAREE FEN	cNHA	279388	310382	B ; BL ; BL3; F; FW; FW4; G; GA; GA1; GS4; GS ; P; PF; PF3; W; WL; WL1; WS ; WS1
525	Dunaree FLUSH	Undesignated site	280092	310695	PF; PF2; P
508	Dungillick North	Undesignated site	266359	344596	
506	Dungillick South	Undesignated site	266320	344299	
131	DUNGONNON	Undesignated site	248900	319100	G; GM; GM1
484	Dunsinare	Undesignated site	266977	332548	
132	DUNSRIM LOUGH	Undesignated site	249700	318900	F; FL; P; PF; PF3; FL2
195	EDENAGOASH	Undesignated site	257960	326380	G; GM; GM1
329	EDERMORE WOODS	Undesignated site	266000	343000	F; FW; W; FW1 ; WN ; WN2 ; WD1
79	EMY LOUGH	pNHA; cNHA	269000	344000	F; FL; G; GA; GA1; W; WN ; WN6 ; E; ER; ER2; FL4; FS; FS1; FW; GS ; GS4; WL; FL7
3	ESHBRACK BOG		255000	343000	P; PB; PB4; PF; PF2; H; HH; HH3; F; FS; FS1; B ; BL ; BL3; FL; FL1; FW; FW4; FW1 ; G; GS ; GS4; PF3; W; WL; WL1; WS ; WS1; ED4; E; ED; FL7; GS3 ; PB2; BL1; ED1 ; ED3; FL2; FL8; GA; GA1; GM; GM1; HH1; WD ; WD4; WN ; WN5; FL4
107	ESHVERAGH QUARRY cNHA - SLIEVE BEAGH SPA	NHA ; ASI; cSPA	258900	345600	E; ED; ED3; ED5; ER; F; FL; FL8; FW; G; GS ; GS4; H; HD; HD1; HH; HH1; W; WS ; WS1; WD ; WD4; P; PB; PB4
435	FAIRFIELD DEMESNE - DROMORE LAKES NHA	SPA	261900	317200	W; WN ; WN6 ; F; FL; WN2
62	FALTAGH	pNHA; cNHA	263600	323100	
144	FEAGH LOUGH	Undesignated site	259000	322700	ED2; E; ED; F; FL; FL1; FW; FW4; G; GA; GA1; W; WL; WL1; WN ; WN6
249	FEEBANE	Undesignated site	270542	333514	F; FL; FL7; FL5
		Undesignated site			G; GS ; GS4

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193	GARRAN EAST	Undesignated site	259860	325900	P; PB
194	GARRAN WEST	Undesignated site	259350	325970	F; FS; FS1; P; PF; PF3
366	GAS LOUGH - MUCKNO LAKE SYSTEM	pNHA; cNHA	282900	320300	F; FL; FL5
410	GHOST LOUGH	Undesignated site	275600	323850	F; FL; FS; FS1; GS ; GS4; P; PB; PB4; FL2
92	GIBSON'S LOUGH	ASI; pNHA; cNHA	267800	312600	PF; P; F; FL; GM; GM1; FS; FS1; FW; FW4; G; GS ; GS4; W; WL; WS ; WS1; PF3; WN ; WN6 ; FL2
124	GLASDRUMMOND	Undesignated site	260700	326700	G; GS ; GS4
338	GLASLOUGH CONSTRUCTED WETLANDS	Undesignated site	272074	342102	F; FL; FL8
82	GLASLOUGH LAKE	Undesignated site	272400	341500	F; FL; W; FS; FS1; WN ; B ; BL ; BL1; BL3; E; ED; ED3; FW; G; GA; GA1; GM; GM1; GS ; GS3 ; GS4; H; HD; HD1; P; PB; PB4; WD ; WD1 ; WD4; WL; WS ; FL7; FL2
513	Glebe	ASI; pNHA; cNHA	265798	348947	
231	GOLAN	Undesignated site	260805	344235	P; PB; G; GS ; GS4
136	GOLANDUFF LAKE - LISABUCK LOUGH	pNHA; cNHA	250550	323200	F; FL; FS; FS1; W; WN ; WS ; WN6
187	GOLANMURPHY	Undesignated site	260400	328300	PF; P; PF3
171	GORTMORE NORTH	Undesignated site	260000	322223	P; PF; PF3
110	GORTNAWINNY LOUGH	Undesignated site	251300	328500	F; FL; FS; FS1; G; GM; GM1; FL3
24	GRAFFAGH AND CORINSHIGO FEN	Undesignated site	259015	333070	W; WN ; WN6 ; B ; BL ; BL3; F; FL; FS; FS1; GA; GA1; G; GM; GM1; GS ; GS4; WD ; WD4; WL; WL1; WS ; WS1; WN7; FL3
214	GRANSHA MORE	Undesignated site	255200	328005	G; GS ; GS4
257	GREAGH - SLIEVE BEAGH SPA	SPA	260700	342000	G; GS ; GS4
127	GREAGH LOUGH - BLACKRAW AND GREAGH	Undesignated site	264258	326922	P; PF; PF3; F; FL; FL5; FS; FS1; WN6 ; WN ; W
383	GREAGHAWILLIN LAKE	Undesignated site	277000	304500	F; FL; FS; FS1; W; WN ; WN6 ; FL2
23	GREAGHGLAS FEN	cNHA	270142	330768	
465	GREAGHLONE LOUGH	Undesignated site	275699	302779	F; FW; FW4; G; GA; GA1; GM; GM1; GS ; GS4; WL; W; WL1; WN ; WN6
319	GREARGLASS (1KM SQUARE H73)	Undesignated site	270000	330000	F; FL; FL7; FL2
278	GREENMOUNT	Undesignated site	274507	332898	G; GM; GM1; GS ; GS4; W; WN ; WN6 ; F; FL; FL8; FW; FW4; WL; WL2
457	GRIG WOOD	Undesignated site	280000	321500	W; WN ; WN6 ; WN7; PF2; PF; P; FW4; FW; F; G; GS ; GS4; WL; WL1; WL2; WS ; WS1; FS; FS1; PB4; PB
266	GRIGGY LOUGH	Undesignated site	267900	337100	F; FL; W; WN ; WN6 ; WS ; G; GM; GM1; FS; FS1
294	GROVE LOUGH	Undesignated site	267180	342800	F; FL; FL7; WN ; WN6 ; W; PF; FL5; GM; GM1; G
469	HALF MOON (BALLYLOUGHAN)	Undesignated site	284100	301340	F; FL; FL6
500	Hillhall Lough	Undesignated site	270732	338935	
134	HILTON LOUGH	Undesignated site	249100	320500	F; FL; FS; FS1; FL7; FL2
175	HOLLYWOOD LAKE	Undesignated site	260700	335600	F; FL; FL7; W; WN ; WN7; FL2
440	INNER LOUGH - DROMORE LAKES NHA	Undesignated site; pN	261500	317400	F; FL; FL5
451	INNISKEEN - RIVER FANE	cNHA	293500	306700	F; FW
172	KIBBERIDOG	Undesignated site	259600	334300	G; GS ; GS4

