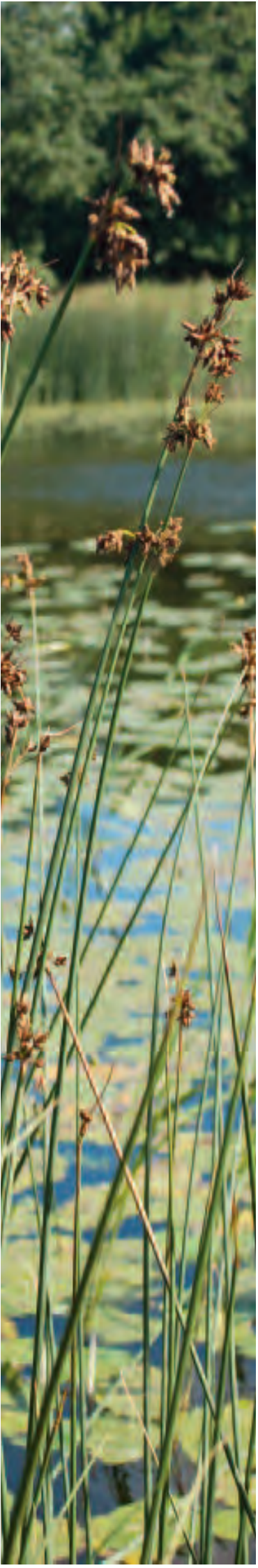

# Monaghan Fen Survey II

## Volume I: Main Report

Report for Monaghan County Council & The National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland

Prepared on behalf of Wetland Surveys by:
Dr Peter Foss & Patrick Crushell

October 2008

An Action of the Monaghan Heritage Plan 2006-2010

Monaghan County Council

National Parks & Wildlife Service

epa

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wetlandsurveys ireland

by

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An Action of the Monaghan Heritage Plan 2006-2010



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Report cover images:
Left: – Common club-rush (*Schoenoplectus lacustris*) forming a narrow reed fringe on the shore Killyboley Lough.
Top: – Reed mace (*Typha latifolia*) marsh forming a fringe on the shore of Lough Aphuca.
Bottom: – Cutover bog area with Ling heather peat hags and intervening pool and poor fen areas at Lough Nahinch.

# Contents: Volume I - Main Report



# Contents: Volume II - Monaghan Fen Survey 2008 Site Survey Reports and Maps – Appendix 2

Containing:

- Site Survey Report
- Six Inch Site map, Boundary data and location of Field Survey Notes
- Site Air Photograph
- Site Habitat Map

# Contents: Volume III - Monaghan Fen Survey 2008 Site Photographic Reports and Notes

# Acknowledgements

This project was made possible through the generous financial support of The Heritage Council, Monaghan County Council and the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

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The land-owners for allowing access onto their lands during the course of the field survey.

Shirley Clerkin, Heritage Officer, Monaghan County Council for help during the survey period and for comments and suggestions on the final report.

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Finally thanks to Deaglán Ó Caoimh for editorial comments and proof reading selected sections of the final report.

# 1. Executive Summary

1. The Monaghan Fen Survey II (2008) report includes results of a detailed survey of 34 sites in County Monaghan, containing a total of 35 discrete survey compartments with a total site area of 559 ha (see Appendix 1) undertaken during summer 2008.

2. Site survey methodology follows that developed by the National Parks and Wildlife Service (Foss & Crushell 2008) for the National Fen Survey of Ireland. This survey methodology was developed following survey trials undertaken as part of the first Monaghan Fen Survey in 2007.

3. On sites where fen communities were observed, the sites were described in detail, and the fen types present were recorded (via the collection of vegetation descriptions (relevés) from quadrats within each site), these relevés were subsequently classified, and hydrochemical analysis of water samples collected from relevés was undertaken. The habitats present were mapped and their extent calculated, threats and damage were noted, management recommendations made and sites were ranked in terms of their conservation value.

4. This survey information was collated, digitised and stored within the National Parks and Wildlife Service (NPWS) National Fen Survey Database (Version 2.0). Additionally, a completed paper based site report for each site was produced and lodged with the NPWS Research Section.

3. The main results to emerge from the sites surveyed in detail as part of the Monaghan Fen Survey II (MFS II) 2008 are as follows:

    - Of the 34 sites surveyed, 10 were found to contain fen communities, the remainder contained other wetland habitats including marsh, reed swamp and wet woodland;
    - The total area of fen recorded on sites during the MFS II was 26.7 ha;
    - Transition Mire 7140 (PF3) is the most frequently occurring fen habitat type recorded during the MFS II, with a total fen habitat area of 25 ha occurring on 9 different sites;
    - Three main fen types were recognised during the MFS II, namely Poor fen PF2 (1.7 ha), Transition Mire 7140 PF3 (25 ha), and *Cladium* fen 7210 PF1 (0.1 ha);
    - Of the 34 sites surveyed, 17 are of National Conservation Value (NHA quality); 11 are of County Conservation Value; with the remaining 6 being of Local Biodiversity Value (Moderate local value);
    - Future conservation of these sites will require appropriate designation, listing and planning control by the NPWS and Monaghan County Council;
    - Three of the sites surveyed cross the international border with Northern Ireland. Two sites in Monaghan occur close by recognised conservation areas in Northern Ireland. Discrepancies in conservation designations occur at each of these sites which may hinder the long term conservation of these areas. These issues should be addressed by National Parks and Wildlife Service (ROI) and the Environment and Heritage Service (NI);
    - All of the fens surveyed during the MFS II were found to have been negatively affected by some degree of damage or modification from their natural state. The most significant damage observed was from drainage of wetlands, possible water pollution and infilling associated with land reclamatation. These issues will need to be addressed to prevent further degradation and subsequent loss of habitat and conservation value.

4. Classification of vegetation relevés showed that three main vegetation types, alkaline *Cladium* fen, Transition mire and Poor fen were recorded on the sites examined during the MFS II.

5. Hydrochemical analysis of water samples confirmed a clear gradient from base-poor acid conditions prevalent at Poor fen sites to intermediate neutral conditions of Transition mires to base-rich alkaline conditions prevalent at the *Cladium* Fen site. The hydrochemistry data

collected provides good baseline data for these fen habitat types, in particular Transition Mire, which to date has received little attention in Ireland despite being listed as a habitat of international importance on the EU Habitats Directive.

6. Although the main plant nutrients Phosphorus and Nitrogen were analysed, the concentration of these nutrients was not found to be directly related to differences in vegetation types.

7. To ensure the long term protection of conservation worthy sites identified by the MFS, with a National or County Conservation Value, these sites must be listed in the County Development Plan and in Local Area Plans where appropriate.

8. On sites that are earmarked for conservation, strict planning controls must be enforced by the County Council.

9. As many of the sites identified, both those with an existing conservation designation and those being proposed for conservation, are in private ownership, their conservation will depend on voluntary co-operation with landowners and various stakeholders. The County Council should foster a wider understanding among these parties.

10. To foster a more positive attitude to the conservation value of wetlands and fen areas in Monaghan in particular, the public information programme initiated with the production of the "Wonderful Wetlands" poster and information brochure, should be continued with interpretation at the most important and accessible sites identified.

11. The National Fen Survey of Ireland methodology developed by the NPWS was tested during the course of the MFS II (2008).

12. Based on the results of the MFS of 2007 and 2008 a total of 122.3 ha of fen habitat have been identified in County Monaghan in a total of 35 discrete sites.

13. The area of the different fen types indicates that Transition Mire is the most abundant fen type in Monaghan with a total recognised habitat area of 101.2 ha.

14. 18.5 ha of Poor fen habitat were recorded within the County.

15. The rarest fen type recorded in Monaghan is Alkaline fen which covers a total area of just 2.7 ha (of which 1.5 ha is Alkaline fen and 1.2 ha can be further classified as *Cladium* fen, a Alkaline fen sub-type).

# 2. Introduction to the Monaghan Fen Survey 2008

## 2.1 Background

The 2008 survey of fens in county Monaghan (MFS II) was commissioned by Monaghan County Council, the National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government and the Heritage Council. The survey is an Action of the Monaghan Heritage Plan 2006-2010.

The MFS II was a follow-on survey from the first Monaghan Fen Survey undertaken in 2007 (Foss & Crushell 2007). The aim of the MFS II was to complete the survey of potential fen sites of conservation interest identified in 2007 in county Monaghan, but which could not be surveyed due to time constraints.

It is suggested that the reader consult the Monaghan Fen Survey reports from 2007 (Foss & Crushell 2007) for background data on County Monaghan which has not been reproduced here.

In addition, details of the survey methodology employed in the MFS II follow those developed by the National Parks and Wildlife Service and presented in the document entitled 'Guidelines for a National Fen Survey of Ireland – Survey Manual 2008' (Foss & Crushell 2008).

## 2.2 The Monaghan Fen Survey 2008

The Monaghan Fen Survey (2008) addressed the following research objectives:

- to describe the vegetation of each site with particular emphasis on the fen communities that are present;
- identify and classify the key fen habitat and vegetation types present on each site according to the scheme proposed in Foss & Crushell 2008;
- ascertain the extent of the fen type(s) present and the overall site extent, and map these fen habitats together with the other main habitats identified;
- investigate the water chemistry parameters of each site and relate it to the fen communities that occur;
- measure peat depth associated with the fen types recorded;
- identify the main threats and damage present on the sites, and propose management options;
- to estimate the extent of fen habitat throughout the county and assess the conservation significance of the resource;
- rank the conservation importance of sites on an international/national scale (NHA and SAC) and from a local biodiversity perspective, and recommend sites for conservation designation;
- test and evaluate the revised National Fen Survey methodology developed by the NPWS (Foss & Crushell 2008).

# 3. Materials and Methods

## 3.1 Introduction

The 2008 Monaghan Fen Survey was undertaken over the period from the 1st May 2008 to the 30th October 2008.

Background research on sites, data collection and survey preparation (maps; survey folders etc.) was undertaken during May 2008 in the National Parks and Wildlife Service Research Headquarters, Dublin and in the offices of Monaghan County Council.

The survey of sites in Monaghan was undertaken from the 14th July to the 23rd July 2008. Survey results including relevé data, water chemistry data, site descriptions, surveys notes, site evaluations and final survey maps with habitat areas mapped were collated and digitised in the National Parks and Wildlife Service Research Headquarters, Dublin during August. Data analysis was undertaken during August. The report of the survey was prepared in September and submitted in final format in October 2008.

## 3.2 Identification of Sites

The sites listed for surveyed as part of the MFS II were principally submitted by Dr Alan Hill, Botanical Society of Britain and Ireland (BSBI) Vice County recorder for Monaghan in 2007 but were not examined as part of the 2007 MFS.

The Hill list contained 31 sites (see Appendix 1). Three further sites were added to the list, one discovered, but not surveyed as part of the MFS in 2007 and two were added at the request of the Monaghan Heritage Officer.

The list of sites for survey included three sites which are potential Natural Heritage Areas (pNHA), as defined by the list of sites originally advertised by NPWS in 1995 (namely Dromore Lakes 000001; Loughbawn House Loughs 001595; and Black and Derrygoony Loughs 001596). A further two sites have been recommended by experts to NPWS for Natural Heritage Areas designation since the 1995 site list was advertised, and include Tassan Lough 001666 and Rahans Lough 002844.

## 3.3 Background Site Research

Once the list of sites had been compiled a site folder was created for each site which included:

- Air photograph of each site with provisional survey boundary, which was overlaid with either a 100 or 200 meter square survey grid;
- Six inch map of each site with provisional survey boundary, overlaid with either a 100 or 200 meter square survey grid;
- Previous survey reports and site descriptions where these were available;
- NPWS Ecologists Survey reports or NPWS Ranger Reports from the NHA survey conducted in the mid 1990's, where these were available for sites;
- National Fen Survey of Ireland (NFS) Site form which held all basic site information

In addition a number of Geographic Information System (GIS) data sets were used to compile background information on sites, including data on underlying solid geology, quaternary deposits and river catchment information (see Foss & Crushell 2007). This GIS information, together with site particulars, descriptions and previous survey information, was entered in respect of each site for which data was available, onto a NFS Site Form, prior to being entered into the NPWS Fen Survey Database (see below).

### 3.3.1 GIS Map Data

ArcView 9.2 GIS software package was used throughout the Monaghan Fen Survey II for all mapping purposes. Digitised base-maps were supplied by Monaghan County Council which included; a full series of colour aerial photographs (digital orthophotos) produced by Ordnance Survey of Ireland, the OS 6 Inch series of maps, the recent 1:5000 series and the discovery series 1:50,000 maps.

Shape files of survey boundaries for each site were created, in the case of existing designated sites, those boundaries as drawn by NPWS were used, but in the case of new sites, boundaries were drawn to include all semi-natural habitat adjoining the fen site. The extent of each site was calculated and recorded in the MFS site database. Maps and aerial photographs were produced for each site for use during the field survey.

Following site surveys, habitat maps were produced. For every site, fen habitat was mapped according to the fen type recorded. On those sites that were ranked as being of local ecological importance no further mapping was undertaken. For those sites that were deemed to be of high local importance and greater, all habitats were mapped using ArcGIS 9.2. The habitats within each site have been classified according to *A Guide to Habitats in Ireland* (Fossitt 2000). The terminology used follows this guide and the alphanumeric codes are used where possible both on maps and in the text.

The colour coding for habitat mapping follows the Heritage Council Draft Guidelines (Anonymous 2002). A final habitat map (overlain on the 1:5000 series maps) of each site was produced for inclusion in the site file and the final report. The extent of fen types and habitat types associated with each site was calculated using GIS and recorded in the MFS site database.

## 3.4 NPWS National Fen Survey Database

All data collected during the MFS II was stored digitally with the NPWS National Fen Survey of Ireland (NFS) Database version 2.0. Details of the structure and operation of this database are presented in Foss & Crushell (2008).

In summary the database holds information on site provenance, site names, county, SAC and NHA codes, national grid reference, site conservation designations, habitat information on the specific fen vegetation type(s) present and the area of each (or an estimate where no accurate data was available), information on rare species of note, a summary of previous published reports holding information on the site, and a site evaluation section which ranked each site in terms of its conservation importance, area information, survey information, and survey priority.

Two secondary relational databases (linked to one another by use of site record number and reference code number), held a list of reports and publications referring to fens within the database, and a publications / report site records database, made up the complete NPWS National Fen Survey of Ireland database.

The database was created using the Filemaker Pro 8 database package which runs on both PC and Mac platforms.

## 3.5 Monaghan Fen Field Survey Methodology

The Monaghan Fen Survey 2008 used the survey procedures, data recording, data analysis and site evaluation and ranking procedures developed for the National Fen Survey of Ireland. Further details of the methodologies employed during the MFS II are presented in the 'Guidelines for a National Fen Survey of Ireland – Survey Manual' (Foss & Crushell 2008).

## 3.6 Site Hydrochemistry

Electrical Conductivity (EC) of surface water was measured in the field (using a WTW 315i EC Meter) at each location that a vegetation relevé was recorded.

Where possible, two 1 litre water samples were collected from each of the sites surveyed in detail during the Monaghan Fen Survey II where fen habitats were recorded. Samples were taken at or as close as possible to relevé locations. In some situations, due to a low water-table, samples were taken from the nearest area of surface water.

Samples were collected in polyethylene bottles, labelled and were stored at 4°C. All water sampling was carried out in a single day at the end of the field survey period and delivered to EPA regional inspectorate (NAB accredited laboratory) within 24 hours for detailed chemical analysis. Determination of metal concentrations was carried out by Inductively Coupled Plasma Mass Spectrometry (ICPMS) at the EPA Richview Laboratory, Dublin.

All chemical parameters measured are listed in Table 3.1 along with the methods used in determination.

A table showing the limits of Quantification (LOQ), the maximum uncertainty of the analysis and the EPA laboratory method reference number (internal Monaghan Inspectorate document) for each parameter are presented in Appendix 8 from the first Monaghan Fen Survey (Foss & Crushell 2007).

The hydro chemistry results from the MFS II is presented in tabular form in Appendix 5.

Table 3.1. Chemical parameters determined by the EPA, laboratory and methods used.

| Parameter | Laboratory | Method of Determination |
|---|---|---|
| Electrical Conductivity | EPA, Monaghan | Electrometrically using a conductivity meter |
| pH | EPA, Monaghan | Electrometrically using a pH meter. |
| Ammonia | EPA, Monaghan | Absorption spectrophotometry using a flow injection analyser - salicylate method. |
| Ortho-phosphate | EPA, Monaghan | Absorption spectrophotometry using a flow injection analyser - scorbic/molybdate method. |
| Total Oxidised Nitrogen | EPA, Monaghan | Absorption spectrophotometry using a flow injection analyser – cadmium reduction/sulphanilamide & NED. |
| Total Phosphorus | EPA, Monaghan | By acid digestion and absorption spectrophotometry using a flow injection analyser – ascorbic/molybdate method. |
| Alkalinity | EPA, Monaghan | Titration with sulphuric acid and methyl orange. |
| Sulphate | EPA, Monaghan | Ion chromatography |
| Metals (Calcium, Magnesium, Iron, Potassium, Sodium, Manganese, Copper, Zinc) | EPA, Richview, Dublin. | Inductively Coupled Plasma Mass Spectrometry (ICPMS) |

## 3.7 Completed Fen Survey Site Record

Following completion of the site survey, a site folder for each site surveyed was created containing the following documents and information (deposited with the Research Branch of the NPWS, Dublin):

- Completed relevé cards
- Photographic record of survey with explanatory notes to photographs
- Site description output from the NPWS Fen Survey database which included all site particulars *inter alia*: site description, survey notes, water chemistry data, information on site threats and damage and site conservation evaluation
- Six inch map of the site with the location of site notes shown
- Colour air photograph of the site
- Previous site reports and survey information
- And where the site is proposed for NHA/SAC designation, a completed NPWS NHA site form

# 4. Results

## 4.1 General Survey Findings from the Monaghan Fen Survey 2008

A detailed habitat survey of 34 wetland sites with a total area of 559 ha was undertaken (containing a total of 35 sub-site compartments) in County Monaghan during the current field survey. Ten of these sites were found to contain fen habitats with a total aea of 26.7 ha.

