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Louth Wetland Identification Survey 2011

The project involved undertaking a field survey of 108 putative freshwater wetlands in County Louth, to identify the specific wetland and ecological interest (if any), and to report on threats and damaging activities. These sites had previously been identified in the Potential Wetland Map GIS dataset prepared in 2009, although detailed environmental information was lacking for most of the sites. The sites selected were believed to contain a range of freshwater wetlands. This report presents the results of the 2011 field survey and includes detailed site descriptions and habitat maps for the wetlands. This list of sites does not however represent a full inventory of freshwater wetlands in Louth and recommendations are made for the achievement of such a comprehensive inventory.

1 Acknowledgements

The County Louth Wetland Identification Survey (LWS) project 2011 was made possible through the financial support of Louth County Council and The Heritage Council. The project is an action of the County Louth Heritage Plan 2007-2011.

Many thanks to:
Brendan McSherry, Heritage Officer, County Louth for help and advice during the 2011 survey.

Helen Divilly, IT Project Leader of Louth County Council for help with mapping issues.

All landowners who facilitated access to their land during this survey, and provided much useful information on the wetlands both in their ownership and more general area.

2 Executive Summary

1. The aim of the Louth Wetland Identification Survey 2011 (LWS) was to undertake a field survey of 108 potential wetland sites identified as part of the previous Potential Wetland Map GIS dataset prepared in 2009 (Brophy 2009) for which little or no habitat or ecological information was available.

2. The 108 potential wetland sites selected for survey are listed in Appendix 1. The total area covered by the sites surveyed in 2011 was 966 ha (based on the extent of the original site polygons).

3. Wetland habitats on sites surveyed were classified and mapped according to the Guide to Habitats published by The Heritage Council (Fossitt 2000). Non-wetland habitats both within the wetland site boundary and those occurring outside were also recorded.

4. The Louth Wetland Identification study, 2011, focussed on determining whether the following 35 freshwater and brackish water wetland types (18 of which are listed in Annex 1 of the EU Habitats Directive, with a further nine listed as priority habitats) exist on the 108 target sites in county Louth.

Fossitt Level 3 Habitat Code and Name	**Fossitt Level 3 Habitat Code and Name**
FL1 Dystrophic lakes *	HH3 Wet heath *
FL2 Acid oligotrophic lakes *	PB1 Raised bogs * & **
FL3 Limestone/marl lakes *	PB2 Upland blanket bog **
FL4 Mesotrophic lakes	PB3 Lowland blanket bog * & **
FL5 Eutrophic lakes *	PB4 Cutover bog *
FL6 Turloughs **	PB5 Eroding blanket bog
FL7 Reservoirs	PF1 Rich fen and flush * & **
FL8 Other artificial lakes and ponds	PF2 Poor fen and flush
FW1 Eroding/upland rivers *	PF3 Transition mire and quaking bog *
FW2 Depositing/lowland rivers *	WN4 Wet pedunculate oak-ash woodland **
FW3 Canals	WN5 Riparian woodland
FW4 Drainage ditches	WN6 Wet willow-alder-ash woodland
FP1 Calcareous springs **	WN7 Bog woodland **
FP2 Non-Calcareous springs	WS1 Scrub *
FS1 Reed and large sedge swamps	CW1 Lagoons and saline lakes **
FS2 Tall herb swamps *	CW2 Tidal rivers *
GS4 Wet grassland *	CD5 Dune slacks *
GM1 Marsh *	

** May correspond with EU Habitats Directive listed Annex 1 habitat;*
*** May correspond with EU Habitats Directive Priority habitat.*

5. Threats and damage to the surveyed sites were recorded and an estimate of the severity of damage was made.

6. The information collected from the 2011 survey was used to populate the Louth Wetland Identification Survey 2011 (LWS) GIS dataset and the Louth Wetland Identification Survey database, in which individual site records were created for each of the sites surveyed.

7. Habitat maps were prepared for a total of 108 sites which were surveyed and found to contain wetland habitats (see Appendix 6).

8. The Louth Wetland Identification Survey 2011 (LWS) recorded the following freshwater wetland habitat types in the numbers and areas below on the 108 sites surveyed.

Fossitt Habitat Code & Name	Number of sites recorded in **LWS Database***	Area (ha) / Length (km) of each wetland habitat recorded in GIS dataset** **LWS GIS**
FL1 Dystrophic lakes	3	0.2
FL2 Acid oligotrophic lakes	-	-
FL3 Limestone/marl lakes	-	-
FL4 Mesotrophic lakes	10	12
FL5 Eutrophic lakes	5	4.4
FL6 Turloughs	-	-
FL7 Reservoirs	1	0.8
FL8 Other artificial lakes and ponds	2	1.3
FW1 Eroding/upland rivers	1	0.9 Km
FW2 Depositing/lowland rivers	6	8.9 Km
FW3 Canals	-	-
FW4 Drainage ditches	55	54.7 Km
FP1 Calcareous springs	2	-
FP2 Non-Calcareous springs	-	-
FS1 Reed and large sedge swamps	48	165.2
FS2 Tall herb swamps	-	-
GS4 Wet grassland	25	68.8
GM1 Marsh	14	31.9
HH3 Wet heath	4	5.1
PB1 Raised bogs	-	-
PB2 Upland blanket bog	-	-
PB3 Lowland blanket bog	-	-
PB4 Cutover bog	8	112.3
PB5 Eroding blanket bog	-	-
PF1 Rich fen and flush	7	7.6
PF2 Poor fen and flush	6	0.02
PF3 Transition mire and quaking bog	31	119.9
WN4 Wet pedunculate oak-ash woodland	-	-
WN5 Riparian woodland	-	-
WN6 Wet willow-alder-ash woodland	14	23.4
WN7 Bog woodland	6	96.8
WS1 Scrub	73	113.4
CW1 Lagoons and saline lakes	1	0.8
CW2 Tidal rivers	-	-
CD5 Dune slacks	-	-

Notes: *Number of sites surveyed was extracted from LWS Site database.
**Area (ha) extracted from LWS GIS dataset.
In the case of mosaic habitats, the area was applied to the dominant habitat.

9. During the course of the survey, and as part of the background research on sites, additional sites not listed in the original Potential Wetland Map GIS dataset (Brophy 2009) were noted. These sites are not included within the Louth Wetland Map GIS data produced from this survey. These sites will require future survey to determine their wetland interest.

3 Background

In 2009 the NPWS provided Louth County Council with a GIS dataset of potential wetlands in the county (Brophy 2009). In 2011 the County Council and The Heritage Council funded a survey of these sites to ascertain whether they were in fact wetlands and to identify the specific habitats present on each site.

The aim of the current Louth Wetland Identification Survey 2011 (LWS) project was to examine the 108 potential wetlands in 2011, so that detailed descriptions, habitat maps and other ecological information could be recorded. Following the survey, the sites were to be ranked in terms of their conservation/ecological importance to assist Louth County Council in its obligations to protect the most important wetlands within the county and to inform future conservation policies in relation to wetlands in county Louth.

All survey data recorded during the project are held in the newly created LWS site database, and in a LWS Geographic Information System (GIS) dataset which should help guide spatial planning and development management by Louth County Council.

3.1 Project set-up

This LWS project was undertaken over a six month period from the start of May 2011.

The following is a summary of the main elements which formed the basis of the project, details of which are provided in the Materials and Methods section which follows.

Louth Wetland Identification Survey (LWS) project summary:

- 108 sites were selected for survey as part of the LWS 2011. These sites were selected by Brophy (2009) as sites likely to contain wetland areas (see Appendix 1).

- Following a review of the sites proposed for survey, field maps were prepared and a wetland survey recording card was designed (see Appendix 3).

- A LWS site database, to hold survey information on sites examined, was created (see Appendices 2). Once survey information was inputted to the LWS survey database, a complete site report could be produced from data held within the database (see Appendix 2). The LWS database also holds secondary information on some of the sites previously reported in literature.

- The field survey was undertaken in August 2011 by a team of four wetland ecologists. In total 108 sites were surveyed and habitat maps and site descriptions were prepared (see Appendix 1 & 6). Following the site survey a conservation evaluation of the sites was undertaken and they were ranked in terms of their local, national or international conservation value.

- Following the field survey, survey data were used to populate the LWS site database. Habitat maps were drawn and survey data transferred too the LWS GIS dataset.

- The final LWS report was then prepared. It includes individual site reports that contain: site descriptions; flora and fauna lists; habitat maps; conservation evaluation; and conservation recommendations for each site surveyed.

4 Importance of Wetlands in County Louth

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 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).

Wetlands 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 wetlands 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:

"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 [is there a difference between 'riverine' and the more usual 'riparian'? to me riparian means along river banks (i.e. OUT of the water), so riverine would mean IN the river, in the water
• **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 treatment facilities and drainage ditches.

Even in certain, so called "natural" wetland systems, human-kind has played a major role 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 borne in mind when considering wetlands is that a specific wetland area is often composed of many different habitat types, which form a mosaic. For example, a cutover bog wetland, may in fact comprise small areas of regenerating fen and bog communities, pools, drainage ditches, and even deeper water pools or small lakes.

On a global scale wetlands occur everywhere, from the tundra to the tropics. How much of the earth's surface is presently composed of wetlands is not known exactly. The UNEP-World Conservation Monitoring Centre has suggested an estimate of about 570 million hectares (5.7 million km^2) of wetland – roughly 6% of the Earth's land surface – of which 2% are lakes, 30% bogs, 26% fens, 20% swamps, and 15% floodplains.

The LWS project focused on 108 potential freshwater wetlands within the county, of both natural and artificial origin, with the additional inclusion of coastal lagoons which may have a variable degree of both salt and

freshwater influence.

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 term benefits (both economic and non-economic) of functioning wetlands (Anonymous 2008d). Three examples of such damaging 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 bog which continues to have a detrimental effect on the national peatland resource.

Functional wetlands are among the world's most productive environments. They are cradles of biological diversity, providing the water and primary productivity upon which countless 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 [diversity?].

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 (Anonymous 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 (Anonymous 2008d).

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) as outlined in section 4.3 below.

4.3 Wetland values

Wetlands range from ponds to rivers, reedbeds to bogs, and are home to a large diversity of plants and animals. However, they are not just important for biodiversity.

Wetlands provide many economic benefits including:

- Wetlands improve water quality by removing and sequestering pollutants and sediments in the water.
- Wetlands are of high importance to fisheries. Over two thirds of the world's fish harvest is linked to the health of coastal and inland wetland areas.
- Wetlands may be of high importance to agriculture and timber production, through the maintenance of water tables and nutrient retention in floodplains.
- 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 (Anonymous 2008d).
- Wetlands may provide important energy resources, such as peat and plant matter.
- Wetlands may be of value to transport, recreation and tourism.
- Wetlands offer habitats 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 makes our own lives possible by ensuring our food supply, regulating the atmosphere and providing raw materials for industry and medicine.
- Wetlands provide valuable open space and create wonderful 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 (Anonymous 2008d) 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 was 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 or biodiversity in general 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 (Anonymous 2008d). In addition a number of reports exist 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 (Anonymous 2008d).

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 wetlands provide.

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

(Modified from Barbier et al. 1997)

5 County Louth Wetlands

5.1 County Louth an introduction

County Louth is strategically located midway between the two largest population centres on the island of Ireland, Belfast and Dublin. Louth is 'reland's smallest county with a land area of 82,000 hectares (LCC 2009).

County Louth is one of 12 counties in the province of Leinster. It is bordered by four counties, Monaghan to the west, Meath to the South-west, Armagh to the North and Down to the North-east (across Carlingford Lough). County Louth is bordered by the Irish Sea to the East.