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183	KIBBERIDOG LAKE	Undesignated site	260464	334058	F; FL; FS; FS1; G; GM; GM1; FL5
99	KILCORRAN LOUGH	pNHA; cNHA	256100	333500	F; FL; FS; FS1; FW; FW2 ; G; GA; GA1; GM; GM1; GS ; GS4; W; WL; WL1; WN ; WN6 ; WS ; WS1; FL7; FL2
186	KILLINA SCHOOL	Undesignated site	260200	329300	P; PF; PF3; F; FL; FL2
80	KILLY LOUGH	Undesignated site	263000	342000	F; FL; GM; GM1; G; B ; BL ; BL3; GA; GA1; FS; FS1; W; WS ; WS1; FL2
511	Killylough	Undesignated site	264524	347207	F; FL; P; PF; PF3; FL2
221	KILLYBERN LAKE	Undesignated site	260000	346900	F; FL; FL4; FS; FS1; FW; FW4; G; GA; GA1; GS ; GS4; W; WL; WL1; WN ; WN6
63	KILLYBOLEY LOUGH	Undesignated site	272423	339515	F; FL; FS; FS1; GA; GA1; G; GS ; GS4; P; PF; PF3; W; WL; WL1; WN ; WN6 ; FW; FW4
42	KILLYCOOLY LOUGH	Undesignated site	269765	345042	GS ; GS4; G
115	KILLYCOONAGH	Undesignated site	253600	326000	F; FL; FL2
304	KILLYCRACKEN LOUGH	Undesignated site	282100	323000	F; FL; FL7; FL2
139	KILLYFARGY LOUGH	Undesignated site	249600	320400	F; FL; FL2
305	KILLYGOLA LOUGH - LOUGH SMILEY	pNHA; cNHA	282500	321600	G; GS ; GS4
273	KILLYGRALLAN	Undesignated site	261800	335080	W; WS ; WS1; F; FW; FW4; G; GS ; GS4; H; HD; HD1; WL; WL1
17	KILLYHOMAN MARSH	pNHA; cNHA	263149	352300	F; FL; PF3; P; PF; FL2
248	KILLYLEEN LAKE	Undesignated site	262488	334353	W; WS ; WS1; G; GA; GA1; WL; WL1; H; HH; HH3; B ; BL ; BL3; ED2; E; ED; FW; FW4; F; GM; GM1; GS ; GS4; P; PF; PF2; PF3; WN ; WN6 ; PB; PB4
5	KILLYNEILL FEN	cNHA	273000	335400	
515	Killyoughavoy North	Undesignated site	264438	348928	
516	Killyoughavoy South	Undesignated site	264684	348780	F; FL; FL2
371	KILLYVAGHAN LAKE - DROMORE LAKES NHA	pNHA; cNHA	264200	316300	PF; PF1; P; F; FS; FS1; G; GM; GM1; FL3 ; FW; FW4; GS ; GS4; W; WN ; WN6 ; FL
12	KILLYVILLY LOUGH	cNHA; pNHA	255100	333400	F; FL; FL6
344	KILMACTRASHA A	Undesignated site	283369	302620	F; FL; FL6
470	KILMACTRASHA B	Undesignated site	283330	302569	F; FL; FL6
182	KILMORE EAST	Undesignated site	261547	335400	G; GS ; GS4
264	KILMORE LAKE	Undesignated site	255466	337365	F; FL; PF3; P; PF; W; WN ; WS ; WN7; PB4; FL3
25	KILNACLAY FEN	cNHA	263208	330354	B ; BL ; BL3; F; FL; FW; FW4; G; GM; GM1; P; PB; PB4; PF; PF3; W; WL; WL1; WN ; WN6 ; WS ; WS1; FL2
208	KILNAMADDY NORTH AND EAST	Undesignated site	256600	328000	P; PF; PF3
209	KILNAMADDY SOUTH	Undesignated site	256050	327700	P; PB
333	KILROOSKY LOUGH - KILROOSKY LOUGH CLUSTER SAC	SAC	249500	327400	F; FL; FS; FS1; W; WS ; WN ; GM; GM1; G; G; PF; PF1; P; FL3
1	KILROOSKY LOUGH CLUSTER SAC	SAC	249000	327500	F; FL; FL3 ; PF; PF1; P; FS; FS1; GM; GM1; G; B ; BL ; BL3; FW; FW1 ; FW4; GA; GA1; GS ; GS4; W; WD ; WD4; WL; WL1; WN ; WN6 ; WS ; WS1; WD2
481	Kiltubbrid	Undesignated site	264498	329059	