The sites surveyed as part of the MFS II are listed in Table 4.1 and their location within the county is illustrated in Figure 4.1.

In addition, a combined map showing the location of all sites surveyed in County Monaghan as part of the fen surveys in 2007 and 2008 and with fen and non-fen sites are shown in Figures 4.2 and 4.3 respectively.

The survey data collected from the detailed survey of each site, included *inter alia*; all habitat types recorded, fen interest on the site, fen extent data, site description, field notes. This information was compiled in a Filemaker Pro 8 database. Version 2.0 of the NPWS National Fen Survey Database, containing a subset of sites listed for County Monaghan (both 2007 and 2008 surveys), is included on the CD accompanying this report.

In addition to the data for each site held within the survey database a photographic record with notes was compiled for each site and in presented in a separate Volume III of this report.

The site air photograph, six inch map with the location of field notes, and a detailed habitat map, and a report on the sites produced from the NFS database constitutes a full site survey report in the context of this survey. The complete site survey reports (for the 34 sites surveyed) are presented in Appendix 2 (Volume II) in of this report.

In addition to the site survey reports presented in this final project report, a detailed paper based site folder for each site surveyed was created and is lodged with the NPWS Research Branch, Dublin. These site folders contain the same information as in the database site report with the addition of previous reports and survey data where this was available for a site, together with field notes taken during this survey, original relevé cards and where the site was proposed for NHA designation, a completed NPWS Natural Heritage Area (NHA) form.

## 4.2 Fen Habitats & Extent Confirmed by the Monaghan Fen Survey 2008

A total of 34 fen sites were identified for survey in County Monaghan as part of the MFS II with a total area of 559 ha.

In contrast to the 2007 fen survey, no data was available on the likelihood of the fen types or extent of fen that were likely to occur on these sites, due primarily to a lack of such data.

Following the Monaghan Fen Survey (MFS II) the following survey findings emerged in relation to fen habitats recorded and the extent of these on the sites surveyed:

- On 10 of the 34 sites surveyed, fen communities were found following the present survey;
- On the remaining 24 sites proposed as possibly containing a fen habitat present, no fen interest was found on the sites following the present survey;
- Three fen types namely, transition mire, poor fen and *Cladium* fen (Alkaline) were recorded on the 10 fen sites discovered;
- The accurately mapped and estimated area of fen based on the current survey results, was found to be 26.7 ha;
- Transition Mire 7140 (PF3) was the most frequently occurring fen type recorded during the MFS II, with a total fen area of 25 ha.
- The Poor fen area recorded was 1.7 ha and the *Cladium* fen (Alkaline) area covered 0.06 ha.

The fen type and area of fen recorded on each site surveyed is presented in Appendix 1. A summary table showing the area of each fen type recorded during the 2007 and 2008 MFS surveys is presented in Table 4.2.

Table 4.1. The sites surveyed in detail as part of the Monaghan Fen Survey 2008.

| MFS Site Code | Site Name | Grid Reference |
|---|---|---|
| MFS-17 | AGHAFIN LOUGH | H 500 240 |
| MFS-09 | AGHAFIN LOUGH LITTLE | H 447 217 |
| MFS-10 | ANNAGOSE LOUGH | H 772 022 |
| MFS-11 | ANNYALTY LOUGHS | H 654 183 |
| MFS-12 | BISHOPS LOUGH | H 457 241 |
| 001596 | BLACK LOUGH (BLACK & DERRYGOONY LOUGHS NHA) | H 525 280 |
| 001595 | BLACK LOUGH (LOUGHBAWN NHA) | H 473 196 |
| MFS-13 | CARGAGHMORE FEN | H 887 085 |
| MFS-14 | CARRICKASLANE LOUGH | H 575 337 |
| MFS-27 | CARRICKMORE | H 853 107 |
| MFS-15 | CLONKEEN LOUGH | H 636 231 |
| MFS-16 | CLONOONY LOUGH | H 606 180 |
| MFS-18 | CORLEA | H 724 394 |
| MFS-19 | CORRAVOO LOUGH | H 831 059 |
| MFS-20 | CORVAGHAN | H 784 265 |
| MFS-21 | CREEVAGHY | H 558 296 |
| MFS-23 | DRUMAVEALE LOUGH | H 940 084 |
| MFS-24 | DRUMGANNY LOUGH | H 842 226 |
| MFS-25 | DRUMGOAST LOUGH | H 831 978 |
| MFS-26 | DRUMHARRIF LOUGH | H 537 020 |
| MFS-28 | FALTAGH | H 571 267 |
| 000001 | ISLAND BRIDGE (DROMORE LAKES NHA) | H 756 109 |
| MFS-29 | KILLYBOLEY LOUGH | H 734 397 |
| MFS-30 | LOUGH APHUCA | H 794 261 |
| MFS-40 | LOUGH NAHINCH | H 500 240 |
| MFS-31 | LOUGH OONEY | H 447 217 |
| MFS-32 | MOUNT MATTHEWS | H 772 022 |
| MFS-33 | MUCKNO MILL LOUGH | H 654 183 |
| 002844 | RAHANS LOUGH pNHA | H 457 241 |
| MFS-35 | RATHKEEVAN LOUGH | H 525 280 |
| MFS-36 | ROOSKY LOUGH | H 473 196 |
| MFS-37 | SHANTONAGH LOUGH | H 887 085 |
| MFS-38 | SILLIS LOUGH | H 575 337 |
| 001666 | TASSAN LOUGH pNHA | H 853 107 |

NHA – Natural Heritage Area; pNHA – proposed Natural Heritage Area.

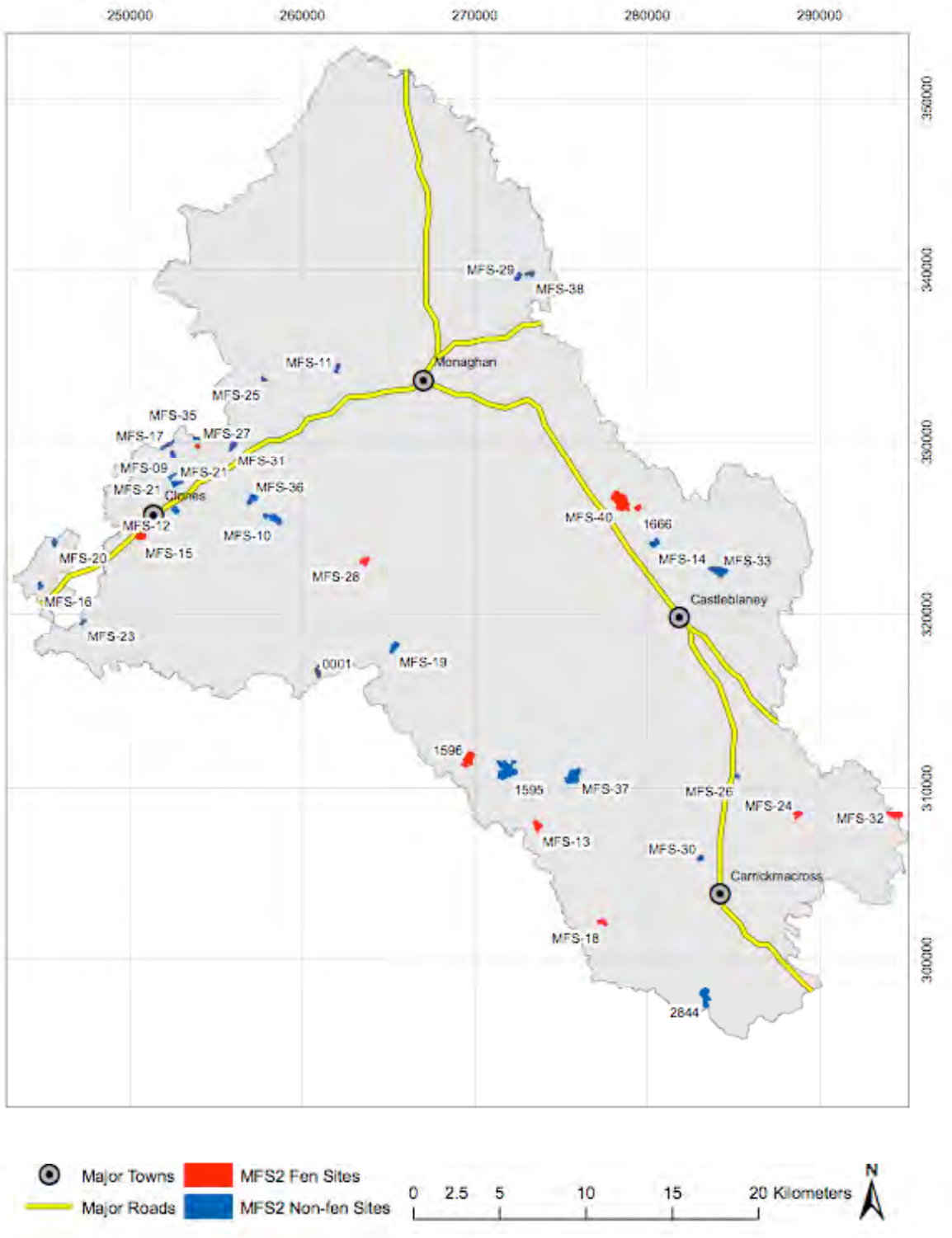


Figure 4.1. The location of sites surveyed as part of the Monaghan Fen Survey II 2008. Sites in red are those that were found to contain fen communities following the survey; sites marked in blue are non-fen sites. An explanation of site codes can be found in Table 4.1.

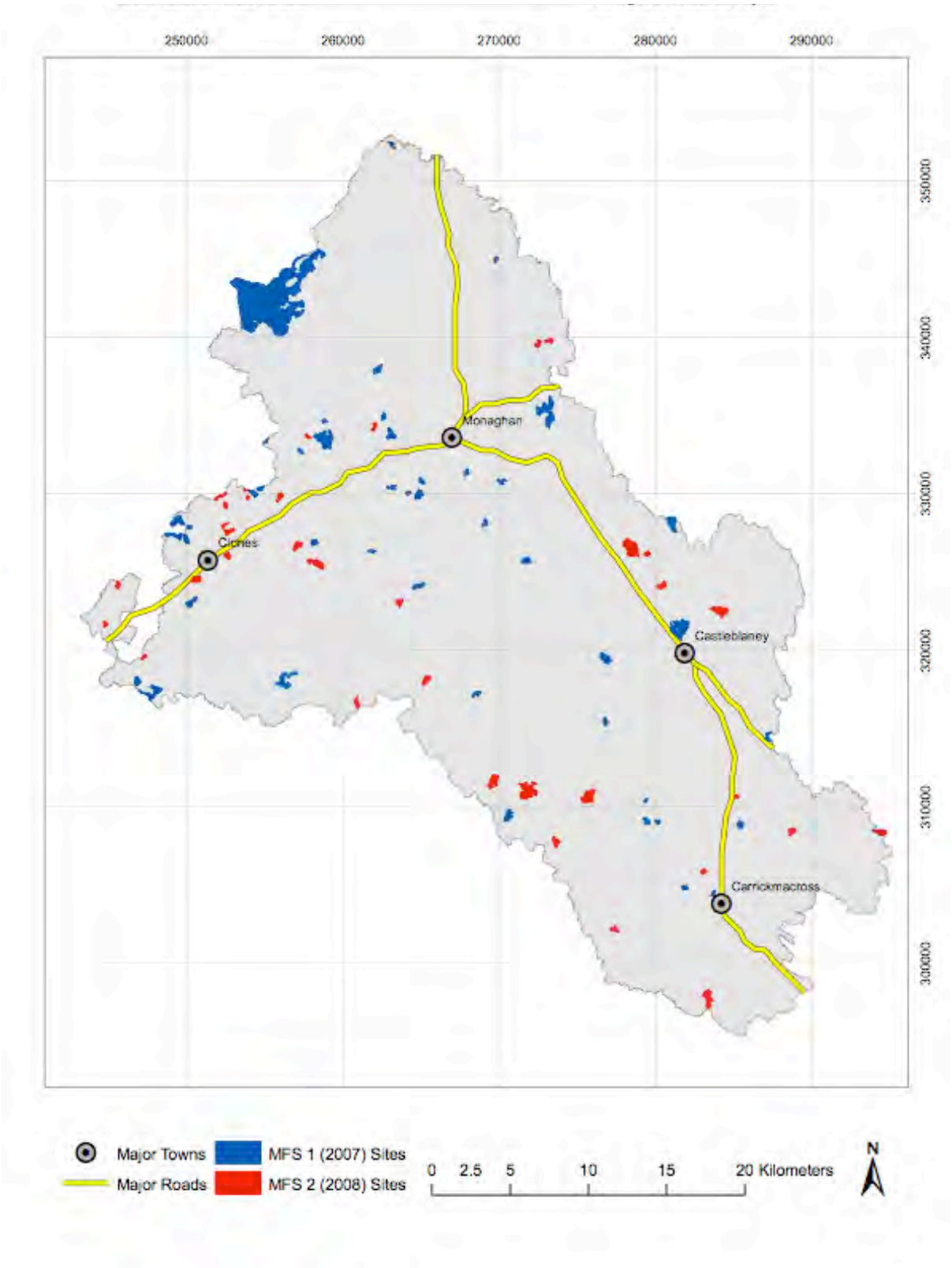


Figure 4.2. The location of all sites surveyed as part of the Monaghan Fen Surveys in 2007 and 2008.

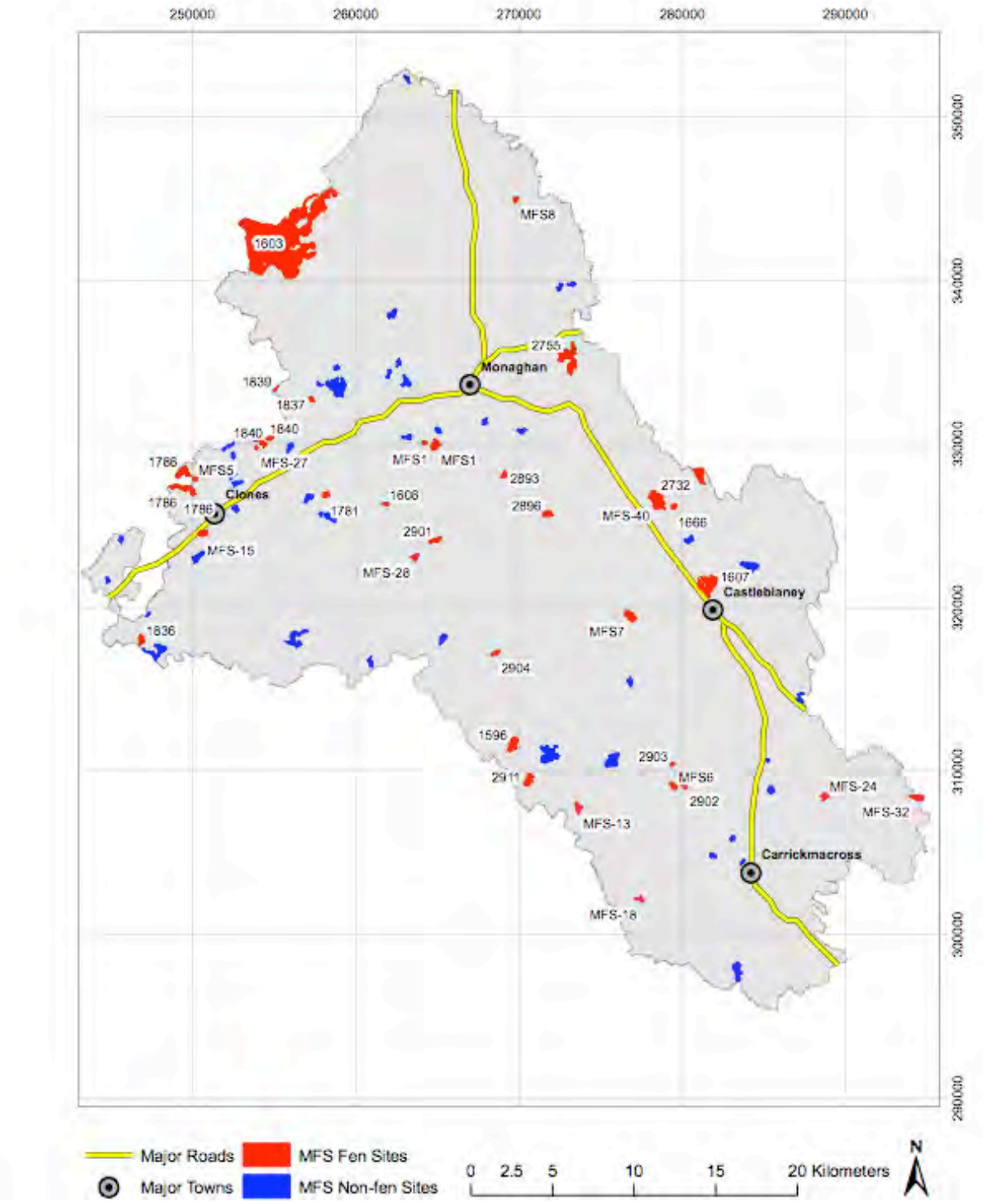


Figure 4.3. The location of all sites surveyed as part of the Monaghan Fen Surveys in 2007 and 2008. Sites in red (with site code numbers) are those that were found to contain fen communities following the survey; sites marked in blue (without codes numbers) are non-fen sites.