Some of the adjacent counties contain major population centres which are in close proximity to Louth. They include Navan in County Meath and Newry, Craigavon and Banbridge in counties Down and Armagh.

The county's coastline stretches some 61 km [we have a much higher figure] from the River Boyne in the south of the county to Carlingford Lough in the north. The breadth of the county is on average only 20 kilometres.

County Louth has a strong settlement structure dominated by the presence of the two largest provincial towns (excluding cities) in the State, Drogheda and Dundalk. These two towns with populations of 28,973 (Drogheda) and 29,037 (Dundalk) [these figures date from 2006, 2011 figures are now available] account for over 50% of the total population of the county. When the urban environs of both towns are included within the census figures, the proportion of urban dwellers rises even further (LCC 2009).

Elsewhere in the County, there is an even spread of population across a range of towns, villages and open countryside. The other urban centres of significance within the County include the towns of Ardee, Dunleer and Carlingford (LCC 2009).). The economy of the county, once predominantly industrial, has now evolved into a high tech, knowledge based economy.

In contrast to much of the State, Louth is a predominantly urbanised county, however, away from the major towns the county contains a wide variety of landscapes from the hill and mountain areas of Faughart and Cooley in the north to the relatively low lying pastoral [not sure pastoral is the right word as a lot of this area is given over to arable prodcution] areas which dominate the mid and south of the county.

The county is blessed with a wealth of natural and manmade features including mountain trails, beaches, nature walks, heritage sights [sites?] and numerous protected structures.

5.2 County Louth's natural wealth

County Louth 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 (Louth County Council 2008 & 2010).

In county Louth there are currently 24 proposed Natural Heritage Areas (pNHAs); six Special Areas of Conservation (SACs) and five Special Protection Areas (SPA) comprising mainly coastal and freshwater wetland habitats, such as lakes, rivers, marshes, fens, bogs and woodland (LCC 2008). These are recognised by Louth County Council as important conservation areas, and are included in the County Development Plan and the Biodiversity Action Plan for Louth (Louth County Council 2008 & 2010). The largest single non-coastal wetland site in county Louth is Carlingford Mountain SAC. This site consists, in the main, of upland blanket bog and wet heath.

Some of these listed sites, but not all, were surveyed as part of the 2011 LWS.

5.2.1 Topography and landforms

The county can be divided into a number of topographic regions (see Figure 5.1 & 5.2 below).

In 2002, a landscape character assessment was completed for the entire county outside the major towns (LCC 2010). This assessment was prepared in accordance with the Government's *Draft Guidelines for Landscape and Landscape Assessment (2000).* Nine landscape character areas were identified in County Louth. They represent geographical areas with a particular landscape type or types, and are listed in Table 5.1 and illustrated in Figure 5.1 below.

Table 5.1. Landscape Area Classification for the region identified in county Louth (LCC 2010).

International	Carlingford Lough and Mountains including West Feede Uplands
National	Boyne and Mattock Valley
Regional	Dundalk Bay Coast, Dunany to Boyne Estuary Coast, Uplands of Collon and Monasterboice
Local	Cooley Lowlands and Coastal Area Lower Faughart. Castletown and Flurry River Basins, Louth Drumlin and Lake Areas Muirhevna Plain

Carlingford Peninsula or Cooley Mountains Zone:
The mountains that occupy the Carlingford or Cooley peninsula are often called the Cooley Mountains. They are located in the north of the county. The highest peaks are Carlingford Mountain at 588 m followed by Clermont Carn at in height. They are composed of both extrusive and intrusive igneous and partly-metamorphosed sedimentary rocks.

The Cooley Mountains are a very popular destination for hill walkers. The famous Táin Way, which is a national walking route, covers 40 km of The Cooley Mountains. This includes forest tracks, mountain paths and country roads. It also includes a selection of walks visiting the Windy Gap and Barnavave.

Coastal Zone:
The coastal zone in the east of the county, which is demarcated on the west by the Belfast - Dublin railway line, consists of low tidal ground, much of which has been colonised by salt marsh species. It includes the Dundalk Bay Coast and Dunany to Boyne Estuary Coast Landscape Character Areas shown in Figure 5.1 below. Its geological interest is its Quaternary raised beaches (Fahy 1972) [there are other interests!].

Drumlin Zone:
The north-west landscape (Louth Drumlin & Lakes areas in Figure 5.1 below) of the county is dominated by drumlin hills, formed during the last glaciation of Ireland, which are rich in calcium carbonate and which enclose small inter drumlin hollow water bodies and raised bogs (Fahy 1972).

Central Zone:
The central landscape (Muirhevna Plain area in Figure 5.1 below) of the county is dominated by low-lying land with deep drift cover, which makes it ideal for intensive agricultural use, in particular arable crops (Fahy 1972).

Collon Uplands Zone:
The southern landscape (Uplands of Collon and Monasterboice area in Figure 5.1 below) of the county is an upland region which extends into county Meath. To the south of the River Dee the terrain changes and deep drift is replaced by a shallow drift cover on high ground.

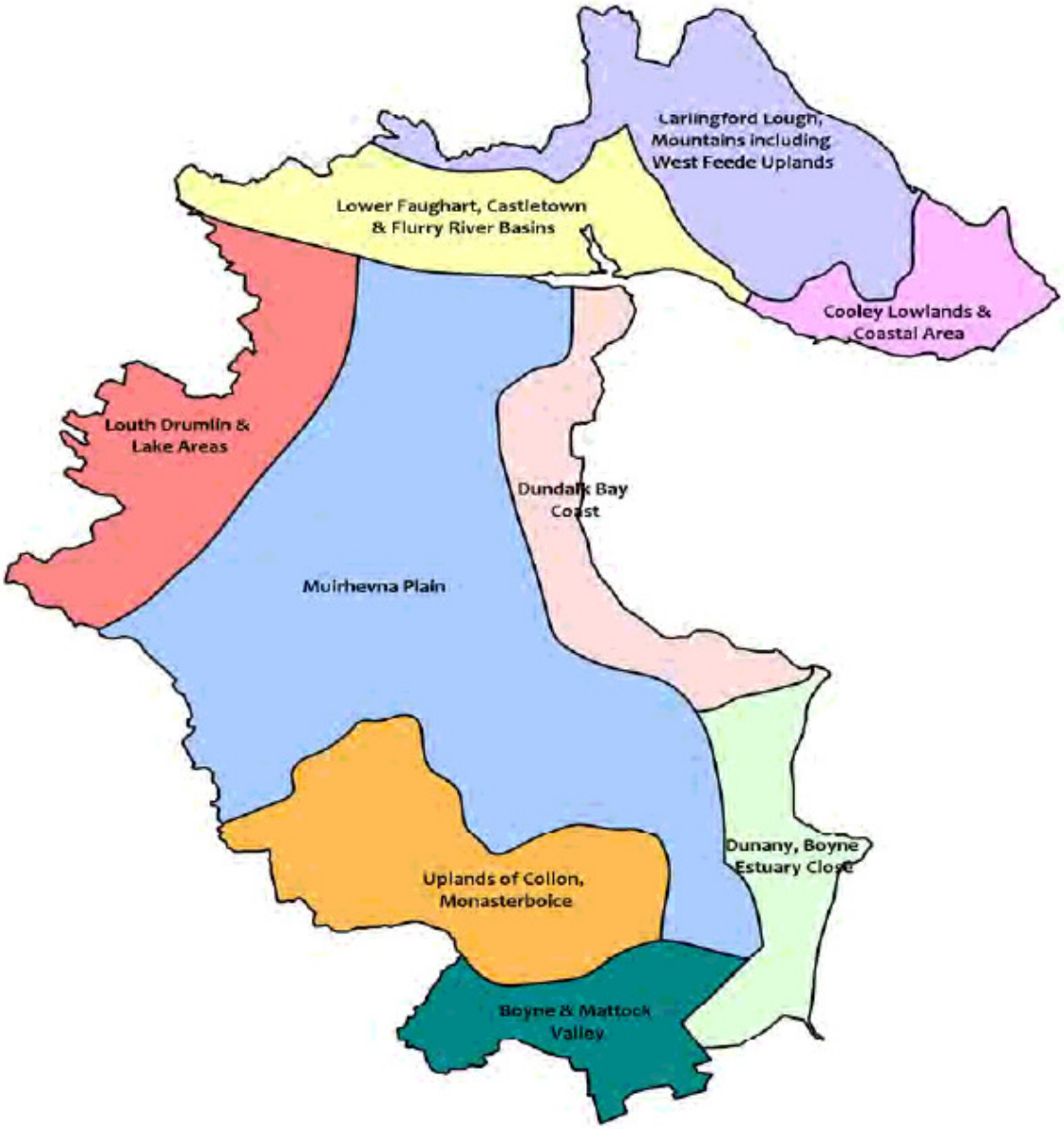

Figure 5.1. Landscape character areas in County Louth.

(Source: Landscape Character Assessment 2002, Louth County Council © Louth County Council)

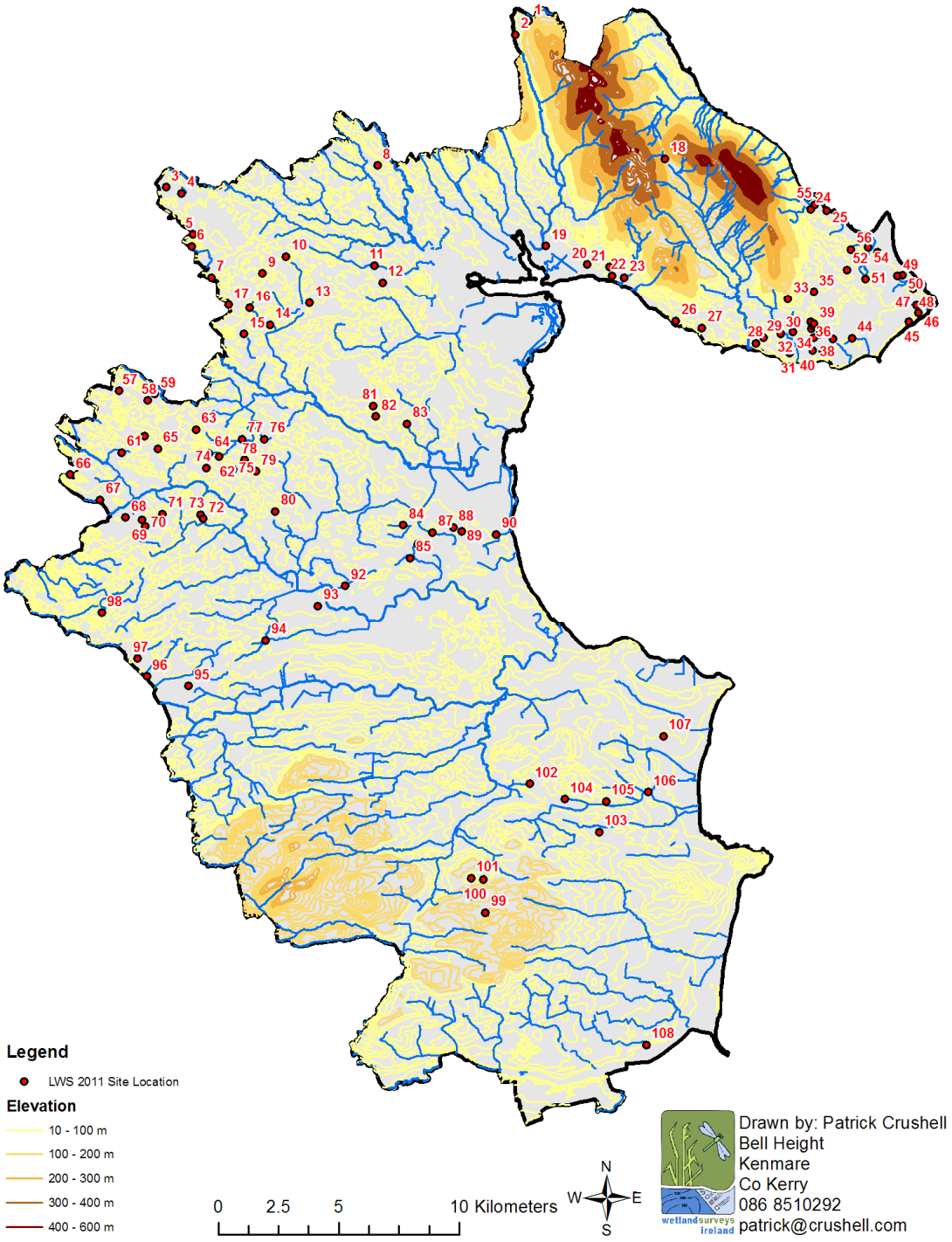

Figure 5.2. Relief and drainage map of County Louth of showing elevation, the river system, and the location of the LWS 2011 sites.