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234	KILVEY LOUGH - GLASLOUGH LAKE	pNHA	273200	341300	F; FL; W; WN ; WS
459	KINNAGIN SWAMP	Undesignated site	281600	318700	W; WN ; WN6 ; F; FS; FS1; G; GS ; GS4; FW; FW2 ; WL; WL1; FW4;
352	KNAPPAGH RIVER	Undesignated site			BL3; B ; BL
287	KNOCKATURLY LOUGH	Undesignated site	266821	328833	F; FL; P; PF; PF3; FL2; FS; FS1; GS4; GS ; G; WS ; WS1; W
317	KNOCKNACRAN (1KM SQUARE H80)	Undesignated site	280000	300000	G; GS ; GS4; FW; FW4; F; FW1
168	KNOCKNAGRAT	Undesignated site	256700	333400	G; GS ; GS4
306	LACKAGH LOUGH - LACKAGH SWAMP	Undesignated site	279200	322700	F; FL; FL5; FS; FS1; ED2; E; ED; G; GS ; GS4; GM; GM1; W; WL; WL2; FW; FW4
456	LACKAGH SWAMP		279400	322500	GS ; GS4; G; W; WS ; WS1; WN ; WN6 ; GS1; GA; GA1; PF2; PF; P; WL; WL1; WL2; FW; FW2 ; FW4; E; ED; ED2; ED5; BL ; BL1; BL3; B
393	LAKE AT CORVALLY WEST	Undesignated site	275300	305900	F; FL; FS; P; PF; PF3; W; WS ; WS1; FL2
394	LAKE AT KEENOGANE - DROMORE LAKES NHA	pNHA; cNHA	269300	319100	
395	LAKE AT TANDRAGEE	Undesignated site	268500	312000	F; FL; FS; FS1; FL2
311	LAKE SW OF MULLANARY LOUGH - DROMORE LAKES NHA	pNHA; cNHA	267000	317300	F; FL; FS; FS1; W; WN ; WN6 ; WS ; WS1; FL2
140	LAKEVIEW LOUGH	Undesignated site	244610	321128	F; FL; FL2
267	LAMBS LOUGH	Undesignated site	267200	335900	F; FL; FL7; FL4; FS; FS1; WN ; WN6 ; W
412	LARAGH LOUGH - LACKAGH SWAMP	Undesignated site	279000	322000	F; FL; FL5; FS; FS1; WN ; WN6 ; GS ; GS4; PF; PF2; P; FW; FW4; FW2 ; WS ; WS1; WL; WL1; WL2; ED5; E; ED
143	LATROE	Undesignated site	254820	324560	G; GS ; GS4
158	LAUREL HILL LOUGH	Undesignated site	245300	317950	F; FL; FS; FS1; G; GM; GM1; FL2
157	LAUREL LOUGH	Undesignated site	246300	318000	F; FL; FS; FS1; W; WN ; WS ; FL2
279	LEITRIM	Undesignated site	272900	336810	G; GS
33	LISABUCK LOUGH	pNHA; cNHA	250206	323036	B ; BL ; BL3; F; FL; FS; FS1; GA; GA1; GM; GM1; G; W; WL; WL1; WN ; WN6 ; FW; FW4; GS ; GS4; WD ; WD4
374	LISANISK LAKE	Undesignated site	284923	303362	F; FL; FL2
11	LISARILLY BOG	cNHA; pNHA	258146	326900	F; FS; FS1; G; GA; GS ; GS4; PF; PF2; P; WL; WL1; WS ; WS1; W
324	LISCAT (1KM SQUARE H63)	Undesignated site	260000	330000	G; GS ; GS4; W; WN ; WN6 ; GM; GM1; F; FW; FW3; FW4; WD1 ; WD ; WL; WL2
339	LISINISKY MARSH	cNHA	270600	309600	GM; GM1; G; P; PF; PF3; F; FS; FS1; FW; FW4; WS ; WS1; W; B ; BL ; BL3; ED2; ED4; ED5; E; ED; FL; GS ; GS4; WL; WL1
160	LISKEABRICK	Undesignated site	255880	334672	G; GS ; GS4
6	LISLANNAN BOG	cNHA; pNHA	254785	330363	P; PF; PF3; B ; BL ; BL3; F; FS; FS1; FW; FW4; G; GA; GM1; GM; GS4; GS ; WL; W; WL1; WS ; WS1; GA1; PB; PB4
216	LISLANNAN WEST - LISNANNAN BOG NHA	pNHA; cNHA	254300	330057	P; PF; PF3
263	LISMACRERK	Undesignated site	270320	329093	FS; FS1; W; WS ; WS1
396	LISMAGONWAY LOUGH	Undesignated site	264600	323400	F; FL; FS; FS1; FL2
415	LISNAKILLEWBANE LOUGH	Undesignated site	273069	311200	F; FL; FL7; FL2