Table 4.2. The extent of different fen habitat types recorded as part of the Monaghan Fen Surveys 2007 and 2008. The table lists the 6 main fen habitat types present in Ireland and being assessed as part of the NPWS National Fen Survey of Ireland.

| Fen Habitat Type and Habitats Directive Code where applicable | Fen Area recorded in MFS 2007 (ha) | Fen Area recorded in MFS II 2008 (ha) | Total Fen Area recorded in County (ha) |
|---|---|---|---|
| Transition Mire 7140 | 76.2 | 25 | 101.2 |
| Alkaline Fen 7230 | 1.5 | 0 | 1.5 |
| Cladium Fen 7210 * | 1.1 | 0.1 | 1.2 |
| Poor Fen | 16.8 | 1.7 | 18.5 |
| Petrifying Springs 7220 * | 0 | 0 | 0 |
| Non-Calcareous Springs | 0 | 0 | 0 |
| Total Area (ha) | 95.6 | 26.7 | 122.3 |
| Number of sites surveyed | 45 | 34 | - |
| Number (and %) of sites with fen interest | 25 (56%) | 10 (29%) | - |

* indicates that habitat has priority status under the EU habitats Directive

A detailed breakdown by site, of the area of each individual fen type, together with all other non-fen habitat areas recorded on sites surveyed is presented in Appendix 6. These data were obtained following the preparation of the GIS habitat maps produced for the sites surveyed.

The individual site reports in Appendix 2 (see Volume III of this report) list the area of each fen type found on each site during the present survey. In total 9 sites were found to contain Transition mire; one site contained Cladium fen and one site held Poor fen communities.

Table 4.2 shows that in total 26.7 ha of fen communities were found on 10 sites during the MFS II (see also Appendix 1). Transition mire was found to be the commonest fen type with 25 ha of this habitat type recorded. This fen type was also found to be the most abundant fen type during the MFS in 2007.

In general the results show that the area of fen habitats discovered during the MFS II was considerably less than 2007, and with less than one third of sites found to contain fen during MFS II (2008) compared to over half of the sites surveyed During MFS I (2007). This suggests that many if not all of the larger fen sites have now been surveyed and it is most likely that only minor areas remain un-surveyed although based on the wetland resource of the county they are likely to be numerous.

Considering the resources and time required to carry out a full systematic survey to identify further fen sites in the county, we believe that such a survey is unjustified at present. However, should other potential fen sites become known through future ecological surveys, then these should be assessed using the methodology used in the current study.

## 4.3 Phytosociological Classification of Fens in County Monaghan

A total of 16 relevés were collected during the course of the Monaghan Fen Survey from 11 of the 34 sites surveyed in detail. Relevés were only sampled on those sites with possible or clearly identifiable fen vegetation communities. Preliminary classification of relevés was carried out during the field survey according to the scheme outlined in Foss & Crushell (2007; 2008).

The completed relevés were later entered into an electronic spreadsheet to allow more detailed analysis and subsequent classification (see Appendix 4). The relevé and species data, was selectively manually re-ordered and the relevés were classified according to the phytosociological classification scheme for Irish fens outlined in Foss & Crushell (2007; 2008).

The relevés recorded during the MFS II were assigned to 3 fen phytosociological groups, namely Cladium fen (relevé table no. 1) which can be assigned to the order Caricetalia davallianae, Transition mire (relevé table no. 2 to 14) which can be assigned to the order Scheuchzerietalia palustris to Caricetalia nigrae and Caricetalia davallianae and Poor fen (relevé table no. 15) which can be assigned to the order Caricetalia nigrae, as well as one relevés (no. 16) which was classified as marsh rather than fen vegetation.

These three phytosociological fen groups recognised during the MFS are described in further detail below.

### 4.3.1 Cladium fen (Appendix 4; relevé # 1)

The community is characterised by the occurrence of a number of species indicative of the Caricion davallianae (rich fen) in the ground layer and by the presence of a low to moderate cover value for the Saw sedge, *Cladium mariscus*.

Electrical conductivity measurements of water (field measurement) at the site was 558 µS/cm, which is typical for this habitat type. pH of the water samples collected from this site ranged from 7.1 to 7.4 confirming its alkaline character.

This fen community type is rare in Monaghan. The importance of sites with this community type is further enhanced by the fact that *Cladium* fen is a priority habitat for conservation under the EU Habitats Directive.

*Cladium mariscus* fen was recorded at one site during the MFS II survey, at Carrickmore (MFS-27).

### 4.3.2 Transition mire (Appendix 4; relevé # 2 to 14)

Appendix 4 reveals that Transition mire, was the most abundant fen type recorded during the course of the Monaghan Fen Survey II, with 13 of the 16 relevés recorded in total, being assigned to this fen type. This fen type was recorded on 9 sites during the MFS II (See Appendix 1).

This fen type occurred most commonly in regenerating inter drumlin cutaway bog areas, where peat was extensively cut out by the end of the last century and secondary fen regeneration has proceeded for a considerable period of time; in low lying cutover bog hollows between peat hag; or on the infilling margins of lakes. A feature of all of the relevés assigned to this group was their occurrence on a quaking or floating scraw of vegetation.

Species commonly occurring on this Transition mire rich fen variant included: *Calliergonella cuspidata, Hydrocotyle vulgaris, Galium palustre, Agrostis stolonifera, Carex rostrata, Caltha palustris, Equisetum fluviatile, Potentilla palustris, Cardamine pratensis, Menyanthes trifoliata, Juncus effusus* and *Angelica sylvestris.*

Other species of note include: *Carex diandra, Filipendula ulmaria, Holcus lanatus, Calliergon giganteum, Rumex acetosa, Plagiomnium rostratum, Carex curta, Calliergon stramineum, Ranunculus flammula, Veronica scutellata* and *Lemna minor.*

Electrical conductivity measurements of water (field measurement) at these transition mire sites varied between 56 to 488 with an average of 186 µS/cm. pH of water samples collected from these sites ranged from 5 to 8.3, with a median value of 6.3.

### 4.3.3 Poor fen (Appendix 4; relevé # 15)

One relevé shows a species composition which allows this relevé to be assigned to Poor fen habitat which includes species characteristic of the Caricetalia nigrae to Scheuchzerietalia palustris. There were small areas of poor fen recorded within two other sites (MFS - 13 Corlea and MFS -18 Cargaghmore), however, due to the limited extent and transitional nature of the habitat, relevés were not recorded. The habitat is noted however in the relevant site reports.

pH of the water sample collected from this sites was 6.5, which is higher than one would expect from such a vegetation type (see Foss and Crushell 2007). Electrical conductivity measurements of water at the site was 150 µS/cm.

Species commonly occurring on Poor fen sites included: *Carex rostrata, Equisetum fluviatile, Potentilla palustris, Eriophorum angustifolium* and *Succisa pratensis.*

Species which differentiated Poor fen from the other fen types recorded during the MFS included: *Sphagnum fallax, Drosera rotundifolia, Aulacomnium palustre, Molinia caerulea* and *Anthoxanthum odoratum.*

## 4.4 Environmental Conditions of Fens in County Monaghan

In total 20 water samples were taken during the field survey, representing two samples from each fen site surveyed. The original result – sheet issued by the EPA is included in the appropriate site folder. A full table of hydrochemistry results together with the associated water sample number, site name and relevé code is presented in Appendix 5b.

The range and median values of each chemical parameter is presented in Table 4.3 along with values for peat depth and water table depth. It can be seen that there is wide variation in the water chemistry recorded from the full suite of sites.

Water chemistry varies considerably between sites (see Table 4.3), with some displaying acid, nutrient poor conditions while other sites are characterised by alkaline mineral rich conditions. The water chemistry reflects the source of water feeding the system which in turn is dependant on the hydrogeology of the area. Overall, the water chemistry recorded from sites during MFS 2 (2008) is comparable to the water chemistry recorded during MFS 1 (2007) (see Table 5.5 in Foss and Crushell 2007).

Table 4.3. Ranges of hydrochemical variables, peat depth and water table depth recorded on sites during the Monaghan Fen Survey 2007 (n=20).

| Variable | Units | Mean | Min | Max | Median |
|---|---|---|---|---|---|
| pH | pH | 6.5 | 5 | 8.3 | 6.4 |
| Alkalinity-total (as CaCO3) | mg/l CaCO3 | 86 | <12 | 276 | 56.5 |
| Conductivity @25°C | µS/cm | 243 | 61 | 546 | 210 |
| Calcium | mg/l | 31 | <5 | 103 | 20 |
| Magnesium | mg/l | 2.8 | <1 | 4.72 | 2.97 |
| Ammonia | mg/l N | 0.2 | 0.03 | 1.03 | 0.06 |
| Ortho-Phosphate | mg/l P | 0.1 | <0.02 | 0.07 | 0.02 |
| Total Oxidised Nitrogen (as N) | mg/l N | 0.2 | <0.05 | 0.06 | 0.05 |
| Total Phosphorus | mg/l P | 0.5 | 0.026 | 1.54 | 0.31 |
| Sulphate | mg/l SO4 | 6.7 | <2 | 16.9 | 4.75 |
| Sodium | mg/l | 12 | 6.27 | 20.5 | 10.1 |
| Potassium | mg/l | 3.4 | <1 | 13.8 | 2.01 |
| Iron | µg/l | 613 | <50 | 4124 | 293 |
| Manganese | µg/l | 2.8 | <1 | 1237 | 203 |
| Copper | µg/l | 18 | <1 | 240 | 2.05 |
| Zinc | µg/l | 228 | 22.8 | 787 | 235 |
| Water Table Depth | cm | -10 | -30 | 10 | 20.5 |
| Peat Depth | cm | >200 | 100 | >200 | >200 |

Table 4.4 shows the range and median concentration of water chemistry variables recorded within different fen types as classified by the Monaghan Fen Survey 2008. As expected it is clear that the *Cladium* fen site is characterised by base rich calcareous conditions while the transition mires have more circum-neutral conditions reflecting the transitional nature of the habitat. The poor fen site (Lough Nahinch) has a comparable water chemistry to the transition mire sites, although it can be seen from Appendix 5b that the two other sites which contain poor-fen (Corlea and Cargaghmore) are more acid and have a comparable water chemistry to the poor fen sites recorded during the MFS I (2007). Due to the small sample size of the different fen types, it was not possible to carry out further statistical tests on the significance of the results reported.

Table 4.4. Median and range of values of environmental variables recorded from different fen types during the Monaghan Fen Survey 2008 (n=sample size).

| | | **Transition Mire (n=17)** | | | **Cladium fen (n=2)** | | | **Poor-fen (n=1)** |
|---|---|---|---|---|---|---|---|---|
| *Variable* | *Units* | *Median* | *Min* | *Max* | *Median* | *Min* | *Max* | *Value* |
| pH | pH | 6.3 | 5 | 8.3 | 7.25 | 7.1 | 7.4 | 6.5 |
| Alkalinity-total (as CaCO3) | mg/l CaCO3 | 48 | <12 | 168 | 267 | 258 | 276 | 71 |
| Conductivity @25°C | µS/cm | 203 | 61 | 370 | 536 | 526 | 546 | 255 |
| Calcium | mg/l | 20 | <5 | 59 | 98 | 92 | 103 | 17 |
| Magnesium | mg/l | 2.8 | <1 | 4.7 | 3.8 | 3.7 | 3.9 | 3.8 |
| Ammonia | mg/l N | 0.06 | 0.04 | 1.03 | 0.04 | 0.03 | 0.04 | 0.04 |
| Ortho-Phosphate | mg/l P | 0.03 | <0.02 | 0.28 | <0.02 | <0.02 | <0.02 | <0.02 |
| Total Oxidised Nitrogen (as N) | mg/l N | 0.05 | <0.05 | 0.18 | <0.05 | <0.05 | <0.05 | <0.05 |
| Total Phosphorus | mg/l P | 0.37 | 0.03 | 1.54 | 0.06 | 0.03 | 0.09 | 0.1 |
| Sulphate | mg/l SO4 | 5.7 | <2 | 16.9 | 3.15 | 3 | 3.3 | 11 |
| Sodium | mg/l | 10.2 | 6.3 | 20.5 | 8.4 | 7.4 | 9.5 | 15.7 |
| Potassium | mg/l | 2 | <1 | 13.8 | 1.9 | <1 | 2.7 | 13.4 |
| Iron | µg/l | 305 | 50 | 4123 | 164 | 164 | 164 | 117 |
| Manganese | µg/l | 217 | <1 | 1237 | 34 | 34 | 34 | 537 |
| Copper | µg/l | 2.1 | <1 | 240 | 1.6 | <1 | 2.2 | <1 |
| Zinc | µg/l | 251 | 23 | 787 | 81 | 48 | 115 | 121 |
| Water Table Depth | cm | -10 | -30 | 10 | 0 | 0 | 0 | -5 |
| Peat Depth | cm | 110 | 100 | >200 | >200 | >200 | >200 | >200 |

In summary the results of the hydrochemical analysis confirms that the Cladium fen site is dependent on a continual supply of oligotrophic Calcium rich groundwater. In contrast, vegetation that occurs on Transition Mires is dependant on less mineral rich groundwater, with a circum-neutral pH.

There is little published data on hydrochemical characteristics of fen types in Ireland. Dowding (1990) reported that Pollardstown Fen (an alkaline fen habitat) had conductivity ranging from 484 to 635µS/cm, which is comparable with the range recorded for Cladium fen in this study. Calcium (122 - 125mg/l) and Magnesium (8.5 – 9.1mg/l) concentrations recorded at Pollardstown were somewhat higher while Total Phosphorus (0.04 – 0.08mg/l) and Ammonia (0.06 – 0.09 mg/l) concentrations recorded were comparable to those recorded from a *Cladium* fen in the current study (Dowding 1990). Brooks et al. (2004) give a range of various parameters characteristic of Alkaline Fen vegetation in the UK which is comparable with the results of the current study.

Total Oxidised Nitrogen (Nitrates and Nitrites) concentrations were relatively low being below the lowest detection level of 0.05mg/l at most sites; with the only exception being a sample from Tassan Lough (0.18mg/l N).

Similar to findings during MFS 1 (2007), the highest water tables were recorded from transition mires indicating that the vegetation within these habitats require a high year-round water table as previously reported by Curtis *et al* (2006).

The current study provides useful baseline data on the chemical status of fen surface waters against which future monitoring can be compared. Unfortunately, due to a lack of knowledge and limited data, it is not possible at present to draw many conclusions regarding the nutrient status of fens in the current study.

(see Appendix 5b for Hydrochemistry data)

## 4.5 Ranking of Sites and Conservation Recommendations

Following the detailed survey of sites in County Monaghan each site was evaluated for its conservation value based on a set of fifteen criteria for which scores were applied. These criteria included Naturalness, Non-recreatability, Potential value, Typicality, Size, Habitat Diversity, Fen value, Rarity of species and habitats, Viability, Recorded History, Educational value, Management needs, Intrinsic appeal and Expert opinion. Thirteen of these criteria are based on those listed in the NPWS National ASI Survey, Guidelines for Ecologists (Lockhart et al. 1993), and were assessed according to the guidelines in that report, while 'Fen Value' and 'Expert Opinion' were added as part of the current conservation assessment of sites. A brief definition of the criteria, their meaning in the context of the MFS surveys and the scoring system applied are presented in Foss & Crushell (2007).

Each of these criteria was scored in relation to each site on a four point scale and score totals for each site were calculated. Those sites which scored highest are deemed to have a greater ecological value. These site scores allowed ranking of sites into a series of categories from International conservation value to sites with a Low Local conservation value (see Table 4.5).

Table 4.5. The conservation value score system and ranking scheme applied to sites on the Monaghan Fen Survey 2007.

| Site Conservation Status | Score Value | Ranking Code |
|---|---|---|
| International value | 40-75 | A |
| National value | 30-75 | B |
| County value | 25-29 | C + |
| High local value | 20-24 | C |
| Moderate local value | 11-19 | D |
| Low local value | 0-10 | E |

Of the 34 sites surveyed in detail during the MFS II, site scores ranged from 12 to 50. The possible maximum that a site could score was 75.

Table 4.6 shows the number of sites in each conservation category following the ranking scheme adopted during the Monaghan Fen Survey 2008, while the evaluation of each site is presented in Appendix 3. This evaluation is based primarily on features of the site, the habitats present and overall damage and threats faced by the site (see Appendix 2 for individual site reports). Due to absence of data it takes only minimal account of general species values of the site (e.g. birds, mammals, insects, fish populations etc.). The addition of such values, based on future species surveys and information, may change the overall ranking of certain sites.