5.2.2 Geology

In geological terms Louth is a county of dramatic contrasts within short distances.

The underlying geology of Louth mainly comprises sandy and shaley rocks (Figure 5.3). These were deposited during the Silurian Period and are part of the Longford-Down massif. The bedrock of other areas of Louth consists of Carboniferous limestone, which continues to extend into the midlands (Fahy 1972).

Almost the entire area between Dundalk Bay and Carlingford Lough is covered with mountains. The Cooley Peninsula acts as a de facto extension of the Mourne Mountains to the northeast in County Down and of the Ring of Gullion in south Armagh and is composed primarily, though not exclusively of granitic rocks. The highest mountain in the range is Carlingford Mountain at [metres please], followed by Clermont Carn at.

In southern Louth a low-lying ridge of hills, known as the Oriel Hills, stretch from the coastal village of Clogherhead west to Collon and across the county border into the heart of County Meath. The area of Louth that lies between the Oriel Hills to the south and the Cooley Peninsula to the north is very flat and is traditionally known as the Plain of Muirthemhne. This low-lying land is mainly used intensively for agriculture

The high ground of the Cooley Peninsula dramatically concedes to transition rocks in the flat areas of the peninsula and this is very noteworthy in the environs of Dundalk. [I have no idea what this means!]

The rest of the county is predominantly low lying and flat, chiefly characterized by shales and greywackes, with the exception of the low lying hills north of Drogheda as in the Fieldstown area and in the vicinity of Collon. [isn't this repeating what you said above?]

In the southern part of Louth runs a low-lying ridge of hills, known as the Oriel Hills, which stretch from the coastal village of Clogherhead to Collon and across the county border into the heart of Co. Meath. The area of Louth that spans between the Oriel Hills to the south and the Cooley Peninsula to the north is very flat. This land is mainly used for agricultural purposes. [Repition]

The other noticeable geological and topographical features of the county occur north and west of Dundalk with the emergence of clay-based Drumlin landscapes which are more characteristic of counties Monaghan and Down to the north and west. [the drumlin belt forms much of the southern borderland of Ulster. These rounded hills and the wetlands between them made travel, especially in winter, extremely difficutl well into the modern period]

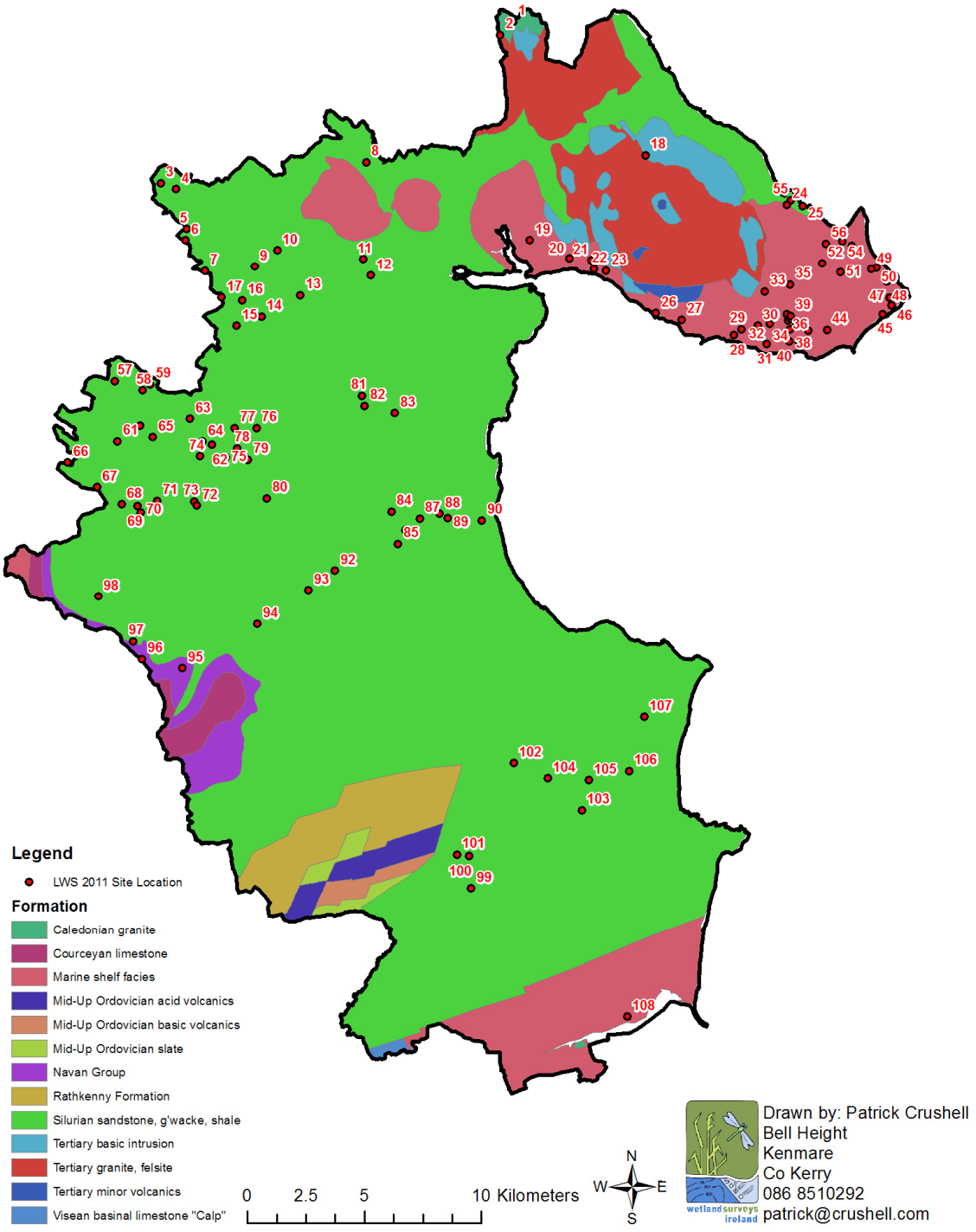

Figure 5.3. The solid geology of County Louth showing the main rock types occurring in the county, and the location of the LWS 2011 sites. Source: Geological Survey of Ireland 1:500000 bedrock map.

The geological column should be presented in terms of systems for the sedimentary rocks, starting with teh oldest at the bottom, with igneous presented separately, not in alphabetical order as herein

5.2.3 Soils

The soils of County Louth are surprisingly varied for such a relatively small area (LCC 2009). In the Cooley Lowlands and Coastal Areas the underlying limestone and glacial deposits have resulted in a rich soil cover of acid brown earths with some gleys and brown podzolics.

In nearby the Carlingford Lough and Mountains area, including West Feede Uplands, quite a variety of soils is found. In the higher areas of the peninsula there are Lithosols with blanket peat and peaty podzols. Lower down there is a variety of brown podzolics with gleys and peats. To the west there are acid brown earths with some gleys and podzols.

North and West of Dundalk lie the Lower Faughart, Castletown & Flurry River Basins. Here the soils are acid brown earths with a mix of gleys and brown podzolics. There are a few small areas of lowland peat bog. This mixture of soils is reflected in farming patterns through the county with a predominance of small holdings in the vicinity of the Cooley Peninsula characterized by animal husbandry whilst farms are generally much larger towards the mid and south of the County and tending towards arable farming, except in a few higher pockets north of Drogheda.

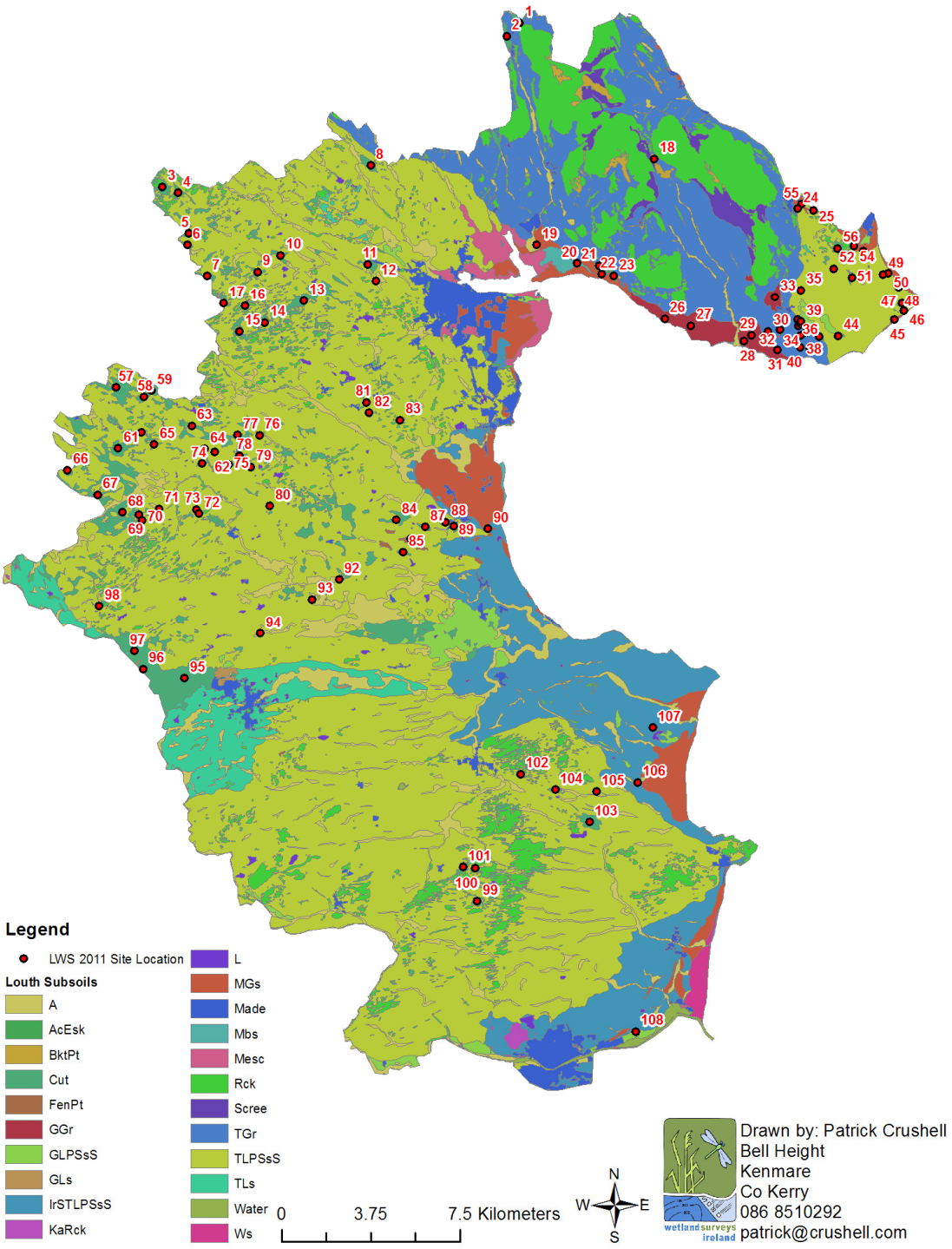

Figure 5.4. Sub-soil (parent material) map of County Louth, and the location of the LWS 2011 sites.
Source: Teagasc subsoil map (Meehan 2004).