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437	LISNAKILLEWDAFF LOUGH	Undesignated site	273500	310700	F; FL; FL7; FL2
19	LISNALEE FEN	cNHA	269090	328133	B ; BL ; BL3; F; FW; FW4; G; GA1; GA; GS ; GS4; H; HD1; HD; P; PB; PB4; PF; PF2; PF3; W; WL; WL1; WS ; WS1
370	LISNALONG LOUGH - DROMORE LAKES NHA	pNHA; cNHA	269000	318700	F; FL; FL2
380	LISNASHANNAGH LAKES	Undesignated site	287400	300920	F; FL; FL2
286	LISNASHANNAGH LOUGH	Undesignated site	266794	328290	F; FL; PF; P; PF3; FL2; FS; FS1; WN6 ; WN ; W; GS4; GS ; GM; GM1; G
200	LISTELLAN	Undesignated site	257400	327830	P; PF; PF3
292	LITTLE LOUGH - DRUM LOUGH	Undesignated site	256500	317800	F; FL; P; PF; PF3; PB; PB4
364	LOUGH AVAGHON	Undesignated site	268700	313200	F; FL; FL4
299	LOUGH ANTRAICER - ESHBRACK BOG	NHA ; cSPA	254600	341700	F; FL; FL7; FL2
64	LOUGH APHUCA	Undesignated site	283100	305900	B ; BL ; BL2; F; FL; FL4; GM; GM1; G; WL1; WL; W; WN ; WN6
300	LOUGH APORTAN - ESHBRACK BOG	NHA ; cSPA	254900	342400	F; FL; FL2
399	LOUGH AT DRUMSKELT - DROMORE LAKES NHA	pNHA; cNHA	268800	319600	F; FL; FL2
382	LOUGH BANE	Undesignated site	271300	309500	F; FL; FS; FS1; FL2
355	LOUGH BOUGHAGH	Undesignated site	281214	302431	F; FL; FL7; FL4
301	LOUGH BRADAN - ESHBRACK BOG	NHA ; cSPA	257200	343000	F; FL; FL2
307	LOUGH CLEGG	Undesignated site	267400	313700	F; FL; FL2
375	LOUGH DERRY	Undesignated site	284375	296610	F; FL; FL2
274	LOUGH DUFF	Undesignated site	261700	337200	F; FL; FL3 ; G; GM1; GM; FS; FS1; WN ; WN6 ; W
83	LOUGH EGISH		279000	313507	F; FL; G; GS ; GS4; B ; BL ; BL1; E; ED; ED3; ER; FS; FS1; FW; FW4; GM; GM1; GS1; GS3 ; H; HH; HH3; P; PB; PB1; W; WL; WL1; WN ; WN5; WS ; WS1; FL7; FL5
421	LOUGH FEA	ASI; pNHA; cNHA; cSF	282300	301500	F; FL; W; WN ; WN6 ; FL4
84	LOUGH FEA DEMESNE	Undesignated site	283700	302100	PF; P; G; GS ; GS1; GM; GM1; B ; BL ; BL1; E; ER; ER2; W; WD ; WD1 ; WD2 ; WS ; WS1
308	LOUGH GULLANE - ESHBRACK BOG	ASI; pNHA; cNHA	255200	343300	F; FL; FL2
367	LOUGH MAJOR	NHA ; cSPA	272500	320400	F; FL; FL5
297	LOUGH MEENISH - ESHBRACK BOG	Undesignated site	256900	341600	F; FL; FL4
466	LOUGH MINOR	NHA ; cSPA	272390	319703	F; FL; FL5
351	LOUGH MORNE	Undesignated site	276000	313600	F; FL; FL4
356	LOUGH NAGARNAMAN	Undesignated site	282000	310900	F; FL; FL7; FL2
85	LOUGH NAGLACK	Undesignated site	285600	302800	G; GM; GM1; GS ; GS1; F; FL; B ; BL ; BL3; FS; FS1; FW; FW4; GA; GA2; W; WL; WN ; WN6 ; WS ; FL5
309	LOUGH NAHEERY - ESHBRACK BOG	ASI; pNHA; cNHA	256400	344350	F; FL; FL2
76	LOUGH NAHINCH	NHA ; cSPA	278406	326571	B ; BL ; BL3; E; ED; ED2; ED3; F; FL; FS; FS1; FW; FW4; G; GA; GA1; GS ; GS4; H; HD; HD1; HH; HH1; P; PB; PB4; W; WL; WL1; WN ; WN6 ; WS ; WS1; PF2; PF; WD1 ; FL4; FL1; FL8
417	LOUGH NAMACHREE	Undesignated site	274500	309900	F; FL; FL7; FL4
312	LOUGH NR MOUNTAIN LODGE DEMESNE	Undesignated site	265900	314200	F; FL; FL2