Table 4.6. The number sites and their conservation ranking following the Monaghan Fen Survey 2008.

| Site Conservation Status | Ranking Code | No. of sites |
|---|---|---|
| International Value | A | 0 |
| National Value | B | 17 |
| County value | C + | 11 |
| High local value | C | 0 |
| Moderate local value | D | 6 |
| Low local value | E | 0 |

### 4.5.1 Internationally important sites (A)

No sites of this conservation status were found during the MFS II.

### 4.5.2 Nationally important sites (B)

The 17 nationally important sites (B rating) contain habitat types which are rare or uncommon in Ireland, and merit designation under the NHA system. Based on the results of the current study, these are now being recommended by the authors for inclusion in the NHA designation process being undertaken by the NPWS.

Of these sites, four are already listed for consideration as potential NHA's by NPWS namely: Tassan Lough 001666; Loughbawn House Loughs 001595; Black and Derrygoony Loughs 001596 and Rahans Lough 002844. On these four sites the formal designation process should be completed.

The remaining 13 sites have no formal conservation designation.

All 10 of the sites surveyed as part of the MFS II and found to contain fen occur within this category. The remaining 7 sites being recommended for designation as NHA's contain no fen habitats within the site, and are primarily sites with a lake and associated wetland (non-fen) interest and are being recommended for NHA designation due to the presence of these other habitats of conservation importance.

### 4.5.3 County Conservation Value (C +)

Of the 11 sites considered to be of County conservation value, the MFS found that most are relatively extensive and contain good examples of lake and other wetland habitat types, but no fen habitats.

In the case of Dromore Lakes 000001 this site has already been listed for consideration as a NHA by the NPWS. We recommend that this conservation designation should be completed and maintained as only a small portion of the pNHA was surveyed (and subsequently evaluated) during the current study.

In the case of the remaining 10 sites the MFS II found that these sites merit conservation due to their County conservation value, although at present they have no formal conservation designation.

Effective conservation of these sites will require their inclusion in the Monaghan County Development Plan and / or Local Area Plans as appropriate. Should a local designation such as Local Biodiversity Area (LBA) be implemented as recommended by Anonymous (2005) these sites should be considered for such a designation.

### 4.5.4 High Local Value (C)

No sites belonging to this category were surveyed during the MFS II.

### 4.5.5 Moderate Local Value (D)

The six sites which are of Moderate local value (D rating) are all either very small or have been heavily modified by drainage or other impacts.

Fen habitat was absent from all of these sites.

Effective conservation of these sites will require their inclusion in the Monaghan County Development Plan and / or Local Area Plans as appropriate. Should a local designation such as Local Biodiversity Area (LBA) be implemented as recommended by Anonymous (2005) these sites should be considered for such a designation.

### 4.5.6 Low Local Value (E)

No sites belonging to this category were surveyed during the MFS II.

### 4.5.7 Future Conservation and Protection of Sites

The future conservation of the fen and wetland sites proposed above depends on a number of factors including conservation designations, ownership, legal status, planning control, habitat management and protection of water sources. These factors which are effectively controlled or under the remit of either the NPWS and Monaghan County Council.

Future conservation of the areas surveyed and found to be of conservation value in County Monaghan will require:

*Designation:* Sites found to be of NHA conservation value and status should be appropriately designated by the NPWS. Following designation, monitoring and enforcement are key requirements.

The NHA sites, as well as sites of County and Moderate local conservation value should be protected, and need to be listed in the County Council Development Plan and other related area plans. A local nature conservation designation similar to the SLNCI (Sites of Local Nature Conservation Value) designation in Northern Ireland would be useful in ensuring the conservation of these sites. Such a designation (Local Biodiversity Areas (LBA's)) has been recently proposed by a report commissioned by the Heritage Council (Anonymous 2005).

The Planning & Development Act 2000 requires Local Authorities to prepare Local Area Plans (LAPs) for towns and villages within their functional areas which satisfy specific criteria. The LAPs go through various public consultation stages before final adoption. The LAP sets out a framework to ensure that development occurs in a planned and sustainable (environmental, economic and social) manner over the plan's six-year lifetime. Fens identified as being of county conservation value should be included in such LAPs.

*Planning control:* Control of damaging developments under the Planning Acts is the most immediate way in which conservation of the most important sites can be achieved, and should be implemented by the County Council, particularily in relation to the issue of landfill and dumping onto fen sites.

*Management:* Agricultural management, such as grazing and control of fertiliser run-off on surrounding lands, may be important in the conservation of certain sites. For example, light grazing of wet grassland or fen by certain livestock can prevent scrub encroachment. The Rural Environment Protection Scheme (REPS) may offer a mechanism to help conserve and manage these areas. Drainage needs to be restricted, and afforestation of sites should not be permitted as both these activities would seriously impact on the conservation value of fen and other wetland habitats.

*Pollution control:* Control of water pollution is a key factor in the conservation of fen sites. This depends on regular monitoring and prevention of nutrient enrichment at source whether this is from individual sewage treatment systems, agricultural run-off or other sources. Wetlands assist in purifying waters (both surface and groundwater) that pass through them.

*Dumping and infilling control:* Dumping and infilling was found to be a major damaging activity during MFS II affecting 6 of those sites surveyed. Further dumping and infilling of wetland sites should be strictly prohibited with a severe penalty imposed for such an offence. This should be a real deterrent for potential offenders in the future. In cases where infilling has already taken place, if there is evidence of indirect effects on water quality due to the polluting nature of the infill, then the fill should be removed.

On wetland sites, where the fill is inert and the impact is loss of habitat, then consideration on whether the removal of fill is justified should be based on the quality of the wetland habitat. Where costs are prohibitive, some other form of compensation for loss of habitat such as wetland enlargement of the remaining wetland area should be required.

Responsibility for the contol of dumping and infilling rests with Monaghan County Council under the Planning & Development legislation and Waste Management legislation.

*Control of invasive species:* Removal of invasive species such as *Rhododendron ponticum* should be considered, as well as selective scrub removal on sites. The latter may be achieved by introducing a suitable grazing regime. Appropriate management regimes should be established with advice from a qualified ecologist and scientific personel from NPWS.

*Provision of Public information:* The provision of information on the conservation value of wetland and fen sites in particular is fundamental to the future local support for retention and enhancement of wetland sites. Such an information programme should be introduced on sites recommended for conservation and local protection; especially those that are located in close proximity to populated areas and easily accessible sites.

The programmes might include site signposting to advertise the nature conservation value of areas a feature lacking on all of the sites surveyed during the MFS 2007 and 2008.

On-site interpretation facilities would need to be vandal proof and be maintained on a regular basis.

The use of sites for recreational purposes should be explored, as this land-use when managed correctly can be beneficial to wetland conservation by building an appreciation of the beauty and value of fens and other wetlands.

## 4.6 Cross Border Conservation Issues

On three of the sites surveyed during the Monaghan Fen Survey 2008, the site crossed the international border with Northern Ireland (see Table 4.7; and Figure 4.4 a to c below), and the wetland vegetation communities in the Republic of Ireland (ROI) continued into Northern Ireland.

All three of these sites have been proposed for NHA designation in the ROI as result of the MFS II. To ensure the long term protection of these cross border sites any designation in the ROI should be matched in Northern Ireland, either through direct designation of the northern section of the sites or through the inclusion of the northern section of these sites in the conservation areas already designated and adjacent to two of the sites.

Unless such discrepancies in conservation designations are resolved by the National Parks and Wildlife Service (ROI) and the Environment and Heritage Service (NI) it is difficult to see how the long term protection of these sites can be assured. Effective long term conservation and protection of these cross-border sites can only be achieved by ensuring the protection and proper management of the entire hydrological unit that constitutes these sites.

Table 4.7. The location of sites which cross the international border between the Republic of Ireland and Northern Ireland.

| Site Code ROI | Site Name and Conservation Status ROI | Site Name and Conservation Status in Northern Ireland, and proximity of designated sites |
|---|---|---|
| MFS 17 | Aghafin Lough, No current conservation designation | Annachullion Lough ASSI (121), designated for the presence of marl Lake and fen habitats is located approximately 300m to the North. |
| MFS 23 | Drumaveale Lough, No current conservation designation | Finn Floods ASSI (110), designated for the presence of fen habitat and zoological interest is located approximately 250m to the North. Lough Erne SPA is also located approximately 250m to the North. |
| MFS 35 | Rathkeevan Lough, No current conservation designation | No site designated for nature conservation in Northern Ireland within 1km. |

** ASSI – Area of Special Scientific Interest*

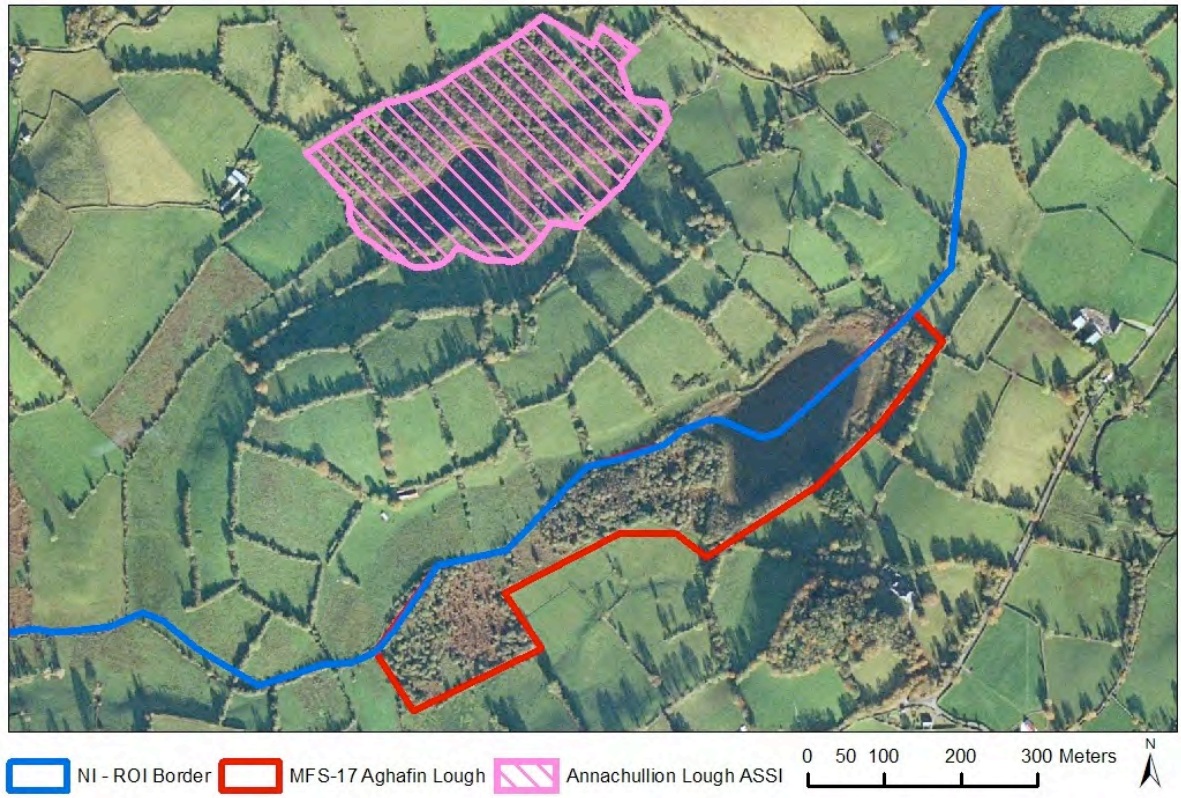


Figure 4.4a. Aghafin Lough MFS 17 showing the location of the site in the Republic of Ireland outlined in red, the international border and the section of the site extending into Northern Ireland, which currently has no conservation designation, and the location of the Annachullion ASSI.

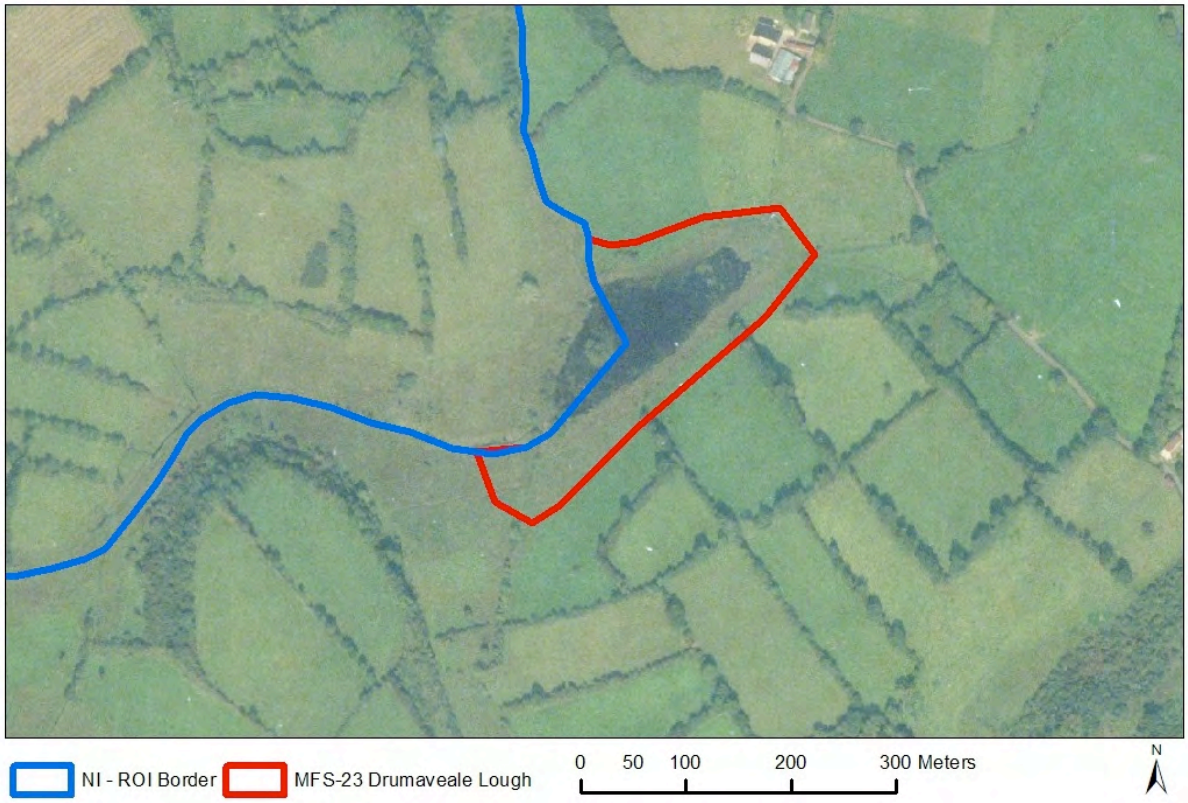


Figure 4.4b. Drumaveale Lough MFS 23 showing the location of the site in the Republic of Ireland outlined in red, the international border and the section of the site extending into Northern Ireland, which currently has no conservation designation.

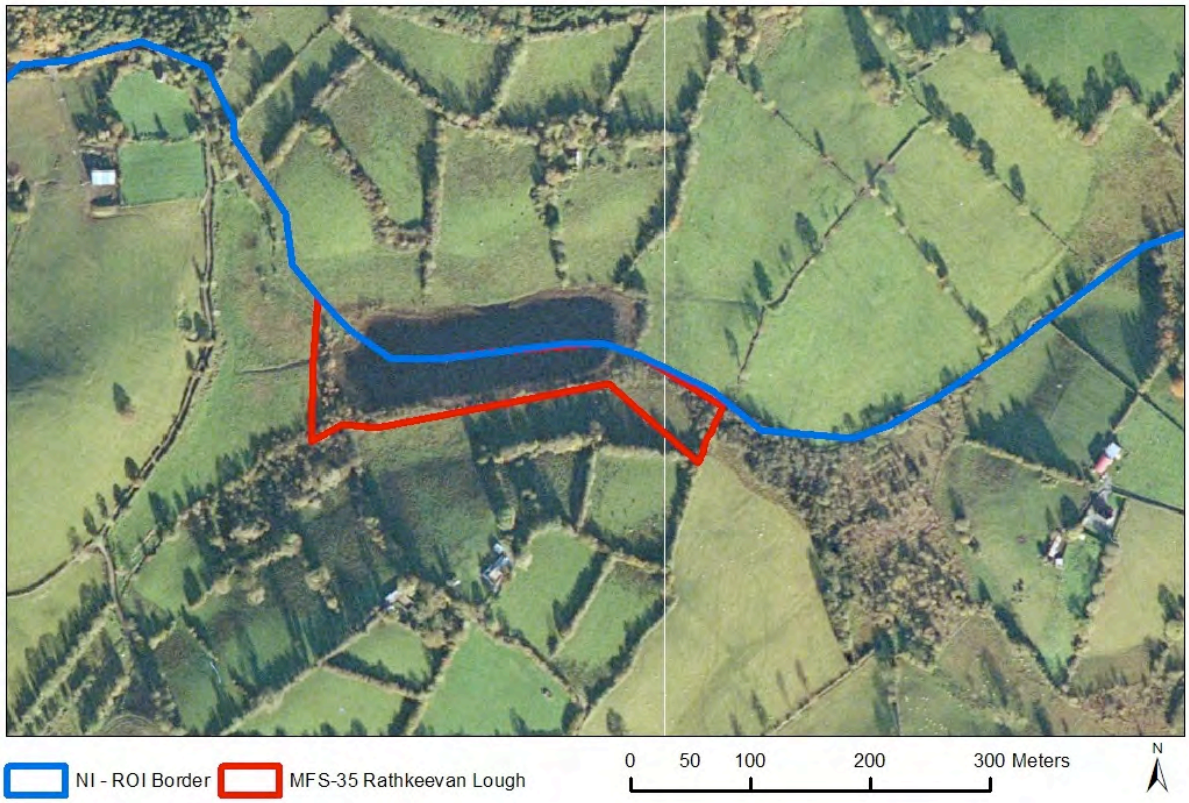


Figure 4.4b. Rathkeevan Lough MFS 35 showing the location of the site in the Republic of Ireland outlined in red, the international border and the section of the site extending into Northern Ireland, which currently has no conservation designation.