Abbreviations to major deposits in Figure 5.3: KaRck, Karst Rock; TLs, Limestone Till; BktPt, Blanket Peat; FenPt, Fen Peat; Cut, Cutover Bog; TNSSs, Till derived from Namurian Sandstones and shales; TDSs, Till derived from Devonian Sandstone; TLPSsS, Till derived from Lower Palaeozoic Sandstones and Shapes; TDSs, Till derived from Devonian Sandstones and Shales.

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.

Ireland is noted for the abundant rainfall it receives [a bit repetitive]. Rainfall is considerably greater in the western part of the country than in the east, where Louth lies. 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.

In comparison to climates typical of other countries in the same latitude, Ireland's weather is considerably warmer. Summers in Ireland are generally warm [at school I was told our summers were cool] and the winters mild, thanks to the country's geographical position: lying in the Atlantic, the North Atlantic Drift 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.

County Louth receives between 800 and 1000 millimetres of rainfall in the year. The upland area in the north of the county on Carlingford Mountain, has rainfall levels which exceed 1,000 millimetres per year [reference?]. December and January are typically the wettest months of the year, and April the driest. The majority of county Louth averages 150 rain days per year, with the coastal zone recording fewer rain days [reference?].

5.2.5 Ground and surface waters

County Louth straddles two River Basin Districts; the Neagh Bann and the Eastern River Basin Districts. However the bulk of County Louth lies within the Neagh Bann River Basin district and is administered as part of the NS Share River Basin District Project.

The surface water drainage pattern and river catchments are shown in Figure 5.2 and 5.5 respectively.

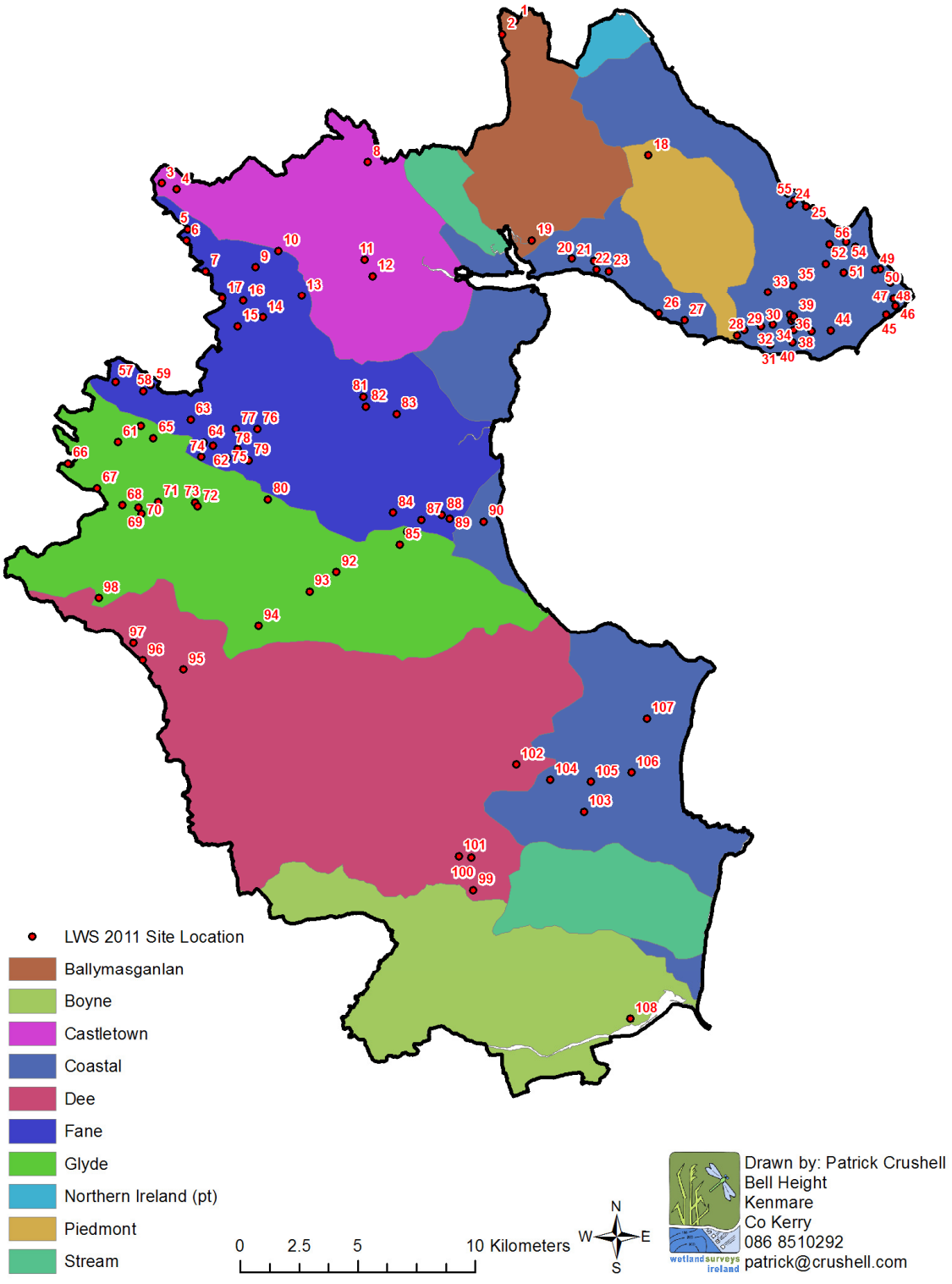

Figure 5.5. Catchment Map of County Louth, and the location of the LWS 2011 sites.
Source: after Ordnance Survey Ireland. Ballymascanlan

5.3 Protection of Louth Wetlands

Due to their recognised ecological importance, many wetland sites in county Louth are already given 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). In Ireland all such sites are directly owned and managed by the State, there being no legislation for the designation of National Parks in Ireland.

There is no National Park in county Louth.

NNR - National Nature Reserve [isn't it just "Nature Reserve", not 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 [reference?].

There are no National Nature Reserves designated in county Louth.

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 for their selection is 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 are currently **six** sites designated as SACs in County Louth, including Carlingford Mountain, Carlingford Shore Dundalk Bay, Clogher Head, Boyne Coast and Estuary and River Boyne and River Blackwater. Only Carlingford Mountain contains significant freshwater wetland areas in the form of upland blanket bog and wet heath.

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 are currently **five** sites designated as SPAs in County Louth, at Dundalk Bay, Carlingford Lough, Boyne Estuary, River Boyne and River Blackwater (September 2011) and Stabannan – Braganstown.

NHA – Natural Heritage Area
The basic designation for wildlife conservation in Ireland 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 are currently no designated Natural Heritage Areas in county Louth.

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 given recognition by planning authorities. Poliucy CON 11 in the Louth County Development Plan 2009 – 2015 commits the council "To resist and development that would be harmful to [any pNHA] or that would result in a significant deterioration or habitats or disturbance of species".

There are currently **24** sites designated as pNHAs in County Louth (LCC 2010). Ten of these sites contain freshwater wetlands.

[note that geological sites can also be proposed for designation as NHAs and/or as County Geological Sites (CGA). Thirty-four such sites have been identified in Louth, of which at least 18 are of national or higher importance. Some of these may also be wetland or other coastal sites however their areal extents have not been defined to the council.]

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 pNHAs described above, together with newly discovered sites recommended for conservation by a variety of third parties but which have not been objectively surveyed by NPWS.

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).

LWS Sites
Following the completion of the LWS 2011 it is recommended that 23 sites which were not previously included on sites of conservation value within the county, should be submitted as cNHA to the National Parks and Wildlife Service for conservation designation. These include sites ranked as C+ Rating: County conservation value or above. See Appendix 1 and the results section for further details of these sites that are deemed to be high conservation worthy sites [maybe reword this].

5.4 Louth Freshwater Wetland types

The LWS set out to map the distribution and extent of wetland habitats within 108 potential freshwater wetlands (Brophy 2009). Habitats were identified and mapped according to the Heritage Council Guide to Habitats in Ireland (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.

Table 5.2 adapted from Fossitt (2000) lists the main wetland habitat types being recorded and mapped as part of the LWS. The level 1 wetland habitat categories are divided to level 2 and subsequently level 3 as shown in Table 5.2. These levels provide progressively more detail of the specific wetland habitat(s) recognised.

The aim of the LWS was to categorise the wetlands surveyed in terms of the occurrence of the 35 level 3 wetland habitat types.

Louth contains a wide range of wetlands of high international and national importance [mention of NRA assessment guidelines?]. Due to the varying topography, geology, hydrology, climate, coastline and soils present it has wetland habitats ranging from raised bogs (mostly cutover), upland blanket bogs, fens, marshes, coastal lagoons, large riverine [riparian?] systems, a variety of lakes, springs, wet woodlands and many more.

, Brief descriptions and illustrations of each of the main freshwater wetland habitat types that occur in Louth are presented In the following section.

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' (Anonymous 2008d).

For a more detailed description of the wetland habitat types, the main floral species that occur in them, and the detailed relationship between schemes used in Fossitt (2000) and the EU Habitats Directive the reader is referred to the Heritage Council Guide to Habitats in Ireland (Fossitt 2000).

Table 5.2. The 35 level three Fossitt (2000) wetland habitat types being recorded as part of the Louth Wetland Identification Survey 2011. Level 3 Fossitt habitats with a possible corresponding 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 *
C Coastland	CW Brackish waters	CW1 Lagoons and saline lakes **
		CW2 Tidal rivers *
	CD Sand dune systems	CD5 Dune slacks *

5.5 Wetland Habitats in County Louth – a brief description

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6 Materials & Methods

6.1 Louth Wetland Identification Survey - Site Selection

At the start of the project 108 sites were proposed for survey originating from the Potential Wetland Map (Brophy 2009), see Appendix 1. The location of the sites selected for survey within the county is shown in Figure 6.1 below and in more detail on the OS Discovery maps shown in Appendix 5.

6.2 Louth Wetland Identification Survey - Field Survey

Field surveys were undertaken during the period 22nd to 28th August 2011. During each site visit, the following was undertaken and noted:

- The general ecological characteristics of the site
- Site photographs were taken of notable features
- Target notes of features of interest within the site were recorded
- Habitats were identified within and immediately adjoining the wetland according to Fossitt (2000)
- Notes were taken on the correspondence of any habitats to those listed under Annex I of the EU Habitats Directive
- An assessment of threats/damaging activities occurring at the site
- Species lists were compiled of both flora and fauna recorded

Site information was recorded using a standard field survey card designed for use during the LWS (see Appendix 3)**.** The information recorded on these cards during the field survey was subsequently used to populate the LWS Site database and GIS.