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65	LOUGH OONEY	Undesignated site	255975	329825	F; FL; FS; FS1; W; WL; WN ; WN6 ; BL ; BL3; W; GS ; GS4; GA; GA1; G; FL5; WS ; WS1
100	LOUGH ROSS	pNHA; ASI; cNHA	287783	315733	GM; GM1; G; F; FL; FL4; FS; FS1; FW; FW4; GA; GA1; GS ; GS4; W; WL; PF; P; FL7
310	LOUGH SALLAGH - ESHBRACK BOG	NHA ; cSPA	253115	343700	F; FL; FL1
449	LOUGH SE OF MUCKNO LOUGH / ANNADRUMMAN - MUCKNO LAKE	Undesignated site	285785	316402	F; FL
10	LOUGH SMILEY		281609	321210	FS; FS1; F; G; GM; GM1; B ; BL ; BL3; E; ED; ED2; ED5; FL; FW; FW4; GA; GA1; GS ; GS2; GS4; H; HH; HH3; P; PB; PB4; PF; PF3; W; WL; WL1; WN ; WN6 ; WS ; WS1; FL2
397	LOUGHAPHORTAN	cNHA; pNHA; ASI	271500	308500	F; FL; FS; FS1; FL2
74	LOUGHBAWN HOUSE LOUGHS NHA	Undesignated site	271773	310779	B ; BL ; BL3; E; ED; ED3; F; FW; FW4; G; GS ; GS4; H; HD; HD1; BL1; FL; FL4; FS; FS1; FW1 ; W; WD ; WD2 ; WN ; WN6 ; WS ; WS1; BC; WL; FL7; FL5
220	LOUGHMORE LAKE	pNHA; cNHA; ASI	259609	348163	F; FL; E; ER; FL7; FL4
347	LOWLAND RIVER 500M STRETCH - RIVER FANE	Undesignated site	292000	307700	F; FL; E; ER; FL7; FL4
401	LYONS LOUGH	cNHA	255700	331500	F; FW; FW2 ; W; WN ; WN5
102	MAGHERARNY CROSSROADS - ULSTER CANAL	Undesignated site	257994	329686	F; FL; FS; FS1; W; WN ; WN6 ; WS ; WS1
203	MAGHERARNY LOUGH	ASI	257994	329686	GS ; G
402	MILL LOUGH	Undesignated site	258400	331000	F; FL; FS; FS1; FL4
93	MONALTY LOUGH	Undesignated site	275600	303700	F; FL; FS; FS1; FL2
345	MONALTYDUFF - MONALTY LOUGH	ASI; WS; pNHA; cNHA	286508	302915	F; FL; FS; FS1; W; WN ; WN6 ; B ; BL ; BL3; FW; G; GS ; WL; FL7; FL5
240	MONMURRAY LOUGH	pNHA; cNHA	286240	303020	F; FL; FL6
163	MONT LOUISE LAKE	Undesignated site	271400	344400	F; FL; FL3 ; P; PF; PF3; FS; FS1; W; WN ; WN6
39	MORGANS LOUGH	Undesignated site	258500	333700	F; FL; FS; FS1; W; WN ; WS ; WN6 ; WS1; FL3
66	MOUNT MATTHEWS	Undesignated site	250178	327887	G; GS ; GS4; P; PF; PF3; W; WS ; WS1; WN ; WN6
503	Mountain Water River at Drumnolan	Undesignated site	294371	308373	B ; BL ; BL3; G; GA; GA1; GS ; GS4; PF; PF3; P; WL; WL1; WN ; WN6 ; W; F; FS; FS1
505	Mountain Water River at Tamlat	Undesignated site	271632	342330	
350	MOYDUFF LOUGH	Undesignated site	265024	343206	
8	MOYLAN LOUGH	Undesignated site	269361	309384	F; FL; FL2
438	MOYLEMUCK LOUGH - DROMORE LAKES NHA	cNHA	285429	308863	
96	MUCKNO LAKE	Undesignated site; pN	264500	315600	F; FL; FL6; B ; BL ; BL1; GA; GS ; GS4; G; W; WL; WL1; FP; FP1; GA1
67	MUCKNO MILL LOUGH	ASI; pNHA; cNHA	284500	319500	F; FL; FL2
498	Mullabrack	Undesignated site	284200	322600	F; FL; FS; FS1; G; GM; GM1; GS ; GS4; W; WD ; WD1 ; WN ; WN2 ; WS ; WS1; FL5
487	Mullaghadun Lough	Undesignated site	268097	338525	B ; BL ; BL3; F; FL; FS; FS1; FW; FW1 ; FW4; G; GA; GA1; GS ; GS4; W; WL; WL1; WN ; WN6 ; WS ; WS1; FL7; FL5
		Undesignated site	266647	333985	