## 4.7 Impact, Activities and Threats to Fens Surveyed in 2008

The majority, if not all, the fen and wetland sites surveyed as part of the MFS II have been subject to some degree of damage or modification from their natural state in the past (mirroring the results of the 2007 Monaghan Fen Survey) while half the sites are threatened with further site deterioration caused by human activities.

In line with recommendations made in the National Fen Survey Manual (Foss & Crushell 2008) the MFS II recorded threats and impacts to sites in a revised manner. Using the system developed by NPWS, four assessments were made following the site survey in relation to various landuse, impacting activities and threats (details of the scheme are provided in Foss & Crushell 2008).

In summary these include:

1. Landuse types within the site boundary were recorded; and assessed on a 4 point severity scale - 1- Rare (c. <5%); 2 – Occasional (c. 5-20%); 3 – Frequent (c. 21-50%); 4- Dominant (c. >50%) with the list of landuse types based on the NPWS Natural Heritage Area survey landuse list.

2. Surrounding Landuse – outside the site boundary were recorded but no scale applied to landuse types. Surrounding landuse types were based on the NPWS Natural Heritage Area survey landuse list.

3. Impacts and Activities Influencing Conservation Status of the site were recorded, and then, where possible, assessment was made of the:
Intensity: A – high influence; B – medium influence; C – low influence; D – unknown and Influence: -2 = irreparable negative influence; -1 = reparable negative influence; 0 = neutral; +1 = natural positive influence; +2 = strongly managed positive influence; Unknown.
Affecting: whether these impacts and activities affect the entire site or are more specific to one or more of the fen habitats present. Specify whether impacts and activities affect:
- Affecting site and all Annex 1 Fen Habitats
- Affecting site but not Annex 1 Fen Habitats
- Affecting mainly Annex 1 Fen Habitats within site
- Affecting only Alkaline Fen
- Affecting only Cladium Fen
- Affecting only Transition Mire
- Affecting only Petrifying Springs
- Affecting only Poor Fen
- Affecting only Non-Calcareous Springs
- Or specify an alternative

4. Site Threats - includes a list of current or planned activities in adjacent areas or within site that is likely to threaten the future conservation value of a site, and not only the impacts that have already occurred on the site, which are covered in the Impacts and Activities section above. These threats are related to specific Survey Note numbers in the site descriptions.

The list of Impacts and Activities influencing the conservation status of the site and the Site Threats are adapted from EU Habitats Directive Natura 2000 form (see Foss & Crushell 2008 for a full list of activities).

Details of the landuse, past damage and future threats posed to each individual site surveyed as part of the MFS II can be viewed on the “Site Landuse/Impacting Activities and Threats” layout in the NPWS National Fen Survey database which accompanies this report, or in the full site survey report for each site in Appendix 2 (Volume II).

### 4.7.1 Landuse within Site Boundary

Table 4.8 lists the main landuse recorded and the number of sites influences by each landuse type.

The MFS II revealed that with the exception of one site (Creevaghy MFS-21) all the sites visited had some landuse activity within the site boundaries surveyed.

This data indicates that a high proportion of the site examined are no longer truly "natural" and are influenced by a variety of human activities.

Table 4.8. Land-use activities recorded within site boundary during the MFS II.

| Landuse Type within Site Boundary | Number of sites recording this landuse type |
|---|---|
| Grazing - cattle | 28 |
| Grazing - sheep | 1 |
| Fishing | 4 |
| Meadow – silage production | 13 |
| Meadow – unknown use | 2 |
| Forestry | 5 |
| Dumping | 7 |
| Roads | 5 |
| Residential - scattered | 1 |
| Amenity Management | 2 |
| Quarrying/Mining | 1 |

### 4.7.2 Surrounding landuse - Outside Site Boundary

The land- use occuring immediately surrounding the 34 sites surveyed during the MFS II is presented in Table 4.9 below.

The data indicates that effectively all of the sites examined occur within a highly managed landscape influenced by human activities.

Table 4.9. Surrounding landuse recorded during the MFS II.

| Surrounding Landuse Type | Number of sites recording this landuse type |
|---|---|
| Grazing - sheep | 1 |
| Grazing - cattle | 32 |
| Meadow – silage use | 32 |
| Residential buildings | 29 |
| Roads | 30 |
| Forestry | 5 |
| Fishing | 5 |
| Agricultural buildings | 11 |
| Dumping/Infill | 2 |
| Walking | 1 |
| Quarrying/Mining | 1 |

### 4.7.3 Impacts and Activities Influencing Conservation Status of Sites

Table 4.10 lists the main impacts and activities that have or are currently affecting sites, to various degrees, as recorded during the MFS II.

Details of the intensity and influence of each of these impacts and activities in relation to each site can be viewed on the "Site Land-use/Impacting Activitiesand Threats" layout in the NPWS National Fen Survey database which accompanies this report, or in the full site survey report for each site in Appendix 2 (Volume II).

This data indicates that 11 sites showed no impacts or activities, while on some of the remaining 23 sites drainage and management of drainage systems, infilling of sites, water pollution and the natural process of organic accumulation are the activities which are recorded most frequently as affecting on the sites surveyed during the MFS II.

Table 4.10. Impacts and Activities Influencing Conservation Status of Sites recorded on sites during the MFS II.

| Impacts and Activities Type and Code | Number of sites recording this impacts and activities |
|---|---|
| No discernable impact and activity | 11 |
| Drainage 810 | 11 |
| Drain management 811 | 2 |
| Grazing – general 140 | 2 |
| Overgrazing – sheep 142 | 1 |
| Overgrazing – cattle 143 | 2 |
| Water pollution 701 | 4 |
| General Forestry Management 160 | 1 |
| Infilling/Dumping 803 | 6 |
| Accumulation of organic material 951 | 4 |
| Invasion – species 954 | 1 |
| Cultivation – mowing 102 | 1 |
| Leisure use – walking 622 | 1 |
| Leisure Fishing 220 | 1 |

### 4.7.4 Site Threats

The MFS II indicated that 17 of the sites surveyed had no discernable threat to the long term survival of the sites assuming present landuse pratices are maintained. On the other 17 surveyed one or more threats were noted on the sites. These are summarised in Table 4.11 below.

Details of the threats to each individual site surveyed as part of the MFS II can be viewed on the "Site Land-use/Impacting Activitiesand Threats" layout in the NPWS National Fen Survey database which accompanies this report, or in the full site survey report for each site in Appendix 2 (Volume II).

Table 4.11. Threats recorded on sites during the MFS II.

| Threat Type and Code | Number of sites recording this threat type |
|---|---|
| No discernable threat on site | 17 |
| Drainage 810 | 6 |
| Grazing – general 140 | 3 |
| Water pollution 701 | 8 |
| Accumulation of organic material 951 | 2 |
| General Forestry Management 160 | 1 |
| Infilling/Dumping 803 | 6 |
| Invasion – species 954 | 1 |
| Cultivation – mowing 102 | 1 |

Recent illegal dumping and infill on sites, with soil and building spoil was noted on six sites during the MFS II. The sites in question were Cargaghmore, Corlea, Lough Nahinch, Faltagh, Black Lough (1596) and Drumganny. Additionally a small area of re-vegetated older dumping of rock spoil was seen at Lough Aphuca.

This activity is particularly incompatible with the long term conservation of these sites and must be address by the County Council if these sites are to maintain their biodiversity value.

# 5. Conclusions

## 5.1 Monaghan Fen Survey 2008

This survey set out to examine 34 potential fen sites in County Monaghan and assess their fen interest.

The results of the survey revealed that 10 sites contained fen communities, with a total fen area of 26.7 ha. Conservation assessment found that of the 34 sites surveyed 17 were considered to qualify for NHA designation, and 11 sites had a County conservation value. The remaining 5 sites were deemed to be of local conservation value.

The results of the Monaghan Fen Survey from 2007 and 2008 would therefore indicate that a total of 122.33 ha of fen have been recorded in Monaghan.

Measures to ensure the long term protection, conservation and management have been proposed for those sites identified as being of conservation importance at county level or higher. The protection and long term biodiversity protection within these sites will require actions by both Monaghan County Council and the National Parks and Wildlife Service.

Considering the abundance of wetland areas (in particular lakes and drainage impeded inter drumlin hollows) in County Monaghan (as outlined in Foss & Crushell 2007) it is possible that other as yet unidentified fen sites exist within the county. However, based on the results of the MFS II it is likely that all of the major fen habitats have now been identified within the county.

A systematic field survey, to examine all wetland areas within the county so as to locate additional fen sites is not feasible at this time, based on the costs that would be involved and manpower required to conduct such an exhaustive field survey.

However, a desk study to identify all wetland areas within the county, and assign these sites to a particular wetland category (e.g. Fossitt habitat classification system) would undoubtedly identify additional sites that could be included within the context of future fen or more generalised wetland field surveys in County Monaghan.

Such a survey would have the advantage of amalgamating the survey findings of the MFS 2007 and 2008 and incorporate additional data from previous Monaghan surveys (e.g. Barron 2006) and that held by Government and other groups nationally. In addition such a project could provide valuable information on the overall extent and knowledge of the wetland resource in County Monaghan.

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# 7. Appendices

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

## Contents – Report Appendices Volume I



## Contents – Report Volume II



## Contents – Report Volume III

**National Fen Survey of Ireland - Monaghan Fen Survey II 2008**

Results Appendix 1A. Sites surveyed in detail in County Monaghan with site source, survey status and conservation designation prior to survey on the NFS 2008.

| Totals | | | 35 | | | 559 | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Site Code** | **Site Name** | **Site Source** | **Number of discrete sub sites for survey** | **Date Survey Completed** | **Survey Status prior to NFS** | **Estimated total site area** | **Grid Reference** | **Existing Conservation Designations** | **Ranking after NFS** |
| MFS-17 | AGHAFIN LOUGH | BSBI Alan Hill Site | 1 | 19-Jul-2008 | No NHA survey | 8.6 | H 517 297 | Undesignated site | B |
| MFS-09 | AGHAFIN LOUGH LITTLE | BSBI Alan Hill Site | 1 | 19-Jul-2008 | No NHA survey | 6.9 | H 523 293 | Undesignated site | C |
| MFS-10 | ANNAGOSE LOUGH | BSBI Alan Hill Site | 1 | 18-Jul-2008 | No NHA survey | 27.9 | H 581 257 | Undesignated site | C+ |
| MFS-11 | ANNYALTY LOUGHS | BSBI Alan Hill Site | 2 | 15-Jul-2008 | No NHA survey | 7.2 | H 619 341 | Undesignated site | C+ |
| MFS-12 | BISHOPS LOUGH | BSBI Alan Hill Site | 1 | 18-Jul-2008 | No NHA survey | 9.5 | H 526 263 | Undesignated site | B |
| 001596 | BLACK LOUGH (BLACK & DERRYGOONY LOUGHS NHA) | BSBI Alan Hill Site | 1 | 16-Jul-2008 | NHA 1596 | 28.6 | H 696 116 | NHA 001596 | B |
| 001595 | BLACK LOUGH (LOUGHBAWN NHA) | BSBI Alan Hill Site | 1 | 16-Jul-2008 | NHA 1595 | 65.6 | H 708 103 | NHA 001595 | B |
| MFS-13 | CARGAGHMORE FEN | MFS 2007 Discovery | 1 | 16-Jul-2008 | No NHA survey | 15.1 | H 736 078 | Undesignated site | B |
| MFS-14 | CARRICKASLANE LOUGH | BSBI Alan Hill Site | 1 | 17-Jul-2008 | No NHA survey | 12.2 | H 803 242 | Undesignated site | C+ |
| MFS-27 | CARRICKMORE | BSBI Alan Hill Site | 1 | 19-Jul-2008 | No NHA survey | 3.4 | H 538 295 | Undesignated site | B |
| MFS-15 | CLONKEEN LOUGH | BSBI Alan Hill Site | 1 | 18-Jul-2008 | No NHA survey | 15.7 | H 500 240 | Undesignated site | B |
| MFS-16 | CLONOONY LOUGH | BSBI Alan Hill Site | 1 | 19-Jul-2008 | No NHA survey | 4.4 | H 447 217 | Undesignated site | C |
| MFS-18 | CORLEA | BSBI Alan Hill Site | 1 | 16-Jul-2008 | No NHA survey | 7.7 | H 772 022 | Undesignated site | B |
| MFS-19 | CORRAVOO LOUGH | BSBI Alan Hill Site | 1 | 17-Jul-2008 | No NHA survey | 15.7 | H 654 183 | Undesignated site | C |
| MFS-20 | CORVAGHAN | BSBI Alan Hill Site | 1 | 19-Jul-2008 | No NHA survey | 7.3 | H 457 241 | Undesignated site | C |
| MFS-21 | CREEVAGHY | BSBI Alan Hill Site | 1 | 18-Jul-2008 | No NHA survey | 16.5 | H 525 280 | Undesignated site | C |
| MFS-23 | DRUMAVEALE LOUGH | BSBI Alan Hill Site | 1 | 19-Jul-2008 | No NHA survey | 3.4 | H 473 196 | Undesignated site | B |
| MFS-24 | DRUMGANNY LOUGH | BSBI Alan Hill Site | 1 | 14-Jul-2008 | No NHA survey | 10.8 | H 887 085 | Undesignated site | B |
| MFS-25 | DRUMGOAST LOUGH | BSBI Alan Hill Site | 1 | 15-Jul-2008 | No NHA survey | 4.3 | H 575 337 | Undesignated site | C+ |
| MFS-26 | DRUMHARRIF LOUGH | BSBI Alan Hill Site | 1 | 14-Jul-2008 | No NHA survey | 3.3 | H 853 107 | Undesignated site | C |
| MFS-28 | FALTAGH | BSBI Alan Hill Site | 1 | 15-Jul-2008 | No NHA survey | 12.3 | H 636 231 | Undesignated site | B |
| 000001 | ISLAND BRIDGE (DROMORE LAKES NHA) | BSBI Alan Hill Site | 1 | 17-Jul-2008 | Proposed NHA | 10 | H 606 180 | Proposed NHA 000001 | C+ |
| MFS-29 | KILLYBOLEY LOUGH | BSBI Alan Hill Site | 1 | 15-Jul-2008 | No NHA survey | 7.9 | H 724 394 | Undesignated site | C+ |
| MFS-30 | LOUGH APHUCA | BSBI Alan Hill Site | 1 | 14-Jul-2008 | No NHA survey | 6.8 | H 831 059 | Undesignated site | C+ |
| MFS-40 | LOUGH NAHINCH | Heritage Officer 2008 | 1 | 17 & 21/07/2008 | No NHA survey | 65.8 | H 784 265 | Undesignated site | B |
| MFS-31 | LOUGH OONEY | BSBI Alan Hill Site | 1 | 18-Jul-2008 | No NHA survey | 12.2 | H 558 296 | Undesignated site | C+ |
| MFS-32 | MOUNT MATTHEWS | BSBI Alan Hill Site | 1 | 14-Jul-2008 | No NHA survey | 20.4 | H 940 084 | Undesignated site | B |
| MFS-33 | MUCKNO MILL LOUGH | BSBI Alan Hill Site | 1 | 17-Jul-2008 | No NHA survey | 36.8 | H 842 226 | Undesignated site | C+ |
| 002844 | RAHANS LOUGH pNHA | BSBI Alan Hill Site | 1 | 14-Jul-2008 | No NHA survey | 34.9 | H 831 978 | Proposed NHA 002844 | B |
| MFS-35 | RATHKEEVAN LOUGH | BSBI Alan Hill Site | 1 | 18-Jul-2008 | No NHA survey | 1.7 | H 537 020 | Undesignated site | B |
| MFS-36 | ROOSKY LOUGH | BSBI Alan Hill Site | 1 | 18-Jul-2008 | No NHA survey | 17.1 | H 571 267 | Undesignated site | B |
| MFS-37 | SHANTONAGH LOUGH | BSBI Alan Hill Site | 1 | 16-Jul-2008 | No NHA survey | 45.8 | H 756 109 | Undesignated site | C+ |
| MFS-38 | SILLIS LOUGH | BSBI Alan Hill Site | 1 | 15-Jul-2008 | No NHA survey | 7.3 | H 734 397 | Undesignated site | C+ |
| 001666 | TASSAN LOUGH pNHA | Heritage Officer 2008 | 1 | 17-Jul-2008 | Proposed NHA | 6 | H 794 261 | Proposed NHA 001666 | B |

**National Fen Survey of Ireland - Monaghan Fen Survey II 2008**

Results Appendix 1B. Sites surveyed in detail during the MFS in 2008 with fen types and total area confirmed following the survey.