Habitat information was marked up by hand on the aerial photographs or 6" maps for each of the sites surveyed in detail.

Plant identification followed Webb *et al* (1996), and species nomenclature follows Scannell & Synnott (1987). Searches for rare or protected species of plants (Curtis & Mc Gough 1988) was not the focus of this study but where these were observed note was taken for inclusion in the database.

Mammals observed were recorded using nomenclature in Sterry (2004) and birds were identified using Ferguson-Lee *et al.* (1983). Any reptiles, amphibians or (readily identifiable) invertebrates were also noted.

Information on threats and damage on the site, and the severity of this, was also noted on the field card and the location marked on field maps.

Following the survey, sites were given an evaluation rating using the NRA '*Guidelines for Assessment of Ecological Impacts of National Road Schemes*' as outlined in Appendix 4.

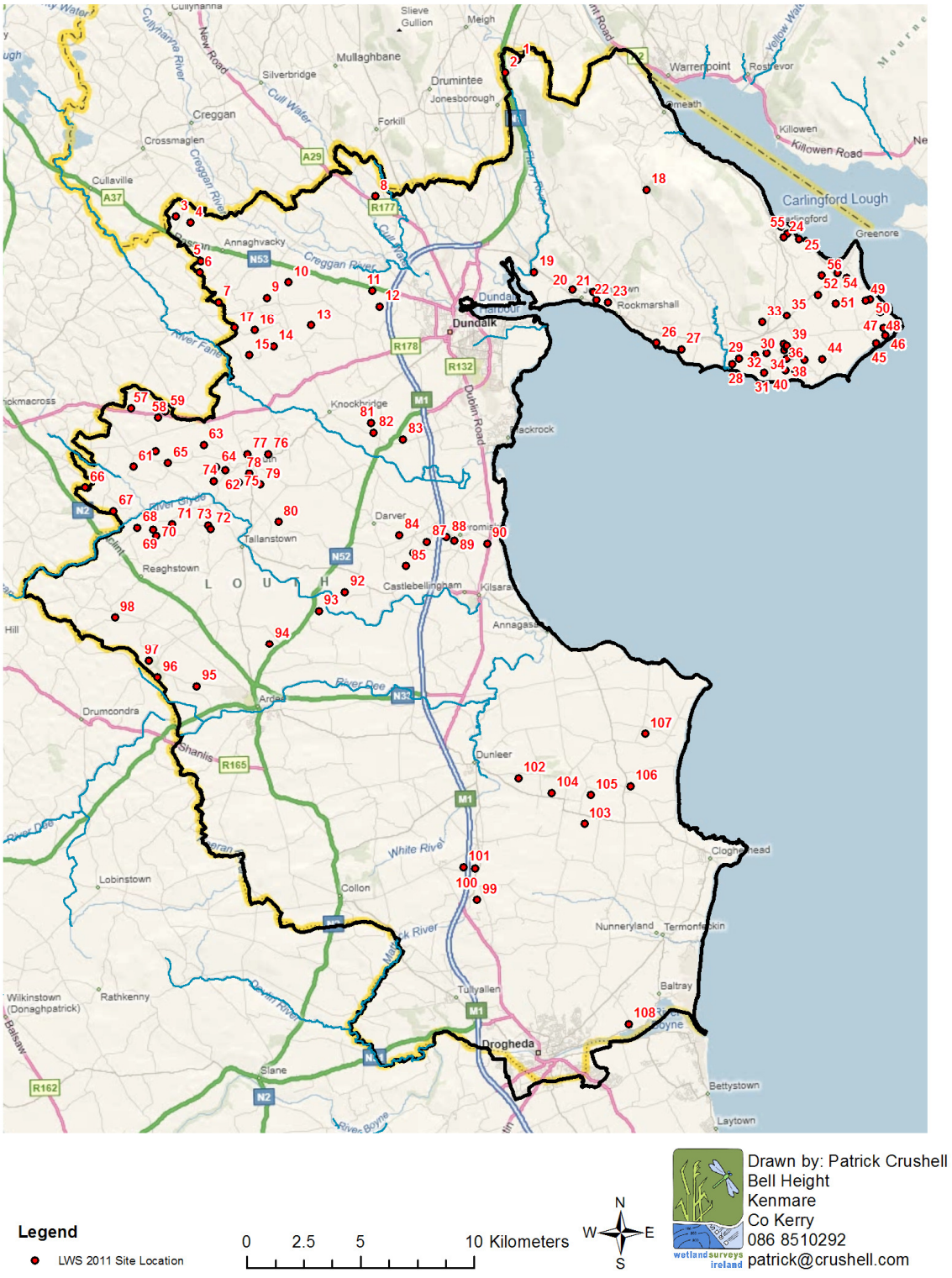

Figure 6.1. The location of sites surveyed during the 2011 Louth Wetland Identification Survey.
For detailed location maps of the sites see Appendix 5 in this report.

6.3 Consultation with Landowners

Where possible, landowners were identified by calling to the house nearest to the wetland, and permission was sought for access to the site. Discussions with landowners typically included an explanation of the project often followed by an informal conversation about the particular wetland site and its past and recent management. If landowners could not be identified land was surveyed from the nearest publicly accessible point. All identified landowners provided access to their lands. A letter outlining the purpose of the survey prepared by the Heritage Office of Louth County Council was shown to all landowners and displayed in survey vehicles.

6.4 Habitat Classification

The habitats within each wetland visited and those immediately adjacent to the site were classified according to Fossitt (2000) '*A Guide to Habitats in Ireland*'.

Guidance in determining whether or not a habitat type present within a wetland may correspond to an Annex I habitat type was sought from a variety of sources including:

- *Interpretation Manual of European Habitats* (Ramao 1996), *Guidelines for a National Fen Survey of Ireland – Survey Manual* (Foss & Crushell 2008a) [should these be on separate lines?]
- *NPWS Study of the extent and conservation status of springs, fens and flushes in Ireland in 2007* (Foss 2007)
- *The Status of EU Protected Habitats and Species in Ireland* (NPWS 2008) as well as Fossitt (2000).

6.5 Site Conservation Assessment & Evaluation

Each wetland surveyed in the field was assigned an evaluation rating by the project team who had visited the site (Peter Foss, Patrick Crushell, Barry O'Loughlin and Faith Wilson). This evaluation was based on the criteria outlined in Appendix 4.

6.6 Louth Wetland Identification Survey database – structure and content

A LWS Site database was created to hold survey data on sites from the present survey. The database was created using Filemaker Pro 11.0 software package which allows data export to Excel spreadsheets.

In summary the main LWS site database held information on site name and code, site provenance, size (area in ha or length in km), third party site name and site codes, national grid reference, site conservation designations, habitat information on the specific wetland vegetation type(s) present, 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. The database also holds all information recorded on the LWS 2011 survey card (see Appendix 2 for details).

A bibliography database, holding a list of references relating to the GIS data sources, scientific reports and publications referring to wetlands in county Louth, make up the complete LWS 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 LWS site database.

Details of the data fields used to store survey data in the LWS database are described in Appendix 2.

6.7 Louth Wetland Identification Survey (LWS) – GIS dataset

The LWS GIS dataset was created (using ArcView 10 GIS software package on a Windows Operating System) and used throughout the LWS for all site selection and mapping purposes. The GIS also contains most of the information on sites which was imported from the LWS site database (e.g. information on site location, site description, information on Annex 1 EU habitats and field survey target notes on items of interest on the site, and site conservation evaluation).

See Appendix 2 for further details on the structure and format of this LWS GIS dataset. The dataset was used to export all habitat maps. The GIS files produced during the LWS are included on the CD that accompanies this report.

6.8 Constraints

The presence of bulls, high barbed wire fencing, high water levels and wide, deep drainage ditches hindered field work by preventing safe access to parts of some of the sites. Such areas were assessed using binoculars.

7 Results

7.1 Louth Wetland Identification Survey

Of the 108 sites initially selected for survey as part of the LWS 2011 (Appendix 1), all were visited during the field survey and described in detail, habitat maps were produced and conservation assessment was undertaken. The list of sites surveyed in 2011 is presented in Appendix 1.

A map showing the location of the 108 sites surveyed is presented in Figure 6.1, and in more detail on the Discovery Maps in Appendix 5.

A detailed report of each site (sorted according to site name), together with habitat maps, is presented in Part 2 of the final report of the project (see Appendix 6).

7.2 Wetland Types Recorded on Site Surveys

108 sites were surveyed as part of the Louth Wetland Identification Survey 2011 (LWS). The habitats present (both wetland and non-wetland) within and surrounding each wetland site were recorded using Fossitt (2000), based on field survey observations. A summary of these wetland types, with examples of where they can be seen in county Louth, is provided in Chapter 5, while detailed habitat descriptions, with species likely to occur on them, is given in Fossitt (2000). Summary findings of the LWS 2011 are presented in the following sections.

The main wetland habitat types observed and the number of sites these were recorded on during the 2011 survey are summarised in Table 7.1.

Table 7.1. The main wetland habitats recorded in the Louth Wetland Identification Survey 2011.

Fossitt Habitat Code & Name	Number of sites recorded in **LWS Database**	Area (ha) / Length (km) of each wetland habitat recorded in **LWS GIS dataset**
FL1 Dystrophic lakes	3	0.2
FL2 Acid oligotrophic lakes	-	-
FL3 Limestone/marl lakes	-	-
FL4 Mesotrophic lakes	10	12
FL5 Eutrophic lakes	5	4.4
FL6 Turloughs	-	-
FL7 Reservoirs	1	0.8
FL8 Other artificial lakes and ponds	2	1.3
FW1 Eroding/upland rivers	1	0.9
FW2 Depositing/lowland rivers	6	8.9
FW3 Canals	-	-
FW4 Drainage ditches	55	54.7
FP1 Calcareous springs	2	-
FP2 Non-Calcareous springs	-	-
FS1 Reed and large sedge swamps	48	165.2
FS2 Tall herb swamps	-	-
GS4 Wet grassland	25	68.8
GM1 Marsh	14	31.9
HH3 Wet heath	4	5.1
PB1 Raised bogs	-	-
PB2 Upland blanket bog	-	-
PB3 Lowland blanket bog	-	-
PB4 Cutover bog	8	112.3

PB5 Eroding blanket bog	-	-
PF1 Rich fen and flush	7	7.6
PF2 Poor fen and flush	6	0.02
PF3 Transition mire and quaking bog	31	119.9
WN4 Wet pedunculate oak-ash woodland	-	-
WN5 Riparian woodland	-	-
WN6 Wet willow-alder-ash woodland	14	23.4
WN7 Bog woodland	6	96.8
WS1 Scrub	73	113.4
CW1 Lagoons and saline lakes	1	0.8
CW2 Tidal rivers	-	-
CD5 Dune slacks	-	-

It would be good if you could indicate which figures are areal and which linear

The most commonly recorded wetland habitats on the LWS was scrub (WS1), which was found in 73 of the 108 sites surveyed (total area of 113 hectares). In many of the sites scrub is dominated by Willow and Alder and is a common feature within reedbeds, at the edges of many wetland sites, bogs and areas of poor fen. Gorse dominated scrub is also a feature on many of the drier areas of cutover bogs.

The next most common habitat type encountered was drainage ditches (FW4) which were recorded on 55 of the 108 sites surveyed (total length of 54.7 km).

Reed and large sedge swamps (FS1) were recorded at 48 of the 108 sites (total area of 165 hectares). This habitat type can form large uniform stands in low lying hollows or can form a marginal reed bed zone around smaller lakes and ponds.