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224	MULLAGHDERMOT	Undesignated site	268214	346968	G; GS ; GS4
358	MULLAGHDUFF RIVER	Undesignated site			F; FW
229	MULLAGHINAGHTIGO LOUGHS (NORTH)	Undesignated site	263000	339400	F; FL; PF; P; PF3; E; ER; FL3
228	MULLAGHINAGHTIGO LOUGHS (SOUTH)	Undesignated site	263000	338800	F; FL; FS; FS1; W; WS ; WS1; FL3
16	MULLAGHMORE LAKE (SOUTH)	pNHA; cNHA	262400	338100	F; FL; FS; FS1; G; GA1; GA; GS ; GS4; GM; GM1; W; WL; WL1; WN ; WN6 ; FW; WS ; WS1; FL3
242	MULLAGHMORE LOUGH (NORTH)	Undesignated site	261800	338500	F; FL; PF; P; PF3; FS; FS1; W; WN ; WN6 ; WS ; WS1; FL2
14	MULLAGLASSAN LOUGH	pNHA; cNHA	257300	332700	F; FL; FS; FS1; FW; FW4; G; GM; GM1; GS ; GS4; P; PF; PF3; W; WL; WL1; WN ; WN6 ; FL3
517	Mullanacask	Undesignated site	263893	349679	
327	MULLANACLOY - RIVER FINN	Undesignated site	253700	328700	F; FW; W; WL; WL2; G; GS
117	MULLANACROSS	Undesignated site	260800	331500	GS ; GS4; G
237	MULLANLARY LOUGH - DROMORE LAKES NHA	pNHA; cNHA	267500	317800	F; FL; PF; P; PF3; FL7; FL5
165	MULLYERA	Undesignated site	260513	333287	F; FS; FS1; P; PF; PF3
241	MULLYJORDAN	Undesignated site	273480	342900	
477	Mullyknock	Undesignated site	268347	329481	
262	MULLYNAHINCH LOUGH	Undesignated site	264011	333812	F; FL
137	MUNNILLY LOUGH	Undesignated site	249300	323600	F; FL; FS; FS1; G; GM; GM1; FL3
7	NAFARTY FEN	cNHA; pNHA	283701	304473	F; FS; FS1; B ; BL ; BL3; E; ED; ED2; GM; GM1; G; GS ; GS4; P; PF; PF3; W; WD ; WD3 ; WN ; WN6
167	NART LOUGH	Undesignated site	255700	332700	G; GS ; GS4
331	OLD RAILWAY BRIDGE - RIVER BLACKWATER	Undesignated site	272900	342500	FW; F; W; WD
436	OLD WOOD - GLASLOUGH LAKE	pNHA	272500	341000	W; WN ; WN6
379	PETER'S LAKE	Undesignated site	267200	333900	F; FL; FL2
261	POINT LAKE	Undesignated site	262415	333616	F; FL; FL2
2	PRIESTFIELD LOUGH - ROSSMORE PARK	ASI; cNHA; CFP	265000	331000	F; FL; W; WS ; WS1; B ; BL ; BL3; GM; GM1; G; WD ; WD2 ; FL2
446	QUARRY LOUGH	Undesignated site	255300	317400	F; FL; FL2
94	QUITG LOUGH	ASI	263300	335300	F; FL; G; GS ; GS1; FS; FS1; FL7; FL2
142	RACAULFIELD	Undesignated site	251200	323000	P; PF; PF3
480	Rackwallace	Undesignated site	272133	329206	
147	RADEERPARK LOUGH	Undesignated site	253100	322300	F; FL; P; PF; PF3; G; GM; GM1; FL2
116	RADEERY	Undesignated site	258600	326000	GM; GM1; G
298	RAFERAGH	Undesignated site	276100	304700	F; FL; FL2
384	RAFERAGH EAST - RAFERAGH	Undesignated site	276500	304500	F; FL; PF
9	RAFINNY LOUGH	cNHA; pNHA	261861	326346	PF; PF2; P; G; GM; GM1; B ; BL ; BL3; F; FL; FL2; GA; GA1; GS ; GS4; PB; PB4; PF3; W; WL; WL1; WS ; WS1; FW; H; HH
68	RAHANS LOUGH		283330	297904	G; GA; GA1; GS ; GS4; W; WS ; WS1; ER; ER2; E; F; FL; FL4; FS; FS1; H; HH; HH2; BL3; BL ; B ; ED2; ED; FW; FW4; WL; WL1; WN ; WN6
482	Rakeeragh (Monaghan By)	Undesignated site	268493	331216	