| | | 559 | | Total Fen Area: | 0 | Total Fen Area: | 26.73 | |
|---|---|---|---|---|---|---|---|---|
| **Site Code** | **Site Name** | **Estimated total site area** | **Grid Reference** | **Predicted Fen type(s) present** | **Estimated Fen Area** | **Confirmed Fen type(s) after NFS** | **Fen Area after NFS** | **Ranking after Survey** |
| MFS-17 | AGHAFIN LOUGH | 8.6 | H 517 297 | Unknown | n/a | No fen on site | 0 | B |
| MFS-09 | AGHAFIN LOUGH LITTLE | 6.9 | H 523 293 | Unknown | n/a | No fen on site | 0 | C |
| MFS-10 | ANNAGOSE LOUGH | 27.9 | H 581 257 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-11 | ANNYALTY LOUGHS | 7.2 | H 619 341 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-12 | BISHOPS LOUGH | 9.5 | H 526 263 | Unknown | n/a | No fen on site | 0 | B |
| 001596 | BLACK LOUGH (BLACK & DERRYGOONY LOUGHS NHA) | 28.6 | H 696 116 | Unknown | n/a | Transition Mire | 2.74 | B |
| 001595 | BLACK LOUGH (LOUGHBAWN NHA) | 65.6 | H 708 103 | Unknown | n/a | No fen on site | 0 | B |
| MFS-13 | CARGAGHMORE FEN | 15.1 | H 736 078 | Unknown | n/a | Transition Mire / Poor Fen | 3.19 | B |
| MFS-14 | CARRICKASLANE LOUGH | 12.2 | H 803 242 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-27 | CARRICKMORE | 3.4 | H 538 295 | Unknown | n/a | Cladium Fen | 0.06 | B |
| MFS-15 | CLONKEEN LOUGH | 15.7 | H 500 240 | Unknown | n/a | Transition Mire | 0.29 | B |
| MFS-16 | CLONOONY LOUGH | 4.4 | H 447 217 | Unknown | n/a | No fen on site | | C |
| MFS-18 | CORLEA | 7.7 | H 772 022 | Unknown | n/a | Transition Mire / Poor Fen | 3.71 | B |
| MFS-19 | CORRAVOO LOUGH | 15.7 | H 654 183 | Unknown | n/a | No fen on site | 0 | C |
| MFS-20 | CORVAGHAN | 7.3 | H 457 241 | Unknown | n/a | No fen on site | 0 | C |
| MFS-21 | CREEVAGHY | 16.5 | H 525 280 | Unknown | n/a | No fen on site | 0 | C |
| MFS-23 | DRUMAVEALE LOUGH | 3.4 | H 473 196 | Unknown | n/a | No fen on site | 0 | B |
| MFS-24 | DRUMGANNY LOUGH | 10.8 | H 887 085 | Unknown | n/a | Transition Mire | 1.64 | B |
| MFS-25 | DRUMGOAST LOUGH | 4.3 | H 575 337 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-26 | DRUMHARRIF LOUGH | 3.3 | H 853 107 | Unknown | n/a | No fen on site | 0 | C |
| MFS-28 | FALTAGH | 12.3 | H 636 231 | Unknown | n/a | Transition Mire | 7.27 | B |
| 000001 | ISLAND BRIDGE (DROMORE LAKES NHA) | 10 | H 606 180 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-29 | KILLYBOLEY LOUGH | 7.9 | H 724 394 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-30 | LOUGH APHUCA | 6.8 | H 831 059 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-40 | LOUGH NAHINCH | 65.8 | H 784 265 | Unknown | n/a | Poor Fen | 1.68 | B |
| MFS-31 | LOUGH OONEY | 12.2 | H 558 296 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-32 | MOUNT MATTHEWS | 20.4 | H 940 084 | Unknown | n/a | Transition Mire | 5.59 | B |
| MFS-33 | MUCKNO MILL LOUGH | 36.8 | H 842 226 | Unknown | n/a | No fen on site | 0 | C+ |
| 002844 | RAHANS LOUGH pNHA | 34.9 | H 831 978 | Unknown | n/a | No fen on site | 0 | B |
| MFS-35 | RATHKEEVAN LOUGH | 1.7 | H 537 020 | Unknown | n/a | No fen on site | 0 | B |
| MFS-36 | ROOSKY LOUGH | 17.1 | H 571 267 | Unknown | n/a | No fen on site | 0 | B |
| MFS-37 | SHANTONAGH LOUGH | 45.8 | H 756 109 | Unknown | n/a | No fen on site | 0 | C+ |
| MFS-38 | SILLIS LOUGH | 7.3 | H 734 397 | Unknown | n/a | No fen on site | 0 | C+ |
| 001666 | TASSAN LOUGH pNHA | 6 | H 794 261 | Unknown | n/a | Transition Mire | 0.56 | B |

**National Fen Survey of Ireland - Monaghan Fen Survey II 2008**

Results Appendix 3: NFS Site Conservation Evaluation of sites surveyed during the MFS in 2008.

Rating value: High - 5; Medium - 3; Low - 1; None - 0 **Maximum possible score 75**

| Site Name/ Scoring System Applied | Site Code | Ranking | Total Site Score | Naturalness | Non-recreatability | Potential value | Typicality | Size | Diversity | Fen value | Rarity - Species | Rarity - Habitats | Viability | Recorded history | Educational value | Management needs | Intrinsic appeal | Expert opinion |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 = high disturbance; 5 = no or minimal disturbance | 0 = easy to re-create; 5 = difficult to re-create | 0 = no improvement possible/ close to its maximum potential; 5 = significant improvement possible/ site not at its maximum potential | 0 = habitat not representative; 5 = excellent example of habitat | 0 = Site too small to be viable; 5 = site size large and viable | 0 = poor habitat / species diversity; 5 = excellent habitat / species diversity | 0 = no fen habitats present; 5 = good quality fen habitats present | 0 = no species of note recorded; 5 = rare species of note confirmed on site | 0 = no habitats of note recorded; 5 = rare habitat of note confirmed on site | 0 = site unviable; 3 = viable but only with management measures; 5 = site viable | 0 = no previous research; 5 = extensive site information available | 0 = no educational value; 5 = highly suitable educational site | 0 = Site requires major management / restoration initiatives; 5 = site requires little or no change in current management regime | 0 = no scenic/landscape appeal; 5 = high scenic/landscape appeal | 0 = site has no value for conservation; 5 = site has high value for conservation |
| CLONKEEN LOUGH | MFS-15 | | 50 | 3 | 5 | 3 | 3 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 0 | 3 | 5 | 3 |
| FALTAGH | MFS-28 | | 48 | 3 | 5 | 1 | 5 | 5 | 3 | 3 | 3 | 3 | 5 | 1 | 0 | 3 | 3 | 5 |
| ROOSKY LOUGH | MFS-36 | | 47 | 5 | 5 | 1 | 3 | 5 | 3 | 0 | 1 | 3 | 5 | 3 | 0 | 3 | 5 | 5 |
| LOUGH NAHINCH | MFS-40 | | 47 | 5 | 5 | 3 | 3 | 5 | 3 | 3 | 1 | 3 | 5 | 0 | 0 | 3 | 5 | 3 |
| BLACK LOUGH (LOUGHBAWN NHA) | 001595 | | 42 | 3 | 5 | 1 | 3 | 5 | 3 | 0 | 1 | 1 | 5 | 3 | 3 | 3 | 3 | 3 |
| TASSAN LOUGH | 001666 | | 41 | 3 | 5 | 1 | 3 | 3 | 5 | 1 | 1 | 3 | 3 | 3 | 1 | 3 | 3 | 3 |
| CORLEA | MFS-18 | | 40 | 1 | 5 | 3 | 3 | 3 | 3 | 5 | 1 | 3 | 3 | 1 | 0 | 3 | 3 | 3 |
| DRUMGANNY LOUGH | MFS-24 | | 39 | 3 | 5 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 1 | 3 | 3 | 3 |
| BISHOPS LOUGH | MFS-12 | | 39 | 3 | 5 | 1 | 3 | 3 | 3 | 0 | 3 | 3 | 3 | 3 | 0 | 3 | 3 | 3 |
| DRUMAVEALE LOUGH | MFS-23 | | 39 | 3 | 5 | 3 | 3 | 3 | 3 | 0 | 1 | 1 | 5 | 3 | 0 | 3 | 3 | 3 |
| RAHANS LOUGH | 2844 | | 38 | 3 | 5 | 1 | 3 | 5 | 1 | 0 | 1 | 1 | 5 | 1 | 3 | 3 | 3 | 3 |
| MOUNT MATTHEWS | MFS-32 | | 38 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 0 | 3 | 1 | 3 |
| CARGAGHMORE FEN | MFS-13 | | 37 | 1 | 5 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 1 | 1 | 3 | 3 |
| BLACK LOUGH (BLACK AND DERRYGOONY LOUGHS NHA) | 001596 | | 36 | 3 | 5 | 3 | 3 | 5 | 3 | 1 | 1 | 1 | 3 | 3 | 0 | 1 | 1 | 3 |
| AGHAFIN LOUGH | MFS-17 | | 34 | 3 | 3 | 5 | 3 | 3 | 3 | 0 | 0 | 3 | 3 | 1 | 0 | 1 | 3 | 3 |
| RATHKEEVAN LOUGH | MFS-35 | | 34 | 3 | 3 | 1 | 3 | 3 | 1 | 0 | 0 | 3 | 5 | 3 | 0 | 3 | 3 | 3 |
| CARRICKMORE | MFS-27 | | 30 | 1 | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 1 | 0 | 1 | 1 | 3 |
| SHANTONAGH LOUGH | MFS-37 | | 29 | 3 | 5 | 1 | 1 | 5 | 1 | 0 | 1 | 1 | 5 | 1 | 0 | 3 | 1 | 1 |
| MUCKNO MILL LOUGH | MFS-33 | | 29 | 3 | 3 | 1 | 1 | 5 | 1 | 0 | 0 | 1 | 3 | 1 | 3 | 3 | 3 | 1 |
| DRUMGOAST LOUGH | MFS-25 | | 29 | 3 | 3 | 1 | 3 | 1 | 1 | 0 | 3 | 1 | 3 | 3 | 0 | 3 | 3 | 1 |
| LOUGH OONEY | MFS-31 | | 29 | 1 | 3 | 3 | 1 | 3 | 1 | 0 | 0 | 1 | 5 | 3 | 1 | 3 | 3 | 1 |
| ISLAND BRIDGE (DROMORE LAKES) | 000001 | | 28 | 1 | 3 | 3 | 1 | 3 | 1 | 0 | 3 | 1 | 3 | 1 | 1 | 3 | 1 | 3 |
| ANNAGOSE LOUGH | MFS-10 | | 28 | 3 | 5 | 1 | 1 | 5 | 1 | 0 | 0 | 1 | 3 | 3 | 0 | 3 | 1 | 1 |
| CARRICKASLANE LOUGH | MFS-14 | | 28 | 3 | 5 | 3 | 3 | 3 | 1 | 0 | 0 | 1 | 3 | 1 | 0 | 1 | 3 | 1 |
| LOUGH APHUCA | MFS-30 | | 28 | 1 | 3 | 3 | 3 | 3 | 3 | 0 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 3 |
| SILLIS LOUGH | MFS-38 | | 28 | 3 | 3 | 3 | 3 | 3 | 1 | 0 | 0 | 1 | 3 | 3 | 0 | 1 | 3 | 1 |
| KILLYBOLEY LOUGH | MFS-29 | | 27 | 1 | 3 | 1 | 3 | 3 | 1 | 0 | 0 | 1 | 3 | 1 | 3 | 3 | 3 | 1 |
| ANNYALTY LOUGHS | MFS-11 | | 27 | 3 | 3 | 3 | 1 | 3 | 0 | 0 | 0 | 1 | 3 | 3 | 0 | 3 | 3 | 1 |
| CLONOONY LOUGH | MFS-16 | | 19 | 1 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 3 | 1 | 1 | 1 | 1 |
| CORRAVOO LOUGH | MFS-19 | | 19 | 1 | 3 | 1 | 1 | 3 | 1 | 0 | 0 | 1 | 3 | 1 | 1 | 1 | 1 | 1 |
| AGHAFIN LOUGH LITTLE | MFS-09 | | 18 | 1 | 3 | 3 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 3 | 0 | 1 | 1 | 1 |
| CORVAGHAN | MFS-20 | | 18 | 0 | 5 | 5 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 |
| DRUMHARRIF LOUGH | MFS-26 | | 15 | 1 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 3 | 1 | 0 | 0 | 1 | 1 |
| CREEVAGHY | MFS-21 | | 12 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 3 | 1 | 0 | 1 | 0 | 1 |

**National Fen Survey of Ireland - Monaghan Fen Survey II 2008**

Results Appendix 4: Relevé Table of vegetation quadrats collected during the NFS of County Monaghan in 2008.

Domin cover values used: +: single individual – no measurable cover; 1: 1-2 individuals – no measurable cover; 2: several indiv
3: 1-5% cover; 4: 6-10% cover; 5: 11-25% cover; 6: 26-33% cover; 7: 34-50% cover; 8: 51-75% cover; 9: 76-90% cover; 1(

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Relevé Table No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | 16 |
| Size (meters squared) | 6 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | | 4 |
| Altitude (m) | 60 | 150 | 105 | 105 | 134 | 140 | 48 | 140 | 140 | 75 | 100 | 100 | 140 | 65 | 150 | | 48 |
| Slope (degrees) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Aspect | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | | na |
| Water Sample number | 19/20 | 11 | 15 | 16 | 13 | 14 | 17/18 | 5 | 6 | 1/2 | 9 | 10 | 7/8 | 3/4 | 12 | | na |
| Water table height | 0 | 0 | 0 | 0 | -25 | -10 | 0 | -10 | 10 | -5 | -20 | -30 | -30 | -20 | -5 | | 25 |
| Field pH | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | | na |
| Field Conductivity | 558 | 262 | 160 | 178 | 163 | 190 | 488 | 74 | 56 | na | 230 | 170 | 80 | na | 150 | | 378 |
| Substate type | P | P | P | P | P | P | P | P | P | P | P | P | P | P | P | | P |
| Substrate depth cm | >200 | >200 | 120 | >200 | >200 | >200 | >200 | 120 | >200 | 100 | >200 | >200 | >200 | >200 | >200 | | >200 |
| Substrate Stability | SQ | F | FM | FM | SQ | F | F | Q | Q | Q | SQ | SQ | SQ | Q | SQ | | F |
| Total cover % | 100 | 90 | 100 | 100 | 100 | 90 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | | 70 |
| Trees % | <5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Shrub % | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | | 0 |
| Herb/Grass/Sedge % | 90 | 60 | 100 | 100 | 90 | 85 | 90 | 95 | 90 | 100 | 100 | 90 | 70 | 85 | 70 | | 70 |
| Bryophytes % | 80 | 0 | 70 | <10 | 100 | 40 | 90 | 100 | 60 | 10 | 70 | 100 | 100 | 100 | 100 | | 0 |
| Litter % | <10 | <5 | 60 | <10 | 10 | <5 | 0 | 15 | 10 | 20 | 20 | 10 | 25 | <5 | <5 | | 0 |
| Bare Peat/Soil % | 0 | 0 | 0 | 0 | 0 | 10 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Algal % | 0 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Open Water % | 10 | 70 | 20 | <10 | 0 | 5 | 5 | 5 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | | 85 |
| Height Herb layer cm | 180 | 30 | 100 | 120 | 60 | 35 | 80 | 80 | 50 | 70 | 120 | 100 | 50 | 150 | 60 | | 100 |
| Habitat type | CF | TM | TM | TM | TM | TM | TM | TM | TM | TM | TM | TM | TM | TM | PF | | FS1 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Grid Reference | | 253944 329752 | 278254 326589 | 263528 323119 | 263637 323145 | 279459 326110 | 279466 326165 | 250469 324431 | 277393 302150 | 277350 302158 | 288667 308514 | 269851 311901 | 269809 311965 | 273698 307789 | 294369 308267 | 278360 326650 | | 252592 325984 |
| | Site name | | Carrickmore | Lough Nahinch | Faltagh | Faltagh | Tassan Lough | Tassan Lough | Clonkeen Lough | Corlea | Corlea | Drumganny Lough | Black Lough | Black Lough | Cargaghmore Fen | Mount Matthews | Lough Nahinch | | Bishops Lough |
| | Relevé Number | No. Occurrences | MFS-27 R1 | MFS2-40 R1 | MFS-28 R1 | MFS-28 R2 | 1666 - R1 | 1666 - R2 | MFS-15 R1 | MFS-18 R1 | MFS-18 R2 | MFS-24 R1 | 1596 R1 | 1596 R2 | MFS-13 R1 | MFS-32 R1 | MFS2-40 R2 | | MFS-12 R1 |
| | Spp. per relevé | | 29 | 18 | 20 | 17 | 13 | 14 | 20 | 19 | 25 | 24 | 25 | 21 | 18 | 24 | 21 | | 14 |
| Code Number | Species full name | | | | | | | | | | | | | | | | | | |
| | Alkaline Fen - Caricetalia davallianae | | | | | | | | | | | | | | | | | | |
| 43 | Cladium mariscus | 1 | 8 | | | | | | | | | | | | | | | | |
| 31 | Carex paniculata | 1 | 5 | | | | | | | | | | | | | | | | |
| 120 | Pedicularis palustris | 1 | | 3 | | | | | | | | | | | | | | | |
| 35 | Carex viridula ssp. oedocarpa | 1 | | 2 | | | | | | | | | | | | | | | |
| 30 | Carex panicea | 1 | | 2 | | | | | | | | | | | | | | | |
| 122 | Phragmites australis | 5 | | | | | 3 | 2 | 2 | | | | | | | 6 | | | 5 |
| | | | | | | | | | | | | | | | | | | | |
| | Transition Mire - Caricetalia davallianae | | | | | | | | | | | | | | | | | | |
| 21 | Carex diandra | 7 | | | 5 | 8 | | | 4 | 8 | 2 | 7 | | | | 4 | | | |
| 73 | Filipendula ulmaria | 3 | | | | | | | | | | | 7 | 6 | | 4 | | | |
| 238 | Plagiomnium rostratum | 2 | 6 | | | | | | | | | | 3 | | | | | | |
| 146 | Rumex acetosa | 3 | 3 | | | | | | | | | | | 3 | | | 2 | | |
| 81 | Holcus lanatus | 10 | 3 | | 4 | 2 | | | | | 2 | 3 | 4 | 4 | 2 | 3 | 4 | | |
| 99 | Lychnis flos-cuculi | 1 | 3 | | | | | | | | | | | | | | | | |
| 184 | Calliergon giganteum | 2 | | | | | | | | | 6 | 3 | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | Transition Mire - Caricetalia nigrae | | | | | | | | | | | | | | | | | | |
| 20 | Carex curta | 6 | | | | | 6 | 5 | | 3 | 4 | 2 | | | 5 | | | | |
| 185 | Calliergon stramineum | 6 | | | | | 7 | 5 | 5 | 4 | | | 4 | | | | 4 | | |
| 141 | Ranunculus flammula | 3 | | | | | | 4 | | 3 | 2 | | | | | | | | |