Examples of transition mire (PF3) have developed at 31 of the 108 sites surveyed (total area of 120 hectares). Transition mires have sometimes developed on areas of old cutover bog, whereas on other sites large areas of former lakes are naturally infilling with a quaking mat of vegetation.

Eight cutover (raised) bog (PB4) sites were surveyed during the present survey. The EU Habitats Directive Annex I habitat "7150 Depressions on peat substrates of the *Rhynchosporion"* was also present on some of these sites.

Wet willow-alder-ash woodland was recorded on 14 of the 108 sites surveyed. It is a common feature adjoining lakes and along watercourses but can also occur on the edge of marsh or transition mire areas.

Rich fen and flush (PF1) was found at seven of the 108 sites surveyed. The habitats on these sites all correspond to the Annex I habitat "7230 Alkaline fens" or "*Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* 7210" (EU Priority Habitat).

Six sites were found to have examples of poor fen and flush (PF2).

The majority of lakes surveyed in 2011 (21 in total) are best described as mesotrophic lakes (FL4) (10 surveyed in total); dystrophic lakes (FL1) (three surveyed in total) are mostly associated with bog sites, while five eutrophic lakes (FL5), showing various levels of pollution and enrichment, were surveyed.

7.3 Priority Habitats Recorded

A number of sites contain examples of habitats which correspond to those listed under Annex I of the EU Habitats Directive; however many are small in extent. These include areas of transition mire, alkaline fen, *Cladium* fen, wet heath, dystrophic lakes and pools, oligotrophic lakes, *Rhynchospora* depressions on peat substrates, and coastal lagoons. A summary of the number of sites with these habitats is presented in Table 7.2 below. Appendix 1 shows the specific sites on which these EU habitat types were recorded.

Table 7.2. Wetland sites surveyed in 2011, which contain examples of habitats, listed under Annex I of the EU Habitats Directive. *EU Priority Habitats are marked with a **

Annex 1 Habitat present	Number of sites
7230 Alkaline fens	6
7210 *Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	6
7140 Transition mires and quaking bogs	24
7150 Depressions on peat substrates of the *Rhynchosporion*	3
1150 *Coastal lagoons	1

7.4 Floral Observations

Floral observations and records made on the sites surveyed were included in the LWS site database. For the sites surveyed the species recorded are presented in the individual site descriptions presented in Appendix 6.

Two new county records for flowering plants (based on current distribution maps available from the National Biodiversity Data Centre) were recorded during the LWS. At Rassan Bog (LWS Site 3), *Sparganium natans (S. minimum)*, Least Bur-reed was recorded on an area of regenerating raised bog in a cutover bog pool. At Tullycahan (LWS site 77) *Senecio viscosus*, Sticky Groundsel was recorded at the edge of the site on a gravel area adjacent to a road.

7.5 Faunal Observations

Fauna associated with wetland habitats, that were observed during the field survey were recorded in the LWS site database. Species recorded on the sites are listed in the individual site reports presented in Appendix 6.

7.6 Damage to County Louth wetlands

The majority of, if not all, Irish wetland sites, and by extension those in county Louth, 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 (NPWS 2008; Foss & Crushell 2007; Foss 2007). A summary table of impacts and the wetland types most affected is presented in Table 7.3 below.

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, infill or soil redistribution, burning or the addition of nutrients so as to facilitate the removal of peat, the planting of trees or the creation of new grazing areas, pasture or arable farmland.

Historical evidence from the Plantation period [Louth was not, unlike Monaghan, planted] indicates that peatlands or bogs, and by extension fens and other associated wetlands, were increasingly utilised by the growing population throughout Ireland. 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*). [see Frank Mitchell's work on Ardee Bog]

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). [and for disposing of 'the Disappeared']

Reclamation and drainage works are ongoing agricultural management techniques which affect the hydrology of wetland habitats. But which are now subject to EA under new legislation in September 2011.

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 found that only four habitats were in favourable conservation status, while seven 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 Louth.

Table 7.3. Natura 2000 Impacts and Activities 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	Impacts and Activities Category with brief description	Wetland habitat types most at threat or likely to be affected from Impacts and Activities
A	**Agriculture** *Including cultivation, fertilisation, and over grazing*	Fens, Marsh, Bog, Wet heath, Reed Swamp, Lake and Lake margins, Wet grassland, Wet woodland, Bog woodland, Turlough, Rivers
B	**Sylviculture, forestry** *Including fertilisation, planting and re-planting, forestry practices*	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** *Including quarry activities, turbary and peat removal*	Bog, Dystrophic lake, Bog woodland
D	**Transportation and service corridors** *Including road construction, power transmission*	All wetland types
E	**Urbanisation, residential and commercial development** *Including Urban and industrial development, discharges and waste disposal*	Fen, Bog, Marsh, Wet Grassland, Scrub
F	**Biological resource use other than agriculture & forestry** *Including leisure fishing, hunting*	Lake, Fen, Marsh, River, Bog
G	**Human intrusions and disturbances** *Including recreational facilities, outdoor leisure activities, littering, trampling overuse*	Bog, Fen, Marsh, Reed Swamp, Wet Grassland
H	**Pollution** *Including surface and groundwater water pollution, air pollution*	Oligotrophic Lake, River, Marsh, Fen
I	**Invasive, other problematic species and genes** *Including invasive species, genetic pollution*	Oligotrophic Lake, River, Marsh, Fen
J	**Natural System modifications** *Including landfill, drainage, drain maintenance, water abstraction, burning*	Fen, Marsh, Bog, Reed Swamp, Lake margins, Wet grassland, River
K	**Natural biotic and abiotic processes (without catastrophes)** *Including organic material accumulation*	Fen, Marsh, Bog, Wet woodland

During the course of the LWS, past and existing damage to wetlands were noted, and an overall assessment of the severity was undertaken where information was available. The scale for the severity of damage used was: Not serious; Serious; Very Serious and Unknown. Table 7.4 below provides a summary of the threats and damage observed, and the number of sites this was recorded from during the course of the LWS. The individual site reports presented in Appendix 6 describe all specific threats or damage and the severity of this on each of the wetland sites surveyed. In many cases more than one threat was recorded on an individual site.

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 LWS database. The LWS 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.

Table 7.4. The impacts and activities threatening or which have degraded sites surveyed as part of the LWS 2011.

Impacts and Activities Category	Number of sites on which the activity was recorded during the LWS
Drainage	70
Dumping - Rubbish	17
Dumping - Green waste	9
Infill - Rubble/Soil	43
Reclamation	18
Afforestation	5
Pollution	1
Enrichment	67
Invasive Species	7
Peat Cutting - active	1
Peat Cutting - historical	7
Grazing	18
Quarrying - gravel	2
No obvious threats	1

Data held within the LWS database indicate that just a single site in Louth was not or did not appear to be affected by human activity.

The remaining 107 wetland sites surveyed were being influenced by human impacts and activities (see Table 7.4). It was clear from the LWS project that extensive damage has been caused, and continues to be caused, to the Louth wetland resource by past and present drainage of wetlands, enrichment from surrounding farmland (especially silage production and arable crops) infilling of wetlands with building waste, peat cutting of bog areas and inappropriate grazing. [Any built upon?]

If those sites identified as being of ecological importance during the LWS are to be conserved, management measures will be required to prevent further damaging activities and in some cases to restore damaged habitats.

7.7 Site Conservation Assessment

On completion of the LWS 2011 fieldwork, sites were reviewed and given a site conservation rating using the criteria presented in Appendix 4. The site conservation rating for sites surveyed is presented in Table 7.5 and illustrated in Figure 7.1.

Of the 108 sites surveyed in detail, thirty are deemed to be of county importance of greater. Just seven of these sites had previously been recognised as being of conservation interest, being listed as proposed Natural Heritage Areas or Special Areas of Conservation by the National Parks and Wildlife Service (i.e. Corrakit (Windy Gap) - Carlingford Mountain SAC**,** Shelties Lough - Carlingford Shore SAC, Ardee Cutaway Bog pNHA, Drumcah, Toprass and Cortial Loughs pNHA, Liscarragh Marsh pNHA). The remaining 23 sites identified as being of county importance of greater, represent a significant, previuously unrecognised, conservation resource which should be listed for protection.

Note that this information is only representative of a limited selection of the wetland resource of County Louth – many additional sites, which may be of international, national or county interest undoubtedly occur but for which we currently have no data.

A Rated Sites (International Ecological Importance):

Three sites (Corrakit (Windy Gap) - Carlingford Mountain SAC; Rockmarshall; Shilties Lough - Carlingford Shore SAC) have been rated as of international conservation importance (see Table 7.5).

These sites have been identified as containing habitats of conservation value that correspond to those listed on Annex I of the EU Habitats Directive. These include the following Annex I habitat types:

(7140) Transition mires and quaking bogs
(1150) *Coastal lagoons (EU Priority Habitat)

B Rated Sites (National Ecological Importance):

Eight sites (Ardee Cutaway Bog NHA; Carraghcloghan; Cortial Lough - Drumcah, Toprass and Cortial Loughs NHA; Drumcah Lough - Drumcah, Toprass and Cortial Lough NHA; Hoarstone; Liscarragh Marsh NHA; Mullatee; Toprass Lough - Drumcah, Toprass and Cortial Lough NHA) have been rated as being of national conservation importance (see Table 7.5).

These sites have been identified as containing habitats of conservation value that may correspond to those listed on Annex I of the EU Habitats Directive. These include the following Annex I habitat types:

(7150) Depressions on peat substrates of the Rhynchosporion
(7210) *Calcareous fens with Cladium mariscus and species of the Caricion davallianae (EU Priority Habitat)
(7230) Alkaline fens
(7140) Transition mires and quaking bogs

C+ Rated Sites (County Value):

Nineteen sites (Artoney; Ballagan and Whitestown; Boycetown; Castlecarragh South; Corradoran Lough; Drumgooland; Edentubber; Lurgankeel; Maghareagh; Millgrange; Muchgrange; Rassan Bog; Rathcor Lough; Redbog; Rootate; Ross Lough; Stormanstown Bog; Tullakeel; Wottonstown) have been rated as of county conservation importance (see Table 7.5).

These sites have been identified as containing habitats of conservation value that may correspond to those listed on Annex I of the EU Habitats Directive. These include the following Annex I habitat types:

(7140) Transition mires and quaking bogs
(7230) Alkaline fens
(7210) *Calcareous fens with Cladium mariscus and species of the Caricion davallianae (EU Priority

Habitat)
(7150) Depressions on peat substrates of the Rhynchosporion

C Rated Sites (High Value, Locally Important):

Twenty seven sites have been rated as being of Local conservation value (high value) (see Table 7.5).

These sites have been identified as containing habitats of conservation value that may correspond to those listed on Annex I of the EU Habitats Directive. These include the following Annex I habitat types:

(7140) Transition mires and quaking bogs
(7230) Alkaline fens
(7210) *Calcareous fens with Cladium mariscus and species of the Caricion davallianae (EU Priority Habitat)

The remaining sites have been given a lower conservation value based on the type and quality of habitat present (see Table 7.5).

The sites, as summarised in Table 7.5, are currently undesignated (with the exception of the seven sites designated as pNHA or SAC) and are also not listed as candidate Natural Heritage Areas in the NPWS sites database. It is recommended that those sites deemed to be of County value or greater (A, B and C+ importance) should as a priority be submitted to the National Parks and Wildlife Service for inclusion on their list of sites for consideration as NHAs. These sites should also be listed in future county development and biodiversity plans as sites of highest conservation value.