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Site Code	Site Name	Site designations	Easting Centre	Northing Centre	in Fossitt Habitat Present
335	RAMAGES LOUGH - KILROOSKY LOUGH CLUSTER SAC	SAC	250000	327000	F; FL; FS; FS1; GS ; GS4; G
69	RATHKEEVAN LOUGH	Undesignated site	253811	330235	F; FL; FL4; FS; FS1; FW; FW4; G; GS ; GS4; W; WN ; WN6
426	RECTORY LOUGH - DERRYVALLY (1KM SQUARE H72)	Undesignated site	270700	320400	F; FL; FL4
376	REILLYS LOUGH	Undesignated site	285933	301092	F; FL; FL2
501	River at Knockronaghan	Undesignated site	266919	341188	
483	River at Rackwallace	Undesignated site	272524	331051	
494	River Blackwater at Corvally	Undesignated site	270108	337605	
490	River Blackwater at Raconnell	Undesignated site	265450	335941	
104	RIVER FANE/RIVER DEE	cNHA			F; FW
348	RIVER FINN	cSAC			F; FW; P; PF; PF3
105	RIVER FINN FLOODS				F; FW; B ; BL ; BL1; FW2 ; FW4; G; GM; GM1; GS ; GS4; W; WL; WL1; WL2
199	ROOSKY	Undesignated site	256700	327400	F; FS; FS1; G; GM; GM1
70	ROOSKY LOUGH	Undesignated site	257163	326786	F; FL; FL4; FS; FS2; FW; FW1 ; G; GA; GA1; GS ; GS4; W; WL; WL1; WL2; WN ; WN6 ; WS ; WS1
108	ROSE LOUGH	Undesignated site	251131	329767	F; FL; FS; FS1; G; GM; GM1
13	ROSEFIELD LAKE AND WOODLAND	Undesignated site	263184	333779	F; FS; FS1; B ; BL ; BL3 ; FL3 ; FW; FW4; GM; GM1; G; GS ; GS4; W; WL; WL1; WN ; WN6 ; FL; WS ; WS1
502	Rossarrell Wood	Undesignated site	269944	340199	
450	ROSSMORE PARK	CFP	266000	332000	F; FL; W; FL2
510	Rvier at Ballynahone	Undesignated site	270936	345296	
197	SHANCO	Undesignated site	255940	325600	P; PF; PF3
205	SHANKILL LOUGH	Undesignated site	255828	331000	F; FL; FS; FS1
159	SHANROE HALL	Undesignated site	256320	335090	FS; FS1; F; P; PF; PF3; W; WN ; WS ; WN6 ; WS1
71	SHANTONAGH LOUGH	Undesignated site	275694	310649	ER; ER1; E; F; FL; FL4; FS; FS1; FW; FW1 ; FW4; G; GA; GA1; GS ; GS4; WL; WL1; W; WN ; WN6
464	SHARRICK RESERVOIR	Undesignated site	251961	320902	F; FL; FL7
227	SHEE LOUGH	Undesignated site	262105	339956	F; FL; FS; FS1; E; ER; W; WS ; WS1; WN ; WN6 ; FL2
497	Sheetrim (ed Bellanode) Lough	Undesignated site	265776	338679	
18	SHEETRIM FEN	cNHA	267900	331500	E; ED; ED2; F; FL; FL5; FS; FS1; FW; FW4; W; WN ; WN6 ; WN7
280	SHELVINS LOUGH	Undesignated site	271960	337460	F; FL; FS; FS1; FL2; GS ; GS4; G; WN ; WN6 ; W
72	SILLIS LOUGH	Undesignated site	273237	339807	F; FL; FL4; FS; FS1; FS2; FW; FW4; G; GA; GA1; GS ; GS4; W; WL; WL1; WN ; WN6
239	SILLIS TOWNLAND	Undesignated site	273550	338819	P; PB; PB4
467	SLIEVE BEAGH SPA	SPA	256400	342600	P; PB; PB2; W; WD ; WD4; G; GS ; GS4; PB4; F; FL; FL8
404	SMALL LOUGH SOUTH OF CORCAGHAN LOUGH - CORCAGHAN LOUGH	Undesignated site	265200	327000	F; FL; FL2
101	SPRING AND CORCRIN LOUGHS	pNHA; AST; cNHA	286274	304300	F; FL; G; GM; GM1; GS ; GS4; FS; FS1; B ; BL ; BL3; E; ED; ED3; FW; GA; GA1; W; WL; WS ; FL7; FL2