| | Relevé Number | No. Occurrences | MFS-27 R1 | MFS2-40 R1 | MFS-28 R1 | MFS-28 R2 | 1666 - R1 | 1666 - R2 | MFS-15 R1 | MFS-18 R1 | MFS-18 R2 | MFS-24 R1 | 1596 R1 | 1596 R2 | MFS-13 R1 | MFS-32 R1 | MFS2-40 R2 | | MFS-12 R1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 177 | Veronica scutellata | 2 | | | | | | | 2 | | | 2 | | | | | | | |
| 92 | Lemna minor | 3 | 2 | | 3 | 6 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | Transition Mire - General Species | | | | | | | | | | | | | | | | | | |
| 186 | Calliergonella cuspidata | 12 | 7 | | 8 | 3 | 8 | 5 | 8 | 10 | 5 | 3 | 5 | | 8 | 4 | | | |
| 82 | Hydrocotyle vulgaris | 12 | 3 | 3 | 4 | | | 2 | 5 | 5 | 3 | 3 | | | 3 | 4 | 5 | | 3 |
| 74 | Galium palustre | 14 | 2 | | 3 | 4 | 4 | 3 | 2 | 5 | 3 | 3 | | 2 | 3 | 3 | 2 | | + |
| 2 | Agrostis stolonifera | 14 | 3 | | | 1 | 5 | 4 | 4 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | | 3 |
| 33 | Carex rostrata | 14 | | 2 | 4 | 6 | 3 | | 3 | 6 | 5 | 4 | 2 | 2 | 5 | 3 | 3 | | 6 |
| 167 | Typha latifolia | 7 | 1 | | 3 | | | | | 1 | + | | 3 | 3 | | | | | 4 |
| 103 | Mentha aquatica | 5 | 2 | | | 2 | | | 4 | | | 3 | | | | | | | 3 |
| 18 | Caltha palustris | 3 | 3 | | | | | | 3 | | | | | | | 1 | | | |
| 150 | Salix cinerea ssp oleifolia | 7 | 2 | | | | 1 | 1 | | 1 | 2 | | | | + | 6 | | | |
| 58 | Epilobium obscurum | 11 | 2 | | 3 | | | | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | | |
| | | | | | | | | | | | | | | | | | | | |
| | Poor Fen - Caricetalia nigrae to Scheuchzerietalia | | | | | | | | | | | | | | | | | | |
| 221 | Sphagnum fallax | 1 | | | | | | | | | | | | | | | 9 | | |
| 105 | Molinia caerulea | 2 | | 3 | | | | | | | | | | | | | 2 | | |
| 8 | Anthoxanthum odoratum | 6 | | | | | | | | | 2 | | 4 | 4 | 3 | 3 | 4 | | |
| 24 | Carex echinata | 1 | | 4 | | | | | | | | | | | | | | | |
| 49 | Drosera rotundifolia | 2 | | | | | | | | | | | | | | 2 | 3 | | |
| 181 | Aulacomnium palustre | 3 | | | | | | | | | | | | | 3 | 10 | 6 | | |
| 98 | Luzula multiflora | 1 | | | | | | | | | | | | | | | 2 | | |
| 149 | Salix aurita | 1 | | | | | | | | | | | | | | | 1 | | |
| 163 | Succisa pratensis | 5 | 3 | | | | | | | | | 1 | | | 3 | 8 | 4 | | |
| | | | | | | | | | | | | | | | | | | | |
| | Marsh Species | | | | | | | | | | | | | | | | | | |
| 247 | Carex acutiformis | 1 | | | | | | | | | | | | | | | | | 5 |
| 93 | Lemna trisulca | 1 | | | | | | | | | | | | | | | | | 4 |
| 135 | Potamogeton obtusifolius | 1 | | | | | | | | | | | | | | | | | 2 |
| | | | | | | | | | | | | | | | | | | | |
| | Companion Species | | | | | | | | | | | | | | | | | | |
| 62 | Equisetum fluviatile | 15 | 2 | 3 | 5 | 5 | 6 | 3 | 6 | 5 | 4 | 3 | 5 | 5 | 4 | 4 | 4 | | |
| 140 | Potentilla palustris | 15 | 4 | 2 | 6 | 4 | 8 | 3 | 3 | 6 | 3 | 5 | 5 | 5 | 5 | 7 | 5 | | |
| 104 | Menyanthes trifoliata | 14 | 7 | 5 | 7 | 7 | 6 | 3 | 5 | 7 | 6 | 8 | 7 | 4 | 7 | 8 | | | |
| 88 | Juncus articulatus | 8 | 2 | | 6 | 3 | | 4 | 4 | 3 | 3 | 4 | | | | | | | |
| 7 | Angelica sylvestris | 7 | 4 | | | | | | | | 2 | | 1 | 2 | | 3 | 1 | | + |
| 19 | Cardamine pratensis | 7 | 2 | | 3 | | 1 | | 3 | | 2 | 2 | | | | 2 | | | |
| 29 | Carex nigra | 6 | | 3 | 3 | | | 8 | 3 | | | 7 | 2 | | | | | | |
| 66 | Eriophorum angustifolium | 6 | | 4 | 3 | | | | | | 5 | 3 | | | 5 | | 3 | | |
| 45 | Dactylorhiza maculata | 5 | 3 | | | | | | | | | + | 3 | | | 2 | 2 | | |
| 106 | Myosotis laxa | 5 | 1 | | | 1 | | | + | 3 | | + | | | | | | | |
| 40 | Cicuta virosa | 4 | | | 4 | 5 | | | | | 3 | | | | | | | | 3 |
| 213 | Rhytidiadelphus squarrosus | 4 | | | | | | | | 3 | | | 5 | 9 | 6 | | | | |
| 90 | Juncus effusus | 3 | | | | 3 | 1 | | | | | | | | 2 | | | | |
| 137 | Potamogeton polygonifolius | 3 | | 3 | | | | | | | 3 | 3 | | | | | | | |
| 142 | Ranunculus lingua | 3 | | | | 5 | | | 3 | | | | | | | | | | 5 |
| 4 | Alnus glutinosa | 2 | 3 | | | | | | | | | | | | | | | | + |
| 54 | Eleocharis palustris | 2 | | | 4 | 5 | | | | | | | | | | | | | |
| 80 | Hippuris vulgaris | 2 | | | 2 | | | | | | | | | 4 | | | | | |
| 96 | Lotus uliginosus | 2 | | | | | | | | | | | | 2 | | 5 | | | |
| 178 | Vicia cracca | 2 | | | | | | | | | | | 2 | 2 | | | | | |
| 262 | Pleurozium schreberi | 2 | | | | | | | | | | | | 7 | | 3 | | | |
| 1 | Agrostis canina | 1 | | | | | | | | | | | | 2 | | | | | |
| 246 | Arrhenatherum elatius | 1 | | | | | | | | | | | 2 | | | | | | |
| 23 | Carex disticha | 1 | 3 | | | | | | | | | | | | | | | | |
| 39 | Chara spp | 1 | | 5 | | | | | | | | | | | | | | | |
| 53 | Eleocharis multicaulis | 1 | | 5 | | | | | | | | | | | | | | | |
| 57 | Epilobium hirsutum | 1 | 3 | | | | | | | | | | | | | | | | |
| 83 | Hypericum elodes | 1 | | | | | | | | | 7 | | | | | | | | |
| 87 | Juncus acutiflorus | 1 | | 2 | | | | | | | | | | | | | | | |
| 89 | Juncus bulbosus | 1 | | 2 | | | | | | | | | | | | | | | |
| 248 | Lathyrus montanus | 1 | | | | | | | | | | | 3 | | | | | | |
| 100 | Lycopus europaeus | 1 | | | | | | | | | | 1 | | | | | | | |
| 125 | Poa pratensis | 1 | | | | | | | | | | | 3 | | | | | | |
| 234 | Rhinanthus minor | 1 | | | | | | | | | | | 4 | | | | | | |
| 155 | Schoenoplectus lacustris | 1 | 2 | | | | | | | | | | | | | | | | |
| 160 | Stellaria graminea | 1 | | | | | | | | | | | 3 | | | | | | |
| 162 | Stellaria uliginosa | 1 | | | | | | | | | | | 3 | | | | | | |
| 269 | Trifolium repens | 1 | | | | | | | | | | | 3 | | | | | | |
| 171 | Utricularia vulgaris | 1 | | | | | | | | | 2 | | | | | | | | |

| | Relevé Number | No. Occurrences | MFS-27 R1 | MFS2-40 R1 | MFS-28 R1 | MFS-28 R2 | 1666 - R1 | 1666 - R2 | MFS-15 R1 | MFS-18 R1 | MFS-18 R2 | MFS-24 R1 | 1596 R1 | 1596 R2 | MFS-13 R1 | MFS-32 R1 | MFS2-40 R2 | | MFS-12 R1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 182 | Brachythecium rivulare | 1 | | | | | | | | 3 | | | | | | | | | |
| 199 | Eurhynchium praelongum | 1 | 5 | | | | | | | | | | | | | | | | |
| 203 | Hylocomium splendens | 1 | | | | | | | | | | | | 3 | | | | | |
| 233 | Algae | 1 | | 7 | | | | | | | | | | | | | | | |
| 257 | Marchantia polymorpha | 1 | | | 3 | | | | | | | | | | | | | | |
| 270 | Carex ovalis | 1 | | | | | | | | | | | | 2 | | | | | |

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Water Samle Record Sheet - MFS2

| Sample Number | Site Code | Site Name | Date Sampled |
|---|---|---|---|
| 1 | MFS-24/1 | Drumganny Lough | 23-Jul-08 |
| 2 | MFS-24/2 | Drumganny Lough | 23-Jul-08 |
| 3 | MFS-32/1 | Mount Matthews | 23-Jul-08 |
| 4 | MFS-32/2 | Mount Matthews | 23-Jul-08 |
| 5 | MFS-18/1 | Corlea | 23-Jul-08 |
| 6 | MFS-18/2 | Corlea | 23-Jul-08 |
| 7 | MFS-13/1 | Cargaghmore fen | 23-Jul-08 |
| 8 | MFS-13/2 | Cargaghmore fen | 23-Jul-08 |
| 9 | 1596/1 | Black Lough (Black and Derrygoony Loughs NHA) | 23-Jul-08 |
| 10 | 1596/2 | Black Lough (Black and Derrygoony Loughs NHA) | 23-Jul-08 |
| 11 | MFS-40/1 | Lough Nahinch | 23-Jul-08 |
| 12 | MFS-40/2 | Lough Nahinch | 23-Jul-08 |
| 13 | 1666/1 | Tassan Lough NHA | 23-Jul-08 |
| 14 | 1666/2 | Tassan Lough NHA | 23-Jul-08 |
| 15 | MFS-28/1 | Faltagh | 23-Jul-08 |
| 16 | MFS-28/2 | Faltagh | 23-Jul-08 |
| 17 | MFS-15/1 | Clonkeen Lough | 23-Jul-08 |
| 18 | MFS-15/2 | Clonkeen Lough | 23-Jul-08 |
| 19 | MFS-27/1 | Carrickmore | 23-Jul-08 |
| 20 | MFS-27/2 | Carrickmore | 23-Jul-08 |

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Appendix 5b. Hydrochemistry data from water samples taken on sites during the Monaghan Fen Survey 2008.