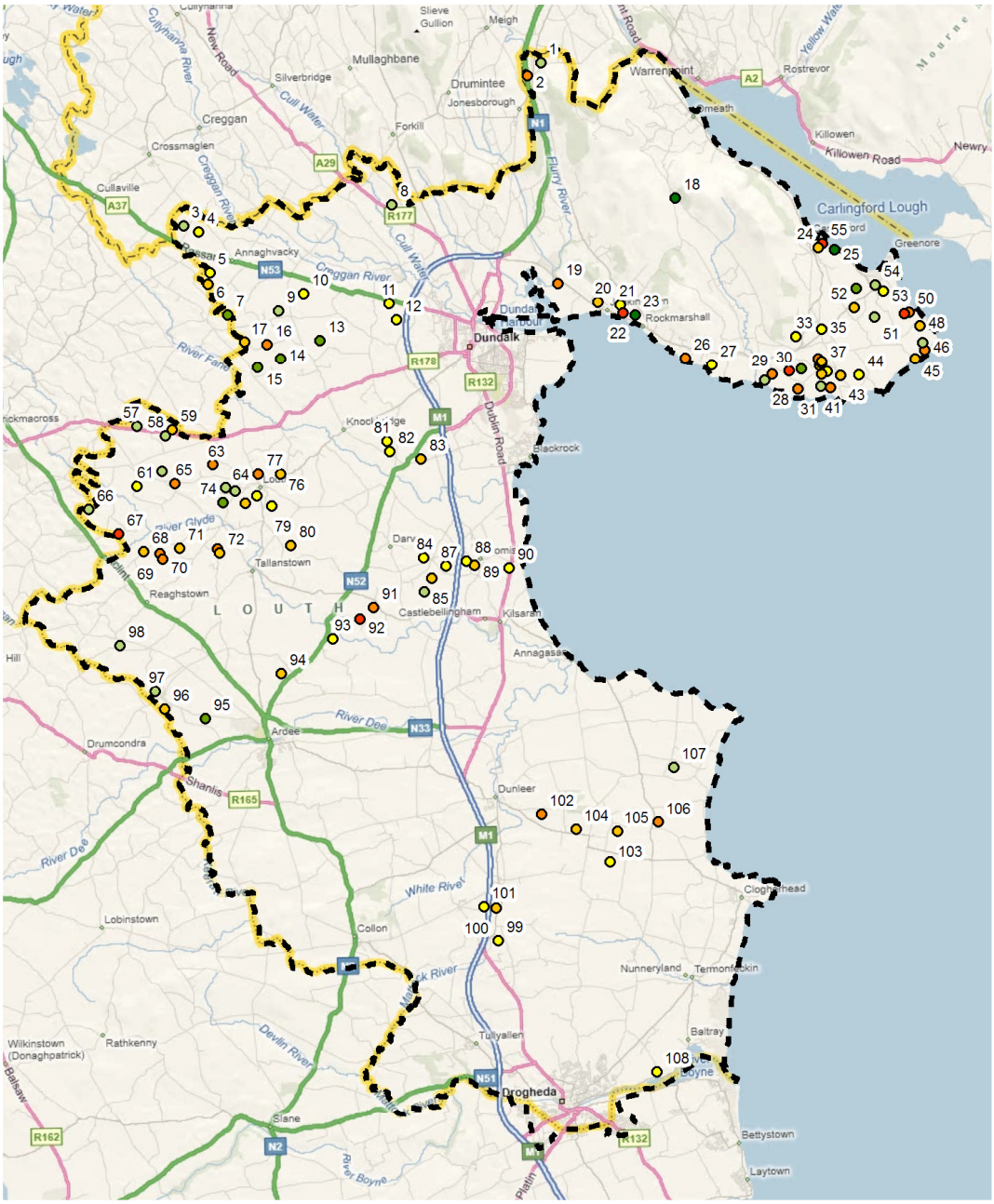

Figure 7.1. Map showing the distribution of LWS 2011 sites according to conservation value.

Table 7.5. Conservation Assessment and ranking of sites surveyed in County Louth during the 2011 LWS.

Ranking: A Rating: Internationally Important; B Rating: Nationally Important; C+ Rating: County Conservation value; C Rating: Local conservation value (high value); D Rating: Local conservation value (moderate value); E Rating: Local conservation value (low value)

Site Name	Site Code	Easting Centre	Northing Centre	Conservation ranking following survey
Corrakit (Windy Gap) - Carlingford Mountain SAC	18	313232	313307	A Rating
Rockmarshall	23	311539	308383	A Rating
Shilties Lough - Carlingford Shore SAC	25	319953	311146	A Rating
Ardee Cutaway Bog NHA	95	293445	291425	B Rating
Carraghcloghan	7	294397	308383	B Rating
Cortial Lough - Drumcah, Toprass and Cortial Loughs NHA	13	298473	307334	B Rating
Drumcah Lough - Drumcah, Toprass and Cortial Lough NHA	15	295757	306025	B Rating
Hoarstone	74	294195	300481	B Rating
Liscarragh Marsh NHA	32	318537.396	306105.8502	B Rating
Mullatee	56	320949	309544	B Rating
Toprass Lough - Drumcah, Toprass and Cortial Lough NHA	14	296823	306410	B Rating
Artoney	62	294711	300955	C+ Rating
Ballagan and Whitestown	47	323674	307214	C+ Rating
Boycetown	107	313181	289342	C+ Rating
Castlecarragh South	28	317011	305634	C+ Rating
Corradoran Lough	66	288528	300201	C+ Rating
Drumgooland	64	294304	301094	C+ Rating
Edentubber	1	307569	319001	C+ Rating
Lurgankeel	8	301298	313023	C+ Rating
Maghareagh	9	296527	308559	C+ Rating
Millgrange	54	321657	309657	C+ Rating
Muchgrange	51	321559	308323	C+ Rating
Rassan Bog	3	292517	312133	C+ Rating
Rathcor Lough	40	319370	305349	C+ Rating
Redbog	57	290554	303670	C+ Rating
Rootate	60	291628	301789	C+ Rating
Ross Lough	58	291747	303276	C+ Rating
Stormanstown Bog	97	291335	292565	C+ Rating
Tullakeel	98	289844	294491	C+ Rating
Wottonstown	85	302658	296749	C+ Rating
Ardpatrick	79	296241	300331	C Rating
Ballynamagher	42	319648	306001	C Rating
Ballynamony (Bradshaw)	44	320987	305849	C Rating
Beaulieu	108	312461	276554	C Rating
Carrickbaggot	103	310509	285380	C Rating
Courtbane	4	293169	311871	C Rating
Cunnicar	10	297493	309253	C Rating
Dromiskin	90	306231	297736	C Rating
Galtrimsland	37	319421	306342	C Rating
Grange Pond	35	319406	307789	C Rating
Greenore	53	322045	309445	C Rating
Jenkinstown	21	310912	308830	C Rating
Knockattin	81	301110	303043	C Rating
Loughanmore Lake	27	314773	306276	C Rating
Mapastown	93	298819	294766	C Rating
Mullaghattin Quarry	33	318329	307489	C Rating
Newrath	87	303580	297818	C Rating
Newtown Monasterboice	99	305780	282045	C Rating
Newtownbalregan	11	301172	308885	C Rating
Newtowndarver	84	302368	298114	C Rating
Richard Taaffes Holding	78	295769	300815	C Rating
Stephenstown Pond NHA	82	301226	302615	C Rating
Tankardsrock	12	301501	308181	C Rating
Tinure	101	305180	283486	C Rating
Treagh North	5	293630	310175	C Rating
Tully (ED Killanny)	61	290658	301114	C Rating

Whiterath	88	304437	298020	C Rating
Ardtully Beg	39	319421	306441	D Rating
Babeswood	86	302970	297319	D Rating
Ballagan	48	323545	307924	D Rating
Ballug	43	320194	305813	D Rating
Ballynamagher West	38	319411	305870	D Rating
Bellurgan	20	309990	308926	D Rating
Briarhill	105	310803	286653	D Rating
Coole Bog	96	291720	291816	D Rating
Dromiskin West	89	304782	297852	D Rating
Drumass	17	295101	307236	D Rating
Dunmahon	83	302520	302309	D Rating
Galtrimsland South	34	319316	306252	D Rating
Greenlane	94	296649	293314	D Rating
Kilcroney	80	297044	298689	D Rating
Knockmor	75	295301	300428	D Rating
Liberties of Carlingford	24	319275	311215	D Rating
Millgrange South	52	320790	308702	D Rating
Morganstown	104	309066	286740	D Rating
Mullavally	76	296600	301670	D Rating
Priest Town	100	305690	283433	D Rating
Rathneestin	72	294057	298375	D Rating
Reaghstown	68	290839	298428	D Rating
Rosslough North	59	292056	303536	D Rating
Thomastown (ED Tallanstown)	71	292366	298578	D Rating
Treagh	6	293570	309690	D Rating
Whitestown Coast	45	323358	306531	D Rating
Ballynamony (Murphy) East	50	323089	308501	E Rating
Bellurgan (Marsh Road) - Dundalk Bay SAC	19	308283	309696	E Rating
Carrickcarnan	2	307015	318435	E Rating
Castlecarragh	29	317323	305872	E Rating
Drumgowna	65	292169	301278	E Rating
Edenagrena	16	295992	307121	E Rating
Galtrimsland Pond	36	319268	306522	E Rating
Grattanstown	102	307612	287382	E Rating
Labanstown	106	312534	287040	E Rating
Nicholastown (ED Tallanstown)	69	291525	298342	E Rating
Nicholastown South	70	291658	298077	E Rating
Rampark Lake	26	313678	306564	E Rating
Rathcor Lower	41	319780	305300	E Rating
Rathcor South	31	318414	305246	E Rating
Rathneestin North	73	293951	298549	E Rating
Toomes	63	293755	302065	E Rating
Tullycahan	77	295676	301674	E Rating
Whitestown	46	323746	306901	E Rating
Woodtown	91	300530	296072	E Rating
Ballynamony (Murphy)	49	322881	308455	No Conservation Value
Bellurgan East	22	311030	308468	No Conservation Value
Derrycammagh	92	299955	295600	No Conservation Value
Drumard	67	289783	299157	No Conservation Value
Liberties of Carlingford East	55	319442	311401	No Conservation Value
Rathcor Upper	30	318025	306032	No Conservation Value

7.8 Additional Wetlands in county Louth

During the course of the LWS 2011 108 potential wetlands (Brophy 2009) were surveyed and described. This list of sites does not, however, represent a full inventory of all freshwater wetlands in county Louth.

Additional sites, both those already recorded in the literature, and unknown but likely to occur in county Louth, exist, which will need to be surveyed, and incorporated into the existing wetland data set prepared as part of this project, if a complete wetland inventory for county Louth is to be created. This was not possible within the resource constraints of the present project. . It is recommended that this be carried out as a matter of urgency as in the absence of such an inventory it is not possible to assess the full extent or conservation status of the resource.

Additional sites have been reported from the literature in both the Louth County Development Plan (LCC 2010) and the draft Biodiversity Action Plan for Louth (LCC 2008) and other resources (Foss 2007; Crushell 2000; Fahy 1972 *inter alia*). It is likely that a systematic review of all published literature, data sets and reports on county Louth, when cross referenced to the sites already surveyed, will yield additional wetland sites in the county.

Some of the additional sites include wetland areas recorded at Carlingford Mountain, Darver Castle Woods, Kildemock Marsh, Mellifont Abbey Woods, Reaghstown Marsh, Rathescar Wood, Mount Mathews *inter alia*.