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Site Code	Site Name	Site designations	Easting Centre	Northing Centre	Present in Fossitt Habitat
336	SUMMERHILL LOUGH - KILROOSKY LOUGH CLUSTER	SAC	249100	327900	F; FL; GM; GM1; G; W; WN ; WS ; PF; PF1; P; FL3
75	TASSAN LOUGH	pNHA; cNHA; ASI	279406	326177	B ; BL ; BL1; E; ED; ED2; F; FL; FS; FS1; FW; FW4; G; GS ; GS3 ; GS4; H; HD; HH; HH1; HD1; P; PB; PB4; PF; PF3; W; WL; WL1; WS ; WS1; BL3; ED3; ER; ER1; FL2
447	TATTINCAKE LOUGH	Undesignated site	255100	317900	F; FL; FL2
180	TATTINDONAGH EAST	Undesignated site	261200	332905	G; GS ; GS4
259	TATTINDONAGH LOUGH	Undesignated site	262117	333400	F; FL; FL2
181	TATTINDONAGH NORTH	Undesignated site	261500	333700	G; GS ; GS4; F; FL; FL2
179	TATTINDONAGH WEST	Undesignated site	260800	332904	G; GS ; GS4
189	TATTYNAGALL	Undesignated site	259500	327300	G; GM; GM1
478	Tenderages Lough	Undesignated site	268313	330071	
111	THE CURRAGH	Undesignated site	253118	327751	P; PF; PF3
103	THREE MILE HOUSE QUARRY	ASI	262600	329730	E; ED4; ER; ER1; F; FL; FL8; FW; FW1 ; G
20	TIRAGARVAN FEN	cNHA	281889	304850	F; FS; FS1; FW; FW4; G; GM; GM1; GS ; GS4; W; WL; WL1; WS ; WS1
277	TIRAVRAY	Undesignated site	273489	333787	G; GS ; GS4
185	TIRNAHINCH LOUGH	Undesignated site	250200	328500	F; FL; FS; FS1; P; PB; W; WN ; WS ; PB4; WN6 ; FL3
178	TIRNAMONA	Undesignated site	260876	333800	G; GS ; GS4
233	TIRNASKEA NORTH	Undesignated site	265184	339031	PF; P; PF3
170	TIRNASKEA SOUTH	Undesignated site	259900	333400	G; GM; GM1
405	TOGAN RESERVOIR	Undesignated site	263700	328600	F; FL; FS; FS1; W; WN ; WN6 ; WS ; WS1; FL7; FL2
255	TONYCLEA - SLIEVE BEAGH SPA	SPA	260791	342478	W; G; GS ; GS4; WD3
343	TONYELLIDA (DONAGHMORE)	Undesignated site	284600	307969	F; FL; FL6
368	TONYSCALLON LOUGH	Undesignated site	276300	320700	F; FL; FL2
21	TOSSY CROSS FEN	cNHA	276900	315400	B ; BL ; BL3; E; ED; ED3; G; GS ; GS4; P; PB; PB4; W; WL; WL1; WS ; WS1
176	TULLAGHAN	Undesignated site	261600	334700	G; GS ; GS4
177	TULLAGHAN LAKE	Undesignated site	261137	334260	F; FL; FL2
496	Tullavogy	Undesignated site	265145	337965	
202	TULLEEVIN LOUGH	Undesignated site	258430	329000	F; FL; FS; FS1; P; PF; PF3; FL2
276	TULLY LOUGH	Undesignated site	264437	337329	F; FL; G; GM; GM1; FL2; FS; FS1; WN6 ; WN ; W
247	TULLY LOUGH (NEAR EMYVALE)	Undesignated site	267850	342400	F; FL; FS; FS1; P; PF; PF3; FL2; WN6 ; WN ; W
141	TULLYARD	Undesignated site	255500	321200	G; GS ; GS4
461	TULLYNAHINERA	Undesignated site	277600	315800	PB4; P; PB; G; GS ; GS4
458	TULLYSKERRY FIELDS		281400	319200	G; GS ; GS4; GS2; FW; FW2 ; W; WL; WL1; ED2; E; ED
251	TWIN LAKES - ROSSMORE PARK	CFP	265935	332136	F; FL; W; WN ; WS ; FL2
468	ULSTER CANAL	Undesignated site			F; FW; FW3
346	UPLAND RIVER 500M STRETCH - RIVER FANE	cNHA	278000	325300	F; FW; FP; FP2 ; FW1 ; P; PB; PB4; PF; PF3
475	Urbalkirk Cutover	Undesignated site	268540	328187	
328	WATT'S BRIDGE - RIVER FINN TRIBUTARY	Undesignated site	256800	334000	F; FW; W; WL; WL2

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337	WEST OF NEW MILLS BRIDGE - RIVER BLACKWATER		271600	338900	
381	WHITE LAKE - BAIRD'S SHORE - DROMORE LAKES NHA	Undesignated site			FW; F; W; WL; WL2
406	WHITE LOUGH	pNHA; cNHA	267500	319000	F; FL; FL7; FL5
290	WHITE LOUGH (GLASDRUMMIN EAST)	Undesignated site	267700	321100	F; FL; FS; FS1; W; WN ; WS ; WS1; WN6 ; FL2
		Undesignated site	277885	327265	F; FL

The County Monaghan Wetlands Map (MWM) 2010 CD ROM Contents

by Peter Foss & Patrick Crushell

Contents:

1. The County Monaghan Wetlands Map – Desk Survey & GIS Preparation. Main report 2010 by P.J. Foss & P. Crushell (In PDF format, requires Adobe Acrobat to view) Size: 32 mb; 159 pages

2. MWM Wetland Site Database Version 1.0 & Bibliography database (Filemaker Pro 8.0 or later format). Wetland sites records from the MWM 2010 project for which site information exists recorded by third party sources. Size: 3.2 mb

3. Selected Excel tables to accompany the County Monaghan Wetlands Map report including appendices; Size: 733 kb

1. Summary list of Wetlands in County Monaghan held in the MWM Site Database
2. Total data export on all site records from the list of wetland sites held in the MWM Site Database

4. GIS Shape files from the County Monaghan Wetlands Map 2010.

- a. ArcView GIS dataset with Heritage Council mapping convention (Requires ArcView 10 GIS Software)
- b. MapInfo GIS dataset with Monaghan County Council mapping convention (Requires MapInfo GIS Software)

5. CD box cover for The County Monaghan Wetlands Map 2010 (PDF format)