| Sample Number | Site Code | Site Name | Releve Code Number | Species Rich ness | Water Table Depth (cm) | Peat Depth (cm) | Fen Type | Conductivity @25°C | pH | Ammonia | ortho-Phosphate (as P) | Total Oxidised Nitrogen (as N) | Total Phosphorus | Alkalinity-total (as CaCO3) | Sulphate | Sodium | Magnesium | Potassium | Calcium | Iron | Manganese | Copper | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | µS/cm | pH | mg/l N | mg/l P | mg/l N | mg/l P | mg/l CaCO3 | mg/l SO4 | mg/l | mg/l | mg/l | mg/l | µg/l | µg/l | µg/l | µg/l |
| 1 | MFS-24/1 | Drumganny Lough | MFS-24 R1 | 24 | -5 | 100 | TM | 295 | 7.2 | 0.04 | <0.02 | <0.05 | 0.04 | 111 | 2.4 | 12.84 | 4.72 | 2.05 | 36.4 | 628.4 | 190.0 | <1 | 50.3 |
| 2 | MFS-24/2 | Drumganny Lough | MFS-24 R1 | 24 | -5 | 100 | TM | 295 | 7.2 | 0.04 | <0.02 | <0.05 | 0.03 | 106 | 2.2 | 12.48 | 4.50 | 1.50 | 36.1 | 684.0 | 258.5 | <1 | 47.8 |
| 3 | MFS-32/1 | Mount Matthews | MFS-32 R1 | 24 | -20 | >200 | TM | 245 | 6.4 | 0.36 | 0.19 | <0.05 | 1.19 | 98 | <2.0 | 11.50 | 3.78 | 2.71 | 31.6 | 308.5 | 474.0 | 6.4 | 318.7 |
| 4 | MFS-32/2 | Mount Matthews | MFS-32 R1 | 24 | -20 | >200 | TM | 245 | 6.4 | 0.47 | 0.17 | <0.05 | 1.09 | 102 | <2.0 | 12.03 | 3.92 | 3.10 | 43.8 | 287.2 | 469.3 | 240.0 | 787.2 |
| 5 | MFS-18/1 | Corlea | MFS-18 R1 | 19 | -10 | 120 | TM | 61 | 5.0 | 0.04 | 0.03 | <0.05 | 0.26 | <12 | <2.0 | 6.27 | <1 | <1 | 6.2 | 298.7 | 70.4 | 2.0 | 265.9 |
| 6 | MFS-18/2 | Corlea | MFS-18 R2 | 25 | 10 | >200 | TM | 66 | 5.4 | 0.04 | 0.02 | <0.05 | 0.37 | <12 | <2.0 | 8.64 | <1 | <1 | <5.00 | 305.8 | 94.1 | 2.0 | 227.7 |
| 7 | MFS-13/1 | Cargaghmore fen | MFS-13 R1 | 18 | -30 | >200 | TM | 80 | 5.5 | 0.15 | 0.03 | <0.05 | 0.36 | 16 | 7.8 | 8.56 | 1.26 | 1.52 | 5.3 | 181.7 | 217.2 | 2.1 | 250.5 |
| 8 | MFS-13/2 | Cargaghmore fen | MFS-13 R1 | 18 | -30 | >200 | TM | 129 | 5.7 | 1.03 | 0.28 | <0.05 | 1.24 | 34 | 3.8 | 15.82 | 1.34 | 2.52 | 8.5 | 457.3 | 92.6 | 32.4 | 454.8 |
| 9 | 1596/1 | Black Lough (Black and Derrygoony Loughs NHA) | 1596 R1 | 25 | -20 | >200 | TM | 199 | 6.0 | 0.06 | 0.16 | <0.05 | 0.84 | 43 | 2.2 | 14.90 | 1.78 | 2.00 | 17.2 | 4123.5 | 1236.8 | 27.3 | 407.9 |
| 10 | 1596/2 | Black Lough (Black and Derrygoony Loughs NHA) | 1596 R2 | 21 | -30 | >200 | TM | 196 | 5.7 | 0.28 | 0.06 | <0.05 | 0.59 | <12 | 14.2 | 20.54 | 1.63 | 1.19 | 8.4 | 242.3 | 483.3 | 6.7 | 242.6 |
| 11 | MFS-40/1 | Lough Nahinch | MFS2-40 R1 | 18 | 0 | >200 | TM | 216 | 5.9 | 0.06 | <0.02 | <0.05 | 1.18 | 23 | 11.9 | 19.07 | 2.58 | 13.75 | 7.3 | 477.6 | 607.5 | 7.1 | 407.4 |
| 12 | MFS-40/2 | Lough Nahinch | MFS2-40 R2 | 21 | -5 | >200 | PF | 255 | 6.5 | 0.04 | <0.02 | <0.05 | 0.10 | 71 | 11.0 | 15.70 | 3.76 | 13.42 | 16.5 | 116.8 | 536.9 | <1 | 121.3 |
| 13 | 1666/1 | Tassan Lough NHA | 1666 - R1 | 13 | -25 | >200 | TM | 203 | 7.2 | 0.04 | <0.02 | 0.18 | 0.11 | 51 | 15.1 | 8.97 | 3.27 | 5.19 | 22.8 | <50 | <1 | <1 | 22.8 |
| 14 | 1666/2 | Tassan Lough NHA | 1666 - R2 | 14 | -10 | >200 | TM | 204 | 7.1 | 0.05 | <0.02 | <0.05 | 0.14 | 48 | 16.9 | 9.51 | 3.46 | 5.94 | 20.1 | 251.5 | 77.2 | <1 | 45.7 |
| 15 | MFS-28/1 | Faltagh | MFS-28 R1 | 20 | 0 | 120 | TM | 185 | 6.3 | 0.16 | 0.10 | <0.05 | 0.46 | 62 | 5.7 | 9.93 | 2.94 | 1.62 | 19.9 | 1923.4 | 521.6 | 10.3 | 312.4 |
| 16 | MFS-28/2 | Faltagh | MFS-28 R2 | 17 | 0 | >200 | TM | 173 | 6.3 | 0.41 | 0.07 | <0.05 | 1.54 | 46 | 6.8 | 10.24 | 2.13 | 2.01 | 17.6 | 1475.6 | 216.7 | 6.0 | 301.7 |
| 17 | MFS-15/1 | Clonkeen Lough | MFS-15 R1 | 20 | 0 | >200 | TM | 370 | 7.9 | 0.08 | <0.02 | <0.05 | 0.04 | 168 | 9.4 | 8.90 | 2.78 | 1.77 | 53.6 | 66.5 | 18.7 | <1 | 73.2 |
| 18 | MFS-15/2 | Clonkeen Lough | MFS-15 R1 | 20 | 0 | >200 | TM | 367 | 8.3 | 0.04 | <0.02 | <0.05 | 0.04 | 168 | 9.7 | 7.61 | 2.99 | 1.95 | 58.8 | 59.9 | 20.3 | <1 | 50.1 |
| 19 | MFS-27/1 | Carrickmore | MFS-27 R1 | 29 | 0 | >200 | CF | 546 | 7.4 | 0.03 | <0.02 | <0.05 | 0.03 | 276 | 3.0 | 7.38 | 3.67 | <1 | 103.1 | 164.1 | 33.6 | <1 | 47.7 |
| 20 | MFS-27/2 | Carrickmore | MFS-27 R1 | 29 | 0 | >200 | CF | 526 | 7.1 | 0.04 | 0.02 | <0.05 | 0.09 | 258 | 3.3 | 9.45 | 3.92 | 2.70 | 92.5 | 164.3 | 33.8 | 2.2 | 114.8 |
| **MINIMUM VALUE** | | | | **13** | **-30** | **100** | | **61** | **5.0** | **0.03** | **<0.02** | **<0.05** | **0.03** | **<12** | **<2** | **6.27** | **<1** | **<1** | **<5** | **<50** | **<1** | **<1** | **22.8** |
| **MAXIMUM VALUE** | | | | **29** | **10** | **>200** | | **546** | **8.3** | **1.03** | **0.28** | **0.18** | **1.54** | **276** | **16.9** | **20.54** | **4.72** | **13.75** | **103.1** | **4123.5** | **1236.8** | **240.0** | **787.2** |
| **MEDIAN** | | | | **20.5** | **-5** | **NA** | | **210** | **6.4** | **0.06** | **0.02** | **0.05** | **0.3** | **57** | **4.8** | **10.09** | **2.97** | **2** | **20.0** | **293.0** | **203.4** | **2.1** | **235.2** |
| **AVERAGE** | | | | **21** | **-10** | **NA** | | **243** | **6.5** | **0.17** | **0.07** | **0.06** | **0.49** | **86** | **6.7** | **11.52** | **2.82** | **3.40** | **30.5** | **613.4** | **282.7** | **17.6** | **227.5** |
| **STANDARD DEVIATION** | | | | **4** | **12** | **NA** | | **132** | **0.9** | **0.24** | **0.08** | **0.03** | **0.50** | **78** | **5.0** | **3.92** | **1.18** | **3.71** | **28.0** | **952.8** | **305.0** | **53.1** | **192.4** |

***Note: In cases where measured values were below the detection limits calculations were based on the detection limit. The average values presented above are likley to be higher than the true average values.**

# Appendix 6: Habitat areas mapped on the sites surveyed during the Monaghan Fen Survey 2008

Site code and site name with calculation of total site survey area (ha), for sites examined during the Monaghan Fen Survey 2008.

Abbreviated habitat codes are those used in Fossitt, J., 2000, A Guide to Habitats in Ireland, The Heritage Council, Ireland.

Area figures presented are hectares, while the length of linear habitats (FW1; FW2; FW4) is given in kilometres.

Habitat abbreviations and Fossitt (2000) title:

PF1 – Rich fen and flush (two subtypes PF1 Alkaline fen and PF1 Cladium fen were distinguished during the current survey and the mapping exercise)
PF2 – Poor fen and flush
PF3 – Transition mire and quaking bog

FS1 – Reed and large sedge swamp
FS2 – Tall herb swamps
PB4 – Cutover bog
PB4/WS1 – mosaic Cutover bog/Scrub
FL - Freshwater
FL1 – Dystrophic lakes
FL2 – Acid oligotrophic lakes
FL3 – Limestone/marl lakes
FL4 – Mesotrophic lakes
FL6 - Turlough
GA1 – Improved agricultural grassland
GA2 – Amenity grassland (improved)
GS3 - Dry-humid acid grassland
GS4 – Wet grassland
GM1 – Freshwater marsh
HH1 – Dry siliceous heath
WN2 – Oak-ash-hazel woodland
WS1 - Scrub
WD1 – (Mixed) broadleaved woodland
WD4 – Conifer plantation
WN6 – Wet willow – alder – ash woodland
WN7 – Bog woodland
ED2 – Spoil and bare ground
ED3 – Recolonising bare ground
FW1 – Eroding/upland rivers
FW2 – Depositing lowland rivers
FW3 – Canals
FW4 – Drainage ditches
WL1 – Hedgerows
WL2 – Treelines

This appendix is available as Excel file on the CD ROM accompanying this report.

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Appendix 6a. Site and habitat areas mapped on the sites surveyed during the Monaghan Fen Survey 2008.

Note: Area is given in hectares (ha) except in the case of linear habitats such as WL1, FW etc. where data is length in kilometers (km).

| Site Name/Habitat Type | ED2 | ED3 | FL1 | FL4 | FS1 | FS2 | GA1 | GM1 | GS3 | GS4 | HH1 | PB4 | PB4 / WS1 | PF1 | PF2 | PF3 | WD1 | WD4 | WN2 | WN6 | WS1 | Total Site Area (ha) | FW1 (km) | FW2 (km) | FW3 (km) | FW4 (km) | WL1 (km) | WL2 (km) | Total Site Length (km) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aghafin Lough | | | | 1.29 | 0.68 | | | | | 0.18 | | 2.75 | | | | | | | | 3.71 | | 8.61 | | | | | | | 0.00 |
| Annagose Lough | | | | 16.93 | | | 6.98 | 2.28 | | 1.68 | | | | | | | | | | | | 27.87 | 0.40 | | | | 0.17 | | 0.57 |
| Annyalty Loughs | | | | 2.46 | 0.91 | | 1.28 | | | 1.95 | | | | | | | | | | 0.60 | | 7.20 | | | | | | | 0.00 |
| Bishops Lough | | | | 1.95 | 3.60 | | | | | 2.32 | | | | | | | | | | 1.12 | 0.42 | 9.41 | | | 0.32 | | | | 0.32 |
| Black Lough | 0.07 | | | 40.61 | 6.53 | | 2.54 | | | | | | | | | 2.74 | 33.61 | 2.25 | | 5.92 | | 94.27 | 0.12 | 0.30 | | | | | 0.43 |
| Cargaghmore Fen | 0.23 | | | | | | 2.71 | | | 8.18 | | 0.75 | | | | 3.19 | | | | | | 15.06 | | | | | 0.29 | | 0.29 |
| Carrickaslane Lough | | | | 2.95 | 3.86 | | | | | 4.00 | | | | | | | | | | 1.08 | 0.14 | 12.03 | 0.07 | | | 0.64 | | | 0.71 |
| Carrickmore | | | 0.07 | | | | | 1.00 | | 1.35 | | | | 0.06 | | | | | | 0.90 | | 3.38 | | | | | | | 0.00 |
| Clonkeen Lough | | | | 7.69 | 0.56 | | 0.46 | | 1.63 | 4.13 | | | | | | 0.29 | | | 0.78 | | | 15.55 | | | | | 0.66 | | 0.66 |
| Corlea | | | | | | | | | | 3.33 | | | | | | 3.71 | | | | 0.46 | | 7.50 | | | | | | | 0.00 |
| Drumaveale Lough | | | | 1.02 | 0.58 | | | | | 1.82 | | | | | | | | | | | | 3.41 | | | | | | | 0.00 |
| Drumganny Lough | 0.12 | | | 2.38 | 1.46 | | 1.71 | | | 3.33 | | | | | | 1.64 | | | | 0.14 | | 10.78 | | | | | | | 0.00 |
| Drumgoast Lough | | | | 1.38 | 0.49 | | | 0.06 | | 2.11 | | | | | | | | | | 0.34 | | 4.38 | | | | 0.24 | | | 0.24 |
| Faltagh | 0.15 | | 0.13 | | | | 3.26 | | | 1.69 | | | | | | 7.27 | | | | | | 12.49 | | | | | 0.27 | | 0.27 |
| Island Bridge | | | | 0.62 | 1.33 | | | | | 0.52 | | | | | | | | | | 7.57 | | 10.04 | | 0.24 | | | | | 0.24 |
| Killyboley Lough | | | | 3.89 | 0.58 | | | | | 2.41 | | | | | | | | | | 1.00 | | 7.87 | | | | 0.26 | | | 0.26 |
| Lough Aphuca | | | | 0.74 | 1.36 | | | 2.05 | | 1.57 | | | | | | | | | | 1.08 | | 6.79 | | | | 0.42 | | | 0.42 |
| Lough Nahinch | 0.83 | 0.59 | | 2.02 | | | 2.24 | | | 0.43 | | | 57.91 | | 1.68 | | 1.73 | | | | | 67.43 | | | | 0.18 | | | 0.18 |
| Lough Ooney | | | | 7.70 | 0.89 | | 0.38 | | | 0.30 | | | | | | | | | | 2.83 | | 12.09 | | | | | | 0.40 | 0.40 |
| Mount Matthews | | | | | 2.09 | | 7.70 | | | 0.86 | | | | | | 5.59 | | | | 4.13 | | 20.37 | | | | | 0.41 | | 0.41 |
| Muckno Mill Lough | | | | 14.81 | 13.12 | | 5.38 | | | 2.56 | | | | | | | | | | 0.84 | | 36.72 | 0.08 | | | 0.60 | | | 0.68 |
| Rahans Lough | | | | 16.10 | 4.69 | | | | | 3.39 | | | | | | | | | | 5.70 | 5.03 | 34.90 | | | | | | | 0.00 |
| Rathkeevan Lough | | | | 0.73 | | 0.36 | | | | 0.44 | | | | | | | | | | 0.19 | | 1.72 | | | | | | | 0.00 |
| Roosky Lough | | | | 3.14 | | 5.32 | 8.66 | | | | | | | | | | | | | | | 17.12 | | | | | 0.33 | | 0.33 |
| Shantonagh Lough | | | | 27.64 | 0.79 | | 7.01 | | | 8.00 | | | | | | | | | | 2.35 | | 45.80 | 0.24 | | | | 0.48 | | 0.72 |
| Sillis Lough | | | | 2.27 | 0.63 | 0.53 | 1.92 | | | 0.54 | | | | | | | | | | 1.45 | | 7.34 | 0.22 | | | | | | 0.22 |
| Tassan Lough | 0.13 | | 0.02 | 1.03 | 1.37 | | | | 0.83 | 1.13 | 0.60 | | | | | 0.56 | | | | | 0.32 | 5.99 | | | | | 0.10 | | 0.10 |
| Total (Habitat Area) | 1.54 | 0.59 | 0.21 | 159.37 | 45.51 | 6.20 | 52.24 | 5.39 | 2.45 | 58.22 | 0.60 | 3.50 | 57.91 | 0.06 | 1.68 | 24.97 | 35.34 | 2.25 | 0.78 | 41.40 | 5.90 | 506.14 | 1.13 | 0.55 | 0.32 | 2.34 | 2.70 | 0.40 | 7.44 |

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Appendix 6b. Summary habitat data mapped on the sites surveyed during the Monaghan Fen Survey 2008.

| HABITAT | FOSSITT CODE | AREA ($m^2$) | AREA (ha) | | HABITAT | FOSSITT CODE | LENGTH ($m^2$) | LENGTH (km) |
|---|---|---|---|---|---|---|---|---|
| *Cladium* fen | PF1 | 590 | 0.06 | | Eroding/upland rivers | FW1 | 1135 | 1.13 |
| Poor fen and flush | PF2 | 16771 | 1.68 | | Depositing/lowland rivers | FW2 | 547 | 0.55 |
| Transition mire and quaking bog | PF3 | 249733 | 24.97 | | Canals | FW3 | 319 | 0.32 |
| Spoil and bare ground | ED2 | 15403 | 1.54 | | Drainage ditches | FW4 | 2336 | 2.34 |
| Recolonising bare ground | ED3 | 5923 | 0.59 | | Hedgerows | WL1 | 2701 | 2.70 |
| Dystrophic lakes | FL1 | 2146 | 0.21 | | Treelines | WL2 | 399 | 0.40 |
| Mesotrophic lake | FL4 | 1593720 | 159.37 | | | | | |
| Reed and large sedge swamps | FS1 | 455128 | 45.51 | | | | | |
| Tall herb swamps | FS2 | 62039 | 6.20 | | | | | |
| Improved agricultural grassland | GA1 | 522393 | 52.24 | | | | | |
| Freshwater marsh | GM1 | 53860 | 5.39 | | | | | |
| Dry-humid acid grassland | GS3 | 24517 | 2.45 | | | | | |
| Wet grassland | GS4 | 582212 | 58.22 | | | | | |
| Dry siliceous heath | HH1 | 6028 | 0.60 | | | | | |
| Cutover bog | PB4 | 35032 | 3.50 | | | | | |
| Mosaic of cutover bog and scrub | PB4 / WS1 | 579104 | 57.91 | | | | | |
| WD1 (Mixed) broadleaved woodland | WD1 | 353390 | 35.34 | | | | | |
| Conifer plantation | WD4 | 22512 | 2.25 | | | | | |
| Oak-ash-hazel woodland | WN2 | 7812 | 0.78 | | | | | |
| Wet willow / alder / ash woodland | WN6 | 414009 | 41.40 | | | | | |
| Scrub | WS1 | 59045 | 5.90 | | | | | |

# 8. Monaghan Fen Survey II 2008 CD ROM

## Contents

## Volume I:

Monaghan Fen Survey 2008 Main Report by P. Foss & P. Crushell (In PDF format, requires Adobe Acrobat to view) Size: 8.2 mb; 45 pages

2. NFS Monaghan Fen Survey Database Version 2.1 (Requires Filemaker Pro 8.0v2)
Subset of sites surveyed in County Monaghan in 2007 & 2008 exported from the NPWS Fen Survey Database Version 2.0 used to calculate report results and produce site lists and site reports. Size: 6.8 mb

3. Selected Excel tables to accompany the Monaghan Fen Survey II Report including appendices; Size: 1 mb

1. List of Fens in County Monaghan Surveyed in detail on the MFS II

3. Conservation Evaluation of Sites Surveyed on the MFS II

4. Phytosociological Relevé Table from samples taken during the MFS II

5. Hydrochemistry Data for Water samples taken during the MFS II

6. Habitat areas mapped on sites surveyed during the MFS II

4. GIS Shape files from the Monaghan Fen Survey 2008
(Requires ArcView 8.1 GIS Software, total of 2.7 mb size for all files)

## Volume II:

Monaghan Fen Survey 2008 Site Survey Reports and Maps – Appendix 2 (In PDF format, requires Adobe Acrobat to view) Size: 60 mb; 230 pages.
Includes: Monaghan Fen Survey 2008 Individual Site Reports, containing:
Site Survey Report; Six Inch Site map, Boundary data and location of Field Survey Notes; Site Air Photograph; Site Habitat Map. (In PDF format, requires Adobe Acrobat to view)

## Volume III:

Monaghan Fen Survey 2008 Site Photographic Record and Notes (In PDF format, requires Adobe Acrobat to view) Size: 87 mb; 93 pages