During the course of the present survey several wetlands were also identified which were not on the 2011 survey list.

In addition, a visual inspection of potential wetland areas across the county from aerial photographs, cross referenced to the sub-soils map produced by the EPA Soil and Subsoil Mapping Project (Teagasc, Kinsealy, 1998-2006), and to known areas liable to flood, will also yield additional sites.

A brief examination of the sub-soils data set, looking at the soil categories Blanket Peat, Fen Peat, Cut Peat and Alluvial Soil indicates that 939 'wetland-indicating subsoil' polygons, with a total area of 8,912 ha, exist within Louth. Although some of these areas will have been examined during the course of the 2011 survey, with only 966 ha of wetland in fact surveyed in 2011, a significant and unknown area of wetland may still await investigation, descrioption and assessment.

A brief examination of the sub-soils dataset for 'wetland-indicating sub-soils' (including Blanket Peat, Fen Peat, Cut Peat and Alluvial Soil) indicates that 939 potential wetland areas, with a total area of 8,912 ha, exist within Louth. Although some of these areas will have been examined during the course of the 2011 survey (966 ha) it is clear that a large part of the resource remains undocumented.[repetition]

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8 Louth Wetland Recommendations

8.1 Distribution and Extent of the Louth Wetland Resource

It is recommended that the countywide survey of wetlands in Louth continues and builds on the baseline information gathered on the 108 wetland sites examined as part of the Louth Wetland Identification Survey 2011. Additional sites exist which require survey or are likely to be discovered as part of systematic aerial photographic or soil follow-on survey of possible wetland locations in the county (see section 7.8 above).

Initially a desktop study should be undertaken with the objective of identifying all 'potential' wetlands within the county.

Where a field survey is proposed it is recommended that the following information is gathered for each site surveyed:

- A detailed site description highlighting the wetland habitat types (classified according to Fossitt Level III) present on each site should be provided;
- 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;
- Faunal observations made should be recorded;
- A botanical list of the species present should be recorded;
- 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.

8.2 Site Designations

It is recommended that all wetland sites, which have been identified in this survey, and rated as either A, B or C+ (of international, national or county importance) are forwarded to the National Parks and Wildlife Service (NPWS) for inclusion on their list of sites for survey and designation.

These sites should be listed as candidate Natural Heritage Areas and objectively assessed by NPWS for designation as Natural Heritage Areas. Such recommendations for assessment should be made on a regular basis as further information on the wetland resource of county Louth becomes known.

8.3 Sites Boundary Review

During the course of the LWS 2011, existing site boundaries were largely retained. It is recommended that boundaries should be re-drawn using base mapping at an appropriate scale. Ecological advice should inform the revised boundaries, to ensure that the entire area of ecological interest (and hydrological unit) is included.

8.4 Planning Controls

Sites which are listed as being of county importance (C+) or of higher value, local importance (C) and of moderate value, local importance (D) should be highlighted and included in any recommendations made under the County Biodiversity Action Plan or included in local area plans, county development plans or other planning strategies. Again, such recommendations for recognition and listing of sites should be made on a regular basis as further information on the wetland resource of county Louth becomes known.

It is recommended that council staff should be aware of a variety of issues regarding wetlands when assessing development proposals and planning applications. These include:

- The need for an appropriate buffer zone surrounding wetland sites. This is often already provided in REPS plans, where, for example, landowners are required to leave a buffer zone around a wetland when spreading slurry .

- The importance of hydrology in how wetland sites function and how indirect impacts on a wetland system can be caused by activities occurring at some distance from the wetland
- The damaging cumulative effect of seemingly isolated losses of wetland habitats across the county on the overall county resource
- The loss of wetland habitats as a result of fragmentation of sites and impacts on wetland hydrology
- The ecological value of wetland habitats adjacent to, and fringing lakes and ponds
- The ecological value of large areas of reed and tall sedge swamps, rivers and river flood plains in controlling and reducing the impacts of flooding events
- The wetland fauna, some of which are listed on Annex II of the Habitats Directive, found in the county's wetlands and the potential impacts on these species as well as their habitats
- The limited coverage provided in the initial NPWS NHA survey – this was never a comprehensive survey of the entire county – many sites of high nature conservation value remain undesignated
- The potential value of wetland sites which are outside statutorily-designated areas and the need for adoption of a precautionary approach when assessing applications that may impact on same
- The role that the wetland resource plays in combatting global warming. It is likely that the wetlands of County Louth act as a major sink of carbon.

8.5 Ongoing Maintenance of the LWS site database and completion of wetland inventory

Undoubtedly additional information exists on wetland sites listed in the LWS site database, and additional sites remain to be discovered and described.

Unfortunately it was not possible to include these data in the 2011 GIS dataset and database, due to resource constraints. It is recommended that these data are compiled within the database and that it is kept up to date, where possible by collating data from additional surveys, EIS documents, etc. This work needs to be done concurrently with ongoing maintenance of the LWS GIS dataset.

8.6 Ongoing Maintenance of the County Louth Wetland Map GIS Dataset

Coupled with ongoing updates of the LWS site database, it is recommended that a complete wetland map of the county should be attempted, drawing on data held within the various GIS resources that currently exist.

8.7 Further Survey & Assessment of Wetland Sites

A hydrological assessment of all sites which have been given a rating of A, B or C+ rating should be commissioned in order to assist in our understanding of how these wetlands function hydrologically. The National Fen Survey manual (Foss (2008)) also recommends that a hydro-chemical analysis is conducted.

In addition a number of sites examined in 2011 have been identified (see site reports in Appendix 6) which may contain important invertebrate assemblages. Surveys of these groups could be undertaken within the county to increase knowledge of the biodiversity value of these wetlands (e.g. Dragonfly & Damselfly survey; Marsh Fritillary survey *inter alia*).

More detailed botanical surveys of some of the sites examined during the LWS 2011 have also been recommended on sites listed as of A, B, or C+ conservation value (see site reports in Appendix 6).

8.8 Management of Louth Wetland Sites

Many of the landowners of wetland sites are likely to be members of the Rural Environmental Protection Scheme (REPS). Where landowners are not members of REPS they should be contacted to make sure that management is sensitive to the requirements of wetland areas, such as the need for an adequate buffer zone around the wetland.

REPS planners based in county Louth should be briefed on the value of wetland habitats and suitable management practices for these sites. Management of agricultural runoff and other measures to prevent water pollution should be discussed and agreed on. These measures will also assist the local authority in meeting its requirements under both the EU Nitrates Directive and the EU Water Framework Directive.

The Department of Agriculture should be informed that their regulations to remove non-agricultural land from area aid packages is prompting some farmers to reclaim wetlands to the detriment of Louth's biodiversity.

For further information on best practice management guidelines for many of the wetland habitats listed, the reader is referred to "The Living Farmland – A Guide to Farming for Nature in Clare" (Anonymous 2008c) which provides practical advice on habitat maintenance and improvement for landowners and farmers. In addition, the NPWS website (www.npws.ie) provides a range of guidelines to help with the protection, management and wise use of conservation-worthy habitats and protected species, including information on the Rural Environment Protection Scheme (REPS), Farm Plan Schemes, Notifiable actions *inter alia*. Furthermore the Irish Peatland Conservation Council has published a Management Handbook for Peatland, which provides practical advice on habitat restoration (see www.ipcc.ie).

Restoration of threatened and degraded wetland habitats should be encouraged, such as of the highly modified bogs. Funding opportunities for such initiatives should be investigated and pursued.

Newly proposed regulations requiring certain agricultural activities to go through the EIA process is a positive development and should aid the protection of wetlands throughout the county and country.

8.9 Enforcement of Fines for Illegal Dumping and Infill

Infilling and reclamation of wetland is an ongoing threat to the wetland resource in county Louth. This practice should be dissuaded through both education on the value of wetlands and the enforcement of suitably deterring fines. Article 10(1)(y) of the EPA Guidance Manual Waste Facility Permit and Registration Regulations requires that an application for a waste facility permit or certificate of registration contain details of the biodiversity of the land and specifically details wetlands within same.

The protection of Louth's diverse wetland resource depends on strict enforcement of national conservation legislation by the NPWS, and planning [and waste?] laws by the County Council to ensure unauthorised damaging activities are prevented.

8.10 Control of Invasive Species in Wetlands

It is important that invasive species are controlled and eradicated within wetland sites as they have the potential to cause serious nuisance and can be very costly and difficult to remove once they become established. Typical species affecting wetlands include Rhododendron (*Rhododendron ponticum)*, Japanese knotweed (*Fallopia japonica*) and Indian balsam (*Impatiens glandulifera*). It is recommended that all records of invasive species in County Louth are submitted to the Invasive Species Ireland database (http://www.invasivespeciesireland.com/sighting/) where advice on control and removal is also available.

8.11 Local Authority Wetlands Policy

A review of the statutory provisions that govern the management of wetlands in County Louth (such as the Habitats Directive, Wildlife Act, Water Framework Directive, Environmental Liability Directive, Nitrates Directive, Planning Act, etc.) should be conducted and the role of the Local Authority in this regard should be examined. This review could be done in collaboration with other Local Authorities.

Increased co-ordination between agencies in their policy and operative approaches to wetlands need to be strengthened.

8.12 Water Framework Directive

As a member of the European Union, Ireland must, as of the 22nd December 2000, implement the Water Framework Directive (2000/60/EC). This directive provides a consolidated, strengthened framework for the protection and improvement of all of our waters - rivers, lakes, marine and groundwaters, and of our water-dependent habitats and species. The aim of the Water Framework Directive is to prevent any deterioration in the existing status of our waters, including the protection of good and high status where it exists, and to ensure that all waters are restored to at least good status by 2015.

The objectives of the WFD are:

- to protect and enhance the status of aquatic ecosystems (and terrestrial ecosystems and wetlands directly dependent on aquatic ecosystems)
- to promote sustainable water use based on long-term protection of available water resources
- to provide for sufficient supply of good quality surface water and groundwater as needed for sustainable, balanced and equitable water use
- to provide for enhanced protection and improvement of the aquatic environment by reducing / phasing out of discharges, emissions etc.
- to contribute to mitigating the effects of floods and droughts
- to protect territorial and marine waters
- to establish a register of 'protected areas' e.g. areas designated for protection of habitats or species

Clearly the identification of wetland habitats in County Louth assists in fulfilling not only our obligations under the EU Habitats Directive and the National Biodiversity Plan but also in implementing the Water Framework Directive.

8.13 Public Information and Interpretation Measures

Public awareness about the importance of the wetlands in county Louth should be developed through a series of targeted measures. **On-going public awareness campaigns** should be undertaken to inform the people of Louth of the value of the county's wetland resource and the valuable ecosystem services they provide.

These could include:

- Information aimed specifically at landowners and farmers to explain the value of wetlands on their land should be developed
- Specific events county-wide as part of 'Heritage Day' which takes place annually in September [no it doesn't, not in Ireland] further details are available from http://www.ramsar.org/wwd/wwd_index.htm
- A series of school visits celebrating local wetlands – co-ordinated through the Heritage in Schools Scheme
- Public display boards and signage at popular wetland sites should be developed to inform the public of their biodiversity value and the ecosystem services such wetlands play
- A workshop on wetland management for landowners should be held
- A colour leaflet should be produced to illustrate the beauty of wetlands within the County and the importance their conservation. A similar leaflet was produced in County Monaghan (MCC 2008).

9 Bibliography

The bibliography list is presented in alphabetical order by author. Code number appearing on the LHS is reference/report code number in the LWM 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 PDFs were created are included on the CD ROM that accompanies this report.